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TABLE OF CONTENTS

Licensing

Chapter 1: Fundamentals

- 1.1: Introduction to Western Musical Notation
- 1.2: Notation of Notes, Clefs, and Ledger Lines
- 1.3: Reading Clefs
- 1.4: The Keyboard and the Grand Staff
- 1.5: Half Steps, Whole Steps, and Accidentals
- 1.6: American Standard Pitch Notation (ASPN)
- 1.7: Other Aspects of Notation
- 1.8: Notating Rhythm
- 1.9: Simple Meter and Time Signatures
- 1.10: Compound Meter and Time Signatures
- 1.11: Other Rhythmic Essentials
- 1.12: Major Scales, Scale Degrees, and Key Signatures
- 1.13: Minor Scales, Scale Degrees, and Key Signatures
- 1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
- 1.15: Intervals
- 1.16: Triads
- 1.17: Seventh Chords
- 1.18: Inversion and Figured Bass
- 1.19: Roman Numerals and SATB Chord Construction
- 1.20: Texture

Chapter 2: Counterpoint and Galant Schemas

- 2.1: Introduction to Species Counterpoint
- 2.2: First-Species Counterpoint
- 2.3: Second-Species Counterpoint
- 2.4: Third-Species Counterpoint
- 2.5: Fourth-Species Counterpoint
- 2.6: Fifth-Species Counterpoint
- 2.7: Gradus ad Parnassum Exercises
- 2.8: 16th-Century Contrapuntal Style
- 2.9: High Baroque Fugal Exposition
- 2.10: Ground Bass
- 2.11: Galant Schemas
- 2.12: Galant Schemas – Summary
- 2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences

Chapter 3: Form

- 3.1: Foundational Concepts for Phrase-Level Forms
- 3.2: The Phrase, Archetypes, and Unique Forms
- 3.3: Hybrid Phrase-Level Forms
- 3.4: Expansion and Contraction at the Phrase Level
- 3.5: Formal Sections in General
- 3.6: Binary Form
- 3.7: Ternary Form

- 3.8: Sonata Form
- 3.9: Rondo

Chapter 4: Diatonic Harmony, Tonicization, and Modulation

- 4.1: Introduction to Harmony, Cadences, and Phrase Endings
- 4.2: Strengthening Endings with V7
- 4.3: Strengthening Endings with Strong Predominants
- 4.4: Embellishing Tones
- 4.5: Strengthening Endings with Cadential 6/4
- 4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
- 4.7: Performing Harmonic Analysis Using the Phrase Model
- 4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
- 4.9: 6/4 Chords as Forms of Prolongation
- 4.10: Plagal Motion as a Form of Prolongation
- 4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
- 4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
- 4.13: Predominant Seventh Chords
- 4.14: Tonicization
- 4.15: Extended Tonicization and Modulation to Closely Related Keys

Chapter 5: Chromaticism

- 5.1: Modal Mixture
- 5.2: Neapolitan 6th (♭II6)
- 5.3: Augmented Sixth Chords
- 5.4: Common-Tone Chords (CT°7 and CT+6)
- 5.5: Harmonic Elision
- 5.6: Chromatic Modulation
- 5.7: Reinterpreting Diminished Seventh Chords
- 5.8: Augmented Options
- 5.9: Equal Divisions of the Octave
- 5.10: Chromatic Sequences
- 5.11: Parallel Chromatic Sequences
- 5.12: The Omnibus Progression
- 5.13: Altered and Extended Chords
- 5.14: Neo-Riemannian Triadic Progressions
- 5.15: Mediants

Chapter 6: Jazz

- 6.1: Swing Rhythms
- 6.2: Chord Symbols
- 6.3: Jazz Voicings
- 6.4: ii–V–I
- 6.5: Embellishing Chords
- 6.6: Substitutions
- 6.7: Chord-Scale Theory
- 6.8: Blues Harmony
- 6.9: Blues Melodies and the Blues Scale

Chapter 7: Popular Music

- 7.1: Rhythm and Meter in Pop Music
- 7.2: Drumbeats
- 7.3: Melody and Phrasing
- 7.4: Introduction to Form in Popular Music
- 7.5: AABA Form and Strophic Form
- 7.6: Verse-Chorus Form
- 7.7: Introduction to Harmonic Schemas in Pop Music
- 7.8: Blues-Based Schemas
- 7.9: Four-Chord Schemas
- 7.10: Classical Schemas (in a Pop Context)
- 7.11: Puff Schemas
- 7.12: Modal Schemas
- 7.13: Pentatonic Harmony
- 7.14: Fragile, Absent, and Emergent Tonics

Chapter 8: 20th- and 21st-Century Techniques

- 8.1: Twentieth-Century Rhythmic Techniques
- 8.2: Pitch and Pitch Class
- 8.3: Intervals in Integer Notation
- 8.4: Pitch-Class Sets, Normal Order, and Transformations
- 8.5: Set Class and Prime Form
- 8.6: Interval-Class Vectors
- 8.7: Analyzing with Set Theory (or not!)
- 8.8: Diatonic Modes
- 8.9: Collections
- 8.10: Analyzing with Modes, Scales, and Collections

Chapter 9: Twelve-Tone Music

- 9.1: Basics of Twelve-Tone Theory
- 9.2: Naming Conventions for Rows
- 9.3: Row Properties
- 9.4: Analysis Examples – Webern Op. 21 and 24
- 9.5: History and Context of Serialism

Chapter 10: Orchestration

- 10.1: Core Principles of Orchestration
- 10.2: Subtle Color Changes
- 10.3: Transcription from Piano

Chapter 11: Rhythm and Meter

- 11.1: Notating Rhythm [crosslist]
- 11.2: Simple Meter and Time Signatures [crosslist]
- 11.3: Compound Meter and Time Signatures [crosslist]
- 11.4: Other Rhythmic Essentials [crosslist]
- 11.5: Hypermeter
- 11.6: Metrical Dissonance
- 11.7: Swing Rhythms [crosslist]
- 11.8: Rhythm and Meter in Pop Music [crosslist]
- 11.9: Drumbeats [crosslist]

- 11.10: Twentieth-Century Rhythmic Techniques [crosslist]

Chapter 12: Anthology

- 12.1: Harmony Anthology
- 12.2: Meter Anthology
- 12.3: Twelve-Tone Anthology

Chapter 13: Workbook

- 13.1: Digital Workbook

Chapter 14: Ear Training Appendix

- 14.1: The Basics of Sight-Singing and Dictation
- 14.2: Examples for Sight-counting and Sight-singing- Level 1
- 14.3: Examples for Sight-counting and Sight-singing- Level 2

Index

Glossary

Detailed Licensing

Licensing

*A detailed breakdown of this resource's licensing can be found in **Back Matter/Detailed Licensing**.*

CHAPTER OVERVIEW

Chapter 1: Fundamentals

1.1: Introduction to Western Musical Notation
1.2: Notation of Notes, Clefs, and Ledger Lines
1.3: Reading Clefs
1.4: The Keyboard and the Grand Staff
1.5: Half Steps, Whole Steps, and Accidentals
1.6: American Standard Pitch Notation (ASPN)
1.7: Other Aspects of Notation
1.8: Notating Rhythm
1.9: Simple Meter and Time Signatures
1.10: Compound Meter and Time Signatures
1.11: Other Rhythmic Essentials
1.12: Major Scales, Scale Degrees, and Key Signatures
1.13: Minor Scales, Scale Degrees, and Key Signatures
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
1.15: Intervals
1.16: Triads
1.17: Seventh Chords
1.18: Inversion and Figured Bass
1.19: Roman Numerals and SATB Chord Construction
1.20: Texture

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1.1: Introduction to Western Musical Notation

Key Takeaways

- The term “Western musical notation” refers to written symbols that are used to communicate musical sounds.
- Western musical notation is one of many different systems of musical notation that appear across time spans, places, and cultures.
- Someone who writes down music chooses a musical notation system based on these factors, also known as their social context or milieu.

Music is an auditory or aural art form that can be represented visually with notation.

Think about what it’s like to translate one language to another. It can be a challenging task—a direct word-for-word translation isn’t always possible or useful, so a translator needs to think about how best to communicate to the reader. Similarly, writing down sounds involves making decisions about what needs to be communicated and how. No system of notation could capture every aspect of sound in full detail and still be useful or readable, so only some musical elements can be depicted.

Despite this, there are several advantages to written musical notation: a written musical work does not need to be memorized, and details can be recorded that might otherwise be forgotten. Additionally, written notation makes musical works accessible to more people, since anyone who knows the notation system can learn a notated work on their own without the help of a teacher.

Imagine inventing a way to write down a favorite song or musical work so that a musician could perform it without ever having heard it before. In the assignment below (“Inventing a Notation System”), you’ll have the opportunity to do this for a specific musical work or song of your choice. Here are some questions to consider as you think about creating your own musical notation system:

1. What are the most important musical features of the work? What are the less important musical features?
2. What are the musical features that you would write down? Are there any that you would leave out?
3. Would your answers to questions 1 and 2 change if you were writing down a different song or work?
4. How would you explain your notation system to someone else?

Online Resources

- “How was Musical Notation Invented? A Brief History.” (WQXR)
- “How did Music Notation Actually Begin?” (Classic FM)

Assignments

1. Inventing a Notation System (.pdf, .docx); Rubric (.pdf, .docx)

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1.2: Notation of Notes, Clefs, and Ledger Lines

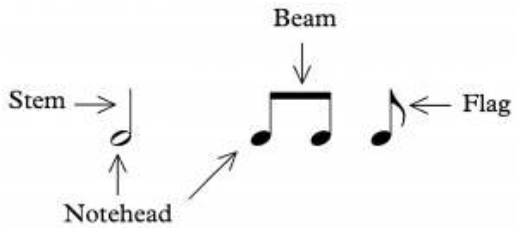
Key Takeaways

- A note indicates both pitch and rhythm.
- Notes are written on a staff. Notes with a higher frequency (shorter wavelength) are written higher on the staff than notes with a lower frequency (longer wavelength). That is, higher notes are placed above lower ones.
- A notehead must be written carefully on a staff. A notehead is oval (not round); additionally, it should be neither too large nor too small, and it is tilted slightly upward toward the right.
- The stems of notes can point either upward (on the right side of a note) or downward (on the left side of a note). For notes above the middle line, the stem points downward, and for notes below the middle line, stems point upward. Notes on the middle line can point in either direction, depending on the surrounding notes.
- Writing seconds always involves displacing one note to the left or right of a stem. The lower note always goes on the left, regardless of whether the stem points up or down.
- A clef indicates which pitches are assigned to the lines and spaces on a staff.
- Extra lines called ledger lines extend a staff higher or lower.

Western musical notation privileges two musical features: pitch and rhythm. Pitches are notated vertically (on the *y*-axis), while rhythms are notated horizontally (on the *x*-axis). Western musical notation is read left-to-right and top-to-bottom, like the page of a book in written English.

Notation of Notes

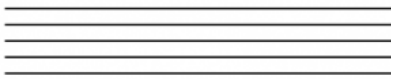
A note indicates both pitch and rhythm. Each written note consists of a notehead (either empty or filled in) and may also have a stem and a beam or flag (see Rhythmic and Rest Values). Example 1 shows an illustration of noteheads, stems, beams, and flags:



Example 1. Noteheads, stems, beams, and flags.

Staff Notation

A staff (plural “staves”) is essential for conveying pitch. A staff consists of five horizontal lines, evenly spaced, and each note is placed on the line or space that corresponds to its pitch (see Clefs below). Example 2 depicts a staff:



Example 2. A staff.

Placing Notes on a Staff

Noteheads on a line should fill in half of each space above and below. Noteheads in a space should just touch the lines above and below. Example 3 shows examples of correct noteheads, both open and filled in, both on lines and in spaces:

Example 3. Correct noteheads, open (white) and filled in (black), both on lines and in spaces.

Noteheads should be oval (not round), and they are tilted slightly upward toward the right. Example 4 shows incorrect noteheads. As you can see, noteheads can be drawn too small, too big, or the wrong shape.

Example 4. Incorrect examples of noteheads.

Stems and Beams

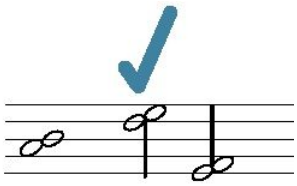
The stems of notes can point either upward (on the right side of a note) or downward (on the left side of a note). For notes above the middle line, the stem points downward, and for notes below the middle line, stems point upward. Notes on the middle line can point in either direction, depending on the surrounding notes. This is shown in Example 5:

Example 5. Correct stemming directions.

Stemming directions and beaming conventions are discussed more in Simple Meter and Time Signatures and Compound Meter and Time Signatures. When hand-drawing stems, their length is equal to four lines of the staff. Beams are about four times thicker than stems.

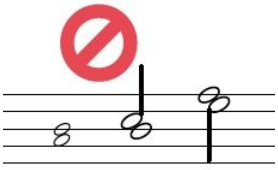
Drawing Seconds

When notes at the interval of a second (see the Generic Intervals section of The Keyboard and the Grand Staff) occur harmonically, they are on an adjacent line and space of the staff, so one note needs to be displaced to the left or right of the stem. The lower note always goes on the left, regardless of whether the stem points up or down. Example 6 shows the correct way to draw seconds:



Example 6. Three correct seconds.

Seconds should not be stacked on top of one another, nor should the lower note be on the right, as seen in Example 7:



Example 7. Three incorrect seconds.

Drawing seconds in seventh chords is discussed in Seventh Chords.

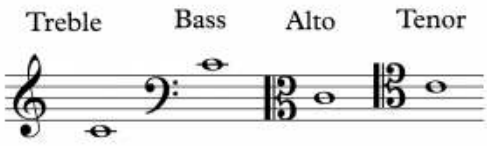
Clefs

The notes drawn on the lines and spaces of a staff represent pitches. Musicians use spatial metaphors to describe notes placed on a staff: notes appearing toward the top of the staff are said to be “higher” than those toward the bottom, which are said to be “lower.” Higher pitches are produced by sound waves with a shorter wavelength (and consequently a higher frequency); sound waves with a longer wavelength (lower frequency) produce lower pitches. Such spatial metaphors vary with milieu—i.e. across cultures and time periods. For example, for some music theorists in ancient Greece, higher-sounding notes were visually placed below lower-sounding notes.[1] As Example 8 demonstrates, this is because these theorists were likely most familiar with string instruments that functioned similarly to the violins, guitars, and harps we know today.

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=69

Example 8. Dr. Jacob Tews (Christopher Newport University) explains more about ancient Greek musical notation.

For notes to convey pitch information beyond “higher” and “lower,” the staff on which they appear must include a clef. A clef indicates which pitches are assigned to the lines and spaces on a staff (see also Reading Clefs). The two most commonly used clefs today are the treble clef and bass clef. Two other clefs that you may encounter are the alto clef and the tenor clef. Example 9 shows the same pitch placed after the treble, bass, alto, and tenor clefs:



Example 9. The same pitch placed after a treble, bass, alto, and tenor clef.

Higher notes, such as those played by a flute or sung by a soprano, are usually written in treble clef, and lower notes, such as those played by a trombone or sung by a bass, are usually written in bass clef. Alto and tenor clefs are relatively rare compared to treble and bass. But in some cases, alto clef is used for medium-high notes, and tenor clef is used for medium-low notes.

Drawing Clefs

One can draw a treble clef in three simple steps, as demonstrated in Example 10:

Example 10. Drawing a treble clef in three steps.

1. Draw a slanted vertical line that extends slightly above and below the staff.
2. Draw a half circle that intersects with your slanted line at the second staff line from the top.
3. Circle around the second staff line from the bottom.

Likewise, one can also draw a bass clef in three steps, as shown in Example 11:

Example 11. Drawing a bass clef in three steps.

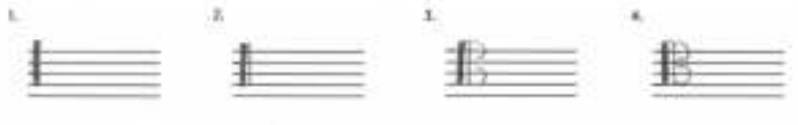
1. Draw a dot on the second staff line from the top.
2. Draw a backward C that ends in the bottom space of the staff, making sure that the top part of the C does not extend above the staff.
3. Place two dots to the right of the backward C, in the top two spaces of the staff.

One can draw an alto clef in four steps, as Example 12 shows:

Example 12. Drawing an alto clef in four steps.

1. Draw a thick vertical line that spans the staff.
2. Draw a thinner vertical line next to it.
3. Draw two backward Cs, the first taking up slightly less than the top half of the staff and the second taking up slightly less than the bottom half of the staff.
4. Connect these backward Cs with a point that rests on the middle line of the staff.

As seen in Example 13, the tenor clef is drawn the same way as the alto clef, just shifted up one line of the staff higher. The vertical lines in steps 1 and 2 begin on the second staff line from the bottom and extend slightly above the staff. The first backward C extends slightly above the top half of the staff, and the second takes up slightly less than the middle two spaces of the staff. The point connecting them rests on the second staff line from the top.



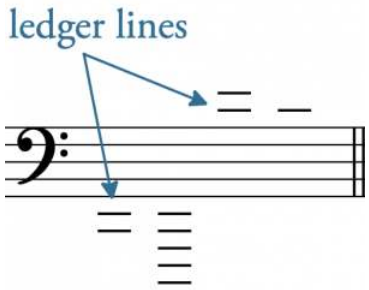
Example 13. Drawing a tenor clef in four steps.

Sometimes when musicians draw the alto or tenor clef, they do so by writing the letter “K” as a form of shorthand. Example 14 shows this:

Example 14. Using the letter “K” to draw the alto and tenor clefs.

Writing Ledger Lines

When notes are too high or low to be written on a staff, small lines called ledger lines are drawn to extend the staff. Example 15 shows ledger lines written above and below a staff:



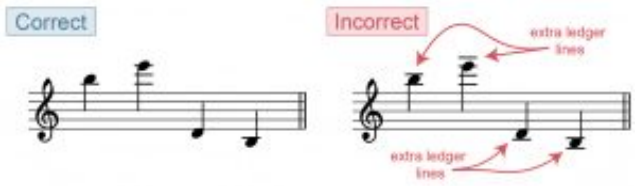
Example 15. Ledger lines, both above and below a staff with a bass clef.

Example 16 shows notes (with stems and beams) drawn on ledger lines, above and below a staff.

Example 16. Notes (with stems and beams) on ledger lines, above and below a staff with a treble clef.

When writing ledger lines, be sure not to put in an extra ledger line above or below the note you are writing. Example 17 first shows the correct way of writing notes on ledger lines, followed by the incorrect way, with extra ledger lines above and below the

notes:



Example 17. Correct and incorrect notation of ledger lines.

Online Resources

- Pitch and Frequency (the Physics of Sound) (physicsclassroom.com)
- The Music Staff (essential-music-theory.com)
- Drawing Notes (YouTube)
- Clefs (Music Notes Now)
- Drawing Treble and Bass Clefs (YouTube)
- Drawing C Clefs (Ultimate Music Theory)
- The Staff, Clefs, and Ledger Lines (musictheory.net)
- Music Notation Style Guide (Indiana University)

Assignments from the Internet

A. The Staff (.pdf)
B. Drawing Notes on Lines and Spaces, High and Low (.pdf)

Assignments

1. Writing Noteheads, Clefs, and Ledger Lines (.pdf, .docx)

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1. For one example, see André Barbera, *The Euclidean Division of the Canon: Greek and Latin Sources. New Critical Texts and Translations on Facing Pages, with an Introduction, Annotations, and Indices Verborum and Nominum et Rerum* (Lincoln: University of Nebraska Press, 1991), 276–9. 1.02: Notation of Notes Clefs and Ledger Lines#return-footnote-69-1

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1.3: Reading Clefs

Key Takeaways

- Pitch in Western musical notation is designated by the letters A, B, C, D, E, F, and G, which repeat in a loop.
- Different clefs make reading different ranges easier.
- Each clef indicates how the lines and spaces of the staff correspond to pitch.

In Western musical notation, pitches are designated by the first seven letters of the Latin alphabet: A, B, C, D, E, F, and G. After G these letter names repeat in a loop: A, B, C, D, E, F, G, A, B, C, D, E, F, G, A, B, C, etc. This loop of letter names exists because musicians and music theorists today accept what is called octave equivalence, or the assumption that pitches separated by an octave should have the same letter name. More information about this concept can be found in the next chapter, The Keyboard and the Grand Staff.

This assumption varies with milieu. For example, some ancient Greek music theorists did not accept octave equivalence. These theorists used more than seven letters of the Greek alphabet to name pitches.

Clefs and Ranges

The Notation of Notes, Clefs, and Ledger Lines chapter introduced four clefs: treble, bass, alto, and tenor. A clef indicates which pitches are assigned to the lines and spaces on a staff. In the next chapter, The Keyboard and the Grand Staff, we will see that having multiple clefs makes reading different ranges easier. The treble clef is typically used for higher voices and instruments, such as a flute, violin, trumpet, or soprano voice. The bass clef is usually utilized for lower voices and instruments, such as a bassoon, cello, trombone, or bass voice. The alto clef is primarily used for the viola, a mid-ranged instrument, while the tenor clef is sometimes employed in cello, bassoon, and trombone music (although the principal clef used for these instruments is the bass clef).

Each clef indicates how the lines and spaces of the staff correspond to pitch. Memorizing the patterns for each clef will help you read music written for different voices and instruments.

Reading Treble Clef

The treble clef is one of the most commonly used clefs today. Example 1 shows the letter names used for the lines of a staff when a treble clef is employed. One mnemonic device that may help you remember this order of letter names is “Every Good Bird Does Fly” (E, G, B, D, F). As seen in Example 1, the treble clef wraps around the G line (the second line from the bottom). For this reason, it is sometimes called the “G clef.”

Example 1. The letter names for the lines with a treble clef.

Example 2 shows the letter names used for the spaces of a staff with a treble clef. Remembering that these letter names spell the word “face” may make identifying these spaces easier.

Example 2. The letter names for the spaces with a treble clef.

Reading Bass Clef

The other most commonly used clef today is the bass clef. Example 3 shows the letter names used for the lines of a staff when a bass clef is employed. A mnemonic device for this order of letter names is “Good Bikes Don’t Fall Apart” (G, B, D, F, A). The bass clef is sometimes called the “F clef”; as seen in Example 3, the dot of the bass clef begins on the F line (the second line from the top).

Example 3. The letter names for the lines with a bass clef.

Example 4 shows the letter names used for the spaces of a staff with a bass clef. The mnemonic device “All Cows Eat Grass” (A, C, E, G) may make identifying these spaces easier.

Example 4. The letter names for the spaces with a bass clef.

Reading Alto Clef

Example 5 shows the letter names used for the lines of the staff with the alto clef, which is less commonly used today. The mnemonic device “Fat Alley Cats Eat Garbage” (F, A, C, E, G) may help you remember this order of letter names. As seen in Example 5, the center of the alto clef is indented around the C line (the middle line). For this reason it is sometimes called a “C clef.”

Example 5. The letter names for the lines with an alto clef.

Example 6 shows the letter names used for the spaces of a staff with an alto clef, which can be remembered with the mnemonic device “Grand Boats Drift Flamboyantly” (G, B, D, F).

Example 6. The letter names for the spaces with an alto clef.

Reading Tenor Clef

The tenor clef, another less commonly used clef, is also sometimes called a “C clef,” but the center of the clef is indented around the second line from the top. Example 7 shows the letter names used for the lines of a staff when a tenor clef is employed, which can be remembered with the mnemonic device “Dodges, Fords, and Chevrolets Everywhere” (D, F, A, C, E):

Example 7. The letter names for the lines with a tenor clef.

Example 8 shows the letter names used for the spaces of a staff with a tenor clef. The mnemonic device “Elvis’s Guitar Broke Down” (E, G, B, D) may make identifying these spaces easier.

Example 8. The letter names for the spaces with a tenor clef.

Ledger Lines

When notes are too high or low to be written on a staff, small lines are drawn to extend the staff. You may recall from the previous chapter that these extra lines are called ledger lines. Ledger lines can be used to extend a staff with any clef. Example 9 shows

ledger lines above a staff with a treble clef:

Example 9. Ledger lines extend a staff upwards with a treble clef.

Notice that each space and line above the staff gets a letter name with ledger lines, as if the staff were simply continuing upwards. The same is true for ledger lines below a staff, as shown in Example 10:

Example 10. Ledger lines extend a staff downwards with a bass clef.

Notice that each space and line below the staff gets a letter name with ledger lines, as if the staff were simply continuing downwards.

Online Resources

- The Staff, Clefs, and Ledger Lines (musictheory.net)
- Flashcards for Treble, Bass, Alto, and Tenor Clefs (Richman Music School)
- Printable Treble Clef Flash Cards (Samuel Stokes Music) (pages 3 to 5)
- Printable Bass Clef Flash Cards (Samuel Stokes Music) (pages 1 to 3)
- Printable Alto Clef Flash Cards (Samuel Stokes Music)
- Printable Tenor Clef Flash Cards (Samuel Stokes Music)
- Paced Game: Treble Clef (Tone Savvy)
- Paced Game: Bass Clef (Tone Savvy)
- Paced Game: Alto Clef (Tone Savvy)
- Paced Game: Tenor Clef (Tone Savvy)

Assignments on the Internet

Easy

A. Treble and Bass Clefs (.pdf)
B. Treble Clef (.pdf)
C. Bass Clef (.pdf)
D. Alto Clef (.pdf)
E. Tenor Clef (.pdf)

Medium

A. Worksheets in Bass Clef (.pdf)
B. Bass Clef with Ledger Lines (.pdf)
C. Worksheets in Alto Clef (.pdf)
D. Worksheets in Tenor Clef (.pdf)

Advanced

A. All Clefs (.pdf)

Assignments

1. Writing and Identifying Notes Assignment #1 (.pdf, .mscz). Asks students to write and identify notes in treble, bass, alto, and tenor clefs, with and without ledger lines.
2. Writing and Identifying Notes Assignment #2 (.pdf, .mscz). Asks students to write and identify notes in treble, bass, alto, and tenor clefs, with and without ledger lines.
3. Notating Pitch (.pdf, .mscz). Asks students to write and identify notes in **treble and bass clefs only**, with and without ledger lines.

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1.4: The Keyboard and the Grand Staff

Key Takeaways

- Playing the piano will help you in your music theoretical studies by allowing you to engage kinesthetically with music.
- A pattern of black keys grouped into twos and threes repeats on the piano keyboard for seven octaves.
- The white note C is to the immediate left of the two-note black key pattern, while the white note F is to the immediate left of the three-note black key pattern.
- Piano players, also called pianists, read music on the grand staff.
- Middle C is the note that appears on the line between the two staves in a grand staff.
- When counting intervals on a piano keyboard, always count the first note as “one.”

Many students find studying music theory easier when they engage with music kinesthetically. In other words, physically creating sounds by playing a musical instrument (such as the piano) helps you to better visualize and audiate the music you are writing down or studying. This allows students to understand the relationship between different pitches more quickly.

The Piano Keyboard

Learning to play notes on the piano is one easy way to engage with music kinesthetically. You may find access to a piano keyboard (acoustic or electronic) at your school. You may also purchase an inexpensive electronic keyboard if you like. Another option is to download a free piano app that you can play on your phone, such as Tiny Piano.

In Example 1, notice that the keyboard has both white keys and black keys. The black keys are grouped into sets of either three or two. In Example 2, notice that the sets of three and two black keys alternate throughout the entire length of a piano keyboard, repeating the pattern for each octave.

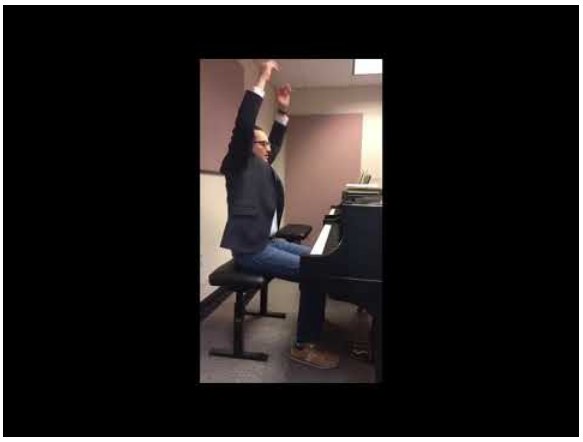
Example 1. A small portion of a piano keyboard.

Example 2. A larger portion of a piano keyboard.

Playing the Piano

When you sit at the piano, it is important to sit up straight, keeping your head over your shoulders, which should be kept down. Your elbows should be a comfortable distance from your body, and your fingers should remain arched (as if you were pulling a library book off of a shelf). Keep your knees and wrists flexible (not stiff), and keep your feet flat on the ground unless you are using the pedals.

Example 3 explains how to achieve proper posture at the piano.



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Example 3. Dr. Benjamin Corbin (Christopher Newport University) demonstrates proper piano posture.

Octave Equivalence and White-Key Letter Names on the Piano Keyboard

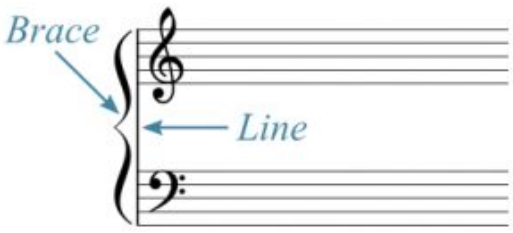
Example 4 shows a piano keyboard with the letter names of the white key pitches labeled. The same letter names appear on different keys of the keyboard. As discussed in the previous chapter, pitches in Western musical notation are designated by the letters A, B, C, D, E, F, and G, repeating in a loop. Because of the principle of octave equivalence in the Western system, pitches separated by an octave have the same letter name.

Example 4. The letter names of the white key pitches are labeled.

On the piano keyboard, when the black keys appear as a set of two, the note to their immediate left is C. With a set of three black keys, the note to their immediate left is F.

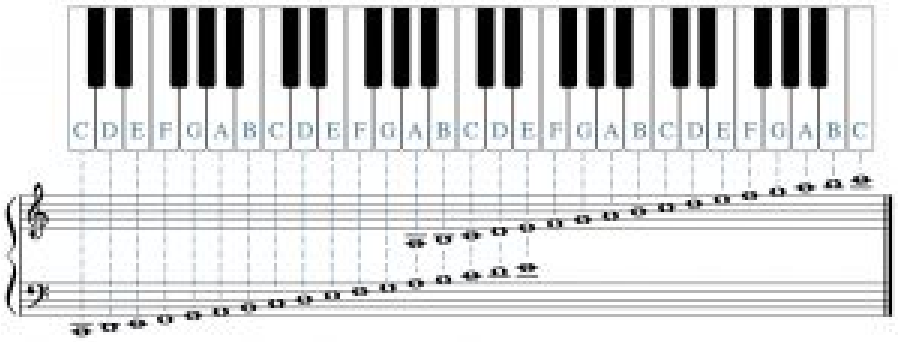
The Grand Staff

Music for the piano is typically written in both the treble and bass clefs on a grand staff, as shown in Example 5. To make a grand staff, a staff with a treble clef is placed above a staff with a bass clef. The two staves are connected on the left side with a line and a brace. Typically, the pianist plays the lower notes (in the bass clef) with their left hand and the higher notes (in the treble clef) with their right hand.



Example 5. A grand staff is connected with a line and a brace.

Example 6 shows the lines and spaces on the grand staff labeled with letter names. As you can see, the letter names of the lines and spaces of the treble and bass clefs match what was discussed in the prior chapter (Reading Clefs).



Example 6. A grand staff with the lines and spaces labeled with pitch names.

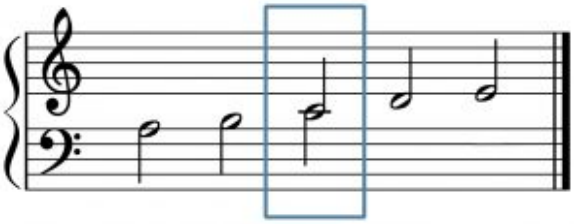
Let's take a closer look at the ledger-line notes that might appear below the treble staff and above the bass clef staff. Example 7 shows some of these notes, labeled with letter names. Each vertical pair of notes is the same pitch, even though the notes are notated in two different clefs. (The notes with upward-pointing stems belong to the treble clef staff, while the notes with downward-pointing stems belong to the bass clef staff.)

Example 7. Pitches below the treble clef staff and above the bass clef staff, labeled with letter names.

Example 8 shows the staves of Example 7 vertically condensed—how these notes would appear if there were not so much space in between the treble clef and bass clef staves of a grand staff. The letter names are the same in Example 8 as they were in Example 7.

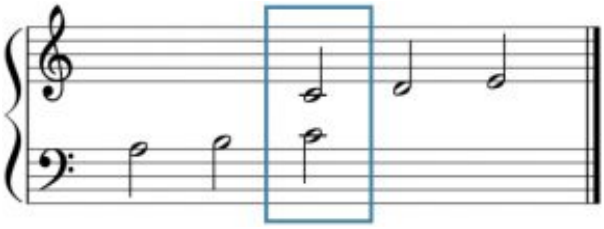
Example 8. The staves of Example 7 have been vertically condensed and the two notes combined into one (with two stems).

Example 9 shows a vertically condensed grand staff with the note C boxed. This boxed C is called middle C, so named because in the vertically condensed grand staff shown in Example 9, it appears in the middle of the treble and bass clef staves. Additionally, middle C is the note that appears to be around the middle of a piano keyboard, usually underneath the brand name.



Example 9. The note C is boxed in a vertically condensed grand staff.

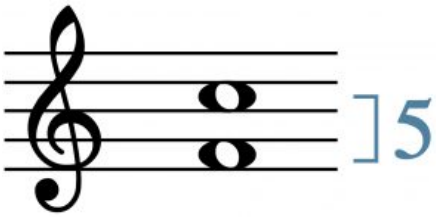
Example 10 shows Example 9 vertically expanded to its regular spacing, with middle C still boxed. Though it now appears in both the treble clef and bass clef staves, this note would still sound as the same pitch.



Example 10. A vertically expanded Example 9.

Generic Intervals (Interval Size)

Often in music theory, you will want to measure or describe the distance between notes—either on a piano keyboard or on a staff. This “count” of notes on a piano keyboard or staff is called a generic interval. When counting generic intervals, it is important to know that when you count the first note, it should be counted as one and not zero. Example 11 shows two notes, an F and a C, on a staff with a treble clef.If you count the notes F to C in Example 11 (by counting each line and space between the two notes), you may be tempted to do this: F to G is one, G to A is two, A to B is three, and B to C is four. However, this would be incorrect. Instead, you need to count F as one, F to G as two, G to A as three, A to B as four, and B to C as five. Therefore, we would say that F and C are five notes apart, not four. Music theorists and musicians would call the distance between these two notes a “generic fifth.”



Example 11. An example of a generic fifth.

Online Resources

- Piano Posture Tips (Liberty Park Music)
- Naming White Keys Practice (music theory.net)
- The Grand Staff (musictheory.net)
- Generic Intervals (musictheory.net)
- Virtual Piano (Online Pianist)
- Blank Keyboards for Students or Teachers

Assignments on the Internet

A. Drawing the Grand Staff, Identifying Notes (.pdf)
B. Identifying Notes on the Grand Staff without Accidentals (.pdf, .pdf, .pdf, .pdf, .pdf)
C. Identifying White Keys on the Piano (.pdf, .pdf)

Assignments

1. White Keys on the Piano and the Grand Staff (.pdf, .docx)
2. The Piano Keyboard and the Grand Staff with Ledger Lines (.pdf, .docx)
3. Generic Intervals (.pdf, .docx)
4. Grand Staff Note Names with Ledger Lines (.pdf, .docx)

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1.5: Half Steps, Whole Steps, and Accidentals

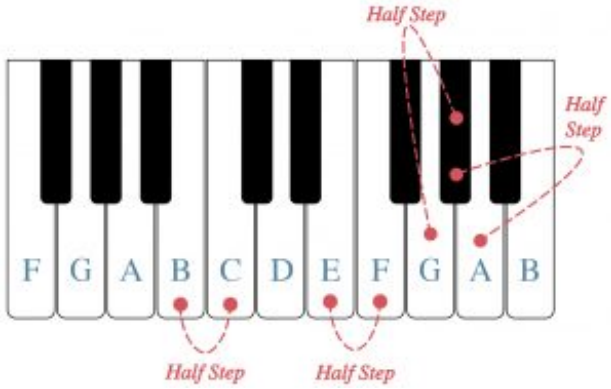
Key Takeaways

- A half step above a key on the piano is the key to its immediate right, while a half step below a key on the piano is the key to its immediate left.
- A whole step is two half steps. A whole step above is two keys to its right, while a whole step below is two keys to its left.
- An accidental changes the pitch of a note. A sharp raises a note by a half step, while a flat lowers a note by a half step. A natural cancels a previous accidental.
- A double sharp raises a note by a whole step, while a double flat lowers a note by a whole step.
- Be sure to write accidentals to the left of a note, directly across the line or space on which a note appears.
- Notes have enharmonic equivalence when they are spelled differently but sound the same.

In the last chapter, The Keyboard and the Grand Staff, we discussed the letter names of the white keys on the piano keyboard and noted that the black keys are grouped into alternating sets of two or three. Before we discuss the names of the black keys, however, we must first learn about half steps and whole steps.

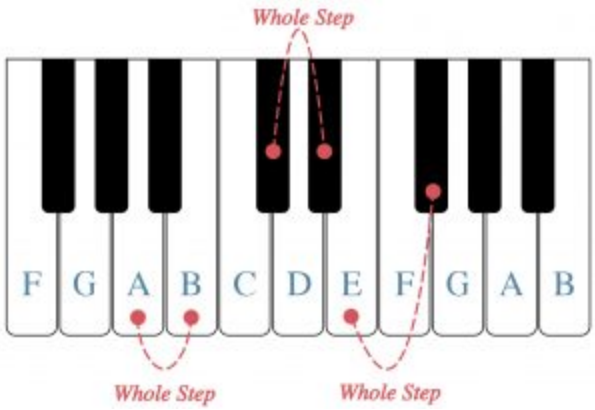
Half Steps and Whole Steps

A half step is considered to be the smallest interval, or distance between two notes, in Western musical notation. Example 1 shows a piano keyboard with the letter names of the white-key pitches and some half steps labeled. On the piano keyboard (see Example 1), for most of the white-key notes, a half step above that note will be the black key to its upper right, while a half step below it will be the black key to its upper left. For example, the black key to the upper right of G is “in between” the notes G and A; one would say that this black key is a half step above G and a half step below A. Two pairs of white keys—E/F and B/C—do not have black keys in between them (see Example 1). This is because E–F and B–C are both half steps. Having the black keys grouped into sets of either two or three makes it easier for a keyboardist to see and feel them more quickly.



Example 1. A piano keyboard with letter names on the white keys; some half steps are labeled.

A whole step is the equivalent of two half steps. Example 2 shows a piano keyboard with the letter names of the white key pitches labeled, and some whole steps bracketed. Pairs of white keys with a black key in between them (A and B, C and D, D and E, F and G, and G and A) are a whole step apart. To find a whole step above the notes E or B, simply count two keys to the right: a whole step above E is the black key to the right of the note F, while a whole step above B is the black key to the right of the note C. Likewise, count two keys to the left to find a whole step below the notes C or F: the black keys to the left of the notes B and E, respectively. To find a whole step from a black key you will want to count two keys to the right or left. For example, a whole step above the black key to the right of C is the black key to the right of the note D. A whole step below the black key to the left of B is the black key to the left of the note A.



Example 2. A piano keyboard with letter names on the white keys; some whole steps are labeled.

What do half steps and whole steps sound like? The short video shown in Example 3 demonstrates:

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Example 3. Dr. Chelsey Hamm (Christopher Newport University) demonstrates the sound of a half step and a whole step.

You can practice identifying half and whole steps by dragging and dropping in the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Sharps, Flats, and Naturals

An accidental changes the pitch of a note. A sharp (♯) looks like a tilted hashtag, and it raises a note by a half step. A flat (♭) looks like a slanted lowercase "b," and it lowers a note by a half step. A natural (♮) looks like a tilted box with a line sticking out of the top left and bottom right corners, and it cancels a previous accidental such as a sharp or flat. Sharps, flats, and naturals are the three most common accidentals.

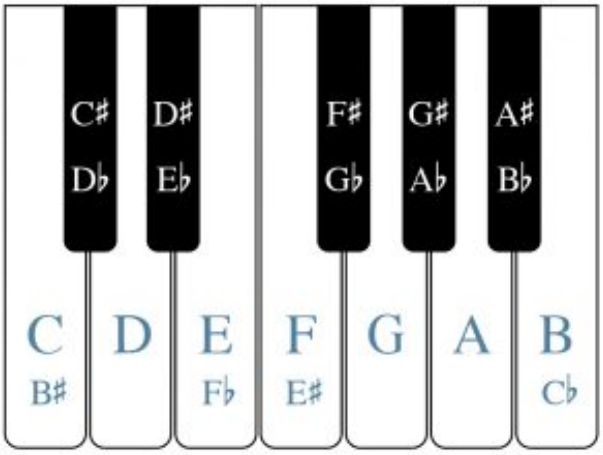
A double sharp (or 𝄪) raises a note by two half steps (i.e., a whole step). A double flat (𝄫) lowers a note by two half steps (i.e., a whole step). Accidentals are always written to the left of a note, regardless of stem direction. An accidental should be written directly across the line or space on which a note appears.

Example 4 shows both correct and incorrect ways to notate sharps, flats, and naturals:

Example 4. Correct and incorrect ways to draw accidentals.

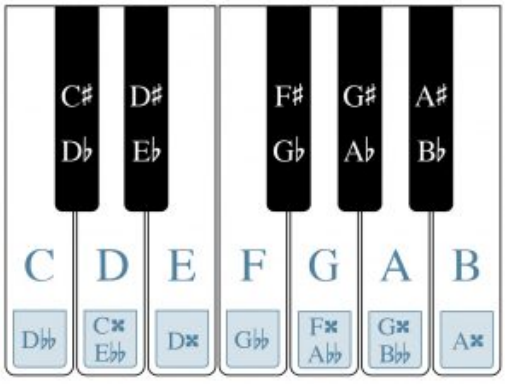
The Black Keys on the Piano Keyboard

Example 5 shows a piano keyboard with the letter names of the black keys labeled. Black keys that are a half step above a white key take the name of the white key and add the word "sharp." For example, the black key to the right of the note C is called "C-sharp" and is written as C♯. Black keys that are a half step below a white key take the name of the white key and add the word "flat." For example, the black key to the left of the note D is called "D-flat" and is written as D♭.



Example 5. A piano keyboard with the letter names of the black keys labeled.

F is also known as E♯, and E is also known as F♭. C is also known as B♯, and B is also known as C♭. Example 6 also shows some of the double-sharp and double-flat accidentals. A double sharp is two half steps above a note. For example, D𝄪 is also E; E𝄪 is also F♯ (or G♭). A double flat is two half steps below a note. For example, A𝄫 is also G; C𝄫 is also B♭ or A♯.



Example 6. Double accidentals on the piano keyboard.

Enharmonic equivalence

You will have noticed by now that each key on the piano keyboard has more than one name. Notes have enharmonic equivalence when they are spelled differently but sound the same. For example, you can see that C♯ and D♭ are enharmonically equivalent, as seen in Examples 5 and 6. Example 6 also shows that the note D is enharmonically equivalent with the notes C𝄪 and E𝄫. In other words, playing a D, C𝄪, or E𝄫 will result in the same pitch.

You can practice identifying half and whole steps by dragging and dropping in the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Online Resources

- Tutorial on Half and Whole Steps (Music Theory Fundamentals)
- Tutorial on Half Steps, Whole Steps, and Accidentals (musictheory.net)
- Game to Practice Half Steps, Whole Steps, and Accidentals (drawmusic.com)
- Tutorial on Accidentals (mymusictheory.com)
- Tutorial on the Black Keys on the Piano (musicradar.com)
- Practicing the Piano Keyboard (musictheory.net)
- Matching Game for Piano Key Notes (quizlet.com)
- Labeling Game for Piano Key Notes (quizlet.com)
- Tutorial on Enharmonic Equivalence (The Music Notation Project)

Assignments on the Internet

A. Half and Whole Steps on the Piano Keyboard and in Staff Notation (.pdf)
B. Half and Whole Steps in Staff Notation (.pdf)
C. Writing and Identifying Notes with Accidentals, p. 1 (.pdf), pp. 9–11 (.pdf)
D. Keyboard to Staff Notation Matching (.pdf)
E. Enharmonic Equivalence, p. 3 (.pdf), (.pdf)

Assignments

1. Black Keys on the Piano (.pdf, .docx)
2. Half and Whole Steps on the Piano Keyboard (.pdf, .docx)
3. Writing Accidentals (.pdf, .docx)
4. Writing and Identifying Accidentals (.pdf, .docx)
5. Half and Whole Steps in Staff Notation (.pdf, .docx)
6. Enharmonic Equivalence (.pdf, .docx)

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1.6: American Standard Pitch Notation (ASPN)

Key Takeaways

- American Standard Pitch Notation (ASPN) provides labels for specific musical frequencies by combining a note name (such as C) with a subscript octave designation (such as 4).
- A pitch is a discrete tone with an individual frequency (e.g. C_4), while a pitch class is less specific (e.g., C in general).
- ASPN differentiates between octaves, from C to B. The octaves are labeled from lowest to highest, beginning with 0 and continuing in ascending numerical order (1, 2, etc.).
- A piano keyboard primarily uses the ASPN octave designations 1 through 7, although small portions of octaves 0 and 8 are included.
- Middle C is C_4 in ASPN. It is helpful to memorize the ASPN label of this note as a starting point.

American Standard Pitch Notation and Pitch versus Pitch Class

In order to discuss specific notes, or pitches, we will use American Standard Pitch Notation, abbreviated ASPN. ASPN designates specific musical pitches by combining a note name (such as C) with a subscript octave designation (such as 4), creating a bipartite label (for example, C_4). ASPN labels are very useful, since they can identify every possible musical note within human hearing range, from the lowest pitches to the highest.

The Reading Clefs chapter introduced octave equivalence, the concept that explains why notes one or more octaves apart have the same letter name. Music theorists distinguish between a pitch, a discrete tone with an individual frequency (e.g. C_4 using ASPN), versus a pitch class, which is less specific (e.g., C in general). A pitch class includes all the pitches with the same letter name, in any octave, along with their enharmonic equivalents. For example, all Cs are the same pitch class, and the enharmonically equivalent notes D♭ and B♯ are also part of the C pitch class. In this chapter we are naming specific pitches with ASPN.

ASPN and Octave Designations

ASPN differentiates between octaves, beginning with the pitch C and ending with the pitch B. This means that each new octave designation begins on the note C, as seen in Example 1. The octaves are labeled from lowest to highest, beginning with 0 and continuing in numerical order (1, 2, 3, etc.). The pitch middle C is C_4, which is useful to memorize.

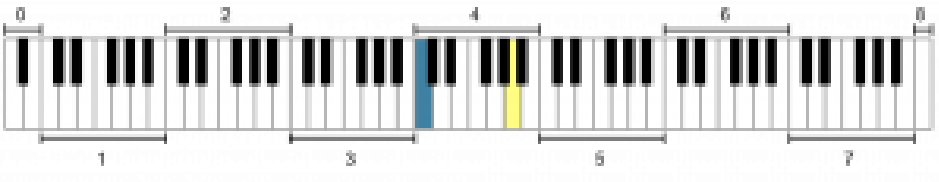
Example 1. ASPN octave designations; each octave begins with the pitch C.

All letter names within an octave (below the C of the next octave) receive the same octave designation. For example, all of the notes in Example 2 would be designated in the 4 octave, because they are above C_4 but below C5. Accidentals applied to a note do not have an effect on its ASPN number. For example, $B♯_3$ and C_4 have different octave numbers despite being enharmonically equivalent, because the B♯ is still considered part of the lower octave.

Example 2. The notes C_4, D_4, E_4, F_4, G_4, A_4, and B_4.

ASPN and the Keyboard

ASPN labels are very helpful for finding specific notes on the piano keyboard. Example 3 depicts a piano keyboard with each octave labeled using ASPN notation. As you can see, the piano keyboard spans the full octaves 1 to 7. It also contains a small part of both octaves 0 and 8. ASPN labels are the same regardless of instrument or voice type. In other words, a C_4 will always be labeled as such regardless of whether it is produced with a flute, trombone, violin, or voice.



Example 3. A piano keyboard with ASPN octave designations labeled; both colored notes (blue and yellow) fall into the octave 4 designation.

ASPN and Staff Notation

Example 4 shows ASPN labels for common notes in the treble, bass, alto, and tenor clefs. Memorizing the location of C_4 in each clef can make finding ASPN labels quicker and easier.

A link to an interactive elements can be found at the bottom of this page.

Example 4. ASPN labels for notes in four clefs.

Online Resources

- "Pitches, Pitch Classes, Octave Designation, Enharmonic Equivalence" (YouTube)
- Tutorial on ASPN Octave Labels (liveabout.com)
- Tutorial on ASPN Octave Labels (flutopedia.com)
- Helpful Graphic with ASPN Labels on the Grand Staff and Piano (Music Theory Tips)
- Flash Cards with ASPN Labels in Treble and Bass Clefs (quizlet.com)

Assignments on the Internet

A. ASPN Labels and Staff Notation (.pdf)
B. ASPN Labels, pp. 23, 27, and 28 (.pdf)

Assignments

1. Writing and Identifying ASPN Labels (.pdf, .docx)

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1.7: Other Aspects of Notation

Key Takeaways

- Dynamics indicate the loudness of music. Musicians use a variety of Italian words to specify dynamics in Western musical notation.
- A crescendo indicates an increase in loudness, while a decrescendo or diminuendo indicates a decrease in loudness.
- The term articulation refers to the connection or separation between notes, as well as the accent level at the beginning of a note (its attack).
- A tempo indication tells a musician how fast or slow to play or sing a composition.
- Musicians periodize music into historical eras, which are useful to memorize. Works within these historical periods tend to share similar style characteristics.
- Structural features divide up a work or movement into smaller sections.

In this chapter we will explore other elements of music besides pitch (discussed in previous chapters) and duration (discussed in following chapters). These elements include dynamics, articulations, tempi, stylistic periods, and structural markers.

Dynamics

Dynamics indicate the loudness of music. In Western musical notation, we often use italicized Italian words, which can be abbreviated, to describe dynamics. The dynamic marking *forte* means loud, while *piano* means quiet. In sheet music, these words are written either above or below the staff.

Several Italian words and suffixes can modify *piano* and *forte* to create a range of dynamics from very quiet to very loud (Example 1). The Italian word *mezzo* means "moderately." Musicians say *mezzo forte* to mean moderately loud and *mezzo piano* to mean moderately quiet. The Italian suffix *-issimo* means "very" or "extremely." Musicians say *pianissimo* to mean "very quiet" and *fortissimo* to mean "very loud." This suffix can be stacked; for example, one can say *pianississimo* to mean "very, very quietly," or *fortississimo* to mean "very, very loudly."

Example 1. Dynamics are arranged from quietest to loudest.

Dynamics are often abbreviated in Western musical notation, as shown below.

- *fff = fortississimo*
- *ff = fortissimo*
- *f = forte*
- *mf = mezzo forte*
- *mp = mezzo piano*
- *p = piano*
- *pp = pianissimo*
- *ppp = pianississimo*

Some composers add even more "*-issimo*"s, but this is rare. However, you might one day spot a *pppppp* or an *ffffff* in music that you play or sing!

There are three other Italian words that are commonly used to indicate a change in dynamic level. Crescendo (*cresc.*) means to get louder, while decrescendo (*decresc.*) and diminuendo (*dim.*) both mean to get quieter. Crescendos and decrescendos are indicated two different ways: either by writing out the abbreviation *cresc.* or *decresc.*, possibly followed by dots, or by drawing hairpins. The term "hairpin" refers to the following symbols, which roughly approximate the shape of a bobby pin (or "hairpin"), as seen in Example 2.

Example 2. A crescendo and decrescendo (“hairpins”).

Articulations

The term articulation refers to the connection or separation between notes and to the accent level at the beginning of a note (its attack). Several articulations are demonstrated in Examples 3–7. Percussion instruments, plucked strings, bowed strings, winds, brass, and voices all have different methods of carrying out particular attacks and articulations. You will want to consult with a private teacher or ensemble director for help with applying different articulations to your instrument or voice.

Example 3: Legato means to play or sing smoothly or connected. This articulation is indicated by a curved slur marking.

Example 4: Another way to indicate smooth, connected playing is with tenuto markings, which look like a small line above or below notes.

Example 5: Staccato means to play or sing notes more separated, leaving space between notes. This articulation is usually indicated by a dot placed above or below notes.

Example 6: An accent (a sideways V) means to play or sing a note with extra stress or emphasis.

Example 7: A marcato marking (an upside-down V) means to play or sing a note with a more forceful accent.

Accented notes can also be indicated by the italicized abbreviations *sfz*, *sf*, or *fz* (*sforzando*, *forzando*, or *forzato*). These accents are usually interpreted to be slightly more forceful (i.e., louder) than regular accents. These symbols work like dynamics and are placed directly above or below the note to which they apply.

Tempo

Tempo (plural tempi) is the term for how fast or slow a composition is performed. Tempi are usually indicated either specifically, by a metronome marking, or less specifically, by a textual indication. A metronome marking is usually indicated in beats per minute (bpm). A work that is marked ♩ = 60 would contain 60 quarter notes in one minute (one quarter note per second). With a free metronome application (such as Pro Metronome) on your phone, you can easily check the tempo of a work you’re playing or singing.

Like dynamics, most tempo markings are written in Italian. They often appear at the beginning of a work, movement, or section, at the top left of the first staff or system. The most common tempi are as follows:

- Fast tempi: vivace, presto, allegro, allegretto (-etto is an Italian suffix meaning “little”)
- Medium tempi: moderato, andante
- Slow tempi: adagio, largo, lento, grave

Example 8 depicts tempi from the slowest to the fastest:

Composers sometimes use additional Italian words, especially emotive expressions, to modify a tempo marking. Words like *assai* (“very” or “rather”), *espressivo* (“expressively”), or *cantabil*e (“singingly”) frequently appear after tempo markings, especially in works written after the year 1800. For example, one might come across tempo markings like “allegro assai” (“very fast”), “andante cantabile” (“a moderate tempo, singingly”), or “adagio espressivo” (“slow and expressive”). Always be sure to look up the definition of any words that you do not know in your music.

Two other Italian words are commonly used to indicate changes in tempo: ritardando (*rit.*) for a gradual decrease and accelerando (*accel.*) for a gradual increase. Both words are generally italicized, and they are often abbreviated (*rit.* and *accel.* respectively).

When these directions are meant to apply to several measures, they are often followed by dots. The dots continue as long as the direction is meant to be followed.

Structural Features

The following words and symbols indicate structural features in compositions. Structural features divide up a work or movement into smaller sections.

- Example 9: A fermata indicates that a note should be held longer than its regular duration. Fermatas often appear at the start or end of a musical section.
- Example 10: A caesura indicates a break or a musical cutoff.
- Example 11: A breath mark indicates a breath for a wind instrumentalist or a vocalist. For percussionists, keyboardists, or string players, it indicates a pause similar in length to a breath.

Repeat signs indicate that a section of music should be repeated (Example 12). If the repeated section ends differently each time, that is indicated with first and second endings (Example 13).

A link to an interactive elements can be found at the bottom of this page.

Example 12. Four notes in bass clef surrounded by repeat signs.

A link to an interactive elements can be found at the bottom of this page.

Example 13. A repeat sign with a first and second ending in treble clef.

Occasionally you may come across music that has more than two endings. Repeated sections with a third or even a fourth ending are common in some styles of music, such as Broadway musicals. These work like a first and second ending: the third ending is performed after the third time the section is repeated, the fourth ending is performed after the fourth time, and so on.

Stylistic Periods

As you begin to study music theory, it will be helpful to have a basic familiarity with the ways in which music theorists and musicologists historically periodize Western classical music. Time periods in the history of this music are flexible, but having a general framework to group musical compositions with certain stylistic similarities can be useful for musicians.

The following time periods, depicted in Example 14, are generally agreed upon by most musicologists:

- Medieval: c. 600–1400
- Renaissance: c. 1400–1600
- Baroque: c. 1600–1750
- Classical: c. 1750–1820
- Romantic: c. 1800–1910
- Post-tonal: c. 1900–present

Example 14. A timeline depicting commonly accepted years for musical stylistic periods.

Online Resources

- Tutorial on Dynamics (Music Theory Academy)
- Tutorial on Dynamics (Lumen's Music Appreciation)
- Dynamics Quiz (quizizz.com)
- Articulations (BBC)
- Articulations (libretexts.org)
- Tempo (BBC)
- Tempo (Music Theory Academy)
- Notes on Periodization in Musicology (Oxford History of Western Music)
- Historical Eras in Musicology (Naxos)

- Music Notation Style Guide (Indiana University)

Assignments on the Internet

A. Dynamics, pp. 13–17 (.pdf), and pp. 2–4, 18 and 22 (.pdf)
B. Articulations, p. 1 (.pdf)
C. Tempo, pp. 12, 21 (.pdf), and p. 13 (.pdf)
D. Structural Markers, p. 9 (.pdf)
E. Mixed Terminology, pp. 13–17, 23 (.pdf)

Assignments

1. Dynamics, Articulations, Tempi, Stylistic Periods, Structural Features (.pdf, .docx)

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1.8: Notating Rhythm

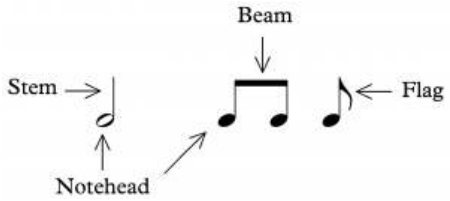
Key Takeaways

- Notes consist of several different components, including a notehead, stem, beam, and flag.
- Common note values include the whole note, half note, quarter note, eighth note, and sixteenth note.
- Common rest values include the whole rest, half rest, quarter rest, eighth rest, and sixteenth rest.
- British terms for rhythmic values are different from American terms.
- A dot increases the duration of a note by half. Subsequent dots add half the duration of the previous dot.
- A tie connects two or more notes of the same pitch. Do not rearticulate any “tied to” notes.

Music is a temporal art—in other words, time is one of its components—so organizing time is essential for Western musical notation. The next several chapters will focus on the temporal facets of rhythm and meter, starting in this chapter with the basic note and rest values in this notation system.

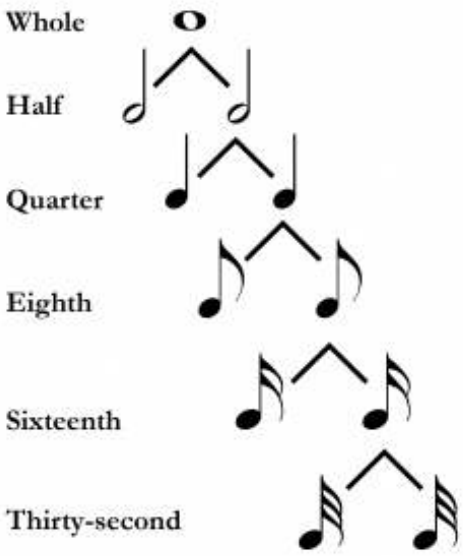
Note Values

Broadly speaking, rhythm refers to the duration of musical sounds and rests in time. As you’ll recall in the chapter titled Notation of Notes, Clefs, and Ledger Lines, notes may contain several different components, as seen in Example 1:



Example 1. Noteheads with stems, beams and flags labeled.

There are many common note values in Western musical notation. Note values are hierarchical; in other words, their lengths are defined relative to one another. Each note value can be divided into two smaller values, as seen in Example 2. Just as a whole pizza divides into two halves, four quarters, eight eighths, etc., a whole note divides into two half notes, four quarter notes, eight eighth notes, and so on.



Example 2. The relative relationships between common note values.

Pay special attention to these aspects of Example 2:

- Noteheads can be filled in (black) or unfilled (white); quarter notes and shorter durations are filled in.
- Unfilled noteheads may or may not have a stem, but filled noteheads always have stems.

- Flags are only added to the stems of filled noteheads.

Additionally, there are three ways to decrease a note's value by half:

- Adding a stem to a note (i.e., whole to half)
- Filling in a notehead (i.e., half to quarter)
- Adding a flag (i.e., quarter to eighth or eighth to sixteenth)

Open Music Theory privileges the North American names for note values, but it's worth being familiar with the British names as well (indicated in parentheses below). See Example 2 for a visual of each note value.

- **Whole note (semibreve in British English):** this thick, unfilled oval shape has no stem. In many compositions today, this is the longest note value used.
- **Half note (minim in British English):** also an oval, drawn with a slightly thinner line, and has a stem. This note is half as long as the whole note (i.e., two half notes make up one whole note).
- **Quarter note (crotchet in British English):** looks like the half note, except that the notehead has been filled in. This note is half as long as a half note (i.e., two quarter notes make up one half note) and a quarter as long as a whole note (i.e., four quarter notes make up one whole note).
- **Eighth note (quaver in British English):** looks like the quarter note, except that a flag has been added to its stem. This note is half as long as a quarter note (i.e., two eighth notes make up one quarter note) and an eighth as long as a whole note (i.e., eight eighth notes make up one whole note).
- **Sixteenth note (semiquaver in British English):** looks like an eighth note, except that it has an extra flag. This note is half as long as an eighth note (i.e., two sixteenth notes make up one eighth note) and one sixteenth as long as a whole note (i.e., sixteen sixteenth notes make up one whole note).

[table id=74 /]

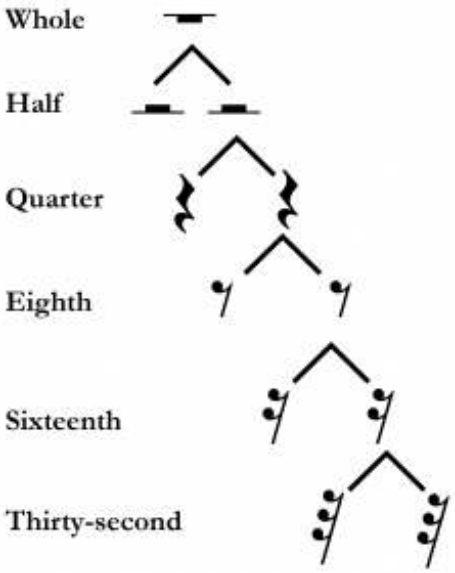
Note values shorter than the sixteenth note (thirty-second note, sixty-fourth note, etc.) are created by adding extra flags. You may run into one additional, less common note value called the double whole note (breve in British English; Example 3). Double whole notes are sometimes notated with only one line on either side of the notehead. In older musical notation styles, the notehead appears more square than oval. Double whole notes divide into whole notes (i.e., two whole notes make up one double whole note).

Example 3. A double whole note on a line.

Rest Values

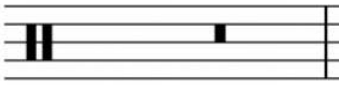
Broadly speaking, rests refer to the duration of silences in music. Each hierarchical note value has a corresponding rest value, as seen in Example 4. Like note values, each rest value can be divided into two smaller values. Several additional aspects of Example 4 should be noted:

- Notice that a whole rest hangs down from a line while a half rest sits on top of a line. It may be helpful to think of a whole rest as "heavier" than a half rest to remember that it hangs down; likewise, a half rest resembles a top hat, so you can think of it as sitting on top of a line as if on a person's head.
- Practice drawing quarter rests carefully; many students find them difficult to draw.
- Adding a flag to a rest (i.e., eighth to sixteenth) decreases a rest's duration by half.



Example 4. The relative relationships between common rest values.

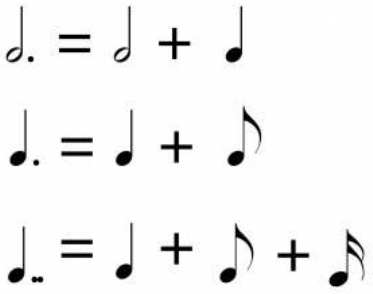
Although rare, you may run across a breve rest (Example 5). A breve rest is equivalent in length to two whole rests. It looks like a filled-in box and appears on the second space from the top.



Example 5. A breve rest.

Dots and ties

Dots and ties allow durations to be lengthened. A dot is written immediately after a note or rest, and it increases its duration by half (Example 6). For example, a quarter note is equivalent in duration to two eighth notes; therefore, a dotted quarter note would be equivalent to *three* eighth notes. Similarly, a whole note is equivalent to two half notes, so a dotted whole note would be equivalent to *three* half notes. Multiple dots can be added to a duration, with each subsequent dot adding half the duration of the previous one. For example, a double-dotted quarter note (i.e., a quarter note with two dots) is equivalent in duration to a quarter note, eighth note, and sixteenth note added together. In other words, a double-dotted note is 1¾ the duration of the original note.



Example 6. The rhythmic breakdown of two dotted notes and one double-dotted note.

A tie is a curved line that connects two or more notes with the same pitch. (Ties are never used with rests.) Tied-to notes are not rearticulated. In other words, ties are used to combine the durations of multiple notes. The tie connecting the first two notes in Example 7 indicates that, when these half and quarter notes are played or sung, the quarter note should not be articulated; in other words, the first note should be held for the duration of three quarter notes instead of two. Another way to write this duration is as a dotted half note.

A link to an interactive elements can be found at the bottom of this page.

Example 7. A tie connects the first two notes.

You would be correct to think that a tie looks like a slur (see Other Aspects of Notation). The difference between the two is that slurs connect notes of different pitches and indicate to play or sing the notes tenuto, while ties connect notes of the same pitch to create a note with a longer duration.

Online Resources

- Note Durations (musictheory.net)
- Rhythmic Values (learnmusictheory.net)
- Note Values (Essentials of Harmony)
- Dots and Ties (YouTube)
- Dots and Ties (musictheory.net)

Assignments on the Internet

A. Writing Notes and Rests, Rhythmic Equations, pp. 3–7 (.pdf)
B. Advanced Rhythmic Equations, p. 3 (.pdf)
C. Slurs and Ties (.pdf)

Assignments

1. Note and Rest Values (.pdf, .docx)
2. Dots and Ties (.pdf, .docx)

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1.9: Simple Meter and Time Signatures

Key Takeaways

- A beat is a pulse in music that regularly recurs.
- Simple meters are meters in which the beat divides into two, and then further subdivides into four.
- Duple meters have groupings of two beats, triple meters have groupings of three beats, and quadruple meters have groupings of four beats.
- There are different conducting patterns for duple, triple, and quadruple meters.
- A measure is equivalent to one group of beats (duple, triple, or quadruple). Measures are separated by bar lines.
- Time signatures in simple meters express two things: how many beats are contained in each measure (the top number), and the beat unit (the bottom number), which refers to the note value that is the beat.
- A beam visually connects notes together, grouping them by beat. Beaming changes in different time signatures.
- Notes below the middle line on a staff are up-stemmed, while notes above the middle line on a staff are down-stemmed. Flag direction works similarly.

Chapter Playlist

In Rhythmic and Rest Values, we discussed the different rhythmic values of notes and rests. Musicians organize rhythmic values into various meters, which are—broadly speaking—formed as the result of recurrent patterns of accents in musical performances.

Terminology

Listen to the following performance by the contemporary musical group Postmodern Jukebox (Example 1). They are performing a cover of the song “Wannabe” by the Spice Girls (originally released in 1996). Beginning at 0:11, it is easy to tap or clap along to this recording. What you are tapping along to is called a beat—a pulse in music that regularly recurs.

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=163

Example 1. A cover of “Wannabe” performed by Postmodern Jukebox; listen starting at 0:11.

Example 1 is in a simple meter: a meter in which the beat divides into two, and then further subdivides into four. You can feel this yourself by tapping your beat twice as fast; you might also think of this as dividing your beat into two smaller beats.

Different numbers of beats group into different meters. Duple meters contain beats that are grouped into twos, while Triple meters contain beats that are grouped into threes, and Quadruple meters contain beats that are grouped into fours.

Listening to Simple Meters

Let’s listen to examples of simple duple, simple triple, and simple quadruple meters. A simple duple meter contains two beats, each of which divides into two (and further subdivides into four). “The Stars and Stripes Forever” (1896), written by John Philip Sousa, is in a simple duple meter.

Listen to Example 2, and tap along, feeling how the beats group into sets of two:

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=163

Example 2. “The Stars and Stripes Forever” played by the Dallas Winds.

A simple triple meter contains three beats, each of which divides into two (and further subdivides into four). Wolfgang Amadeus Mozart’s “Minuet in F major,” K.2 (1774) is in a simple triple meter. Listen to Example 3, and tap along, feeling how the beats group into sets of three:

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=163

Example 3. Mozart’s “Minuet in F major,” played by Alan Huckleberry.

Finally, a simple quadruple meter contains four beats, each of which divides into two (and further subdivides into four). The song “Cake” (2017) by Flo Rida is in a simple quadruple meter. Listen to Example 4 starting at 0:45 and tap along, feeling how the beats group into sets of four:

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=163

Example 4. “Cake” by Flo Rida; listen starting at 0:45.

As you can hear and feel (by tapping along), musical compositions in a wide variety of styles are governed by meter. You might practice identifying the meters of some of your favorite songs or musical compositions as simple duple, simple triple, or simple quadruple; listening carefully and tapping along is the best way to do this. Note that simple quadruple meters feel similar to simple duple meters, since four beats can be divided into two groups of two beats. It may not always be immediately apparent if a work is in a simple duple or simple quadruple meter by listening alone.

Conducting Patterns

If you have ever sung in a choir or played an instrument in a band or orchestra, then you have likely had experience with a conductor. Conductors have many jobs. One of these jobs is to provide conducting patterns for the musicians in their choir, band, or orchestra. Conducting patterns serve two main purposes: first, they establish a tempo, and second, they establish a meter.

The three most common conducting patterns outline duple, triple, and quadruple meters. Duple meters are conducted with a downward/outward motion (step 1), followed by an upward motion (step 2), as seen in Example 5. Triple meters are conducted with a downward motion (step 1), an outward motion (step 2), and an upward motion (step 3), as seen in Example 6. Quadruple meters are conducted with a downward motion (step 1), an inward motion (step 2), an outward motion (step 3), and an upward motion (step 4), as seen in Example 7:

Beat 1 of each of these measures is considered a downbeat . A downbeat is conducted with a downward motion, and you may hear and feel that it has more “weight” or “heaviness” then the other beats. An upbeat is the last beat of any measure. Upbeats are conducted with an upward motion, and you may feel and hear that they are anticipatory in nature.

Time Signatures

In Western musical notation, beat groupings (duple, triple, quadruple, etc.) are shown using bar lines, which separate music into measures (also called bars), as shown in Example 8. Each measure is equivalent to one beat grouping.

Example 8. Bar lines and measures.

In simple meters, time signatures (also called meter signatures) express two things: 1) how many beats are contained in each measure, and 2) the beat unit (which note value gets the beat). Time signatures are expressed by two numbers, one above the other, placed after the clef (Example 9).

Example 9. The two numbers (4 and 4) form a time signature.

A time signature is not a fraction, though it may look like one; note that there is no line between the two numbers. In simple meters, the top number of a time signature represents the number of beats in each measure, while the bottom number represents the beat unit.

In simple meters, the top number is always 2, 3, or 4, corresponding to duple, triple, or quadruple beat patterns. The bottom number is usually one of the following:

- 2, which means the half note gets the beat.
- 4, which means the quarter note gets the beat.
- 8, which means the eighth note gets the beat.

You may also see the bottom number 16 (the sixteenth note gets the beat) or 1 (the whole note gets the beat) in simple meter time signatures.

There are two additional simple meter time signatures, which are 𝐜 (common time) and 𝐜¢ (cut time). Common time is the equivalent of $\mathbf{^4_4}$ (simple quadruple—four beats per measure), while cut time is the equivalent of $\mathbf{^2_2}$ (simple duple—two beats per measure).

Counting in Simple Meter

Counting rhythms aloud is important for musical performance; as a singer or instrumentalist, you must be able to perform rhythms that are written in Western musical notation. Conducting while counting rhythms is highly recommended and will help you to keep a steady tempo. Please note that your instructor may employ a different counting system. *Open Music Theory* privileges American traditional counting, but this is not the only method.

Example 10 shows a rhythm in a $\mathbf{^4_4}$ time signature, which is a simple quadruple meter. This time signature means that there are four beats per measure (the top 4) and that the quarter note gets the beat (the bottom 4).

- In each measure, each quarter note gets a count, expressed with Arabic numerals—"1, 2, 3, 4."
- When notes last longer than one beat (such as a half or whole note in this example), the count is held over multiple beats. Beats that are not counted out loud are written in parentheses.
- When the beat in a simple meter is divided into two, the divisions are counted aloud with the syllable "and," which is usually notated with the plus sign (+). So, if the quarter note gets the beat, the second eighth note in each beat would be counted as "and."
- Further subdivisions at the sixteenth-note level are counted as "e" (pronounced as a long vowel, as in the word "see") and "a" (pronounced "uh"). At the thirty-second-note level, further subdivisions add the syllable "ta" in between each of the previous syllables.

A link to an interactive elements can be found at the bottom of this page.

Example 10. Rhythm in 4/4 time.

Simple duple meters have only two beats and simple triple meters have only three, but the subdivisions are counted the same way (Example 11).

A link to an interactive elements can be found at the bottom of this page.

Example 11. Simple duple meters have two beats per measure; simple triple meters have three.

Like with notes that last for two or more beats, beats that are not articulated because of rests, ties, and dots are also not counted out loud. These beats are usually written in parentheses, as shown in Example 12:

A link to an interactive elements can be found at the bottom of this page.

Example 12. Beats that are not counted out loud are put in parentheses.

Example 13. An anacrusis.

When an example begins with a pickup note (anacrusis), your count will not begin on "1," as shown in Example 13. An anacrusis is counted as the last note(s) of an imaginary measure. When a work begins with an anacrusis, the last measure is usually shortened by the length of the anacrusis. This is demonstrated in Example 13: the anacrusis is one quarter note in length, so the last measure is only three beats long (i.e., it is missing one quarter note).

Counting with Beat Units of 2, 8, and 16

In simple meters with other beat units (shown in the bottom number of the time signature), the same counting patterns are used for the beats and subdivisions, but they correspond to different note values. Example 14 shows a rhythm with a $\mathbf{^4_4}$ time signature, followed by the same rhythms with different beat units. Each of these rhythms sounds the same and is counted the same. They are also all considered simple quadruple meters. The difference in each example is the bottom number of the time signature—which note gets the beat unit (quarter, half, eighth, or sixteenth).

A link to an interactive elements can be found at the bottom of this page.

Example 14. The same counted rhythm, as written in a meter with (a) a quarter-note beat, (b) a half-note beat, (c) an eighth-note beat, and (d) a sixteenth-note beat.

Beaming, Stems, Flags, and Multi-Measure Rests

Beams connect notes together by beat. As Example 15 shows, this means that beaming changes depending on the time signature. In the first measure, sixteenth notes are grouped into sets of four, because four sixteenth notes in a mathbf{^4_4} time signature are equivalent to one beat. In the second measure, however, sixteenth notes are grouped into sets of two, because one beat in a mathbf{^4_8} time signature is only equivalent to two sixteenth notes.

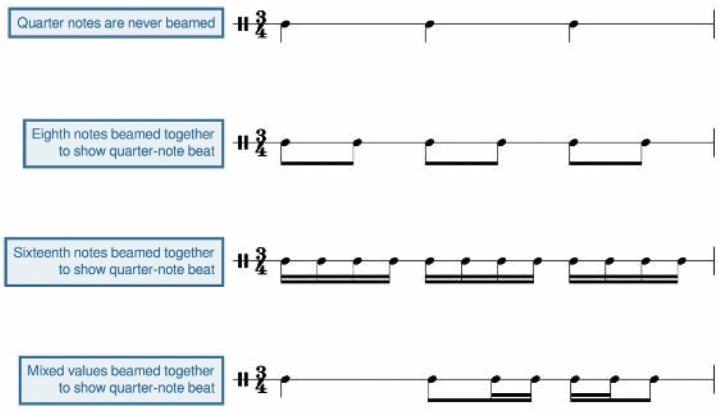
A link to an interactive elements can be found at the bottom of this page.

Example 15. Beaming in two different meters.

Example 16. Beaming makes rhythms easier to read by showing the beat unit.

Note that in vocal music, beaming is sometimes only used to connect notes sung on the same syllable. If you are accustomed to music without beaming, you may need to pay special attention to beaming conventions until you have mastered them. In the top staff of Example 16, the eighth notes are not grouped with beams, making it difficult to see where beats 2 and 3 in the triple meter begin. The bottom staff shows that if we re-notate the rhythm so that the notes that fall within the same beat are grouped together with a beam, it makes the music much easier to read. Note that these two rhythms sound the same, even though they are beamed differently. The ability to group events according to a hierarchy is an important part of human perception, which is why beaming helps us visually parse notated musical rhythms—the metrical structure provides a hierarchy that we show using notational tools like beaming.

Example 17 shows several different note values beamed together to show the beat unit. The first line does not require beams because quarter notes are never beamed, but all subsequent lines do need beams to clarify beats.



Example 17. Note values can be beamed together to show the beat unit. In [latex]\mathit{^3_4}[/latex], eighth and sixteenth notes can be beamed together to show a quarter-note beat.

Example 18. Beaming with different stem directions.

The second measure of Example 18 shows that when notes are grouped together with beams, the stem direction is determined by the note farthest from the middle line. On beat 1 of measure 2, this note is E_5, which is above the middle line, so down-stems are used. Beat 2 uses up-stems because the note farthest from the middle line is the E_4 below it.

Example 19. Flagging is determined by stem direction.

Flagging is determined by stem direction (Example 19). Notes above the middle line receive a down-stem (on the left) and an inward-facing flag (facing right). Notes below the middle line receive an up-stem (on the right) and an outward-facing flag (facing left). Notes on the middle line can be flagged in either direction, usually depending on the contour of the musical line.

Partial beams can be used for mixed rhythmic groupings, as shown in Example 20. Sometimes these beaming conventions look strange to students who have had less experience with reading beamed music. If this is the case, you will want to pay special attention to how the notes in Example 20 are beamed.

A link to an interactive elements can be found at the bottom of this page.

Example 20. Partial beams are used for some mixed rhythmic groupings.

Example 21. A multi-measure rest lasting four measures.

Rests that last for multiple full measures are sometimes notated as seen in Example 21. This example indicates that the musician is to rest for a duration of four full measures.

A Note on Ties

We have already encountered ties that can be used to extend a note over a measure line. But ties can also be used like beams to clarify the metrical structure within a measure. In the first measure of Example 22, beat 2 begins in the middle of the eighth note, making it difficult to see the metrical structure. Breaking the eighth note into two sixteenth notes connected by a tie, as shown in the second measure, clearly shows the beginning of beat 2.

Example 22. Ties and proper beaming help to clarify beats.

Online Resources

- Simple Meter Tutorial (musictheory.net)
- Video Tutorial on Simple Meter, Beats, and Beaming (YouTube)
- Conducting Patterns (YouTube)
- Simple Meter Time Signatures (liveabout.com)
- Simple Meter Counting (YouTube)
- Beaming Rules (Music Notes Now)
- Beaming Examples (Dr. Sebastian Anthony Birch)

Assignments from the Internet

A. Time Signatures and Rhythms (.pdf)
B. Terminology, Bar Lines, Fill-in-rhythms, Re-beaming (.pdf)
C. Meters, Time Signatures, Re-beaming (website)
D. Bar Lines, Time Signatures, Counting (.pdf)
E. Time Signatures, Re-beaming, p. 4 (.pdf)
F. Fill-in-rhythms (.pdf)
G. Time Signatures (.pdf, .pdf)
H. Bar Lines (.pdf, .pdf, .pdf)

Assignments

1. Notes, Rests, Bar Lines (.pdf, .docx)
2. Re-beaming (.pdf, .musx)

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1.10: Compound Meter and Time Signatures

Key Takeaways

- Compound meters are meters in which the beat divides into three and then further subdivides into six.
- Duple meters have groupings of two beats, triple meters have groupings of three beats, and quadruple meters have groupings of four beats. You can determine these groupings aurally by listening carefully and tapping along to the beat.
- There are different conducting patterns for duple, triple, and quadruple meters; these are the same in both compound and simple meters.
- Time signatures in compound meters express two things: how many divisions are contained in each measure (the top number), and the division unit—which note gets the division (the bottom number).
- Rhythms in compound meters get different counts based upon their division unit. Beats that are not articulated (because they contain more than one beat or because of ties, rests, or dots) receive parentheses around their counts.

Chapter Playlist

In the previous chapter, Simple Meter and Time Signatures, we explored rhythm and time signatures in simple meters—meters in which the beat divides into two and further subdivides into four. In this chapter, we will learn about compound meters—meters in which the beat divides into three and further subdivides into six.

Listening to and Conducting Compound Meters

Compound meters can be duple, triple, or quadruple, just like simple meters. In other words, the beats of compound meters group into sets of either two, three, or four. The difference is that each beat divides into three divisions instead of two, as you can hear by listening carefully to the following examples:

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=170

- “End of the Road” (1992) by Boyz II Men is in a duple meter—the beats group into a two pattern. Tap along to the beat and notice how it divides into three parts instead of two. If you further divide the beat (by tapping twice as fast), you will feel that the beat subdivides into six parts.
- The second movement (Minuet) of Franz Joseph Haydn’s Sonata no. 42 in G Major (1784) is in a compound triple meter. Listen for the groupings of three beats, each of which divides into three.
- Finally, a compound quadruple meter contains four beats, each of which divides into three. Listen to “Exogenesis Symphony Part III” (2010) by the alternative rock band Muse. This is in a compound quadruple meter; in other words, the beats are grouped into a four pattern.

In general, it is less common for music to be written in compound meters. Nonetheless, you must learn how to read music and perform in these meters in order to master Western musical notation.

Review the conducting patterns for simple meters in the previous chapter, as they are the same for compound meters.

Time Signatures

Measures in compound meters are equivalent to one beat grouping (duple, triple, or quadruple), just as they are in simple meters. However, the two numbers in the time signature express different information for compound meters. The top number of a time

signature in compound meter expresses the number of divisions in a measure, while the bottom number expresses the division unit —which note value is the division. Example 1 shows a common compound-meter time signature.

Example 1. Two numbers (6 and 8) form a common compound meter time signature.

Just like in simple meter, compound-meter time signatures are not fractions (and there is no line between the two numbers), and they are placed after the clef on the staff. In Example 1, the top number (6) means that each measure will contain six divisions; the bottom number (8) means that the eighth note is the division. This means that each measure in this time signature will contain six eighth notes, as you can verify by examining Example 1.

In compound meters, the top number is always a multiple of three. Divide this number by three to find the corresponding number of beats in simple meter: top numbers of 6, 9, and 12 correspond to duple, triple, and quadruple meters respectively. In compound meters, the bottom number is usually one of the following:

- 8, which means the eighth note receives the division.
- 4, which means the quarter note receives the division.
- 16, which means the sixteenth note receives the division.

The following table summarizes the six categories of meters that we have covered so far:

[table id=36 /]

Example 2. Categories of meters.

Counting in Compound Meter

While counting compound meter rhythms, it is recommended that you conduct in order to keep a steady tempo. Because beats in compound meter divide into three, they are always dotted. Beats in compound meter are as follows:

- If 8 is the bottom number, the beat is a dotted quarter note (equivalent to three eighth notes).
- If 4 is the bottom number, the beat is a dotted half note (equivalent to three quarter notes).
- If 16 is the bottom number, the beat is a dotted eighth note (equivalent to three sixteenth notes).

In simple meters, the beat divides into two parts, the first accented and the second non-accented. In compound meters, the beat divides into three parts, the first accented and the second and third non-accented. The counts for compound meter are different from simple meter, as demonstrated in Example 3, which is in $\mathbf{6_8}$.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Counting in a compound duple meter.

In this time signature, each measure has two beats (6÷3=2), indicating duple meter. Each dotted quarter note (the beat) gets a count, which is expressed in Arabic numerals, like in simple meter. For notes that are longer than one beat (such as the dotted half note in the fourth measure of Example 3), the beats that are not counted out loud are still written in parentheses. Divisions are counted using the syllables “la” (first division) and “li” (second division). As the final measure of Example 3 shows, further subdivisions at the sixteenth-note level are counted as “ta,” with the “la” and “li” syllables on the eighth-note subdivisions remaining consistent.

The third measure of Example 3 presents two of the most common compound-meter rhythms with divisions, so make sure to review this measure carefully if you are not familiar with compound meter.

Please note that your instructor may employ a different counting system. *Open Music Theory* privileges American traditional counting, but this is not the only method.

Example 4 gives examples of rhythms in (a) duple, (b) triple, and (c) quadruple meter. Just as with simple meters, compound duple meters have only two beats, compound triple meters have three beats, and compound quadruple meters have four beats.

A link to an interactive elements can be found at the bottom of this page.

Example 4. (a) Compound duple has two beats, (b) compound triple has three beats, and (c) compound quadruple has four beats.

Like in simple meters, beats that are not articulated because of rests and ties are written in parentheses and not counted out loud, as shown in Example 5. However, because dotted notes receive the beat in compound meters, dotted rhythms do not cause beats to be written in parentheses the way they do in simple meters.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Beats that are not counted out loud are put in parentheses.

Counting with Division Units of 4 and 16

So far, we have focused on meters with a dotted-quarter beat. In compound meters with other beat units (shown in the bottom number of the time signature), the same counting patterns are used for the beats and subdivisions, but they correspond to different note values (Example 6).

A link to an interactive elements can be found at the bottom of this page.

Example 6. The same rhythm written with three different beat units: (a) dotted quarter, (b) dotted half, and (c) dotted eighth.

Each of these rhythms sounds the same and is counted the same. They are also all considered compound triple meters. The difference in each example is the bottom number—which note gets the division unit (eighth, quarter, or sixteenth), which then determines the beat unit.

Beaming, Stems, and Flags

In compound meters, beams still connect notes together by beat; beaming therefore changes in different time signatures. In the first measure of Example 7, sixteenth notes are grouped into sets of six, because six sixteenth notes in a $\mathbf{^6_8}$ time signature are equivalent to one beat. In the second measure of Example 7, sixteenth notes are grouped into sets of three, because three sixteenth notes in a $\mathbf{^{\:6}_{16}}$ time signature are equivalent to one beat.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Beaming in two different meters.

When the music involves note values smaller than a quarter note, you should always clarify the meter with beams, regardless of whether the time signature is simple or compound. Example 8 shows twelve sixteenth notes beamed properly in two different meters. The first measure is in simple meter, so the notes are grouped by beat into sets of four; in the second measure, the compound meter requires the notes to be grouped by beat into sets of six.

Example 8. Proper beaming is essential in both simple and compound meters.

The same rules of stemming and flagging that applied in simple meter still apply in compound meter. For notes above the middle line, stems and flags point downward on the left side of the note, and for notes below the middle line, stems and flags point upward on the right side of the note. Stems and flags on notes on the middle line can point in either direction, depending on the surrounding notes.

Like in simple meters, partial beams can be used for mixed rhythmic groupings. If you aren't yet familiar with these conventions, pay special attention to how the notes in Example 9 are beamed.

A link to an interactive elements can be found at the bottom of this page.

Example 9. The most common partially beamed variations with a division unit of the eighth note. Online Resources

- Compound Meter Tutorial (musictheory.net) (compound meter starts about halfway through)
- Simple vs. Compound Time Signatures (YouTube) (start at 1:49 for compound meter)
- Compound Meter Counting and Time Signatures (John Ellinger)
- Compound Meter Counting (YouTube)
- Compound Meter Rhythmic Practice (YouTube)
- Compound Meter Beaming (Michael Sult)

Assignments from the Internet

A. Meter Identification (Simple and Compound) (.pdf,), and with Bar Lines (.pdf)
B. Meter Beaming (Simple and Compound) (.pdf), and pp. 4 and 5 (.pdf)
C. Time Signatures (Simple and Compound) (.pdf)
D. Counting in 6/8 (.pdf, .pdf, .pdf)
E. Time Signatures (.pdf, .pdf, .pdf)
F. Bar Lines (.pdf), and p. 2 (.pdf)

Assignments

1. Notes, Rests, Bar Lines (.pdf, .docx)
2. Re-beaming (.pdf, .musx)

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1.11: Other Rhythmic Essentials

Key Takeaways

- A triplet is a type of tuplet in which a beat (or subdivision, or multiple beats) in simple meter is divided into three parts. Notate a triplet by writing a 3 above the triplet rhythm.
- A duplet is a tuplet in which a beat (or subdivision) in compound meter is divided into two parts. Notate a duplet by writing a 2 above the duplet rhythm.
- Hypermeter refers to the patterns of accentuation at the metrical level.
- Syncopation happens when there are off-beat rhythmic accents, which can be created by ties, dots, rests, and/or dynamics.

Borrowed Divisions

Typically, a meter is defined by the presence of a consistent beat division: division by two in simple meter, and by three in compound meter. Sometimes composers will use a triple division of the beat in a simple meter, or a duple division of the beat in a compound meter; these rhythms are called tuplets. Triplets are a type of tuplet in which a beat (or subdivision, or multiple beats) in simple meter is divided into three parts. Triplets are sometimes thought of as "borrowed" from compound meter, because the beat in compound meter is usually divided into three parts. A triplet is notated by writing the number 3 on top of the triplet rhythm.

Triplets may occur at both any metric level, as seen in Example 1. In Example 1a, the triplet is at the beat level—this is the most common use of a triplet. Example 1b shows a sixteenth-note triplet, which is equivalent to one eighth note (the division in this time signature). Triplets also may occur across multiple beats, as seen in Example 1c. This triplet (notated with three quarter notes) takes up the space of one half note.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Triplets at (a) the beat level, (b) the subdivision level, and (c) the multi-beat level.

A duplet is a tuplet in which a beat (or subdivision) in compound meter is divided into two parts. Duplets are notated by writing the number 2 on top of the duplet rhythm, as seen in Example 2.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Notate a duplet by writing a 2 on top of the duplet rhythm.

Counting for tuplet rhythms is usually "borrowed" as well. For example, triplets are usually counted 1-la-li, while duplets are usually counted 1-and, 2-and, etc.

Meter Beyond Measure (Hypermeter)

We have seen that beats are either accented or non-accented which was observed in the discussion of conducting patterns in the previous two chapters (see Simple Meter and Time Signatures and Compound Meter and Time Signatures). Hypermeter refers to groups of measures that form patterns of accentuation, especially at faster tempos. In order to label patterns of accentuation across multiple measures, it can be helpful to annotate the score with hypermetrical counts as in Example 3, which shows a reduced excerpt from the "Scherzo" of Ludwig van Beethoven's Symphony no. 9 (1824). While listening to Example 3, try conducting along to the hypermetrical numbers in a quadruple pattern. By doing this, you will be able to feel (and hear) which measures are more accented (1 and 3) and which are less accented (2 and 4).

A link to an interactive elements can be found at the bottom of this page.

Example 3. Eight measures of the "Scherzo" of Ludwig van Beethoven's Symphony no. 9 (1824) with hypermetric counts.

Syncopation

Syncopation happens when there are off-beat rhythmic accents (see Rhythm and Meter in Pop Music for more information), and as Example 4 shows, it can be created by ties, dots, rests, and/or dynamics. In measure 1, the ties create the syncopation, while in measure 2, the rhythm is syncopated because of both a dot and a tie. The sense of syncopation in measure 3 is created by the rests at the beginning of each beat. In measure 4, while there is an eighth note on each division, the off-beat accents (dynamics) produce syncopation.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Different examples of syncopated rhythms. Online Resources

- Triplets and Duplets (YouTube)
- Triplets (Hello Music Theory)
- Duplets (Hello Music Theory)
- Syncopation (Music Theory Academy)
- Syncopated Rhythm Practice (YouTube)

Assignments from the Internet

A. Counting Triplets, pp. 32–33 (.pdf)
B. Counting Duplets, p. 13 (.pdf)
C. Hypermetrical Numbers (.pdf)
D. Counting Syncopation (.pdf, .pdf)

Assignments

1. Triplets and Duplets, Hypermeter, Syncopation (.pdf, .docx) Worksheet playlist

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1.12: Major Scales, Scale Degrees, and Key Signatures

Key Takeaways

- A major scale is an ordered collection of half (H) and whole (W) steps with the ascending succession W-W-H-W-W-W-H.
- Major scales are named for their first note (which is also their last note), including any accidental that applies to the note.
- Scale degrees are solmization syllables notated by Arabic numerals with carets above them. The scale degrees are $\hat{1}$-$\hat{2}$-$\hat{3}$-$\hat{4}$-$\hat{5}$-$\hat{6}$-$\hat{7}$.
- Solfège solmization syllables are another method of naming notes in a major scale. The syllables are *do*, *re*, *mi*, *fa*, *sol*, *la*, and *ti*.
- Each note of a major scale is also named with scale-degree names: tonic, supertonic, mediant, subdominant, dominant, submediant, and leading tone.
- A key signature, consisting of either sharps or flats, appears at the beginning of a composition, after a clef but before a time signature.
- The order of sharps in key signatures is F, C, G, D, A, E, B, while the order of flats is the opposite: B, E, A, D, G, C, F. In sharp key signatures, the last sharp is a half step below the tonic (the first note of a scale). In flat key signatures, the second-to-last flat is the tonic.
- The circle of fifths is a convenient visual for remembering major key signatures. All of the major key signatures are placed on a circle in order of number of accidentals.

A scale is an ordered collection of half and whole steps (see Half and Whole Steps and Accidentals to review).

Major Scales

A major scale is an ordered collection of half- (abbreviated H) and whole steps (abbreviated W) in the following ascending succession: W-W-H-W-W-W-H. Listen to Example 1 to hear an ascending major scale. Each whole step is labeled with a square bracket and “W,” and each half step is labeled with an angled bracket and “H.”

A link to an interactive elements can be found at the bottom of this page.

Example 1. An ascending major scale.

A major scale always starts and ends on notes of the same letter name, one octave apart, and this starting and ending note determines the name of the scale. Therefore, Example 1 depicts a C major scale because its first and last note is a C.

The name of a scale includes any accidental that applies to the first and last note. Example 2 shows a B♭ (B-flat) major scale—not a B major scale, which would use a different collection of pitches. Note that the pattern of half and whole steps is the same in every major scale, as shown in Example 1 and Example 2.

A link to an interactive elements can be found at the bottom of this page.

Example 2. A B-flat major scale.

Scale Degrees, Solfège, and Scale-Degree Names

Musicians name the notes of major scales in several different ways. Scale degrees are solmization syllables notated by Arabic numerals with carets above them. The first note of a scale is $\hat{1}$ and the numbers ascend until the last note of a scale, which is also $\hat{1}$ (although some instructors prefer $\hat{8}$). Example 3 shows a D major scale with each scale degree labeled with an Arabic numeral and a caret.

A link to an interactive elements can be found at the bottom of this page.

Example 3. A D major scale.

Below the scale degrees, Example 3 also shows another method of naming notes in a major scale: solfège solmization syllables. Solfège (a system of solmization syllables) are another method of naming notes in a major scale. The syllables *do*, *re*, *mi*, *fa*, *sol*, *la*, and *ti* can be applied to the first seven notes of any major scale; these are analogous to the scale degrees $\hat{1}$, $\hat{2}$, $\hat{3}$, $\hat{4}$, $\hat{5}$, $\hat{6}$, and $\hat{7}$. The last note is *do* ($\hat{1}$) because it is a repetition of the first note. Because *do* ($\hat{1}$) changes depending on what the first note of a major scale is, this method of solfège is called movable *do*. This is in contrast to a fixed *do* solmization system, in which *do* ($\hat{1}$) is always the pitch class C.

Each note of a major scale is also named with scale-degree names: tonic, supertonic, mediant, subdominant, dominant, submediant, leading tone, and then tonic again. Example 4 shows how these names align with the scale-degree number and solfège systems described above.

[table id=37 /]

Example 4. Scale-degree numbers, solfège syllables, and scale-degree names.

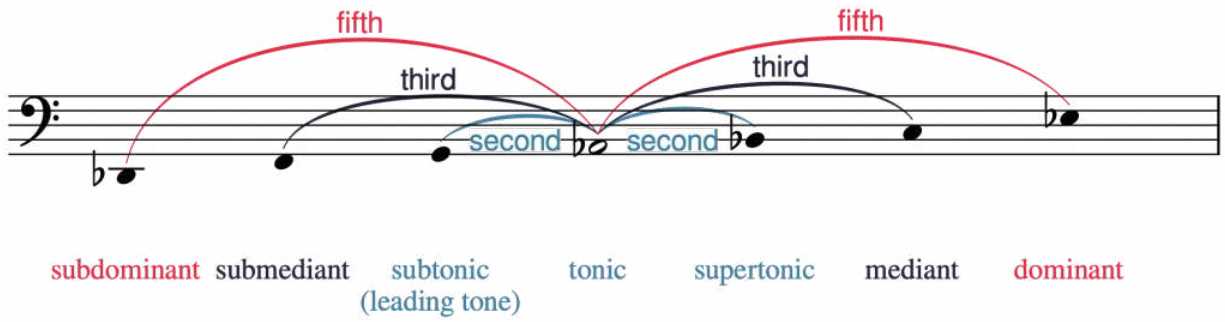
Example 5 shows these scale-degree names applied to an A♭ major scale:

A link to an interactive elements can be found at the bottom of this page.

Example 5. An A♭ major scale with scale-degree names.

Example 6 shows the notes and scale-degree names of the A♭ major scale in an order that shows how the names of the scale degrees were derived. The curved lines above the staff show the intervallic distance between each scale degree and the tonic.

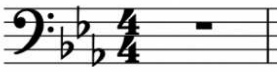
- The word *dominant* is inherited from medieval music theory, and refers to the importance of the fifth above the tonic in diatonic music.
- The word *mediant* means "middle," and refers to the fact that the mediant is in the middle of the tonic and dominant pitches.
- The Latin prefix *super* means "above," so the supertonic is a second above the tonic. This is the only "super-" interval.
- The Latin prefix *sub* means "below"; the subtonic, submediant, and subdominant are the inverted versions (i.e., below the tonic) of the supertonic, mediant, and dominant respectively. (Note that in this text, we prefer the term leading tone instead of "subtonic" when referring to the scale-degree that is a half step below tonic, so named because it is often thought of as "leading" toward the tonic.)



Example 6. The notes of the A♭ major scale arranged to show the derivation of scale-degree names.

Key Signatures

A key signature, consisting of either sharps or flats, appears at the beginning of a composition, after a clef but before a time signature. You can remember this order because it is alphabetical: clef, key, time. Example 7 shows a key signature in between a bass clef and a time signature.



Example 7. A key signature goes after a clef, but before a time signature.

Example 8. Both Bs are flat, regardless of octave.

Key signatures collect the accidentals in a scale and place them at the beginning of a composition so that it is easier to keep track of which notes have accidentals applied to them. In Example 7, there are flats on the lines and spaces that indicate the notes B, E, and A (reading left to right). Therefore, every B, E, and A in a composition with this key signature will be flat, regardless of octave. In Example 8 both of these Bs will be flat because B♭ is in the key signature.

Flat key signatures have a specific order in which flats are added, and the same is true of the sharps in sharp key signatures. These orders apply regardless of clef. Example 9 shows the order of sharps and flats in all four clefs that we have learned:

Example 9. The order of sharps and flats in treble, bass, alto, and tenor clefs.

The order of sharps is always F, C, G, D, A, E, B. This can be remembered with the mnemonic “Fat Cats Go Down Alleys (to) Eat Birds.” The sharps form a zig-zag pattern, alternating going down and up. In the treble, bass, and alto clefs, this pattern “breaks” after D♯ and then resumes. In the tenor clef, there is no break, but F♯ and G♯ appear in the lower octave instead of the upper octave.

The order of the flats is the opposite of the order of the sharps: B, E, A, D, G, C, F. This makes the order of flats and sharps palindromes. The order of flats can be remembered with this mnemonic: “Birds Eat And Dive Going Copiously Far.” The flats always make a perfect zig-zag pattern, alternating going up and down, regardless of clef, as seen in Example 9.

There are easy ways to remember which key signature belongs to which major scale. In sharp key signatures, the last sharp is a half step below the tonic (the first note of a scale). Example 10 shows three sharp key signatures in different clefs. Here’s how to identify each with this method:

Example 10. Three different sharp key signatures in treble, bass, and alto clefs.

1. The last sharp (in this case the only sharp), F♯, is a half step below the note G. Therefore, this is the key signature of G major.
2. The last sharp, G♯, is a half step below the note A. Therefore, this is the key signature of A major.
3. The last sharp, E♯, is a half step below the note F♯. Therefore, this is the key signature of F♯ major.

In flat key signatures, the second-to-last flat is the tonic (the first note of a scale). Example 11 shows three flat key signatures in different clefs. Here’s how to identify each with this method:

Example 11. Three different flat key signatures in bass, treble, and tenor clefs.

1. The second-to-last flat in this key signature is B♭. Therefore, this is the key signature of B♭ major.
2. The second-to-last flat is A♭. Therefore, this is the key signature of A♭ major.
3. The second-to-last flat is G♭. Therefore, this is the key signature of G♭ major.

Example 12. The key signatures of C major (top) and F major (bottom).

There are two key signatures that have no “tricks” that you will simply have to memorize. These are C major, which has nothing in its key signature (no sharps or flats), and F major, which has one flat: B♭ (Example 12).

Example 13 shows the key signature for C major (no sharps or flats) followed by all of the sharp key signatures in order in all four clefs: G, D, A, E, B, F♯, and C♯ major.

Example 13. The key signatures of C, G, D, A, E, B, F♯, and C♯ in all four clefs.

Example 14 first shows the key signature for C major (no sharps or flats), then all of the flat key signatures in order in all four clefs: F, B♭, E♭, A♭, D♭, G♭, and C♭ major.

Example 14. The key signatures of C, F, B♭, E♭, A♭, D♭, G♭, and C♭ in all four clefs.

Example 14 first shows the key signature of C major (with no sharps or flats), and then the key signatures of F, B♭, E♭, A♭, D♭, G♭, and C♭ in all four clefs.

There is one other “trick” that might make memorization of the key signatures easier: C major is the key signature with no sharps or flats, C♭ major is the key signature with every note flat (7 flats total), and C♯ major is the key signature with every note sharp (7 sharps total).

Major keys are said to be “real” if they correspond to one of the key signatures in Examples 13 or 14. If a double sharp or double flat would be needed for a key signature, then that key signature would be “imaginary.” Occasionally, you may encounter music in an imaginary key. Example 15 shows an F♭ major scale; an F♭ major key signature is imaginary because it would need a B𝄫.

A link to an interactive elements can be found at the bottom of this page.

Example 15. An F♭ major scale in treble clef.

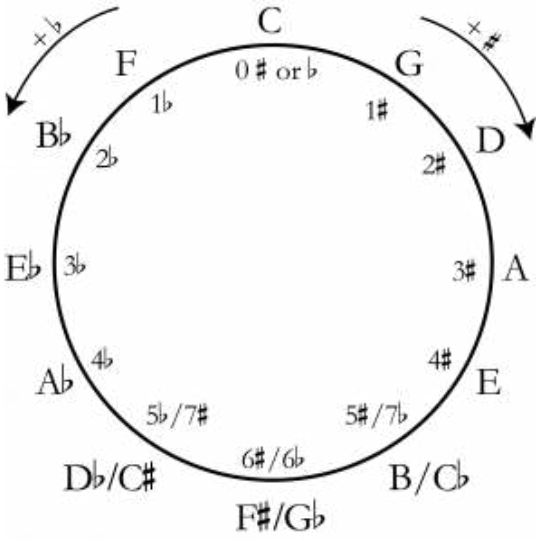
You can practice identifying major key signatures in the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

The Circle of Fifths

The circle of fifths is a convenient visual. In the circle of fifths, all of the major key signatures are placed on a circle in order of number of accidentals. The circle of fifths is so named because each key signature is a fifth away from the ones on either side of it. Example 16 shows the circle of fifths for major key signatures:



Example 16. The circle of fifths for major keys.

If you start at the top of the circle (12 o'clock), the key signature of C major appears, which has no sharps or flats. If you continue clockwise, sharp key signatures appear, each subsequent key signature adding one more sharp. If you continue counter-clockwise from C major, flat key signatures appear, each subsequent key signature adding one more flat. The bottom three key signatures (at 7, 6, and 5 o'clock) in Example 16 are enharmonically equivalent. For example, the B major and C♭ major scales have different key signatures—five sharps and seven flats, respectively—but they sound the same because the notes B and C♭ are enharmonically equivalent.

Online Resources

- Major Scales Tutorial (musictheory.net)
- Major Scales (Practical Chords and Harmonies)
- Major Scales (YouTube)
- Scale Degree Names (musictheoryfundamentals.com)
- Scale Degree Names (musictheory.net)
- Scale Degrees, Solfège, and Scale-degree Names (YouTube)
- Major Key Signatures (musictheory.net)
- Sharp Key Signatures (YouTube)
- Flat Key Signatures (YouTube)
- Major Key Signature Flashcards (music-theory-practice.com)
- The Circle of Fifths (YouTube)
- The Circle of Fifths (Classic FM)

Assignments from the Internet

A. Writing Major Scales (.pdf), from Tonic and Other Scale Degrees (.pdf)
B. Writing Major Key Signatures (.pdf)
C. Identifying Major Key Signatures (.pdf)
D. Major Keys Worksheets for Children (.pdf)
E. Scale Degrees or Solfège (.pdf, .pdf)

Assignments

1. Writing Major Scales (.pdf, .mscx)
2. Key Signatures: Major (.pdf, .mscx)

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1.13: Minor Scales, Scale Degrees, and Key Signatures

Key Takeaways

- A minor scale's third note is always a half step lower than the third note of the major scale with the same name.
- There are three variations on the minor scale: natural minor, harmonic minor, and melodic minor.
- Each minor scale is an ordered collection of half and whole steps, as follows:
  - Natural minor: W-H-W-W-H-W-W (ascending)
  - Harmonic minor: W-H-W-W-H-3Hs-H (ascending)
  - Melodic minor: W-H-W-W-W-W-H (ascending) and W-W-H-W-W-H-W (descending).
- While there are three minor scales, minor keys and minor key signatures are always identified as simply “minor” (“A minor,” “D minor,” etc.) and are based on the natural minor scale.
- Scale degrees in minor are the same as those in major. There are a few new solfège syllables in minor including *me* (\downarrow\hat3), *le* (\downarrow\hat6), and *te* (\downarrow\hat7).
- Each note of a minor scale is also named with scale-degree names. These are largely the same in minor as they are in major, except for the subtonic (*te* or \downarrow\hat7).
- Major and minor keys share two different relationships. The parallel relationship is when a major and minor key share a tonic note, while the relative relationship is when a major and minor key share a key signature.
- Each major key signature has a corresponding relative minor key signature whose tonic is three half steps below the relative major’s tonic. The orders of sharps and flats in major and minor key signatures are the same.

Chapter Playlist

The Minor Scale

A minor scale's third note is always a half step lower than the third note of the major scale with the same name (e.g., B major and B minor). There are three different types of minor scales: natural minor, harmonic minor, and melodic minor. These three types of minor scales should be thought of like flavors of ice cream; ice cream is still ice cream regardless of whether it is chocolate, vanilla, strawberry, etc. Likewise, a work is simply “minor” or “in minor”; musicians do not consider music to be “in” a specific type of minor scale (i.e., natural, harmonic, or melodic). In other words, while there are three minor scales, minor keys and minor key signatures are always identified as simply “minor” (“A minor,” “D minor,” etc.) and are based on the natural minor scale.

The three different types of minor scales are useful categories primarily for instrumental performers. Learning to play the different types of minor scales on instruments allows performers to become familiar with the minor patterns most commonly used in Western classical music. Just like major scales, minor scales are named for their first note (including the accidental, if any), which is also their last note.

Natural Minor

The natural minor form of the minor scale consists of an ordered collection of half and whole steps with the ascending succession W-H-W-W-H-W-W, as shown in Example 1. Each whole step is labeled with a square bracket and “W,” and each half step is labeled with an angled bracket and “H.” Listen carefully to Example 1 and notice that the half and whole step pattern of the natural minor form of the minor scale is the same ascending and descending.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A G natural minor scale. (Sounding scale is F natural minor.)

Harmonic Minor

The harmonic minor form of the minor scale consists of an ordered collection of half and whole steps in the ascending succession W-H-W-W-H-3Hs-H (“3Hs” = 3 half steps), as shown in Example 2. The curved bracket represents a distance of three half steps (or a whole step plus a half step). Listen carefully to Example 2 and notice that the half and whole step pattern of the harmonic minor form of the minor scale is the same ascending and descending.

A link to an interactive elements can be found at the bottom of this page.

Example 2. A G harmonic minor scale. (Sounding scale is F harmonic minor.)

Melodic Minor

The melodic minor form of the minor scale consists of an ordered collection of half and whole steps in the ascending succession W-H-W-W-W-W-H and the descending succession W-W-H-W-W-H-W, as shown in Example 3. When you listen to Example 3, notice that the melodic minor form has different ascending and descending patterns: the ascending pattern is unique to the melodic minor form, while the descending pattern is the same as the natural form.

A link to an interactive elements can be found at the bottom of this page.

Example 3. A G melodic minor scale. (Sounding scale is F melodic minor.)

Example 4 shows four versions of a C scale—major, natural minor, harmonic minor, and melodic minor—with the scale degrees indicated. Listen to this example carefully, noting the aural differences between the scales.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Major, natural minor, harmonic minor, and melodic minor scales, all starting on C.

Minor Scale Degrees, Solfège, and Scale-Degree Names

Minor scale degrees, solfège, and scale-degree names are similar to, but not exactly the same as, their major-scale counterparts. Example 5 summarizes the three types of minor scale, and shows the scale degrees and solfège for each. Note that the scale degrees are the same as in a major scale. The bottom line shows the solfège syllables, which differ from the major-scale syllables in several places to reflect the minor scale's pattern of whole and half steps.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Scale degrees and solfege for all three types of minor scales: a) natural minor; b) harmonic minor, and c) melodic minor.

In natural minor (Example 5a), *mi* ($\hat{3}$) becomes *me* ($\downarrow\hat{3}$) (pronounced "may"), *la* ($\hat{6}$) becomes *le* ($\downarrow\hat{6}$) (pronounced "lay"), and *ti* ($\hat{7}$) becomes *te* ($\downarrow\hat{7}$) (pronounced "tay"). If you sing or play through the above example, you'll notice that the ending lacks the same sense of closure you heard in the major scale. In the major scale, this closure is created in part by the ascending semitone between *ti* ($\hat{7}$) and *do* ($\hat{1}$).

In harmonic minor (Example 5b), *mi* ($\hat{3}$) becomes *me* ($\downarrow\hat{3}$) and *la* ($\hat{6}$) becomes *le* ($\downarrow\hat{6}$). Having *ti* ($\hat{7}$) creates the sense of closure that is absent in the natural minor scale.

As noted above, the melodic minor scale has different ascending and descending patterns (Example 5c). In the ascending form of melodic minor, *mi* ($\hat{3}$) becomes *me* ($\downarrow\hat{3}$), but the rest of the solfège syllables are the same as in major. In the descending form of melodic minor, *mi*($\hat{3}$) becomes *me* ($\downarrow\hat{3}$), *la*($\hat{6}$) becomes *le* ($\downarrow\hat{6}$), and *ti*($\hat{7}$) becomes *te*($\downarrow\hat{7}$), like natural minor. Therefore, the ascending version of melodic minor has the sense of closure associated with the major scale, while the descending version follows the pattern of the natural minor scale.

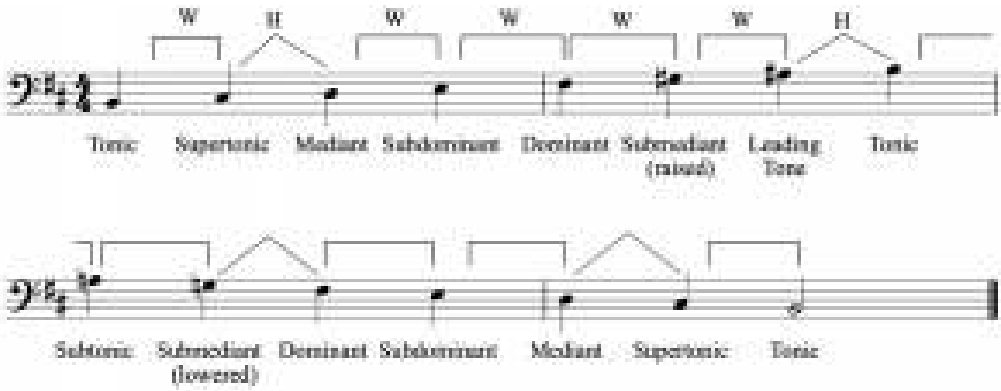
As in major scales, each note of a minor scale is also named with scale-degree names. Example 6 shows the scale-degree names used in minor scales alongside the corresponding scale-degree numbers and solfège syllables.

[table id=39 /]

Example 6. Scale-degree names in minor scales.

As the chapter on major scales discussed, the Latin prefix *sub* means "under"—the submediant is a third below the tonic, and the subdominant is a fifth below. To this, we can now add one new scale degree name: the subtonic, for lowered $\downarrow\hat{7}$. The supertonic is one whole step above the tonic, while the subtonic is one whole step below the tonic.

Example 7 shows a B melodic minor scale, ascending and descending, with scale-degree names labeled. As you can see, the melodic minor scale utilizes the leading tone in its ascending form, and the subtonic in its descending form.



Example 7. A B melodic minor scale.

Example 8 is a helpful visual for learning about the three forms of the minor scale. The order reflects the number of lowered scale degrees (compared to a major scale starting on the same note).

[table id=40 /]

Example 8. Lowered scale degrees of minor.

As you can see, natural minor scales have three lowered scale degrees, harmonic minor scales have two, and melodic minor scales have one in the ascending version. Remember, the descending version of melodic minor is the same as natural minor, with three lowered scale degrees.

The Parallel and Relative Relationships

$$\hat{1} \tag{1.13.1}$$

The relative relationship is when a major key shares a key signature with a minor key. For example, C major does not have any sharps or flats in its key signature, and neither does A minor. We use the terms “relative minor” and “relative major” to describe this relationship: C major is the relative major of A minor, and A minor is the relative minor of C major. The tonic of a minor key is always three half steps below the tonic of its relative major: if you count three half steps below C, you will get A (C–B, B–B♭, B♭–A). Likewise, to find the relative major key of a given minor key, count three half steps up.

When counting half steps to determine the relative major or minor of a given key, keep in mind that relative keys have the same key signature. A sharp key cannot share a relative relationship with a flat key (and vice versa), which means you need to select the correct enharmonic key. For example, although the pitch three half steps down from D♭ could be written as either B♭ or A♯, only B♭ minor (five flats) is the relative minor of D♭ major (also five flats), because A♯ minor has a different key signature (seven sharps).

Minor Key Signatures

Minor key signatures, like major key signatures, go after a clef but before a time signature. Each major key has a corresponding relative minor key signature; therefore, the orders of the sharps and flats are the same in minor key signatures as they are in major key signatures, placed on the same lines and spaces. Example 9, reproduced from the previous chapter, shows the order of sharps and flats in all four clefs:

Example 9. The order of sharps and flats in all four clefs.

As previously mentioned, if you know the major key associated with a given key signature, you can go down three half steps from the tonic to find the minor key for that key signature. Example 10 shows all of the sharp minor key signatures in order, and Example 11 depicts all of the flat minor key signatures in order.

Minor keys can also be imaginary (like imaginary major keys) if they contain double accidentals.

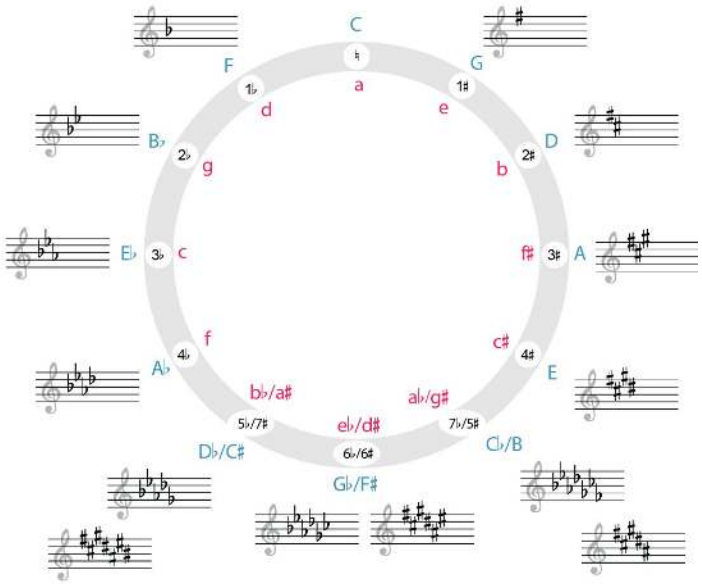
You can practice identifying minor key signatures in the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Minor Keys and the Circle of Fifths

The circle of fifths can be used as a visual for minor key signatures as well as major key signatures. Each key signature is placed alongside the corresponding major and minor keys. Example 12 shows the circle of fifths for minor and major keys:



Example 12. The circle of fifths for major and minor keys.

In Example 12, major keys are in blue uppercase letters around the outside of the circle, while minor keys are in red lowercase letters around the inside of the circle. Once again, key signatures appear in order of their number of accidentals. If you start at the top of the circle (12 o'clock) and continue clockwise, key signatures add sharps, while if you start at the top of the circle and continue counterclockwise, they add flats. The bottom three key signatures can be written in sharps or flats, and so are enharmonic.

Major or Minor?

When you are given a piece of music to play or sing, the notation will often include a key signature, which will help you to narrow down the key of the work to two options: a major key and its relative minor.[1] But how can you tell which one the work is in? One thing that can help is to listen to and look at the first and last notes of the work—pieces often start and end on the tonic, so this can help you determine whether a work is major or minor.

Example 13 shows the first three measures of a song by Louise Reichardt (1779–1826) titled "Durch die bunten Rosenhecken" ("Through the colorful rose hedges"):

Example 13. The first three measures of "Durch die bunten Rosenhecken."

This example shows a vocal line (the top staff) and a piano part (the grand staff underneath the vocal part). The key signature contains four flats, which means we can narrow down the key of this work to A♭ major or F minor. In Example 13, the first note that is circled in the highest part (the vocalist) is is F, as is the first note that is circled in the lowest part (the lowest note played by the piano). Therefore, it is likely that the key of this work is F minor instead of A♭ major.

Online Resources

- Minor Scales Tutorial (musictheory.net)
- Minor Scales (Practical Chords and Harmonies)
- Minor Scales (YouTube)
- Scale Degree Names in Major and Minor (musictheory.net)
- Minor and Major Key Signatures (musictheory.net)
- Minor Key Signatures (YouTube)
- Minor Key Signature Flashcards (music-theory-practice.com) (be sure to click "minor" in the menu)
- The Circle of Fifths for Minor and Major (YouTube)
- The Circle of Fifths (Classic FM)

Assignments from the Internet

A. Natural Minor Scales (.pdf)
B. Harmonic Minor Scales (.pdf)
C. Melodic Minor Scales (.pdf)
D. Writing Minor Scales (.pdf, .pdf)
E. Writing Minor Key Signatures (.pdf)
F. Writing and Identifying Minor Key Signatures (.pdf)
G. Parallel and Relative Minor Questions (.pdf)
H. Scale Degree Names and Scale Degrees (.pdf)

Assignments

1. Writing Minor Scales (.pdf, .mscx)
2. Key Signatures: Minor (.pdf, .mscz)

---

1. The vast majority of Western classical works from 1700–1900 are in either major or minor. But outside of this time period and cultural context, you should also consider if the piece may be in a diatonic mode. This would expand the number of possible tonics indicated by a key signature. 1.13: Minor Scales Scale Degrees and Key Signatures#return-footnote-196-1

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1.14: Introduction to Diatonic Modes and the Chromatic “Scale”

Key Takeaways

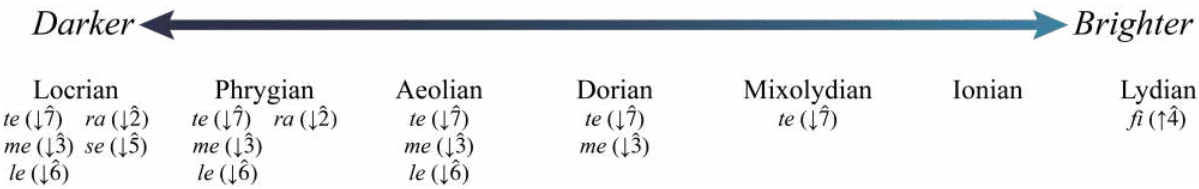
- The diatonic modes are scale-like collections of notes with patterns of half and whole steps.
- Modes can be described within a continuum of modal brightness: brighter modes sound more like a major scale, while darker modes sound more like a minor scale.
- The three bright modes, which contain *mi* ($\hat{3}$) instead of *me* ($\downarrow\hat{3}$), are lydian, ionian, and mixolydian.
- The four dark modes, which contain *me* ($\downarrow\hat{3}$) instead of *mi* ($\hat{3}$) are dorian, aeolian, phrygian, and locrian.
- A chromatic "scale", also known as the chromatic collection, consists of twelve adjacent half steps. Chromatic scales are often (but not always) written with sharps while ascending and with flats while descending.

This book covers modes from many different angles. For more information on modes, check Chord-Scale Theory (jazz), Modal Schemas (pop), Diatonic Modes (20th/21st-c.), and Analyzing with Modes, Scales, and Collections (20th-/21st-c.).

Modes and the Parallel Relationship

The diatonic modes are scale-like collections of notes with different patterns of half and whole steps. As we have learned previously, scales that share a tonic have a parallel relationship. In this chapter, modes are going to be described using the parallel relationship. Modes will also be described within a continuum of modal brightness; modal brightness: brighter modes sound more like a major scale, while darker modes sound more like a minor scale.

Example 1 ranks the seven diatonic modes in terms of relative brightness and darkness. It also summarizes which scale degrees are altered in relation to the ionian (major) mode, which will be explained in more detail below.



Example 1. Relative darkness and brightness of modes.

$$(\uparrow \hat{4}) \tag{1.14.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 2. C lydian with solfège.

The next brightest mode is the ionian mode. This mode consists of an ascending pattern of half and whole steps that is the same as a major scale: W-W-H-W-W-W-H. Example 3 shows C ionian with solfège.

A link to an interactive elements can be found at the bottom of this page.

Example 3. C ionian with solfège.

The next brightest mode is the mixolydian mode, with W-W-H-W-W-H-W as the ascending pattern of half and whole steps. Another way to think of this mode is as a major scale but with lowered $\hat{7}$. Example 4 shows C mixolydian with solfège.

A link to an interactive elements can be found at the bottom of this page.

Example 4. C mixolydian with solfège.

The lydian, ionian, and mixolydian modes are usually considered the brighter (or more major) modes because they contain *mi* instead of *me* (unaltered $\hat{3}$ instead of lowered $\downarrow\hat{3}$). The dorian, aeolian, phrygian, and locrian modes are usually considered darker (or more minor) modes because they contain *me* instead of *mi* ($\downarrow\hat{3}$ instead of unaltered $\hat{3}$).

The dorian mode is the first darker (or more minor) mode. This mode’s ascending pattern of half and whole steps is W-H-W-W-W-H-W. Another way to think of this mode is as a minor scale but with raised $\hat{6}$ (*la*). Example 5 shows C dorian with solfège:

A link to an interactive elements can be found at the bottom of this page.

Example 5. C dorian with solfège.

The next darkest mode is the aeolian mode. The aeolian mode's ascending pattern of half and whole steps is the same as a natural minor scale: W-H-W-W-H-W-W. Example 6shows C aeolian with solfège.

A link to an interactive elements can be found at the bottom of this page.

Example 6. C aeolian with solfège.

The next darkest mode is the phrygian mode. The ascending pattern of half and whole steps in the phrygian mode is H-W-W-W-H-W-W. This is the same pattern as a natural minor scale, but with lowered , whose solfège is *ra*. Example 7 shows C phrygian with solfège:

A link to an interactive elements can be found at the bottom of this page.

Example 7. C phrygian with solfège.

The darkest mode is the locrian mode. The locrian mode's ascending pattern of half and whole steps is H-W-W-H-W-W-W. This is the same pattern as a natural minor scale, but with lowered (*ra*) and lowered , whose solfège is *se*. Example 8 shows C locrian with solfège:

A link to an interactive elements can be found at the bottom of this page.

Example 8. C locrian with solfège.

Each mode can start on any note. For example, one could build a mixolydian collection starting on D♭, an aeolian collection starting on G♭, or a lydian collection starting on F♯. When writing modal collections, be sure to think about your accidentals carefully.

Example 9 shows all of the different modes with scale degrees and solfège, ordered from brightest to darkest (lydian to locrian):

A link to an interactive elements can be found at the bottom of this page.

Example 9. The modes from brightest to darkest, starting on C, with scale degrees.

Listen to Example 9 carefully, observing the difference between the modes.

Chromatic "Scales"

A chromatic "scale" consists of twelve adjacent half steps. Because it lacks a pattern of half and whole steps, music theorists generally refer to it as a chromatic collection, which is why "scale" is in scare quotes here. Example 10 shows two chromatic collections, the first starting on A and the second starting on E♭:

A link to an interactive elements can be found at the bottom of this page.

Example 10. Two chromatic collections starting on A and E♭.

As you can see in Example 10, chromatic collections are often (but not always) written with sharps while ascending and with flats while descending; the first line of this example demonstrates this. A chromatic collection that begins with a flat note (such as the second line in Example 10) is usually written with naturals while ascending and with flats while descending. When you write chromatic collections, don't forget that two pairs of white keys on the keyboard are half steps: B/C and E/F.

Online Resources

- Overview of the Modes and History (Classic FM)
- Modes from a Relative Conception (Learning Music)
- Modes Tutorial and Quiz (musictheoryfundamentals.com)
- Modes Identification Quiz (music-theory-practice.com)
- Chromatic Scales (Hello Music Theory)

Assignments from the Internet

A. Writing Modes (.pdf, .pdf), from a Relative Conception (.pdf)
B. Mode Identification and Accidental Error Detection (.pdf)
C. Dorian p. 1, and lydian p. 3 (.pdf)
D. Mode Writing and Questions (.docx, .docx)
E. Mode Identification (.pdf)
F. Chromatic Scales and Modes, p. 1 (.pdf)

G. Writing Chromatic Scales (.pdf)

Assignments

1. Writing Modes Assignment #1 (.pdf, .mscx)
2. Writing Modes Assignment #2 (.pdf, .mscx)
3. Writing Chromatic “Scales” Assignment #1 (.pdf, .mscx)
4. Writing Chromatic “Scales” Assignment #2 (.pdf, .mscx)

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1.15: Intervals

Key Takeaways

- Two pitches form an interval, which is usually defined as the distance between two notes.
- Melodic intervals are played or sung separately, while harmonic intervals are played or sung together.
- Every interval has a size and a quality. An interval's size is the distance between two notes on a staff—i.e., it is a measurement of the number of lines and spaces between two notes.
- Interval size is considered generic. In other words, it doesn't matter what accidentals you apply to the notes, the size is always the same.
- A quality makes an interval specific when used in combination with a size. Unisons, fourths, fifths, and octaves form perfect intervals, while seconds, thirds, sixths, and sevenths form major and minor intervals.
- Any interval can be augmented or diminished. Augmented intervals are one half step larger than a perfect or major interval. Diminished intervals are one half step smaller than a perfect or minor interval.
- Intervals between a unison and an octave are called simple intervals. Any interval larger than an octave is a compound interval.
- Intervallic inversion occurs when two notes are "flipped." When you need to identify an interval where the lower note is the tonic of a difficult or imaginary major key, inverting the interval can help.
- Consonant intervals are intervals that are considered more stable, as if they do not need to resolve, while dissonant intervals are considered less stable, as if they do need to resolve.

Two pitches form an interval, which is usually defined as the distance between two notes. But what does an interval measure? Physical distance on the staff? Difference in wavelength between pitches? Something else? Music theorists have had contradictory ideas on the definition of "interval," and these definitions have varied greatly with milieu. This chapter will focus on intervals as a measure of two things: written distance between two notes on a staff, and an aural "distance" (or space) between two sounding pitches. It will be important to keep in mind at all times that intervals are both written and aural, so that you are thinking of them musically (and not simply as an abstract concept that you are writing and reading).

Size

Intervals can be melodic (played or sung separately) or harmonic (played or sung together). In Example 1, the notes in the first measure sound together (harmonically), while in the second measure, they sound separately (melodically).

A link to an interactive elements can be found at the bottom of this page.

Example 1. A harmonic and a melodic interval.

Every interval has a size and a quality. A size is the distance between two notes on a staff—i.e., it is a measurement of the number of lines and spaces between two notes. Sizes are written with Arabic numbers (2, 3, 4, etc.); however, they are spoken with ordinal numbers (second, third, fourth, fifth, sixth, seventh, etc.). Always begin with "one" when counting size. Example 2 shows the eight sizes within a C major scale. As you can see, the sizes are labeled with ordinal numbers, with two exceptions: the interval between two notes on the same line or space is called a "unison," not a "first," and notes eight lines and spaces apart are said to be an "octave," not an "eighth."

A link to an interactive elements can be found at the bottom of this page.

Example 2. Sizes of intervals.

Size is considered generic. In other words, it doesn't matter what accidentals you apply to the notes—the size is always the same. Example 3 demonstrates this: despite the different accidentals, each of these intervals is a third (or "generic third") because there are three lines/spaces between the two notes.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Accidentals do not affect an interval's generic size.

You can practice identifying interval size with the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Perfect, Major, and Minor Qualities

A quality makes an interval specific when used in combination with a size. Quality more precisely measures written distance between notes, and—in combination with an interval's size—it describes the aural sound of an interval.

There are five possible interval qualities:

- Augmented (designated as A or +)
- Major (ma)
- Perfect (P)
- Minor (mi)
- Diminished (d or ^{o})

The quality comes before the size when saying or writing an interval. For example, an interval could be described as a "perfect fourth" (abbreviated P4), a "minor third" (abbreviated mi3), or an "augmented second" (abbreviated A2 or +2).

For now, we will only discuss three qualities: perfect, major, and minor. Different theorists (in different locations and time periods) have applied these qualities to different sizes of intervals, depending on milieu. Example 4 shows how these qualities are applied today. The left column shows that seconds, thirds, sixths, and sevenths are major and/or minor, while the right column shows that unisons, fourths, fifths, and octaves are perfect intervals.

[table id=61 /]

Example 4. Interval qualities.

The "Major Scale" Method for Determining Quality

There are several different methods for learning to write and identify qualities of intervals. One method you may have heard of is counting half steps. We do not recommend this method, because it is time consuming and often inaccurate. Instead, we recommend using what you know about major scales to identify interval quality.

To identify an interval (size and quality) using this method, complete the following steps:

1. Determine size (by counting lines and spaces between the notes).
2. Imagine that the bottom note of the interval is the tonic of a major scale.
3. Determine whether or not the top note is in the bottom note's major scale (imagined in step 2) and assign the corresponding quality.
4. If it is: the interval is perfect (if it is a unison, fourth, fifth, or octave) or major (if it is a second, third, sixth, or seventh). If it is not: the interval could be minor (a lowered second, third, sixth, or seventh), or it could be augmented or diminished, which will be covered in the next section.

Example 5 shows two intervals. Try identifying their size and quality:

A link to an interactive elements can be found at the bottom of this page.

Example 5. Two intervals.

In Example 5a, the notes are F and C in treble clef. Here is how you would use the "Major Scale" method to identify the interval:

1. First, this interval is a generic fifth (F to itself is 1; to G is 2; to A is 3; to B is 4; to C is 5).
2. Second, C is within the key of F major (which has one flat, B♭).
3. Therefore, the interval is a perfect fifth.

Let's now use this process for Example 5b. The notes in this example are E♭ and C♭ in treble clef. Let's go through the same process again:

1. First, this interval is a generic sixth (E♭ to itself is 1; to F is 2; to G is 3; to A is 4; to B is 5; to C is 6).
2. Second, C♭ is *not* in the key of E♭ major (which has three flats: B♭, E♭, and A♭).
3. Therefore, this is a minor sixth. If it were a major sixth, then the C would have to be C♮ instead of C♭, because C♮ is in the key of E♭ major.

You can practice identifying perfect, major, and minor intervals with the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Augmented and Diminished Qualities

To review, there are five possible interval qualities, of which we have covered major, minor, and perfect:

- Augmented (designated as A or +)
- Major (ma)
- Perfect (P)
- Minor (mi)
- Diminished (d or °)

Augmented intervals are one half step larger than a perfect or major interval. The first measure of Example 6a first shows the notes F and C, which form a perfect fifth (because C is in the key of F major). The top note of this interval is then raised by a half step to a C♯, making the interval one half step larger. The interval from F to C♯ is therefore an augmented fifth (abbreviated as either A5 or +5). In the second measure of Example 6a, the first interval is a major sixth between G and E (because E is in the key of G major). The top note is then raised by a half step to E♯, making the interval into an augmented sixth (A6 or +6). The bottom note of an interval can be altered as well. In the first measure of Example 6b, the perfect fifth F–C is turned into an augmented fifth by lowering the F by a half step to F♭, which makes the interval one half step larger than a perfect fifth. In the second measure of Example 6b, the major sixth G–E is turned into an augmented sixth by lowering the G by a half step to G♭.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Augmented intervals created by (a) raising the top note and (b) lowering the bottom note.

Diminished intervals are one half step smaller than a perfect or minor interval. In the first measure of Example 7a, the perfect fifth F–C is made a half step smaller by lowering the top note to C♭, forming a diminished fifth (also called a tritone, usually abbreviated as d5 or °5). In the second measure, G–E form a major sixth, which becomes a minor sixth when the top note is lowered by a half step. The minor sixth then becomes a diminished sixth when the top note is lowered again to E𝄫. Note that contracting an interval by one half step turns perfect and minor intervals into diminished intervals, but it turns major intervals into minor intervals. Again, it is not always the top note that is altered. In Example 7b, the perfect fifth F–C becomes diminished when the bottom note moves up a half step to F♯. In the second measure, the major sixth G–E first becomes a minor sixth when the G moves up a half step to G♯. This minor interval then becomes diminished when the G♯ moves to G𝄪 in the third measure, further contracting the interval by another half step.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Diminished intervals created by (a) lowering the top note and (b) raising the bottom note.

Example 8 again demonstrates and summarizes the relative size of intervals. Each bracket in this example is one half step larger or smaller than the brackets to its right and left. In Example 8a, the interval quality is changed by altering the top note with accidentals. As you can see, intervals one half step larger than perfect or major intervals are augmented; intervals one half step smaller than major intervals are minor; and intervals one half step smaller than perfect or minor intervals are diminished. Example 8b outlines the same qualities as 10a, only with the bottom note altered by accidentals instead of the top note.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Relative size of intervals with (a) the top note altered and (b) the bottom note altered.

You can practice identifying augmented and diminished intervals with the following exercise:

Practice

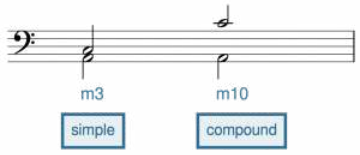
The original version of this chapter contained H5P content. You may want to remove or replace this element.

Doubly and Triply Augmented and Diminished Intervals

Intervals can be further contracted or expanded outside of the augmented and diminished qualities. An interval a half step larger than an augmented interval is a doubly augmented interval, while an interval a half step larger than a doubly augmented interval is a triply augmented interval. Likewise, an interval a half step smaller than a diminished interval is a doubly diminished interval, while an interval a half step smaller than a doubly diminished interval is a triply diminished interval.

Compound Intervals

The intervals discussed above, from unison to octave, are simple intervals, which have a size of an octave or smaller. Any interval larger than an octave is a compound interval. In Example 9, the notes A and C first form a minor third (a simple interval). When the C is brought up an octave in the second pair of notes, the interval becomes a minor tenth (a compound interval). Quality remains the same for simple intervals and their corresponding compound intervals.



Example 9. A simple and compound interval.

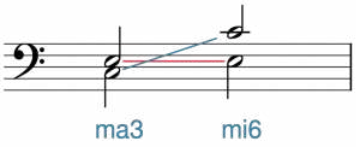
If you want to make a simple interval a compound interval, add 7 to its size. Consequently:

- Unisons (which get the number 1) become octaves (8s)
- 2nds become 9ths
- 3rds become 10ths
- 4ths become 11ths
- 5ths become 12ths
- 6ths become 13ths

These are the most common compound intervals that you will encounter in your music studies. Remember that octaves, 11ths, and 12ths are perfect like their simple counterparts, while 9ths, 10ths, and 13ths are major/minor.

Intervallic Inversion

Intervallic inversion occurs when two notes are “flipped.” In Example 10, for instance, an interval with C on the bottom and E on the top is inverted by moving the C up by an octave. You might be wondering: why is this important? There are two reasons: first, because inverted pairs of notes share many interesting properties (which are sometimes exploited by composers), and second, because inverting a pair of notes can help you to identify or write an interval when you do not want to work from the given bottom note.



Example 10. Intervallic inversion.

Let’s start with the first point: the interesting properties. First, the size of inverted pairs always adds up to 9:

- Unisons (1s) invert to octaves (8s) (1 + 8 = 9) and octaves invert to unisons.
- Seconds invert to sevenths (2 + 7 = 9) and sevenths invert to seconds.
- Thirds invert to sixths (3 + 6 = 9) and sixths invert to thirds.
- Fourths invert to fifths (4 + 5 = 9) and fifths invert to fourths.

Qualities of inverted pairs of notes are also very consistent:

- Perfect intervals invert to perfect intervals.
- Major intervals invert to minor intervals (and minor intervals to major intervals).
- Augmented intervals invert to diminished intervals (and diminished intervals to augmented intervals).

With that information, you can now calculate the inversions of intervals without even looking at staff paper. For example: a major seventh inverts to a minor second, an augmented sixth inverts to a diminished third, and a perfect fourth inverts to a perfect fifth.

Example 11. Inverting an interval may help with identification by putting a simpler note on the bottom.

Now for the second point: sometimes you will come across an interval that you do not want to calculate or identify from the bottom note. In the interval E𝄫–A♭ written in Example 11, for instance, identifying the interval using the "Major Scale" method would not work—the bottom note is E𝄫, and there is no key signature for this note (its key signature is "imaginary"). So, if you were given this interval to identify, you might consider inverting the interval. Now the inversion of the interval can be calculated from the non-imaginary key of A♭ major. The key of A♭ major has four flats (B♭, E♭, A♭, and D♭). An E♭ above A♭ would therefore be a perfect fifth; however, this interval has been contracted (made a half step smaller) because the E♭ has been lowered to E𝄫. That means this interval is a d5 (diminished fifth).

Now that we know the inversion of the first interval is a d5, we can calculate the original interval. A diminished fifth inverts to an augmented fourth (because diminished intervals invert to augmented intervals and because five plus four equals nine). Thus, the first interval is an augmented fourth (A4).

Consonance and Dissonance

Intervals are categorized as consonant or dissonant. Consonant intervals are intervals that are considered more stable, as if they do not need to resolve, while dissonant intervals are considered less stable, as if they do need to resolve. These categorizations have varied with milieu. Example 12 shows a table of melodically consonant and dissonant intervals:

[table id=63 /]

Example 12. *Melodically consonant and dissonant intervals.*

Example 13 shows harmonically consonant and dissonant intervals:

[table id=64 /]

Example 13. Harmonically consonant and dissonant intervals.

The implications of consonant and dissonant intervals are discussed further in the Introduction to Species Counterpoint.

Another Method for Intervals: The White-Key Method

Ultimately, intervals need to be committed to memory, both aurally and visually. There are, however, a few tricks to learning how to do this quickly. One such trick is the so-called "white-key method," which refers to the piano keyboard.

This method requires you to memorize all of the intervals found between the white keys on the piano (or simply all of the intervals in the key of C major). Once you've learned these, any interval can be calculated as an alteration of a white-key interval. For example, we can figure out the interval for the notes D and F♯ if we know that the interval D to F is a minor third and this interval has been made one semitone larger: a major third.

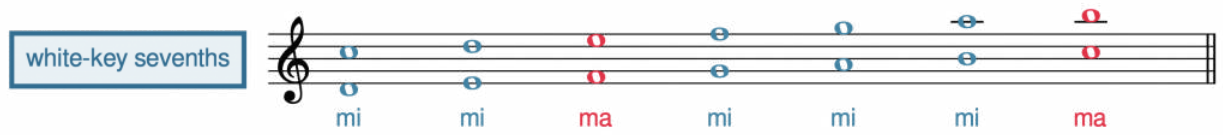
Conveniently, there is a lot of repetition of interval size and quality among white-key intervals, summarized in Example 14. Memorize the most frequent type and the exceptions.

- All of the seconds are major except for two: E–F and B–C.
- All of the thirds are minor except for three: C–E, F–A, and G–B, which are major.
- All of the fourths are perfect except for one: F–B, which is an augmented fourth (a tritone).

A link to an interactive elements can be found at the bottom of this page.

Example 14. White-key seconds, thirds, and fourths.

Believe it or not, you now know all of the white-key intervals, as long as you understand the concept of intervallic inversion, which was previously explained. For example, if you know that all seconds are major except for E–F and B–C (which are minor), then you know that all sevenths are minor except for F–E and C–B (which are major), as seen in Example 15.



Example 15. White-key sevenths.

Once you've mastered the white-key intervals, you can figure out any other interval by taking into account any accidentals applied to the notes.

Intervallic Enharmonic Equivalence

Example 16 may be useful when thinking about enharmonic equivalence of intervals. In this chart, the columns are different intervallic sizes, while the rows present intervals based on the number of half steps they contain. Each row in this chart is enharmonically equivalent. For example, a major second (ma2) and diminished third (d3) are enharmonically equivalent (both are two half steps). Likewise, an augmented fourth (A4) and diminished fifth (d5) are enharmonically equivalent—both are six half steps in size.

number of semitones	unis.	2nd	3rd	4th	5th	6th	7th	oct.
0	P1	d2						
1	A1	mi2						
2		ma2	d3					
3		A2	mi3					
4			ma3	d4				
5			A3	P4				
6				A4	d5			
7					P5	d6		
8					A5	mi6		
9						ma6	d7	
10						A6	mi7	
11							ma7	d8
12							A7	P8

Example 16. Enharmonic equivalence of intervals.

Example 17. Use enharmonic equivalence to aid in identifying difficult intervals.

Intervallic enharmonic equivalence is useful when you come across an interval that you do not want to calculate or identify from the bottom note. We have already discussed one method for this situation previously, which was intervallic inversion. You may prefer one method or the other, though both will yield the same result. Example 17 reproduces the interval from Example 11. As you'll recall, there is no key signature for the bottom note (E𝄫), making identification of this interval difficult. By using enharmonic equivalence, however, we can identify this interval more easily, recognizing that E𝄫 is enharmonically equivalent with D and that A♭ is enharmonically equivalent with G♯. Now we can identify the interval as an A4 (augmented fourth), using the key signature of the enharmonically equivalent bottom note (D).

Online Resources

- Specific Intervals (musictheory.net)
- Interval Introduction (Robert Hutchinson)
- Intervals (Hello Music Theory)
- Diminished and Augmented Intervals (Open Textbooks)
- Diminished and Augmented Intervals (Robert Hutchinson)
- Compound Intervals (Hello Music Theory)
- Interval Inversion (musictheory.net)
- Interval Ear Training (musictheory.net)
- Interval Ear Training (Tone Dear)
- Interval Ear Training (teoria)
- Interval Identification (musictheory.net)
- Keyboard Interval Identification (musictheory.net)

Assignments from the Internet

A. Interval Identification (.pdf, .pdf, .pdf), in Major Keys (.pdf), in Minor Keys (.pdf)
B. Interval Identification and Construction, pp. 18–19 (.pdf)
C. Interval Construction (.pdf, .pdf)
D. Compound Intervals, pp. 15–17 (.pdf)

Assignments

Using C clefs:

1. Writing and Identifying Intervals Assignment #1 (.pdf, .mcsz)
2. Writing and Identifying Intervals Assignment #2 (.pdf, .mcsz)
3. Writing and Identifying Intervals Assignment #3 (.pdf, .mcsz)

Treble and bass clef only:

4. Writing and Identifying Intervals Assignment #4 (.pdf, .mcsz)
5. Writing and Identifying Intervals Assignment #5 (.pdf, .mcsz)

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1.16: Triads

Key Takeaways

- A triad is a three-note chord whose notes can be arranged in thirds. A triad can always be “stacked” so that its notes are either on all lines or all spaces.
- When a triad is stacked in its most compact form in thirds, the lowest note is called the root, the middle note is called the third, and the highest note is called the fifth.
- There are four qualities of triad. A major triad's third is major and its fifth is perfect, while a minor triad's third is minor and its fifth is perfect. A diminished triad's third is minor and its fifth is diminished, while an augmented triad's third is major and its fifth is augmented.
- In chord symbols, major triads are represented with capital letters that correspond to the triad’s root. Minor triads have a lowercase “mi” after the letter, diminished triads have a superscript circle (^{o}), and augmented triads have a plus sign (+). You may see other abbreviations in other contexts (a more exhaustive list is given in the Chord Symbols chapter).
- Within major and minor keys, triads have particular qualities that correspond to scale degree. These are the same in every major and minor key, which makes memorizing them useful.
- Triads are identified by their root, quality, and inversion.

A chord is any combination of three or more pitch classes that sound simultaneously. This chapter focuses on triads—three-note chords whose notes can be stacked into thirds.

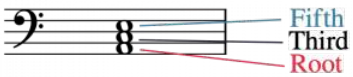
Triads

The three notes of a triad can always be arranged in thirds. Example 1 shows two triads, each written both melodically and harmonically. The first triad is on three adjacent spaces, while the second triad is on three adjacent lines. A triad can always be “stacked” so that its notes are either on all lines or all spaces. When a triad is stacked in its most compact form (measures 2 and 4 of Example 1), it looks like a snowperson (see Example 2). Just as a snowperson consists of a bottom, middle, and head, a triad consists of lowest, middle, and upper notes.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Two triads, shown melodically and harmonically.

Example 2. A snowperson.



Example 3. A triad with the root, third, and fifth labeled.

Colloquially, when a triad is stacked in this fashion, we might call this “snowperson form,” but the official term is root position; this is explored more in the chapter titled Inversion and Figured Bass. As Example 3 shows, the lowest note of a triad is called the root, the middle note is called the third (a generic third above the root), and the highest note is called the fifth (a generic fifth above the root).

Triadic Qualities and Listening to Triads

There are four qualities of triad—major, minor, diminished, and augmented—which are determined by the quality of the intervals from the root to the third and the root to the fifth. These qualities are labeled in Example 4: triad qualities are shown above the staff, the quality of the fifth to the root is given in red to the left of the triad, and the quality of the third is given in blue to the right of the triad. Augmented triads are shown last because the other three types are more common in most classical and popular music.

Note that triads are named for certain important intervals they contain:

- Major and minor triads are named for the quality of their third. (Both have perfect fifths.)
- Diminished and augmented triads are named for the quality of their fifth:
  - A diminished triad's fifth is diminished. (Its third is minor.)
  - An augmented triad's fifth is augmented. (Its third is major.)

Listen carefully to the different qualities of triad in Example 4. It is common to pair expressive qualities with triads when learning what they sound like. You might think of major triads as sounding "happy," minor triads as "sad," diminished triads as "scary," and augmented triads as having a "fantasy" or "mystical" sound.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Different qualities of triads.

Chord Symbols

Chord symbols for triads include the letter name of the root and an indication of the triad's quality, and sometimes the pitch class of the bass voice (meaning the lowest note in the chord, not any particular instrument or voice type).

A chord symbol begins with a capital letter (and, if necessary, an accidental) denoting the root of the chord. That letter is followed by information about a chord's quality. *Open Music Theory* will use the following abbreviations.[1]

- Major triad: no quality symbol is added
- Minor triad: lowercase "mi"
- Diminished triad: superscript circle (^{o})
- Augmented triad: plus sign (+)

For example, the chord symbols C, Cmi, C^{o}, and C+ mean a C major triad, C minor triad, C diminished triad, and C augmented triad, respectively. If the root of the chord has an accidental, include it: for example, B♭mi is the chord symbol for a B♭ minor triad, and F♯^{o} is the chord symbol for an F♯ diminished triad.

Finally, if a pitch class other than the chord root is the lowest note in the chord, a slash is added, followed by a capital letter denoting the pitch class in the bass. This topic will be explored more in the chapter titled Inversion and Figured Bass. Example 5 first shows C major and C minor triads with their chord symbols (C and Cmi). It then shows how the chord symbol for the C minor triad changes when a note other than C is on the bottom: when E♭ is the lowest note, the chord symbol is Cmi/E♭, and when G is the lowest note, the symbol is Cmi/G.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Four triads are shown with chord symbols.

Triad Qualities in Major and Minor

$$(\hat{1},\ \hat{4}, \tag{1.16.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. Qualities of triads in major keys.

$$(\hat{5}) \tag{1.16.2}$$

A link to an interactive elements can be found at the bottom of this page.

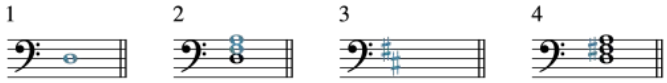
Example 7. Qualities of triads built on the minor scale.

Spelling Triads

To build a triad from a chord symbol, you need to be aware of the triad's root and quality. Complete the following steps:

1. Draw the root on the staff.
2. Draw notes a third and fifth above the root (i.e., draw a snowperson).
3. Think of (or write down) the major key signature of the triad's root.
4. To spell a major triad, write any accidentals from the key signature that apply to the notes of the triad.
5. For a minor, diminished, or augmented triad, add additional accidentals to alter the chord's third and/or fifth when appropriate.

Example 8 shows this process for a D major triad:



Example 8. Drawing a D major triad in four steps.

1. The note D, the chord's root, is drawn on the staff.
2. A snowperson is drawn—an F and A, the notes a generic third and a fifth above the D.
3. The key signature of D major has been recalled. D major has two sharps, F♯ and C♯.
4. A sharp (♯) has been added to the left of the F, because F♯ is in the key signature of D major. No C♯ was necessary because there is no C in the chord.

Let's complete this process for an A♭ minor triad (A♭mi), as seen in Example 9.

Example 9. Drawing an A♭ minor triad in five steps.

1. The note A♭ is written because it is the root of the triad.
2. A snowperson is drawn; in other words, the notes C and E are added because they are a generic third and fifth, respectively, above A♭.
3. The key signature of A♭ major is recalled. A♭ major has four flats: B♭, E♭, A♭, and D♭.
4. E♭ is added, because it is in the key signature of A♭ major. B♭ and D♭ are not needed, because those notes aren't in an A♭ triad. Now we have successfully spelled an A♭ major triad (A♭, C, and E♭).
5. Minor triads contain a minor third, which is one half step smaller than a major third. Therefore, our final step is to lower the chord's third (the C) by a half step (to a C♭). Now we have an A♭ minor triad (A♭, C♭, and E♭).

Don't forget that diminished triads have a minor third and a diminished fifth, meaning you have to lower both the third and the fifth by a half step from a major triad. An augmented triad has a major third and an augmented fifth, so its fifth must be raised by a half step from a major triad.

Identifying Triads, Doubling, and Spacing

Triads are identified according to their root, quality, and inversion; inversion is discussed in the Inversion and Figured Bass chapter, so we will focus on root and quality for now. You can identify triads in three steps:

1. Identify and write its root.
2. Imagine the major key signature of its root.
3. Identify and write its quality.

Example 10 shows a triad for the process of identification.

A link to an interactive elements can be found at the bottom of this page.

Example 10. A triad for identification.

To identify this triad:

1. This triad is written in its most compact form, so the root is the lowest note, D.
2. The key of D major has two sharps, F♯ and C♯; we can use this information to identify the quality of the triad.
3. In this triad, the F is sharp, matching the major key signature. Therefore, we can correctly identify this as a D major triad.

Let's apply the same steps to the triad in Example 11:

A link to an interactive elements can be found at the bottom of this page.

Example 11. A second triad for identification.

To identify this triad:

1. First, we identify and write its root, which is C♯.
2. Next, we can identify and write its quality. We imagine the key signature of C♯ major, which has seven sharps (every note is sharp).
3. Therefore, E and G would be sharp in the key of C♯ major, but we see that they are both natural in Example 11. Because both the third and the fifth have been lowered by a half step, this triad is diminished. We can now correctly identify this triad as a $C♯^{o}$ triad.

If the bottom note of a triad has an imaginary key signature (because there is a double accidental that applies to it), use enharmonic equivalence to respell the triad. The process for this will be the same as that outlined in the last section of Intervals.

Because of the principle of octave equivalence, the doubling or spacing of notes does not affect a triad's identification. Example 12 shows several different triads and their chord symbols. As you can see, the identification of these triads is the same, regardless of octave doublings (Example 12a) or the use of open spacing with wide intervals (Example 12b). Doublings and open spacing can be combined, as seen in Example 12c. In order to identify triads with doublings and open spacing, you need to either imagine or write the notes as a triad in closed spacing without any doublings.

A link to an interactive elements can be found at the bottom of this page.

Example 12. Doublings do not affect chord symbols.

You can practice identifying triad qualities with the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Online Resources

- Introduction to Chords (musictheory.net)
- Triad Introduction (Robert Hutchinson)
- What is a Triad? (YouTube)
- Building Triads (YouTube)
- Constructing Triads (Columbia)
- Lead-sheet Symbols (Robert Hutchinson)
- Triad Identification Practice Tool (teoria)
- Chord Ear Training (musictheory.net)
- Triad Ear Training (Tone Dear)
- Triad Ear Training (teoria)

Assignments from the Internet

A. Triad Identification (.pdf, .pdf, .pdf, .pdf, .pdf, .pdf, .pdf)
B. Triad Construction (.pdf), pp. 2, 4, 6, 7 (.pdf), p. 9 (.pdf)

Assignments

1. Triads Assignment #1 (.pdf, .mcsz). Asks students to identify 10 root-position closed-spacing chords with a chord symbol and write 10 chords in root position from a chord symbol. Includes C clefs.
2. Triads Assignment #2 (.pdf,.mcsz). Asks students to identify 10 root-position closed-spacing chords with a chord symbol and write 10 chords in root position from a chord symbol. Includes C clefs.
3. Triads Assignment #3 (.pdf, .mcsz). Asks students to identify 10 root-position closed-spacing chords with a chord symbol and write 10 chords in root position from a chord symbol. Includes C clefs.
4. Triads Assignment #4 (.pdf, .mcsz). Treble and bass clefs only. Asks students to identify 20 root-position closed-spacing chords with a chord symbol, write 20 chords in root position from a chord symbol, and identify chords by chord symbol in a short piano-and-voice excerpt.

1. You may see other abbreviations in other contexts (a more exhaustive list is given in the Chord Symbols chapter). 1.16: Triads#return-footnote-225-1

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1.17: Seventh Chords

Key Takeaways

- A seventh chord is a four-note chord whose notes can be arranged in thirds. A seventh chord can always be “stacked” so that its notes are either on all lines or all spaces.
- When a seventh chord is stacked in thirds, the lowest note is called the root, the lower middle note is called the third, the upper middle note is called the fifth, and the highest note is called the seventh, which is sometimes called the “chordal” seventh to distinguish it from the seventh scale degree.
- There are five common qualities of seventh chord. These qualities are the major-major seventh chord, major-minor seventh chord, minor-minor seventh chord, half-diminished seventh chord, and fully diminished seventh chord.
- There is another common way of naming seventh chords: the major-major seventh chord is also often called the major seventh chord, the major-minor seventh chord is also often called the dominant seventh chord, the minor-minor seventh chord is also often called the minor seventh chord, and the fully diminished seventh chord is also often simply called the diminished seventh chord.
- Within major and minor keys, seventh chords have particular qualities that correspond to scale degrees. These are the same in every major and minor key, which makes memorizing them useful.
- Seventh chords are identified by their root, quality of triad and seventh, and inversion.

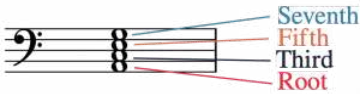
In this chapter, we will focus on seventh chords: four-note chords whose notes can be stacked into thirds.

Seventh Chords

Like triads, the notes of a seventh chord can always be arranged in thirds, on adjacent lines or spaces of the staff. If a triad in closed spacing looks like a snowperson, then a seventh chord in closed spacing (as in the second measure of Example 1) looks like an extra-long snowperson, with a bottom, two middles, and a head.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A seventh chord written melodically and harmonically.



Example 2. A seventh chord with the root, third, fifth, and seventh labeled. Click to enlarge.

Like in a triad, the lowest note of a seventh chord stacked in closed spacing is called the root, and the other notes are named for their generic intervals above the root, as shown in Example 2: the third, the fifth, and the seventh.

Seventh Chord Qualities and Nomenclature

Example 3 lists the five most common qualities of seventh chord: major-major, major-minor, minor-minor, half-diminished, and fully diminished. These qualities are determined by two factors:

1. The quality of the triad created by the root, third, and fifth (shown in the second column)
2. The quality of the seventh from the root to the seventh (shown in the third column)

A chord symbol for a seventh chord begins with the letter name of the triad’s root followed by an indication of the quality of its triad and seventh. Examples of chord symbols for different seventh chord qualities are given in the last column of Example 3.[1]

[table id=73 /]

Example 3. Summary of nomenclature for different qualities of seventh chord.

For the first three qualities of seventh chord, the first word describes the quality of the triad, and the second word describes the quality of the seventh:

- **major-major** seventh chord = **major** triad + **major** seventh
- **major-minor** seventh chord = **major** triad + **minor** seventh
- **minor-minor** seventh chord = **minor** triad + **minor** seventh

The other two qualities are both built on diminished triads but differ in the quality of the seventh:

- half-diminished seventh chord (diminished triad, minor seventh)
- fully diminished seventh chord (diminished triad, diminished seventh)

Music theorists often use the names described above, but there is also another common way of naming these chords, given in parentheses in the first column of Example 3:

- The major-major seventh chord is also often called the major seventh chord.
- The major-minor seventh chord is also often called the dominant seventh chord.
- The minor-minor seventh chord is also often called the minor seventh chord.
- The fully diminished seventh chord is also often simply called the diminished seventh chord.
- The half-diminished seventh chord does not typically have an alternate name.

Your instructor may have you label these chords using one set of terminology or the other, or a mix of both.

Example 4 summarizes all this information in music notation.

A link to an interactive elements can be found at the bottom of this page.

Example 4. The qualities of sevenths and triads in various seventh chord types.

Don't forget that when the root of a seventh chord has an accidental, you add that accidental into its name. For example, B♭mi^{7} is the chord symbol for a seventh chord with a B♭ minor triad and a minor seventh. Likewise, a G♯^{ma7} is the chord symbol for a seventh chord with a G♯ major triad and a major seventh.

In chord-symbol notation, if a pitch class other than the chord's root is the lowest note in a seventh chord, then a slash is added, followed by a capital letter denoting the pitch class in the bass (lowest) voice. Example 5 shows a G half-diminished seventh chord (G$^{\varnothing 7}$). In the first measure, the chord appears in first position; in the second measure, the chord's seventh (F) is in the bass voice, so the chord symbol is written as G$^{\varnothing 7}$/F. This topic will be explored more in the chapter Inversion and Figured Bass.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Two seventh chords.

Listening to Seventh Chords

Listen carefully to the different qualities of seventh chord in Example 4. It is common to pair expressive qualities with seventh chords when learning what they sound like. You might think of major-major seventh chords as sounding "happy and jazzy," major-minor seventh chords as sounding "unresolved" (like they strongly need to move to another chord), minor-minor seventh chords as "sad and jazzy," half-diminished seventh chords as "scary and jazzy," and fully diminished seventh chords as "very scary."

Seventh Chord Qualities in Major and Minor

$$(\hat{1}) \tag{1.17.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. Qualities of seventh chords in major keys.

$$(\hat{5}) \tag{1.17.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 8. Qualities of seventh chords in minor keys.

Spelling Seventh Chords

To build a seventh chord from a chord symbol, you need to be aware of its root and quality—inversion is discussed in the next chapter, titled Inversion and Figured Bass. The steps for spelling a seventh chord are similar to the steps for drawing a triad. Let's start with spelling a major-major seventh chord:

1. Draw the root on the staff.
2. Draw notes a third, fifth, and seventh above the root (i.e., draw an "extra-long" snowperson).
3. Think of (or write down) the major key signature of the triad's root.
4. Write any accidentals from the key signature that apply to the notes in the chord, creating a major triad and a major seventh.

For any other quality of seventh chord, add additional accidentals to alter the chord's third, fifth, and/or seventh when appropriate.

Example 8 shows this process for a D major-major seventh chord (D^{ma7}):

Example 8. Spelling a D major-major seventh chord in four steps. Click to enlarge.

1. The note D, the chord's root, is drawn on the staff.
2. An extra-long snowperson is drawn—an F, A, and C, the notes a generic third, fifth, and seventh above the D.
3. The key signature of D major has been recalled. D major has two sharps, F♯ and C♯.
4. Sharps (♯) have been added to the left of the F and the C, because F♯ and C♯ are in the key signature of D major.

The quality of the next chord will require us to write additional accidentals, so the process has a couple more steps. Example 9 shows the process for an A♭ fully diminished seventh chord ($A♭^{o7}$):

Example 9. Spelling an A♭ fully diminished seventh chord in six steps. Click to enlarge.

1. The note A♭ is written because it is the root of the triad.
2. An extra-long snowperson is drawn: C, E, and G are added because they are a generic third, fifth, and seventh, respectively, above A♭.
3. The key signature of A♭ major is recalled. A♭ major has four flats: B♭, E♭, A♭, and D♭.
4. E♭ is added, because it is in the key signature of A♭ major.
5. We have now followed the process to spell a major-major seventh chord, but we want a fully diminished seventh chord, which means adding accidentals that are not in the key signature of A♭ major:
   a. C and E♭ are lowered by a half step to C♭ and E𝄫 to change the triad from major to diminished.
   b. To change the chord's seventh from major to diminished, it needs to be lowered by two half steps, from G to G𝄫.

Following these steps is a reliable way for beginners to spell seventh chords, but it's a time-consuming process. If you practice playing all of the qualities of seventh chords on an instrument until you are fluent in them, your knowledge of these notes will become more automatic without using this process.

Identifying Seventh Chords, Doubling, and Spacing

Like triads, seventh chords are also identified according to their root, quality, and inversion; inversion is discussed in the Inversion and Figured Bass chapter, so the examples here will be in root position.

1. Identify and write its root.
2. Imagine the major key signature of its root.
3. Identify and write its quality of its triad.
4. Identify and write its quality of its seventh.

Example 10 shows a seventh chord in root position for the process of identification.

A link to an interactive elements can be found at the bottom of this page.

Example 10. A seventh chord in root position for identification.

To identify this seventh chord:

1. Because the chord is in root position, the root is the lowest note, C♯.
2. The key of C♯ major has seven sharps (every note is sharp). E and G would be sharp in the key of C♯ major, but we see that both of those notes are natural instead—lowered by a half step—making the triad diminished.
3. The chord's seventh, B, would also be sharp in C♯ major, but it is natural here. When a major seventh is made a half step smaller, it becomes a minor seventh.
4. A diminished triad and a minor seventh form a half-diminished seventh chord; therefore, this is a C♯ half-diminished seventh chord ($C♯^{∅7}$).

If the bottom note of a seventh chord has an imaginary key signature (because there is a double accidental that applies to it), use enharmonic equivalence to respell the seventh chord, following the process outlined in the last section of the Intervals chapter.

Like with triads, a seventh chord's identification is not affected by the doubling of notes or open spacing of notes (even across multiple clefs). Example 11 shows two different seventh chords in open spacing with doublings. Simply imagine or write the notes of seventh chords in closed spacing without any doublings to identify these chords, as we did previously.

A link to an interactive elements can be found at the bottom of this page.

Example 11. Two seventh chords with doublings in open spacing.

You can practice identifying seventh chords with the following exercise:

Practice

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Online Resources

- Seventh Chords (musictheory.net)
- Understanding Seventh Chords in Music (Hello Music Theory)
- Introduction to Seventh Chords (Robert Hutchinson)
- Seventh Chords (Kaitlin Bove)
- Seventh Chords (Music Theory Academy)
- Seventh Chords For Dummies (YouTube)
- Seventh Chords – Music Theory Crash Course (YouTube)
- Seventh Chord Ear Training (teoria)
- Chord Ear Training (musictheory.net)
- Chord Ear Training (Tone Savvy)

Assignments from the Internet

A. Seventh Chord Construction (.pdf, .pdf), p. 1 .pdf)
B. Constructing and Identifying Seventh Chords (.pdf)
C. Identifying Root Position Diatonic Seventh Chords (website), III

Assignments

1. Seventh Chords Assignment #1 (.pdf, .mcsz). Asks students to identify 10 root-position closed-spacing chords with a chord symbol and write 10 chords in root position from a chord symbol. Includes C clefs.
2. Seventh Chords Assignment #2 (.pdf, .mcsz). Asks students to identify 10 root-position closed-spacing chords with a chord symbol and write 10 chords in root position from a chord symbol. Includes C clefs.
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4. Seventh Chords Assignment #4 (.pdf, .mscz). Treble and bass clefs only. Asks students to identify 20 root-position closed-spacing chords with a chord symbol, write 20 chords in root position from a chord symbol, and identify chords by chord symbol in a short piano-and-voice excerpt.

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1. These chord symbols reflect those used in *Open Music Theory*, but you may come across others in your studies. See Chord Symbols for a more thorough explanation of these variations. 1.17: Seventh Chords#return-footnote-234-1

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1.18: Inversion and Figured Bass

Key Takeaways

- The bass voice of triadic harmonies, often simply called the “bass,” determines inversion.
- Inverted harmonies do not have the root in the bass. When the third appears in the bass, we say the chord is in first inversion, when the fifth appears in the bass we say the chord is in second inversion, and when the seventh appears in the bass we say the chord is in third inversion.
- In addition to chord symbols, musicians also use figured bass to indicate inversion. Each triad and seventh chord is indicated by unique figures, which are often abbreviated.
- Figured bass is not usually added to chord symbols; however, it is added to triadic shorthand notation.
- It is called realizing figured bass when musicians turn figured bass into chords, either on paper or in performance.
- Triads and seventh chords are identified according to their root, quality, and inversion. Inversion includes the appropriate figures if applicable.
- In order to denote chromatic alterations to notes, musicians put accidentals (♭, ♯, ♮) before the figure that is altered. Musicians also use slashes through a figure or a plus sign before a figure, in order to indicate raising the note by a half step.

Triadic Inversion and Figures

Musicians often prioritize the note that is in the bass voice of triadic harmonies, often simply called the “bass,” which is the lowest part (or voice) of a composition, regardless of what instrument or voice type is singing or playing that lowest note. Example 1 shows an A major triad with three different notes in the bass and chord symbols (above the staff):

A link to an interactive elements can be found at the bottom of this page.

Example 1. An A major triad in root position, first inversion, and second inversion.

An A major triad consists of three notes, the root (A), the third (C♯), and the fifth (E). When a triad is stacked in thirds (i.e. “snowperson form”), we say the triad is in root position. The bass note in root position is the root. Chords that do not have the root in the bass are said to be inverted, as summarized in Example 2:

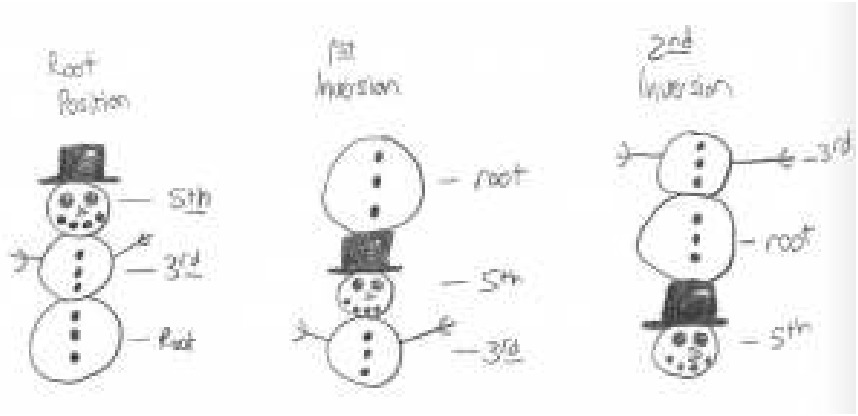
[table id=69 /]

Example 2. A summary of triadic inversions, root, and bass.

As seen in Example 2, when the third appears in the bass, we say the triad is in first inversion, and when the fifth appears in the bass we say the triad is in second inversion.

It is important to note that the bass voice of the chord is NOT the same thing as the chord’s root. The root of an A major triad is always A, regardless of whether the triad is in root position, first inversion, or second inversion. However, the bass voice changes between these inversions, from A to C♯ to E, as seen in Example 1 and Example 2.

You might think of first inversion triads as looking like a snowperson whose feet have been moved above their head, while a second inversion triad looks like a snow person whose head has been moved to where their feet would normally appear. Example 3 demonstrates this similarity:



Example 3. Visual similarity between snowpeople and inverted triads.

Sometimes musicians use chord symbols to indicate inversions, as seen in Example 1. However, musicians also use figured bass to indicate inversion. Figured bass uses Arabic numerals and some symbols which indicate intervals above the bass (NOT the root) note. These are then interpreted as chords by musicians.

Example 4 shows the full figured bass for triads underneath their chord symbols:

A link to an interactive elements can be found at the bottom of this page.

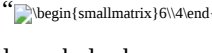
Example 4. The full figured bass for triadic inversions.

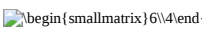
As you can see in Example 4, a root position triad has a third and a fifth above the bass. A first inversion triad has a third and a sixth above the bass, while a second inversion triad has a fourth and a sixth above the bass. In figured bass, the larger numerals (intervals) always appear above the smaller ones.

Many centuries ago, however, musicians abbreviated the full figured bass for triads and seventh chords in order to save time and supplies (paper and ink were very expensive before the industrial revolution). Example 5 shows the abbreviated figured bass for triads that we usually use today underneath their chord symbols:

A link to an interactive elements can be found at the bottom of this page.

Example 5. The abbreviated figured bass for triadic inversions.

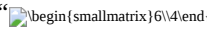
As you can see, no figure appears for root position. First inversion triads are abbreviated with the superscript number "6," while a second inversion triad keeps its full figures, "  ," to distinguish it from a first inversion triad.

Figured bass is not usually added to chord symbols; however, it is added to triadic shorthand notation. For example, the last measure of example 5 would be notated as "A/E" in chord symbols. Using triadic shorthand, this chord would be notated as "A  ."

When musicians turn figured bass into chords—either on paper or in performance—this is called realizing the figured bass. Example 6 shows the process of realization for several triads:

A link to an interactive elements can be found at the bottom of this page.

Example 6. Some triads with figured bass and their realizations.

As seen in the first measure of Example 6, an E♭ appears with no figured bass next to it. Therefore, we can assume that we are realizing an E♭ major triad in root position. This chord is realized (written out with notes) in the next measure. In measure 3, we see the number "6" below the bass note G. We can understand that notation to mean that we are realizing an E♭ major triad in first inversion. This chord is realized in the next measure. In measure 5, we see the figures "  " below the bass note B♭. This notation means that we are realizing an E♭ major triad in second inversion, realized in the next measure.

Example 7 shows the process of realization for a triad in first inversion in more detail:

A link to an interactive elements can be found at the bottom of this page.

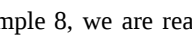
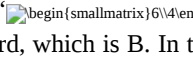
Example 7. Realizing a Gm triad in first inversion in three steps.

As seen in Example 7, we first see the bass note B♭ with the figure "6" underneath. This means that the third of the triad is in the bass. We can now find the root of the chord, which is G. In the second measure of Example 7, a G minor triad in root position has been realized in parentheses. In the third measure of Example 7, the third of the chord (the B♭) is in the bass; now the triad is in first inversion. The last measure of Example 7 is the correct "answer" or realization of this chord symbol.

Example 8 shows the process of realization for a triad in second inversion in more detail:

A link to an interactive elements can be found at the bottom of this page.

Example 8. Realizing a B triad in second inversion in three steps.

As seen in Example 8, we are realizing a B  triad—a B major triad in second inversion. In the first measure, we see an F# with the figured bass "  "underneath. This means that the fifth of the triad is in the bass, and we must find the root of the chord, which is B. In the second measure of Example 8, a B major triad in root position has been realized in parentheses. In the third measure of Example 8, the fifth of the chord (the F♯) appears in the bass; this chord is now in second inversion. The last measure of Example 8 is the correct "answer" or realization of this figure.

Identifying Triads

Triads are identified according to their root, quality, and inversion. With the addition of inversion, you can identify triads in four steps:

1. Identify and write its root.
2. Identify and write its quality.
3. Identify its inversion.
4. Write the appropriate figured bass figures if applicable.

Example 9 shows a triad in inversion (measure 1) and root position (measure 2):

A link to an interactive elements can be found at the bottom of this page.

Example 9. A triad in inversion (measure 1) and root position (measure 2).

The four-step process of identification for the triad in measure 1 is as follows:

1. In measure 2, the chord has been put into root position. Now we can see the root of the triad is D.
2. This triad is minor.
3. The third of the triad is in the bass; therefore this triad is in first inversion.
4. Using figured bass, we would identify this triad as Dm^6. Using chord symbols, we would identify this triad as Dm/F.

Example 10 shows another triad in inversion (measure 1) and root position (measure 2):

A link to an interactive elements can be found at the bottom of this page.

Example 10. A triad in inversion (measure 1) and root position (measure 2).

The four-step process of identification for the triad in measure 1 is as follows:

1. In measure 2, the chord has been put into root position. Now we can see the root is A.
2. This triad is major.
3. The fifth of the triad in the bass; therefore this triad is in second inversion.
4. Using figured bass, we would identify this triad is A$\begin{smallmatrix}6\\4\end{smallmatrix}$. Using chord symbols, we would identify this triad as A/E.

Note that the second measure of example 9 and example 10 are in parentheses. It is recommended that you imagine the chord in root position rather than write it out in order to save time.

Seventh Chord Inversion and Figures

Like triads, seventh chords can also be inverted; in other words, their root doesn't necessarily have to be the bass. Example 11 shows an A^7 chord in root position, first inversion, second inversion, and third inversion:

A link to an interactive elements can be found at the bottom of this page.

Example 11. Seventh chord inversions.

As you can see in Example 11, when a seventh chord has its root in the bass it is in root position. When the third appears in the bass it is in first inversion, and when the fifth appears in the bass it is in second inversion. Seventh chords have one more note than triads, so they have one additional inversion. When the chordal seventh of a seventh chord is in the bass it is in third inversion. Don't forget that the bass and the root of the chord are NOT synonymous. In Example 11 the root of the chord is always A, regardless of its inversion and bass note.

A summary of the different seventh chord inversions can be seen in Example 12:

[table id=70 /]

Example 12. A summary of seventh chord inversion, root, and bass.

We also use figured bass to indicate the inversion of seventh chords. Example 13 shows the full figured bass for seventh chords underneath their chord symbols:

A link to an interactive elements can be found at the bottom of this page.

Example 13. Seventh chord inversions with chord and figured bass.

As you can see in Example 13, a root position seventh chord has a third, fifth, and chordal seventh above the bass. A first inversion seventh chord has a third, fifth, and a sixth above the bass, while a second inversion seventh chord has a third, a fourth, and a sixth above the bass. Finally, a third inversion seventh chord has a second, a fourth, and a sixth above the bass.

Example 14 shows the abbreviated figured bass for seventh chords that musicians use today underneath their chord symbols:

A link to an interactive elements can be found at the bottom of this page.

Example 14. The abbreviated figures for seventh chord inversion.

As seen in Example 14, a root position seventh chord is abbreviated with just the number "7," while a first inversion seventh chord is abbreviated as "^6_5." A second inversion seventh chord is abbreviated "^4_3," and a third inversion seventh chord is abbreviated as "^4_2." Sometimes, in older style figured bass notation, a third inversion seventh chord is notated as "2."

You can realize figured bass for inverted seventh chords in a similar way to how you realized them for triads. To realize an inverted seventh chord, first realize the chord in root position, then invert the chord. Example 15 shows this process for a Gmm^6_5 chord (chord symbol $Gmi^7/B\flat$).

A link to an interactive elements can be found at the bottom of this page.

Example 15. Realizing an inverted seventh chord.

As seen in example 15, we first see the bass note B♭ with the figured bass "^6_5" underneath. This means that the third of the seventh chord is in the bass. We can now find the root of the chord, which is G. In the second measure of example 15, a Gmm7 (chord symbol Gmi^7) seventh chord has been realized in parentheses. In the third measure of example 15, the third of the chord (B♭) is in the bass; now the triad is in first inversion.

Example 16 shows another figured bass realization with inversion:

A link to an interactive elements can be found at the bottom of this page.

Example 16. Realizing an inverted seventh chord.

As seen in example 16, we first see the bass note F with the figured bass "^4_3" underneath. This means that the fifth of the seventh chord is in the bass. We can now find the root of the chord, which is B♭. In the second measure of example 16, a B♭MM^7 (chord symbol $B\flat M^7$) seventh chord has been realized in parentheses. In the third measure of example 16, the fifth of the chord (F) is in the bass; now the triad is in second inversion.

Identifying Seventh Chords

Like triads, seventh chords are also identified according to their root, quality, and inversion. You can identify seventh chords in five steps:

1. Identify and write its root.
2. Identify and write its quality of triad.
3. Identify and write its quality of seventh.
4. Identify its inversion if applicable.
5. Write the appropriate figured bass figures if applicable.

Example 17 shows a seventh chord in inversion and the process of identification:

A link to an interactive elements can be found at the bottom of this page.

Example 17. A seventh chord in inversion (measure 1) and root position (measure 2).

The five-step process of identification for the seventh chord in measure 1 is as follows:

1. In measure 2, the seventh chord has been put into root position (measure 2). Now we can see the root of the chord is E.
2. This triad is minor.
3. The chordal seventh is also minor.
4. The original example is in first inversion, because the third is in the bass.
5. This chord is an Emm^6_5 (chord symbol Emi^7/G) chord.

Another seventh chord in inversion is shown in Example 18, along with the process of identification:

A link to an interactive elements can be found at the bottom of this page.

Example 18. A seventh chord in inversion (measure 1) and root position (measure 2).

The five-step process of identification for the seventh chord in measure 1 is as follows:

1. In measure 2, the seventh chord has been put into root position (measure 2). Now we can see the root of the chord is G.
2. The triad is major.
3. The chordal seventh is minor.
4. The original example is in third inversion, because the seventh is in the bass.
5. This chord is an GMm4_2 (chord symbol G^7/F) chord.

Note that the second measure of Example 17 and Example 18 are in parentheses. It is recommended that you imagine the chord in root position rather than write it out in order to save time.

Other Figured Bass Symbols

In order to denote chromatic alterations to notes, musicians put accidentals (♭, ♯, ♮) before the figure that is altered. Example 19 shows a few realizations of figures with accidentals:

A link to an interactive elements can be found at the bottom of this page.

Example 19. Realizations of figures with accidentals.

Musicians also use slashes through a figure or a plus sign before a figure, in order to indicate raising the note by a half step. These symbols and their realizations are shown in Example 20:

A link to an interactive elements can be found at the bottom of this page.

Example 20. Realization of figures with other symbols.

An orphaned accidental (or hanging accidental) is also common. These are accidentals, that appear by themselves, not accompanying any other figure or symbol. In these cases, the accidental is assumed to apply to the third above the bass, as seen in Example 21:

A link to an interactive elements can be found at the bottom of this page.

Example 21. Realization of orphaned accidentals.

Take note that if only a “7” appears below the bass, a root position seventh chord is assumed. If no figures appear below the bass, a root position triad is assumed.

Online Resources

- Understanding Inversions of Triads and Seventh Chords (Justin Rubin)
- Triad Inversion (musictheory.net)
- Seventh Chord Inversion (musictheory.net)
- Figured Bass Inversion Symbols (Robert Hutchinson)
- Triad Chord Inversions (musictheoryacademy.com)
- How Do Chord Inversions Work? (Hello Music Theory)
- Chord Inversions (key-notes.com)
- Triad Chord Inversion (teoria)
- Figured Bass: How to Read Chord Inversion Symbols (LANDR)
- 7th Chord inversion (Gracemusic.us)
- Figured Bass (thinkingmusic.ca)
- What are Chord Inversions? (YouTube)
- What are Chord Inversions? Piano (YouTube)
- Seventh Chord Ear Training (teoria)
- Chord Ear Training (musictheory.net)
- Chord Ear Training (Tone Savvy)

Assignments from the Internet

A. Triad Construction (Inversion) (.pdf)
B. Triad Construction and Identification (Inversion), p.10 (.pdf), pp.4–8 (.pdf),

C. Triad Chord Identification (Inversion) (.pdf, .pdf)
D. Seventh Chord Construction (Inversion) (.pdf)
E. Seventh Chord Identification (Inversion) (.pdf)

Assignments

1. Triadic Inversions (.pdf, .mcsz). Asks students to write chord symbols and identify the inversion of closed-position chords, and to realize chords from chord-symbol-and-figured-bass notation.
2. Seventh Chord Inversions (.pdf, .mcsz) Asks students to write chord symbols and identify the inversion of closed-position chords, and to realize chords from chord-symbol-and-figured-bass notation.

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1.19: Roman Numerals and SATB Chord Construction

Key Takeaways

- Roman numeral analysis is an analytical procedure in which musicians use Roman numerals to identify chords within the context of key signatures.
- Roman numerals identify the scale degree of the chord's root, the chord's quality, and any extensions or inversions the chord may include.
- Uppercase Roman numerals denote major triads, and lowercase Roman numerals denote minor triads. A ^{o} symbol after a lowercase Roman numeral represents a diminished triad, while a $^{+}$ sign after an uppercase Roman numeral represents an augmented triad.
- The Roman numeral quality of a seventh chord is dependent on the chord's triad; the exceptions are half-diminished and fully diminished seventh chords, whose qualities are dependent on their chordal seventh.
- When constructing a chord in SATB style, there are six rules to keep in mind: stem direction, chord construction, range, spacing, voice crossing, and doubling.

Writing Roman Numerals

Music theorists use Roman numerals to identify chords within the context of key signatures. Roman numerals identify the scale degree of the chord's root, the chord's quality, and any extensions or inversions the chord may include. Because Roman numerals convey the same information across major and minor key signatures, using them can save time in analyzing Western common practice music.

The three columns of Example 1 show the Arabic numerals 1 through 7 alongside the corresponding uppercase and lowercase Roman numerals.

[table id=68 /]

Example 1. Arabic and Roman numerals.

To type uppercase Roman numerals, use the uppercase Latin alphabet letters "I" and "V"; likewise, for lowercase Roman numerals, type the lowercase "i" and "v." The Roman numerals IV (4) and VI (6) are often confused; to remember the difference, think of IV (4) as V minus I (5 minus 1), and VI (6) as V plus I (5 plus 1).

Ⅰ Ⅱ Ⅲ Ⅳ Ⅴ Ⅵ Ⅶ

versus

I II III IV V VI VII

Example 2. The difference between handwritten and typed Roman numerals.

Handwritten uppercase Roman numerals have horizontal bars across the top and bottom of the numeral, in order to further distinguish between uppercase and lowercase (Example 2). There is no such difference with lowercase Roman numerals.

Roman Numerals and Triad Quality

Roman numerals indicate three things: the scale degree of a chord's root, the quality of the chord, and the chord's inversion (see Inversion below). The number represented by the Roman numeral (see Example 1) corresponds to the scale degree of the chord's root in whatever key the music is in. Uppercase Roman numerals denote major triads, and lowercase Roman numerals denote minor triads. For example, in a major key, a chord built on the first scale degree, \hat1 or *do*, is identified as "I," and a chord built on the second scale degree, \hat2 or *re*, is identified by the lowercase Roman numeral "ii." Lowercase Roman numerals followed by a superscript "o" (such as vii^{o}) represent diminished triads. Uppercase Roman numerals followed by a + sign (for example, the rare V+) represent augmented triads.

In the analysis of Western music, Roman numerals are generally placed below the bottom staff. Some music theorists prefer to use only uppercase Roman numerals, a system which assumes chord quality is intuited; in this textbook, we privilege the distinction of triadic qualities as denoted by uppercase and lowercase Roman numerals.

Example 3 shows the triads and seventh chords of a G major scale, labeled with chord symbols and now Roman numerals (in blue). The solfège and scale degree of the roots are also labeled.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Roman numerals of triads in major and minor keys.

The Roman numerals and qualities of triads in major keys are as follows:

- I: major
- ii: minor
- iii: minor
- IV: major
- V: major
- vi: minor
- vii°: diminished

The Roman numerals and qualities of triads in minor keys are as follows:

- i: minor
- ii°: diminished
- III: major
- iv: minor
- v: minor
- V: major (raised leading tone)
- VI: major
- VII: major
- vii°: diminished (raised leading tone)

Note that the quality of v/V and VII/viiº differs depending on whether or not the leading tone is raised.

Roman Numerals and Seventh Chord Quality

Roman numeral labels for seventh chords add a superscript 7: for example, V^7, ii^7, and vii^{o7}. The capitalization of the Roman numeral depends on the quality of its triad: uppercase for a major triad (e.g., V^7), lowercase for a minor or diminished triad (e.g., ii^7). Half-diminished and fully diminished seventh chords, which both contain a diminished triad, are distinguished by an additional symbol after the lowercase Roman numeral: $^{\varnothing}$ for half-diminished (e.g., $vii^{\varnothing 7}$) and ^{o} for fully diminished (e.g., vii^{o7}).

Example 4 shows the triads and seventh chords of a G minor scale labeled with chord symbols and now Roman numerals (in blue). The solfège and scale degree of the roots are also labeled.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Roman numerals of seventh chords in major and minor keys.

The Roman numeral and qualities of seventh chords in major keys are as follows:

- I^7: major-major seventh (major seventh)
- ii^7: minor-minor seventh (minor seventh)
- iii^7: minor-minor seventh (minor seventh)
- IV^7: major-major seventh (major seventh)
- V^7: major-minor seventh (dominant seventh)
- vi^7: minor-minor seventh (minor seventh)
- $vii^{\varnothing 7}$: half-diminished seventh

The Roman numeral and qualities of seventh chords in minor keys are as follows:

- i^7: minor-minor seventh (minor seventh)
- $ii^{\varnothing 7}$: half-diminished seventh
- III^7: major-major seventh (major seventh)
- iv^7: minor-minor seventh (minor seventh)
- v^7: minor-minor seventh (minor seventh)
- V^7: major-minor seventh (dominant seventh)
- VI^7: major-major seventh (major seventh)

- VII^7: major-minor seventh (dominant seventh)
- vii°^{7}: fully diminished seventh (diminished seventh)

Note that the quality of v^7/V^7 and VII^7/vii°^{7} differs depending on whether or not the leading tone is raised.

Additionally, major seventh and dominant seventh chords have the same Roman numeral nomenclature; in other words, a I^7 chord and a V^7 chord are written the same even though the former is a major seventh chord and the latter is a dominant seventh chord. The difference would be discerned from the musical context.

Inversion

Roman numerals also denote inversions, shown through figured bass symbols placed after the Roman numeral (see the Inversion and Figured Bass chapter). For example, a superscript 6 represents a first inversion triad, and the figures would indicate a second inversion seventh chord. Example 5 shows four different inverted chords with Roman numerals:

A link to an interactive elements can be found at the bottom of this page.

Example 5. Four inverted chords with Roman numerals and figures.

Roman Numeral Analysis

To complete a Roman numeral analysis, begin by identifying the work's key and writing it under the key signature at the beginning of the work, using an uppercase letter name for a major key and a lowercase letter name for a minor key. It can also be helpful to write a lowercase "m" following the letter name of a minor key (e.g., "dm" for D minor). Be sure to apply any applicable accidental (e.g., "E♭" for E-flat major).

After you identify and write the key at the start of the work, follow these steps for each chord to complete the Roman numeral analysis:

1. If a chord is in inversion, stack it in root position (preferably mentally).
2. Identify all the notes of the chord, taking its quality into account.
3. Write the Roman numeral that corresponds with the scale degree of the chord's root, reflecting the quality in the Roman numeral (uppercase or lowercase).
4. Write any additional quality symbols (°, ∅, +) as needed.
5. Write figures after the Roman numeral.

Example 6 shows a Roman numeral analysis for Johann Sebastian Bach's chorale "Jesu meiner Seelen Wonne" (1642), which translates to "Jesus, delight of my soul." When analyzing this chorale, ignore the notes in parentheses. It is recommended that you cover up the Roman numerals in this example and try to generate them on your own before uncovering them:

A link to an interactive elements can be found at the bottom of this page.

Example 6. Roman numeral analysis of an excerpt of Johann Sebastian Bach's "Jesu, meiner Seelen Wonne" (BWV 359).

Roman numeral analysis is not just limited to chorales; indeed, you can apply them to many different genres of music. Example 7 shows an excerpt from "Caro Mio Ben" (c. 1783), which translates to "Dearly beloved" and is attributed to Guiseppe Giodani, with a Roman numeral analysis:

A link to an interactive elements can be found at the bottom of this page.

Example 7. Roman numeral analysis of an excerpt of Giuseppe Giordani's "Caro Mio Ben."

When the same chord occurs two or more times in a row, which is common, you can choose whether to repeat the Roman numeral (as in measure 1 of Example 7) or not (as in measure 2 of Example 6).

Writing Chords in SATB Style

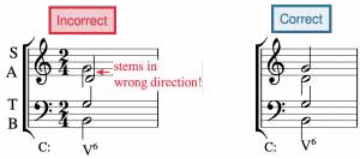
Music theorists sometimes simplify compositions into four parts (or voices) in order to make their harmonic content more readily accessible. This practice is called SATB style, abbreviated after the four common voice parts of a choir—soprano (S), alto (A), tenor (T), and bass (B). When constructing a chord in strict SATB style, there are six rules musicians generally follow:

- Stem Direction

- Chord Construction
- Range
- Spacing
- Voice Crossing
- Doubling

These six parameters form the basis of counterpoint and part writing, explored further in the sections Counterpoint and Galant Schemas and Diatonic Harmony, Tonicization, and Modulation.

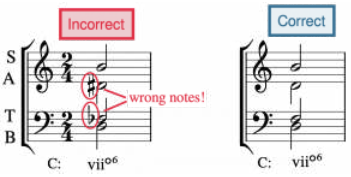
Stem Direction



Example 8. A stemming error.

On a grand staff in SATB style, the soprano and alto are written in the treble clef (upper staff), while the tenor and bass are written in the bass clef (lower staff). The soprano and tenor voices receive up-stems, while the alto and bass parts receive down-stems. If the stem direction is crossed, this is an error. Example 8 shows a chord with incorrect stemming, followed by the corrected version.

Chord Construction

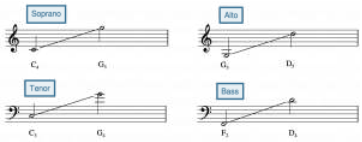


Example 9. A chord construction error.

Be sure to check each chord for correct notes and accidentals, and make sure that your chords are not missing any notes. In Example 9, the first chord has accidentals erroneously added to two of the pitches, which are removed in the second chord to create a correct B diminished triad in first inversion.

The bass voice must always correspond with the inversion that the Roman numeral's figures indicate. However, the order of the upper notes can be arranged in many ways. In other words, there is not necessarily just one correct way to voice a chord.

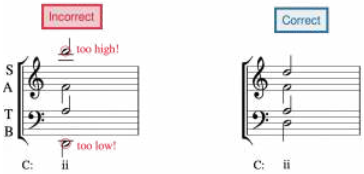
Range



Example 10. Vocal ranges.

There is a generally accepted range for each voice (Example 10):

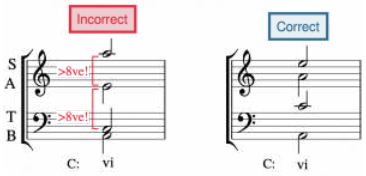
- Soprano – C_4 to G_5
- Alto – G_3 to D_5
- Tenor – C_3 to G_4
- Bass – F_2 to D_4



Example 11. A range error.

In Example 11, the soprano and bass notes are out of range; this is corrected by moving the soprano note down by an octave and the bass note up by an octave.

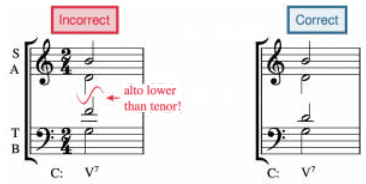
Spacing



Example 12. A spacing error.

There should be no more than an octave between adjacent upper voices (soprano and alto, alto and tenor) and no more than a twelfth between the tenor and bass. The most common spacing error occurs between the alto and tenor because the notes appear in different clefs. Example 12 first shows a chord with incorrect spacing—the soprano and alto are more than an octave apart, as are the alto and tenor—followed by a corrected version:

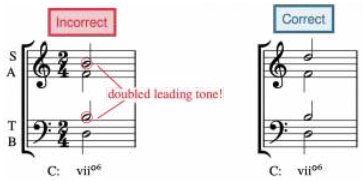
Voice Crossing



Example 13. A voice crossing error.

The ranges of voices should not cross. In other words, the soprano must always be higher than the alto, the alto must always be higher than the tenor, and the tenor must always be higher than the bass. In Example 13, the alto and tenor voices are crossed. This error is also the most common between the alto and tenor voices.

Doubling



Example 14. A doubling error.

In a triad, the note in the bass is usually doubled in an upper voice. However, there is an exception to this: the leading tone is never doubled. Other tendency tones, such as chordal sevenths, are also never doubled. Seventh chords don't have any notes doubled because they contain four notes, one for each voice part. Incorrect doubling is seen in the first measure of Example 14, where the leading tone is doubled, followed by a corrected voicing in the second measure.

Online Resources

- Roman Numeral Analysis: Triads (musictheory.net)
- Harmonizing Scales & Roman Numeral Analysis (Kaitlan Bove)
- Roman Numerals (learnmusictheory.net)
- Roman Numeral Analysis (Phillip Magnuson)
- Roman Numeral Analysis (8notes.com)
- Roman Numeral Chord Symbols (Robert Hutchinson)
- Roman Numerals in Major Flashcards (gmajormusictheory.org)
- Roman Numerals in Minor Flashcards (gmajormusictheory.org)
- Inversion & Roman Numerals in Major Flashcards (gmajormusictheory.org)
- Inversion & Roman Numerals in Minor Flashcards (gmajormusictheory.org)
- How the Roman Numeral System Works (YouTube)

Assignments from the Internet

A. Roman Numeral Identification, pp. 15–16, 18 (.pdf), pp. 5–7 (.pdf), pp. 1, 3, 4 (.pdf), (.pdf, .pdf, .pdf, .pdf)
B. Roman Numeral Identification and Construction, p. 14 (triads) and 17 (seventh chords) (.pdf), p. 11 (.pdf), p. 8 (.pdf), p. 5 (.pdf), (website, website)
C. Roman Numeral Construction, p. 22 (.pdf)

Assignments

1. Roman Numerals Identification Assignment #1 (.pdf, .mscz, .mp3). Asks students to create a Roman numeral analysis with figures of a modified Bach chorale.
2. Roman Numerals Identification Assignment #2 (.pdf, .mscz, .mp3). Asks students to create a Roman numeral analysis with figures of a modified Bach chorale.
3. Roman Numerals Identification Assignment #3 (.pdf, .mscz, .mp3). Asks students to create a Roman numeral analysis with figures of a modified Bach chorale.
4. Roman Numerals (.pdf, .mscz). Asks students to identify chord symbols and Roman numerals for open-voicing chords in major and minor keys, realize Roman numerals in closed position, and label the chords of two excerpts with Roman numerals. No figured bass.

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1.20: Texture

Key Takeaways

- Musical texture is the density of and interaction between a work's different voices.
- Monophony is characterized by an unaccompanied melodic line.
- Heterophony is characterized by multiple variants of a single melodic line heard simultaneously.
- Homophony is characterized by multiple voices harmonically moving together at the same pace.
- Polyphony is characterized by multiple voices with separate melodic lines and rhythms.
- Most music does not conform to a single texture; rather, it can move between them.

Chapter Playlist

Texture is an important (and sometimes overlooked) aspect of music. There are many types of musical texture, but the four main categories used by music scholars are monophony, heterophony, homophony, and polyphony.

Monophony

A monophonic texture is characterized by a single unaccompanied melodic line of music. Monophony involves all instruments playing or singing in unison, making it the simplest and most exposed of all musical textures. The first movement of Cello Suite no. 1 in G Major (1717) by Johann Sebastian Bach is an example of a monophonic texture. Notice how the solo cello line is the only voice in this work.

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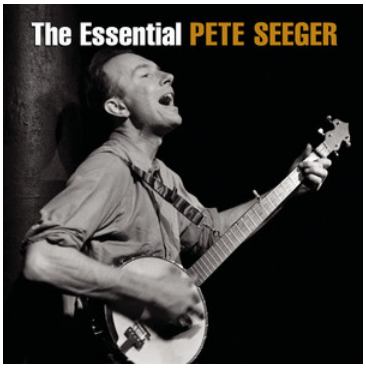
Example 1. Cello Suite no. 1 in G Major, I. Prelude, (BWV 1007) by Johann Sebastian Bach, performed by Yo-Yo Ma.

Now let's listen to "Where Have All the Flowers Gone?" (1955) by Pete Seeger. Note that Seeger's voice is the only musical line; therefore, this work is a second example of monophony.



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Example 2. "Where Have All the Flowers Gone?" by Pete Seeger.

Heterophony

A heterophonic texture is characterized by multiple variations of the same melodic line that are heard simultaneously across different voices. These variations can range from small embellishing tones to longer runs in a single voice, as long as the melodic material stays relatively constant.

Listen to “Ana Hasreti” (2001) by Göskel Baktagir, an example of Turkish classical music. Notice how the winds embellish the melody presented by the plucked strings. While the instruments play different embellishments, they present essentially the same melodic material.

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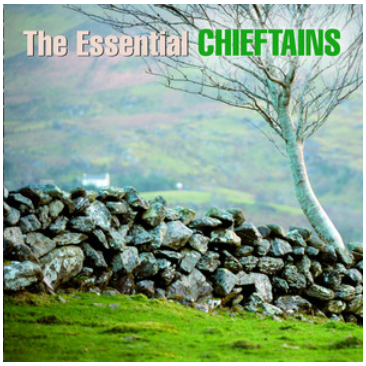
Example 3. “Ana Hasreti” (2001) by Göskel Baktagir.

Now listen to the traditional Irish reel “The Wind That Shakes the Barley,” recorded by the Chieftains in 1978 (beginning at 0:50), and notice the slight variation between the melodic lines of the fiddle (violin) and the flute. This slight variation between the violin and flute presents a second example of heterophony.



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Example 4. “The Wind That Shakes The Barley/The Reel With The Beryle” by The Chieftains; listen starting at 0:50.

Homophony

A homophonic texture is characterized by having multiple voices moving together harmonically at the same pace. This is a very common texture. Many times, this takes the form of having a single melody that predominates, while other voices are used to fill out the harmonies. Homophony is sometimes further divided into two subcategories, homorhythm and melody and accompaniment.

Homorhythm

Homorhythm is a type of homophonic texture in which all voices move in an extremely similar or completely unison rhythm. This is most often seen in chorale-like compositions, where the melody and harmonies move together in block chords.

Let’s listen to Six Horn Quartets: no. 6, Chorale (1910), written by Nikolai Tcherepnin. Notice how both the melody and harmony move mostly in block chords, creating a unified rhythm.

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Example 5. Six Horn Quartets: no 6, Chorale by Nikolai Tcherepnin, performed by the Deutsches Horn Ensemble.

Now let's listen to the folk song "Wild Mountain Thyme" recorded by The Longest Johns in 2018 (0:20–0:44). Remember that in a homorhythmic texture, there is a similarity of rhythm throughout all of the voices. In this example, there is a melody that stands out from the texture, but the voices still move in rhythmic unison.

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Example 6. "Wild Mountain Thyme," by The Longest Johns; listen from 0:20–0:44.

Melody and Accompaniment

A melody and accompaniment texture is perhaps the most common type of homophony. This texture is characterized by a clear melody that is distinct from other supporting voices, which are called an accompaniment. Often the melody will have a different rhythm from the supporting voice(s).

Let's listen to the second movement of Paul Hindemith's Flute Sonata (1936). This example features a very clear melody (flute) and accompaniment (piano). Notice how the piano is never completely in rhythmic unison with the flute; however, it provides the role of accompaniment by filling out the texture harmonically.

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Example 7. Flute Sonata by Paul Hindemith, performed by Emmanuel Pahud and Eric Le Sage.

Now let's listen to "Misty" (1954), written by Erroll Garner and performed by Ella Fitzgerald. Notice how the piano accompanies the primary melody sung by Fitzgerald (the vocalist).

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Example 8. "Misty" (1954), written by Erroll Garner and performed by Ella Fitzgerald.

Polyphony

Polyphony is characterized by multiple voices with separate melodic lines and rhythms. In other words, each voice has its own independent melodic line, and the independent voices blend together to create harmonies.

In Western classical music, polyphony is commonly heard in fugues, such as Fugue no. 5 in D Major (1951–1952), written by Dmitri Shostakovich. Notice how each individual melodic line is independent, yet the voices create harmonies overall when heard together.

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Example 9. Fugue no. 5 in D Major by Dmitri Shostakovich, performed by Joachim Kwetzinsky.

This can also be heard in the final chorus of "I'll Cover You – Reprise" from the Broadway musical *Rent* (1996), written by Jonathan Larson (2:20–2:45). Notice how there are three independent vocal layers, singing different melodies and rhythms, but working together to create new harmonies overall:

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Example 10. “I’ll Cover You – Reprise” from the Broadway musical *Rent* (1996), written by Jonathan Larson; listen from 2:20–2:45.

Most musical works have some variety in texture. For example, you may have heard a work that opened with a solo voice or instrument, then changed to a melody with accompaniment. There are many different possibilities!

Online Resources

- Terms That Describe Texture (Lumen)
- Texture in Music (Hello Music Theory)
- Texture in Music (learnmusictheory.net)
- Texture (Emory University)
- Texture (Robert Hutchinson)
- Texture (Phillip Magnuson)
- Four Types of Texture in Music (perennialmusicandarts.com)

Assignments from the Internet

A. Interactive Musical Textures Worksheet (website, website)
B. Texture: Homophonic or Polyphonic? (website)
C. Texture Composition Assignment, pp. 17–22 (.pdf)

Assignments

1. Identifying Textures (.pdf, .docx) Worksheet playlist

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CHAPTER OVERVIEW

Chapter 2: Counterpoint and Galant Schemas

2.1: Introduction to Species Counterpoint
2.2: First-Species Counterpoint
2.3: Second-Species Counterpoint
2.4: Third-Species Counterpoint
2.5: Fourth-Species Counterpoint
2.6: Fifth-Species Counterpoint
2.7: Gradus ad Parnassum Exercises
2.8: 16th-Century Contrapuntal Style
2.9: High Baroque Fugal Exposition
2.10: Ground Bass
2.11: Galant Schemas
2.12: Galant Schemas – Summary
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences

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2.1: Introduction to Species Counterpoint

Key Takeaways

- Species counterpoint is a step-by-step method for learning to write melodies and to combine them.
- While the "rules" involved are somewhat linked to music in the 16th century, the idea really is to train basic skills, independent of a specific repertoire or style.
- This chapter recaps some key concepts we met in the Fundamentals section and introduces some basic "rules" that will be relevant for each of the following chapters, including some terms for:
  - Consonance and dissonance:
    - Perfect consonances: perfect unisons, fifths, and octaves
    - Imperfect consonances: major and minor thirds and sixths
    - Dissonances: all seconds, sevenths, and diminished and augmented intervals
  - Types of two-part motion:
    - Contrary: the two parts move in opposite directions (one up, the other down
    - Similar: the two parts move in the same direction (both up or both down)
    - Parallel: the two parts move in the same direction (both up or both down) by the same distance, such that the starting and ending intervals are of the same type (e.g., parallel thirds)
    - Oblique: one part moves, the other stays on the same pitch

We begin with a specific method called species counterpoint. The term "species" is probably most familiar as a way of categorizing animals, but it is also used in a wider sense to refer to any system of grouping similar elements. Here, the species are types of exercises that are done in a particular order, introducing one or two new musical "problems" at each stage. (So no, we won't have any elephants or monkeys singing polyphony, sorry!)

While there are many variants on this approach, the chapters here are closely based on Johann Joseph Fux's *Gradus ad Parnassum (Steps to Parnassus,* 1725). Many composers from the 18th to the 21st centuries have used this method, or some variation on it. In the first part of *Gradus ad Parnassum*, Fux works through five species for combining two voices, which will be the focus of our next five chapters. The "Gradus ad Parnassum" Exercises chapter provides all of the exercises from *Gradus ad Parnassum* in an editable format so you can try this yourself.

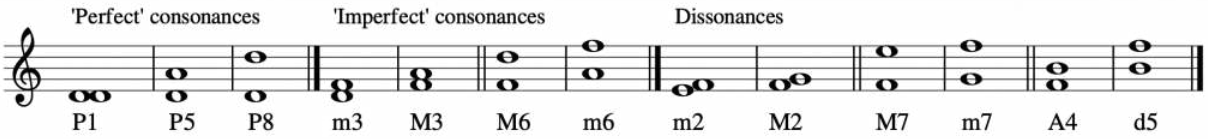
Before getting into the five species, we begin in this chapter by introducing principles that apply to writing lines in any species. These principles build on concepts from the Fundamentals section, such as intervals and scale degrees.

Consonance and dissonance

Consonance and dissonance was introduced in a previous chapter, but in counterpoint, we further distinguish between:

- Perfect consonances (perfect unisons, fifths, and octaves)
- Imperfect consonances (major and minor thirds and sixths)
- Dissonances (all seconds, sevenths, and diminished and augmented intervals)

These categories are summarized in Example 1 below.



Example 1. Perfect consonances, imperfect consonances, and dissonances.

The elusive perfect fourth

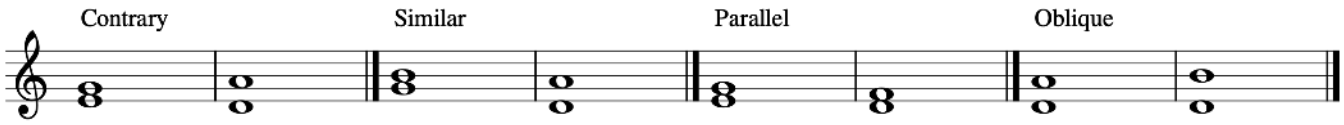
As in many theories of tonal music, the perfect fourth has a special status in species counterpoint that depends on where it appears in the texture. Basically, the interval of a perfect fourth is dissonant when it involves the lowest voice in the texture, but it is consonant when it occurs between two upper voices.

$$\frac{6}{4} \qquad (2.1.1)$$

Types of motion

Species counterpoint also concerns the motion between melodic lines (demonstrated in Example 2):

- Contrary: the two parts move in opposite directions (one up, the other down)
- Similar: the two parts move in the same direction (both up or both down)
- Parallel: the two parts move in the same direction (both up or both down) by the same distance, such that the starting and ending intervals are of the same type (e.g., parallel thirds)
- Oblique: one part moves, the other stays on the same pitch



Example 2. Examples of different types of motion.

Composing a Cantus Firmus

Exercises in strict voice leading, or species counterpoint, begin with a single well-formed musical line called the cantus firmus ("fixed voice" or "fixed melody"; plural "cantus firmi"). Cantus firmus composition gives us the opportunity to engage the following fundamental musical traits:

- smoothness
- independence and integrity of melodic lines
- variety
- motion (toward a goal)

Example 3 contains all the cantus firmi that Fux uses throughout *Gradus at Parnassum*: one for each mode, presented here in the upper and lower of two parts. Apart from using this to review the type of cantus firmi Fux composed, you can use this to practice any of the species, on any of the modes, and in both the upper and lower parts.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Cantus firmi from *Gradus ad Parnassum*.

Notice how in each case, the general musical characteristics of smoothness, melodic integrity, variety, and motion toward a goal are worked out in specific characteristics. The following characteristics are typical of all well-formed cantus firmi:

- length of about 8–16 notes
- arhythmic (all whole notes; no long or short notes)
- begin and end on *do* (\hat1)
- approach final tonic by step: usually *re–do* (\hat2-\hat1), sometimes *ti–do* (\hat7-\hat1)
- all note-to-note progressions are melodic consonances
- range (interval between lowest and highest notes) of no more than a tenth, usually less than an octave
- a single climax (high point) that usually appears only once in the melody
- clear logical connection and smooth shape from beginning to climax to ending
- mostly stepwise motion, but with some leaps (mostly small leaps)
- no repetition of "motives" or "licks"
- any large leaps (fourth or larger) are followed by step in opposite direction
- no more than two leaps in a row and no consecutive leaps in the same direction (except in the F-mode cantus firmus, where the back-to-back descending leaps outline a consonant triad)
- the leading tone progresses to the tonic
- leading notes in all cases, including in "minor"-type modes for which that seventh degree needs to be raised

Melodic tendencies

Some of the characteristics listed above are specific to strict species counterpoint; however, taken together, they express some general tendencies of melodies found in a variety of styles.

David Huron (2006) identifies five general properties of melodies in Western music that connect to the basic principles of perception and cognition listed above, but play out in slightly different ways in specific musical styles. They are:

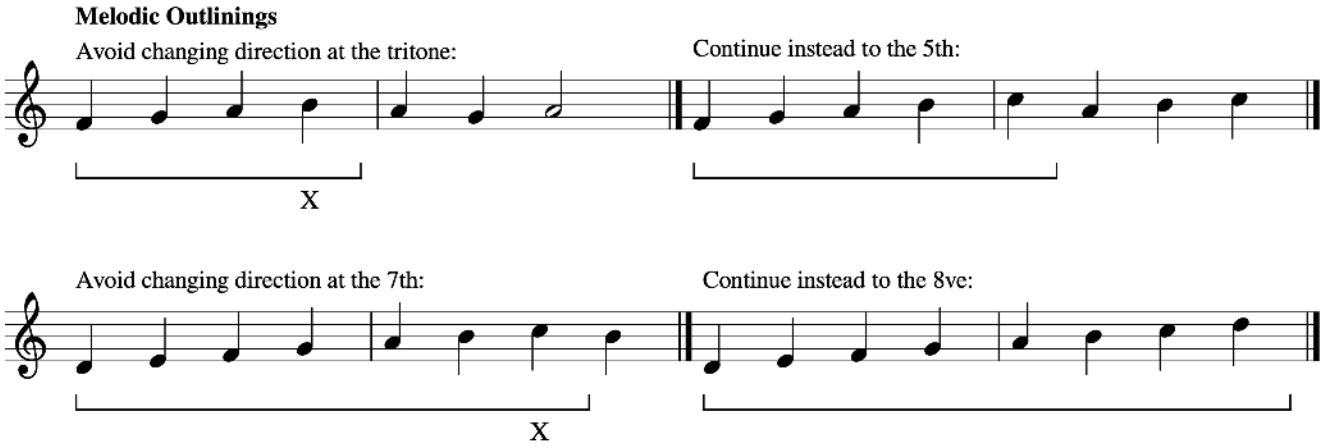
- **Pitch proximity**: The tendency for melodies to progress by steps more than leaps and by small leaps more than large leaps. An expression of smoothness and melodic integrity.
- **Step declination**: The tendency for melodies to move by descending step more than ascending. Possibly an expression of goal-oriented motion, as we tend to perceive a move down as a decrease in energy (movement toward a state of rest).
- **Step inertia**: The tendency for melodies to change direction less frequently than they continue in the same direction. (That is, the majority of melodic progressions are in the same direction as the previous one.) An expression of smoothness and, at times, goal-oriented motion.
- **Melodic regression:** The tendency for melodic notes in extreme registers to progress back toward the middle. An expression of motion toward a position of rest (with non-extreme notes representing "rest"). Also an expression simply of the statistical distribution of notes in a melody: the higher a note is, the more notes there are below it for a composer to choose from, and the fewer notes there are above it.
- **Melodic arch:** The tendency for melodies to ascend in the first half of a phrase, reach a climax, and descend in the second half. An expression of goal orientation and the rest–motion–rest pattern. Also a combination of the above rules in the context of a musical phrase.

Rules for melodic and harmonic writing

In species counterpoint, we both write and combine such melodic lines. The following set of rules invoked in all the species begins with the melodic matters discussed already, then presents some harmonic considerations that we will focus on in the following chapters.

Melodic writing (horizontal intervals)

- Approach the final octave/unison of each exercise by step (this creates the clausula vera).
- Limit the number of:
  - consecutive, repeated notes: the same pitch more than once in a row
  - non-consecutive repeated notes: the same pitch more than once across the whole exercise
  - consecutive leaps: multiple intervals of a third or greater in a row (separate them with stepwise motion)
  - non-consecutive leaps: the total number of leaps within a short span, even if they're not successive
  - consecutive repeated generic intervals: the same interval size (e.g., second) even if not the same specific interval (minor second)
- Control the melodic climax (highest note):
- Aim for exactly one unique climax in each melodic part
- Avoid ending on that climax
- Preferably leap to that climax
- Avoid the two parts reaching their respective climax pitches at the same time
- Avoid melodic leaps of:
  - an augmented interval
  - a diminished interval
  - any seventh
  - any sixth, except perhaps the ascending minor sixth
  - any interval larger than an octave
- Also avoid outlining (Example 4):
  - an augmented interval
  - a diminished interval
  - any seventh



Example 4. Melodic outlinings.

Harmonic writing (vertical intervals and the combination of parts)

- The first interval should be a perfect unison, fifth, or octave, and the last interval should be a perfect unison or octave (not fifth).
- Restrict the gap between parts to a twelfth (compound fifth) maximum, and to an octave for the most part.
- Avoid “overlapping” parts (where the nominally “upper” part goes below the “lower” one).
- Make sure to avoid:
  - parallel octaves: when two parts start an octave apart and both move in the same direction by the same interval to also end an octave apart
  - parallel fifths: when two parts start an perfect fifth apart and both move in the same direction by the same interval to also end a perfect fifth apart
- Also try to avoid:
  - direct fifths and octaves: when two parts begin any interval apart and move in the same direction to a perfect fifth or octave
  - unisons at any point in the exercise other than the first and last intervals

The Psychology of Counterpoint

The chapters on species counterpoint will not involve a specific style (classical, baroque, romantic, pop/rock, etc.). Instead, these exercises will set aside important musical elements like orchestration, melodic motives, formal structure, and even many elements of harmony and rhythm, in order to focus very specifically on a small set of fundamental musical problems. These fundamental problems are closely related to how some basic principles of auditory perception and cognition (i.e., how the brain perceives and conceptualizes sound) play out in Western musical structure.

For example, our brains tend to assume that sounds similar in pitch or timbre come from the same source. Our brains also listen for patterns, and when a new sound continues or completes a previously heard pattern, we typically assume that the new sound belongs together with those others. This is related to some of the most deep-seated, fundamental parts of our human experience, and even evolution. Hearing a regular pattern typically indicates a predictable (and safe) environment, while any change can signal danger and will tend to heighten our attention to the source. This system for directing attention (and adrenaline) where it is most likely to be needed has been essential to the survival of the human species. While listening to music in the 21st century does not (usually!) require us to listen out for animal predators, some part of that evolutionary experience is “hard-wired” into the psychology of human listening, and it has a role in what gives music its emotional effect—even in a safe environment.

For Western listeners, music that simply makes it easy for the brain to parse and process sound is boring—it calls for no heightened attention; it doesn’t increase our heart rate, make the hair on the back of our neck stand up, or give us a little jolt of dopamine. On the other hand, music that constantly activates our innate sense of danger is hardly pleasant for most listeners. That being the case, a balance between tension and relaxation, motion and rest, is fundamental to most of the music we will study.

The study of counterpoint helps us to engage several important musical “problems” in a strictly limited context, so that we can develop composition and analytical skills that can then be applied widely. Those problems arise as we seek to bring the following traits together:

- smooth, independent melodic lines
- tonal fusion (the preference for simultaneous notes to form a consonant unity)
- variety
- motion (towards a goal)

These traits are based in human perception and cognition, but they are often in conflict in specific musical moments and need to be balanced over the course of larger passages and complete works. Counterpoint will help us begin to practice working with that balance.

Finally, despite abstractions, it's still best to treat counterpoint exercises as miniature compositions and to perform them—vocally and instrumentally, and with a partner where possible—so that the ear, the fingers, the throat, and ultimately the mind can internalize the sound, sight, and feel of how musical lines work and combine.

Further Reading

- Huron, David. 2006. *Sweet Anticipation: Music and the Psychology of Expectation*. Cambridge, MA: MIT Press.

Assignments

1. Cantus firmus A (.pdf, .mscx). Asks students to critique one cantus firmus and write their own.
2. Cantus firmus B (.pdf, .mscx). Asks students to critique one cantus firmus and write their own.
3. For the complete set of Fux exercises, see the Gradus ad Parnassum chapter.

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2.2: First-Species Counterpoint

Key Takeaways

- First-species counterpoint is a traditional compositional exercise that teaches beginning musicians to consider how to start and end melodic lines, and most importantly, how to keep them independent of each other.
- When writing in first species, follow these rules:
  - Begin on a perfect unison, fifth, or octave.
  - Both voices move at exactly the same rate and have no rhythmic variety (for example, all notes are whole notes).
  - Harmonically, the intervals between the two voices are all consonances.
  - Melodically, prefer stepwise motion and leap only occasionally. Melodic leaps of a tritone or seventh are forbidden.
  - Parallel perfect consonances are forbidden.
  - End with a perfect unison or octave.
- This chapter presents additional guidelines that will help in writing a successful first-species counterpoint.

Counterpoint is the mediation of two or more musical lines into a meaningful and pleasing whole. In first-species counterpoint, we not only write a smooth melody that has its own integrity of shape, variety, and goal-directed motion, but we also write a second melody that contains these traits. Further, and most importantly, we combine these melodies to create a whole texture that is smooth, that exhibits variety and goal-oriented motion, and in which these melodies both maintain their independence and fuse together into consonant simultaneities (the general term for two or more notes sounding at the same time).
In first-species counterpoint, we begin with a cantus firmus (new or existing) and compose a single new line—called the counterpoint—above or below it. That new line contains one note for every note in the cantus: both the cantus firmus and the counterpoint will be all whole notes. Thus, first species is sometimes called “one-against-one” or 1:1 counterpoint.

The Counterpoint Line

In general, the counterpoint should follow the principles of writing a good cantus firmus discussed in the previous chapter, Introduction to Species Counterpoint. There are some minor differences, to be discussed below, but generally a first-species counterpoint should consist of two cantus-firmus-quality lines.

Example 1 shows the complete exercises of first-species counterpoint from Part I of *Gradus ad Parnassum*. Each example sees one of the cantus firmi we’ve already met combined with a new counterpoint line either above or below. We’ve annotated each one with the interval that the counterpoint line makes with the cantus firmus. For the complete examples from *Gradus ad Parnassum* as exercises, solutions, and annotations, see Gradus ad Parnassum Exercises.

A link to an interactive elements can be found at the bottom of this page.

Example 1. All first-species exercises from *Gradus ad Parnassum.*

Beginning and Ending

Beginning a first-species counterpoint

Note that each exercise in Example 1 begins with a perfect consonance. This creates a sense of stability at the opening of the line.

$$(\hat{1}) \qquad (2.2.1)$$

$$(\hat{1}) \qquad (2.2.2)$$

Ending a first-species counterpoint

$$(\hat{1}) \qquad (2.2.3)$$

To approach this ending smoothly, with variety, and with strong goal orientation, always approach the final interval by contrary stepwise motion, as follows:

- If the cantus ends *re–do*(\hat2-\hat1), the counterpoint’s final two pitches should be *ti–do*(\hat7-\hat1).
- If the cantus ends *ti–do*(\hat7-\hat1), the counterpoint’s final two pitches should be *re–do*(\hat2-\hat1).

Thus, the penultimate bar will either be a third or a sixth between the two lines (Example 2). This ending formula is known as the clausula vera. The exercises in Example 1 each end with a clausula vera.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Examples of the clausula vera.

Independence of the Lines

Like the cantus firmus, the counterpoint line should have a single climax. To maintain the independence of the lines and the smoothness of the entire passage (so no one moment is hyper-emphasized by a double climax), these climaxes should not coincide.penultimate

A single repeat/tie in the counterpoint is allowed, but try to avoid repeating at all. This promotes variety in the exercise, since there are so few notes to begin with.

Avoid voice crossing. Voice crossings diminish the independence of the lines and make them more difficult to distinguish by ear.

Avoid voice overlap, where one voice leaps past the previous note of the other voice. For example, if the upper part sings an E_4, the lower part cannot sing an F_4 in the following bar. This also helps maintain the independence of the lines.

Intervals and Motion

The interval between the cantus firmus and counterpoint at any moment should not exceed a perfect twelfth (octave plus fifth). In general, try to keep the two lines within an octave where possible, and only exceed a tenth in “emergencies” and only briefly (one or two notes). When the voices are too far apart, tonal fusion is diminished. Further, it can diminish performability, which, though not an essential principle of human cognition, is an important consideration for composers, and it has a direct effect on the smoothness, melodic integrity, and tonal fusion of what listeners hear during a performance.

In general, all harmonic consonances are allowed. However, unisons should only be used for the first and last intervals. Unisons are very stable and serve best as goals rather than midpoints. They also diminish the independence of the lines.

Imperfect consonances are preferable to perfect consonances for all intervals other than the first and last dyads, in order to heighten the sense of arrival at the end and to promote a sense of motion toward that arrival. In all cases, aim for a variety of harmonic intervals over the course of the exercise.

Never use two perfect consonances of the same size in a row: P5–P5 or P8–P8. This includes both simple and compound intervals; for example, P5–P12 is considered the same as P5–P5. (Two different perfect consonances in a row, such as P8–P5, are allowed, but try to follow every perfect consonance with an imperfect consonance if possible.) Parallel fifths and octaves promote tonal fusion at the expense of melodic independence, and these consecutive stable sonorities also limit variety and motion in the exercise. Thus, they are far from ideal, and are to be avoided in species counterpoint.

Vary the types of motion between successive intervals, aiming to use each type (except perhaps oblique motion). Contrary motion is best for variety and preserving the independence of the lines, so it should be preferred where possible.

Because similar and parallel motion diminish variety and melodic independence, their use should be mediated by other factors:

- Do not use more than three of the same imperfect consonance type in a row (e.g., three thirds in a row).
- Never move into a perfect consonance by similar motion (this is called direct fifths/octaves. This draws too much attention to an interval that already stands out of the texture.
- Avoid combining similar motion with leaps, especially large ones.

Assignments

1. First-Species Counterpoint A (.pdf, .mscx). Asks students to compose a first-species example and do error detection.
2. First-Species Counterpoint B (.pdf, .mscx). Asks students to compose a first-species example and do error detection.
3. For the complete set of Fux exercises, see the Gradus ad Parnassum chapter.

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2.3: Second-Species Counterpoint

Key Takeaways

The second species of species counterpoint sees the counterpoint line move twice as fast as the cantus firmus. This introduces the ideas of *strong* versus *weak* beats.

Strong beats are always consonant. Weak beats may be consonant or dissonant. Dissonance may occur on weak beats may arise through passing motion. Consonant weak beats connect two consonant strong beats to create a succession of 3 consonances. These can be of many types:

1. consonant passing tone: two steps in the same direction to outline a third.
2. substitution: leap a fourth, then step in the opposite direction.
3. skipped passing tone: a third and a step in the same direction to outline a fourth.
4. interval subdivision: two leaps in the same direction to divide a larger melodic interval, for example, with two thirds to make a fifth.
5. change of register: a large, consonant leap (perfect fifth, sixth, or octave) from strong beat to weak beat, followed by a step in the opposite direction.
6. delay of melodic progression: leap a third, then step in the opposite direction.
7. consonant neighbor tone: step in one direction, then step back to the original tone.

In second-species counterpoint, the counterpoint line moves in half notes against a cantus firmus in whole notes. This 2:1 rhythmic ratio leads to two new "fundamental musical problems"—one metric and one harmonic: the differentiation between strong beats and weak beats, and the introduction of the passing-tone dissonance. The introduction of harmonic dissonance into second species adds to the variety of the musical texture. However, it brings a tension that must be balanced with consonance to promote tonal fusion, and it requires careful attention in order to maintain smoothness in and out of the dissonance.

Here are the complete examples of second-species counterpoint from Part I of *Gradus ad Parnassum*, annotated (as before) with the interval that the counterpoint line makes with the cantus firmus. For the complete examples from *Gradus ad Parnassum* as exercises, solutions, and annotations, see Gradus ad Parnassum Exercises.

A link to an interactive elements can be found at the bottom of this page.

Example 1. All second-species exercises from *Gradus ad Parnassum.*

The Counterpoint Line

As in first species, the counterpoint line should be singable and have a good shape, with a single climax and primarily stepwise motion (with some small leaps and an occasional large leap for variety). However, because a first-species counterpoint had so few notes, in order to maintain smoothness in other aspects of the exercise, the melody frequently employed small leaps. In second species, the increase in notes and the added freedom involving the use of dissonance makes it easier to move by step without causing other musical problems. Thus, a second-species counterpoint is even more dominated by stepwise motion than in first species. If the counterpoint must leap, take advantage of the metrical arrangement to diminish the attention drawn to the leap: leap from strong beat to weak beat (within the bar) rather than from weak beat to strong beat (across the bar line) when possible. Also, because there are more notes in a second-species line, there should usually be one or two secondary climaxes—notes lower than the overall climax that serve as "local" climaxes for portions of the line. This will help the integrity of the line by ensuring that it has a coherent shape and does not simply wander around.

Beginning and Ending

Beginning a second-species counterpoint

$$(\hat{1}) \tag{2.3.1}$$

A second-species line can begin with two half notes in the first bar, or a half rest followed by a half note. Beginning with a half rest establishes the rhythmic profile more readily, making it easier for the listener to parse, so it is often preferable. It is also easier to compose. Regardless of rhythm, the first pitch in the counterpoint should follow the intervallic rules above.

Ending a second-species counterpoint

$$(\hat{1}) \qquad (2.3.2)$$

The penultimate bar of the counterpoint can either be a whole note (making the last two bars identical to first species) or two half notes. This allows you to begin your clausula vera on either the strong beat or the weak beat of the penultimate measure.

Strong Beats

The inclusion of dissonance in a musical texture creates new musical problems that need to be addressed. Because the philosophy of species counterpoint is to present only a small number of new musical difficulties with each successive species, second-species counterpoint introduces dissonance in a very limited way.

Strong beats (downbeats) in second species are always consonant. As in first species, prefer imperfect consonances (thirds and sixths) to perfect consonances (fifths and octaves), and avoid unisons.

Because motion across bar lines (from weak beat to strong beat) involves the same kind of voice motion as first species (two voices moving simultaneously), follow the same principles as first-species counterpoint. For instance, if a weak beat is a perfect fifth, the following downbeat cannot also be a perfect fifth.

Likewise, progressions from downbeat to downbeat must follow the principles of first-species counterpoint described in the previous chapter, such as:

- Do not begin two consecutive bars with the same perfect interval.
- Do not outline a dissonant melodic interval between consecutive downbeats. (Exception: if the counterpoint leaps an octave from the strong beat to the weak beat, the leap should be followed by step in the opposite direction, making a seventh with the preceding downbeat. This is okay, since it is the result of smooth voice motion.)
- Do not begin more than three bars in a row with the same imperfect consonance.

Hidden or direct fifths/octaves between successive downbeats are fine, as the effect is weak, and diminished by the intervening note in the counterpoint.

Weak Beats

Since harmonic dissonances can appear on weak beats, a mixture of consonant and dissonant intervals on weak beats is the best way to promote variety.

Unisons were problematic in first species because they diminished the independence of the lines. However, when they occur on the weak beats of second species and are the result of otherwise smooth voice leading, the rhythmic difference in the two lines is sufficient to maintain that independence. Thus, unisons are permitted on weak beats when necessary to make good counterpoint between the lines.

Any weak-beat dissonance must follow the pattern of the *dissonant passing tone*, explained below. Also explained below are a number of standard patterns for consonant weak beats. Chances are high that if your weak beats do not fit into one of the following patterns, there is a problem with the counterpoint, so use them as a guide both for composing the counterpoint and for evaluating it.

These principles should help guide your use of weak-beat notes in a second-species counterpoint line. A good general practice is to start with a downbeat note, then choose the following downbeat note, and finally choose a pattern below that will allow you to fill in the space between downbeats well.

Most of these principles are used as examples in the demonstration video at the bottom of the page.

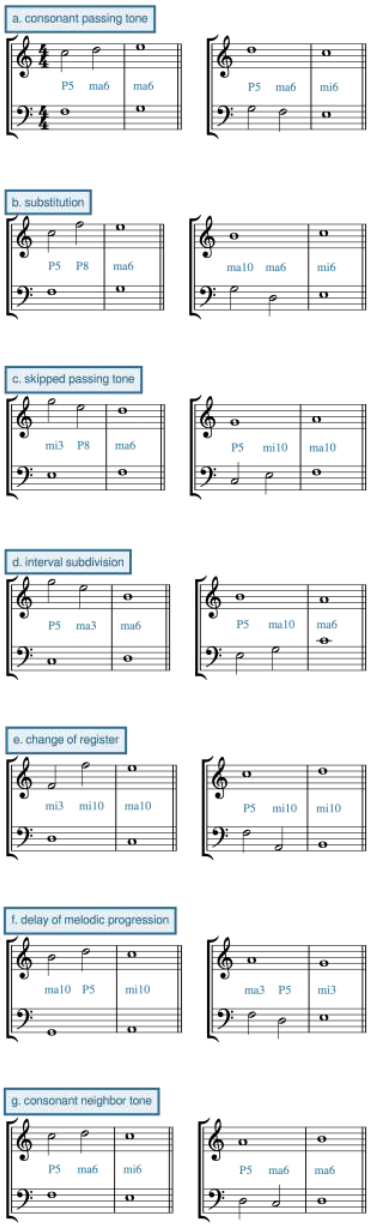
Dissonant passing tones (weak beats only)

All dissonant weak beats in second species are dissonant passing tones, so called because the counterpoint line passes from one consonant downbeat to another consonant downbeat by stepwise motion. The melodic interval from downbeat to downbeat in the counterpoint will always be a third, and the passing tone will come in the middle in order to fill that third with passing motion.

Since all dissonances in second species are passing tones, you will not leap into or out of a dissonant tone, change directions on a dissonant tone, nor write a dissonance on a downbeat.

Consonant weak beats

Unlike dissonant weak beats (of which there is only one type), there are several types of consonant weak beats available (Example 2):[1]



Example 2. Examples of consonant weak beat types, above and below a cantus firmus.

a. A consonant passing tone outlines a third from downbeat to downbeat, and it has the same pattern as the dissonant passing tone, except that all three tones (downbeat, passing tone, downbeat) are consonant with the cantus firmus. A consonant passing tone will always be a sixth or perfect fifth above/below the cantus.
b. A substitution also outlines a third from downbeat to downbeat. However, instead of filling it in with stepwise motion, the counterpoint leaps a fourth and then steps in the opposite direction. It is called a substitution because it can substitute for a passing tone in a line that needs an extra leap or change of direction to provide variety. Like the consonant passing tone, all three notes in the counterpoint must be consonant with the cantus.
c. A skipped passing tone outlines a fourth from downbeat to downbeat. The weak-beat note divides that fourth into a third and a step. Again, all three intervals (downbeat, skipped passing tone, downbeat) are consonant with the cantus.
d. An interval subdivision outlines a fifth or sixth between successive downbeats. The large, consonant melodic interval between downbeats is divided into two smaller consonant leaps. A melodic fifth between downbeats would be divided into

two thirds. A melodic sixth between downbeats would be divided into a third and a fourth, or a fourth and a third. Not only must all three melodic intervals be consonant (both note-to-note intervals and the downbeat-to-downbeat interval), but each note in the counterpoint must be consonant with the cantus.

e. A change of register occurs when a large, consonant leap (perfect fifth, sixth, or octave) from strong beat to weak beat is followed by a step in the opposite direction. It is used to achieve melodic variety after a long stretch of stepwise motion, to avoid parallels or other problems, or to get out of the way of the cantus to maintain independence. It should be used infrequently. And as always, each note must be consonant with the cantus.
f. A delay of melodic progression outlines a step from downbeat to downbeat. It involves a leap of a third from strong beat to weak beat, followed by a step in the opposite direction into the following downbeat. It is called a “delay” because it is used to embellish what otherwise is a slower first-species progression (motion by step from downbeat to downbeat).
g. A consonant neighbor tone occurs when the counterpoint moves by step from downbeat to weak beat, and then returns to the original pitch on the following downbeat. If the first downbeat makes a fifth with the cantus, the consonant neighbor will make a sixth, and vice versa.

Demonstration

Example 3 is a video by Kris Shaffer illustrating the process of composing a second-species counterpoint. This video provides new information about the compositional process, as well as concrete examples of the above rules and principles.

A Vimeo element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=278

Example 3. Video lesson on composing a second-species counterpoint.

Assignments

1. Second-Species Counterpoint A (.pdf, .mscx). Asks students to compose a second-species example and do error detection.
2. Second-Species Counterpoint B (.pdf, .mscx). Asks students to compose a second-species example and do error detection.
3. For the complete set of Fux exercises, see the Gradus ad Parnassum chapter.

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1. The terms used here are either standard or taken from Salzer & Schachter’s Counterpoint in Composition. 2.03: Second-Species Counterpoint#return-footnote-278-1

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2.4: Third-Species Counterpoint

Key Takeaways

The third species of species counterpoint sees the counterpoint line move four times as fast as the cantus firmus. This introduces:

- a further metrical level (strong, weak, *medium*, weak)
- a neighbor tone and other new dissonance types so that the total includes:
  - The dissonant passing tone: fills in the space of a melodic third via stepwise motion.
  - The dissonant neighbor tone: a step away from and back to the same consonant tone.
  - The double neighbor: both the higher and lower neighbour tones together (e.g., C–D–B–C or C–B–D–C).
  - The nota cambiata (changing tone) is special five-note figure that highly unusually includes a leap from a dissonance.

In third-species counterpoint, the counterpoint line moves in quarter notes against a cantus firmus in whole notes. This 4:1 rhythmic ratio creates a still greater differentiation between beats than in second species: strong beats (downbeats), moderately strong beats (the third quarter note of each bar), and weak beats (the second and fourth quarter notes of each bar). Third species also introduces the neighbor-tone dissonance and two related figures in which dissonances can participate in leaps.

Example 1 provides the examples of third-species counterpoint from Part I of *Gradus ad Parnassum*, annotated (as before) with the interval that the counterpoint line makes with the cantus firmus. For the complete examples from *Gradus ad Parnassum* as exercises, solutions, and annotations, see Gradus ad Parnassum Exercises.

A link to an interactive elements can be found at the bottom of this page.

Example 1. All third-species exercises from *Gradus ad Parnassum*.

The Counterpoint Line

As in first and second species, the counterpoint line should be singable and have a good shape, with a single climax that does not coincide with the climax of the cantus firmus, and primarily stepwise motion (with some small leaps and an occasional large leap for variety). Like second species, a third-species counterpoint should be dominated by stepwise motion, more so than in first species, because there are fewer sticky situations that would require a leap. If the counterpoint must leap, it is preferable to do so within the bar rather than across the bar line. Also like second species, there should usually be one or two secondary climaxes—notes lower than the overall climax that serve as “local” climaxes for portions of the line.

Beginning and Ending

Beginning a third-species counterpoint

Begin a third-species counterpoint above the cantus firmus with *do* ($\hat{1}$) or *sol* ($\hat{5}$). Begin a third-species counterpoint below the cantus firmus with *do* ($\hat{1}$).

A third-species line can begin with four quarter notes in the first bar, or a quarter rest followed by three quarter notes. Regardless of rhythm, the first pitch in the counterpoint should follow the intervallic rules above.

Ending a third-species counterpoint

As in other species, end with a clausula vera. The final pitch of the counterpoint must always be *do* ($\hat{1}$), and it must be a whole note.

The penultimate note of the counterpoint (the last quarter note of the penultimate bar) should be *ti* ($\hat{7}$) if the cantus is *re* ($\hat{2}$), and *re* ($\hat{2}$) if the cantus is *ti* ($\hat{7}$).

Strong Beats

Principles for strong beats (downbeats) are generally the same as in second species:

- Strong beats are always consonant, and not unisons.
- Prefer imperfect consonances (thirds and sixths) to perfect consonances (fifths and octaves).

Motion across bar lines (from beat 4 to downbeat) follows the same rules as first-species counterpoint.

Progressions from downbeat to downbeat follow principles of second-species counterpoint (except that direct fifths/octaves between successive downbeats *are* allowed). The following is a review of some of the most important principles from second species that apply in third species as well:

- No three consecutive bars can begin with the same perfect interval (two in a row are fine).
- No more than three bars in a row should begin with the same imperfect consonance.
- The pitches that begin consecutive downbeats must not make a dissonant melodic interval.

If a downbeat contains a perfect fifth, neither beat 3 nor 4 of the previous bar can be a fifth. If a downbeat contains an octave, neither beat 2, 3, nor 4 of the previous bar can be an octave. Like in second species, the negative effects of parallel fifths and octaves are not mitigated by the addition of a note or two.

Other Beats

Beats 2–4 should exhibit a mixture of consonant and dissonant intervals to promote variety. Among consonances, unisons are permitted on weak beats when necessary to make good counterpoint between the lines. Any dissonance must follow the pattern of the dissonant passing tone or the dissonant neighbor tone, explained below.

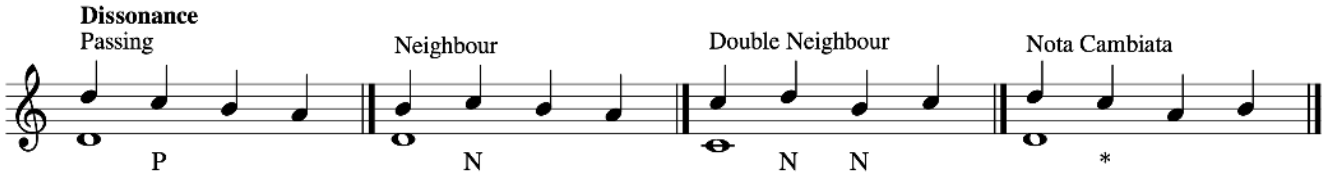
Consonance

The counterpoint can move in and out of consonant tones freely by step, as well as by leap from another consonance, with the following considerations:

- All melodic leaps, of course, must be melodic consonances.
- A large leap should be followed by a step in the opposite direction.
- Motion from the fourth beat into the following downbeat should follow the constraints above for motion into strong beats.

Dissonance

Dissonances in third species can occur on beat 2, 3, or 4, and should be preceded and followed by stepwise motion (with the exception of the double neighbor and the *nota cambiata*, explained below). This promotes smoothness, both by keeping the dissonances away from the strongest beat of the bar and by coupling them with the smoothest melodic motion. Dissonance handling in third-species counterpointcentered on the types illustrated in Example 2 and described below:



Example 2. Third-species dissonance types.

- The dissonant passing tone fills in the space of a melodic third via stepwise motion. The notes before and after the passing tone must be consonant with the cantus firmus. However, it is possible to have two dissonant passing tones in a row (P4–d5 or d5–P4). As long as these dissonances do not fall on downbeats and the counterpoint moves in stepwise motion in a single direction, there is no negative effect.
- The dissonant neighbor tone ornaments a consonant tone by stepping away and stepping back to the original consonance (6–7–6 over the cantus, for example). It is melodically identical to the consonant neighbor tone of second species, with the difference being the harmonic dissonance. Employing it on a weak beat (2 or 4) ensures the greatest smoothness.
- The double neighbor occurs when beats 1 and 4 in the counterpoint are the same tone, and beats 2 and 3 include the notes a step higher and a step lower than the original tone: for example, C–D–B–C or C–B–D–C. Both beats 2 and 3 are dissonant, but since both are embellishing the original tone by step, the leap between them does not significantly diminish the smoothness of the line. When using a double neighbor, the direction between beats 3 and 4 should be the same as between beat 4 and the following downbeat. That motion across the bar line should also be stepwise. This further maintains smoothness to temper the effect of the dissonances.
- The nota cambiata (changing tone) is a five-note figure that outlines a step progression from downbeat to downbeat. It follows one of two patterns shown in Example 3). For a *nota cambiata* to be effective, the first, third, and fifth notes must be consonant with the cantus. The second note will be dissonant and will leap to the third tone. However, like the double neighbor, the overall

pattern minimizes the negative effect of the leap away from the dissonance. It is surrounded by stepwise motion, the overall progression is a single step, and the dissonant tone and the following downbeat are the same pitch.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Two forms of nota cambiata. From downbeat to downbeat, the nota cambiata may fill in (a) a step down or (b) a step up.

Assignments

1. Third-Species Counterpoint A (.pdf, .mscx). Asks students to compose a third-species example and do error detection.
2. Third-Species Counterpoint B (.pdf, .mscx). Asks students to compose a third-species example and do error detection.
3. For the complete set of Fux exercises, see the Gradus ad Parnassum chapter.

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2.5: Fourth-Species Counterpoint

Key Takeaways

The fourth species of species counterpoint is characterized by use of the suspension and its proper handling with:

- “consonant preparation”: a consonance interval before the suspension;
- “dissonant suspension”: one part stay while the other part moves to create a dissonant interval;
- “consonant resolution”: the part that stayed before now moves to resolve the dissonance to a consonance.

In fourth-species counterpoint, the counterpoint line and cantus firmus both move once per bar, but they are rhythmically offset from each other by a half note. (Think syncopation on the bar level.) The counterpoint line will be notated in half notes, with each weak-beat half note tied across the bar line to the following strong beat. This arrangement means that in pure fourth-species counterpoint, the two lines always move in oblique motion. It also introduces a new kind of dissonance: the suspension.

Example 1 provides the complete examples of fourth-species counterpoint from Part I of *Gradus ad Parnassum*, annotated (as before) with the interval that the counterpoint line makes with the cantus firmus. For the complete examples from *Gradus ad Parnassum* as exercises, solutions, and annotations, see Gradus ad Parnassum Exercises.

A link to an interactive elements can be found at the bottom of this page.

Example 1. All fourth-species exercises from *Gradus ad Parnassum.*

The Suspension

The suspension is an accented dissonance, meaning it always occurs on strong beats. Because of the increased emphasis, even greater care must be taken to promote smoothness and overall coherence. Thus, like the passing-tone and neighbor-tone dissonances, the suspension is always preceded and followed by harmonic consonances. A suspension figure has three parts:

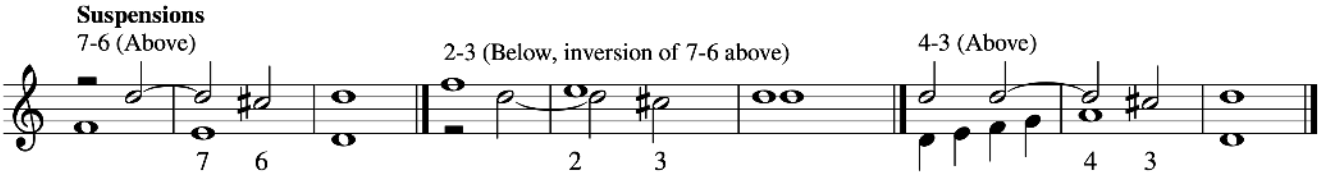
- *Preparation*: a weak-beat note in the counterpoint that is consonant with the cantus. This note is tied to the suspension, and the two are the same pitch.
- *Suspension*: a strong-beat note in the counterpoint, tied from the preparation, that is dissonant with the cantus.
- *Resolution*: a weak-beat note in the counterpoint that is one step below the preparation-suspension pitch and consonant with the cantus.

Use dissonant suspensions as much as possible in fourth-species counterpoint. The primary purpose of the exercise is to practice handling dissonant suspension.

Types of suspensions

Suspensions are categorized according to the intervals of the suspension and resolution tones above or below the cantus firmus (Example 2). A 7–6 suspension, for example, includes a strong-beat suspension that forms a *seventh* with the cantus, which resolves down by step to a weak-beat tone that forms a *sixth* with the cantus.

- Possible dissonant suspensions above the cantus firmus are 7–6, 4–3, and 9–8 (2–1). These are the only options that start on a dissonance and resolve down by step to an allowable consonance. 7–6 and 4–3 are preferable due to the resolution to imperfect consonances.
- The main dissonant suspension to use below the cantus firmus is 2–3.
- Other motions like 5–6 can be used, but they do not constitute dissonant suspensions, as the suspended note is not dissonant.



Example 2. Fourth-species suspension types.

Using suspensions

The pattern set forward by a fourth-species line invites listeners to interpret the weak beats as the main consonances, so treat suspensions in fourth species the same way you would treat their intervals of resolution in first species. Use 7–6 and 4–3 (above) or 2–3 and 5–6 (below) liberally, but no more than three times in a row (like thirds and sixths in first species). Since you cannot use two octaves or two fifths in a row in first species, do not use two 9–8, 6–5, or 4–5 suspensions in a row. In fact, avoid any configuration that would create two fifths or two octaves on consecutive weak beats in fourth species (after-beat fifths or octaves).

The Fourth-Species Counterpoint Line

Use dissonant suspensions whenever possible. This will create a line consisting mostly of downward stepwise motion, and it will also make it hard to direct motion toward a climax, but this is fine. Do not worry about the shape of the line as long as it is smooth and singable and the suspensions are properly prepared and resolved. (It is difficult to create a fourth-species counterpoint with the same shape as a cantus firmus, and the main goal of fourth species is the treatment of the suspensions, so we focus on that over melodic shape.)

If a dissonant suspension is not possible, try to use a tie from weak beat to strong beat. This can be a "consonant suspension," or you can leap up from downbeat consonance to weak-beat consonance. At least one or two upward leaps will be necessary to counteract the downward resolutions in order to keep the line in a singable range.

If neither a dissonant suspension nor a consonant tied figure is possible, it is permissible to break species (see video demo below). When you break species, follow the principles of second-species counterpoint and resume fourth-species ties as soon as possible. Try not to break species more than once per exercise, and do so for just a bar or two.

Beginning and Ending

Beginning a fourth-species counterpoint

$$(\hat{1}) \tag{2.5.1}$$

Always begin with a half rest.

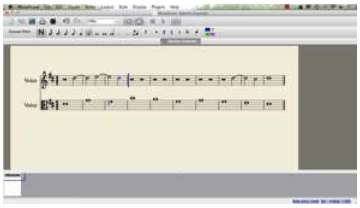
Ending a fourth-species counterpoint

$$(\hat{2}-\hat{1}) \tag{2.5.2}$$

$$(\hat{1}-\hat{7}) \tag{2.5.3}$$

Demonstration

Examples 3 and 4 are video lessons by Kris Shaffer illustrate the process of composing a fourth-species counterpoint above and below a cantus firmus. These videos provide new information about the compositional process, as well as concrete examples of the above rules and principles.



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Example 3. Composing fourth-species above a cantus firmus.

A Vimeo element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=286

Example 4. Composing fourth-species below a cantus firmus.

Assignments

1. For the complete set of Fux exercises, see the Gradus ad Parnassum chapter.

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2.6: Fifth-Species Counterpoint

Key Takeaways

The fifth species of species counterpoint primarily involves combining the tricks we've learned so far along with a little decoration into something that starts to resemble real music! Specifically:

- Elements from all previous species combine such that the counterpoint line may include motion in whole notes (1st species), half notes (2nd), quarter notes (3rd), and suspensions (4th) in almost any combination and order.
- New to the 5th species are:
  - certain embellishments such as notes of anticipation which …
  - may include 8th note motion for the first time (not seen in species 1–4).

In fifth-species counterpoint, we combine the tricks developed in species 1–4 with only a few additions. As such, the fifth species starts to resemble real music in a way that none of the previous species did, and the challenge is to balance not only types of consonance but also types of counterpoint.

Beginning and Ending

Once again, fifth-species counterpoint observes the now-familiar practice of handling of perfect consonances and reduced motion in the first and last measures. Begin with a perfect consonance and end with a clausula vera.

Embellishing Suspensions

While suspensions are a fourth-species consideration, in fifth-species counterpoint we add the option of decorating those suspensions with some common embellishments. Example 1 illustrates the main types, set out on a single chain of 7-6 suspensions.

Example 1. A chain of suspensions with common embellishments.

Note that if you simplify the line by sustaining the first note of the measure for a half note, you get right back to unembellished fourth-species suspensions.

Eighth notes

Note too that the last of the suspension embellishments in Example 1 introduces eighth-note motion for the first time. Fux introduces embellished suspensions and eighth-note motion "in between" fourth and fifth species. Apart from this "anticipation with turn" embellishment of a suspension, Fux also introduces the possibility of a pair of passing eighth notes. In all cases, these eighth notes come in pairs, and they occur on weak beats (filling the second or fourth quarter note of the measure).

Gradus ad Parnassum Examples

Example 2 gives the complete examples of fifth-species counterpoint from Part I of *Gradus ad Parnassum*, annotated (as before) with the interval that the counterpoint line makes with the cantus firmus. For the complete examples from *Gradus ad Parnassum* as exercises, solutions, and annotations, see Gradus ad Parnassum Exercises.

A link to an interactive elements can be found at the bottom of this page.

Example 2. All fifth-species exercises from *Gradus ad Parnassum.*

Assignments

1. For the complete set of Fux exercises, see the Gradus ad Parnassum chapter.

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the style and standards of the LibreTexts platform.

2.7: Gradus ad Parnassum Exercises

The previous chapters have introduced species counterpoint and the iconic pedagogical treatise on cantus firmus composition, Johann Joseph Fux's *Gradus ad Parnassum* (1725). This page provides the full cantus firmus exercises of that treatise so you can try your hand at species counterpoint à la Fux.

Gradus ad Parnassum is in three sections:

1. **Two Voices** (46 exercises)
2. **Three Voices** (44 exercises)
3. **Four Voices** (32 exercises)

For each of these sections, we provide four files:

1. **Exercises:** all of the cantus firmus exercises with only the cantus firmus present and the other part(s) left blank for you to complete.
2. **Solutions:** all of Fux's solutions to those exercises—i.e., both the cantus firmus and the additional part(s) that Fux wrote as answers.
3. **Annotations:** Those solutions annotated with the interval that every note in each additional part forms with the cantus firmus part.
4. **Distinct:** Every distinct cantus firmus in all parts. All of the exercises are based on this format, so these simple files distill all possibilities: you can use this file to do any species exercise, on any cantus firmus, in any part arrangement.

Everything is provided in an editable format so teachers can adjust and combine exercises freely for their own classes' needs. Specifically, the files are provided in the following formats:

- .mxl: open these in any music notation package like MuseScore, Sibelius, or Finale
- .mscz: for MuseScore specifically, preserving all original formatting
- .pdf

View Online and/or Download

View these files on MuseScore.com (and download in multiple formats if you have an account):

- The "Annotations" files on OMT's MuseScore page
- All of the files on Four Score and More's MuseScore page

Click on the links to download any particular type. Please note that the .mxl files are hosted externally on http://fourscoreandmore.org/species/, so you will be redirected and may prefer to open in a new tab.

Part	Exercises	Solutions	Annotated	Distinct
I	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf
II	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf
III	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf	.mxl, .mscz, .pdf

Gradus ad Parnassum Data

Each exercise includes the following information:

- Figure number (in the modern Norton/Mann edition, 1965)
- Species type
- Modal final

- Cantus firmus part

For ease of reference, the following subsections and tables set out that information in full.

Finally, a note on clefs. These files use the clefs in the Norton/Mann edition (1965) for parts I and II. Part III keeps the same clefs throughout to be consistent both internally and with the modern choral score layout (treble, treble, treble 8vb, bass). Teachers may wish to choose their own clefs as part of adapting these files for class.

Part I (Two Voices)

[table id=77 /]
Fux basically uses one cantus firmus for each modal final throughout. The note sequences are as follows, along with their usage counts (46 total) and the minor exceptions:

Modal final	Pitches	Number of times used, and exceptions
D	D_4–F_4–E_4–D_4–G_4–F_4–A_4–G_4–F_4–E_4–D_4	10 counts
E	E_4–C_4–D_4–C_4–A_3–A_4–G_4–E_4–F_4–E_4	10 counts
F	F_3–G_3–A_3–F_3–D_3–E_3–F_3–C_4–A_3–F_3–G_3–F_3	10 counts including one at the octave above, (fig. 13: starting F_4)
G	G_3–C_4–B_3–G_3–C_4–E_4–D_4–G_4–E_4–C_4–D_4–B_3–A_3–G_3	6 counts
A	A_3–C_4–B_3–D_4–C_4–E_4–F_4–E_4–D_4–C_4–B_3–A_3	6 counts including one lacking the first D (fig. 42: A_3–C_4–B_3–C_4–E_4 …)
C	C_4–E_4–F_4–G_4–E_4–A_4–G_4–E_4–F_4–E_4–D_4–C_4	2 counts; the most anomalous case
C	C_4–D_4–F_4–E_4–G_4–E_4–F_4–E_4–D_4–C_4	2 counts; more divergent than for the other modes

Part II (Three Voices)

[table id=78 /]
The table below summarizes the cantus firmi used in Part II:

Modal final	Pitches	Number of times used, and exceptions
D	D_4–F_4–E_4–D_4–G_4–F_4–A_4–G_4–F_4–E_4–D_4	16 counts at two octaves (D_3 and D_4)
E	E_4–C_4–D_4–C_4–A_3–A_4–G_4–E_4–F_4–E_4	12 counts at two octaves (E_3 and E_4)
F	F_3–G_3–A_3–F_3–D_3–E_3–F_3–C_4–A_3–F_3–G_3–F_3	9 counts at two octaves (F_3 and F_4)
G	G_3–C_4–B_3–G_3–C_4–E_4–D_4–G_4–E_4–C_4–D_4–B_3–A_3–G_3	2 counts
A	A_3–C_4–B_3–D_4–C_4–E_4–F_4–E_4–D_4–C_4–B_3–A_3	3 counts at three octaves (A_2, A_3 and A_4)
C	C_4–E_4–F_4–G_4–E_4–A_4–G_4–E_4–F_4–E_4–D_4–C_4	2 counts; corresponds to the first case for Part I

Part III (Four Voices)

[table id=79 /]
The table below summarizes the cantus firmi used in Part III:

Modal final	Pitches	Number of times used, and exceptions
D	D_4–F_4–E_4–D_4–G_4–F_4–A_4–G_4–F_4–E_4–D_4	21 counts at two octaves (D_3 and D_4)
E	E_4–C_4–D_4–C_4–A_3–A_4–G_4–E_4–F_4–E_4	7 counts, one at E_5 (fig. 184)

Modal final	Pitches	Number of times used, and exceptions
F	F_3–G_3–A_3–F_3–D_3–E_3–F_3–C_4–A_3–F_3–G_3–F_3	4 counts at two octaves (F_3 and F_4)

Further Reading

- Fux, Johann Joseph. (1725) 1965. *Gradus ad Parnassum.* Translated and edited by Alfred Mann. New York: W. W. Norton.

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2.8: 16th-Century Contrapuntal Style

Key Takeaways

- The 16th-century contrapuntal style is related—but not identical—to the principles outlined in species counterpoint.
- This chapter sets out some key principles and practice exercises especially for imitation.

The 16th-century contrapuntal style has historically enjoyed a prominent position in the teaching of music theory. “Pastiche” or “counterfactual” composition of 16th-century imitative choral polyphony (especially in the style of Palestrina) has frequently appeared in curricula and is sometimes conflated with the later, 18th-century notion of species counterpoint which we met in the previous chapters. This chapter sets out some rules of thumb to bear in mind when completing style-composition exercises based on this repertoire where you are given a partial score to complete. At the end, you’ll find a couple of example exercises in this format.

Imitation

Imitation involves two or more parts entering separately with the same melody, or versions of the same melody. This is a common practice in 16th-century contrapuntal music, particularly for beginning whole movements and large sections in those movements (with the introduction of a new line of text, for instance). You might think of it as a precursor to the later fugue (which we’ll return to in the High Baroque Fugal Exposition chapter).

Here is an example from Vicente Lusitano’s “Ave spes nostra” from the

Liber primus epigramatum (click here for the source on IMSLP) .[1]
A link to an interactive elements can be found at the bottom of this page.

Ave Spes Nostra by openmusictheory

In this opening passage, a “point of imitation” setting the text “Ave spes nostra” appears in all five voices. The imitation is exact, give or take small changes. The first voice to enter starts on F and descends to C, then it repeats the text a second time, now starting on C and descending to F with a similar melody, adding one more note at the end. Other parts imitate either this pattern (F–C then C–F) or this pair the other way round (C–F, then F–C).

The end of this example sees the start of a second imitative point setting the next line “Dei genitrix … ”. This new figure has a “turn”-like shape: original note, note above, note below, original note (C-D-Bb-C). What follows is a sectnmio based on that second point. As is common in this style, the two phrase overlap (i.e., the new phrase begins before the end of the previous one) and the imitation for this second point is treated more freely than the first. You can even see a couple of subtle rhythmic changes to the first point in this last bar shown where this overlap takes place.

When completing an exercise involving imitation, let the existing material be your guide and consider the following guidelines:

- Identify (potential) points of imitation: In any given part, look for changes of text (often preceded by a comma or rest), and particularly any repetition of text with the same music.
- Pitch interval: The interval between imitative parts at the start of a section or movement is usually a perfect consonance. That said, others are eminently possible, especially later in the movement. Note that we are talking about the primary corresponding interval between the parts and not necessarily the very first pitch. We sometimes see examples of the tonal answer typical of the later high Baroque fugue, discussed in the next chapter.
- Meter: Imitate at metrically comparable positions (strong beat → strong beat; weak beat → weak beat).
- When working out what imitative relationships will work, try out all options in both directions. As the section governed by one imitative point often overlaps with the next, imitative entries around that section change may come from other point.
- Make sure there is meaningful overlap between consecutively entering imitative parts. To achieve that, shorter points of imitation may require correspondingly shorter intervals between entering parts.
- Consider how much of the point to imitate. Longer melodies eventually go from being a point to imitate exactly, to free counterpoint. Where does that change occur in this case?
- Consider how closely to imitate the point. Try to preserve at least the rhythm and the distinctive intervals/contour/shape of the point’s opening.
- Remember that phrases and sections can overlap, even at strong cadences.

Melody

- Contrary motion predominates between parts (partly to maintain independence of lines). Avoid too much parallel writing even of permitted intervals (but note the exceptional case of the “fauxbourdon,” which is an extended passage of parallel $^6_3$ triads).
- Conjunct motion predominates within parts.
  - Approach the final by step (in most parts).
  - Raise the leading note when approaching the final from below (in most modal contexts, though not Phrygian).
- Melodic intervals:
  - Seconds, thirds, fourths, fifths, and octaves are all permitted;
  - The status of sixths is more complex. Rising minor sixths are used fairly freely (814 times in the Palestrina masses), rising major sixths are rarer (54 times), and descending sixths are extremely rare (7 descending minor, 1 single case of descending major).
  - Sevenths and tritones are avoided. Do not even outline these intervals with successive leaps or by the boundaries (high and low points) of a melodic gesture.
  - Successive leaps in the same direction are generally avoided. If you do have such successive leaps, then position the larger leap lower (first when rising, second when descending).
  - Large leaps are to be followed (and often preceded) by motion in the opposite direction. This is connected to both the idea of gap-fill and regression to the middle of the tessitura.
  - Avoid outlining triads as if you were arpeggiating chords.
- Contour: The arch shape is common for melodies (what goes up must come down!).
- Range per part: A common recommendation is to place each voice within an octave, corresponding to either the authentic or plagal ranges of the piece’s mode. But in practice, parts more often span a slightly wider range of 14 semitones. Extremely few parts exceed the twelfth (octave plus fifth), so take that as a maximum.
- Common melodic devices:
  - Suspensions: Suspended notes are to be “prepared” as a consonance on a weak metrical tied to a dissonance (on a strong position) and resolved by moving the suspended dissonant part down a step. For 7–6 and 4–3 suspensions, this involves dissonance in the upper voice; for 2–3 suspension, the dissonance is in the lower voice (as an inversion of 7–6). This is explained further in the chapter on fourth-species counterpoint.
  - While not a suspension, the oblique motion from fifth to sixth is also common.
  - Decorations at the end of a phrase are more common than at the beginning.

Rhythm and Meter

- The original notation for this repertoire lacks bar lines, but metrical thinking is abundantly clear. While modern editions will usually put bar lines in explicitly, remember that these are editorial interventions, not original. Editors may also change the tactus-level note values to be shorter than what was originally notated (from half to quarter notes, for instance). With those caveats borne in mind, the editorial intervention can be helpful—barlines are helpful for rehearsal and for conducting, and some performers may feel more comfortable reading in shorter note values. Editorial choices may also offer subtler hints, such as the use of “longer” meters ($\mathbf{^2_2}$ in place of $\mathbf{^4_4}$) to hint at the possibility of thinking in terms of longer beat, and thus the possibility of longer dissonances, for instance.
- Melodic lines frequently start (and often end) with slower rhythmic movement.
- Half-tactus (quarter-note) movement should begin on weak metrical positions—on an unaccented beat (2 or 4), or between beats (as part of a dotted rhythm).
- Ties connect long notes to shorter ones (not vice versa).
- In the (relatively rare) cases of triple meter, rhythms generally divide into 2+1 rather than 1+2 (as in many styles).

Text Setting

- Clarity of music and text was held in high regard by many composers of this time.[2]
- Meter: The above caveats notwithstanding, match textual and musical meters by placing strong syllables on “strong beats.” Systematic exceptions follow the conventions outlined above including syncopations, suspensions, and “metrical dissonance” (use of a consistent meter in one part that is contrary to that prevailing in other parts (usually the one notated in modern editions).

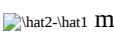
- Musical phrases follow the text.
  - Typically use at least one beat (half note) for each syllable.
  - Exceptions include dotted rhythms, where the shorter (quarter) note frequently receives its own syllable. This may be thought of as a modification of a “straight” rhythm, which meets the “one per beat” guideline.
  - Syllable changes immediately after sub-tactus (quarter-note) motion are rare.

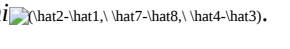
Texture

- The appropriate texture is usually clear from the given parts in these exercises.
- To generalize rather crudely, broad conventions for textures in Mass settings are as follows (where I = usually imitative; H = may be [more] homophonic):
  - Kyrie (I).
  - Gloria (H). The “qui tollis” frequently exists as a separate section.
  - Credo (H). Especially often homophonic at important moments. “Crucifixus” separable.
  - Sanctus (I). Hosanna (H).
  - Benedictus (I). Often for fewer voices. (Second Hosanna usually a repeat of the first.)
  - Agnus Dei (I). There may be a second or third Agnus, often with more parts and canons.
- The Magnificat tends to be a freer genre that is more flexible with the points of imitations.

Harmony

Composers of this era did not think in terms of chords, Roman numerals, inversions, and so on the way that we typically do today. Instead, they were principally concerned with intervallic relationships among parts. With this in mind, following are some guidelines for the vertical combination of parts in this style.

- Parallel fifths and parallel octaves: Avoid, as in later idioms. However, unlike in later idioms, those involving diminished fifths must also be avoided.
- Direct fifths or octaves:
  - Avoid in principle (some rationalize this on the basis that they imply parallels that would present if the intervening passing notes were added).
  - More common at cadences and/or when mitigated by strong contrary motion in one or more other parts.
- Diminished triad:
  - Used not infrequently in Palestrina’s music, mostly in first inversion.
  - Useful especially as a solution for cadences in multi-part music with 

 motion in the bass, for instance.
  - Resolve according to standard voice-leading: *re–do*, *ti–do*, *fa–mi* 

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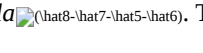
- Dissonance: types and treatment:
  - Suspensions: preparation (weak beat) – suspension (strong) – resolution (weak).
  - “Inessential” dissonances: passing tones, neighbor tones at the sub-tactus (quarter-note) level.
  - Nota cambiata, “changed note”: generally *do–ti–sol–la* 

. The only case of a dissonance left by leap.
- Final chord: Bare fifth or major triad (picardy third).
  - The raised (“Picardy”) third “originated c. 1500 when for the first time, the third was admitted in the final chord of a piece … in the second half of the sixteenth century this practice became fairly common” (Apel 1969, 677).
  - By Palestrina, major triads are the most common kind of final chord (accounting for around 85% of cases in the Palestrina masses).

Further Reading

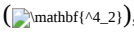
- Apel, Willi. “Picardy Third.” 1969. *Harvard Dictionary of Music*. 2nd ed. Cambridge, MA: Harvard University Press.

Online Resources

In addition to well-known libraries like IMSLP, there are some interesting projects dedicated specifically to Renaissance music.

- Perhaps most notable and relevant is Citations: The Renaissance Imitation Mass Project (CRIM), where you can explore a wide range of relevant repertoire in attractive, modern editions, along with related information.
- For a similar curatorial approach to a slightly earlier repertoire, you may wish to explore the Josquin Research Project (JRP)

Assignments

1. Imitative writing in the 16th-century contrapuntal style. These exercises provide at least one complete part for reference, and one part with missing passages to complete in a suitable style. Original note values are used, with modern time signatures for those values (), some editorial accidentals (ficta), and only G and F clefs.
   - Lassus: Benedictus from the *Missa Venatorum*. 2 voices. .mscz, .pdf
   - Lassus: Bicinum IV. 2 voices. .mscz, .pdf
   - Palestrina: Benedictus from the *Missa Brevis*. 3 voices. .mscz, .pdf
   - Palestrina: *Surge Propera a 4* (excerpt). 4 voices. .mscz, .pdf

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1. IMSLP has this numbered simply as No. “10”, but if consulting the source, note that the parts are numbered as follows in book order: Supranus 24 (“XXIIII”, name and numbering sic), Altus 26 (“XXVI”), Tenor 25 (XXV”), Bassus 23 (XXIII, sic even though the source index page says 22), and Quinta Pars 25 (XXV), remaining parts not applicable. The transcription is in modern notation, but preserves original pitch and note values. 2.08: 16th-Century Contrapuntal Style#return-footnote-305-1
2. This is said to be especially true of Palestrina, and further said to have appeased the Council of Trent in its review of recent developments in music. 2.08: 16th-Century Contrapuntal Style#return-footnote-305-2

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2.9: High Baroque Fugal Exposition

Key Takeaways

- The fugue is a contrapuntal genre popular since at least the 18th century.
- This chapter sets out some key principles of the opening exposition section.
- We introduce new terms including these (click on the term for the glossary entry):
  - Subject
  - Answer
  - Countersubject
  - Exposition
- We also meet some fugue-specific variants of familiars terms, notably:
  - Voices
  - SATB

We now move on from imitative practices common in the 16th century to the fugue, which may be thought of as the 18th-century equivalent and successor to this tradition. Fugues can vary quite a bit, and thus "fugue" is a surprisingly difficult term to define satisfactorily. Fugues in general are contrapuntal compositions that are defined by the strict use of a certain number of independent voices; each voice enters one by one, stating the main theme (subject) of the fugue. In this chapter, we will treat fugue as a process and show how to construct (the first part of) a fugue from first principles. This chapter deals with the basics of writing a fugal exposition from a given subject according to the "high Baroque" technique of Bach, Handel, and their contemporaries.

Basic Definitions

First, let's define some of the terms we'll need.

- **Subject:** A short tune that forms the melodic basis of a fugue, recurring throughout.
- **Answer** A transposition of the subject that is also sometimes slightly altered, as discussed below.
- **Countersubject:** A melodic line that is sounded with (and complements) the subject/answer.
- **Exposition:** The first part of a fugue, during which each of the voices enters with the subject or answer. Note that this is distinct from the use of the term "exposition" in sonata form; they both refer to a first section setting out the main material, but they otherwise differ.
- **Voices:** The separate contrapuntal lines, which may be either instrumental or vocal. The number of voices does not necessarily correspond to the number of parts or musicians involved—a keyboard fugue for one player may have three, four, five, or six voices, and there are even some fugues for solo violin (which is quite a compositional feat!).
- **SATB:** Although a fugue may not involve any singers, it is customary to refer to the lines in a four-voice texture with S (soprano), A (alto), T (tenor), and B (bass) from highest to lowest. The ranges do not need to match those of the vocal parts exactly.

Structure / Voice Entries

Basically, the fugal exposition works as shown in Example 1: one voice begins with the subject, then the next voices enters with the answer while the first continues with a countersubject, and so on.

Voice 1	Subject	Countersubject	Free counterpoint
Voice 2		Answer	Countersubject
Voice 3			Subject

Example 1. Hypothetical structure of voice entries at the beginning of a fugue.

Note that the voices are numbered according to the order in which they enter. While it is perfectly common for the voices to enter in order from highest to lowest or lowest to highest, this is not strictly necessary. However, when a new part enters, it should be the highest or lowest voice at that stage, so it is uncommon for an inner part (alto or tenor) to enter last. That leaves us plenty of options. For instance, the order of voice entries in a four-voice fugue could be:

- In register order from highest to lowest (SATB), or vice versa (BTAS)
- Starting in the middle with the alto: ASTB, ATSB, ATBS
- Starting in the middle with the tenor: TBAS, TABS, TASB

Any further subjects/answers entering (beyond the total number of voices) are described as “redundant” entries.

Subject

When considering how to handle a subject, look at its structure and character.

The structure of a subject can often be thought of in three parts. Like many tonal phrases, the subject charts a course from a distinctive opening to a generic cadence:

- *Kopfmotiv* (literally “head motive”): an opening gesture
- *Fortspinnung*: prolongation that may include sequence and/or motor rhythm
- Cadence

Types of character include:

- Toccata style: this has a motor-rhythm feel, is often chromatic, and may have irregular rhythmic placement.
- Ricercar: deriving from the plainsong/motet tradition, this is slow moving, has an antiquated feel, and makes extensive use of suspensions.

Answer

We distinguish between two types of answer: real for an exact transposition, and tonal for one that has been altered further.

A real answer simply transposes the original subject by perfect fifth/fourth. All generic intervallic relationships remain the same between the notes.

We need a tonal answer if the subject:

- starts on *sol*$\hat{5}$ or otherwise uses it prominently at the outset. In this case, we must adjust the transposed version such that *sol* $\hat{5}$ is not transposed up to *re*$\hat{2}$, but instead to *do*$\hat{1}$.
- includes any other V–I suggestion at start. Prominent dominant note in subject becomes tonic note in answer, so T → D progressions often become D → T and vice versa.
- modulates. In this case, split the subject into two phrases, one in each key, and adapt accordingly. If the subject modulates at its end to the dominant, the answer must modulate back to the tonic.

In all cases, we seek to make minimal adjustment such that the subject and answer are still as alike as possible, and both make melodic sense.

Countersubject

Try working up a skeletal version of your countersubject first before fully fleshing it out. It’s frustrating to dash off a lovely tune and then realize that it doesn’t fit. Additionally, sketch the version that will go with the answer at the same time as the version that goes with the subject. It’s just as frustrating to write a countersubject that works beautifully with the subject but which the answer makes harmonically nonsensical.

Indeed, countersubjects are melodies, but they only work if they make sense harmonically as well. To that effect, remember that your countersubject will first appear in a two-voice passage, so consider how best to outline clear larger harmonies (triads and sevenths) with only two voices.

You may wish to set yourself the additional constraint of a countersubject which is invertible at the octave—basically, one that can appear above or below the subject and still work. In this case, again work on both versions as you go, and specifically make sure to:

- Avoid fifths, because fifths invert to fourths, which have special rules in two-voice writing. Stick to unisons (/ octaves), thirds (/ sixths), and in the case of seventh chords, also seconds (/ sevenths). The fifth is not a problem in the free part, so “reserve” that note as the completion of the chord and use it there.
- Similarly, avoid 4–3 suspensions, because the first note is not dissonant when inverted (5–6). Instead, use 7–6 and 2–3 suspensions (which invert to each other).

To create your skeletal countersubject, first look for skeletal patterns in the subject. Find the simple, unembellished form of the subject and treat it as a kind of tonal cantus firmus against which to write your counterpoint (skeletal countersubject), which you can then embellish into a more interesting musical line.

When it comes to embellishing, try to:

- be true to the character of the subject when composing the countersubject
- establish complementary rhythmic motion such that one voices moves while the other is stationary
- make changes to the countersubject when moving between subjects and answers only and exactly where those changes appear in the subject/answer

Free Counterpoint

Frankly, the idea of "free" counterpoint is a bit of a misnomer, especially if you're writing an invertible countersubject, because the subject and countersubject will leave your options highly constrained. This part is "free" in the sense that it doesn't necessarily recur later on, so you might like to think of it as a fre*er* part, relative to the even less free subject and countersubject! Alternatively, you can embrace the extreme order and replace the free counterpoint with a second regular countersubject that does recur later.

Links

Your fugal exposition may include short interpolations between the subject/answer entries. We call these links. Links frequently make use of a motive from the subject, for instance with sequential repetition of a short fragment. They may appear between any or all voice entries and may be of varying lengths.

There are many musical motivations for including one or more links. Links provide an opportunity to:

- Change harmony: The end of one subject/answer and the beginning of the next may not match up harmonically. In that case, you can use the link to get where you need to be.
- Change register: If you have a continually descending line, for instance, links can be a useful way of resetting the register so you don't go outside the instrument's range.
- Vary the phrase lengths: If you have a subject of exactly two measures and just proceed through several voices entering successively, then you may well want to use a link to make the hypermetrical and phrase groupings a little more interesting. That said, the voices should always enter on metrically comparable positions: for example, if your subject comes in on a pickup, all the subject/answer entries should do the same, at least in the exposition.
- Dovetail entries: Apart from varying the phrase lengths, we can also vary the melodic context in which a voice enters. For instance, if a link develops the Kopfmotiv sequentially, then you can bring in the next subject/answer in seamlessly, as it begins with that motive.

General Matters

Apart from the specific considerations of the fugue, naturally much of the general practice of writing (tonal) music applies here. Remember in particular to:

- Control rhythmic flow: If and when continuous use of a given metrical level has built up (e.g., quarter/eighth/sixteenth notes), consider carefully whether and when it is appropriate to discontinue that motion.
- Graduate the relative strength of cadences, for instance by controlling the scale degrees in the top and bottom voices.
- Write idiomatically for the instrument/s. Remember to observe practical limitations of hand span, instrument range, and the like.

Example

For an example of all of this in action, let's consider Example 2: the C minor fugue from Book I of Bach's Well-Tempered Clavier (BWV 847).

A link to an interactive elements can be found at the bottom of this page.

Example 2. Exposition of the Fugue in C minor (BWV 847) by Johann Sebastian Bach.

Note that:

- The exposition runs from from measures 1–8 (the extract here includes the start of the following "episode").
- All the subject and answer entries are highlighted with blue noteheads.

- There are two regular countersubjects (annotated as CS1 and CS2).
- The answer is tonal.
- The link between entries 2 and 3 (mm. 5–6) and the episode following the last voice to enter (starting in m. 9) are built on sequential handling of a motive from the subject, as indicated with brackets.

Online Resources

Head to dezrann.net for a full version of this Bach fugue, complete with on-score annotations and an aligned audio recording of a real performance. You can even choose between using this friendly version in modern notation with the fugal voices on separate staves, or following along with Bach's manuscript.

Assignments

1. In the Bach C minor fugue shown above, the answer is "tonal." Given what has been said about tonal answers in this chapter, try explaining how the subject and answer differ, and why.
2. Pick another fugue, identify how many "voices" there are, and locate each voice's entry and the end of the exposition.
3. Try writing your own answers and countersubjects. The template file below provides the subjects for all 48 fugues in both books of the Well-Tempered Clavier. An empty second staff is provided for your practice. (Note that the last note in many of the fugue subjects is given without a stem to indicate the pitch without specifying the duration rhythm.) If you know some of these fugues well, you may want to work on ones you're less familiar with.
4. Once you are feeling confident with writing answers and countersubjects, try writing up a full exposition. Again, you may wish to work on fugues you're less familiar with.

For 3 and 4, you may wish to compare your solutions to Bach's. Note that Bach's solutions are not the only possible ones, so don't expect to come up with exactly the same music. Note too that not every fugue has a regular invertible countersubject. Here are direct downloads in .mscz and .pdf formats.

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2.10: Ground Bass

Key Takeaways

Ground bass compositions have a bass line that repeats continually throughout.

This chapter focussed on the use of grounds in baroque context (like trio sonatas) where variety is created through textural and harmonic change in parts above the bass line, notably with:

- re-harmonisation of the bass, often to suggest local tonicizations of other keys;
- lively imitation and interplay between the upper parts.

Ground bass compositions are based on a bass line that repeats throughout the piece, usually exactly, or nearly so. Many musicians have found this a compelling compositional constraint for keeping themselves … well … grounded!

How many musicians are we talking about? Well, this practice was highly popular in the Baroque (Purcell was a particularly keen and expert protagonist), it is even more common in popular songs of recent years (see Harmonic Schemas in Pop Music), and there are more than a few examples from in between. In short, it is an extremely and enduringly popular form.

It's easy to confuse "ground bass" with some other terms; going from broad to specific, the key terms to distinguish are:

- Ostinato: any pattern that repeats throughout a long section or whole work in one voice, like the motto side drum rhythm of Ravel's *Boléro*.
- Ground bass: a specific type of ostinato in which a bass line repeats throughout a work or section. The work itself can also be called a ground bass.
- Chaconne and Passacaglia (and international variant spellings such as "Chacony"): sub-genres of the Baroque ground bass. Among their other characteristics, both of these two are in triple meter. Every Chaconne or Passacaglia is also a ground bass, and every ground bass is also an ostinato, but the reverse is *not* true: not every ostinato is a ground bass, and not every ground bass is a Chaconne or Passacaglia.

This chapter provides some files and instructions to help you explore some of the ways to create effective ground bass compositions. We focus on the Baroque model, and on creating variety through re-harmonizing the same bass in different ways and varying the texture.

Multiple Harmonizations of a Given Bass

Continually using the same repeating bass line throughout could get tedious, and is especially liable to make the harmony extremely static. To that effect, inventive composers find ways to re-harmonize the same bass line to move to other keys, or at least hint at such a move. This often relies on seeing the different ways in which a single interval in the bass could be reinterpreted.

While this might not seem like much to work with, this bass harmonization "cheat sheet" (PDF) shows that there are many ways to re-harmonize bass intervals. It is organized by bass interval: both ascending and descending forms of each interval from minor seconds to tritones. Note that this is supposed to help you work out your options—you definitely don't need to use all of these! We'll see below how Purcell uses just a few of these to create harmonic variety in a very long work that's almost entirely in G minor. We'll be especially interested in moments where Purcell avoids the main perfect cadence at the start/end of each iteration of the ground, joining two grounds together with a subtler seam and thereby varying not only the harmony but also the phrase rhythm of the piece.

Analysis: Purcell's Sonata in G Minor (Z 807)

To explore some of the options here, let's take a look at Purcell's Sonata in G Minor (Z 807). We'll look at how Purcell uses (extensive) imitation and (occasional) tonicization. All of these matters are also included on the score as text annotations at the relevant moment (Example 1).

A link to an interactive elements can be found at the bottom of this page.

Harmony

Harmonically, the piece is resolutely in G minor almost throughout, though Purcell tonicizes several keys along the way. The full list of tonicizations is (arguably):

- Dmi in measure 17
- F in measure 27
- B♭ in measure 28
- Cmi in measure 33
- E♭ in measure 78
- F in measure 87
- E♭ in measure 88
- Cmi in measure 93
- Dmi in measure 107
- F in measure 117
- Cmi in measure 131 (beat 3) and in measure 133
- E♭ in measure 158
- E♭ in measure 163

Notice especially how Purcell finesses that boundary between the start and end of a ground iteration by avoiding yet another perfect cadence in G minor. For instance, see m. 16 and m. 106 for uses of G major as part of V^{4_2}/v–v^6, broadly reversing tonic and dominant function, and likewise m. 26 and m. 86 for G diminished as vii^{o6}–I in F major. These special cases are marked on the score.

As a wider matter, notice how extensively Purcell uses 5–6 steps in the melodic parts and how this creates ambiguity in the harmony, as in m. 1 and m. 12. Is the 5 or the 6 harmonic, or perhaps both? Is this consistent, or does it change? This all makes it harder to pin down exactly what the harmony is and where it changes, adding ever further layers of interest to the score. It also helps set up the sequences of 7–6 suspensions such as from m. 71.

Imitation

Imitation is prevalent throughout. The melodic imitations are labeled “D” and “C” on the score. This is short for *dux* (leader) and *comes* (follower). For instance, the violin 1 parts starts a melodic line in measure 1 (beat 1), which is imitated by the violin 2 entering in measure 3 (beat 1).

Notice how often these imitations start in the same part of the bar. This is consistent with what we discussed in the context of 16th-century and 18th-century imitative traditions. Entering on equivalent beats leads to temporal gaps between entries of three or six beats (beat gaps on the table). Then again, note how Purcell occasionally uses closer imitation in measures 36, 41, 56, 63, 71, 133, 171, 178, 181, and 182.

As the score shows, there is a great deal of imitation in this piece; almost every iteration of the ground is accompanied by a new imitative relationship in the upper parts (the exceptions are given in the second table below). Perhaps the two most special and interesting cases are:

1. the double imitation starting in m. 196 and imitated with parts swapped in m. 201
2. the imitation of the ground itself in the violin 2 part at m. 99/102

Rhythm and Meter

Finally, note how Purcell continually varies the rhythmic values (metrical levels) involved, using a wide range of options. This includes introducing continuous eighth notes (m. 36), sixteenth notes (m. 81 and m. 146), syncopation (m. 126), dotted rhythms (m. 136), and for one passage near the end, changing the notated meter to compound time (mm. 166–185). This is a common device in Baroque ground bass (and other variations-style works of the time); again, these changes usually (but not always) coincide with the start of a new iteration of the ground.

Online Resources

Click on the following links for:

- the above Purcell score hosted on OMTs MuseScore page
- a more thoroughly annotated version of this Purcell score on FourScoreAndMore’s MuseScore page

Here are some additional files you may find useful in two types:

1. **Annotate scores:** Baroque ground bass compositions with analytical annotations including an attempt at full Roman numeral analysis, despite the contrapuntal nature of many of these works. The Purcell above is an example of this.
2. **Template scores:** this same ground bass scores, with the bass on its own and the upper parts blank so you can compose your own completion of the rest (see the Assignments below).

In all of these templates and annotated scores, there is exactly one iteration of the ground per system so you can compare equivalent moments directly (vertically). Below is the full list with links for direct downloads from Four Score and More. You can also view this wider set of templates and annotations files on Four Score and More's MuseScore.com page.

	Annotate scores	Template Score
Bach Crucifixus B Minor mass BWV232	.mscz, .mxl	.mscz, .mxl
Corelli La Folia		.mscz, .mxl
Purcell Chacony in G Minor Z730	Highlights .mscz / .mxl; Full .mscz / .mxl	.mscz, .mxl
Purcell Here the deities approve		.mscz, .mxl
Purcell Sonata in G Minor Z807 (the example on this page)	.mscz, .mxl	.mscz, .mxl

Assignments

These template scores allow you to try your hand at composing music based on some of the repertoire's great ground basses.

Take a template and try to compose your own ground bass composition, following these steps:

1. A simple, predominantly diatonic harmonization of the ground, with simple block chords, making sure to follow good voice-leading practice. Use this as a prototype.
2. A set of alternative harmonizations including tonicizations of other keys and re-harmonizations of the first note in particular to vary the apparent phrase length (as discussed above in reference to the "cheat sheet").
3. Melodic parts that fit with the bass and create more interesting textures. Seek out ways of writing upper parts that can recur in another voice in imitation (and refer back to the Purcell analysis above for ideas!).
4. Finally, combine the best of your ideas into an overall piece that balances textural and harmonic interest and charts an overall trajectory. Why not try a piece with six iterations of the ground, of which the first and last are simple and alike?

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2.11: Galant Schemas

Key Takeaways

- Schemas are basic musical patterns that composers and improvisers of the 18th century would learn and use as a simple basis for creating new music.
- There are many types of patterns, and they are typically associated with a particular place or function within the music, for instance as a way of beginning.

Schemas are "stock musical phrases" (Gjerdingen 2007, 6) that act as melodic, harmonic, and rhythmic/metric skeletons for creating new music in the Galant style. We can apply the term "schema" in three specific ways. First, a schema is a *prototype*—an idealized version of a common pattern. Second, a schema can be an *exemplar*—a single pattern that resembles the prototype. Third, a schema can be a *theory*—an explanation of a commonly occurring musical event. All of these ideas go into how we understand schemas. We understand an individual pattern (exemplar) as a version of an ideal general pattern (prototype), and that relationship helps us understand how that pattern is functioning within a particular passage of music (theory).

Schemas are often given names, sometimes based on descriptions from earlier theorists (the Monte, Fonte, and Ponte were described by Joseph Riepel, for example) or, at other times, named after theorists themselves (the Meyer is named after Leonard Meyer).

Schemas are defined both by what happens in the schema and by where it typically appears in a piece. The "what" part involves two or more "stages" (basically, events) and includes:

1. melodic features, shown by scale degrees, usually for both the top (melodic) and bottom (bass) voices;
2. harmonic features, shown with figured bass notation
3. metric features, showing whether a stage occurs on a strong ("S") or weak ("W") beat of the bar

The "when" part basically distinguishes between schemas that are typically used to start a piece ("opening gambits"), as a "continuation," or as a concluding "cadence." This section introduces one of each type, and the Galant Schemas – Summary chapter sets out many more examples.

Opening Gambits Such as the Meyer

The Meyer is an example of an opening schema. It is four stages long: the first and last are tonic chords, and the two in the middle are not-tonics. Here's a summary of what the melody, harmony, and meter do during this schema:

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*do* \hat1	*ti* \hat7	*fa* \hat4	*mi* \hat3
Bass	*do* \hat1	*re* \hat2	*ti* \hat7	*do* \hat1
Figures	\^5_3	\^4_3	\^6_5	\^5_3
Roman numerals	I	V	V	I

We can break this schema down into two parts, a first, opening one that moves from I to V:

Stage	1	2
Meter	W	S
Melody	*do* \hat1	*ti* \hat7

Stage	1	2
Bass	*do* \hat1	*re* \hat2
Figures	^5_3	^4_3
Roman numerals	I	V

… and a closing part moving back from V to I:

Stage	1	2
Meter	W	S
Melody	*fa* \hat4	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	^6_5	^5_3
Roman numerals	V	I

As the Galant Schemas – Summary chapter shows, there are many other schemas with a similar pattern to the Meyer, such as the Pastorella, the Jupiter, and the Aprile. In each of these cases, the schema starts with a tonic chord, moves away for two stages, and then returns to the tonic at the end. Like the Meyer, they are prototypes for the first phrase of an opening theme. As with the Meyer, the bass and harmonic structure are less fixed than the melody. The two central stages may articulate dominant harmony in all three schemas, and the second stage is also commonly accompanied by predominant harmony.

When each stage of a Meyer schema is given one measure of music, it is commonly found in the presentation or antecedent part of an opening theme. If those stages occur at the rate of two per measure, the Meyer may form a basic idea that would be followed by a closing gesture, such as the Prinner described below.

Closing Gestures Such as the Prinner

$$(\hat{4}–\hat{3}–\hat{2}–\hat{1}) \tag{2.11.1}$$

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*la/le* \hat6	*sol* \hat5	*fa* \hat4	*mi/me* \hat3
Bass	*fa* \hat4	*mi/me* \hat3	*re* \hat2	*do* \hat1
Figures	5	6	7-6	I
Roman numerals	IV	I	vii	I

There are a few variants on the Prinner, including one that modulates to the dominant by using a version of the Prinner transposed up a fifth. In this version, the first stage of the Prinner is still a ^5_3 chord and can also still be viewed as a subdominant (IV) chord, but now relative to the dominant key.

The Prinner can also be used to modulate from the tonic to the dominant. This variant is called the Modulating Prinner:

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*mi* \hat3	*re* \hat2	*do* \hat1	*ti* \hat7
Bass	*do* \hat8	*ti* \hat7	*la* \hat6	*sol* \hat5
Figures	^5_3	6	7-♯6	^5_3
RNs in the tonic key	I	V	vii/V	V
RNs in the dominant key	IV	I	vii	I

Other

Apart from schemas for opening and closing, others are typically used for “continuation” and “cadences,” and we even have one common “post-cadential” type. The Galant Schemas – Summary chapter provides examples of the main types, along with information about further variants and details. Additionally, while abstract layouts like the tables above are best for setting out what these schemas are, it’s obviously also useful to check them out in musical notation. Here is a simple realization for exploring the schemas discussed in these chapters:

A link to an interactive elements can be found at the bottom of this page.

Partimenti Prototypes With Chords by FourScoreAndMore

References

Gjerdingen, Robert O. 2007. *Music in the Galant Style*. Oxford University Press.

Online Resources

For all the musical notation files used in these schema chapters, head to:

- This site on MuseScore.com for copies of the scores playable online.
- This site on fourscoreandmore.org for direct download without login.

For much more on this topic, and especially on the historical sources, head to Gjerdingen’s own partimenti.org.

Assignments

Learning schemas really calls for hands-on practice.

1. **Playing:** Begin by playing through these examples from the files provided, preferably in a range of different keys. (Note: you can transpose scores in MuseScore with the Notes menu: Notes/Transpose).
2. **Memorization:** See if you can memorize some of these patterns. Test yourself by:
   - writing them out on paper (start with a blank scale)
   - playing them from memory
3. **Embellishment:** Schemas help to structure music, but they are not really musical pieces in themselves: it takes a lot of fleshing out to get from these skeletons to real music. That being the case, try improvising embellishments of these basic patterns. Start with simple turns, passing notes and the like, then move on to more ambitious changes.
4. **Full pieces:** When you’re confident with individual cases, try piecing them together, according to their usual position and ordering. Start by using templates like these:
   - Template 1: .pdf
   - Template 2: .mscz, .mxl, .pdf

These templates each provide a combination of schemas which can be thought of as prototype pieces, both to illustrate how they work and as a template for scaffolding exercises in pastiche composition. Use these templates, but bury them beneath layers of musical character and embellishment. Here are some tips for getting started:

- **Rhythm:** Try picking a single characteristic rhythm to serve as the basis for your piece and use it often (but not exactly: see how many different ways you can adapt it).
- **Melody:** Introduce embellishments, decorating some stepwise motions with turns, for instance, and filling in some large leaps.
- **Accompaniment:** Use one or more characteristic patterns for chordal accompaniments, like the Alberti Bass.
- **Texture:** Particularly for longer pieces, vary the number of voices present and the way they relate.

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2.12: Galant Schemas – Summary

Key Takeaways

There are many different schemas. This chapter provides an introductory overview of the main ones along with some (brief) discussion of variants and details.

We begin with an at-a-glance summary of some important schemas, then proceed to set out each of the schemas listed one by one.

Overall Short Summary

Musical notation

Here are files in musical notation with all the schemas listed on this page:

- With chordal realizations: .mscz, .mxl, .pdf
- Without chords (outer voices only): .mscz, .mxl, .pdf

These files provide a set of schemas, with the constituent parts set out as prototypically as is possible in musical notation: that is, with melody and figured bass lines, along with (in the first file's case) chords in a middle part realizing those figures. Musical notation is obviously useful, though really, schemas are prototypes that exist apart from any specific realization, so the more abstract representations in tables and the like are better in some ways. That's why you'll see them set out in this fashion here and in other literature on this topic.

Summarizing table

[table id=75 /]

Itemized List

Opening Gambits

Romanesca

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*do* \hat1	*sol* \hat5	*do* \hat1	*do* \hat1
Bass	*do* \hat1	*ti* \hat7	*la* \hat6	*mi* \hat3
Figures	5	6	5	6
Roman numerals	I	V	vi	I

Do–Re–Mi

Stage	1	2	3
Meter	S	W	S
Melody	*do* \hat1	*re* \hat2	*mi* \hat3
Bass	*do* \hat1	*ti* \hat7	*do* \hat1
Figures	5	6	5
Roman numerals	I	V	I

Many of the schemas involve two steps that can be considered schemas on their own. These often take the form of question-answer pairs.
Here, we have the Do–Re opening part as the opening question:

Stage	1	2
Meter	S	W
Melody	*do* \hat1	*re* \hat2
Bass	*do* \hat1	*ti* \hat7
Figures	5	6
Roman numerals	I	V

That Do–Re is answered by the Re–Mi:

Stage	1	2
Meter	W	S
Melody	*re* \hat2	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	6	5
Roman numerals	V	I

The Do–Re–Mi may also appear in a four-stage version by putting those constituent parts back together. This basically involves doubling up the central stage of the three-stage version.

Sol–Fa–Mi

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*sol* \hat5	*fa* \hat4	*fa* \hat4	*mi* \hat3
Bass	*do* \hat1	*re* \hat2	*ti* \hat7	*do* \hat1
Figures	5	5	6/5	5
Roman numerals	I	ii	V	I

Again, this comprises two parts.

Opening part (Sol–Fa):

Stage	1	2
Meter	W	S

Stage	1	2
Melody	*sol* \hat5	*fa* \hat4
Bass	*do* \hat1	*re* \hat2
Figures	5	5
Roman numerals	I	ii

Answering part (Fa–Mi):

Stage	1	2
Meter	W	S
Melody	*fa* \hat4	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	6	5
Roman numerals	V	I

This schema may also appear with the harmony slightly altered, as follows:

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*sol* \hat5	*fa* \hat4	*fa* \hat4	*mi* \hat3
Bass	*do* \hat1	*re* \hat2	*ti* \hat7	*do* \hat1
Figures	5	6	6/5	5
Roman numerals	I	vii	V	I

Meyer

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*do* \hat1	*ti* \hat7	*fa* \hat4	*mi* \hat3
Bass	*do* \hat1	*re* \hat2	*ti* \hat7	*do* \hat1
Figures	5	6/4/3	6/5	5
Roman numerals	I	V	V	I

Opening part:

Stage	1	2
Meter	W	S
Melody	*do* \hat1	*ti* \hat7
Bass	*do* \hat1	*re* \hat2
Figures	5	6,4,3
Roman numerals	I	V

Closing part:

Stage	1	2
Meter	W	S
Melody	*fa* \hat4	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	6,5	5
Roman numerals	V	I

Aprile

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*do* \hat1	*ti* \hat7	*re* \hat2	*do* \hat1
Bass	*do* \hat1	*re* \hat2	*ti* \hat7	*do* \hat1
Figures	5	6,4,3	6,5	5
Roman numerals	I	V	V	I

Jupiter

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*do* \hat1	*re* \hat2	*fa* \hat4	*mi* \hat3
Bass	*do* \hat1	*ti* \hat7	*sol* \hat5	*do* \hat1
Figures	5	6	5	5
Roman numerals	I	V	V	I

Pastorella

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*mi* \hat3	*re* \hat2	*fa* \hat4	*mi* \hat3
Bass	*do* \hat1	*sol* \hat5	*sol* \hat5	*do* \hat1
Figures	5	5	7	5
Roman numerals	I	V	V	I

Answer/Process/Transition

Prinner and Modulating Prinner

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*la* \hat6	*sol* \hat5	*fa* \hat4	*mi* \hat3
Bass	*fa* \hat4	*mi* \hat3	*re* \hat2	*do* \hat1
Figures	5	6	7-6	I
Roman numerals	IV	I	vii	I

A slight variant on this inserts a root-position dominant before the final stage:

Stage	1	2	3	4	5
Meter	S	W	S	W	S
Melody	*la* \hat6	*sol* \hat5	*fa* \hat4	*fa* \hat4	*mi* \hat3
Bass	*fa* \hat4	*mi* \hat3	*re* \hat2	*sol* \hat5	*do* \hat1
Figures	5	6	7–6	7	5
Roman numerals	IV	I	vii	V	I

The Prinner can also be used to modulate from the tonic to the dominant. This variant is called the Modulating Prinner:

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*mi* \hat3	*re* \hat2	*do* \hat1	*ti* \hat7
Bass	*do* \hat8	*ti* \hat7	*la* \hat6	*sol* \hat5

Stage	1	2	3	4
Figures	5	6	7-♯6	5
Roman numerals	I	V	vii/V	V

Again, this can come with an additional root-position dominant:

Stage	1	2	3	4	5
Meter	S	W	S	W	S
Melody	*mi* \hat3	*re* \hat2	*do* \hat1	*do* \hat1	*ti* \hat7
Bass	*do* \hat1	*ti* \hat7	*la* \hat6	*re* \hat2	*sol* \hat5
Figures	5	6	7–♯6	7/♯	5
Roman numerals	I	V	vii/V	V/V	V

Fonte

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*sol* \hat5	*fa* \hat4	*fa* \hat4	*mi* \hat3
Bass	*di* \uparrow\hat1	*re* \hat2	*ti* \hat7	*do* \hat1
Figures	6/5	5	6/5	5
Roman numerals	V/ii	ii	V	I

The Fonte has a strong relation to the Meyer and indeed to the cycle of fifths. This effectively tonicizes the A minor key (e.g., the supertonic minor) and then a major key a tone below (the overall tonic). The modular part is just one of those tonicizations:

Stage	1	2
Meter	W	S
Melody	*fa* \hat4	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	6/5	5/3
Roman numerals	V	I

Monte

Stage	1	2	3	4
Meter	W	S	W	S

Stage	1	2	3	4
Melody	*do-te* \hat1-\downarrow\hat7	*la* \hat6	*re-do* \hat2-\hat1	*ti* \hat7
Bass	*mi* \hat3	*fa* \hat4	*fi* \uparrow\hat4	*sol* \hat5
Figures	6/5	5	6/5	5
Roman numerals	V/IV	V	V/V	V

Like the Fonte, the Monte also goes through two tonicizations with a sequential treatment of a modular half:

Stage	1	2
Meter	W	S
Melody	*sol-fa* \hat5-\hat4	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	6/5	5
Roman numerals	V	I

Ponte

Stage	1	2	3
Meter	S	W	S
Melody	*sol* \hat5	*ti* \hat7	*re* \hat2
Bass	*sol* \hat5	*sol* \hat5	*sol* \hat5
Figures	5	7	7
Roman numerals	V	V	V

Pre-Cadential / Incomplete Cadences

Fenaroli

Stage	1	2	3	4
Meter	S	W	S	W
Melody	*fa* \hat4	*mi* \hat3	*ti* \hat7	*do* \hat1
Bass	*ti* \hat7	*do* \hat1	*re* \hat2	*mi* \hat3
Figures	6/5	5	6/5	6
Roman numerals	V	I	V	I

Indugio

Stage	1	2	3	4	5
Meter	S	W	S	W	S
Melody	*re* \hat2	*fa* \hat4	*la* \hat6	*do* \hat1	*ti* \hat7
Bass	*fa* \hat4	*fa* \hat4	*fa* \hat4	*fi* \uparrow\hat4	*sol* \hat5
Figures	6/5	6/5	6/5	6/5	5
Roman numerals	IV	IV	IV	V/V	V

Deceptive Cadence

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*do* \hat1	*re* \hat2	*re* \hat2	*do* \hat1
Bass	*mi* \hat3	*fa* \hat4	*sol* \hat5	*la* \hat6
Figures	6	6/5	5	5
Roman numerals	I	ii	V	vi

Evaded Cadence

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*do* \hat1	*re* \hat2	*re* \hat2	*do* \hat1
Bass	*mi* \hat3	*fa* \hat4	*sol* \hat5	*mi* \hat3
Figures	6	6/5	5	6
Roman numerals	I	ii	V	I

Passo Indietro

Stage	1	2
Meter	S	W
Melody	*ti* \hat7	*do* \hat1
Bass	*fa* \hat4	*mi* \hat3
Figures	6/4/2	6
Roman numerals	V	I

The Passo Indietro is essentially the first two stages of a Prinner. Literally a “stepping back,” the Passo Indietro often precedes a significant cadence.

Comma

Stage	1	2
Meter	W	S
Melody	*fa* \hat4	*mi* \hat3
Bass	*ti* \hat7	*do* \hat1
Figures	6/5	5
Roman numerals	V	I

Converging Cadence

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*mi* \hat3	*re* \hat2	*do* \hat1	*ti* \hat7
Bass	*mi* \hat3	*fa* \hat4	*fi* \uparrow\hat4	*sol* \hat5
Figures	6	6/5	6/5	5
Roman numerals	I	ii	V/V	V

This cadence is also known as the *fa–fi–sol* half cadence after the definitive bass line: \hat4-\uparrow\hat4-\hat5. Note the correspondence between this schema and the Indugio.

Cadences and Post-Cadential

Cadenza Semplice

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*do* \hat1	*re* \hat2	*re* \hat2	*do* \hat1
Bass	*mi* \hat3	*fa* \hat4	*sol* \hat5	*do* \hat1
Figures	6	6/5	5	5
Roman numerals	I	ii	V	I

Cadenza Composta

Stage	1	2	3	4	5
Meter	W	S	S	W	S

Stage	1	2	3	4	5
Melody	*do* \hat1	*re* \hat2	*mi* \hat3	*re* \hat2	*do* \hat1
Bass	*mi* \hat3	*fa* \hat4	*sol* \hat5	*sol* \hat5	*do* \hat1
Figures	6	6/5	6/4	7	5
Roman numerals	I	ii	Cad.	V	I

Cadenza Doppia

Stage	1	2	3	4	5
Meter	S	W	S	W	S
Melody	*fa* \hat4	*mi* \hat3	*re* \hat2	*re* \hat2	*do* \hat1
Bass	*sol* \hat5	*sol* \hat5	*sol* \hat5	*sol* \hat5	*do* \hat1
Figures	5	6/4	4	3	5
Roman numerals	V	V	V	V	I

Quiescenza

Stage	1	2	3	4
Meter	W	S	W	S
Melody	*te* \downarrow\hat7	*la* \hat6	*ti* \hat7	*do* \hat1
Bass	*do* \hat1	*do* \hat1	*do* \hat1	*do* \hat1
Figures	♭7	6/4	7/4/2	5
Roman numerals	V/IV	V	V	I

The Quiescenza is a post-cadential schema.

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2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences

Key Takeaways

This chapter discusses harmonizations of the scale using the so-called “rule of the octave” and other sequential configurations. There are many files provided to view or download:

1. The Rule of the Octave
   - Building the Rule, approaching the “Rule” by incrementally nuancing a succession of parallel ^6_3s: .mscz, .mxl, .pdf
   - Part by Part, taking a closer look at the component parts of the “Rule”: .mscz, .mxl, .pdf
2. Harmonizing the scale with sequences
   - Open score (one voice per part): .mscz, .mxl, .pdf
   - Short (piano) score: .mscz, .mxl, .pdf

The Rule of the Octave

The “Rule of the Octave” is an important part of the schema/partimento tradition. You might like to think of it as a kind of cheat sheet for harmonizing bass lines: there’s one chord for each scale degree, and you can go a long way by just matching up those bass notes with their corresponding chord.

There are many, subtly different versions of the Rule of the Octave harmonization. The version used here is closely based on that of Fedele Fenaroli (Naples, 1775), with just a couple of modifications to preserve a consistent number of voices throughout (four voices, including the bass) and to avoid any suggestion of parallels.

Approaching the “Rule” from parallel ^6_3s

File downloads: .mscz, .mxl, .pdf

Let’s begin by building up our version of the Rule of the Octave from simple principles, starting with parallel ^6_3 (first inversion) chords. You could also think of this as a matter of moving from a flat to a rich harmonic hierarchy, or else as a “Regolo recipe”: how to make or understand the rule in four easy steps.

1. We begin with a simple harmonization of the bass scale using parallel ^6_3 chords only. There’s nothing grammatically incorrect about this, but neither does it have much of a sense of hierarchy or variety. In short, it’s not very interesting.
2. Next we put in strategic ^5_3s on the first and last chords to give a sense of closure on the tonic.
3. Then we also add a ^5_3 on the dominant chords of both ascending and descending forms to further nuance the hierarchy (these are important chords too).
4. Finally, we precede each of the tonic and dominant chords (including those in inversion) with seventh chords. In one case, this also involves a chromatic alteration for a stronger sense of tonicizing the dominant. Why do you think we might only make that change this one time, and not anywhere else in the progression?

A link to an interactive elements can be found at the bottom of this page.

Rule of the Octave from ^6_3 by FourScoreAndMore

Examining the Rule part by part

File downloads: .mscz, .mxl, .pdf

Having arrived at the Rule, this second file deconstructs it again so you can practice and engage with it in parts, with any number of voices, and in any position (i.e., any inversion of the right-hand harmonization). Keep practicing each component part separately and in a range of keys to build fluency with and abstraction of the Rule. (Note: you can transpose scores in MuseScore with the Notes menu: Notes/Transpose.)

We begin by combining the bass scale with each of the three upper-voice parts in turn, centered respectively on the:

- tonic (first system of each page: ascending on p. 1; descending on p. 2)

- mediant (second system)
- dominant (third system)
  These systems are annotated with the interval between the upper and lower parts.

We then combine those upper parts into three-note right-hand chords to generate the Rule.
Here the three versions ("positions" in Fenaroli's language) are given by the inversion of the chord. Again, the top voice is centered successively on the:

- tonic (fourth system)
- mediant (fifth system)
- dominant (sixth system)

A link to an interactive elements can be found at the bottom of this page.

Rule of the Octave Part by Part by FourScoreAndMore

Harmonizing the Scale with Sequences

File Downloads and online:

- Open score (one voice per part): .mscz, .mxl, .pdf, link to view the score online
- Short (piano) score: .mscz, .mxl, .pdf, link to view the score online

Note: The open and short-score versions of this material are otherwise identical, so these introductory comments apply equally to both.

As we've seen above, the Rule of the Octave can be thought of as in terms of a sequential harmonization of bass scales (parallel ^6_3 chords). This section looks at some other sequential harmonizations of the bass scale here. Basically, this involves patterns of one or more harmonies which repeat sequentially in the direction of the scale. Some of these work in the same way for both ascending and descending forms; others require some modification.

We begin just as we did before, with a simple harmonization of the scale using parallel ^6_3 chords only. The following systems proceed to patterns of:

5–6 patterns

- Ascending: In the ascending form, we alternate between the fifth and sixth above each note of the bass line scale.
- Descending: In the descending form, we could do the same note-by-note alternation as the ascending form, or else alternate between the fifth and sixth on separate notes (as in this file).

7–6 patterns: chains of suspensions

- Ascending: 7–6 suspensions involve a descending upper part, so in the ascending form of this pattern, we need to add in a leap up the octave to restart the pattern, so the repeating pattern is more like 7–6–8.
- Descending: Here the descending sequence matches the descending scale, so no modification is necessary. We essentially go back to the parallel ^6_3 chords we started with, and just delay or offset the top line.

Cycles of fifths

The cycle of fifths is a based on a progression of root motion descending by fifths. Hiding in this pattern is another (usually descending) scalic progression between alternate bass notes. This arises because instead of literally going down two fifths, we usually go down a fifth and up a fourth, which is the equivalent progression, just keeping it in the same register / octave. At the end of one such "down a fifth, up a fourth," we end up a step lower than where we started, and so we also have a stepwise progression that can be scalic (if it is diatonic—i.e., not modulating).
We set this out in some of the main forms:

- Descending 1: with triads only
- Descending 2: with sevenths and suspensions (cf. 7–6 descending)
- Descending 3: "zigzag" circle-of-fifths (note the outer-voice canon)
  Finally, we set out one version of this in the ascending direction:
- Ascending 1: with 4–3 suspensions

2–3: more chains of suspensions

So far, we've used 7–6 and 4–3 suspensions, so that leaves us one more important type: the 2–3 suspension (which is the inversion of 7–6).

- Ascending: Just like the 7–6 suspensions above, for the ascending scale, we need to restart each pattern, so it ends up being 2–3–1 with the upper part, or 9–8–10 with the bass.
- Descending: Again, no restart is needed for the descending form. The 2–3 pattern sets up a series of ^{4_2} to ^{6} progressions like the important V^{4_2}–I^{6} progression, except that we've kept it diatonic here (i.e., without tonicizing each key).

A link to an interactive elements can be found at the bottom of this page.

Scale Sequences Short by FourScoreAndMore Assignments

The partimenti approach really calls for hands-on practice.

1. Begin by playing through these examples from the files provided, preferably in a range of different keys. (Note: As mentioned above, you can transpose scores in MuseScore with the Notes menu: Notes/Transpose).
2. See if you can memorize the patterns. Test yourself by:
   - writing them out on paper (start with a blank scale)
   - playing them from memory
3. Both with the music and (when you're ready) from memory, try embellishing these basic patterns.

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CHAPTER OVERVIEW

Chapter 3: Form

3.1: Foundational Concepts for Phrase-Level Forms
3.2: The Phrase, Archetypes, and Unique Forms
3.3: Hybrid Phrase-Level Forms
3.4: Expansion and Contraction at the Phrase Level
3.5: Formal Sections in General
3.6: Binary Form
3.7: Ternary Form
3.8: Sonata Form
3.9: Rondo

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3.1: Foundational Concepts for Phrase-Level Forms

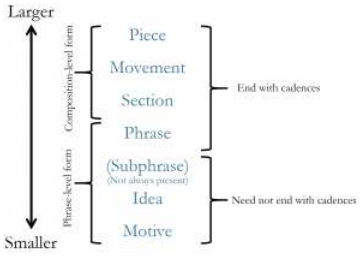
Key Takeaways

This chapter describes the hierarchy of musical form, motives, and segmentation analysis.

- Musical form can be understood as a hierarchical grouping of units.
- The smallest of these groupings is a motive, which is a regularly recurring unit of music that's typically smaller than an idea. In an analysis, we circle and label motives that recur and are transformed across a work. Avoid identifying large melodies or portions of melodies as motives—motives are short!
- A segmentation analysis is a way to show the grouping units of a passage or whole piece. To do a segmentation analysis, we begin by identifying phrase endings, which are often marked by cadences. Then, we divide phrases into smaller units using square brackets above the score to show the idea level.

Chapter Playlist

Hierarchy



Example 1. Hierarchy of form in classical music.

One way to understand musical form is as a hierarchical grouping of units. Example 1 shows that a piece contains movements, movements contain sections, sections contain themes, themes contain phrases, and so on.

Although the diagram in Example 1 looks quite simple, the relationships between the levels are a little more complicated in reality. For instance, sometimes two levels are collapsed into one: a single phrase may comprise an entire section of a work, so it may not always be worthwhile to distinguish between each level. It's best to think of Example 1 as a guide and not as something that strictly defines formal levels.

This chapter, along with the three that follow it, are focused on phrase-level form, or the various ways in which a phrase may be constructed of motives, ideas, and sometimes subphrases (which will be discussed in later chapters).

Motives

A motive is like a little snippet of a melody. It's a regularly recurring unit of music that's typically smaller than an idea (the focus of the next section of this chapter). Each video in Examples 2–4 discusses a motive from a different work. They all contain the same basic information, so you might choose to watch the one that interests you the most, or you might watch all three.

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=325

Example 2. Motivic analysis of John Williams, "Journey to the Island" (1:20–1:46) and Main Theme from *Jurassic Park (0:48–1:06)*.

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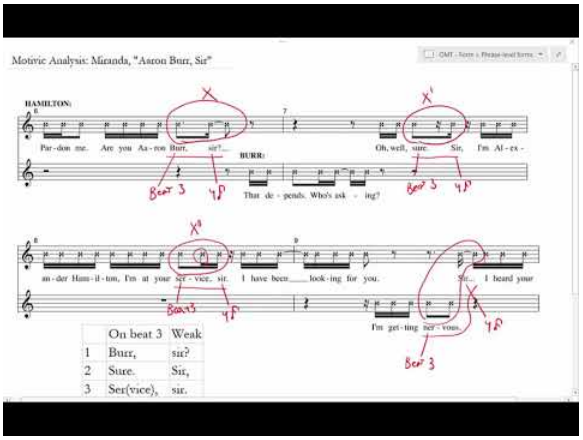
Example 3. Motivic analysis: Ludwig van Beethoven, Symphony 5, I (0:00–0:27).



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Example 4. Motivic analysis: Lin-Manuel Miranda, "Aaron Burr, Sir" from *Hamilton (0:12–0:16)*.

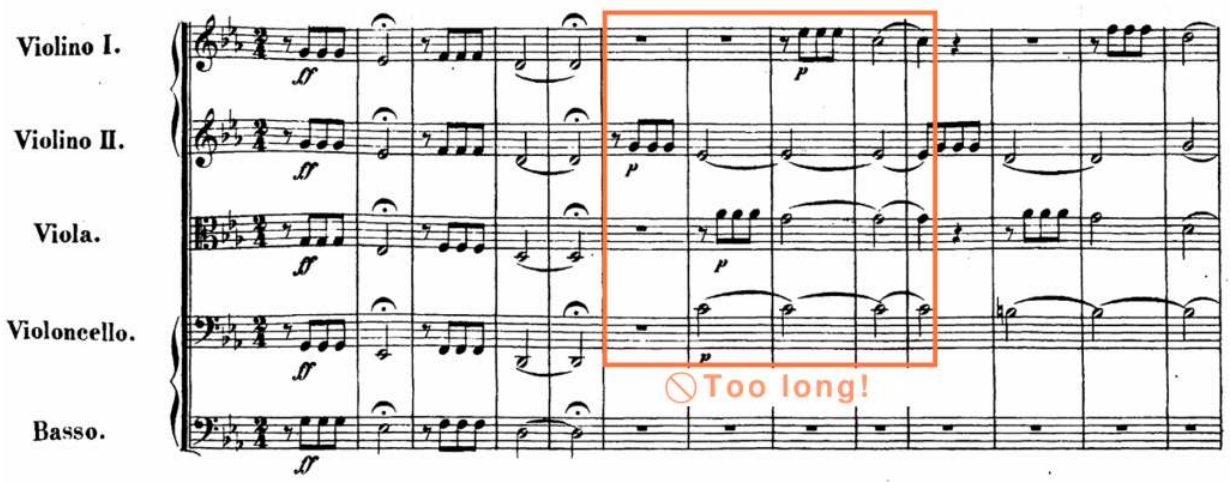
While a motive does not necessarily have to repeat, those that do are usually the most interesting ones to talk about, so we tend to focus on motives that recur throughout a passage.

There are many kinds of motives (e.g., rhythmic, pitch, contour, timbre), but the word "motive" by itself most often refers to a pitch-based motive. A motive that's primarily recognizable from its rhythmic design, for example, would be spoken of as a "rhythmic motive."

As a motive recurs throughout a work, it tends to change. Some common transformations are:

- Enlargement: making the durations of a motive longer than the original
- Contraction: making the durations of a motive shorter than the original
- Inversion: changing the direction of the motive (e.g., instead of going up, it goes down)
- Displacement: changing the metric position of the motive relative to its original statement
- Retrograde: stating the motive backward in comparison to the initial statement
- Intervallic manipulation: changing the size of the intervals that comprise the motive (e.g., mi2 becomes ma2)
- Embellishment: adding embellishing tones to the underlying basic shape of the motive

Often when people are first asked to identify motives in a work, they tend to choose something too large, like an entire theme, for instance. Example 5 shows a common mistake in a motivic analysis of the opening of Ludwig van Beethoven's Fifth Symphony: identifying a passage that is too long to be considered a motive. For a more useful approach, see the video in Example 3.



Example 5. Beethoven, Symphony 5, I, mm. 1–13 (0:00–0:17). The boxed measures indicate something that is too long to be considered a motive.

Practice It! 1: Motivic Analysis

This **Practice It!** will guide you through a motivic analysis of the opening of John Williams's "Duel of the Fates." To begin, listen to the opening (0:15–0:26), then start the quiz.

The original version of this chapter contained H5P content. You may want to remove or replace this element.

The Idea Level, the Phrase, and Segmentation Analysis

A phrase is a relatively complete thought that exhibits trajectory toward a goal, arriving at a sense of closure. While phrases are examined in more detail in the following chapter, here are two important points:

1. "Relatively complete" means that the phrase has a sense of beginning, middle, and end.
2. In much tonal music, closure is most often signaled by a cadence (though other ways of achieving closure will be examined in the following chapter). In performance, knowing that phrases end with closure can help us to shape passages with a sense of trajectory toward their goal.[1]

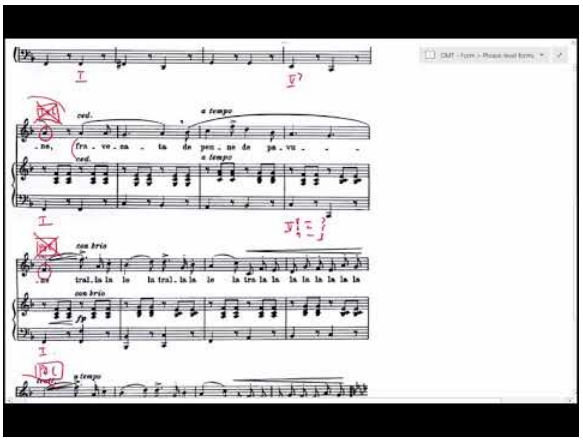
When we analyze a phrase, we often begin with a segmentation analysis, which uses square brackets above the staff to identify the phrase's component parts.

The smallest level of a segmentation analysis is called the idea level. (If needed, see Example 1 for a reminder of where the idea level fits in the hierarchy of form.) Ideas are short grouping units that contain the motivic material for the work. They are often two measures long, but they may be longer or shorter. Ideas may group together to create subphrases or phrases, something that is discussed in more detail in the next chapter.

To perform a segmentation analysis, do the following:

1. Identify potential points of closure.
   - Consider that phrases need a sense of beginning, middle, and end, so be careful that you're not thinking too small to determine where a phrase ends.
   - In tonal music, very often cadences tell us where the ends of phrases are.
2. Divide each phrase into smaller units. (To identify these units, consider: if you were to coach someone to prepare this phrase, how would you divide it so they could practice it in smaller chunks?)
3. Use square brackets above the staff to indicate those small units.
4. Verify and label any cadences that are present.

The videos in Examples 6 and 7 each demonstrate a segmentation analysis. They contain similar explanations, so you may watch both or choose the one that most interests you.



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Example 6. A segmentation analysis of Donizetti, “Me voglio fà ‘na casa” (0:00–0:43).

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Example 7. A segmentation analysis of Clara Schumann, Piano Trio Op. 17, I (0:00–0:32).

Assignments

1. Foundational Concepts for Phrase-Level Forms (.pdf, .docx). Asks students to perform motivic analyses on three excerpts: John Williams, “Hedwig’s Theme” from *Harry Potter*; Omar Thomas, *A Mother of a Revolution!*; and Maria Szymanowska, *56 Dances of Different Genres*, Polonaise in E minor, Trio, mm. 1–8.

---

1. Sometimes people confuse the terms "phrase" and "phrasing." Usually when people say "phrasing," they are referring to the way a passage might be shaped (where to push and pull time, where and how to change dynamic levels, etc.), and they may or may not be referring to an actual phrase (a complete thought that ends with a cadence). 3.01: Foundational Concepts for Phrase-Level Forms#return-footnote-325-1

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3.2: The Phrase, Archetypes, and Unique Forms

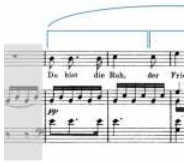
Key Takeaways

This chapter introduces the phrase, the sentence, the period, the repeated phrase, compound forms, and unique phrase-level forms.

- A phrase is a relatively complete thought that exhibits trajectory toward a goal. In tonal classical music, that goal is almost always one of the traditional cadence types, but in other kinds of music, that goal may be something else.
  - A sentence is a special kind of phrase that contains a presentation and a continuation.
- Sometimes phrases are combined to form larger forms. Two such combinations of phrases are:
  - The period: a phrase-level form consisting of an antecedent and a consequent.
  - The repeated phrase: two phrases where the second is a written-out repeat of the first.
- Sometimes two sentences are arranged in an antecedent-consequent relationship to create a compound period.
- Although the forms discussed in this chapter are all quite common, it's equally common for a composer to write a unique phrase-level form that isn't in dialogue with the ones discussed here.

Chapter Playlist

The Phrase



Example 1. A segmentation analysis of a phrase of common length in Schubert, "Du bist die Ruh" (0:21–0:32).

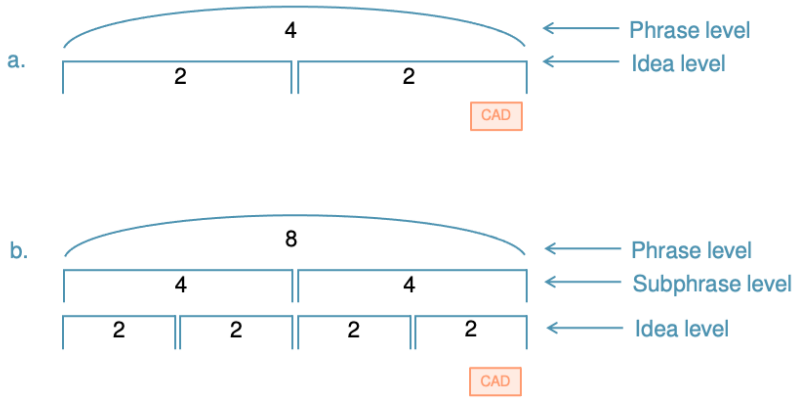
Example 2. A segmentation analysis of a phrase of unique length in Fanny Hensel, "Abendbild" (0:00–0:40).

A phrase is a relatively complete thought that exhibits trajectory toward a goal, arriving at a sense of closure. In tonal classical music, the goal of a phrase is almost always one of the kinds of cadences described in the Introduction to Harmony, Cadences, and Phrase Endings chapter: perfect authentic cadences (PACs), imperfect authentic cadences (IACs), and half cadences (HCs).[1]

A phrase can be any length, but phrases of 4, 8, or 16 measures are particularly common. Example 1 shows a segmentation analysis for a phrase of 4 measures (a common length), while **Example 2** shows a segmentation analysis for a phrase of 13 measures (an unusual length).

Phrases can comprise either ideas or both subphrases and ideas. The diagrams in Example 3 depict both of these scenarios.
When we diagram phrases, we follow two general principles:

1. Square brackets are used for ideas and subphrases (essentially anything that doesn't have to end with a cadence).
2. Arcs are used for anything at the phrase level or above (essentially anything that must end with a cadence).[2]



Example 3. A phrase divided into (a) ideas only, and (b) subphrases and ideas.

Because closure is so important for phrase identification, it's crucial to correctly identify cadences. Not every pause or V–I motion is a cadence! Example 4 discusses a passage with multiple locations someone might mistakenly label as cadences.

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Example 4. A passage with multiple locations someone might mistakenly label as cadences in Haydn's Piano Trio in F Major, Hob. XV:6, I (0:00–0:24).

Two Categories: Archetypes vs. Unique Forms

Below, we'll explore two main ways that phrase-level forms might be organized:

1. They might play with what we'll call an archetype. These are special ways of organizing phrases, and you'll read about two kinds: sentences and periods.
2. They might not relate to an archetype at all, in which case we'll say they're unique forms, meaning they are not organized as sentences or periods.

Note that this doesn't mean that archetypes are more common than unique forms. Phrase-level forms belonging to both categories appear frequently in common-practice music. Moreover, these categories might best be viewed as two ends of a spectrum (Example 5) in which a phrase-level form can be understood as "closer" to one category or the other without clearly belonging to either one.

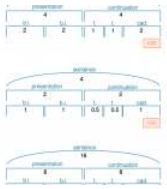
Example 5. A spectrum of phrase-level formal categories.

Archetype 1: The Sentence (A Special Kind of Phrase)

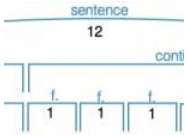
The Basics

EXAMPLE 6. A sentence at the beginning of Louise Farrenc, Cello Sonata, II (0:00–0:28).

Example 6 shows one common way to construct a phrase, called a sentence. A sentence consists of two subphrases: the presentation and the continuation. The presentation is often four measures long, and it consists of a basic idea (b.i.) and its repetition. The continuation is often the same length as the presentation, creating a sense of proportional balance. It's characterized by four traits that are discussed below.



Example 7. Common sentence lengths.



Example 8. A hypothetical sentence with a continuation that's longer than the presentation.

Although it's common for the presentation and continuation to be the same length (several common lengths are shown in Example 7), just as often, the continuation is longer than the presentation (Example 8). However, it's not common for the continuation to be shorter than the presentation.

More Detail: The Presentation

The presentation is a subphrase comprised of a basic idea (b.i.) and its repetition (as in the first half of Example 6).

Basic ideas are often two measures long, but one-measure or four-measure basic ideas also occur with some frequency.

The repetition of the basic idea is often varied, which can sometimes make it challenging to determine whether one is dealing with repetition or with a completely different idea. One of the characteristics that usually helps to clarify is **contour**: if the two ideas share the same contour, often we hear the second as a varied repetition of the first. If the two ideas have different contours, then we're more likely to hear the second section as contrasting with the first, something that will return in our discussion of the period later in this chapter.

Some common transformations of the basic idea are:

- Rhythmic or melodic embellishment
- Transposition
- Change of harmonization
- Change of interval quality or size (or both)

Presentations typically begin on the tonic harmony, and they may do one of several things:

- Prolong tonic via a progression such as $\mathrm{I–V–V–I}$ or $\mathrm{I–ii^4_2–V^6_5–I}$
- Move from tonic to dominant: $\mathrm{I—V—}$
- Move from tonic to a non-dominant harmony, most often a strong pre-dominant such as ii$^{(6)}$

More Detail: The Continuation

The continuation is a subphrase that typically feels less stable than the presentation.

It's characterized by four traits:

- Fragmentation (f.): making unit sizes shorter than the previously established unit sizes (e.g., if the basic ideas are each two measures, fragments may be one measure long).
  - Note that *fragmentation refers only to the length of the units*. It does not refer to their melodic content, which may or may not be related to the basic ideas.
- Increased rhythmic activity: the use of faster durations than in previous units.
- Sequences: units are repeated and transposed.
- Increased harmonic rhythm: chord changes occur more often than before. For example, if the basic ideas are each two measures long and each is harmonized with a single chord, the continuation might contain chord changes every measure.

A continuation subphrase is easier to identify if it includes more of the traits listed above, but very often, only some of these traits are present. Perhaps the most obvious one is fragmentation, which usually signals continuation even in the absence of the other

traits, but not all continuations exhibit fragmentation.

Continuations may therefore take one of two typical forms: with fragmentation (as in Example 6) and without fragmentation (as in Examples 9 and 10). In Example 9, the continuation doesn't divide into a smaller idea level. The term unit (u.) denotes a grouping that simply expresses the traits of the next higher grouping to which it belongs; in Example 10, it indicates that the two-measure idea expresses continuation (perhaps through increased harmonic rhythm, for example).

Example 9. A sentence without fragmentation in Beethoven, *Polonaise for Military Band* (0:00–0:06).

Example 10. A sentence whose continuation doesn't exhibit fragmentation in Beethoven, Piano Sonata no. 4, Op. 7, II (0:00–0:45).

Continuations may therefore take one of two typical forms:

- Example 6 above showed a typical continuation with fragmentation.
- Examples 8 and 9 show continuations without fragmentation.
  - In Example 9, the continuation doesn't divide into a smaller idea level.
  - The term "unit" (u.) is used in Example 10 to denote a grouping that simply expresses the traits of the next higher grouping to which it belongs. Here, unit would mean that the two-measure idea expresses continuation through its increased harmonic rhythm.

Since continuations are unstable at their beginnings, it's hard to generalize about how they might begin harmonically. In terms of their endings, however, continuations always drive toward a cadence, and in classical music, that cadence can be any of the three common kinds (perfect authentic, half, or imperfect authentic cadence).

Summary: The Archetypal Sentence and Its Variants

Sentences come in many forms: the clearest, most obvious sentences are closer to the idealized archetype, and phrases that are less clear may be highly varied while still exhibiting some traits of the sentence (we call such phrases sentential). The archetypal sentence consists of:

- 4 or 8 measures
- A presentation
- A continuation whose length balances that of the presentation
- Fragmentation in the continuation

To be clear, many sentences do not have all of these traits. At a minimum, to be sentential, a phrase needs a presentation and a continuation.

Archetype 2: The Period (A Combination of Two Phrases)

The Basics

Example 11. A period in Mozart's Clarinet Concerto, III (0:00–0:11).

In addition to the sentence, another common phrase-level form is the period (Example 11). Unlike the sentence, which is a single phrase, the period comprises two phrases, each consisting of a basic idea (b.i.) followed by a contrasting idea (c.i.) (see below on how the treatment of these ideas differs in each phrase). The first phrase, called the antecedent, is often four measures long, and it ends with a weaker cadence, most often a half cadence (HC). The second phrase is called the consequent. It ends with a stronger cadence than the antecedent, most often a perfect authentic cadence (PAC). It may be the same length as or longer than the antecedent; it's rare for it to be shorter.

More Detail: The Antecedent

Antecedents are sometimes characterized as "asking a question" to which the consequent "provides the answer." Another way to think of it is that the antecedent makes an incomplete statement and the consequent completes it. Both of these descriptions stem from the fact that the antecedent always ends with a weaker cadence than the consequent.

Antecedents typically start on tonic harmony, and they most often end on a half cadence. While it's certainly possible for the antecedent to modulate, it's more common for the it to be entirely in the tonic key.

More Detail: The Consequent

Like the antecedent, the consequent also comprises a basic idea and a contrasting idea. Most consequents begin with a basic idea that is similar or identical to that of the antecedent, but it may also be different.[3] If the two basic ideas are different, it might be useful to label the antecedent's basic idea as "b.i.^{1}" and the consequent's as "b.i.^{2}."

The consequent's contrasting idea is almost always different from the antecedent's due to the fact that it must end with a stronger cadence than the antecedent. The degree of difference varies widely: sometimes the consequent's c.i. begins like the antecedent's and only changes near the very end; other times, the c.i. is entirely different.

Consequents most often begin on tonic harmony and end with a PAC.

Periods may either stay in a single key or modulate (i.e., change keys). If the period modulates, the change of key usually happens during the consequent.

The Repeated Phrase (Another Way to Combine Two Phrases)

Another relatively common phrase-level form—one that sometimes gets confused with the period—is the repeated phrase, which consists of a phrase followed by a written-out repeat (Example 12).

Example 12. A repeated phrase in Schubert's "Du bist die Ruh" (0:22–0:44).

A phrase between two repeat signs would typically not be considered a repeated phrase—this term refers to a phrase with a written-out repeat that adds additional measures to the piece. The repetition is often varied (for example, the melody may be embellished during the repeat), which explains why a composer may choose to write out the phrase a second time.

In a repeated phrase, the first phrase can end with any kind of cadence, and the second phrase must therefore end with the same one. This distinguishes a repeated phrase from a period, in which the consequent ends with a stronger cadence than the antecedent.

Compound Phrase-Level Forms (Combining Archetypes)

Example 13. A compound period in Christian Petzold's Minuet in G Major (0:00–0:25).

Since the sentence is a single phrase, and since the period is composed of two phrases, it's possible for a period to be made of two sentences, as in Example 13. When one form contains another kind of form in this way, we call the result a compound form.

Example 14. A unique phrase-level form in Fanny Hensel's "Abendbild" (0:00–0:40).

How is Example 13 like a period? The first phrase (the antecedent) ends with a half cadence, and the second phrase (the consequent) ends with a stronger cadence: a perfect authentic cadence. This weak-to-strong cadence pattern makes this example retain that sense of "question and answer" or "incomplete thought to completed thought" that is so characteristic of the period.

How does Example 13 use sentences? The antecedent and the consequent are each a sentence: in each phrase, the first four measures are the presentation and the last four measure are the continuation.

Unique Phrase-Level Forms

The phrase-level forms we've looked at in this chapter are all quite common, but just as common are phrases that are unique—that aren't in dialogue with these archetypes in any obvious way.

When we analyze such passages, we can still perform a segmentation analysis. We can choose to apply labels flexibly, but we can also feel free to abandon labels where they don't seem to support our interpretation. In Example 2, we showed a segmentation analysis of a phrase of unique length, and we now show how one might apply select labels to those segments in Example 14.

Assignments

1. Analyzing sentences (.pdf, .docx). Asks students to compare excerpts to the archetypal sentence, provide form diagrams, and optionally, provide harmonic analysis for any given excerpt. Worksheet playlist
2. Analyzing archetypes and unique forms (.pdf, .docx). Asks students to identify excerpts that are archetypes (periods, sentences, compond periods) or unique forms, and to diagram those that are archetypes. Optionally, students can harmonically analyze the excerpts. Worksheet playlist
3. Composing melody-only sentences (.pdf, .mscx). Students compose four-measure sentences from a given basic idea (melody only).
4. Composing fully realized sentences (.pdf, .mscx). Students select from a bank of basic ideas to compose an 8-measure sentence with full texture (accompaniment and melody).

---

1. In other kinds of music, such as post-tonal music or popular music, closure may be signaled by other kinds of devices. 3.02: The Phrase Archetypes and Unique Forms#return-footnote-340-1
2. See the discussion of formal hierarchy in Foundational Concepts for Phrase-Level Forms for a reminder of what is above the phrase level. 3.02: The Phrase Archetypes and Unique Forms#return-footnote-340-2
3. Some analysts use the term "parallel period" to describe a period in which the consequent begins the same way as the antecedent, and "contrasting period" to describe a period in which the consequent begins differently than the antecedent. Since contrasting periods are so rare, however, this book simply uses "period" to refer to a parallel period, specifying the type only in the rare instance of a contrasting period. 3.02: The Phrase Archetypes and Unique Forms#return-footnote-340-3

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3.3: Hybrid Phrase-Level Forms

Key Takeaways

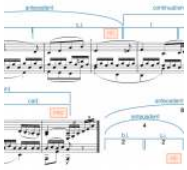
- A hybrid form combines the beginning of one archetype with the ending from another.
  - Possible beginnings are antecedents, presentations, or compound basic ideas.
  - Possible endings are consequents, continuations, or cadential endings.
- Although any beginning could be combined with any ending, some pairings are more common than others (see Example 7).

Chapter Playlist

What's a hybrid form?

In The Phrase, Archetypes and Unique Forms, we looked at two phrase-level formal archetypes: the sentence and the period.

We found that these forms divide into two parts. A sentence divides into two subphrases: a presentation and a continuation. A period divides into two phrases: an antecedent and a consequent.



Example 1. An antecedent + continuation in Beethoven, Piano Sonata Op. 13, II, mm. 1–8 (0:00–0:32).

A hybrid form occurs when the beginning of one archetype is paired with the ending from another archetype. In Example 1, an antecedent is followed by a continuation.

- How do we know the first part is an antecedent rather than a presentation?
  - It ends with a weaker cadence, whereas presentations don't end with cadences.
  - It has a basic idea followed by a contrasting idea, whereas presentations have a basic idea followed by a repetition of the basic idea.
- How do we know the second part is a continuation rather than a consequent?
  - Rather than beginning as consequents do with a basic idea, it begins with fragmentation, which is characteristic of continuations.
  - It begins with a feeling of instability created by the dominant that continues after the half cadence, rather than the stability that's typical of a consequent's beginning.

So far, we know two beginnings (presentation and antecedent) and two endings (continuation and consequent), but there's actually one more possible beginning (compound basic idea) and one more possible ending (cadential). Below, we'll outline these new beginnings and endings and provide ways to help distinguish between them.

Beginnings

New: The Compound Basic Idea (c.b.i.)

Example 2. A compound basic idea in Haydn's Piano Sonata in C, Hob. XVI:35, I, mm. 1–8 (0:00–0:05).

A compound basic idea (c.b.i.) is an antecedent without a cadence, as seen in Example 2.[1]

- How is Example 2 like an antecedent?
  - It contains a basic idea followed by a contrasting idea.
- How is Example 2 different from an antecedent?

- It doesn't end with a cadence. Notice how the bass sits on G across mm. 3–4: although the melody comes to a point of rest, the lack of harmonic motion in the bass evades the half cadence (HC) that might have appeared there.

Summary: The Three Beginning Types

The three beginnings that appear in hybrid phrase-level forms are antecedent, compound basic idea, and presentation. Example 3 provides a summary of the characteristics that differentiate each of these beginnings.

[table id=8/]

Example 3. Characteristics that differentiate beginnings.

Endings

New: Cadential (cad.)

Example 4. A cadential ending in Haydn, String Quartet Op. 64, No. 4, II, mm. 1–8 (0:05–0:10).

A cadential (cad.) ending harmonizes a particular bass pattern (demonstrated in Example 4).[2]

$$(\hat{3}-\hat{4}-\hat{5}-\hat{1}) \tag{3.3.1}$$

- *mi* (\hat3): I^6
- *fa* (\hat4): ii^6 or IV
- *sol* (\hat5): $V^{(7)}$ (often elaborated with cadential ^6_4)
- *do* (\hat1): I

$$(\hat{3}-\hat{4}-\hat{5}-\hat{1}) \tag{3.3.2}$$

The clearest cadential endings are four measures long with one bass note per measure.

Summary: The Three Ending Types

The three endings that appear in hybrid phrase-level forms are consequent, continuation, and cadential. Example 5 provides a summary of the characteristics that differentiate each of these endings.

[table id=9/]

Example 5. Characteristics that differentiate endings.

Hybrid Possibilities and Examples

The three possible beginnings and three possible endings are shown in Example 6. While any beginning on the left could be paired with any ending on the right, Example 7 shows that there are some pairings that are more common than others.

Below, we provide examples for all hybrids in the "slightly less common" and "occasional" categories (**Examples 8–12**). We already provided examples of the period and sentence in The Phrase, Archetypes, and Unique Forms.

The examples we provide in this chapter are all eight-measure archetypes, but as we show in the next chapter, these forms *can* be any length.

[table id=10/]

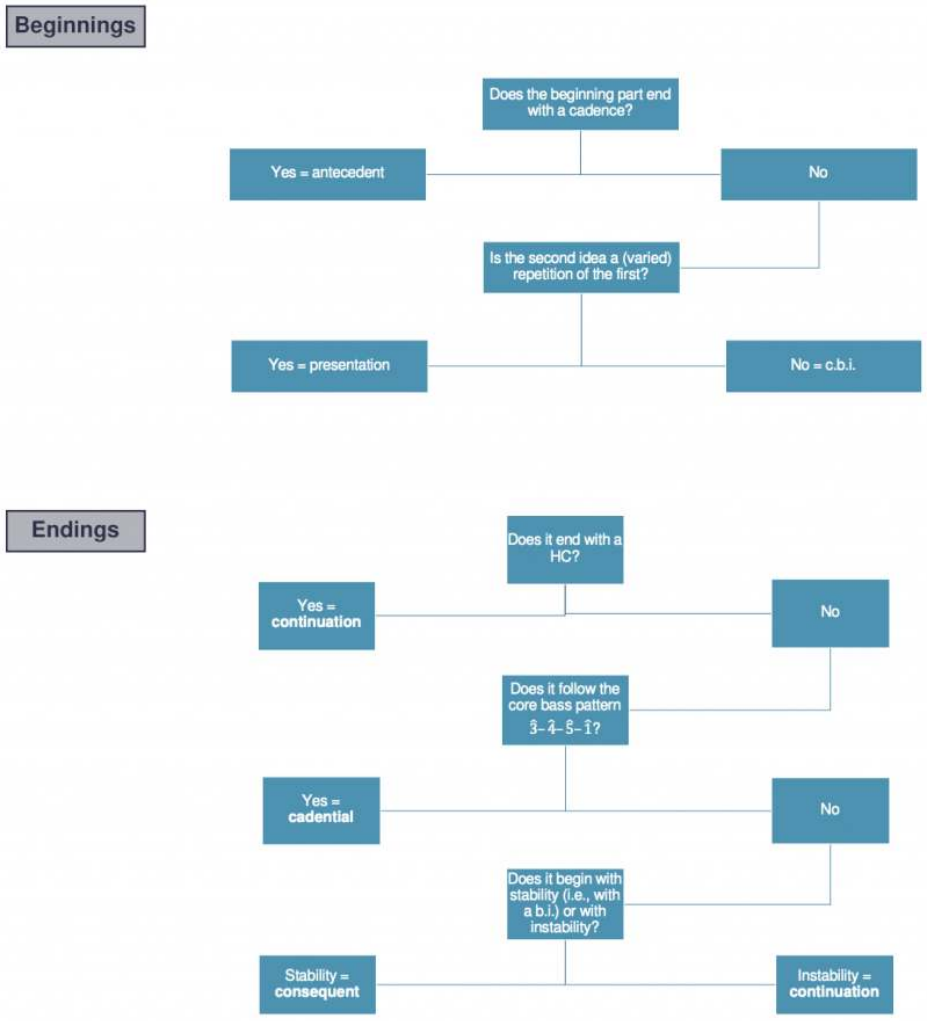
Example 6. Possible beginnings and endings. Any beginning on the left can theoretically pair with any ending on the right.

[table id=11/]

Example 7. Pairings of beginnings and endings sorted by degree of commonality.

Listening to Phrase-level Forms

With so many possibilities, it might seem overwhelming to try to sort through the various possibilities. Example 13 offers a suggested listening strategy that can help determine what kind of beginning and ending you're hearing.



Example 13. Suggested process for listening to phrase-level forms: (a) what to listen for in beginnings, and (b) what to listen for in endings.

Further Reading

- Caplin, William Earl. 2013. *Analyzing Classical Form: An Approach for the Classroom*. New York: Oxford University Press.

Assignments

1. Analyzing hybrid forms (.pdf, .docx). Provides excerpts and asks students to indicate which term best describes the first and second half of each. Optional harmonic analysis included. Worksheet playlist
2. Analyzing forms with multiple possibilities (.pdf, .docx). Asks students to identify preferred and plausible alternative interpretations for several excerpts. Also includes band music. Worksheet playlist
3. Composing phrase-level forms (.pdf, .docx). Asks students to compose a phrase-level form given a description. Provides a basic idea bank to give students a start.

---

1. What is "compound" about the compound basic idea? It often functions as the basic idea of a large sentence, one that is sixteen measures in length, where the presentation is eight measures long and comprises two c.b.i. units. It's "compound" in the sense

that these large basic ideas are themselves composed of two units: a b.i. and a c.i. 3.03: Hybrid Phrase-Level Forms#return-footnote-346-1

2. What is the difference between a cadential *idea* and cadential *ending*? The cadential idea comes at the end of a continuation, and essentially, the cadential ending is like the cadential idea being expanded to four measures and replacing the continuation. That means that "cadential" can occur at two formal levels: the idea level and the subphrase level. 3.03: Hybrid Phrase-Level Forms#return-footnote-346-2
3. This can also occur in minor, of course, as *me–fa–sol–do* [latex](\downarrow\hat3-\hat4-\hat5-\hat1)[/latex]. 3.03: Hybrid Phrase-Level Forms#return-footnote-346-3

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3.4: Expansion and Contraction at the Phrase Level

Key Takeaways

- Expansions make a phrase last longer than expected. They can be internal (between the beginning and ending of the phrase) or external (before the beginning or after the end).
  - Internal expansion techniques include repetition, stretching, one-more-time technique, and alternative path.
  - External expansions fall into two categories:
    - Prefixes occur before the beginning, such as an introduction.
    - Suffixes occur after the cadence, such as post-cadential extensions, codettas, and codas.
- Contractions make a phrase shorter than expected.

Chapter Playlist

The terms expansion and contraction refer to ways composers play with the expected length of a phrase.

What does “expected length” mean?

- When a phrase invokes one of the archetypes without following it exactly, we can often identify how long a closer representation of that archetype would have been.
- Sometimes the cadential motion of the phrase allows us to anticipate where a cadence might occur, but the phrase evades the expected cadence.
- Sometimes a piece states two versions of a phrase—one unexpanded and the other expanded—giving us a model to which we can compare the expanded version.

Expansion refers to the process of making a phrase longer than we expect. This lengthening might occur within the phrase (“internal expansion“) or outside of the phrase (“external expansion“). Contraction refers to the process of making a phrase shorter than we expect, and it always occurs within a phrase.

In this chapter, we offer an overview of several techniques for phrase expansion and contraction. This isn’t an exhaustive list, but it covers several of the more common techniques. The terminology concerning expansion and contraction techniques can quickly become overwhelming. What’s most important is to be able to recognize when a phrase is longer or shorter than expected and to be able to describe what’s creating the difference in length.

Internal Expansions

The four techniques we discuss below—repetition, stretching, one-more-time, and alternative path—all occur *within* a phrase: after the phrase’s beginning, but before its cadence. Often, composers use these techniques in combination; in fact, it’s relatively rare to find a phrase that’s expanded using only one technique.

Repetition

Example 1. Internal expansion via exact repetition in Robert Sheldon’s *Bright Lights!* (0:49–1:03).

Sometimes when a composer repeats material, the repetition creates extra length.

Example 1 shows an exact repetition of a motive *within a unit* that creates extra length: a four-measure antecedent is followed by an expanded five-measure consequent. The extra length results from a repeated motive within a unit.

Example 2. Internal expansion via varied repetition in Mozart's Horn Concerto, K. 447, I, mm. 1–9 (0:00–0:18).

Example 2 shows a varied repetition in which *a whole unit* is repeated to add extra length: a four-measure compound basic idea (c.b.i.) is followed by a five-measure continuation. The continuation begins with a sequence that expands it from the expected four measures to five.

Not all repetitions create expansion! Be careful to differentiate expansion-creating repetitions, which are unexpected, from more predictable repetitions, such as when the basic idea is repeated in a presentation.

Stretching

Example 3. Internal expansion via stretching in Schubert's Piano Sonata D. 459, I, mm. 1–9 (0:00–0:17).

Sometimes composers will lengthen a harmony or melody by increasing its duration so that it lasts longer than expected. When that happens, we say that the unit that contains the harmony or melody has been stretched. In Example 3, a four-measure presentation is followed by a five-measure continuation. The continuation's cadential idea is stretched when a I^6 chord and the cadential dominant (embellished by a Ger^6 and a cadential $^6_4$) each last for a full measure as opposed to both occurring within a single measure.

One-More-Time Technique (o.m.t.)

Coined by Janet Schmalfeldt (1989), the one-more-time technique involves three steps: 1) the music tries to cadence, 2) the attempted cadence is evaded, and 3) the music retries the cadence. The re-tried cadence often uses the same material, such that it feels like the music is "backing up," but it may also retry the cadence with different cadential material.

Example 4. Internal expansion via the one-more-time technique in Mendelssohn, Op. 8, no. 5, "Pilgerspruch" (0:00–0:37).

In Example 4, a cadence is proposed in m. 10, but it's evaded ($\mathrm{cad}^6_4 - \mathrm{V}^4_2 - \mathrm{I}^6$). A one-more-time repetition of the cadential idea ensues. The one-more-time unit is stretched: notice that it takes two measures (compared to one originally) for the melody to descend C–B♭–A–G, and it takes a full measure (compared to a half measure originally) for the cadential $^6_4$ to resolve to V^7.

Alternative Paths

An alternative path occurs when unexpected new material either temporarily or permanently causes a phrase to deviate from its expected trajectory toward a cadence. A temporary deviation is called a detour. Detours return to previous material from within the phrase before the phrase achieves a cadence. A permanent deviation is called a reroute. Reroutes achieve cadences without returning to previous material from within the phrase.

Example 5. Internal expansion via alternative path (detour) in Mendelssohn, *Hebrides* Overture, mm. 9–26 (0:20–0:58).

Example 5 shows a detour: the sentence's continuation is repeated. We realize the repetition is getting "off track" when the motive in the cadential idea (m. 19) is repeated (m. 20), which did not happen in the analogous place before (m. 15). A highly contrasting two-measure passage emerges (mm. 21–22) that leads to a return of material (mm. 23–26) similar to the cadential idea in mm. 19–20, now stretched.

Example 6. Internal expansion via alternative path (reroute) in Maria Theresia von Paradis, Sicilienne, mm. 1–10 (*0:00–0:42*).

Example 6 shows a reroute: a four-measure antecedent is followed by a six-measure expanded consequent. The consequent begins with the same basic idea as the antecedent, but its contrasting idea moves in a markedly different direction, one that doesn't lead to a cadence. A new cadential idea is needed to bring the phrase to a perfect authentic cadence (PAC).

Although one-more-time technique and alternative paths both involve cadences, they are very different techniques, as explained below:

One-more-time technique	Alternative path
• Passage has tried and failed to achieve a cadence • Feels as though the phrase backs up to try the failed cadence again	• Passage has not yet tried to cadence • Feels as though the phrase has gone off course

External Expansions

When composers add length outside of a phrase, they may add measures before the beginning (prefixes) or after the cadence (suffixes). In diagrams, we indicate external expansions using dashed arcs or brackets.

The Prefix

Example 7. External expansion via small prefix in Cécile Chaminade, "L'amour captif," mm. 1–10 (0:00–0:13).

A prefix occurs before the beginning of a phrase, usually taking the form of an introduction. A prefix can be small, but it may also be large, such as when a composer begins a symphony with a slow introduction. Example 7 shows a small prefix. As is very common with songs, this mélodie opens with an instrumental introduction before the singer enters—that is, before the phrase beginningg. Note also that this phrase includes a variant on the typical core bass cadential pattern. Instead of *mi-fa-sol-do* (\hat{3}-\hat{4}-\hat{5}-\hat{1}), Chaminade writes *di-re-sol-do* (\uparrow\hat{1}-\hat{2}-\hat{5}-\hat{1}) (mm. 8–11).

The Suffix

A suffix occurs after a phrase has cadenced. The terms in Example 8 are flexibly used to describe different types of suffix. While Example 8 provides guidelines for their use, what one person calls a post-cadential extension, another might choose to call a codetta. It's more important to recognize that a given suffix adds length outside the bounds of a phrase than to worry about which term is most appropriate.

[table id=13 /]

Example 8. Characteristics that differentiate common suffix types.

Example 9 shows the end of a lengthy period. After the perfect authentic cadence that ends the consequent, a two-measure post-cadential extension prolongs the final tonic via arpeggiation.[1]

In Example 10, a lengthy phrase ends the exposition of the piano sonata with a PAC in A♭ major at m. 41. The cadence is followed by a codetta: notice that it features a repeated two-measure unit harmonized with the cadential bass line *fi-sol-do* ($\uparrow\hat{4}-\hat{5}-\hat{1}$).

Example 11 features the longest kind of suffix: a coda. After the introduction returns (4:52) and then is varied (5:03), an elided PAC ends the piece proper (5:32). The coda (also at 5:32) presents an energetic celebration of the piece's closure, featuring a fast version of a previously-heard theme with several phrases.

[table id=15 /]

Example 11. External expansion via suffix (coda) in Shostakovich, *Festive Overture*.

Contraction

Example 12. Contraction in Stéphan Elmas, Piano Concerto No. 1, III, mm. 15–21 (32:21–32:28).

Contractions occur less frequently than expansions. A contraction occurs when a phrase is shorter than we might expect it to be.

In Example 12, a four-measure compound basic idea is followed by a three-measure continuation. Given the length of the compound basic idea, we might have expected the continuation to be four measures long to create proportional balance. As you listen, notice how the cadence feels abrupt, a feeling that usually accompanies contraction.

Further Reading

- Jarvis, Brian, and John Peterson. 2019. "Alternative Paths, Phrase Expansion, and the Music of Felix Mendelssohn." *Music Theory Spectrum* 41, no. 2 (Fall): 187–217.
- Schmalfeldt, Janet. 1992. "Cadential Processes: The Evaded Cadence and the 'One More Time' Technique." *Journal of Musicological Research* 12 (1–2): 1–52.

Assignments

1. Analyzing expansion techniques (.pdf, .docx). Asks students to name, segment, and label the form of excerpts and identify the location of any expansion technique(s). Optional harmonic analysis included. Worksheet playlist
2. Analyzing multiple expansion techniques (.pdf, .docx). More complicated examples than in worksheet 1. Each excerpt is significantly expanded. Worksheet playlist
3. Recomposing to remove expansions (.pdf, .docx). Asks students to recompose excerpts from worksheet 1 to remove the expanded portion of the archetypal form. Worksheet playlist

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1. The recording linked is the only commercial recording of the piece. We hope more people will record this beautiful work. 3.04: Expansion and Contraction at the Phrase Level#return-footnote-356-1

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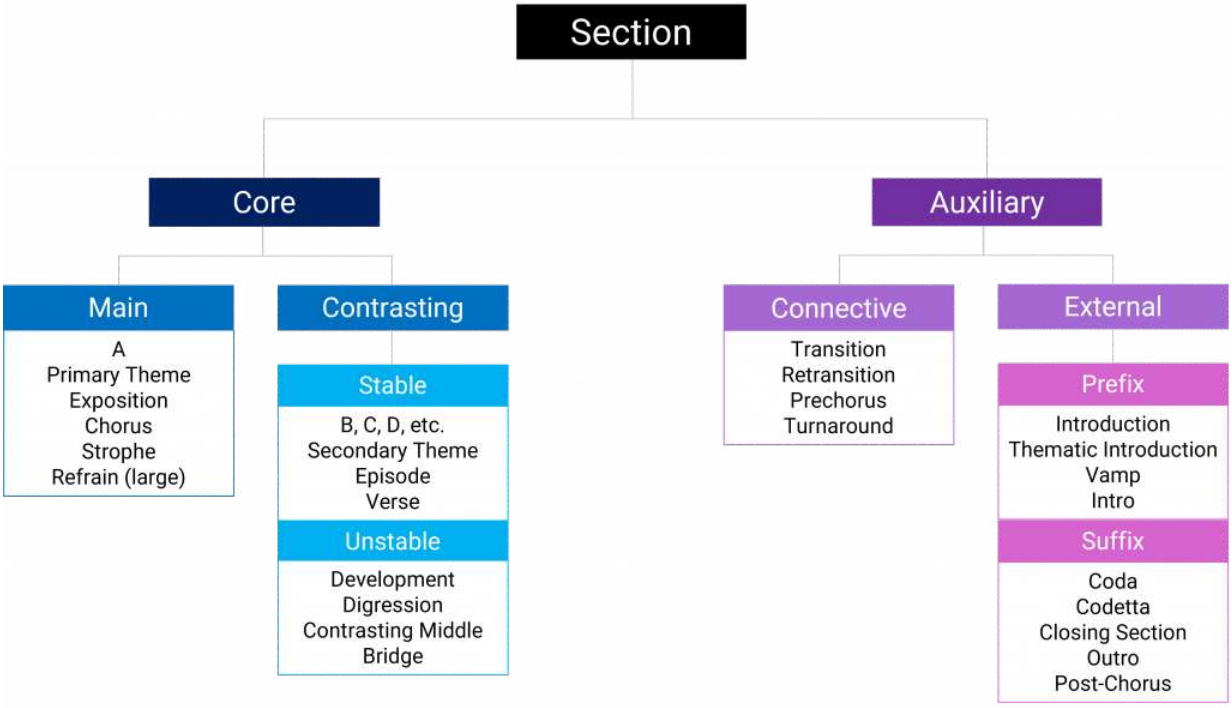
3.5: Formal Sections in General

Key Takeaways

- Analyzing musical form involves determining the identity and function of musical spans.
- Musical sections are either core or auxiliary.
- Core sections are either main or contrasting.
- Auxiliary sections are either external or connective.

Overview of Formal Sections in General

Understanding the form of a musical work typically involves breaking it down into spans of time, based on how each span is similar to and/or contrasts with other spans. These spans are then classified based on the identity of their musical material and how the section "functions" in the context of the piece. The two largest categories of formal function are core sections and auxiliary sections.[1]Example 1 below summarizes the hierarchical relationship between some of the most common section types. At the broadest level, musical sections are either core or auxiliary. Core sections are either main or contrasting, and auxiliary sections are either external or connective.



Example 1. Core versus auxiliary formal sections.

Core Sections

The core sections identified in Example 1 typically introduce and repeat a work's primary musical content. You can think of them as the sections you might sing for someone if they asked you how the work "goes." You can also think of core sections as containing the work's themes, though the term "theme" can be used in a broad or specific sense. Core sections also tend to repeat, which is another reason they will often make a stronger impression on your memory.

Main Sections

Main sections are typically the first section that presents primary musical content; they are usually repeated later in the work and are characterized by a relative sense of stability.

Terminology

The terms for main sections change depending upon the conventions of the genre and form (if it is a form with a name). When thinking about form in general, the main section should be called **A**, but within a known form, it may go by many names, including

but not limited to:

- primary theme (sonata)
- refrain (rondo or verse-refrain)
- exposition (sonata)
- theme from a set of variations
- chorus (verse-chorus)
- dance chorus (verse-chorus)
- strophe (AABA and strophic)

Contrasting Sections

Contrasting sections are hard to generalize, since they can vary in affect and stability. In some cases, the section is perfectly stable, and it contrasts mainly because it comes second instead of first; in other cases, a contrasting section may be the most unstable section of the work.

Unstable contrasting sections may share many musical features with connective auxiliary sections (defined below). The distinction lies in whether or not it is considered a core section: contrasting sections sound like a primary place in the work, whereas connective sections sound like a place between two core sections. In cases where the line between the two is blurry, a decision can be made based on the conventions of the overall form of the piece, or multiple formal descriptors (e.g., becoming) can be used to create an accurate and unforced classification.

Stability

Formal stability is the sense of tension vs. calmness in a portion of music. A relative sense of stability in a work is a common means of delineating form, and it is an important dramatic concern for creating momentum and engaging a listener's expectations about what might happen, given their familiarity with how other pieces in a given genre/style behave.

Common features for each might include some combination of the following, among others:

- **Stability:** relatively less change, consistent or decreasing dynamic level, tonic expansions, regular hypermeter, no modulation, diatonic melody, and diatonic harmony
- **Instability:** relatively more change, increasing dynamic level, extreme registers, increased chromaticism (tonicization), increased rhythmic activity, modulation, sustained dominant, sequences (especially chromatic ones), irregular hypermeter, and irregular phrase lengths

Because it's statistically common for works to start with a stable section, an unstable contrasting section would likely sound unusual at the beginning of a work.

Terminology

In terms of form in general, the first contrasting section is labeled **B**, and each subsequent new section receives the next letter of the alphabet (**C**, **D**, **E**, etc.).Within a known form, contrasting sections go by many names, including but not limited to:

- Stable
  - secondary theme (sonata)
  - episode (rondo, fugue)
    - Note: episodes are just as often unstable
  - verse (verse-chorus)
- Unstable
  - development (sonata)
  - episode (rondo, fugue)
  - digression (binary)
  - contrasting middle (binary)
  - bridge (multiple popular song forms)
    - Note: "bridge" in this context is referring only to popular-form terminology

Auxiliary Formal Sections

In addition to the core sections of a work, other sections may introduce, follow, or come between these core sections. These sections are called auxiliary sections, and there are two general categories: external and connective.

External Auxiliary Sections

External auxiliary sections either introduce a piece/section (prefix) or follow the generic conclusion of the piece or section (suffix). Prefixes and suffixes come in small and large varieties.

Prefix

A prefix (Rothstein 1989) refers to music that comes before the generic start of a phrase or piece and tends to express a formal sense of "before the beginning." A prefix can be described as either small or large depending on whether or not it contains a complete phrase. Large prefixes contain at least one phrase, while small prefixes don't have complete phrases and are typically far less noticeable. Small prefixes are often nothing more than the accompaniment for a section starting before the melody begins, and they may precede any phrase in a work.

The most common type of large prefix is called an introduction. Introductions are often in a slower tempo than the rest of the work and often contain their own thematic material. Small prefixes can be found in works of most genres and eras, but large prefixes are less ubiquitous and tend to show up more often in particular genres, like the opening of a symphony. However, other genres like the piano sonata (Beethoven's "Das Lebewohl," Op. 81a), string quartet (Mozart's "Dissonance" quartet), and dance forms like ragtime (Joplin, "The Entertainer") can contain them as well.

Below are some examples:

- Small Prefix:
  - Chopin's Polonaise in C minor, Op. 40, no. 2 – First two measures
  - Kiesza's "Dearly Beloved" – Opening
- Large Prefix:
  - Introduction of the 1st movement of Mozart's "Dissonance" string quartet in C major (K. 465) – The whole movement is about 10 minutes long, and its slow introduction (large prefix) lasts for nearly two minutes until the sonata form proper starts. There is a stark tempo change from slow to fast at 1:59 that makes the boundary clear.
  - Joplin's "The Entertainer" – First four measures
  - Madonna's "Vogue" – This large prefix has many subsections (0:00, 0:34, 0:50), but the song proper doesn't start until she begins singing at 1:07.

Suffix

A suffix (Rothstein 1989) refers to music that comes after the close of a phrase or piece and tends to express a formal sense of "after the end." The distinction between large and small again concerns whether or not it contains a complete phrase. Small suffixes can be found after the close of any phrase, but the affect is quite different depending on the type of cadence they follow. After an authentic cadence, they typically project a sense of stability and closure, but after half cadences, they tend to prepare for the entrance of the upcoming section and therefore project a sense of instability. Though possible after any phrase, large suffixes typically appear in two specific locations: (1) at the very end of a piece in the form of a coda, and (2) as the closing section of a sonata form's exposition and recapitulation (see Sonata Form). In most cases, a suffix contains musical material that is different from the phrase it follows, though that material may be derived from an earlier phrase.

Below are some examples:

- Small Suffix:
  - Dove Shack's "Summertime in the LBC" – After the final chorus, a small suffix (in the form of a simple accompaniment) ends the song as it fades out from 3:41 until the end.
  - Bizet, Habanera from *Carmen* – The B section ends just after the singer sustains a high note and cadences with the orchestra immediately after (cadence is at 2:01). After this cadence, the orchestra just repeats an accompanimental pattern a few times. The music from 2:01-2:06 is the small suffix.
- Large Suffix:
  - Puccini, "O Mio Babbino Caro" from *Gianni Schicchi* – Ending: You can hear the formal ending of the aria at 1:48 with the line "O Dio, vorrei morir!" at which time the aria could have ended satisfactorily. However, an elision occurs with the

strings, which play the main melody (a.k.a. ritornello) after the soloist finishes her line. Notice that the music from 1:48 to the end projects a sense of stability, as suffixes tend to do when they follow an authentic cadence.

- End of the 1st movement of Mozart's "Dissonance" string quartet in C major (K. 465) – This movement ends with a coda at 9:58 (large suffix at the very end of a piece). Notice that it starts after the material from the closing section of the recapitulation comes to an end. You can compare the very end of the exposition (6:12) to the very end of the recapitulation (9:28) to hear how this large suffix is added material that was not in the exposition (even though many of its motives and ideas have been heard before).
- Brahms's Intermezzo in A major, op. 118, no. 2 – This work is in ternary form. The A section ends at 1:28 and is followed by a suffix from then until before the B section starts at 1:57.

Connective Auxiliary Sections

Transition

Generally, a transition is a section of music that functions to connect two core sections. Transitions usually help to lead away from the piece's main section toward a contrasting section. In particular, a transition comes between two sections where the upcoming section is not the initiation of a large-scale return (i.e., between **A** and **B**, not between **B** and **A**). Often a modulation is introduced to help prepare a section in a new key, though it is not required. A transition also plays a role in the balance of stability and instability in a work. Core sections of a work are very often stable thematic statements (relatively), but transitions typically introduce instability (and a gain in energy), which will likely be countered by the stability of the section that follows.

Like suffixes and prefixes, transitions and retransitions (discussed further below) come in "large" and "small" varieties. A transition can be described as either small or large depending on whether or not it contains a complete phrase. Large transitions contain at least one phrase, while small transitions don't have complete phrases and are typically far less noticeable.

Near their end, transitions (and retransitions) often drive toward attaining the dominant chord of the upcoming key. Often, a suffix will begin once the dominant has been attained in a situation sometimes called "standing on the dominant" (William Caplin) or "dominant lock" (James Hepokoski and Warren Darcy).

A transition may have a clear stopping point before the next section starts, or there may be a single melodic line that fills the space between it and the upcoming section (caesura fill), or the transition my end at the onset of the new section with an elision. In more vague cases, the end of the transition and the start of the new section may be hard to pinpoint, but it is still clear that it must have happened during a particular span of time.

Transitions are commonly found in sonata forms between the primary and secondary themes and in rondo forms between the A section (refrain) and a contrasting section (episode). Small transitions are often found in ternary forms to connect the **A** and **B** sections.

Below are some examples:

- Large Transition:
  - Mozart's piano sonata in B♭ major, K. 333, 1st – This work is in sonata form. The transition between the primary theme and the secondary theme occurs between 0:20 and 0:42.

Retransition

A retransition is very similar to a transition, but its location and function are different. Retransitions come between two sections where the upcoming section is the initiation of a large-scale return (i.e., between **B** and **A**, not between **A** and **B**). In most cases, retransitions help to prepare the return of the piece's main section: the return of the **A** section in ternary or rondo form, or the restatement of the primary theme at the onset of the recapitulation in sonata form. A retransition often drives toward attaining the dominant chord of the home key and will often prolong the dominant once attained, usually in the form of a suffix. Retransitions may have a clear half-cadential ending (possibly followed by a suffix), or they may have an elided ending that coincides with the initiation of the following section.

Below are some examples:

- Small Retransition:
  - Chopin's Polonaise in C minor, Op. 40, no. 2 – This work is in compound ternary form. In the first, large A section of the overall ABA form, there is a small retransition between B and A from 2:35 to 2:39. It is only one measure long.

- Handel's aria "Lascia ch'io pianga" from *Rinaldo* – This work is in five-part rondo form (ABACA). There is a very short, small retransition between the B and A sections from 1:41 to 1:44.

- Large Retransition:
  - Mozart's piano sonata in B♭ major, K. 333, 1st – This work is in sonata form. The retransition between the development and the recapitulation occurs between 4:29 and 4:45.
  - Brahms's Intermezzo in A major, Op. 118, no. 2 – This work is in ternary form. There is a retransition between the B section and the final A section from 3:08 to 3:19.

Further Reading

- Rothstein, William. 1989. *Phrase Rhythm in Tonal Music*. New York: Schirmer.
- Summach, Jason. 2012. "Form in Top-20 Rock Music, 1955–89." PhD diss., Yale University.

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1. This particular dichotomy was introduced by Jay Summach (2012). 3.05: Formal Sections in General#return-footnote-359-1

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3.6: Binary Form

Key Takeaways

- Binary forms contain two reprises.
- Binary forms can either be simple or rounded.
- Simple and rounded binary forms may both feature a balanced aspect.

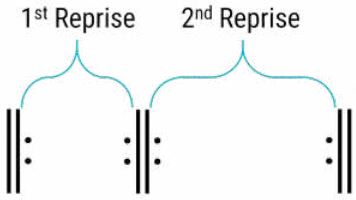
Chapter Playlist

In the context of musical form, the term “binary” refers to a formal type that has two main parts. These parts are often called reprises because each is typically repeated. Binary forms are common in 17th-, 18th-, and 19th-century repertoire, and they were used heavily in dance music.

There are two types of binary form: rounded and simple. Both forms have the possibility of featuring a balanced aspect as well (note: balanced binary is often described as its own type of binary form, but that approach is not taken here).

Binary form is typically one of the shorter forms, and because of that, it is often embedded within larger, compound forms like compound ternary form.

Repeat Structure and Types of Binary Form



Example 1. Abstract diagram of the repeat structure in binary form.

In 17th– and 18th-century classical music, each reprise of the binary form is typically repeated, as in Example 1. The listener will hear the following structure:

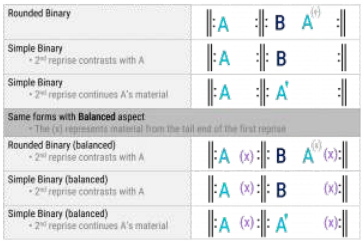
- Reprise 1
- Reprise 1
- Reprise 2
- Reprise 2

In 17th– and 18th-century music, it is very common to find the repeat signs written in the score. Decorative improvisation on the repeat was expected without being specified in the score. But in the 19th century, it became more common for composers to write out the repeat instead of using repeat signs. This may be done to indicate specific decorations on the repeat, to include changes in some musical domain (like instrumentation or register), and/or to expand the music beyond the length of its first statement.

While having two—usually repeated—reprises is common to all binary forms, there are two relatively distinct sub-types that capture the form’s larger melodic organization: rounded and simple, shown in Example 2. Formal organization is represented with uppercase letters and prime symbols.

The first section of a binary form piece is represented with the letter **A**. In both subtypes of binary form, **A** is the main section and presents the main melodic material (see Formal Sections in General).

B sections (the contrasting sections) vary depending on the type of binary form (Example 2). Both forms can also feature a balanced aspect (represented with an **x** in parentheses), as discussed further below.



Example 2. Abstract diagram of each binary form.

Rounded Binary Form

Example 3. Abstract diagram of rounded binary form.

In rounded binary, the beginning of **A** returns in the home key somewhere in the middle of the second reprise. It is not necessary for all of **A** to return (though often it does)—only the beginning. While the returning material may be exactly the same, it's also common to see slight variations, like change of octave, accompanimental pattern, and/or melodic embellishments. If there is variation, you should still be able to experience the feeling of return when the **A** material comes back. If unsure, you can expect the harmonic analysis to remain essentially the same, the chord changes will likely be in the same metric locations, and the scale degrees of the melody will also be in the same order and in the same metric locations; just make sure to account for the possibility of slight variation in the domains listed above.

In rounded binary form, the second reprise starts with a **B** section. Typically, the **B** section is less stable than the **A** section and may involve common destabilizing features like sequences, chromaticism, and dominant pedals. In some binary forms, however, the **B** section is quite stable but simply presents different thematic material than **A** (see, for example, the **B** section of the Trio from the third movement of Mozart's String Quartet in G major, K. 80).

Rounded Binary Example

The Menuetto from the third movement of Mozart's Symphony no. 25 in G minor (Example 4) is a clear instance of a rounded binary form typical of the mid- to late 18th century. After a relatively stable thematic statement during the first reprise (mm. 1–12, **A**), the second reprise (mm. 13–36) can easily be divided into two distinct parts, **B** (mm. 13–20) and **A′** (mm. 21–36). The impression of a division is the result of the return of **A** material at m. 21 and the half cadence that precedes it at m. 20.

In the 18th century, half cadences before the return of **A** in rounded binary forms are quite common. In the 19th century, however, composers may also elide or otherwise obscure this boundary, as Chopin does between mm. 16 and 17 in the rounded binary form found in mm. 1–24 of his polonaise in A major, Op. 40, no. 1.

pb.libretexts.org/music12/wp-content/uploads/sites/614/2023/12/Mozart_Symphony_No_25_in_Gm_KV_183_-_3_MENUETTO_Only_piano.mp3

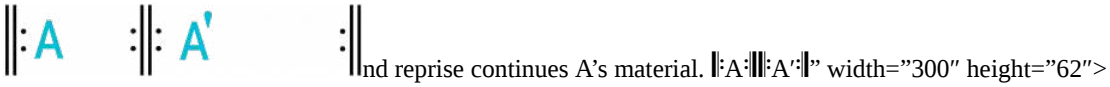
Example 4. Mozart, Symphony no. 25 in G minor, 3rd movement, Menuetto.

Simple Binary Form

In simple binary, there is no substantial *return* of opening material in the second reprise. Instead, the material in the second reprise takes one of two possible manifestations:

1. **A′** (note the prime symbol): The second reprise, though not a repeat of the first reprise, continues with the same sorts of ideas. As the **A** material is always present, there is no "return" to the opening material.
2. **B**: The second reprise contains relatively new material throughout.

or



Example 5. Abstract diagrams of simple binary form.

Simple Binary Example

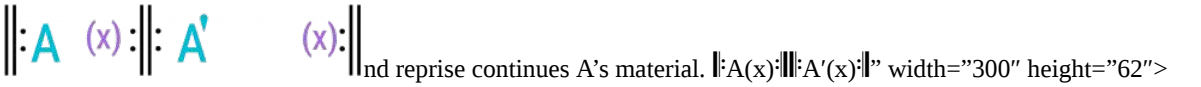
The Bourrée from Bach's Lute Suite in E minor, BWV 996 (Example 6) is a good example of a simple binary form where the second reprise would be labeled **A′**. The musical material in the second reprise simply continues the ideas from the first reprise throughout. Notice how there is no clear return of the first reprise's opening material in the middle of the second reprise, and therefore, this is not an example of rounded binary.

Example 6. J. S. Bach, Bourrée from Lute Suite in E minor, BWV 996.

Balancing a Binary Form

"Balanced" is a term used to describe a binary form (either simple or rounded) in which the tail end of the first reprise returns at the tail end of the second reprise. That return will be in the piece's home key, even if it was in another key in the first reprise. In Example 7, the **(x)** represents the music at the tail end of the first reprise (**A** section) and its return at the tail end of the second reprise.

In order to be considered a return, there needs to be a crux point—a particular moment where the restatement begins at the tail end of the second reprise. This restatement is the point at which there is a direct bar-for-bar mapping of measures between the tail ends of both reprises. Importantly, this excludes rounded binary examples where the entire first reprise is repeated verbatim in the second reprise, because there is no crux point at the tail end of the second reprise.



or

or

Example 7. Abstract diagrams of each binary form with balanced aspect.

Simple Binary (Balanced) Example

In longer simple binary forms, the balancing material can be quite substantial. In Domenico Scarlatti's Sonata in A major, K. 322 (Example 8), the material that returns is nearly 24 measures long—over half the length of the first reprise—and is easily recognizable by ear. In the Scarlatti work, **(x)** starts in the middle of m. 21 and ends at the end of the first reprise, m. 44. That material returns in the second reprise in the middle of m. 59 and continues to the end of the work, with a few new melodic decorations along the way (compare m. 26 and m. 63, for example). Importantly, note that **(x)** in the second reprise has been transposed back to the home key. In other words, when it was stated initially in the first reprise, **(x)** was in the key of E minor/E major, so it needed to be transposed back to the key of A in order for the work to start and end in the same key.

pb.libretexts.org/music12/wp-content/uploads/sites/614/2023/12/Scarlatti_K_322_CFX.mp3

Example 8. Domenico Scarlatti, Sonata in A major, K. 322. Click to download a PDF score.

Harmonic Expectations

Cadences

Each part of the binary form commonly ends with standard cadence types (perfect authentic, imperfect authentic, or half), especially in 18th-century classical music. But stylistic preferences of the 19th century alter cadential expectations for the first part in particular: composers sometimes opted for lower levels of closure, ending with tonic-prolongational progressions instead of standard cadence types (examples: Schumann, Papillon, 1 [m. 8] & 7 [m. 8], Kinderszenen, no. 9 [m. 8]).

Harmonically Open or Closed

As with other forms, the first reprise of a binary form can be described as harmonically open or closed. The second reprise can be described this way as well, but because binary forms are expected to be monotonal, it usually is implied instead.

Keys

If the first reprise of a binary form is open, it may contain a modulation.

Regardless of the harmonic situation at the end of the first reprise, you should expect the second reprise to end with an authentic cadence in the original key. There may be additional cadences before the end, but the PAC at the end of the second reprise is essentially an obligatory convention in common-practice-period tonal music. If a piece starts and ends in different keys, it exhibits progressive tonality rather than monotonality.

Beginning, Middle, End – Stability Expectations

As with most aspects of form, binary form moves between relative stability and relative instability throughout the form which serves to give the work a linear drive due to the expectation that a work will start stable, become unstable, and ultimately end with a sense of relative stability. In binary form, you can expect that:

- The first reprise is relatively stable.
- The beginning of the second reprise is relatively unstable. This is so common that some theorists refer to the second reprise as a "digression" or "departure,"[1] sometimes forgoing the letter **B** altogether to focus on the function of the music.
- The end of the second reprise returns to stability. The return of **A** material in the second reprise of a rounded binary form is also commonly expected to be a point of relative stability.

Assignments

1. Binary Form Analysis Assignment (.pdf, .docx)
    - Audio Example 1 – Franz Schubert, Écossaise, D. 529, No. 3 (Starts at 1:07)
    - Audio Example 2 – Franz Joseph Haydn, Piano Sonata no. 37, III, theme

- Audio Example 3 – Johann Sebastian Bach, Sarabande from Violin Partita no. 1, BWV 1002
- Audio Example 4 – Franz Schubert (1797-1828), Piano Sonata in E major, D. 157, II (mm. 1– 16)
- Audio Example 5 – Franz Schubert (1797-1828), Symphony no. 2 in B♭ major, D. 125, II

2. Guided Composition (.pdf, .mscz)

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1. Green 3.06: Binary Form#return-footnote-377-1

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3.7: Ternary Form

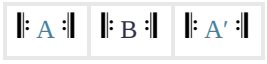
Key Takeaways

- Ternary forms have an ABA formal structure.
- A may immediately repeat and B may immediately repeat, but A and B do not repeat together, and neither do B and A.
- Repeat signs are common but not required.
- The B section typically contains contrasting material a new key, and it may be relatively unstable.
- Auxiliary section are possible before, between, and after each section.

Chapter Playlist

Ternary form is a musical form consisting of three distinct sections with an **ABA** pattern of large-scale repetition: an opening section (**A**), a contrasting section in the middle (**B**), and then a return to the material from the opening section (**A**). (Though it might seem logical to call **ABC** ternary form as well, it is more often considered through-composed because each section contains different music.)

As shown in Example 1, each section in ternary form may immediately repeat, either with repeat signs (most commonly) or written out. However, **A** and **B** do not repeat together, and neither do **B** and **A**.



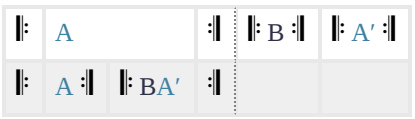
Example 1. Abstract diagram of ternary form with common repeat structure.

Structure of Individual Sections (Simple vs. Compound)

While the contents of each section can vary greatly concerning phrase and form, each section commonly comprises multiple phrases, and very often those phrases combine together into a complete form (very often a binary form). A ternary form is considered to be compound (or composite) if one or more of its sections comprises a complete musical form. If a section does not contain a complete form, it can be called simple. In many compound ternary forms (like minuet & trio or scherzo & trio in particular), all sections contain complete forms (often rounded binary form). In compound ternary forms of the 19th century, however, the last **A** section is often shortened and is simple, not compound.

Example 2. Abstract diagram of a compound ternary form where all sections contain their own complete form.

Example 3. Hypothetical example of a compound ternary form where all sections contain their own complete forms.



Example 4. Diagram of a ternary form where only the first section of the form comprises its own complete form. See Chopin's Mazurka in A minor, Op. 17, no. 4 for an example of this.

Contrasting Characteristics of **B**

The second section of a ternary form, usually referred to as the **B** section, is expected to provide contrast with the **A** section that preceded it. This contrast may come from a variety of musical domains including key, mode, texture, time signature, rhythmic ideas, melodic ideas, range, instrumentation, register, and so on. The length of **B**, however, is expected to be generally proportional to that of **A**.

Stability of Each Section

In some genres (like the minuet & trio), the **A** and **B** sections exhibit a relatively similar level of stability, usually because they start and end in the same key and contain phrases that are tight-knit. In other genres (arias in particular), the **B** section is often less stable than **A**. **B**'s instability is largely due to starting and ending in different keys and having a generally looser phrase-structural organization than **A**.

Keys and Harmony

Closed and Open Harmonic Endings

As with other forms, each section can be described in terms of being harmonically open or closed.

Modulation *within* a Section

Modulation is possible within each section in ternary form, but it is very rare in the **A** section and should be considered atypical when found there. Modulation in the **B** section is much more likely to be found in an aria than in dance forms like the minuet and trio.

Auxiliary Sections

Like other forms, ternary form can contain auxiliary sections. Small transitions, small retransitions, small prefixes, and small and large suffixes are common. See the chapter on Formal Sections in General for more information on auxiliary sections.

Example Analyses

A link to an interactive elements can be found at the bottom of this page.

Example 1. Frederic Chopin, Polonaise in A major, Op. 40, no. 1 – Click to See Score (PDF)

pb.libretexts.org/music12/wp-content/uploads/sites/614/2023/12/Chopin-Polonaise_in_A_major_Op-40_No-1.mp3

Example 2. George Frideric Handel, "Waft Her Angels" from *Jephtha* – Click to See Score (PDF) – Audio

Assignments

1. Bernhard Crusell – Clarinet Quartet, Op. 7, III, Menuetto (.pdf, .docx). Access score and audio.
2. Josephine Lang – Traumbild, Op. 28, no. 1 (.pdf, .docx). Access score and audio.

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3.8: Sonata Form

Key Takeaways

- Sonata form is a complex manifestation of a harmonically open, rounded binary form that is also balanced.
- The first reprise is called the exposition, and the second reprise contains the development and recapitulation.
- The exposition has two core sections in different keys called the primary theme and secondary theme.
- The primary and secondary themes are separated by a transition.
- The secondary theme is typically followed by a large suffix called the closing section.
- The development and recapitulation may have a retransition between them.
- The recapitulation's secondary theme should be in the overall tonic key.
- The sonata form proper may be preceded by an introduction or followed by a coda.

Chapter Playlist

At the largest level, the form is as follows in Example 1 , and each of those large levels is further subdivided, as shown in example 2.

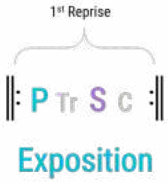
Example 1. Sonata form at the largest level.

Example 2. Standard formal layout of a complete sonata form.

Exposition

Due to its popularity and intricacy, sonata form has developed its own set of terms to help capture its multiple formal components, but these components share properties with other formal sections (see Formal Sections in General). The sonata form's first reprise is called the "exposition," because it *exposes* the main thematic material of the work. The exposition can be further broken down into four sections with specific names:

- Primary Theme (P): the main section, in the tonic key; concludes with a cadence in the tonic key
- Transition (TR): the connective section; concludes with the medial caesura
- Secondary Theme (S): the contrasting section, in a non-tonic key (typically V for major-mode pieces and III for minor-mode pieces); concludes with the essential expositional cadence
- Closing Area (C): a large suffix in the non-tonic key.



Example 3. Standard formal layout of a sonata exposition.

On the whole, the exposition is a relatively stable part of the form. **P**, **S**, and **C** are all typically very stable areas; only **TR** is unstable.

In the exposition, expect the secondary theme to start and end in a non-tonic key. In major-key sonatas, this tends to be the dominant (V), and in minor-key sonatas, this is usually the mediant (III) or the minor dominant (v). These keys are very common in the 18th and 19th centuries, but other options also occur in the 19th century.

Dependent and Independent Transitions

The exposition's transition between **P** and **S** takes one of two forms, depending on whether the transition's melodic/motivic material clearly derives from **P**: if it does, the transition is dependent, and if it doesn't, the transition is independent. An independent transition is usually easier to locate because it sounds like something new instead of a continuation of **P** . Dependent transitions might begin like a restatement of **P** but veer off in another direction after getting started, and they typically build energy and feel relatively unstable. A dependent transition typically involves the process of becoming because it initially sounds like **P** is ongoing, but as it continues, its transitional function emerges without clear delineation between the two. Another type of dependent transition can occur when **P** 's suffix doesn't come to a clear end and instead evolves into a transition through the process of becoming. However, becoming is such a common aspect of dependent transitions in sonata form that most analysts don't bother labeling it as such.

Development

The development is a large, unstable section. Like other unstable sections (e.g., **B** in rounded binary form and **C** in sonata rondo), the development typically favors sequential passages, chromaticism and modulation, and partial (rather than complete) thematic statements. As the name implies, the development may "develop" material from the exposition, but this is not a requirement, as the development may also introduce its own material.

Developments often explore multiple key areas through modulation or extended tonicizations. The sequential passages in developments often involve models that are quite long, often four to eight measures. For example, in the development of the first movement of Mozart's Piano Sonata in A minor, K. 310, discussed in the analysis example below, a four-measure sequential model is used. Sequences make up such a substantial portion of Classic-era sonata developments that William Caplin suggests focusing on them when determining their overall structure. He thinks of each sequential passage, from its model to its eventual half cadence, as a "core"; suggests the possibility of multiple cores (usually only two); and describes the music between the beginning of the development to the first core as the "pre-core."

Because developments explore non-tonic keys, they typically end with a retransition (either small or large) that helps to prepare the return of the primary theme in the tonic at the start of the recapitulation. The development often ends with a medial-caesura effect that marks a clear dividing line between the development and recapitulation. But this boundary can be less clear as well and even involve an elision, and in some cases, P starts over a dominant pedal, making it hard to hear as a clear point of initiation.

Recapitulation

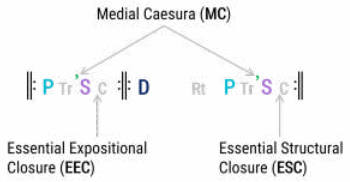
The recapitulation involves the restatement of material from the exposition, but with the necessary adjustments so that the secondary theme and closing sections are now in the tonic. In order for this key change to take place, this restatement usually has to be recomposed somewhere between the primary theme and the start of the secondary theme (creating a crux). The changes often take place during the transition, but it can also happen during the primary theme. If the exposition's transition ended with a half cadence in the original key (e.g., Mozart, Symphony no. 25, i), then the recapitulation can actually be restated in full without changes, and the secondary theme can simply start in the tonic key with no other required changes. But often, composers decide to make changes during this restatement.

Similarity to Binary Form

Sonata form can be understood as a complex manifestation of a harmonically open, rounded binary form that is also balanced. In both forms, the opening of the first reprise returns in the middle of the second reprise (A′ in binary form; the recapitulation in sonata form), after a contrasting section (B in binary form; the development in sonata form).

Sonata recapitulations also feature a balanced aspect because they restate the ending of the first reprise at the end of the second reprise, this time transposed to the tonic key, necessitating a crux. However, the return of material in sonata form is more consistent than in binary forms that are balanced. In sonata forms in particular, you should expect that all of **S** and **C** will be included in the balanced return.

Additional Sonata Terminology: MC, EEC, ESC



Example 5. Location of Medial Caesura (MC), Essential Expositional Closure (EEC), and Essential Structural Closure (ESC).

Medial Caesura (MC)

The medial caesura is a term introduced by James Hepokoski and Warren Darcy that refers to a common phenomenon in late 18th-century sonatas where a mid-expositional break (caesura) occurs between the end of the transition and the beginning of the secondary theme. While Mozart is an exemplary champion of this technique, it is also used by earlier, later, and contemporaneous composers.

As Mark Richards explains, a "medial caesura complex" has three stages:

1. Harmonic preparation: Occurs at the end of the transition and is most commonly a half cadence (often followed by a suffix, particularly a dominant pedal). This can be in either the home key or the upcoming key of **S**.
2. Textural gap: A literal space (caesura) between the end of the transition and the beginning of **S**. The caesura may be preceded by a series of "hammer blows"—repeated emphatic chords. In many cases, only rests occur during this gap, but just as often, the gap is filled with a single voice that helps to bridge the gap between the two sections (caesura fill).
3. Acceptance by **S**. A convincing feeling of starting a new section (**S**) will confirm that the medial caesura occurred. If the textural gap instead led back to material from the transition and it felt as though the secondary theme never really started, then a true medial caesura would not have occurred because the third stage was missing.

Both the exposition and recapitulation can contain a medial caesura, though they may be different because the transition is often recomposed in the recapitulation.

Essential Expositional Closure (EEC) and Essential Structural Closure (ESC)

Hepokoski and Darcy's parallel concepts of Essential Expositional Closure (EEC) and Essential Structural Closure (ESC) refer to the first satisfactory perfect authentic cadence (PAC) in **S** that moves on to non-**S** material—this moment is called the EEC in the exposition and the ESC in the recapitulation. In both situations, this moment determines the end of **S** and therefore the onset of **C**. The harmonic goal of the exposition is to establish a new key and produce a PAC in that key, and the EEC marks that occasion. The music after the EEC, the closing section (**C**), was not necessary for reaching this goal and is therefore an auxiliary section of the exposition, a suffix. The same situation occurs in the recapitulation. The harmonic goal of the recapitulation is that the material from the second half of the exposition is restated in the overall tonic key and that a PAC occurs to confirm that key (ESC).

External Auxiliary Sections: Introduction and Closing Area

Introduction

It is common for sonata forms (especially the first movement of symphonic works) to have a large prefix known as an introduction, or slow introduction. Introductions often contain musical material not found in the rest of the work (in the 18th century in particular). The tempo is usually significantly slower than the tempo of the sonata form proper. In many cases, the distinction between the end of the introduction and the beginning of the sonata form is quite clear, because the tempo changes abruptly when the sonata form proper begins.

Closing area

Sonata forms usually contain a large suffix after the end of the second reprise called a "closing area," "coda," or "tail." As is normal for a suffix, closing sections are a stable aspect of the form, but particularly long codas might contain unstable portions. Codas may also revisit material from the rest of the work.

Sonata Form Analysis Example

A link to an interactive elements can be found at the bottom of this page.

pb.libretexts.org/music12/wp-content/uploads/sites/614/2023/12/Mozart_Sonata_K_310_i.mp3

EXAMPLE 6. Mozart, Piano Sonata in A minor, K 310, 1st movement. Click to see PDF score.

The first movement of Mozart's sonata in A minor, K. 310 (1778) is a relatively clear example of a late 18th-century sonata form. As indicated by the repeat signs at mm. 49–50 and m. 133, the form has two reprises—just like a binary form. As is customary in sonata form, this movement is rounded and features a balanced aspect.

Determining the location of a sonata form's two core sections (**P** and **S**) is an efficient approach for starting a formal analysis of the first reprise. The primary theme (**P**) begins in m. 1 in the key of A minor (i), and the secondary theme (**S**) begins in m. 23 in the key of C major (III). It's expected that **S** will start somewhere around the middle of the first reprise, and that is indeed what we find: this first reprise is 49 measures, half of which is 24.5, so **S** starting in m. 23 puts it quite close to the middle.

Determining the location of the **Tr** between **P** and **S** is a more subtle task. The end of **Tr** is easy to identify—it's right before **S**—but its beginning requires a more detailed investigation. In this case, the transition is dependent, so at first it actually just sounds like **P** is continuing. **Tr** starts in m. 9 with a repetition of **P**'s basic idea, but it starts to change soon after that, in m. 12. At that point, a harmonically unstable passage begins as it modulates to the relative key of C major (III). The tonic of the new key is most clearly established with the elided half cadence at m. 16, which also marks the beginning of the transition's suffix.

Dominant lock persists from that moment until the MC at m. 22. In the sonata-form movements of this era, clear MCs are very common, and this movement's MC represents a relatively straightforward instance. This MC is a III:HC—a half cadence in the key of III. There is no literal silence at this moment because caesura fill covers the space, with three eighth notes that lead to the initiation of **S** at measure 23. There is, however, a clear gap in texture in m. 22, as the transition finishes and **S** starts in the following measure. Notice also that the transition's suffix is actually implying that the key is C *minor*, not C major, due to the presence of E♭s. The implication of a minor key here adds an aspect of drama to the end of the transition, and consequently an element of surprise, as S ends up being in the major mode when its preparation suggested otherwise. (Mozart doesn't employ this technique very often, but it's actually pretty common in Beethoven's music.)

Remember that the harmonic goal at the end of the exposition is the EEC: the first PAC in **S** that moves on to non-**S** material. In this movement, and in many of his works, Mozart seems to be playing a sort of game with the exact location of this all-important moment. There is a clear attempt at a PAC in m. 35, but Mozart does two things that prevent it from functioning as the EEC. The first is that he withholds the local tonic in the melody, even though the trill in the previous measure suggests that the next note would have been C. Instead, the melody rests on the downbeat, and a stream of sixteenth notes start an octave higher. The second issue is that those sixteenth notes in m. 35 seem very strongly related to **S**'s melodic/motivic content, which gives the impression that **S** is ongoing instead of being finished. For these reasons, the potential cadence point has been evaded. Mozart then continues this game by setting up another attempt at the cadence in m. 40—this time, it's the bass voice that's omitted at the cadence, and again S-based material continues afterward. The actual EEC only arrives in m. 45, and it elides with the onset of **C**. **C** lasts until the end of the exposition in m. 49.

The boundary between the development and recapitulation can be identified within the second reprise (mm. 50–133) by locating the return of exposition material in the tonic key. This occurs at m. 80. The development is the most unstable portion of the work, due to the variety of chromatic harmonies and sequences. It starts by presenting the opening of **P** in the mediant but quickly veers off into harmonic uncertainty: the apparent V^7 in m. 57 is reinterpreted as an augmented sixth chord in E minor, which initiates a large-scale descending fifths sequence when it resolves in m. 58. The sequential model is very long, four measures in this case, and its copies are stated at m. 62 and m. 66. The sequence's last chord (A^7, m. 69) resolves to D minor in m. 70 and initiates a modulating retransition that leads back to the tonic key of A minor. The HC at m. 74 confirms we are back in A minor. Like in the exposition, this HC elides with the onset of a suffix with dominant lock, though this occurrence has more variety in its bass line. The effect of reaching and maintaining the dominant during this passage, however, is still quite audible. This development has a clear distinction between the end of the development and the start of the recapitulation due to the medial-caesura effect that occurs in m. 79 (notice also the chromatic line connecting the two parts that functions as caesura fill).

As expected, the recapitulation restates most of the material from the exposition, and those materials are presented in the same order. In the exposition, **S** and **C** were in III, and the transition prepared that key by modulating and ending with a half cadence in that key. For the ESC to occur in A minor, S and C can simply be transposed from C major to A minor (making sure to account for the difference in mode), but the transition will need to be rewritten to accommodate this change. As it did in the exposition, the transition of the recapitulation begins after nine measures of **P**, in m. 88. This transition is still dependent upon **P**, but it is quite different from the exposition's version. Notice, however, that they start to become the same again at the half cadence that ends the transition and begins its suffix (compare mm. 16–22 and mm. 97–103)—this is the crux. Mozart expands **S** in m. 126 by delaying the ESC with a few fully diminished seventh chords that lead back to the dominant (m. 128), which delay the ESC until m. 129.

The closing section does not include recomposition, but is simply transposed to the overall tonic key of A minor, and no coda follows.

Further Reading

- Caplin, William Earl. 1998. *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart, and Beethoven*. New York: Oxford University Press.
- Hepokoski, James A., and Warren Darcy. 2006. *Elements of Sonata Theory: Norms, Types, and Deformations in the Late Eighteenth-Century Sonata*. Oxford ; New York: Oxford University Press.

Assignments

1. Maria Hester Park, Sonata, Op. 7, I Allegro Spirito (.pdf, .docx). Access score and audio.

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3.9: Rondo

Key Takeaways

- Rondo is a form featuring a main section (referred to as either **A** or refrain) that returns throughout a work and is juxtaposed with contrasting sections (referred to as **B**, **C**, etc., or as episodes).
- Common formal layouts include **ABACA** (five-part) and **ABACABA** (seven-part, likely sonata rondo).

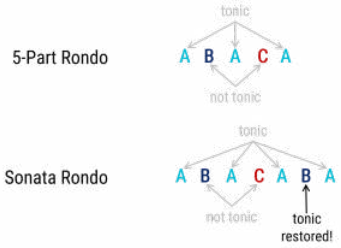
Chapter Playlist

Conceptually, rondo is quite simple: the form consists of a recurring main section that alternates with contrasting sections. As with other forms, rondo can include a variety of auxiliary sections. In rondo form, it is tradition to call the repeating main section the refrain (or **A**), and the contrasting sections are referred to as episodes (and/or by letters: **B**, **C**, etc.).

The refrain material is essentially the same throughout the course of a movement (allowing for some embellishment or abbreviation) and is always heard in the tonic key. Episodes contrast with refrains tonally, and usually thematically as well. A given episode may occur multiple times in the movement or only once.

The most common manifestations of rondo form are either five-part rondo (**ABACA**) or sonata rondo (**ABACABA**), summarized in Example 1. There are two main differences between them:

1. In sonata rondo, the **C** section is often akin to a sonata form's development section, whereas in a five-part rondo, the **C** section is likely to be a relatively stable thematic statement like any other episode.
2. In sonata rondo, the first **ABA** (i.e., **ABA**CABA) constitutes the equivalent of a complete sonata exposition (without the repeat, and it ends in the tonic), and the second **ABA** (i.e., ABAC**ABA**) functions as the recapitulation, where the **B** section is now transposed to the tonic key.



Example 1. General outline of five-part rondo and sonata-rondo forms.

Refrains, Episodes, and Auxiliary Sections in Rondo Form

Refrains are constructed as a combination of one or more phrases and could even be an entire binary form. You can expect that they will have a clear ending punctuated with a perfect authentic cadence (PAC) and will be relatively stable thematic statements. Episodes may be structured like that as well (though with contrasting keys and melodic/motivic material), or they can include destabilizing features like modulation, chromatic harmony, and phrase expansion. Episodes may end with a clear PAC, or they may have ambiguous endings, even lacking a cadence and merging into a retransition section instead through the process of becoming.

Like other forms, rondo form can have auxiliary sections. The most common are retransitions that generate anticipation for the refrain's return. Codas are also quite common, but introductions are not.

Analytical Challenges with Episodes: Transition ⇒ Episode or Episode ⇒ Retransition

Like the other forms, rondos may include any combination of auxiliary sections, though retransitions that dramatize the return of the refrain are particularly common. Since episodes are often relatively looser than their refrain counterparts, two sections may blend together through the process of becoming (⇒). In particular, a transition may *become* an episode without any clear delineation of the two formal sections. Similarly, the episode itself may not reach a clear cadential conclusion (i.e., a PAC in the key of the episode) and instead may *become* a retransition that prepares for the statement of another refrain. However, it is unlikely to find both of these situations occurring within a single episode. One of the important distinctions between the end of a connective section (transition/retransition) and a stable thematic statement (refrains and episodes) is that connective sections tend to emphasize their arrival on the dominant, while stable thematic statements tend to emphasize the arrival at a PAC.

Five-Part Rondo Example

Example 2. Maria Hester Park, Piano Sonata in C major, Op. 7, 3rd movement – Audio (YouTube) – Click to See Score (PDF)

The final movement from Maria Hester Park's Sonata in C major, Op. 7, from 1796 is a relatively clear example of a five-part rondo form. The **A** section (refrain) lasts from mm. 1–26 and consists of multiple phrases. The **B** section (episode 1) does not start right away at m. 27; it is instead separated from **A** by a transition (mm. 27–44) that modulates to the key of the dominant in m. 38 during a passage of chromaticism involving modal mixture. *Unlike* most transitions, this transition actually ends on the upcoming local tonic of G major (mm. 42–44) instead of the local dominant. **B**'s primary thematic material lasts from mm. 45–54, and its ending is elided with a suffix that eventually becomes a retransition (around m. 71) that harmonically prepares for the return of **A** in m. 73. This second statement of **A** lasts from mm. 73–98 and is a complete repeat of the first statement of **A**. **C** (episode 2) starts in m. 99, immediately after the second statement of **A**, and is in a contrasting key, the submediant (A minor). The **C** section (mm. 99–132) is longer than the **B** section. Its ending elides with the start of a suffix that becomes a retransition (around m. 135). The third and final statement of **A** starts in m. 141 and is again a complete repeat of the initial statement of **A**.

Sonata Rondo Example

A link to an interactive elements can be found at the bottom of this page.

Example 3. Ludwig van Beethoven, Piano Sonata in C minor, Op. 13, 3rd movement – Click to See Score (PDF)

The **A** Sections (Refrains)

The last movement from Beethoven's Op. 13 piano sonata (subtitled *Grande Sonatepathétique*) is an example of a sonata-rondo form. The form is fairly complex, and while most of the sections are quite clear, the **B** section in particular has a few challenges. The form also includes a good amount of becoming. When approaching the form of any rondo, an efficient strategy for determining the form is to find the location of the **A** sections. Remember that restatements of **A** need to be in the tonic key and that they may contain slight variations like omitted repeats, melodic embellishments, and/or new accompaniments. In this particular form, the **A** sections can be found starting in mm. 1, 62, 121, and 171.

In order to understand the differences between the **A** sections, a more detailed look at the structure of the initial **A** section is required. The initial **A** section ends in m. 17, and there are two phrase-expansion techniques used to generate that length. The first is the one-more-time technique that starts in m. 9 (mm. 9–12 are a varied repetition of mm. 5–8). The second expansion technique is the suffix that starts in m. 12. This suffix starts with an elision and ends in m. 17. So, what could have been an 8-measure theme is now 17 measures because of these two expansion techniques.

With that more detailed analysis in mind, we now have a model we can use to compare the other **A** sections. While the second **A** section is a repeat of the first, the third and fourth **A** sections have been altered. The third **A** section is the shortest, lasting only 8 measures. It achieves this brevity by removing both of the expansion techniques used in the **A** section's initial statement. Instead of having the one-more-time technique in its ninth measure, new, unstable music enters that is derived from the **A** section but is used as the start of a transition away from the **A** section's material. The fourth and last **A** section ends at measure 182, making it 12 measures long. In this version, the one-more-time repetition is still included, but **A**'s original suffix has been replaced by a new, much longer suffix that functions as the work's coda (mm. 183–210).

The **B** sections (Episodes 1 & 3)

This movement's episodes vary in key and melodic/motivic material, and they contain multiple auxiliary sections including transitions, retransitions, and suffixes. The first episode, **B**, is the most complex, and it is stated twice throughout the work. As is expected for sonata-rondo form, the first statement of **B**is in a contrasting key (the mediant) and its restatement in the "recapitulation" is in the tonic key of C—though instead of being in the minor mode to match the global key, it is in the parallel major key of C major (I).

While it's very clear that the initial **B** section occurs somewhere between the first two **A** sections (mm. 18–62), the initiation of **B** is obscured by a number of features, resulting in an ambiguous starting point. There are four possible candidates for the beginning of **B** : mm. 25, 33, 37, and 44. There is certainly a transition starting in m. 18 due to the harmonic/melodic sequence and harmonic instability, but m. 25's relatively stable presentation of melodic material is obscured by the lack of separation between the rhythmic activity leading into it and the fact the this melodic/motivic material is not new—it's derived from the **A** section's suffix (see m. 12) —obscuring a possible initiation function. The next candidate, m. 33, is marked because of the dominant arrival and because it introduces new melodic material involving a triplet figure. However, this candidate for the start of **B** is also obscured by lack of

rhythmic separation between mm. 32 & 33 and the fact that m. 33 starts on a dominant harmony instead of the tonic (III). M. 37 is a similarly unclear starting point because it continues the melodic/motivic material introduced in m. 33 instead of introducing its own material, even though it is the first statement of that material in the local tonic of E♭ major. The last candidate is m. 44. Of all the options, this is the clearest starting point because of the textural gap that preceded it. However, it is very uncommon for episodes to start after a PAC has been sounded in the local key, which is the case here (see m. 43). Typically a suffix would begin after a PAC occurs in the local key of an episode. This is all to say that, after careful consideration, no clear starting point of **B** can be determined, and yet it seems very clear that the presence of an episode in a contrasting key occurs. In order to avoid making a dubious factual statement about exactly where **B** starts, I think the best way to capture the reality of this passage is to invoke the concept of becoming. So, while it's clear that a transition begins in m. 18, the **B** section has no clear beginning; instead, the transition "becomes" the **B** section somewhere between mm. 25 and 44 but in no precise location.

The space between **B** and the second statement of **A** is a little clearer. The PAC in III at m. 51 marks the end of **B** and the simultaneous start of a suffix. As is common in many forms, this suffix turns into a connective section (in this case a retransition) without a clear division between the two sections, again achieving this fluidity through the process of becoming. The dominant arrival in the global key at m. 58 is a common marker of being in a retransition.

When the **B** section returns in the recapitulation, it is approached with a newly composed transition (m. 129). The return of **B**'s material starts around mm. 134–135 (compare with mm. 25–26). Similar to the exposition's **B** section, the exact location of the initiation of **B** in the recapitulation is also obscured. In the recapitulation, **B**'s original suffix (m. 51) is omitted; instead, the melodic/motivic material first stated in m. 44 is recomposed in the recapitulation so that it now blends into a new retransition through the process of becoming before it leads to the final statement of **A** in m. 171.

The **C** Section (Episode 2)

In this movement, the **C** section is much easier to identify than the **B** sections were. It features a very clear beginning in m. 79 (notice also the clear separation of the end of **A** in the previous measure) and begins in the contrasting key of the submediant (A♭ major). The internal form of this section could be considered a rounded binary form in which the returning **A** section is not complete and instead becomes a retransition. The internal **A** section features a modulating period (mm. 79–86) with a written-out repeat to accommodate some textural changes (mm. 87–94). The internal **B** section is short (mm. 95–98), and the return of the internal **A** (m. 99) introduces a new texture, but the consequent phrase does not close; instead, it becomes a retransition around m. 104 that reaches a strong dominant arrival (m. 107), featuring a dramatic preparation for the return of **A** at m. 121. Though many sonata-rondo forms contain a **C** section akin to a sonata form's development section, this movement does not, and **C** is instead a clear statement of an episode in a contrasting key that leads to a retransition.

Assignments

1. Joseph Bologne, String Quartet, Op. 1, no. 4, ii, Rondeau (.pdf, .docx). Access score and audio.

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CHAPTER OVERVIEW

Chapter 4: Diatonic Harmony, Tonicization, and Modulation

4.1: Introduction to Harmony, Cadences, and Phrase Endings
4.2: Strengthening Endings with V7
4.3: Strengthening Endings with Strong Predominants
4.4: Embellishing Tones
4.5: Strengthening Endings with Cadential 6/4
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
4.7: Performing Harmonic Analysis Using the Phrase Model
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
4.9: 6/4 Chords as Forms of Prolongation
4.10: Plagal Motion as a Form of Prolongation
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
4.13: Predominant Seventh Chords
4.14: Tonicization
4.15: Extended Tonicization and Modulation to Closely Related Keys

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4.1: Introduction to Harmony, Cadences, and Phrase Endings

Key Takeaways

- This chapter provides an introduction to the harmony section of *Open Music Theory*, then begins a discussion of how to create a sense of ending in a phrase. We focus exclusively on using I and V for now.
- Two larger concepts inform the way we present harmony here: harmonic function and the phrase model.
- Endings are often marked by cadences, of which there are two primary types: authentic cadences and half cadences.
  - Authentic cadences involve the progression V–I. They are perfect when both harmonies are in root position and *do* $\hat{1}$ is in the soprano over tonic. If either of these conditions is not met, the authentic cadence is imperfect.
  - Half cadences involve the progression *x*–V, where *x* is any of a variety of harmonies.

Chapter Playlist

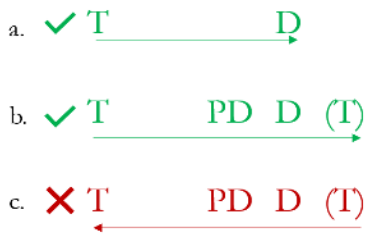
Introduction to Harmony

In this section, we'll focus on how composers of common-practice Western classical music use harmony in a phrase. Harmony is one important component (among others) of creating a phrase's sense of forward motion toward a goal. As we study harmony, it's important to keep two larger related concepts in mind: harmonic function and the phrase model.

Harmonic function refers to three categories of chords:

1. Tonic (T): Chords that sound stable, providing a sense of home or center. In Western classical music, the only chord that belongs to this category is I (in minor: i).
2. Predominant (PD): Chords that transition away from tonic function toward dominant function. This category can be split into two groups:
   1. Strong predominants signal that a dominant function chord is imminent: IV and ii (in minor: iv and ii^{o}).
   2. Weak predominants transition away from tonic, typically moving to a stronger predominant: iii and vi (in minor: VII, III, and VI).
3. Dominant (D): Chords that provide a sense of urgency to resolve toward the tonic chord: V and vii^{o} (the same in minor).

The phrase model refers to the typical order and flow of harmonic functions in a phrase. The principle of the phrase model is that a phrase needs at least tonic function and dominant function harmonies in order to exhibit a sense of trajectory. More often, phrases also include a predominant harmony to heighten the sense of trajectory toward closure. Phrases almost always progress from left to right in the phrase model, not from right to left, although we'll discuss some exceptions later. This is summarized in Example 1.



Example 1. The phrase model: (a) the minimum functions needed to create forward motion, (b) more common functional layout for a phrase (the final tonic is optional), (c) harmonic functions do not progress right to left.

Introduction to Cadences

One way to create a sense of closure at the end of a phrase is through cadences—melodic and harmonic patterns that create goals, kind of like punctuation marks in literary sentences. They're important not only because they can help you determine phrase endings, but also because they help establish a key. As a result, listening for potential cadence points is typically a good first step in analysis.

Example 2 shows two phrases and the two main categories of cadence: (1) inconclusive and (2) conclusive. The first phrase ends in m. 4 with a half cadence (HC) that sounds inconclusive. The second phrase begins in m. 5 and ends in m. 8 with an authentic cadence that sounds conclusive. The label PAC marks this as a particular kind of authentic cadence called a perfect authentic cadence, discussed below.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Two cadences in Joseph Boulogne, Chevalier de Saint-George's "Ballet No. 6" from L'amant anonyme, Act II (0:00–0:07).

Authentic Cadences (they sound conclusive!)

An authentic cadence occurs when the harmonic progression V–I (or V–i in minor) marks the end of a phrase. There are two kinds of authentic cadence:

- A perfect authentic cadence (PAC) occurs when both of the following conditions are met (Example 2, m. 8):
  - *Do* $\hat{1}$ is in the soprano over the tonic chord
  - Both V and I are in root position
- An imperfect authentic cadence (IAC) occurs if either of the above two conditions isn't met, but V–I is still involved (Example 3). For instance, an IAC can occur when:
  - *Mi* (*me* in minor) $\hat{3}$ is in the soprano over the tonic chord (as in Example 3), or
  - V, I, or both harmonies are inverted

A link to an interactive elements can be found at the bottom of this page.

Example 3. An imperfect authentic cadence (IAC) in Fanny Hensel, "Ferne" Op. 9, No. 2 (0:00–0:14).

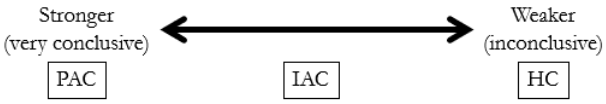
Half Cadences (they sound inconclusive!)

A half cadence (HC) occurs when a phrase ends on V (Example 2, m. 4). A variety of chords can precede V, so we often refer to the harmonic progression that marks HCs as "*x*–V."

For now, we'll restrict our vocabulary to only I and V chords (or i and V in minor) so we can learn some basic techniques of voice-leading.

Cadential Strength and the IAC

PACs are the strongest kind of cadence available to a composer because of the sense of finality they can create, and HCs are the weakest kind of cadence because of their unfinished sound. IACs are special because they occupy the space between HCs and PACs in terms of cadential strength (Example 4).



Example 4. Spectrum of cadential strength.

Since there are many ways to compose an IAC (a composer can theoretically use various combinations of inverted chords and scale degrees in the melody), a composer can choose to make an IAC more or less strong.

$$(\hat{3}) \tag{4.1.1}$$

The potential IAC in **Example 5** is comparably weaker: it uses V^6–I, the moment goes by relatively quickly, and it's followed by material that could easily be understood as continuing a phrase that's under way *or* as referencing the beginning of a phrase that has just concluded, something that would strengthen reading m. 5 as an IAC. Performers may disagree on whether Example 5 contains an IAC or not, and they may adjust their playing accordingly.

A link to an interactive elements can be found at the bottom of this page.

Example 5. A potential IAC in Schubert's Piano Sonata D. 845, III.

An additional complication is that composers often avoid creating a PAC using progressions that fit the description of an IAC, but that don't mark the end of a phrase. In Example 6, m. 8 contains a potential IAC, but when m. 9 begins to repeat the material from m. 5 (compare the bass voice in m. 9 with the soprano in m. 5) it sounds like the passage is trying the run-up to the cadence again to achieve something stronger than the potential IAC at m. 8. We indicate that the cadence in m. 8 is subverted by crossing the label out on the score.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Avoiding a cadence in Beethoven's Piano Sonata Op. 2, no. 3, I, mm. 1–13.

With so many possibilities, how can we determine what counts as a true IAC? The next section ("Hearing Cadences") offers some help.

Hearing Cadences

While there is certainly a degree of intuition involved with hearing cadences, it's also a skill that can be honed over time. We recommend listening for cadences following this process:

Summary: steps for hearing cadences

- Mark potential cadence points
- Analyze the harmonies involved
- Listen for a sense of beginning *after* each potential cadence point
- **At first, listen and mark *potential* points of rest, goal, or closure.**
  - It's common for students to initially mark too many cadences. One rule of thumb is that unless an excerpt's tempo is quite slow, it's not common for phrases to be two measures long.
- **Next, check the harmonies involved in these potential cadence points:**
  - *x*–V = potential HC
  - V–I = potential AC
    - If *do* ($\hat{1}$) is in the soprano over I and both harmonies are in root position, it's a potential PAC.
    - If something else like *mi* ($\hat{3}$) or *sol* ($\hat{5}$) is in the soprano over I, it's a potential IAC.
    - If V, I, or both harmonies are inverted, it's a potential IAC.
  - If it doesn't involve one of the above two progressions, then it's not a potential cadence. (Note that this doesn't mean it doesn't represent some kind of ending. It just means it's not a cadence.[1])
- **Finally, listen for what happens after each potential cadence point.**
  - Since true cadences mark the *end* of a phrase, it's very common for cadences to be followed by a sense of beginning. This "beginning" may be a repetition of the beginning of the phrase that just ended, or it may be new material that starts a new phrase. Hearing a sense of beginning following a cadence point is a great way to help verify that what you've marked as a potential cadence is indeed a true cadence point.
  - If, instead, you hear repetition of material from the *middle* of the previous phrase, your potential cadence may not be a true cadence. Instead, it likely represents a potential cadence point that has been subverted.

Writing Authentic Cadences (with triads only)

The steps for writing a PAC or IAC are summarized in the box below and illustrated in Examples 7–10.

Writing a PAC or IAC

1. Determine the key
2. Write the entire bass: *sol–do* ($\hat{5}$-$\hat{1}$)
3. Write the entire soprano:
   1. PAC: *re–do* or *ti–do* ($\hat{2}$-$\hat{1}$ or $\hat{7}$-$\hat{1}$)
   2. IAC: *re–mi* or *sol–sol* ($\hat{2}$-$\hat{3}$ or $\hat{5}$-$\hat{5}$)
4. Fill in the inner voices by asking:
   1. What notes do I already have in the bass and soprano?
   2. What notes do I need to complete the chord?
   3. What note will I double? (Remember, in root position chords, it's common to double the bass.)
5. If you're writing in minor, remember that you need to use the leading-tone, *ti* ($\uparrow\hat{7}$), in your V chord (making it a major triad, not minor) to give it momentum toward the tonic.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Writing a PAC in a major key.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Writing a PAC in a minor key.

A link to an interactive elements can be found at the bottom of this page.

Example 9. Writing an IAC in a major key.

A link to an interactive elements can be found at the bottom of this page.

Example 10. Writing an IAC in a minor key.

Writing Half Cadences (using I and V only)

The steps for writing a HC are summarized in the box below and illustrated in Examples 11 and 12.

Writing a HC:

1. Determine the key
2. Write the entire bass: *do–sol* (\hat1-\hat5) (note: for now, we'll use only I and V chords, although we'll see later that other chords more commonly precede V)
3. Write the entire soprano: *do–ti* or *mi–re* (\hat1-\hat7 or \hat3-\hat2) (note: *sol–sol* [\hat5-\hat5] is possible, but not common)
4. Fill in the inner voices by asking:
    1. What notes do I already have?
    2. What notes do I need to complete the chord?
    3. What note will I double? (Remember, in root position chords, it's common to double the bass.)
5. If you're writing in minor, remember to use the leading-tone, *ti* (\uparrow\hat{7}), in your V chord, making it a major triad, not minor.

A link to an interactive elements can be found at the bottom of this page.

Example 11. Writing a HC in a major key.

A link to an interactive elements can be found at the bottom of this page.

Example 12. Writing a HC in a minor key.

Assignments

1. Introduction to harmony, cadences, and phrase endings (.pdf, .docx). Asks students to part-write and identify cadences using only I (or i) and V chords in major and minor.
2. Introduction to harmony, cadences, and phrase endings—no four-part writing (.pdf, .mscz). Asks students to write and identify cadences using only I (or i) and V chords in major and minor.

---

1. Sometimes, for example, the melody suggests an ending, but the harmony doesn't participate. Or, sometimes the harmony suggests an end, but the melody refuses to close. Cadences are special goal points because they represent places where both the melody and harmony agree on a phrase ending. 4.01: Introduction to Harmony Cadences and Phrase Endings#return-footnote-414-1

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4.2: Strengthening Endings with V7

Key Takeaways

- This chapter introduces how composers add a seventh to the dominant to strengthen its pull toward the tonic. There are three ways a V^7 can resolve to tonic:
  - **The default resolution:** where all active notes resolve according to their tendencies.
  - **Incomplete V^7:** where the fifth is omitted from the V^7 and the V^7's root is doubled instead to create a complete tonic.
  - **Leading-tone drop:** where the leading tone in a complete V^7 leaps down to *sol* ($\hat{5}$) to create a complete tonic.

The phrase in Example 1 ends with a perfect authentic cadence (PAC) similar to those we saw and wrote in the Introduction to Harmony, Cadences, and Endings chapter. Here, however, the V chord contains an extra note, *fa* ($\hat{4}$), that transforms it from a major triad into a dominant seventh chord. Since the seventh adds dissonance (and therefore instability) to the chord, it strengthens the pull of the V chord toward I. Compare the sound of the excerpts in Example 2.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A PAC involving V^7 in Margaret Casson's *The Cuckoo*

A link to an interactive elements can be found at the bottom of this page.

Example 2. A PAC involving: (a) only triads and (b) a V^7 chord.

The Default Resolution of V^7 to I

When the notes of a complete V^7 chord resolve according to their typical tendencies, we end up with a tonic triad that has three roots and one third—no fifth (**Examples 3a** and**3b**). This is a completely normal, expected, and common resolution of V^7 to I. It's okay to leave out the fifth here since it doesn't provide essential information about the chord. By contrast, the root and third are essential: the root determines the chord's name, and the third determines its quality.

The resolution in **Example 3c**, where *re* ($\hat{2}$) goes up to *mi* ($\hat{3}$), is very uncommon, and such an unusual doubling in the tonic chord (two roots, two thirds) usually leads to voice-leading problems. We suggest avoiding this kind of resolution.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Default resolution of V^7.

To resolve V^7 to I using a default resolution:

1. Write the entire bass: *sol* to *do* ($\hat{5}$—$\hat{1}$)
2. Write the entire soprano by choosing an active note to place in the soprano over V^7, then resolving that note according to its tendency. Example 4 shows the tendencies for active notes in V^7.
   1. If you are writing in minor, remember to use *ti* ($\uparrow\hat{7}$), not *te* ($\downarrow\hat{7}$) in V^7 to make the chord major!
3. Fill in the inner voices by asking "what do I have, what do I need, and what is the tendency of those notes?"

[table id=38 /]

Example 4. Tendencies of active notes in V^7.

Alternative Resolutions of V^7 to I

Sometimes a composer may want the tonic chord to be complete rather than the incomplete chord that occurs in the default resolution. Two alternative resolutions of V^7 make it possible to create a complete I. Note that the steps for writing remain the same as for the default resolution: write the entire bass, write the entire soprano choosing an active note over V^7, then fill in the inner voices together as a pair by asking "what do I have, what do I need, and where do those notes go?"

Incomplete V^7

Examples 5a and**5b** show a resolution where the fifth has been omitted from the V^7, allowing that chord to resolve to a complete I. When we omit the fifth, we need to select a note to double in order to retain our four-voice texture. The only note we can double is the root, since doubling *ti* ($\uparrow\hat{7}$) or *fa* ($\hat{4}$) would create parallel octaves when both voices resolve according to their tendencies (**Examples 5c** and**5d**).

A link to an interactive elements can be found at the bottom of this page.

Example 5. Alternative resolution of V^7 involving an incomplete V^7.

Leading-Tone Drop

It's also possible to create a complete I from a complete V^7, but in order to do so, we have to allow a tendency tone to move somewhere other than its expected resolution. Example 6 shows how this is possible using a leading-tone drop. [1] Here, *ti* ($\uparrow\hat{7}$) drops down to *sol* ($\hat{5}$) in an inner voice. This works because: (1) *ti* ($\uparrow\hat{7}$) is not a dissonant note; (2) *ti* ($\uparrow\hat{7}$) is in an inner voice, so it's not too noticeable; and (3) *ti* ($\uparrow\hat{7}$) is the closest note that can move to *sol* ($\hat{5}$) in the tonic without causing parallels.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Alternative resolution of V^7 involving a leading-tone drop.

Two things are worth emphasizing here:

1. Use the leading-tone drop only in the alto or tenor voice to hide the fact that it's not resolving as expected.
2. The leading tone always leaps down to *sol* ($\hat{5}$), never to *mi* ($\hat{3}$), which is further away than *sol* ($\hat{5}$).

Summary

Example 7 summarizes the three possible ways to resolve V^7–I. You may notice that we have not discussed how V^7 works in half cadences (HCs). V^7 is much less common in a HC since the HC is already unstable, and adding a seventh makes it that much more unstable. Since such a cadence more often appears in Romantic music, Janet Schmalfeldt (2011, 202) has termed HCs involving V^7 the "19th-century HC."

A link to an interactive elements can be found at the bottom of this page.

Example 7. A summary of possible resolutions of V^7.

Further Reading

- Schmalfeldt, Janet. 2011. *In the Process of Becoming: Analytic and Philosophical Perspectives on Form in Early Nineteenth-Century Music*. New York: Oxford University Press.

Assignments

1. Strengthening Endings with V^7 (.pdf, .docx, spotify playlist). Asks students to write and resolve V^7 chords and provide analysis of cadences in select passages.

---

1. This is a term we first heard from Nancy Rogers at Florida State University. Some people describe this phenomenon as a "frustrated leading tone," but we believe that "leading-tone drop" better describes the technique. 4.02: Strengthening Endings with V7#return-footnote-418-1

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4.3: Strengthening Endings with Strong Predominants

Key Takeaways

This chapter introduces two strong predominants: IV and ii^6.

- Both harmonize *fa* ($\hat{4}$) in the bass.
- They typically precede a dominant chord and predict that a dominant chord is on its way.
- The most common part-writing error when using strong predominants is parallel octaves or fifths.

Chapter Playlist

$$(\hat{4} - \hat{5}) \tag{4.3.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 1. Strengthened ending with a strong PD in Maria Szymanowska, March no. 6 from Six Marches for Piano (0:00-0:16).

A link to an interactive elements can be found at the bottom of this page.

Example 2. Placement of strong predominant at a phrase ending.

Writing with ii^6

$$(\hat{4} - \hat{5}) \tag{4.3.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Parallels in the strong predominant area.

Steps for writing with ii^6

1. Write the entire bass: *fa–sol–do* ($\hat{4} - \hat{5} - \hat{1}$).
2. Write the entire soprano:
    1. Start with the V chord, and place an active note in the soprano.
    2. Resolve the active note appropriately over I.
    3. Approach the active note from above to make contrary motion with the bass, or by common tone.
3. Fill in the inner voices by asking “What do I have? What do I need? How should these voices move to create smooth motion and avoid parallels?”
    1. In ii^6, since it’s a first inversion chord, remember that you may double any note that gives you the smoothest voice leading and that avoids parallels.

This process is illustrated in Example 4.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Writing with ii^6.

Writing with IV

The danger of writing parallels is even greater with IV than with ii^6 because of the root motion by step. Avoid doing something like Example 5, where all voices move upward in parallel motion. Just as with ii^6, if you make your upper voices move in contrary motion to the bass (down) where possible, you’ll avoid the problem.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Parallels created by moving all voices in the same direction.

The steps for writing with IV are the same as those for ii^6: write the entire bass, write the entire soprano starting with V and working outward, then fill in the inner voices (Example 6). There’s one important difference with respect to doubling: whereas the ii^6 chord’s doubling is quite flexible since it’s a first-inversion chord, the IV chord almost always sees its bass doubled since it’s a root-position chord.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Writing with IV.

Root position ii

The ii chord in root position is much less common than ii^6 or IV, but it can be used as a strong predominant in major keys. (In minor keys, the iio chord, like any diminished triad, doesn't normally show up in root position.)

$$(\hat{2} \qquad (4.3.3)$$

A link to an interactive elements can be found at the bottom of this page.

Example 7. Writing with ii.

Using IV and ii$^{(6)}$ in combination

Sometimes a composer will choose to use both IV and ii$^{(6)}$ before the dominant at a phrase ending. In such cases, ii always comes after IV. Although both IV and ii$^{(6)}$ are strong pre-dominants, ii$^{(6)}$ shares a special relationship with the V chord that follows: the root of ii is a fifth away from the root of V, similar to how the root of V is a fifth away from the root of I (Example 8). This root relationship makes ii a stronger predominant than IV, which is why ii always comes after IV, never before IV, when both are used at a phrase ending.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Comparison of root relationships between ii–V (left) and V–I (right).

Assignments

1. Strengthening Endings with Strong Predominants (.pdf, .docx). Includes part writing from Roman numerals and figures, analysis of phrase endings, and a discussion question about a number from *Hamilton.*

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4.4: Embellishing Tones

Key Takeaways

- Embellishing tones can be grouped into three categories (summarized in Example 13):
  - Involving only stepwise motion: passing tone, neighbor tone
  - Involving a leap: appoggiatura, escape tone
  - Involving static notes: suspension, retardation, pedal, anticipation

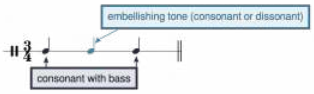
Chapter Playlist

Overview

Example 1 reproduces Maria Szymanowska's March no. 6, which we also saw in our discussion of strong predominants. You might have noticed that some of the notes in the bass in mm. 8–10 don't fit our harmonic analysis. These notes, which are blue and circled in Example 1, are collectively called "embellishing tones" because they embellish notes that belong to the chord. Embellishing tones can be grouped into three categories, which we describe below.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Embellishing tones in Maria Szymanowska, March no. 6 from Six Marches (0:00-0:16).



Example 2. Common three-note layout of most embellishing tones.

In nearly all cases, an embellishing tone is the middle note of a three-note gesture in which the first and last notes are consonant with the bass (Example 2). The actual embellishing tone itself may be either consonant or dissonant with the bass. In almost all cases, however, the embellishing tone is a note that doesn't belong to the underlying chord.

Category 1: Embellishing tones that move by step

Example 1 showed the two kinds of embellishing tones that move by step: passing tones (PTs) and neighbor tones (NTs). Passing tones are approached by step and left by step in the *same direction*, either ascending or descending (Example 3). Neighbor tones are approached by step and left by step in the *opposite direction*, producing either an upper neighbor or a lower neighbor (Example 4).

A link to an interactive elements can be found at the bottom of this page.

Example 3. Passing tones in a two-voice texture, (a) ascending and (b) descending.

A link to an interactive elements can be found at the bottom of this page.

Example 4. (a) Upper neighbor and (b) lower neighbor tones in a two-voice texture.

Category 2: Embellishing tones that involve a leap

Examples 5 and**6** show the two kinds of embellishing tones that involve a leap: appoggiaturas (APPs) and escape tones (ETs). Appoggiaturas are *approached by leap and left by step* in the opposite direction (Example 7). The appoggiatura typically occurs on a stronger part of the beat than its surrounding notes. Escape tones are *approached by step and left by leap* in the opposite direction (Example 8). The escape tone typically occurs on a weaker part of the beat than its surrounding notes. It is more common for appoggiaturas and escape tones to be left by motion downward (Examples 7a and 8a) than upward (7b and 8b).

A link to an interactive elements can be found at the bottom of this page.

Example 5. An appoggiatura in Joseph Boulogne, String Quartet no. 4, I, mm. 5–9 (0:09-0:19).

A link to an interactive elements can be found at the bottom of this page.

Example 6. An escape tone in Margaret Casson, "The Cuckoo."

A link to an interactive elements can be found at the bottom of this page.

Example 7. Appoggiaturas in a two-voice texture.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Escape tones in a two-voice texture.

Category 3: Embellishing tones involving static notes

Examples 9–11 show three of the four kinds of embellishing tones that involve static notes (i.e., notes that don't move): suspensions (SUS), retardations (RET), and pedal tones (PED). A fourth kind of embellishing tone, the anticipation, deserves special comment below.

Suspensions are approached by a static note and left by step down, while retardations are approached by a static note and left by step up (Examples 9 and 10). Both suspensions and retardations are always on a stronger part of the beat than the surrounding notes. (Suspensions are discussed in greater detail in the chapter on fourth species counterpoint.)

Pedal tones are often found in the bass. They consist of a series of static notes below chord changes that do not include the bass. We typically label them using the scale degree number of the pedal note, as in Example 11.

A link to an interactive elements can be found at the bottom of this page.

Example 9. Suspensions and a retardation in Joseph Boulogne's String Quartet no. 4, I, mm. 47–49 (1:30–1:36).

A link to an interactive elements can be found at the bottom of this page.

Example 10. (a) Suspension and (b) retardation in a two-voice texture.

A link to an interactive elements can be found at the bottom of this page.

Example 11. Pedal tone in Josephine Lang's "Dem Königs-Sohn," mm. 16–18.

Anticipations

Like the suspension, retardation, and pedal tone, anticipations also involve static notes. But anticipations are a two-note (rather than three-note) gesture, in which a chord tone is heard early as a non-chord tone (Example 12). In other words, it "anticipates" its upcoming membership in a chord.

A link to an interactive elements can be found at the bottom of this page.

Example 12. An anticipation in Josephine Lang's "Erinnerung," mm. 29–30 (1:54–1:59).

Summary

The table in Example 13 provides a summary of the embellishing tones covered in this chapter.

[table id=41 /]

Example 13. Summary of embellishing tones.

Assignments

1. Embellishing tones (.pdf, .docx). Asks students to write embellishing tones in a two-voice texture and label embellishing tones in an excerpt.

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4.5: Strengthening Endings with Cadential 6/4

Key Takeaways

- This chapter introduces the $\mathrm{cadential}^6_4$($\mathrm{cad.}^6_4$), an embellishment of the dominant that results from the combination of two embellishing tones a sixth and a fourth above the bass note *sol* ($\hat{5}$). We label the $\mathrm{cad.\ }^6_4$ and its resolution to $V^{(7)}$ as one unit: $\mathrm{V}\begin{smallmatrix}(8-7)\\6-5\\4-3\end{smallmatrix}$.
- Any chord that normally approaches V can approach $\mathrm{cad.\ }^6_4$. Most commonly, this is one of the strong predominants.
- When resolving $\mathrm{cad.}^6_4$, be sure to follow the figures such that the sixth above the bass falls to a fifth above the bass and the fourth above the bass falls to a third above the bass.

Chapter Playlist

$$(\mathrm{cad.}^6_4) \tag{4.5.1}$$

The authentic cadence in Example 1 involves a V^7 that has been embellished by $\mathrm{cad.}^6_4$. We use the word "embellished" intentionally here because the $\mathrm{cad.}^6_4$ comprises two embellishing tones that appear over *sol* ($\hat{5}$) in the bass. In Example 1, the embellishing tones are a passing tone and a suspension. These embellishing tones happen to always be a sixth and a fourth above the bass, and their appearance often intensifies the expectation to hear a cadence, hence the name "$\mathrm{cad.}^6_4$." Although the $\mathrm{cad.}^6_4$ often shows up at cadence points, it may show up anywhere in a phrase as an embellishment of $V^{(7)}$.

A link to an interactive elements can be found at the bottom of this page.

$$cad.\ {}^{6}_{4} \tag{4.5.2}$$

$^6_4$A note on chords.

$$\begin{matrix}6\\4\end{matrix} \tag{4.5.3}$$

Labeling cadential 6/4

You might have noticed that the $\mathrm{cad.}^6_4$ in Example 1 involves the notes $B_{\flat}$, G, and $E_{\flat}$, which spells a tonic triad in second inversion in the excerpt's key. Why are we labeling this chord V^6_4, then? Besides the fact that $\mathrm{cad.}^6_4$ arises from the combination of two embellishing tones (and therefore isn't a standalone triad), here are two additional reasons to use the label V^6_4 over I^6_4:

1. The chord appears after a strong predominant. If we label it I^6_4, we'd be implying that a predominant goes to tonic, which is not the sound we hear, given that *sol* ($\hat{5}$) is in the bass.
2. V^6_4 reflects the chord's sound as an elaboration of V, whereas I^6_4 reflects the chord's spelling only.[1]

Writing with cadential 6/4

Spelling cadential 6/4 in four voices

To spell $\mathrm{cad.}^6_4$, do the following (Example 2):

1. Write *sol* ($\hat{5}$) in the bass
2. Determine what notes are a sixth and fourth above the bass. Choose one of those notes to place in the soprano. The other will go in an inner voice in step 3.
3. Fill in the inner voices: one voice will double the bass, which is a necessity in $\mathrm{cad.}^6_4$ to avoid parallels. The other will take the unused note from step 2.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Spelling $\mathrm{cad.}\mathit{^6_4}$.

Voice leading with cadential 6/4

Resolution

Cadential $^6_4$ can resolve either to a V triad (Examples 3a, 3c) or a V^7 chord (Examples 3b, 3d). The lines in the label $^{6-5}_{4-3}$ tell you how the $\mathrm{cad.}^6_4$ resolves, indicating “keep this motion in the same voice.” That is, whichever voice has a sixth above the bass should fall to a fifth above the bass, and whichever voice has the fourth above the bass should fall to a third above the bass.

Adding a seventh is just as straightforward: whatever voice is doubling the bass moves down a step to take the seventh of the chord. This motion is reflected by the figures 8-7 (the octave above the bass moves down to a seventh above the bass).

A link to an interactive elements can be found at the bottom of this page.

Example 3. Resolving $\mathit{cad.}^6_4$.

Approaching cadential 6/4

Since the $\mathrm{cad.}^6_4$ embellishes the dominant, any harmony that approaches V can also approach $\mathrm{cad.}^6_4$. Most commonly, though, these are the strong predominants IV and ii^6 (Example 4).

Two guidelines apply here:

1. As always when dealing with the predominant area, watch out for parallel octaves between the predominant and $\mathrm{cad.}^6_4$.
2. Motion into (and out of) the $\mathrm{cad.}^6_4$ is usually very smooth. Avoid leaping to a member of the $\mathrm{cad.}^6_4$. While composers do occasionally leap to the sixth above the bass, it’s comparatively much rarer to leap to the fourth above the bass because it’s a dissonance, so that in particular should be avoided.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Approaching $\mathit{cad.}^6_4$.

Assignments

1. Strengthening Endings with Cadential $^6_4$ (.pdf, .docx, .mscz of score). Includes unfigured bass exercises and analysis.

---

1. If you're not convinced by the sound of the chord argument, try playing the passage in **Example 1**, but stop on the [latex]\mathrm{cad.}^6_4[/latex]. Does it sound stable? Probably not. Tonic chords are associated with stability and a sense of “home,” while dominants are associated with a desire to resolve. The [latex]\mathrm{cad.}^6_4[/latex] surely sounds more unstable than stable. 4.05: Strengthening Endings with Cadential 6 4#return-footnote-431-1

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4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s

Key Takeaways

- Prolongation is a common feature of phrase beginnings in Western classical music.
- The most common way to prolong the tonic is by alternating tonic with V^6 or inverted V^7 chords.

Chapter Playlist

Overview

Phrase beginnings in Western classical music typically feature a prolongation of tonic harmony to establish the home key. "Prolongation" just means that the harmony's influence lasts longer than a single chord. Say, for example, that you bought a serving of ice cream that you wanted to enjoy over an extended period. One way to do it would be to take small bites to extend the length of time you're eating. While this method would work, you might be eating ice cream soup by the end. Another way to do it would be to eat some, put it in the freezer, do some other activity, then come back and eat some more. You might say, "I've been eating ice cream all day," even though you haven't literally been eating ice cream every second of the day (as much as you might want to).

Something analogous happens in music. We could prolong the tonic's importance at the beginning of a phrase by holding or repeating the chord (like taking small bites of the ice cream), as in Example 1, but more interesting and rewarding is to use other chords between instances of the tonic (like putting the ice cream in the freezer and coming back to it later).

A link to an interactive elements can be found at the bottom of this page.

Example 1. Prolongation by sustaining or repeating a chord.

Example 2 shows one instance of the most common way to prolong tonic at the beginning of a phrase: using inverted V^7s between tonic triads. The tonic's influence is felt more strongly because (1) it's on stronger beats or hyperbeats than the V^7, and (2) it appears at least once in root position, whereas the V^7 is in a weaker inversion.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Tonic prolongation in Clara Schumann, Piano Trio, III, mm. 1–2 (0:00-0:08).

Writing Tonic Prolongations

The tonic prolongations covered in this chapter are the ones most commonly seen in Western classical music, and they all share several traits:

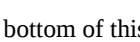
- They are three chords long
- The first and last chords are I or I^6
- The middle chord is V^6 or an inverted V^7
- The V^6 or inverted V^7 resolves using the same principles we learned in Strengthening Endings with Cadential

Prolonging with V6/5 and V6

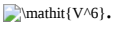
$$V^6_5 \tag{4.6.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Tonic prolongation involving .

It's also possible to prolong tonic with V^6 rather than  , though this is less common (Example 4).

A link to an interactive elements can be found at the bottom of this page.

Example 4. Tonic prolongation involving  .

Prolonging with V4/2

$$V^4_2 \tag{4.6.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 5. Tonic prolongation involving $\mathit{V^4_2}$.

Prolonging with V4/3

Most commonly, V^4_3 helps us move from root position to first inversion I in the progression $\mathrm{I\text{-}V^4_3\text{-}I^6}$ (Example 6). It occasionally prolongs root position tonic in the progression $\mathrm{I\text{-}V^4_3\text{-}I}$, but this isn't very common (Example 7). These options are available because V^4_3's bass note, *re* ($\hat{2}$), may go either to *do* ($\hat{1}$) or to *mi* ($\hat{3}$). Again, follow the typical writing procedure.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Tonic prolongation involving $\mathit{V^4_3}$.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Less common tonic prolongation involving $\mathit{V^4_3}$.

Writing with V^4_3 also offers one exception to the rule that the chordal seventh, *fa* ($\hat{4}$), must resolve down (Example 8). Here, *fa* moves up to *sol* ($\hat{4}$-$\hat{5}$). This exception is made possible because the bass creates parallel tenths with the upper voice that takes the line *mi–fa–sol* ($\hat{3}$-$\hat{4}$-$\hat{5}$).

A link to an interactive elements can be found at the bottom of this page.

Example 8. Exception to the typical resolution of the chordal seventh.

Combining Progressions

By chaining together several of these tonic prolongation progressions, composers can extend the tonic's influence for quite a while at the beginning of a phrase, as in Example 2. A part-written example is given in Example 9.

A link to an interactive elements can be found at the bottom of this page.

Example 9. Extensive tonic prolongation.

Bass Line Summary

A summary of the four tonic-prolongation bass lines discussed in this chapter, along with their associated progressions, is given in Example 10.

[table id=42 /]

Example 10. Summary of bass lines and their associated tonic prolongation progressions.

Assignments

1. Prolonging Tonic at Phrase Beginnings with V^6 and Inverted V^7 (.pdf, .docx,recording). Asks students to write from Roman numerals and figures and complete a guided analysis. Download score.

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4.7: Performing Harmonic Analysis Using the Phrase Model

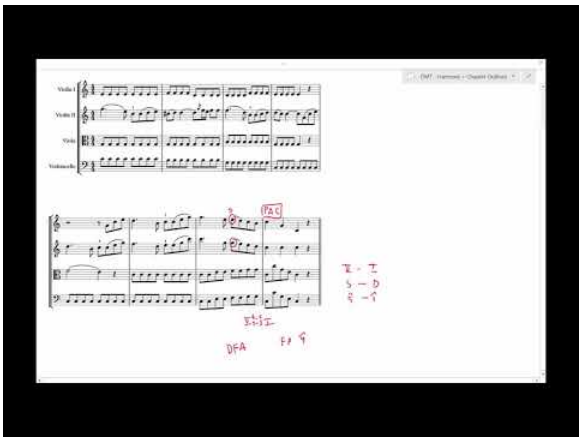
Key Takeaways

This chapter provides a strategy for harmonic analysis, in which we use the bass line to make an educated guess about what harmonic progression is active in a phrase:

1. Identify phrase endings by listening.
2. Provide a harmonic analysis of each phrase ending's cadence.
3. Identify the strong predominant that leads to the cadence.
4. Back up the the beginning of the phrase and analyze toward the cadence.

Overview

So far, we've mostly been looking at short segments of music, focusing on how composers create a sense of beginning and ending in a phrase. In this chapter, we consider a longer phrase of music that employs some of the harmony we've learned so far, with the goal of learning how to perform a harmonic analysis quickly and how to identify the phrase model at work in our analysis. The video lesson below (Example 1) walks through the process and is followed by an outline of the steps (along with some guidance).



A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=440

Example 1. Video lesson on harmonic analysis.

Performing a Harmonic Analysis

1. Identify phrase endings.
    - It's often helpful to listen for:
        - A new phrase beginning or a repetition of a previous phrase beginning. This tells you an "old" phrase must have just ended.
        - A sense of goal, often marked by a cadence.
2. Analyze the phrase ending.
    - Listen, and label the cadence if present (it often is).
    - Provide a harmonic analysis of the ending:
        - You know that if there's a half cadence, the phrase ends on V, and if there's an authentic cadence, the phrase ends with $V^{(7)}$-I. Look for *sol* $(\hat{5})$ in the bass at a HC or *sol–do* $(\hat{5}-\hat{1})$ in the bass at an AC.
            - Be careful to look for $(\mathrm{cad.}^6_4)$, which is often present at a cadence.
3. Look for a strong predominant.
    - Back up from the cadence to look for a strong predominant. Remember that usually *fa* $(\hat{4})$ is in the bass for the strong predominant, though *re* $(\hat{2})$ is also possible.
4. Analyze from the beginning.

- Use your knowledge of tonic prolongations and take a look at the bass line to make an educated guess about what you think is happening to prolong tonic. Verify your guess to make sure it's accurate by taking stock of the notes in the chord above each bass note.

Identifying the Phrase Model in Harmonic Analysis

To identify how the phrase model operates in a given phrase, we can apply the harmonic function labels we learned in Introduction to Harmony, Cadences, and Phrase Endings. For each phrase, we get one (and only one!) set of the labels **Tb–PD–D–Te**: Tonic beginning, Predominant, Dominant, and Tonic ending. To apply them, do the following:

1. Locate the phrase ending.
    1. Apply the **D** label to the cadential dominant.
    2. If the phrase ends with an authentic cadence, apply the **Te** label to the tonic of the cadence. If it ends with a half cadence, you can omit this label.
2. Locate the strong predominant.
    1. The **PD** label goes on the first strong predominant (reading left to right) that comes immediately before the cadential dominant.
3. Label the opening tonic.
    1. The **Tb** label goes on the tonic that starts the phrase. Rarely, a phrase may delay this tonic or may omit it altogether. This kind of delay or omission is more common in Romantic music.

Assignments

1. Performing Harmonic Analysis Using the Phrase Model (.pdf, .docx). Asks students to analyze three short excerpts.

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4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord

Key Takeaways

- Instead of using an inverted $\mathrm{V^7}$ chord to prolong tonic, composers sometimes use $\mathrm{vii^{o7}}$ or its inversions.
- Each inversion of $\mathrm{vii^{o7}}$ can be used in the same way as a particular inversion of $\mathrm{V^7}$. The pairings of $\mathrm{V^7}$ and $\mathrm{vii^{o7}}$ are based on the bass note each chord harmonizes.
  - $\mathrm{vii^{o7}}$ can be used anywhere that $\mathrm{V^6_5}$ or $\mathrm{V^6}$ can be used.
  - $\mathrm{vii^o\begin{smallmatrix}6\\5\end{smallmatrix}}$ or $\mathrm{vii^{o6}}$ can be used in place of $\mathrm{V^4_3}$.
  - $\mathrm{vii^o\begin{smallmatrix}4\\3\end{smallmatrix}}$ can be used in place of $\mathrm{V^4_2}$.

Chapter Playlist

Overview

Earlier, we saw how the tonic can be prolonged using essentially four kinds of progressions, which we categorized according to their basslines (see the summary section of that chapter for a reminder). In this chapter, we consider an alternative way to harmonize those same tonic-prolongation bass lines using a harmony that can substitute for V^7: the leading-tone chord. Example 1 shows a passage from Mozart's "Agnus Dei" that uses vii^{o7} and its inversions to prolong tonic. Below the actual version, a recomposition shows that the bass line from the actual version can also be harmonized with V^7 and its inversions. As you listen, notice the differences in color between the two versions. You may hear that the actual version is full of a wonderful tension that is less present in the recomposed version.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Using vii^{o7} vs. V^7 in Mozart, "Agnus Dei" from *Requiem (*0:06–0:20).

Before we address how this substitution works, here are three points we need to emphasize:

1. The leading-tone chord as a triad is always used in first inversion vii^{o6}. This is because any other inversion creates a dissonance with the bass that composers tend to avoid.
2. In minor, we need to remember to use *ti* $(\uparrow\hat{7})$, not *te* $(\downarrow\hat{7})$, to build the leading-tone chord. In other words, remember to raise the leading tone.
3. In major, the leading-tone seventh chord's quality is half diminished if we don't alter it (e.g. in C major: B-D-F-A). Composers tend to prefer the sound of a fully diminished 7^{th} chord, though, so we nearly always find that in major keys, composers lower the chordal seventh to make the chord fully diminished (e.g., in C major: B-D-F-A♭) (Example 2). You can use both, but vii^{o7} is much more common than $vii^{\varnothing 7}$, and we'll see why below.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Comparing qualities of leading-tone seventh chords.

Substituting the leading-tone chord in place of $V^{(7)}$

Almost all inversions of $\mathrm{vii^{o7}}$ (plus $\mathrm{vii^{o6}}$) can substitute for an inversion of $\mathrm{V^7}$ (and $\mathrm{V^6}$) according to which note is in the bass (Example 3). What this means is that, for example, $\mathrm{vii^{o7}}$ can be used anywhere that $\mathrm{V^6_5}$ or $\mathrm{V^6}$ can be used. Similarly, $\mathrm{vii^o\begin{smallmatrix}6\\5\end{smallmatrix}}$ or $\mathrm{vii^{o6}}$ can be used in place of $\mathrm{V^4_3}$, and $\mathrm{vii^o\begin{smallmatrix}4\\3\end{smallmatrix}}$ can be used in place of $\mathrm{V^4_2}$.

[table id=43 /]

Example 3. Substituting vii^{o7} for V^7 according to which note is in the bass.

$$(\downarrow \hat{6} \tag{4.8.1}$$

[table id=44 /]

Example 4. Tendencies of active notes in dominant-function chords.

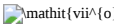
A link to an interactive elements can be found at the bottom of this page.

Example 5. Writing with $\mathit{vii^{o6}}$ and $\mathit{vii^{o7}}$ and its inversions.

vii^{o}4/2

$$(\downarrow \hat{6}) \tag{4.8.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. Using  .

Using the leading-tone chord as a half-diminished seventh chord

$$(\hat{2}) \tag{4.8.3}$$

A link to an interactive elements can be found at the bottom of this page.

Example 7. Using and its inversions.

Assignments

1. Prolongation at Phrase Beginnings using the Leading-tone Chord (.pdf, .docx). Asks students to write from Roman numerals, complete analysis, and realize figured bass.

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4.9: 6/4 Chords as Forms of Prolongation

Key Takeaways

This chapter introduces three additional ^6_4 chords beyond cadential ^6_4.

- Passing (pass.) ^6_4 involves a passing tone in the bass that has been harmonized by a ^6_4 chord. It typically prolongs tonic or predominant harmonies, and it always occurs between two chords of the same function.
- Neighbor (n.) ^6_4 involves a static bass above which two of the upper voices perform upper neighbor motion. It typically prolongs tonic or dominant harmonies, and the chords on both sides of it are always in root position.
- Arpeggiating (arp.) ^6_4 involves a bass that arpeggiates through the fifth of the chord while the upper voices sustain the chord in some way. It may prolong any harmony, and we don't typically bother recognizing it in analysis.

The table in Example 6 below summarizes the characteristics of each of the three types of ^6_4 that we advocate labeling in analysis.

Chapter Playlist

$$\text{cad.}^{6}_{4} \tag{4.9.1}$$

Passing ^6_4

The passing (pass.) [latex]^6_4[/latex] is a ^6_4 chord built on a passing tone in the bass (Example 1). It's most commonly found prolonging tonic or predominant harmonies. Importantly, the chords on both sides of the \mathrm{pass.^6_4} are always the same function (e.g., \mathrm{IV^6\text{-}pass.^6_4\text{-}ii^6}), not of different function (e.g., \mathrm{IV^6\text{-}pass.^6_4\text{-}I}).

A link to an interactive elements can be found at the bottom of this page.

$$\text{pass.}^{6}_{4} \tag{4.9.2}$$

Example 2a demonstrates the steps for writing \mathrm{pass.^6_4} to expand tonic, and **Examples 2b** and**2c** show several ways \mathrm{pass.^6_4} can prolong the predominant area. Note that each of these progressions can also work backward (e.g., \mathrm{I^6\text{-}pass.^6_4\text{-}I} also works).

To write with pass^6_4:

1. **Write the entire bass.** You should have three notes in stepwise motion where the first and last notes belong to the same functional area (T or PD). The middle note will be your passing tone.
2. **Spell the pass.**\mathbf{^6_4}**.** Just like with \mathrm{cad.^6_4}, to spell \mathrm{pass.^6_4}, determine what notes are a fourth and sixth above the bass. One voice will double the bass, just like in \mathrm{cad.^6_4}.
3. **Write the entire soprano.** The soprano should be a line that moves by step, not the static line.
4. **Fill in inner voices, making them move as little as possible.**

A link to an interactive elements can be found at the bottom of this page.

Example 2. Writing with pass.\mathit{^6_4}.

Neighbor ^6_4

The neighbor (n.) ^6_4 consists of a static bass over top of which two voices have upper-neighbor motion (Example 3). Sometimes \mathrm{n.^6_4} is called pedal ^6_4, a name that reflects the static pedal in the bass. It's most commonly found prolonging I or V. **Example 4a** demonstrates the steps for writing \mathrm{n.^6_4} to prolong tonic, and **Example 4b** shows the voice leading to prolong V.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Neighbor and arpeggiating \mathit{^6_4} in Josephine Lang, "Dem Königs-Sohn."

To write with \mathrm{n.^6_4}:

1. **Write the entire bass.** The bass will be three of the same note, typically *do–do–do* or *sol–sol–sol* (\hat1-\hat1-\hat1 or \hat5-\hat5-\hat5)
2. **Spell n.**\mathbf{^6_4}**.** The \mathrm{n.^6_4} will be over the middle bass note. As with \mathrm{cad.} and \mathrm{pass.^6_4}, determine a sixth and fourth above the middle bass note. One voice will double the bass.

3. **Write the entire soprano.** For the soprano, choose either an upper-neighbor line or the static line. Unlike with $\mathrm{cad.}$ or $\mathrm{pass.}^6_4$, $\mathrm{n.}^6_4$ will more frequently have a static line in the soprano.
4. **Fill in the inner voices, making them move as little as possible.**

A link to an interactive elements can be found at the bottom of this page.

Example 4. Writing with $\mathit{n.}^6_4$.

Arpeggiating $^6_4$

Arpeggiating (arp.) $^6_4$ is typically created when the bass leaps to the fifth of a chord while the upper voices sustain the chord. It's commonly found in, for example, ending bass arpeggiations (Example 3) or waltz-style accompaniments (Example 5). Unlike the other types, $\mathrm{arp.}^6_4$ typically doesn't need to be labeled in analysis. Example 5 identifies it using figures, but it's not necessary to do so—each measure could simply be labeled as I.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Arpeggiating $\mathit{}^6_4$ in Sophie de Auguste Weyrauch, Six Danses No. 3.

Summary: 6/4 chord types

The table in Example 6 summarizes the characteristics of the three $^6_4$ chord types that should be labeled in analysis. When you come across a $^6_4$ chord in analysis, remember to stop and ask yourself what type it is (passing, neighboring, or cadential) and label it appropriately.

[table id=45 /]

Example 6. Summary of $\mathit{}^6_4$ chord types.

Assignments

1. $^6_4$ chords as forms of prolongation (.pdf, .docx). Asks students to review previous concepts, write from Roman numerals, write from figures, and analyze excerpts.

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4.10: Plagal Motion as a Form of Prolongation

Key Takeaways

- Plagal motion from IV to I serves to prolong tonic either after an authentic cadence (AC) or at the beginning of a phrase.
- We place plagal (IV) in parentheses in analysis to differentiate it from the more common use of IV as a predominant.
- In 18th- and 19th-century music, this use of (IV) more commonly occurs as part of a prolongation rather than as part of a cadence, so this part of the book will use the term “plagal motion” rather than “plagal cadence.”
- Writing with plagal motion is not difficult when both harmonies are in root position, but watch for parallels when either harmony is inverted.

Chapter Playlist

Earlier we saw that chords that function as predominants, such as ii and IV, are typically used to strengthen a phrase’s motion toward the dominant, often at the end of a phrase. In this chapter, we look at a special situation in which IV functions not as a predominant but rather to prolong I, which produces plagal motion. In analysis, we place plagal (IV) in parentheses to differentiate it from the more common use of IV as a predominant. Plagal motion most commonly serves to prolong tonic in two places: after an authentic cadence (as in Example 1) or at the beginning of a phrase in place of the more common tonic prolongations involving dominant-function chords.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Plagal motion after a PAC in Handel, “Hallelujah Chorus,” from *Messiah* (3:02-3:29).

Plagal motion versus plagal cadence

You may sometimes see all (IV)–I motions described as “plagal cadences,” but this part of the book uses the broader term “plagal motion” instead, preserving our definition of cadences as marking the ends of phrases. While true phrase endings involving the progression (IV)–I do exist, in 18th-century classical music, it’s more common to see a (IV)–I tonic prolongation either after a PAC or at the beginning of a phrase. Using “plagal cadence” in all scenarios would inaccurately imply that (IV)–I always ends a phrase, whereas “plagal motion” allows us to describe the more common usage of (IV)–I as prolongational without rejecting the situations in which (IV)–I really does end a phrase.

Writing plagal motion after an authentic cadence

It’s most common to see both I and (IV) in root position when composers use plagal motion after an authentic cadence. The progression isn’t difficult to write, since the danger of parallels is low, provided you follow three pieces of advice (Example 2):

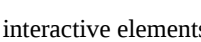
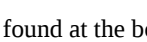
1. Make both I and (IV) complete (don’t omit the fifth).
2. Double the bass (as is common in root position chords).
3. Move all upper voices by step or common tone.

It’s most common to have *do* ( ) in the soprano, which makes sense given that plagal motion comes after a PAC where the melody has already completed its journey toward *do* ( ). As always, follow typical writing procedures.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Writing plagal motion with root-position chords.

Writing plagal motion at a phrase beginning

While the root-position version of plagal motion (as in Example 2) also occurs at phrase beginnings sometimes, Example 3 shows that (IV) can also go to I^6. Here, watch for parallels between (IV) and I^6: if the alto in Example 3 went to G (shown in parentheses) instead of B♭, it would create parallel octaves with the bass. Remember that it’s more common by far for tonic to be prolonged by an inverted V^7 than by (IV) at a phrase beginning. When you see *fa*–*mi* () at the beginning of a phrase, your instinct should still be to use  rather than  .

A link to an interactive elements can be found at the bottom of this page.

Example 3. Writing plagal motion with an inverted tonic.

Assignments

1. Plagal Motion as a Form of Prolongation (.pdf, .docx). Asks students to identify bass lines and analyze an excerpt. Download audio (.mscz).

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4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings

Key Takeaways

$$(\hat{6}) \tag{4.11.1}$$

- At phrase beginnings, *la* ($\hat{6}$) is often used to prolong tonic in two ways:
  - harmonized with IV^6 in the progression $\mathrm{I\text{-}IV^6\text{-}V^6_5\text{-}I}$ (**Examples 1** and**3**)
  - harmonized with plagal (IV^6) in the progression $\mathrm{I\text{-}IV^6\text{-}I^6}$ (**Examples 2** and**4**)
- At phrase middles, *la* ($\hat{6}$) is often used:
  - in a deceptive motion ($V^{(7)}$–vi) (**Examples 5** and**7**)
  - to connect the tonic (T) and strong predominant (PD) areas, harmonized with vi (**Examples 6** and**8**)
- At phrase endings, *la* ($\hat{6}$) is often used:
  - to create a phrygian half cadence (iv^6–V in minor) (**Examples 7** and**9**)
  - as a "stand-in" for the expected strong PD note *fa* ($\hat{4}$) (Example 10)

Chapter Playlist

Overview: uses of *la* (scale degree 6)

$$(\hat{6}) \tag{4.11.2}$$

At phrase beginnings

$$(\hat{6}) \tag{4.11.3}$$

A link to an interactive elements can be found at the bottom of this page.

Example 1. Tonic prolongation via $\mathit{I\text{-}IV^6\text{-}V^6_5\text{-}I}$ in Josephine Lang, Arie.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Tonic prolongation via $\mathit{I\text{-}IV^6\text{-}I^6}$ in Josephine Lang, Lied.

Using IV^6 as a predominant

$$(\hat{1} - \hat{1} - \hat{2} - \hat{1}) \tag{4.11.4}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Writing with $\mathit{I\text{-}IV^6\text{-}V^6_5\text{-}I}$.

Using plagal (IV^6)

Writing $\mathrm{I\text{-}IV^6\text{-}I^6}$ is relatively easy (Example 4). Here, remember three things:

1. The bass always arpeggiates down.
2. The most common soprano is *mi–fa–sol* ($\hat{3}$-$\hat{4}$-$\hat{5}$).
3. The other voices should move by step or common tone.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Writing with plagal (IV^6).

At phrase middles

$$(\hat{6}) \tag{4.11.5}$$

1. To avoid a cadence as part of a deceptive motion (Example 5)
2. To connect the tonic area to the strong predominant area by arpeggiating *do–la–fa* ($\hat{1}$-$\hat{6}$-$\hat{4}$), harmonized by vi or IV^6 (Example 6)

A link to an interactive elements can be found at the bottom of this page.

Example 5. Deceptive motion in Bernhard Henrik Crussell, Clarinet Quartet Op. 7, II, mm. 66–72 (5:06-5:38).

A link to an interactive elements can be found at the bottom of this page.

Example 6. vi connecting **T** and strong **PD** areas in Bernhard Henrik Crussell, Clarinet Quartet Op. 7, II, mm. 1–4 (0:00-0:18).

Deceptive motion

$$(\hat{5} - \hat{6}) \tag{4.11.6}$$

A link to an interactive elements can be found at the bottom of this page.

Example 7. Writing deceptive motion.

Deceptive motion vs. Deceptive cadence

Some people use the term "deceptive cadence" to describe what we refer to as "deceptive motion." Since the progression $V^{(7)}$–vi avoids a cadence rather than creating one, we find that the term "deceptive cadence" inaccurately describes the progression's purpose, so we prefer the more neutral description "deceptive motion."

vi as a weak predominant

Using vi to connect the tonic and strong predominant areas is quite easy to write (Example 8). As long as your upper voices move by step or common tone and you follow typical writing procedures, you should not run into writing issues. Notice that for the phrase model analysis (**T/PD/D**) labels, the **PD** label goes on the first strong **PD** before the cadence, as in Example 6.

A link to an interactive elements can be found at the bottom of this page.

$$(\hat{6}) \tag{4.11.7}$$

At phrase endings

$$(\hat{6}) \tag{4.11.8}$$

1. As part of a phrygian half cadence (Example 9)
2. Harmonized with a predominant chord as part of a push to a cadence

A link to an interactive elements can be found at the bottom of this page.

Example 9. Phrygian half cadence in Franz Schubert, "Die Mainacht," mm. 1–10 (0:00-0:19).

The phrygian half cadence (PHC)

$$(\downarrow \hat{6} - \hat{5}) \tag{4.11.9}$$

A link to an interactive elements can be found at the bottom of this page.

Example 10. Writing a PHC.

La (\hat6) harmonized with a predominant at a cadence

$$(\hat{6}) \tag{4.11.10}$$

A link to an interactive elements can be found at the bottom of this page.

$$(\hat{6}) \tag{4.11.11}$$

Assignments

1. *La* (\hat6) in the bass at beginnings, middles, and endings (.pdf, .docx). Asks students to analyze bass lines, write from figures and Roman numerals, harmonize an unfigured bass, and analyze an excerpt.

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4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass

Key Takeaways

- The iii chord (III in minor) is a weak predominant that typically moves through a strong predominant on the way to a V chord.
- In major, iii usually harmonizes a descending *ti* $(\hat{7})$; similarly, in minor, III usually harmonizes a descending *te* $(\downarrow\hat{7})$.
- iii/III is usually found in root position.
- iii *is not* used as a substitute for I^6 (see the explanation below Example 1).
- iii *is not* not a very common chord.

Chapter Playlist

Overview: the iii chord

$$(\hat{7}/\downarrow\hat{7}) \tag{4.12.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 1. The iii chord in Koji Kondo's Athletic Theme from Super Mario 3 (4:19–4:24).

$$(\hat{1}-\hat{2}-\hat{3}) \tag{4.12.2}$$

Writing with iii

$$(\hat{6}) \tag{4.12.3}$$

$$(\downarrow\hat{7}) \tag{4.12.4}$$

A link to an interactive elements can be found at the bottom of this page.

Example 2. Writing with iii going to a strong predominant.

$$(\downarrow\hat{7}) \tag{4.12.5}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Writing with iii going to V.

Assignments

1. *Mi* $(\hat{3})$ in the bass at beginnings (.pdf, .docx). Asks students to realize unfigured bass, analyze, and do a transcription with analysis.

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4.13: Predominant Seventh Chords

Key Takeaways

- This chapter discusses the predominant seventh chords ii^7, IV^7, vi^7, and iii^7.
- ii^7 and its inversions are the most common predominant seventh chord, and Example 2 shows which inversions of ii^7 are more common than others.
- When writing with predominant seventh chords, two general principles apply with respect to the treatment of the chordal seventh:
  - Approach the chordal seventh by step or common tone.
  - Resolve the chordal seventh down by step.

Earlier, we saw how adding a chordal seventh to the dominant strengthened its drive toward the tonic. In this chapter, we see that something similar can be accomplished by adding a chordal seventh to predominant chords: it can intensify their motion to the dominant (Example 1). Adding a seventh to ii chords is common; it also occurs with the other predominant chords (particularly IV and vi), but less frequently. All predominant seventh chords share two general guidelines for the treatment of a chordal seventh:

1. The chordal seventh is usually approached by step or common tone.
2. The chordal seventh resolves down by step.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A predominant seventh chord in Josephine Lang, “Dort hoch auf jenem Berge”

Adding a chordal seventh to ii

Example 2 lists the various inversions of ii^7 from more common to less common. We’ll discuss each in turn.

[table id=46 /]

Example 2. Inversions of ii^7 sorted by relative degree of commonality.

ii\mathit{^6_5}

$$\mathrm{ii}^6_5 \tag{4.13.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Writing with ii\mathit{^6_5}.

ii^7

ii^7 is typically found near the end of a phrase (Example 1). In addition to following typical writing procedures and treatment of the chordal seventh, there are two main issues to be aware of when writing with ii^7:

1. The chord is often preceded by tonic, and it’s best to use I^6 rather than I to avoid potential parallels,
2. When ii^7 resolves to V^7, either ii^7 or V^7 will need to be incomplete to avoid causing a voice-leading problem (Example 4).

A link to an interactive elements can be found at the bottom of this page.

Example 4. Writing with ii^7.

ii\mathit{^4_2}

$$\mathrm{ii}^4_2 \tag{4.13.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 5. Writing with ii\mathit{^4_2}.

ii\mathit{^4_3}

$$\mathrm{ii}^4_3 \tag{4.13.3}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. Writing with ii$\mathit{^4_3}$.

Other predominant sevenths

The remaining predominant sevenths, IV^7, vi^7, and iii^7 are not nearly as common as ii^7 and its inversions. Among them, IV^7 and vi^7 are more common than iii^7, which makes sense given that iii as a triad isn't very common in the first place. Both IV^7 and vi^7 tend to show up as root-position chords when they're used, and vi^7 only shows up as a harmony connecting the tonic area to the strong predominant area, and not as part of a deceptive motion (in other words, V^7 to vi^7 is not common). Example 7 shows sample voice leading involving these chords. It follows typical writing procedures and treatment of chordal sevenths.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Writing with IV^7 and vi^7.

Assignments

1. Predominant Seventh Chords (.pdf, .docx). Asks students to realize figured bass and analyze.

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4.14: Tonicization

Key Takeaways

- Tonicization is the process of making a non-tonic chord sound like a temporary tonic. This is done with chromatic chords called applied chords, or secondary dominant chords ($V^{(7)}$) and secondary leading-tone chords ($vii^{o(7)}$) borrowed from the temporary key.
- Applied chords are notated with a slash. The chord before the slash is the identity of the applied chord within the secondary key, and the chord after the slash is the chord being tonicized. It's read aloud from left to right with the word "of" replacing the slash: V/ii becomes "five of two."
- Applied chords nearly always involve accidentals, and especially accidentals that raise the pitch.
- Another way of thinking about applied chords is to imagine them as altered versions of the diatonic chord with which it shares a root (for example, ii becomes II♯, which is V/V).

Chapter Playlist

Tonicization is the process of making a non-tonic chord temporarily sound like tonic. It's accomplished using secondary dominant or secondary leading-tone chords (sometimes called applied dominant and applied leading-tone chords). First, we'll learn how to tonicize the dominant, and then we'll see tonicizations of non-dominant chords.

Tonicizing V

Analyzing tonicization

Secondary dominant chords ($V^{(7)}$/V)

Example 1 analyzes a passage that temporarily makes V sound like the tonic chord. Example 2 extracts the two chords from Example 1 that participate in the tonicization. We have a C^7 chord moving to an F chord, so if we were to analyze these chords without considering the key signature or the context that **Example 1** provides, we'd say the two chords represent the progression $\mathrm{V^6_{5}\text{-}I}$ in F major (**Example 2a**).

A link to an interactive elements can be found at the bottom of this page.

Example 1. Tonicization in Joseph Bologne, *Six Concertante Quartets*, no. 1, II, mm. 1–8.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Reduction of the tonicization in Joseph Bologne, Six Concertante Quartets, no. 1, II, mm. 3–4.

If we now reconsider the context that Example 1 provides, we can see that the F major chord functions as V in the excerpt's home key of B♭ major (**Example 2b**). Indeed, it's the chord that creates the half cadence that ends the first phrase. We know that we haven't changed keys here because, in addition to the half cadence being in B♭ major, the second phrase also begins in B♭ major (it repeats the beginning of the first phrase). The C^7 chord, however, clearly doesn't belong to B♭ major—that's what the E♮ accidental in the bass tells us. As we determined in Example 2, the C^7 chord is $\mathrm{V^6_5}$ of the F major chord. To represent that in the context of Example 1, we say that the C^7 chord is "$\mathrm{V^6_5}$ of V," and we write "$\mathrm{V^6_5/V}$." In other words, the F major chord is V, and the C^7 chord is the $\mathrm{V^6_5}$ of that V chord. We've just labeled our first secondary dominant chord!

Secondary leading-tone chords ($vii^{o(7)}$/V)

Tonicization can also be accomplished using secondary leading-tone chords, as in Example 3.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Tonicization in Josephine Lang, "Du gleichst dem klaren blanen See," mm. 21–24.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Reduction of the tonicization in Josephine Lang.

Example 4 walks through how to understand the relationship between the two highlighted chords in Example 3.

a. If we were in G major, we would analyze these chords as vii^{o7}–I. Recall that when we learned about the leading-tone seventh chord, we discovered that it's common to lower the chordal seventh in major to create a fully diminished seventh chord. That's still true here (notice the E♭!).

b. The passage in Example 3 is in C major, so we would analyze the G major chord as V, rather than I. That means the F♯^{o7} chord is vii^{o7} of the V chord. We write "vii^{o7}/V" and say "seven diminished seven of five."
c. The passage in Example 3 adds a \mathrm{cad.^6_4} to embellish the dominant. That's why the vii^{o7}/V doesn't resolve directly to V.
d. The \mathrm{cad.^6_4} resolves to V^7 rather than the V triad. Now we've arrived at the passage in Example 3.

Summary: Steps for analyzing tonicization

Note: It's rare but possible in classical music to have a half-diminished seventh chord act as an applied chord. It's even less common in jazz, where it's almost certainly an applied ii$^{\varnothing 7}$.

Chromaticism is an indication that tonicization may be present. Since only V$^{(7)}$ and vii^{o7} (or, rarely, vii$^{\varnothing 7}$—see note in sidebar) can create tonicization, one of the most helpful things for determining the label is to ask "what is the quality of the chromatic chord?" The quality determines the label: if the chord is a major triad or dominant seventh chord, it gets the label V$^{(7)}$. If the chord is a diminished triad or diminished seventh chord, it gets the label vii$^{o(7)}$.

When you come across a chromatic note, stop and ask the following questions:

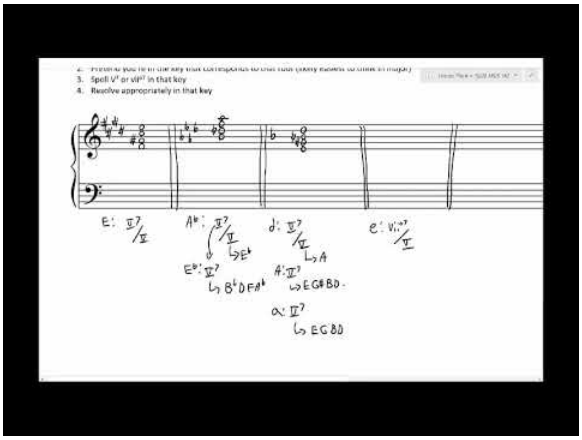
1. Is the chromatic note part of the chord, or is it an embellishing tone?
    1. Part of the chord: move on to question 2
    2. Embellishing tone: label appropriately
2. What's the quality of the chord?
    1. Major triad or dominant seventh chord: secondary V chord; label is V$^{(7)}$/*x*
    2. Diminished triad or diminished seventh: secondary vii^o chord; label is vii^{o7}/*x*
3. To determine *x* above, ask: In what key is the chromatic chord V or vii^o? Then, determine what Roman numeral the tonic triad of that key would get in the home key of your passage. That Roman numeral is *x*.

Writing applied chords

Spelling

The video in Example 5 walks through the steps for spelling V^7/V, vii^{o7}/V, and vii$^{\varnothing 7}$/V in major and minor keys. We recommend you grab a piece of staff paper so you can follow along by pausing the video and trying the exercises yourself. The steps are summarized below:

1. Determine the root of the chord being tonicized
2. Pretend this root is the tonic of a temporary key
3. Spell the top Roman numeral in that key (either V^7 or vii^{o7})



A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=472

Example 5. Steps for spelling applied chords.

Resolving

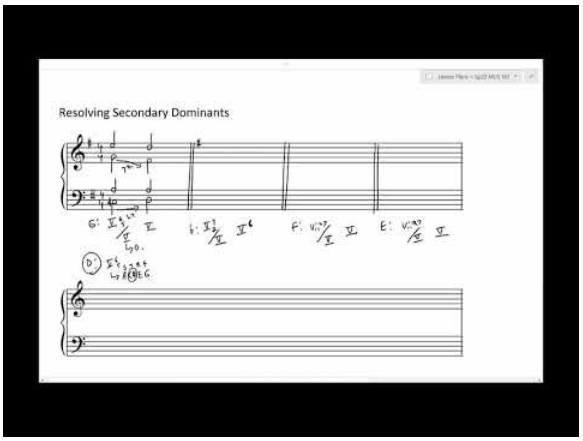
The leading tone of the applied chord is referred to as the secondary leading tone; the chordal seventh is referred to as the secondary seventh. These dissonances resolve just as they normally would in their own key.

Example 6. If the applied chord is proceeding to another seventh chord, the secondary leading tone may resolve downward, instead of upward like a leading tone normally would, into the seventh of the next chord.

One exception is that when the tonicized chord is itself a seventh chord (as in the progression **D^7–G^7–C**), the secondary leading tone may resolve down by semitone into the seventh of the following chord. In the example progression, this would create a nice chromatic line: **F♯–F♮–E** (Example 6).

The video in Example 7 walks through the steps for spelling V^7/V, vii^{o7}/V, and vii$^{\varnothing 7}$/V in major and minor keys. Like with the previous video, we recommend pausing to try each exercise on staff paper. The steps are summarized below:

1. Spell the secondary chord
2. Follow the typical writing procedure to part-write, but think in the temporary new key to determine how tendency tones resolve
3. Check accidentals (especially if in minor)



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Example 7. Steps for resolving applied chords.

Tonicizing chords other than V

Overview

Any major or minor triad can be tonicized, not just V. Diminished and augmented triads can't be tonicized, since there are no diminished or augmented keys. This means that every Roman numeral can be tonicized except vii^o and ii^o.

Analyzing various tonicizations

When chords other than V are tonicized, we follow the same steps for analysis that we learned earlier; the only difference is that there are now more possibilities for which chords can be tonicized. Be on the lookout for chromatic notes: these are signals that tonicization may be present!

As you might imagine, the frequency with which a given chord is tonicized is related to the frequency with which that chord generally appears. For instance, the dominant and strong predominant chords are quite common, so we also see those chords tonicized with some frequency. The vi chord, while less common than ii, IV, and V, also frequently gets tonicized. The iii and VII (minor only) chords are uncommon harmonies, and we tend not to see them tonicized frequently.

Tonicizing strong predominants

$$(\downarrow \hat{7}) \qquad (4.14.1)$$

A link to an interactive elements can be found at the bottom of this page.

Example 8. Tonicizing IV in Joseph Bologne, String Quartet no. 4, I, mm. 41–47 (1:18–1:30).

A link to an interactive elements can be found at the bottom of this page.

Example 9. Tonicizing ii in Maria Szymanowska, Minuet no. 4, mm. 57–64 (1:48–1:55).

Tonicized deceptive motion

One striking way to use tonicization is to highlight a deceptive motion (Example 10). Here, the dominant moves to vii^{o7}/vi before the vi chord arrives, which draws our attention even more to the absence of the expected tonic after the V chord.

A link to an interactive elements can be found at the bottom of this page.

Example 10. Tonicized deceptive motion in Josephine Lang, “Mag da draussen Sehnee,” mm. 1–5.

Adding tonicization to diatonic progressions

The steps for part-writing tonicization remain the same as for tonicizations of V. Now, however, we should expect to see tonicizations of non-dominant major and minor triads. Example 11 shows a diatonic progression (a) to which several tonicizations have been added (b).

A link to an interactive elements can be found at the bottom of this page.

Example 11. Adding tonicizations to a diatonic progression.

Secondary dominants as altered diatonic chords

Another way of thinking about secondary chords is to imagine them as altered versions of the diatonic chord with which it shares a root.

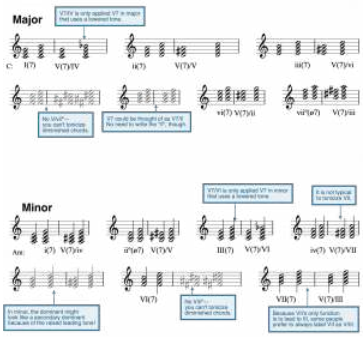
$$(\hat{4} - \uparrow \hat{4}) \tag{4.14.2}$$

Take the chord progression **Dmi^7–G–C** in C major, which we would label with Roman numerals as **ii^7–V–I**. If we change *fa* to *fi* (\hat4 to \uparrow\hat4, F to F♯) in the first chord, we get **D^7–G–C**. In the key of C, we might analyze this progression as **II♯^{7}–V–I**(note the uppercase Roman numeral, indicating the change of quality; the sharp sign afterward further clarifies the raised third of the chord). However, we can also note that D major belongs to G major; it is a dominant-functioning chord (V) in the key of G—the key in which the following chord is tonic. In other words, we are borrowing the dominant chord from the key of G and *applying* it to the G-major triad. Thus, we can re-interpret the progression as **V^7/V–V–I.**

Practice it! Add accidentals in the following chords to turn them into secondary dominants. What Roman numeral would you give the new chord?

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Example 12 summarizes secondary chords as they relate to diatonic chords with the same root.



Example 12. A summary of how diatonic triads may be altered chromatically to generate secondary V^7 chords. Click to enlarge.

Assignments

1. Applied chords worksheet, available in three slightly different versions:

1. Version A (.pdf, .mscx). Asks students to identify and write applied V, V^7, vii^o, vii^{o7}, and $vii^{\varnothing 7}$ chords with Roman numerals and figures.
2. Version B—without ∅7s (.pdf, .mscz). Asks students to identify and write applied V, V^7, vii^o, and vii^{o7} chords with Roman numerals and figures.
3. Version C—jazz/pop focus (.pdf, .mscz). No ∅7s or figured bass; all chords in root position. Students identify and write chord symbols in addition to notation.

2. Tonicization Voice Leading and Score Analysis (.pdf, .docx). Asks students to write from Roman numerals and figured bass, write from a longer figured bass, and analyze a complete piece with discussion questions.

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4.15: Extended Tonicization and Modulation to Closely Related Keys

Key Takeaways

- Modulation (sometimes called a “key change”) involves a longer-term change of tonic.
- There are two basic ways a composer can introduce a new key:
  - A direct, abrupt modulation (Example 1)
  - A pivot chord modulation, which is more subtle (Example 2)
- Sometimes, a composer will blur the lines between a tonicization and a modulation. We refer to such cases as “extended tonicizations.”

Chapter Playlist

We’ve seen that tonicization involves making a non-tonic chord sound like a temporary tonic. In this chapter, we discuss modulation, which, in contrast to the temporary nature of tonicization, involves a longer-term change of tonic. Sometimes people refer to modulation as a “change of key.”

Analyzing Modulations

There are two basic ways a composer can introduce a new key: they can make the key change abrupt (Example 1), or they can be more subtle about it (Example 2). Two pieces of advice are helpful for identifying modulations:

1. Remember that cadences establish keys, so if you can identify cadences before you start your analysis, you’ll know where new keys occur.
2. The presence of the same accidentals over and over again in a passage is an indication of potential modulation. If you start seeing a consistent accidental, see if you can identify a cadence that establishes the new key corresponding to the change in accidentals.

Direct modulations (these are abrupt)

Abrupt modulations are often called “direct modulations” because the composer goes directly to the new key. These are also sometimes called “phrase modulations” because they tend to occur at phrase boundaries. To recognize a direct modulation in analysis, simply label the new key, then continue with your harmonic analysis as in Example 1.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Direct modulation in Joseph Bologne, String Quartet no. 4, I, mm. 15–29 (0:27-0:56).

Pivot chord modulations (these are subtle)

A composer can use a variety of techniques to make a modulation more subtle, but one of the more common ways to do it is through the use of a pivot chord. A pivot chord is a single chord that is diatonic in (i.e., that belongs to) both the home key and the new key. Example 2 shows that we analyze a pivot chord using a special symbol where the upper Roman numeral labels the chord in the old key and the lower Roman numeral labels the chord in the new key. In measure 6 of Example 2, we would say “iv^7 becomes ii^7.” There’s no single method that always works to find a pivot, but one strategy that’s helpful is to analyze in the old key until it stops making sense, then back up a chord and try analyzing that as your pivot. If that chord doesn’t work as a pivot either, try backing up one more chord.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Pivot chord modulation in Josephine Lang, “Der Winter,” mm. 1–12.

Sometimes multiple chords *could* serve as pivots. In such cases, the best chords are ones where the upper and lower Roman numerals are both predominant chords. That’s because V will usually appear shortly after the pivot, and having a predominant in both positions for your pivot chord label suggests that we’re on the way to V in both the old and new keys. Your second best option would be a tonic chord in the old key becoming a predominant in the new key (I becomes IV). Since a tonic chord *can* go directly to V, the analysis here still makes functional sense. Poor pivot chord analyses are usually ones that involve the dominant. An analysis such as “V becomes I,” for example, suggests that the same chord is simultaneously unstable (V) and very stable (I), which isn’t how we’re likely to hear it.

Closely related keys

While a composer may modulate anywhere, some modulations are more common than others because of the number of chords the two keys share. Key signatures within one accidental of one another (e.g., C major and G major) are considered closely related keys, sharing many common chords. To find all of the closely related keys for a given home key, do the following. You may find it useful to reference the circle of fifths (Example 3).

Example 3. The circle of fifths. Click to enlarge.

1. Create a grid with three columns and two rows.
2. Place the home key in the center of the upper row.
3. Add a sharp (or subtract a flat—the equivalent of adding a sharp) to the home key's signature and list that key to the right.
4. Add a flat to (or subtract a sharp from) the home key's signature and list that key to the left.
5. In the lower row, list the relative major or minor keys for each key in the upper row.

If you were to do this with F major as a starting point, you should end up with something like Example 4. Notice that the keys will always correspond to every major or minor triad in the home key's universe of Roman numerals (so, in major: I, ii, iii, IV, V, and vi; in minor: i, III, iv, v, VI, and VII). This is a good way to check your work.

	One step flatwise	Starting key signature	One step sharpwise
starting key	B♭	F	C
relative key	Gmi	Dmi	Ami

Example 4. Identifying closely related keys of F major.

While it's possible to modulate to any key, certain keys are much more common than others:

- In major: I → V and I → vi (e.g., C → G and C → Am)
- In minor: i → III and i → v (e.g., Cm → E♭ and Cm → Gm)

Writing modulations with pivot chords

If you're writing a modulating phrase that uses pivot chords, you'll need to choose a pivot chord, then determine an appropriate progression.

Identifying potential pivots

To identify potential pivot chords between two keys (Example 5):

1. Create a table with two columns.
2. List all triads in the old key on the left.
3. List all triads in the new key on the right.
4. Match triads that appear in both columns.

Remember that the best pivots are ones that are predominants in both keys.

Old key		New key
i – dm		I – FM
ii° – e°		ii – gm
III – FM		iii – am
iv - gm		IV – BbM
v – am		V – CM
VI – BbM		vi – dm
VII – CM		vii° - e°

Example 5. Identifying pivots to modulate from Dm to F.

Choosing a progression

Our ears tend to need time to adjust to hearing a new key. If you want your new key to sound firmly established, it's therefore best not to cadence too quickly after your pivot. A good strategy can be to use deceptive motion to avoid a cadence in the new key, and then to retry and successfully achieve a cadence afterward (Example 6). Notice that Example 6 begins by establishing the home key with a standard tonic expansion progression.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Writing a modulating phrase.

Tonicization versus modulation

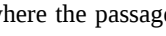
Tonicization and modulation can be viewed as two poles on a spectrum based on the length of the passage in question and the strength with which a new key is established (Example 7). Modulations are longer and stronger than tonicization. What does "stronger" mean here? The clearest modulations are those in which the new key is established with the cadence, and then the passage continues in the new key after the cadence. Weaker modulations might only establish the new key with the cadence, then go right back to the home key. Sometimes people will simply hear a passage differently: some people's ears seem to more willingly accept key changes than others. In your analysis, you should be able to represent your hearing of a given passage and explain why you hear it that way, and you should also be able to understand why someone else might hear it differently.

Tonicization ⟵ (extended tonicization) ⟶ **Modulation**

- Shorter
- Weaker

- Longer
- Stronger

Example 7. Spectrum between tonicization and modulation.

In between clear tonicizations and modulations is a gray area that we call "extended tonicization." These are passages like the one in Example 8 where the passage is longer than two chords (longer than, for instance,  \mathrm{V^6_5/V} to V), but not so long that it leads to a cadence to establish true modulation. In such cases, we temporarily analyze in a new key, and we show it by placing the Roman numeral of the new key underneath a bracket that underlies the entirety of the extended tonicization. Example 8 begins in E♭ major, then tonicizes F minor, so we put Roman numeral ii under the bracket. In the case of Example 8, the extended tonicization also helps us transition from E♭ major to C minor—in other words, the extended tonicization itself serves as a pivot area.

Often, analysts realize an extended tonicization is taking place when one of two things happens:

1. The analyst realizes they have been writing *x*/ii, *y*/ii, *z*/ii over and over again in a short space.
2. The Roman numerals stop making functional sense in the home key, but the upcoming cadence is still in the home key.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Extended tonicization in Joseph Bologne, String Quartet Op. 4, II (0:25-0:39).

Assignments

1. Extended Tonicization and Modulation to Closely Related Keys (.pdf, .docx). Asks students to review tonicization, identify closely related keys and pivot chords, analyze, and create a modulating progression.

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CHAPTER OVERVIEW

Chapter 5: Chromaticism

5.1: Modal Mixture
5.2: Neapolitan 6th (♭II6)
5.3: Augmented Sixth Chords
5.4: Common-Tone Chords (CT°7 and CT+6)
5.5: Harmonic Elision
5.6: Chromatic Modulation
5.7: Reinterpreting Diminished Seventh Chords
5.8: Augmented Options
5.9: Equal Divisions of the Octave
5.10: Chromatic Sequences
5.11: Parallel Chromatic Sequences
5.12: The Omnibus Progression
5.13: Altered and Extended Chords
5.14: Neo-Riemannian Triadic Progressions
5.15: Mediants

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5.1: Modal Mixture

Key Takeaways

- Modal mixture involves borrowing notes from the parallel key.
- Mixture is more common in major keys (borrowing from the parallel minor).
- Mixture changes the quality of a chord, but not its function.
- Mixture can be used in melodies, one or more chords, extended tonicizations, and modulations.
- Chords with lowered roots use a flat sign in front of the Roman numeral (e.g., ♭VI).

Chapter Playlist

$$(\hat{3}/\downarrow\hat{3}) \tag{5.1.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 1. Comparison of parallel major and minor scales and their solfège.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Comparison of parallel major and minor scales and their scale degrees.

Melody and Harmony

While these changes may only be reflected in a single melodic line to add color to a specific moment, quite often they have a pronounced harmonic effect. By borrowing notes from the parallel scale, the chord qualities change, as shown in Examples 3 and 4:

A link to an interactive elements can be found at the bottom of this page.

Example 3. Comparison of parallel major and minor chord qualities.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Comparison of parallel major and minor Roman numerals.

Common Progressions

Chords with *le* $\downarrow\hat{6}$ only: ii^{o6}, ii$^{\varnothing 7}$, and iv

$$(\downarrow\hat{6}) \tag{5.1.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 5. Common predominant mixture chords: ii^{o6}, ii$^{\varnothing 7}$, and iv.

Altering Chord Roots

$$(\downarrow\hat{3}) \tag{5.1.3}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. Modal mixture possibilities involving altered roots.

Try it!

Construct the chord according to the given Roman numeral. Pay careful attention to chord quality.

A link to an interactive elements can be found at the bottom of this page.

Tonic and Dominant

Using modal mixture with tonic and dominant chords is also possible (see Example 7). Changing from I to i is a common technique, but V to v is not as common. When v occurs in a major key, it is more likely to indicate an extended tonicization or modulatory passage instead of a single instance of modal mixture.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Modal mixture with tonic and dominant.

Using Modal Mixture

$$(\downarrow \hat{6}) \tag{5.1.4}$$

A link to an interactive elements can be found at the bottom of this page.

Example 8. Comparison of a diatonic progression and the same progression with modal mixture in the predominant area.

Picardy Third

The one common use of modal mixture in minor keys is called a picardy third, in which a minor-key piece or movement ends with a major tonic chord (Example 9). The origin of the name "picardy" is unknown; the technique was quite common in the 16th and 17th centuries but faded in popularity in the 18th and 19th centuries.

A link to an interactive elements can be found at the bottom of this page.

Example 9. Harmonic progression ending with a picardy third.

Large-Scale Modal Mixture

$$(\downarrow \hat{6}) \tag{5.1.5}$$

A link to an interactive elements can be found at the bottom of this page.

Example 10. A progression that uses modal mixture to modulate to a distantly related key.

Musical Examples

Example 11 shows a simple harmonic progression that borrows $\downarrow\hat{6}$ from the parallel minor key, which produces modal mixture. Notice the change in quality from ii^{4}_{3} to $\mathrm{ii}^{\text{ø}}{}^{4}_{3}$.

A link to an interactive elements can be found at the bottom of this page.

Example 11. Camille Saint-Saëns, *Samson et Dalila*, Act II, "Mon cœur s'ouvre à ta voix" (excerpt begins at 1:36). Note that the B♭ is borrowed from the parallel minor key, creating modal mixture.

Example 12 is a more extensive usage of modal mixture. Modal mixture is introduced at the third system and continues until the conclusion of the phrase at the bottom of the page. This results in a modulation from E major to its parallel minor, E minor. Notice in particular the dramatic effect of starting a phrase in a major key and ending in a minor key with the same tonic.

A link to an interactive elements can be found at the bottom of this page.

Example 12. Alfredo Catalani, *La Wally*, Act I, "Ebben? Ne andrò lontana" (excerpt starts at 0:50). Larger-scale modal mixture starting in measure 14.

Assignments

1. Modal Mixture Assignment (.pdf, .docx). Includes spelling, figured bass realization, 4-part voice-leading with Roman numerals, and analysis of musical excerpt. Access audio.

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5.2: Neapolitan 6th (♭II6)

Key Takeaways

- The major triad built on *ra* ($\downarrow\hat{2}$) is a chromatic predominant chord called a Neapolitan sixth (♭II6).
- ♭II is typically found in first inversion (♭II^6).
- In voice leading, *ra* resolves down to *ti* ($\downarrow\hat{2}$-$\hat{7}$).

Chapter Playlist

$$(\downarrow \hat{2}) \tag{5.2.1}$$

Context

$$(\downarrow \hat{2}) \tag{5.2.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 1. To change from ii^{o6} to ♭II^6, lower $\mathit{\hat{2}}$ (re to ra).

Try it!

Construct the chord according to the given Roman numeral.

A link to an interactive elements can be found at the bottom of this page.

Voice Leading

$$(\hat{2}) \tag{5.2.3}$$

A link to an interactive elements can be found at the bottom of this page.

Example 2. Standard voice-leading paradigms when ♭II^6 resolves to V.

Try it!

Practice resolving the given Neapolitan sixth chord to the indicated Roman numeral.

A link to an interactive elements can be found at the bottom of this page.

Example 3 shows a relatively straightforward example of a ♭II^6 chord occuring in the context of a cadential progression. Note that the harmonic rhythm is a half note long, so think of beats 3 and 4 in measure 6 as part of a single harmony.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Frederic Chopin, Nocturne in F minor, Op. 55, no. 1. Neapolitan sixth as part of a cadential progression.

Associated Progressions

Common progressions

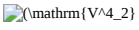
- ♭II^6–V
- ♭II^6–vii^{o7}/V–V

While ♭II^6 often goes directly to V (with or without a $\mathrm{cad.^6_4}$), the applied chord vii^{o7} commonly occurs between ♭II^6 and V, creating the progression ♭ II^6–vii^{o7}/V–V (Example 4). The added diminished chord intensifies the push toward the expected dominant.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Using vii^{o7} between ♭II^6 and V.

Less Common Uses

As mentioned above, the Neapolitan mostly appears in a small number of stock harmonic progressions. Less often, however, the Neapolitan can be found in root position ♭II, and it may lead to an inverted dominant instead of the root-position version  in particular).

While the Neapolitan is most often used as a single chord within a cadential progression, it—like any other chord—can be prolonged through an extended tonicization or even used as a key area, as in Example 5. ♭II is introduced first as a temporary tonic and elaborated with a pedal point, then the phrase ends with a typical cadential progression with the Neapolitan sixth: $\flat II^6$–vii^{o7}/V–V^7–i.

A link to an interactive elements can be found at the bottom of this page.

Example 5. “Erlkönig” by Franz Schubert (1815; excerpt begins at 3:23) tonicizes the Neapolitan chord and then uses it as part of a cadential progression.

Assignments

1. Neapolitan Sixths (.pdf, .docx). Asks students to spell $\flat II^6$, realize figured bass, write 4-part voice-leading with Roman numerals, and analyze a musical excerpt.

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5.3: Augmented Sixth Chords

Key Takeaways

- Augmented sixth chords are a group of chromatic predominant chords containing the interval of an augmented sixth between *le* and *fi*(\downarrow\hat6-\uparrow\hat4).
- There are Italian (It^{+6}), French (Fr^{+6}), and German (Ger^{+6}) augmented sixth chords.
- Augmented sixth chords have no root, and they resolve to a root-position dominant chord.

Chapter Playlist

Brief Overview

$$(\downarrow \hat{6} – \uparrow \hat{4}) \tag{5.3.1}$$

[table id=35 /]

A link to an interactive elements can be found at the bottom of this page.

Example 1. Overview of the different augmented sixth chords.

Context

$$(\downarrow \hat{6} – \uparrow \hat{4}) \tag{5.3.2}$$

$$(\hat{5}) \tag{5.3.3}$$

A link to an interactive elements can be found at the bottom of this page.

Example 2. Standard voice leading of the augmented sixth interval.

$$(\downarrow \hat{6}) \tag{5.3.4}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. All three types of augmented sixth chords in a cadential context.

Try it!

Construct the chord according to the given chord symbol.

A link to an interactive elements can be found at the bottom of this page.

Connection to the lament-bass progression

$$(\hat{4} \tag{5.3.5}$$

A link to an interactive elements can be found at the bottom of this page.

Example 4. Examples of replacing iv^6 with an augmented sixth chord in lament-bass progressions.

Recognizing augmented sixth chords when analyzing

$$(\downarrow \hat{6} – \hat{5}) \tag{5.3.6}$$

Ger^{+6} in major keys: *me* vs. *ri* (\downarrow\hat3 vs. \uparrow\hat2)

$$(\downarrow \hat{3}) \tag{5.3.7}$$

A link to an interactive elements can be found at the bottom of this page.

Example 5. Alternative spelling of the Ger^{+6} chord in major keys.

The German Diminished Third Chord

$$(\uparrow \hat{4}) \tag{5.3.8}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. Using the \mathit{Ger^{o3}}.

Try it!

Resolve the augmented sixth chord to the given Roman numeral.

A link to an interactive elements can be found at the bottom of this page.

Musical Example

$$(\hat{6}- \downarrow \hat{6}-\hat{5}) \tag{5.3.9}$$

Example 7. Ernesto Nazareth, Remando (excerpt starts at 1:48). German augmented sixth chord as part of a cadential progression.

Assignments

1. Augmented Sixth Chords (.pdf, .docx.) Asks students to spell augmented sixth chords, realize figured bass, write 4-part voice-leading with Roman numerals, and analyze a musical excerpt. Audio 1 – Frederic Chopin, Audio 2 – Scott Joplin (excerpt starts at 0:56).

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5.4: Common-Tone Chords (CT^{o7} and CT+6)

Key Takeaways

- The common-tone diminished seventh chord (CT^{o7}) and common-tone augmented sixth chord (CT^{+6}) have the same pitches as vii^{o7} and Ger^{+6} but a different function: to embellish the upcoming chord (a major triad or dominant seventh chord, typically I or V).
- Common-tone chords are so named because they contain the root of (i.e., have a common tone with) the chord being embellished.
- In a four-voice texture, the fifth of the embellished chord is often doubled.

Chapter Playlist

The common-tone diminished seventh chord (CT^{o7}) and common-tone augmented sixth chord (CT^{+6}) represent a completely different usage of two chords with which you are already familiar: vii^{o7} and Ger^{+6}. Whereas these chords typically function in a more progressive harmonic context, when employed as common-tone chords, they serve a purely embellishing function and are the result of the culmination of multiple simultaneous neighbor tones. Common-tone chords share a common tone with the chord being embellished, whereas vii^{o7} and Ger^{+6} do not.[1] You can expect that the embellished chord will either be a major triad or sometimes a dominant seventh chord, and the Roman numeral will be either I or V. Minor triads can be embellished in this way too, but this is far less common, so this chapter will focus on major triads and dominant seventh chords only.[2]

Deriving a CT^{o7} chord from multiple neighbor tones

Example 1 shows how a CT^{o7} chord is produced through the layering of simultaneous neighbor tones. In the first system, each three-measure unit applies a single neighbor tone to the tonic chord. The second system uses two neighbor tones at a time—here, each three-measure unit is still a single tonic chord throughout, just with two neighbors instead of one. The final system shows all three neighbors combined into a single chord: a CT^{o7} chord. Notice that the chord in the middle has a fully diminished quality, but if you try to wrangle it into being some type of vii^{o7} chord, you'll come up with $\mathrm{vii}^{\circ}\begin{smallmatrix}4\\2\end{smallmatrix}/\mathrm{iii}$. The problem is, there is no iii chord to be found, so that analysis wouldn't represent this music accurately.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Multiple neighbor tones can come together to form a CT^{o7} chord.

Creating a CT^{o7} chord

Creating a CT^{o7} chord is a little different from spelling a traditional chord because it doesn't have a root (similar to augmented sixth chords). To build one, focus on the neighboring aspect of the chord. Look again at the final system of Example 1 and notice how the notes of the CT^{o7} chord relate to the tonic chord. The root of the tonic chord is also in the CT^{o7} chord—that's the common tone. The fifth of the resolving chord is doubled because it is embellished by both upper and lower neighbor tones (G–A–G and G–F♯–G). Finally, the third of the tonic chord is embellished by its lower neighbor a half step below (E–D♯–E). Finally, look at how the third of the chord is embellished by its lower neighbor (E–D♯–E).

You can create a CT^{o7} chord by going through the following procedure:

1. Find the root of the chord you want to embellish (this will be the common tone).
2. Find the upper and lower neighbors to the fifth of the embellished chord.
   - The upper neighbor will involve a whole step (major second).
   - The lower neighbor will involve a half step (minor second).
3. Find the lower neighbor (minor second in particular) of the third of the embellished chord.

Try it!

Construct the requested common-tone chord.

A link to an interactive elements can be found at the bottom of this page.

Recognizing CT^{o7} when analyzing

Finding this chord in context involves being aware of all fully diminished seventh chords. For each fully diminished seventh chord you find, determine if it has a common tone with the chord it resolves to. If it doesn't, then it should be some form of vii^{o7} or an applied vii^{o7} chord. If it does have a common tone, then it is a CT^{o7} chord. Remember, though, that if the fully diminished seventh chord is followed by a \mathrm{cad.^6_4}, you need to look past the \mathrm{cad.^6_4} embellishment to its resolution to determine if there is a common tone (see Example 2).

A link to an interactive elements can be found at the bottom of this page.

Example 2. The \mathit{cad.^6_4} can produce a common-tone that does not relate to CT^{o7} chords.

Resolving CT^{o7} to V^7

$$\hat{2}) \tag{5.4.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Comparison of a complete neighbor CT^{o7} that resolves to V and to V^7.

Try it!

Construct the requested common-tone chord.

A link to an interactive elements can be found at the bottom of this page.

CT^{o7} with incomplete neighbors

The CT^{o7} is often preceded and followed by the same chord, producing complete neighbor tones in the pattern x–CT^{o7}–x. However, the CT^{o7} chord may be preceded by a different chord instead (y–CT^{o7}–x), and in such cases, one or more of the neighbor tones will be incomplete.

Example 4 demonstrates this situation. Notice that the first CT^{o7} is surrounded by different chords: first I, then \mathrm{V^4_3}. The arrow shows which chord the CT^{o7} is embellishing. Just like in complete-neighbor CT^{o7} contexts, the embellished chord is the one to focus on, not the preceding chord. This progression is an elaboration of the \mathrm{I\text{-}V^4_3\text{-}I^6} progression that you've encountered with tonic prolongation but with CT^{o7} chords filling in the space between each chord providing a much more colorful version of what was a rather simple progression. When listening to Example 4, try to hear the underlying \mathrm{I\text{-}V^4_3\text{-}I^6} progression as its underlying model.

A link to an interactive elements can be found at the bottom of this page.

Example 4. A tonic expansion pattern elaborated by two different CT^{o7} chords comprising incomplete neighbors.

Creating a CT^{+6} chord

The other category of common-tone chords you'll encounter (especially in music of the later 19th century) is a German augmented sixth chord (Ger^{+6}) that functions, like the CT^{o7}, as an embellishing chord. The effect is similar to the CT^{o7}, but a little darker, because all three neighbor tones are chromatic in this version instead of just two: a CT^{+6} chord uses a minor second neighbor above the fifth of the chord instead of a major second.

1. Find the root of the chord you want to embellish (this will be the common tone). Tonic is the most common harmony to embellish with a CT^{+6} chord.
2. Find the upper and lower neighbors to the fifth of the embellished chord. Both will be a half step.
3. Find the lower neighbor (minor second in particular) of the third of the embellished chord.

$$(\downarrow \hat{6} - \hat{1} - \downarrow \hat{3} / \uparrow \hat{2} - \uparrow \hat{4}) \tag{5.4.2}$$

Example 5 below shows both chords (CT^{o7} and CT^{+6}) for comparison. Note that the common tone is not always the bass note and that the augmented sixth interval may be inverted to become a diminished third instead, but the chord is typically labeled CT^{+6} in both contexts.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Comparison between a CT^{o7} and CT^{+6} chord, both as complete neighbors.

Try it!

Construct the requested common-tone chord.

A link to an interactive elements can be found at the bottom of this page.

Musical Examples

The introduction to Scott Joplin's "The Sycamore" shows how a CT^{o7} can be sandwiched between a $\mathrm{cad.^6_4}$ and its resolution to V^7 (Example 6). It appears as though the bass is moving from D to F♯ and back to D, but the F♯ is not related to the functional bass of the passage.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Scott Joplin, "The Sycamore," mm. 1–4. A CT^{o7} is introduced between the start of the $\mathit{cad.^6_4}$ and its resolution to V^7

In Example 7, Frederic Chopin uses a CT^{+6} in m. 8 at the conclusion of a parallel period that is occuring over a tonic pedal. This instance is a common-tone chord that is an incomplete neighbor, because the chord before it in measure 7 is V7 above the tonic pedal. Notice also that Chopin spelled the chord with a C♭ instead of a B♮. Spelling variants do happen with common-tone chords, but the B♮ spelling in this case would have clarified the neighboring function of that note with surrounding Cs in that voice.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Frederic Chopin, Etude in F minor, Op. 10, no. 9, mm. 1–9. A CT^{+6} occurs in the context of a tonic pedal in m. 8.

Assignments

1. Common-Tone Chords (.pdf, .docx.) Asks students to spell common tone chords, realize figured bass, complete 4-part voice leading with Roman numerals, and analyze a musical excerpt. Access audio (excerpt begins at 0:25).

---

1. Ger+6 does have a common tone with [latex]\mathrm{cad.^6_4}[/latex], but not with the dominant chord that follows it, which is the actual destination chord. 5.04: Common-Tone Chords (CT7 and CT6)#return-footnote-497-1
2. The neighbor effect is somewhat less striking when embellishing a minor triad, since the third of the minor triad creates a second common tone with the embellishing chord. 5.04: Common-Tone Chords (CT7 and CT6)#return-footnote-497-2

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5.5: Harmonic Elision

Key Takeaways

- Harmonic elision is the *suppression* of an expected chord (distinct from chord substitution).
- Leading-tone elision:
  - The expected triad is replaced by the dominant seventh chord with the same root or by a functionally equivalent diminished seventh chord.
  - The leading tone (or applied leading tone) is altered to become *te* $\downarrow\hat{7}$ instead of resolving up by minor second.
  - The same bass note is maintained unless the bass had the leading tone (or applied leading tone).
- Raised-root elision:
  - The root of the expected chord is raised to become a leading tone (or applied leading tone).
  - The new chord can typically be V, V^7, or vii^{o7}.
  - The bass should be as close to the expected bass note as possible.

Chapter Playlist

Harmonic elision occurs when a harmonic progression seems to suppress or remove an expected chord for one that is similar but functionally distinct from the chord it replaced. It often feels like the combination of two simultaneous harmonic events. This is different from chord substitution, where the replacement of an expected chord just seems like a single unexpected event. However, some use the term “chord substitution” in a broader sense that would also include harmonic elision as described here. This chapter covers two types of elision: leading-tone elision and raised-root elision.

Context

Leading-tone elision with a dominant seventh chord

A leading-tone elision occurs when a chord has a leading tone (or an applied leading tone) that doesn’t resolve as expected (up by minor second) and instead becomes the lowered version of itself (e.g., B becomes B♭ or C♯ becomes C♮). This can happen when a dominant-functioning chord resolves not to the expected triad but to a dominant seventh with the same root as the expected triad, as in Example 1. Note that the suppressed chord can be clearly identified given what we expect to happen in this harmonic context.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A harmonic elision where the expected chord is suppressed and replaced with a dominant seventh with the same root.

Leading-tone elision with a fully diminished seventh chord

Leading-tone elision can also occur when an expected triad is replaced by a fully diminished seventh chord that is functionally equivalent to the dominant seventh chord that could have replaced it (if there is one) and has the same bass note. Example 2 shows each inversion of a V^7 chord and the functionally equivalent vii^{o7} chord that can be used instead.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Functionally equivalent V^7 and vii^{o7} chords.

Example 3 contains an example of this type of leading-tone elision. Notice that Examples 1 and 3 are nearly identical except that Example 3 is using the functionally equivalent fully diminished seventh chord instead (vii^{o7} instead of $\mathrm{V^6_5}$).

A link to an interactive elements can be found at the bottom of this page.

Example 3. A harmonic elision where the expected chord is suppressed and replaced with a fully diminished seventh chord that has an equivalent function to the dominant seventh in Example 1.

Voice leading with leading-tone elision

When dealing with elision, the voice leading doesn’t change much; the only difference is that the leading tone becomes the lowered version of itself instead of resolving up by minor second to the root of the next chord as it normally would. See the voice-leading comparison in Example 4.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Voice-leading comparison between a regular resolution and an elided one.

When the leading tone is in the bass

It is important to remember that if the leading tone before a leading-tone elision is in the bass, this means the bass will change, putting the upcoming chord in a different inversion. This is expected to happen with V6, V65, and viio7 (and any applied chords with the same Roman numerals) because they all have the leading tone in the bass. Common progressions for this occurrence are $\mathrm{V^6_5\text{-}V^4_2/IV}$ and $\mathrm{V^6_5/V\text{-}V^4_2}$, as in Example 5 below. In other situations, the bass note will stay the same.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Change of expected bass when the leading tone is in the bass and a leading-tone elision occurs.

Raised-Root Elision

Raised-root elision occurs when the root of the expected chord arrives in its raised version (e.g., B♭ becomes B♮ or C becomes C♯) to become the leading tone in an applied chord. For example, a raised-root elision would occur if an expected chord with C as the root was suppressed and a chord with C♯ as a leading tone appeared instead. This could be any of the chords that use C♯ as a leading tone: A, A^7, $C♯^o$, $C♯^{o7}$ and $C♯^{∅7}$ (though the half-diminished option is not very common). The overall harmonic result is that the progression is pushed higher up the scale. In Example 6, the expected progression (based upon norms in this style) would be $\mathrm{I^6\text{-}V^4_3\text{-}I}$. Instead, the final I chord is elided with a raised-root elision, because $\mathrm{V^6_5/ii}$ ($A^7/C♯$) takes its place. That chord then resolves to ii, so while the expected progression was heading toward I, the end result of the raised-root elision is that the progression resolves to ii, one step higher in the scale.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Raised-root elision.

The $\mathrm{cad.^6_4}$ version

Progressions with $\mathrm{cad.^6_4}$ can contain raised-root elision that is a little different because the expected root does appear with the arrival of the $\mathrm{cad.^6_4}$ but transforms into its raised version when the $^6_4$ resolves to the $\begin{smallmatrix}(7)\\5\\3\end{smallmatrix}$. Example 7 illustrates this situation.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Raised root elision involving $\mathit{cad.^6_4}$.

Finding Harmonic Elision

Harmonic elision is fairly easy to spot in Roman numeral analysis because you will notice incongruities in the sequence of symbols. For example, if you see the Roman numeral $\mathrm{V^6_5}$, you would expect I to follow, but with a leading-tone elision, you could see $\mathrm{V^6_5}$ followed directly by $\mathrm{V^4_2/IV}$, which should alert you to the fact that something unexpected has occurred. After looking at the progression, you can conclude that harmonic elision has taken place—you analyzed the chord correctly, but the chord you expected has been elided. The same is true for raised-root elision: if you saw $\mathrm{V^6_5/V}$ followed directly by $\mathrm{V^6_5/vi}$instead of the expected V, you could investigate further and conclude that the V chord has been elided, with its root raised to become the leading tone of vi.

Notation: When an elision occurs, it's good practice to write the expected Roman numeral in your analysis but then cross it out and place the symbol for the chord that actually occurred. Example 8 below shows an example of this style of notation.

Musical Example

The first phrase of Richard Strauss's song "Zueignung" (Example 8) includes three harmonic elisions. The first occurs on beat 4 of measure 6. It is expected that the G major chord on beat 3 will be followed by a C major chord, but the C major chord has been suppressed, and in its place, a chord with a C♯ is used instead. This is a raised-root elision because the expected root was C and a chord with C♯ occurred instead, with the C♯ functioning as an applied leading tone.

The second harmonic elision occurs in m. 8, where a quasi $\mathrm{cad.^6_4}$ (without the expected 4–3 part of the chord, but otherwise quite similar) never resolves to its $^5_3$ version. Instead, the expected root, G, is suppressed and a G♯ appears in its place (as an applied leading tone to vi), making this another instance of a raised-root elision.

Measure 9 repeats the quasi $\mathrm{cad.^6_4}$ chord again. This time, it resolves to a chord with C as the root, but it still isn't the root-position tonic triad we expect. Instead, we find a leading-tone elision: the dominant's leading tone resolves down, making the C chord a dominant seventh (V^7/IV).

A link to an interactive elements can be found at the bottom of this page.

Example 8. Richard Strauss, "Zueignung", Op. 10, no. 1, mm. 1–10 – Multiple harmonic elisions in a single phrase.

Assignments

1. Harmonic Elision (.pdf, .docx.) Asks students to spell chords, realize figured bass, write 4-part voice leading with Roman numerals, and analyze a musical excerpt.

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5.7: Reinterpreting Diminished Seventh Chords

Chromatic Modulation Using Enharmonically Reinterpreted Diminished-Seventh Chords

Diminished-seventh chords can also be respelled for the purposes of modulating to distant keys. Each diminished-seventh chord can be respelled such that any of the its four notes is the root, and thus, can be resolved to any of four different target chords.

Assignments

1. Coming soon!

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5.8: Augmented Options

Key Takeaways

The augmented triad is:

- much rarer than the other three triad types (major, minor, and diminished).

- interesting for several reasons including
    - that rarity itself, and
    - the symmetrical construction, which creates potential flexibility and ambiguity (just like with the diminished seventh chord)
  - most often seen in one of two forms:
    - as III+ in harmonic minor (this being the only form in the major/minor system without chromatic alteration), and
    - as a chromatic passing chord between V and I in a major key: V, V+, I.

Aren't we forgetting something here? We're now well into chromatic harmony, yet we've hardly mentioned one of the four types of ostensibly diatonic triads: we're up to speed with augmented sixth chords, but not the augmented triad. So what is this augmented triad all about? How do composers use it? How have we neglected it so long (and why do so many textbooks brush over it altogether)?

Recall that we have four types of triads that can be constructed with major and minor thirds alone:

- Diminished triad (minor third + minor third)
- Minor triad (minor third + major third)
- Major triad (major third + minor third)
- Augmented triad (major third + major third)

So the augmented triad is part of this set of possibilities, but apparently not an equal member, at least not in the eyes of common practice composers. Clearly major and minor triads are mission critical to tonal music, and so is the diminished triad, especially in its dominant function role (as vii^{o} and as a part of V^{7}). The augmented triad is a slightly peripheral character in relation to those protagonists.

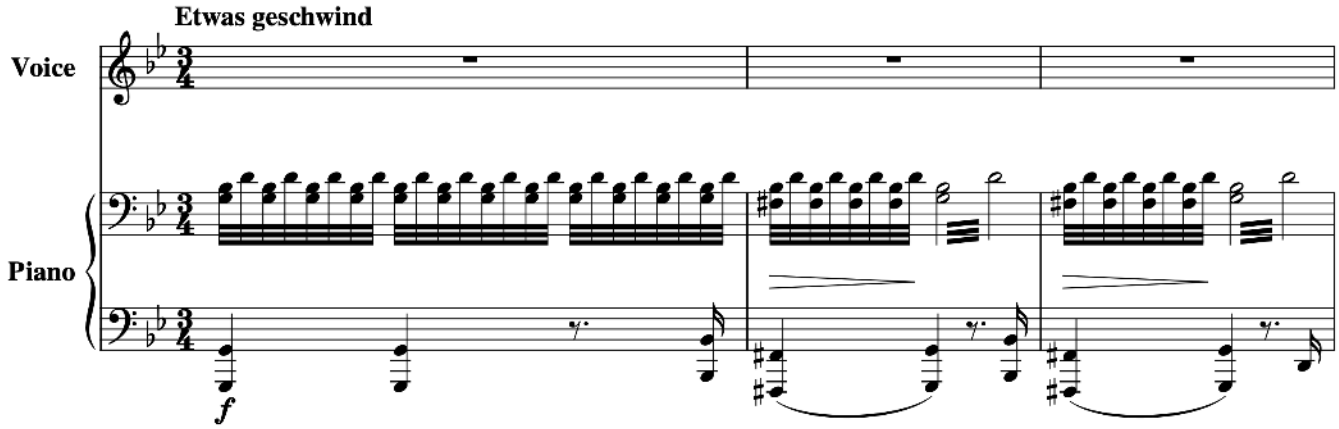
Always Chromatic?

Part of that rarity has to do with the structure of the major/minor system itself: III+ in harmonic minor is the only time the augmented triad appears in the major/minor system without chromatic alteration. This III+ triad is closely related to both the dominant (V) and minor tonic (i): in both cases, two scale degrees are held common and only one semitone distinguishes the chord tone which changes:

- III+ and V: \hat5 and \hat7 in common, semitone between \hat2 and \hat3;
- III+ and i: \hat3 and \hat5 in common, semitone between \hat1 and \hat7.

Overall, I'd say that the sound and usage of III+ typically suggests a dominant function. See what you think of the following example from the opening of Schubert's "Der Atlas" (Example 1) in which:

- B♭ and D remain constant throughout (\hat3 and \hat5).
- G moves to F♯ and back (\hat1 and \hat7).
- This arguably gives the impression of a tonic-dominant alternation, but with very slight changes.



Example 1. Extract from the start of Schubert's "Der Atlas" (from *Schwanengesang*, D.957), showing the augmented triad III+ (possibly, depending on your analytical viewpoint) and certainly how closely related this chord is to both V and i.

Here is the entire song:

A link to an interactive elements can be found at the bottom of this page.

Schwanengesang, D.957 by OpenScore Lieder

The small steps between these chords relate to a key part of the "parsimonious voice leading" that's so important to the "Neo-Riemannian" approach to harmony, which seeks to account for the extended tonal relations that become more common in the late 19th century. For more on that, see Neo-Riemannian Triadic Progressions. For now, let's continue to look at some examples of the augmented triad in practice.

Rarely focal

The relatively peripheral role and the rarity of augmented triads may be thought to diminish its importance, though as the price of gold, diamond, and other rare commodities attest, that very rarity can be valuable. For Schoenberg, this makes the augmented triad "better protected against banality" than the diminished triad and seventh (1911, trans. ed. 1983, p. 239).

The idea of rarity also needs unpacking: when we speak of "rarity" in harmony, we usually mean that it is unusual to see that chord in a focal role. This speaks to Richard Cohn's observation that "when an augmented triad appears in music before 1830, its behavior is normally well regulated and unobtrusive, tucked into the middle of a phrase rather than exposed at its boundaries, passed through quickly and lacking metric accent" (2012, p. 43).

This may be true in the general case, though that's not to say there aren't glorious counterexamples. Example 2 sets out such an example from the "mente cordis" section that concludes the "Fecit Potentiam" of Bach's Magnificat (1723, 1733). This is a remarkable moment: not only is there an augmented triad at all, but it is introduced by nearly full forces, spanning the full register, and after a dramatic general pause which itself is preceded by a diminished seventh. You couldn't hope to find a clearer, more dramatically foregrounded augmented triad in any repertoire.

Example 2. A prominent augmented chord in the "Fecit Potentiam" of Bach's Magnificat with a possible harmonic reading of this passage that sees the augmented triad setting up a deceptive cadence in the middle of a passage in V minor enclosed by two secondary dominants, vii^{o7}/v.

Chromatic passing chord

Although there is only one diatonic form of the augmented triad (III+ in minor), there are clearly many more possibilities when we expand the remit to include chromatic alterations. Here too, however, some are more common than others. A particularly favored use sees the augmented chord as part of a chromatic passing motion from V to I in major, with the whole-tone step from $\hat{2}$ to $\hat{3}$ "filled in" with a chromatic semitone motion that gives a fleeing . This can appear in several ways:

- As a straightforward V–V+–I
- With another harmony on the initial $\hat{2}$: e.g., ii–V+–I
- With or without sevenths: e.g., ii^7–V+^{7}–I

Example 3, from Fanny Mendelssohn Hensel's *Gondellied* (6 Lieder, Op. 1, no. 6), sets this out. Measures 19–20 can be seen as a V^6/V–V+–I cadence in A (or, with sevenths, V$_{\mathrm{6_5}}$/V–V+^{7}–I) where:

- the augmented chord appears in a dominant function;
- the crucial note of that augmented chord (B♯) is the raised supertonic, arising through chromatic motion from $\hat{2}$ to $\hat{3}$ (both in the voice part and doubled in the piano).

Example 3. Extract from Fanny Mendelssohn Hensel's *Gondellied* (6 Lieder, Op. 1, no. 6)

Here is the entire song:

A link to an interactive elements can be found at the bottom of this page.

Hensel, Fanny (Mendelssohn) – 6 Lieder, Op.1, No.6 – Gondellied by OpenScore LiederCorpus

The Augmented Triad as Figure or Ground in Liszt's *R. W. Venezia*

Score on IMSLP

So far, we have seen examples of the augmented triad in diatonic form (III+), and as a chromatic alteration but with a clearly defined function (V+). Let's now venture further into the chromatic territory and to pieces which use the augmented triad in a prominent, focal way. Liszt's late music includes some fascinating miniatures, many of which heavily emphasize the augmented triad.[1] *R.W. Venezia* is one such work, highlighting the augmented chord in general, and C♯ augmented [C♯, F, A] in particular. This chord receives such a weighting that it stakes a remarkable claim to a kind of overall primacy or tonicity that at least challenges and perhaps even vanquishes the corresponding claim from a tonal center (B♭).

Cohn (2012, 47), after Harrison (1994, 75ff.), discusses a similar emphasis of the diminished chord in Schubert's "Die Stadt," rightly observing that "rhetorical garments normally reserved for consonances" are used in this repertoire to afford dissonant chords a kind of surrogate tonic status (see also Morgan 1976). Those rhetorical strategies are well summarized by the pithy notion of "first, last, loudest, longest."

R.W. Venezia begins with a C♯ augmented chord outlining, resolving by parsimonious voice leading to B♭ minor as the start of a rising chromatic sequence which ultimately turns into a long succession of rising (initially parallel augmented) triads that climax in a blazing, *forte* B♭ major. That forte section then moves through more parsimonious voice leading cycles before returning to C♯ augmented, now *fortissimo*. Finally, this C♯ augmented chord initiates a descent which deftly combines the pitches of B♭ minor and C♯ augmented [B♭, C♯, F, A], leading to an ambiguous close on a unison C♯. That final C♯ is repeated, carrying with it the ambiguity right up to the last note. If the second, final C♯ were a B♭, then the piece would come down more firmly in favor of B♭ minor. As it is, Liszt maintains the delicate balance and leaves us wondering which is the figure and which the ground.

In short, C♯ comes "first" and "last," while B-flat probably wins in the "loudest" stakes, leaving "longest" as the primary vehicle of ambiguity. The augmented chord is used considerably more than the average for the time, even for Liszt (a considerably above-average user), though still not to the same extent as major or minor triads. Then again, the C♯ augmented triad specifically is used to approximately the same extent as B♭ major and minor combined, raising the case for it as "tonic." Whether that is enough is open to debate; ultimately, I hear them in an amazingly effective balance where neither quite shines through.

Anthology Examples

This chapter has surveyed some claims about how relatively common or otherwise specific particular progressions are. But so far, we've just looked at examples. To make sense of this kind of claim, we ought to consider the overall case. We don't have space here to go into that in detail, but this final section provides some direction toward extensive lists of further examples for you to explore.

First, here is an initial list of approximately 200 examples gathered from the literature. The list could be thought of as an augmented triad “canon”—those instances notable enough to have been mentioned in either the theoretical or historical literature. These repertoire occurrences are varied in function and tone. Many are indeed “merely” incidental appoggiaturas and decorations, while others are fundamental, referential sonorities; some are isolated cases, others are a core part of wider, recurring harmonic processes; some have an ambiguous role, others have a clear musical and even extra-musical meaning including topical associations which generally center on death, ambivalence, or mystery.[2]

Second, head to the Harmony Anthology chapter for a list of moments in the OpenScore Lieder collection that analysts have viewed in terms of augmented chords. The list is sortable by composer, collection, song, measure, Roman numeral (figure) and key. Each entry includes a link to the score.

Assignments

1. Head to the section on augmented chords in the Harmony Anthology chapter and pick one (or more) of the repertoire examples listed in which an analyst has identified the use of an augmented chord.
   - For that passage, make a Roman numeral analysis of the measure in question and one or two on either side (enough to establish a chord progression and some context).
   - Create one such harmonic analysis including the augmented triad provided (figure and key are given in the table).
   - If you disagree with that reading (as you may well do), then provide an alternative harmonic analysis without it.
2. Do step 1 for several cases and identify any that seem similar to each other, and to the above. For instance, for the cases given as V+ in the anthology, are many of them similar to the chromatic passing motion in the Hensel above? Can you find any dramatic examples like the Bach? Do you see any other recurring practices not described in this chapter?

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1. See Cohn 2000; Forte 1987; Gut 1975; Hantz 1982; McKinney 1993; Satyendra 1992, 1997; Todd 1981, 1996. 5.08: Augmented Options#return-footnote-513-1
2. See Moomaw, "The Expressive Use of the Augmented Fifth" (1985, p. 354 ff.) for numerous apparent extra-musical uses, perhaps most remarkably his very final example, no. 213e, for the depiction of cannon shots in Mondonville’s *Daphnis et Alcimadure* (1754). 5.08: Augmented Options#return-footnote-513-2

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5.9: Equal Divisions of the Octave

In the 19th century (and even as early as the late 18th century), composers became more interested in creating ambiguity in their music; avoiding chord progressions that explicitly confirmed a tonal center allowed them to thwart listeners' expectations. One way of achieving this ambiguity was to use chord progressions in which the roots of the chords divide the octave equally. In a purely diatonic system, chord progressions tend to divide the octave unequally–think about the tritone leap in a descending-fifths sequence, or the half steps in an ascending-step sequence, for instance. In a tonal system, the asymmetry of major and minor scales serves to pull chords and scale degrees towards a tonic. Conversely, root progressions that divide the octave equally quickly bring the music outside of the diatonic scale. For example, consider a root progression by major thirds: C–E–G♯/A♭–C. While the chords built upon C and E could certainly be harmonized by chords within the C-major scale, the chord with a root of G♯/A♭ cannot. Further, the root progression from G♯/A♭ to C subverts the harmonic functions that define the tonal system: this chord progression does not contain any sort of dominant to tonic motion at all. The earliest examples of this are found as short passages in larger works that otherwise abide by the norms of common-practice tonality. Nevertheless, these examples are remarkable in that they foreshadow an unhinging of the tonal system, making way for compositional practices in the 20th century and beyond to new systems of pitch organization.

Ways to divide the octave equally

There are only *five* ways to divide a single octave equally. Such root progressions would move by:

Minor 2nd

This is somewhat trivial, as it simply produces the chromatic scale. Chord progressions in which roots move by ascending or descending minor seconds do exist, though.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Dividing the octave by minor seconds (a chromatic scale).

Major 2nd

Plenty of music has been written using the whole-tone scale, which divides the octave equally into major seconds. Much of this music is not tonal, or even triadic. There are a handful of examples in which tertian chord roots outline the whole-tone scale.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Dividing the octave by major seconds (a whole-tone scale).

Minor Third

Roots progressing by minor third outline the diminished-seventh chord. These chord progressions are most often found in examples where each of these chord roots outlining the division of the octave are tonicized, or otherwise interrupted by intervening chords. More rarely, they're found in progressions in which the chord roots outlining the division are presented in immediate succession. These kinds of progressions also tie in with the octatonic scale, which contains overlapping diminished-seventh chords.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Dividing the octave by minor thirds, outlining a diminished-seventh chord

Major Third

Chord progressions in which the roots move by major third will outline the augmented triad. These chord progressions can be found both in examples where the chords are in immediate succession, and with intervening chords. These progressions go hand-in-hand with the hexatonic scale, which contains two overlapping augmented triads.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Dividing the octave by major thirds, outlining an augmented triad.

Tritone

The last way in which one might divide the octave equally is by tritone. A chord progression that does this would simply be two chords, so repertoire examples would be somewhat trivial.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Dividing the octave by tritone.

Of course, you can create chord progressions in which roots progress consistently by other intervals, like perfect fourths and fifths. These will create tonal ambiguity, but they will not come to completion within a single octave in the way the five listed above do.

Assignments

1. Coming soon!

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5.10: Chromatic Sequences

Key Takeaways

- Diatonic sequences repeat musical segments and are transposed in a regular pattern within a key.
- Chromaticized diatonic sequences include can include chromatic embellishments or chromatic chords, such as applied (secondary) dominants. These sequences avoid strict transposition of both interval size and quality.
- Chromatic sequences differ from diatonic sequences in that both the size and quality of the interval of transposition is maintained throughout the sequence. Diatonic sequences preserve the interval size, but not the quality, to ensure that they stay within a single key.
- Remember, with all sequences, the voice leading must be consistent within every voice. Chord voicings should match between all corresponding components.

Descending-Fifths Sequence

Consider the following two-chord sequence (Example 1), often referred to as the "descending-fifths sequence."

A link to an interactive elements can be found at the bottom of this page.

Example 1. A diatonic descending-fifths sequence.

The sequence model, a root progression by descending fifth, is transposed down by second in each subsequent copy of the model. Because the sequence uses chords entirely from the key of G major, the root progressions don't match exactly throughout the sequence. For example, the root progression between the IV and viio chords is an augmented fourth, whereas the root progressions between every other pair of chords is either a perfect fifth or perfect fourth. We "cheat" in the sequence in this way in order to keep the music within a single key. If the interval between successive chord roots was consistently a perfect fifth/fourth, the root progression would be as follows: G–C–F–B♭–E♭–A♭–D♭… and so on. The sequence would rather quickly bring the music outside of the key of G major, and into new chromatic territory. It would become a chromatic sequence.
Chromatic sequences differ from their diatonic counterparts in a few important ways:

- The chords that initiate the sequence model and each successive copy contain altered scale degrees.
- The chords within the pattern are of the same quality and type as those within each successive copy of that pattern.
- The sequences derive from those that divide the octave equally.

Importantly, chromatic sequences are not merely sequences that contain chromatic pitches. Example 2 shows the same descending-fifths sequence, this time with alternating secondary dominant chords. While the sequence contains chromatic chords (the secondary dominants), it is not a truly chromatic sequence because the overall trajectory of the sequence is still one that traverses the scale steps of a single key. Notice that the progression of chord roots on successive downbeats still matches the purely diatonic sequence shown in Example 1: G–F♯–E–D.

A link to an interactive elements can be found at the bottom of this page.

Example 2. A diatonic descending-fifths sequence with alternating secondary dominant-seventh chords.

Conversely, we can create a truly chromatic sequence if we ensure that the progression of chord roots maintains a consistent pattern of intervals throughout the sequence. An easy way to do this is to make the second chord of the sequence model into a dominant-seventh chord that can be applied to the first chord of the subsequent copy of the model. In Example 3, the second chord of the model is now F^7 instead of a diatonic IV chord. We interpret this as V^7 of the chord that follows, which is, in turn, another dominant-seventh chord.

A link to an interactive elements can be found at the bottom of this page.

Example 3. A chromatic descending-fifths sequence with interlocking secondary dominant-seventh chords.

The voice leading in the above sequence requires some attention. Because every chord is interpreted as a dominant-seventh of the chord that follows, it is not possible to resolve both the leading tone and the chordal seventh as normal. As is the case whenever you connect seventh chords with roots a fifth apart, the voice leading requires an *elided resolution.* Instead of the chord you expect to hear following a dominant-seventh chord, you get a dominant-seventh chord with the same chord root. For example, we expect to hear either a C or Cm chord following a G^7 chord. An elided resolution would result in a C^7 chord in place of the expected chord. An example of an elided resolution is shown in Example 4. The example shows the expected C resolution in parentheses. The elided resolution essentially "elides" the chord we expect with the following chord, C^7. In a sense, we mentally skip over the

expected chord to get to the next dominant-seventh chord. An important result of the elision is that the leading tone of the first dominant-seventh chord, B, resolves down by half step to become the new chordal seventh. Likewise, when the chordal seventh in the first dominant-seventh chord, F, resolves down by half step, it becomes the new leading tone. This leading tone/chordal seventh exchange is essential for proper voice leading in chord progressions that use interlocking seventh chords, such as the sequence above. Furthermore, this kind of voice leading is integral to the study of jazz harmony, as you will find in other parts of this textbook.

A link to an interactive elements can be found at the bottom of this page.

Example 4. An elided resolution of a dominant-seventh chord.

Returning to Example 3, notice that the progression of chord roots on each successive strong beat divides the octave equally into major seconds. This results in a sense of tonal ambiguity, making the Roman numeral analysis of these chords tenuous, at best. In particular, the chords identified with asterisks in the example are only labeled as such for consistency. In many cases, when analyzing highly chromatic music, it is often quite difficult to assign Roman numerals to chords; this tonal ambiguity is part of the aesthetic of this kind of music. In cases like this, it is often convenient to also analyze the music using lead-sheet symbols. These have been included in the examples in this chapter.

Ascending 5–6 Sequence

A link to an interactive elements can be found at the bottom of this page.

Example 5. A diatonic ascending 5–6 sequence.

A link to an interactive elements can be found at the bottom of this page.

Example 6. A chromaticized diatonic ascending 5–6 sequence, featuring secondary dominant chords.

The above examples present the diatonic ascending 5–6 sequence (Example 5) and its chromaticized variant (Example 6). Note that both of these include an inconsistent pattern of intervals between chord roots in the second measure. To that point, the pattern of chord roots was a descending minor third followed by an ascending perfect fourth. From beat 1 to beat 2 in m. 2, the chord roots are D to B♭—a major third. To make this a truly chromatic sequence, this interval must be corrected to match the others. Thus, we would change the B♭^{7} to a B^7. Likewise, we would then change the chord that follows the B^7 to a chord with a root of E (rather than E♭), to preserve the root progression by perfect fourth (Example 7).

A link to an interactive elements can be found at the bottom of this page.

Example 7. A chromatic ascending step sequence, featuring secondary dominant chords.

A similar problem arises with the chord qualities used at the beginning of each subsequent copy of the sequence model. The first chord of the sequence is major, so for it to be a chromatic sequence, we must change the remaining first chords of each iteration to be major as well. The final result is a sequence in which the chord on every strong beat is a major triad with roots a major second apart. If it were to traverse the entire octave, the sequence would divide the octave into major seconds. In Example 7, though, the sequence stops once it reaches the E major triad, treats that triad as a dominant chord, and modulates into A major. The modulation brings the music down a half step from its starting key. Distant modulations such as these are one of the reasons that chromatic sequences can be powerful tools.

Descending 5–6 Sequence

A link to an interactive elements can be found at the bottom of this page.

Example 8. A diatonic descending thirds sequence.

A link to an interactive elements can be found at the bottom of this page.

Example 9. A chromatic descending 5–6 sequence that modulates from D major to C major.

A link to an interactive elements can be found at the bottom of this page.

Example 10. A chromatic descending 5–6 sequence using inverted chords on every weak beat. The sequence outlines the whole-tone scale on every strong beat.

The familiar “Pachelbel” sequence (Example 8) can derive a chromatic sequence in a couple of ways. The diatonic version of this sequence alternates root motion by perfect fourth with either major or minor seconds. The fully chromatic version of this sequence replaces the root motion by second with root motion by minor third (Example 9). This version of the sequence traverses the octave

by major seconds, outlining the whole-tone scale and creating a strong sense of harmonic ambiguity by its end. When you listen to Example 10, for instance, notice that the D major chord that finishes the sequence hardly sounds like the tonic, even though, nominally, it is. This version of the sequence also uses inverted chords on every weak beat, creating a bass line that descends through the chromatic scale.

Assignments

1. Coming soon!

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5.11: Parallel Chromatic Sequences

Parallel 6/3 Chords

Parallel Dominant Chords

Parallel Augmented Triads

Assignments

1. Coming soon!

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5.12: The Omnibus Progression

The omnibus progression is a special type of chromatic sequence in which the bass and another voice in the texture move in contrary motion. Most commonly, the omnibus progression is used to prolong dominant harmony, but it can also be used as a means of modulating into distant keys.

Example 1 shows the prolongation of a dominant-seventh chord via a voice-exchange between the leading tone (in the soprano) and the root of the chord (in the bass).

A link to an interactive elements can be found at the bottom of this page.

Example 1. The omnibus progression prolongs dominant harmony using a chromatic a voice exchange between the leading tone and the root.

Notice that the voice leading in this progression is as smooth as possible: The only voices that are moving are the ones involved in the voice exchange. The other voices remain static as common tones.

The harmony throughout the
There are two ways of writing an omnibus progression: with the bass and upper voices converging, or with the bass and upper voices diverging.

The converging omnibus progression begins on a root-position dominant-seventh chord. The bass moves up- ward by semitone, while the voice with the leading tone moves downward by semitone, creating a voice ex- change. The remaining two upper voices maintain common tones.

Moving three semitones in this fashion brings you to another root-position dominant-seventh chord. Moving four semitones in this fashion brings you to the same dominant-seventh chord on which you began the progression, but this time, in first inversion.

The omnibus progression can be used to move into distant keys (and eventually traverse the octave) if, once you reach the new root-position dominant-seventh chord (that you arrived at after three semitones), you find the new leading tone and begin the process again.

The diverging omnibus progression works almost identically, but instead of moving the leading tone in contrary motion to the bass, you move the seventh. To move into distant keys, find the new seventh in the root-position dominant-seventh chord and repeat the process.

Assignments

1. Coming soon!

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5.13: Altered and Extended Chords

Key Takeaways

- Dominant chords may feature an augmented or diminished fifth, indicated in analysis by “+” beside the Roman numeral. Diminished fifths are indicated by a “o” beside the Roman numeral.
- Augmented dominant chords typically have the augmented fifth resolving up to the third of the chord. These most commonly are found resolving to major triads
- Diminished fifths typically resolve down by semitone to the root of the following chord
- A 9th replaces a doubled root, and resolves downward by step
- An 11th replaces a third, and resolves via common-tone
- A 13th replaces a fifth, and resolves downward by third
- Extended chords are almost exclusively found in root position

Altered Chords

To this point, many of the chromatic harmonies we have explored have been explained in terms of either secondary function or modal borrowing. None of these harmonies include alterations to the perfect fifth of the chord; a practice we will now discuss in some detail. When the fifth of a triad is raised or lowered, it becomes either augmented or diminished. While we have seen diminished triads and seventh chords that feature diminished fifths, we have yet to discuss the possibility of a chord with a major third and either an augmented or diminished fifth. These chords are commonly referred to as “altered chords.” Although there is no standard analytical notation, augmented fifths are often indicated in analysis by “+” beside the Roman numeral. Diminished fifths are indicated by a “o” beside the Roman numeral. We will adopt this practice here.

The Dominant with an augmented fifth

If you raise the fifth of a major triad, it will become an augmented triad. Typically, raised fifths resolve upward by step to the third of its target chord. In Example 1, Franck abruptly modulates from f-sharp minor to D major by way of a dominant seventh chord with an augmented fifth. Note the resolution moves upward to the third of the target chord (in this case, tonic in D major). This is the most common resolution of this chromatic pitch.

A link to an interactive elements can be found at the bottom of this page.

Example 1: César Franck, Symphonic Variations (2 piano reduction), mm. 170-72

The dominant chord with augmented fifth can be used as an applied chord, as well, as you can hear in the excerpt from Strauss’s “Till Eulenspiegel’s Merry Pranks” in Example 2.

A link to an interactive elements can be found at the bottom of this page.

Example 2: Richard Strauss, “Till Eulenspiegel’s Merry Pranks” (Piano Reduction)

Importantly, these chords do not resolve easily to minor triads, since the augmented fifth would not be able to resolve upward by step. In Example 3, the dominant chord with an augmented fifth is used in first inversion, with the chromaticized fifth resolving upward again.

A link to an interactive elements can be found at the bottom of this page.

Example 3: Brahms, Piano Concerto No. 2, iv

Note that the augmented triad is a symmetrical chord than can be interpreted in multiple ways, making it difficult to identify its root without proper surrounding context. In Example 3, Brahms makes it clear that chord is functioning as the dominant of Bb, but one could easily re-interpret the bass note as the root of an A augmented triad. Like the diminished-seventh chord, the augmented triad can be a pathway to distant, chromatic modulations. Example 4 shows the three possible enharmonic interpretations and resolutions of the C augmented triad.

A link to an interactive elements can be found at the bottom of this page.

Example 4: Enharmonic Respellings of Augmented Dominant Triads

The Dominant with Diminished Fifth

Flattening the fifth of a major triad results in a strange chord quality that we have not encountered thus far. This alteration makes a diminished fifth above the root, and this tone tends to resolve downward by step to the root of its target chord. Although it is possible to use this triad, it is far more common to use the diminished fifth in a dominant-seventh chord. In Example 5, an excerpt from the opera *Salome* by Richard Strauss, the cadential dominant includes a diminished fifth, which provides a delightful dissonance leading to the tonic. In this example, Strauss is more liberal with the resolution of the flattened fifth, and doesn't bother resolving the pitch to the root of the tonic chord.

A link to an interactive elements can be found at the bottom of this page.

Example 5: Richard Strauss, Salome, rehearsal 117

Like the augmented triads and diminished-seventh chords, the dominant seventh with a diminished fifth is symmetrical. Moreover, the chord is equivalent to a French augmented-sixth chord. This equivalence becomes even clearer when you use the Vo7 chord in second inversion, leaving the lowered fifth in the bass voice to resolve downward by step. For example, in C major, the Vo4/3 chord is identical to the French augmented-sixth chord in F major. Similarly, the Vo4/3/V is equivalent to the French augmented-sixth chord in the home key of C major. Technically, the root-position dominant seventh chord with a diminished fifth is *also* equivalent to a French augmented-sixth chord, though this requires some enharmonic respelling to become clear. Example 6 shows all of these equivalences.

A link to an interactive elements can be found at the bottom of this page.

Example 6: Dominant Sevenths with Diminished Fifths and Their Enharmonic Equivalents

To finish off our discussion of altered dominants, consider Example 7, from the second movement of Tchaikovsky's Symphony No. 5. In this excerpt, emerging from a chromatic quagmire of half-diminished and fully-diminished seventh chords is a relatively surprising diatonic ii7 chord. This chord resolves via stepwise motion, through another half-diminished seventh chord, to the cadential dominant of the passage: a Vo4/3 chord. Typically, cadential dominants are only effective in root position, however this chord is emblematic of nineteenth-century chromaticism and ambiguity. The lowered fifth resolves downward by step, much like an augmented-sixth chord, to the D major tonic.

A link to an interactive elements can be found at the bottom of this page.

Example 7: Tchaikovsky, Symphony No. 5, ii, mm. 40-46

Extended Chords

To this point, we have only used harmonies that form triads or seventh chords. It is possible, and indeed, many Romantic-era composers and beyond did this, to continue to superimpose thirds beyond the seventh above the root of a chord. You can do this only so far, though, before you reach the root of the chord again, as you can see in Example 8a). In jazz theory, chord members beyond the seventh are referred to as *extensions*, and we will adopt this practice here. Importantly, extensions rely on their voicing to determine their meaning. In Example 8b) and 8c), two different voicings of the same four pitches are given. In Example 8b), the chord can clearly be contextualized as V13/7 in the key of C major. Example 8c) is much less clear; it could be some kind of inversion of the chord in 8b), or we could consider it to be an extended iii chord. In either case, the context is made unclear by the chord's voicing. Because of this, we tend to only use extended chords in root position (as the extensions are truly defined by the chord root).

A link to an interactive elements can be found at the bottom of this page.

Example 8: Types of Extensions

While you could include all chord members and extensions in textures with 5, 6, or 7 voices, it is often undesirable to use such dense chords. When composing these chords in a four-voice texture, you will need to decide which notes to leave out. It's useful to consider these chords as being linearly derived, with the extension displacing a regular chord member. Importantly, when we write these chords, we will always include the root and the chordal seventh, as these are essential for identifying the chord's quality.

Example 9 shows all of the derivations of these extensions as applied to a dominant-seventh chord.

In example 9a), the 9th displaces the root, doubled an octave above the bass. The 9th may appear together with the root (found in the bass), but make sure that it sounds in the octave above the root; this is a 9th, and not a 2nd. Here, the 5th is omitted, but could well be present in a five-voice texture. The ninth should resolve down by step.

Example 9b) shows the 11th displacing the 10th (3rd). Since the 3rd (the leading tone) is not normally doubled, the 11th and the 3rd should not sound together. Paradoxically, the 11th "resolves by common-tone. Since the leading tone would typically resolve to the tonic, so should the 11th. This chord sometimes includes both the ninth and the eleventh, and resembles a IV chord with scale-degree 5 in the bass.

Example 9c) shows the 13th displacing the 12th (5th). It is uncommon to double the 5th in a dominant-seventh chord, so the 13th and the 5th don't normally sound together. Since the 5th (scale-degree 2) would often resolve down by step to the tonic, the 13th sometimes "resolves" by leaping down by third to scale-degree 1. It is also possible for the 13th to be held as a common tone, becoming the 3rd of the tonic chord.

Lastly, Example 9d) shows that you can combine extensions and alterations to make some truly interesting dominant sonorities.

A link to an interactive elements can be found at the bottom of this page.

Example 9: Derivations of Extensions

"Fake" Extensions vs. "Real" Extensions

It is important to note that in the first part of each of the above examples, the extension resolves to a regular chord member before the chord changes. This makes it much more explainable as an instance of accented dissonance, rather than an extension. Only when the extension lasts for the duration of the chord, resolving *with* the chord change, do we consider it a "real" extension.

A link to an interactive elements can be found at the bottom of this page.

Example 10: Robert Schumann, "Waldesgesprach," from Liederkreis, Op. 39, No. 3, mm. 1-8

In Example 10, we can see that Schumann uses a dominant ninth chord in the opening of this song. The 9th is treated like a chord member, rather than as an embellishment; notice that it is approached by leap, within the chord, and does not resolve until the chord changes. Compare this with Example 11, in which Schubert uses an Fb to create a 9th above the dominant in measure 5. This 9th resolves down by step before the chord changes. This is an example of a "fake" 9th that is better explained as an accented dissonance, rather than a "real" chord extension.

A link to an interactive elements can be found at the bottom of this page.

Example 11:Schubert, Impromptu Op. 90 No. 4, mm. 1-8

Similarly, listen to Schubert's *Valse noble* in Example 12, below. Notice that the 13th, while prominent in the melody, always resolves down by step before the chord changes. This 13th is best explained as appoggiatura rather than a "real" member of the chord. Compare this with Schubert's *Valse sentimentale* in Example 13. Along with several "real" 9ths used throughout the passage, The cadential dominant in m. 7 includes a 13th above the bass that is approached and left by leap–a true chord extension.

A link to an interactive elements can be found at the bottom of this page.

Example 12: Schubert, Valse noble, D. 969 No. 4, mm. 1-8

A link to an interactive elements can be found at the bottom of this page.

Example 13: Schubert, Valse sentimentale, D. 779 No. 17, mm. 1-8

The Case for Elevenths

Unlike 9ths and 13ths, 11ths are considerably more rare in the Western European Art Music repertoire. This is likely because the 11th displaces the 3rd of a chord, which is the chord member that indicates a chord's quality (and in the case of a dominant chord, its function as well). Consider Example 14, below, by Fauré. Throughout the passage, the dominant chords lack 3rds, and in most cases, use a 4th (or 11th) in its place. The overall sense of function from dominant to tonic is particularly weak, a sense which is further weakened by the tonic pedal heard throughout the passage.

A link to an interactive elements can be found at the bottom of this page.

Example 14: Fauré, "Les Roses d'Ispahan," Op. 39 No. 4, mm. 1-14

Sometimes, chord extensions can be applied to non-dominant chords, as is the case in Example 15. Here, the ii chord has a 7th, along with a 9th and an 11th. The 11th is presented as a "true" 11th, voiced above the 7th and 9th, unlike in the Fauré example above, where the 11th is written as a 4th (and sounds more like an unresolved suspension). Voicings like this are far more common

in popular music, such as in Example 16 by The Emotions. Here, the dominant is presented as a “real” 11th chord, or, as many practicing pop musicians would put it, a “IV over V” chord in which F major is sounded above a G bass.

A link to an interactive elements can be found at the bottom of this page.

Example 15:Mendelssohn, Midsummer Night’s Dream, Op. 21, Overture, mm. 450-58

A link to an interactive elements can be found at the bottom of this page.

Example 16: The Emotions, “Best of My Love,” mm. 1-2

Examples like the last two reinforce the fact that extensions are defined by voicing and linear context, and indeed, begin to call into question the entire notion of function in tertian harmony. Is it the bass that determines function, or is it the chord’s content? For our last example, we will consider the beautiful opening to César Franck’s Violin Sonata in A major, found in Example 17. This movement begins in tonal obscurity, alternating between two chords whose function seems completely suppressed. The opening V9 chord loses its sense of dominant function when it progresses “backwards” to what appears to be a ii13 chord that also includes an 11th. Alternatively, one could interpret this chord as an “inversion” of the same V9 chord heard in the first measure. When the violin enters, more evidence is given for hearing the chord in m.2 as ii, this time supported by an arpeggiated b minor triad in the violin. Eventually, the tonality settles in A major with a tonic arrival. Of course, the tonic is weakened somewhat by the presence of an F sharp, which resolves downward by step, but is left dangling in the violin’s melody.

A link to an interactive elements can be found at the bottom of this page.

Example 17: Franck, Violin Sonata in A major, I, mm 1-8 Assignments

1. Coming soon!

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5.14: Neo-Riemannian Triadic Progressions

Key Takeaways

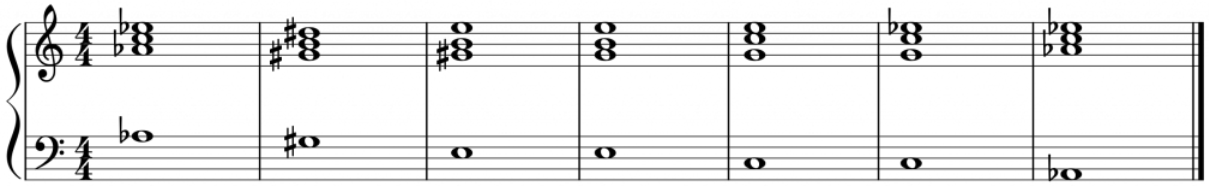
- Neo-Riemannian theory, named after music theorist Hugo Riemann, provides a means of rationalizing triadic progressions that involve sharing common tones, more so than staying within one key.
- Every Neo-Riemannian transformation toggles between one major and one minor triad.
- The most basic Neo-Riemannian transformations shift one note and keep two common tones.
  - **R**elative relates a major triad and the minor triad a minor third lower, such as C and Ami.
  - **P**arallel relates a major triad and the minor triad sharing the same root, such as C and Cmi.
  - **L**eading-tone exchange relates a major triad and the minor triad a major third higher, such as C and Emi.
- Other important Neo-Riemannian transformations keep one common tone and shift two notes.
  - **S**lide relates a major triad and the minor triad one semitone higher, such as C and C♯mi.
  - *Nebenverwandt* relates a major triad and the minor triad a fifth below, such as C and Fmi.
- **H**expole relates a major triad and the minor triad a major third below, such as C and A♭mi. This transformation is unique because it does not keep any common tones; instead, each note is shifted by a half step to get to the new chord.
- Neo-Riemannian transformations are abbreviated to one letter each: R, P, L, S, N, and H.
- Theorists have come up with several networks of transformations that help visualize these relationships, such as the *Tonnetz*, the Weitzmann regions, and the Cube Dance.

A one-page summary of transformations is available as an interactive score and as a PDF.

In the late 19th century, composers often used triadic progressions that confound conventional Roman numeral analysis. Consider the following excerpt from Brahms's concerto for violin and cello (Example 1):

Example 1. Brahms, Concerto for Violin and Cello, I, mm. 268–79 (10:22).

A reduction of the chord progression in the excerpt above can be found in Example 2. The passage connects two A♭ major triads; however, the chords in between those triads do not belong to A♭ major in any useful way, nor do they follow any of the conventions of functional harmony.



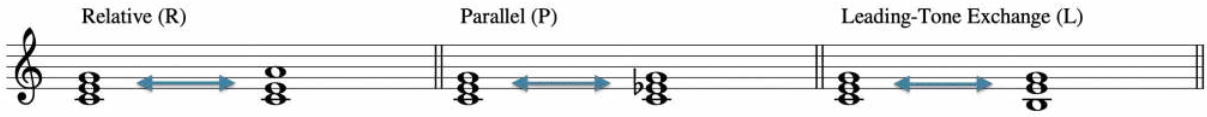
Example 2. Brahms, Concerto for Violin and Cello, I, mm. 270–76, reduction.

One might dismiss the passage altogether as "non-functional harmony," but when you listen to it, it follows a certain kind of logic. As Richard Cohn writes, "if this music [music that is triadic but functionally indeterminate] is not fully coherent according to the principles of diatonic tonality, by what other principles might it cohere?" (1998, 169).

Neo-Riemannian Transformations

Neo-Riemannian theory describes a way of connecting major and minor triads without a tonal context. Example 3 shows the three basic Neo-Riemannian operations. Notice that each operation preserves two common tones in a triad and changes its mode.

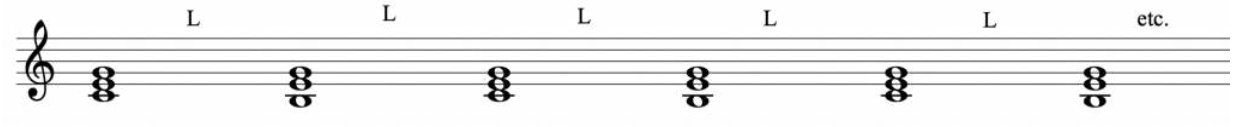
- The **R**elative transformation (R) preserves the major third in the triad and moves the remaining note by whole tone.
- The **P**arallel transformation (P) preserves the perfect fifth in the triad and moves the remaining note by semitone.
- The **L**eading-Tone Exchange transformation (L) preserves the minor third in the triad and moves the remaining note by semitone.



Example 3. The three basic Neo-Riemannian operations: Relative, Parallel, and Leading-Tone Exchange.

It's important to note that each transformation is a toggle between two chords. As an analogy, think of the caps lock key on your keyboard, which toggles between two cases of letters. If you are typing with lowercase letters and then press caps lock, this tells your keyboard to begin typing in uppercase letters. But if you press caps lock again, it toggles back to lowercase—it doesn't go to some third case.

Similarly, if you do the L transformation on a C major triad, you get an E minor triad. If you do the L transformation on an E minor triad, you return to a C major triad. Put another way, successive repetitions of the same transformation alternate between two chords, as shown in Example 4.



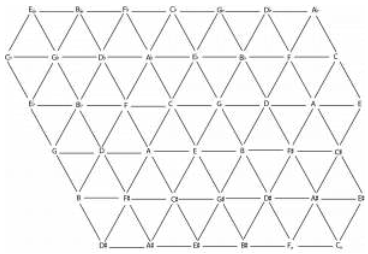
Example 4. Successive L transformations on C major and E minor triads.

While most 19th-century composers didn't write progressions using the same transformation over and over again, you will find this technique used in twentieth-century works like "O Superman" by Laurie Anderson, which uses successive L transformations throughout.

The *Tonnetz*

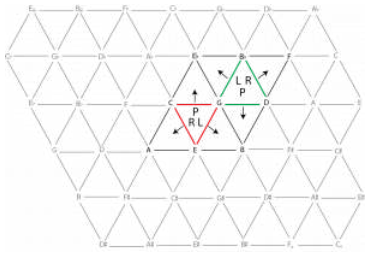
Example 5 shows a *Tonnetz*. A *Tonnetz* is a visual representation of pitches arranged such that perfect fifths are read from left to right, major thirds are read diagonally from the top left to the bottom right, and minor thirds are read diagonally from the bottom left to the top right. Any three pitches in a triangle form a major or minor triad. Although it's pictured here as a flat, confined plane, theoretically, without enharmonic equivalence, the *Tonnetz* continues on infinitely; with enharmonic equivalence, the *Tonnetz* forms a torus shape.

Neo-Riemannian transformations can be visualized by flipping a triangle along one of its three edges.



Example 5. The Tonnetz.

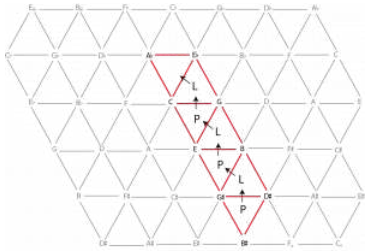
- The (P)arallel transformation flips the triangle along the edge belonging to the line of perfect fifths (left to right).
- The (R)elative transformation flips the triangle along the edge belonging to the line of major thirds (top left to bottom right).
- The (L)eading-tone transformation flips the triangle along the edge belonging to the line of minor thirds (top right to bottom left).



Example 6. *Tonnetz* showing the three Neo-Riemannian operations (P, L, and R) performed on a C major triad and a G minor triad.

Example 6 shows each of the transformations on the *Tonnetz*. If you perform a P transformation on the C major triad, highlighted with red edges, it will flip along the C–G side to become C minor. Similarly, L will flip the triad along the G–E edge to become E minor, and R will flip the triad along the C–E edge to become A minor. Note that if you start on a minor triad, such as the G minor triad highlighted with green edges, all of the flips will be in the opposite directions.

Returning to the example from Brahms's concerto for violin and cello, we now have a means of understanding how this chord progression works. Example 7 shows that the two A♭ major triads are connected by a series of P and L transformations between chords.



Example 8. Brahms's concerto for violin and cello, mm. 270–76 on the *Tonnetz*.

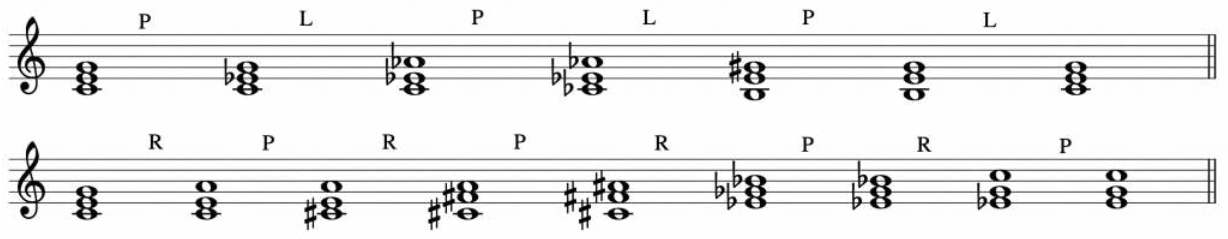
The excerpt from the Brahms concerto navigates a column of triangles moving upward from the bottom right of the *Tonnetz*, shown in Example 8. Note that you need to enharmonically re-interpret the G♯ major triad as an A♭ major triad at the starting point.

The *Tonnetz* is useful for visualizing the proximity of major and minor triads; notice that all of the triads in a given key are close together, while tonally disparate keys are also far apart on the *Tonnetz*. Conversely, the *Tonnetz* is helpful for imagining interesting chord progressions that you might not think of if you're limiting yourself to typical common-practice syntax.

Chains or Cycles of Transformations

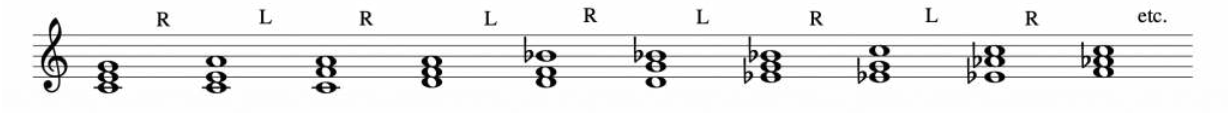
While you can use Neo-Riemannian theory to create or analyze just about any chord progression, composers have often focused on chains of operations that create closed cycles of triads. Cycles begin and end on the same chord, and they follow a specific pattern of transformations (much like a sequence). The progression from the Brahms example above is a PL cycle because it alternates P and L transformations and begins and ends on the same chord.

There are three possible cycles that use two transformations: the PL cycle, the RP cycle, and the RL cycle. As you can see in Example 9, the PL and RP cycles "close the loop" after relatively few transformations: six for the PL cycle, and eight for the RP cycle.



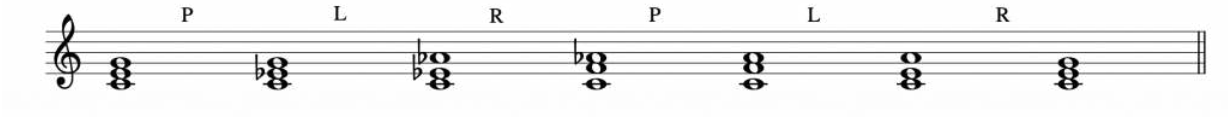
Example 9. PL and RP cycles.

Conversely, the RL cycle (Example 10) is is quite long: it passes through all 24 major and minor triads. Since this cycle takes so long to "close the loop," it is often ignored or presented in truncated form.

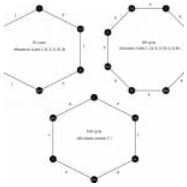


Example 10. The RL cycle.

There is one three-transformation cycle that is noteworthy: the PLR cycle. As Example 11 shows, it takes two cycles of the PLR transformations to return to the starting chord.



Example 11. The PLR cycle.



Example 12. PL, RP, and PLR cycles related to their parent scales/common tones.

Of the cycles mentioned above, both the PL and RP cycles generate a parent scale made up of all of the notes used by its constituent triads. The PL cycle generates the hexatonic scale, a symmetrical scale made up of alternating semitones and minor thirds. The RP cycle generates an octatonic scale, another symmetrical scale made up of alternating semitones and major seconds. You might consider these scales to represent the "overall sound" of the cycle. Each PLR cycle is centered around a single pitch, which is contained in each of the triads within the cycle.

Each of these cycles is illustrated in Example 12.

Other Transformations

There are three other types of Neo-Riemannian transformations that occur frequently enough in the repertoire that they are worth mentioning here.

- The **S**lide transformation (S) (short for "slide") is effectively the opposite of the P transformation: it moves the two pitches that form the perfect fifth in a triad by semitone and changes the mode of the triad.[1]
- The *Nebenverwandt* transformation (N) moves both members of the minor third in a triad by semitone and again changes the mode. *Nebenverwandt* means "neighbor-related" in German, and it describes the neighbor-tone-like motion of this third. [2]
- The **H**expole (H) transformation connects a triad to its modal opposite a third away by moving each voice by a single semitone, generating the hexatonic poles in the hexatonic PL cycle discussed above and shown in Example 12.[3]

These three transformations are shown in Example 13.

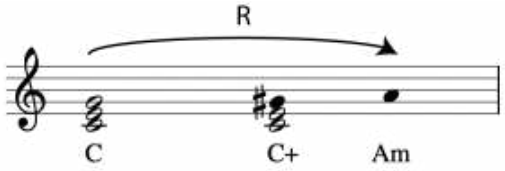
Example 13. S, N, and H transformations.

Of course, all of the above transformations can be considered combinations of the staple P, L, and R transformations. For example, you could describe H as "PLP." Indeed, you can describe the connection between *any* two major and/or minor triads as combinations of transformations: you can get from one triad to any other in five steps or less. The most interesting are those that use *parsimonious* voice leading: voice leading in which no single voice moves more than a step. There are numerous other combinations you could come up with—try some on your own!

More Networks of Neo-Riemannian Transformations

Augmented triads

Although it is not part of the staple Neo-Riemannian transformations, which only deal with major and minor triads, the augmented triad provides a useful link *between* major and minor triads, specifically those that are connected by R transformations. Upon scrutinizing the above examples, you may have noticed that the R transformation isn't quite the same as the P and L transformations, because it moves its non-preserved note by two semitones, while the others move their non-preserved note by one semitone. In a sense, the R transformation is twice as much "work" as the P and L transformations. If we fill in the gap between two R-related triads, an augmented triad emerges, as shown in Example 14.



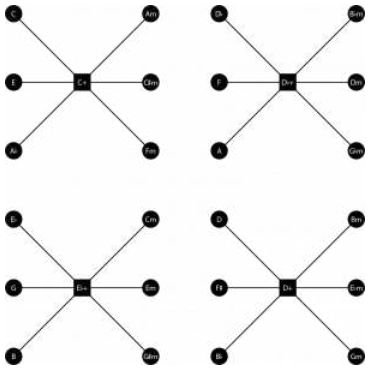
Example 14. The R transformation with an intervening augmented triad.

Things get interesting when you consider the augmented triad's ambiguity. Because it is a symmetrical chord (like the diminished seventh chord), you can enharmonically respell the augmented triad such that any of its chord members can act as the root. For example, the C augmented triad in Example 14 could also be spelled as an E augmented triad (E–G♯–B♯), or an A♭ augmented triad (A♭–C–E). As a result, you can resolve the augmented triad to three different minor triads by moving a single voice by semitone, depending on how its root is interpreted. Example 15 shows the three possible resolutions of the C^+ triad.

Example 15. Three different spellings of the augmented triad resolving to three different minor triads.

Likewise, the same augmented triad can connect to three different major triads by moving a single voice by semitone, as shown in Example 16.

Example 16. Three different major triads connect to the same augmented triad.



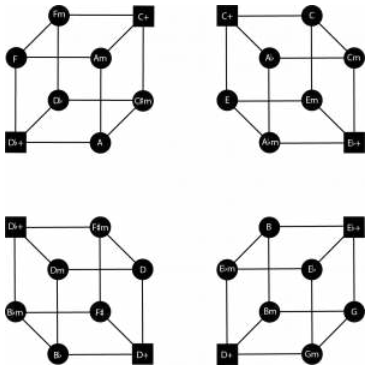
Example 17. The four Weitzmann regions.

Example 17 illustrates the four augmented triads (yes, there are *only* four, due to the symmetry of the chord) and the major and minor triads they can resolve to by moving only one voice by semitone. Each augmented triad and its six associated triads are referred to as Weitzmann regions, named after the theorist Carl Friedrich Weitzmann, who wrote at length about the augmented triad and its versatility in several 19th-century treatises.

Each line in a Weitzmann region represents moving one note in a triad by a single semitone. When you trace a path from a triad on the left to a triad on the right, you'll find several of the transformations discussed previously. R, S, and N each require a total move of two semitones, and each of these can be traced through any given Weitzmann region.

The Cube Dance

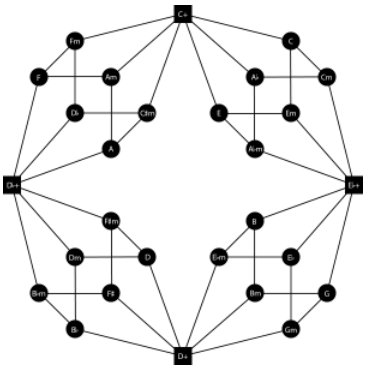
Recall that the LP, RP, and PLR cycles are "closed loops." These recurring patterns are interesting, but could grow stale after a while. What if there were a way to "modulate" between cycles? Enter the augmented triad.



Example 18. PL cycles with added augmented triads.

Take another look at the major triads connected to the C$^+$ Weitzmann region: C, E, and A♭. Notice that these three major triads are the same as those found in the PL cycle that started on C, found in Example 12. The minor triads in that PL cycle can be found in a different Weitzmann region: the E♭$^+$ region. If we add augmented triads into our PL cycles, we grow the group of possible chords within a cycle from six to eight. Instead of representing these cycles on a hexagon, let's illustrate them using a cube, as shown in Example 18.

The PL cycle that starts on C can be found in the top right of Example 18. Each side of the cube represents the motion of one note in the triad moving by semitone. When the triads move from major to minor, these are either P or L transformations. The augmented triads that connect to the major and minor triads are on opposite corners of the cube, and, of course, these connect to each adjoining triad by a one-semitone move as well.



Example 19. The Cube Dance (originally conceived by Douthett and Steinbach).

Now, how might we "modulate" from one PL cycle to another? Notice that the *same* augmented triad can be found in two different cubes. If we wrote a chord progression within one PL cycle, we could "jump" to an adjacent PL cycle by navigating to one of the two augmented triads and continue in the new cycle. In a sense, each cube is connected to two other cubes via an augmented triad. We can use these connections to create a single illustration that provides us a map of all major and minor triads connected by a single semitone. This was first explained by Jack Douthett and Peter Steinbach (1998), who referred to this diagram as a "cube dance." The cube dance has been reproduced in Example 19.

Using the cube dance model, you could create a chord progression starting in the PL cycle that includes C, and modulate to a new PL cycle via either the C^+ or $E\flat^+$ triads. If you wanted to get from C to, say, D, you would have to modulate twice: either through C^+ and $D\flat^+$, or $E\flat^+$ and D^+. Though the other cycles are not depicted clearly on the cube dance model, you can also use augmented triads to modulate between RP cycles, or PLR cycles, or indeed any group of Neo-Riemannian transformations that include R transformations.

Perhaps even better than the *Tonnetz*, the cube dance illustrates the proximity of major and minor triads. If we equate proximity with the total number of semitones needed to move from one triad to another, the cube dance diagram puts chords together that we would intuitively consider to be "close" to one another, while those that we might consider "distant" are relatively far apart. Moreover, the cube dance (and even the *Tonnetz*) does this without reference to a tonal center, making it useful for rationalizing chord progressions from music of the 19th and 20th (and even 21st) centuries that is triadic but shies away from functional tonality. This can be incredibly helpful when analyzing this kind of music, or even when writing your own.

Further Reading

- Cohn, Richard. 1996. "Maximally Smooth Cycles, Hexatonic Systems, and the Analysis of Late-Romantic Triadic Progressions." *Music Analysis* 15, no. 1 (March): 9–40.
- Cohn, Richard. 1997. "Neo-Riemannian Operations, Parsimonious Trichords, and Their *Tonnetz* Representations." *Journal of Music Theory* 41, no. 1 (Spring): 1–66.
- Cohn, Richard. 1998. "Introduction to Neo-Riemannian Theory: A Survey and a Historical Perspective." *Journal of Music Theory* 42, no. 2 (Autumn): 167–80.
- Cohn, Richard. 1998. "Square Dances with Cubes." *Journal of Music Theory* 42, no. 2 (Autumn): 283–96.
- Cohn, Richard. 2004. "Uncanny Resemblances: Tonal Signification in the Freudian Age." *Journal of the American Musicological Society* 57, no. 2 (Summer): 285–323.
- Douthett, Jack, and Peter Steinbach. 1998. "Parsimonious Graphs: A Study in Parsimony, Contextual Transformations, and Modes of Limited Transposition." *Journal of Music Theory* 42, no. 2 (Autumn): 241–63.
- Engebretsen, Nora, and Per F. Broman. 2007. "Transformational Theory in the Undergraduate Curriculum – A Case for Teaching the Neo-Riemannian Approach." *Journal of Music Theory Pedagogy* 21:39–69.
- Mason, Laura Felicity. 2013. "Essential Neo-Riemannian Theory for Today's Musician." Master's thesis, University of Tennessee, Knoxville. https://trace.tennessee.edu/utk_gradthes/1646.

Assignments

1. Worksheet on Neo-Riemannian Transformations (.pdf, .mscz). Asks students to perform P, L, R, SLIDE, N, and H on individual triads, to realize chains of transformations, and find a transformation chain to connect two chords.
2. Composing with Neo-Riemannian Transformations (.pdf, .mscz). Asks students to use the Cube Dance and other Neo-Riemannian cycles to compose a short minimalist piano solo.

1. This term was coined by David Lewin. 5.14: Neo-Riemannian Triadic Progressions#return-footnote-546-1
2. This transformation was introduced by Richard Cohn. 5.14: Neo-Riemannian Triadic Progressions#return-footnote-546-2
3. Robert Cook is attributed with referring to this as the H transformation. 5.14: Neo-Riemannian Triadic Progressions#return-footnote-546-3

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5.15: Mediants

Key Takeaways

- The mediant relationship describes chords whose roots are separated by third (major or minor).
- Mediants can be grouped into three categories:
  - Diatonic (Grade 1): two common tones; chord quality changes (major → minor or vice-versa). Both chords fit into a diatonic key.
  - Chromatic (Grade 2): one common tone; chord quality remains the same (both are major or both are minor). Both chords do not fit in a diatonic key.
  - Doubly-chromatic or disjunct (Grade 3): no common tones; chord quality changes (major → minor or vice-versa).

One main focus in the previous chapter on Neo-Riemannian Triadic Progressions is the connection between triads with roots a third apart. For instance, **L** connects C with Emi. Another way of looking at these third-related chords is in terms of mediants. Recall from the Major Scales chapter that \hat3 and the triad built upon it (iii/III) is sometimes called the "mediant," and \hat6 and its triad (vi/VI) is the "submediant." But "mediant" has another, more general meaning: any two chords whose roots are related by third. In this sense, both the iii and the vi chord (or III and VI in minor) are mediants.

But these mediant relationships do not have to be diatonic. The combined collection of possible mediants can be divided into three categories:[1]

- Diatonic (Grade 1): two common tones; chord quality changes (major → minor or vice-versa). Both chords fit into a diatonic key.
- Chromatic (Grade 2): one common tone; chord quality remains the same (both are major or both are minor). Both chords do not fit in a diatonic key.
- Doubly-chromatic or disjunct (Grade 3): no common tones; chord quality changes (major → minor or vice-versa).

These categories are demonstrated in Example 1 and discussed in the sections below.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A summary of mediants by type.

Diatonic Mediants (Grade 1)

Diatonic mediants share two common tones and involve a change of triad quality (between major and minor), such as C and Ami or C and Emi. Diatonic mediants can be understood in neo-Riemannian terms as forming **L** or **R** relationships.[2]

Chromatic Mediants (Grade 2)

Chromatic mediants are a step more remote: the pair of chords now has one common tone, and the triad quality is kept the same in both chords. For instance, in relation to the C triad, the chromatic mediants would be the major triads of E, E♭, A, and A♭. These triads would be related with two neo-Riemannian transformations: the various combinations of **L**/**R** and **P**.

Some English-language sources give extra labels of "upper flat," "upper sharp," "lower flat," and "lower sharp" to these four mediant types. Upper/lower refers to whether the root of the mediant is above or below the original chord, and flat/sharp clarifies the scale degree upon which the chromatic mediant chord is built. German-speaking theory accounts for these with function-transformational terms like *Tonikavariantparallel*: i.e., change the mode of the tonic chord (from major to minor or vice versa) and then take the (German) parallel transformation from there.

Doubly-Chromatic Mediants (Grade 3)

In the third and last type, the mediant chords do not share any common tones, and the triad quality also changes. From C major, the doubly-chromatic mediants are E♭mi and A♭mi. These chords sound especially remote from one another.

Summary

In total, mediant relationships can be said to cover four possible chord roots, each with a major or minor triad built above; this yields eight possible mediants (4 roots × 2 qualities = 8 mediant chords). The following table summarizes those eight cases for the

example of C major:

[table id=88 /]

Function and Transformations

As mentioned above, we need a bit of caution in regards to functions, terms and labels here, as there are some different conventions running in parallel (pun intended!). The main headache is the use of that term “parallel” which in English-speaking traditions connects two modes on the same root (C and Cmi, for instance), while the German tradition uses it for what English-speaking theory calls “relative” (such as C and Ami). Confusing, right? Watch out, especially if you’re working with historical and/or multi-lingual sources. The following table is an overview of both functional labels (in German, taking the example of a tonic starting point) and combined neo-Riemannian transformations as discussed in the previous chapter (English). On the German side, “n/a” indicates that there is no commonly used term or abbreviation.

[table id=89 /]

An Example

Enough theory! Let’s close with a wonderful example of mediant relations in a song by Augusta Mary Anne Holmès.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Mediants in “L’Or” by Augusta Mary Anne Holmès.

Further reading

- Kopp, David. 2002. *Chromatic Transformations in Nineteenth-Century Music* (Cambridge: Cambridge University Press).

Assignments

1. Harmonic analysis: analyse the first 10 measures of the Holmès example above using whichever you prefer of Roman numeral and Functional labels.
2. Identify the type (name or grade) of mediant that Holmès keeps using.
3. Do this step 1 analysis using the other terminological system (Roman numeral or Functional labels, which you disprefer and didn’t use before).

---

1. The notion of "grades" (1, 2, 3) is more common in German-speaking music theory; the other terms (diatonic/chromatic/doubly-chromatic mediants) are more common in English-speaking music theory. Both are useful. 5.15: Mediants#return-footnote-548-1
2. Despite the German roots of these neo-Riemannian terms, contemporary German music theory would typically discuss these relations with the terms *Gegenklang* (G) and *Parallel* (P). This gets confusing, so please see the section on "Function and Transformations" at the end of this chapter. For now, the **LPR** terms are used here in the neo-Riemannian sense established in the previous chapter. 5.15: Mediants#return-footnote-548-2

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CHAPTER OVERVIEW

Chapter 6: Jazz

6.1: Swing Rhythms
6.2: Chord Symbols
6.3: Jazz Voicings
6.4: ii–V–I
6.5: Embellishing Chords
6.6: Substitutions
6.7: Chord-Scale Theory
6.8: Blues Harmony
6.9: Blues Melodies and the Blues Scale

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6.1: Swing Rhythms

Key Takeaways

- Swing eighths are notated as regular straight eighths but performed unevenly, in a quasi-triplet rhythm where the first note is twice as long as the second.
- Backbeat, a syncopation created through accent on beats 2 and 4 of a quadruple meter, is common in jazz.
- Syncopation occurs when the hierarchy of the meter is obscured.

Jazz has many characteristic uses of rhythm that define it as a genre. This chapter introduces two especially signficant rhythms—swing eighths and the backbeat—and discusses syncopation generally.

The Basic Swing Groove

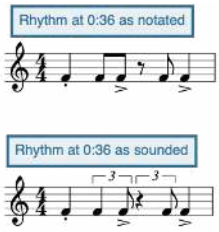
Swing eighths

Example 1. Swing eighths are performed so that the first eighth is roughly twice as long as the second.

One of the most recognizable features of swing rhythms is swung eighth notes. Swing eighths are performed as uneven eighth notes in a quasi-triplet rhythm, shifting the proportion from 1:1 to, roughly, 2:1—that is, the first eighth note is about twice as long as the second eighth note. This is illustrated with notation in Example 1.

While in some sense it may be more accurate to notate the eighth notes of a jazz tune as a triplet rhythm as notated in Example 1, imagine how cluttered that would be! Instead, swing eighth notes in jazz are always written as straight eighth notes, and performers are expected to know to swing them.

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=563



Example 2. The entire ensemble plays the notated rhythm at 0:36 of the overture to *Anything Goes*.

Example 3. This rhythm, with straight eighths, occurs in a drum part throughout the second part of the *Anything Goes* overture.

The overture from the musical *Anything Goes* contains passages with both straight and swing eighths. The first few minutes are swung; this is easiest to hear at 0:36 when all the instruments in the ensemble play swing eighths together (Example 2).While listening, tap along to the swing eighths—and note that the tempo is very brisk, so you'll be tapping quite quickly.

Contrast this with the straight eighths in the middle section of the overture, which begins at 0:52 (Example 3). The feel changes dramatically during this straight section. As you listen, tap along to the straight eighths, which are at a considerably slower tempo than the first part's swing eighths.

After a quick transition in the trumpets, swing eighths return for the third part of the overture, which begins at 1:39. The swing eighths are audible in the hi-hat cymbal of the drumset.

The triplet rhythm notated in Example 1 is a common way to explain swing, but in reality, the exact ratio of swing eighths varies from piece to piece and from performer to performer. Generally speaking, faster tempos tend to be more straight and slower tempos tend to employ a more dramatic swing. Compare the swing of "Eternal Triangle" by Dizzy Gillespie and "Duet" by Count Basie—the former has a more even swing rhythm, while the latter has a more uneven swing.

Backbeat

The next most significant rhythmic feature of jazz is the backbeat. The backbeat is an accent on beats 2 and 4 of a quadruple meter. This is the opposite of the typical accent structure of classical music, where beats 1 and 3 are usually the most accented. (Beat 1 is still important in jazz, though—that's still usually where chord changes occur and roots of chords are sounded. It just may not be the *loudest* beat.)

The backbeat and the swing eighth together make up an important part of a standard swing drum beat (Example 4). The backbeat is accented with the closed hi-hat cymbal, while the swing eighths are played on the ride cymbal. Drum beats vary widely and are typically improvised, but these are two components you will find in most jazz drum patterns.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Standard swing drum beat with swing eighths and a backbeat.

When tapping along with jazz tunes, try tapping along to the backbeat, rather than the downbeat.

Syncopation

Before understanding syncopation, it is important to understand meter more generally (refer to the chapters on simple and compound meter). Meter emerges when a series of equally spaced pulses imply a sense of hierarchy. For example, $\mathbf{^4_4}$ time, which most jazz is in, is a series of four quarter notes (equally distant beats) in which beat 1 is most important, beat 3 less important, and beats 2 and 4 least important of all. "Importance" here means that important things happen on beat 1: things like chord changes, key changes, and so on. These important things might also happen on beat 3, but it is less common, and it's relatively unusual to see chord changes on beat 2 or 4.

Syncopation occurs when this sense of hierarchy is subverted in some way. There are many ways to achieve this subversion, and the backbeat is actually one such example. By sounding on beats 2 and 4, but not on beats 1 and 3, the backbeat creates syncopation by accenting the less important beats of the $\mathbf{^4_4}$ meter. Another common jazz syncopation is accenting the second offbeat eighth of an eighth-note pair, as in Example 2 above.

In addition to accents that obscure the beat, syncopation can also be created through rests and ties: for example, avoiding downbeats when beginning melodic lines. An example of syncopation created with rests and ties is in Example 5.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Syncopation in Carla Bley, "Donkey" (1976).

Further reading

- Aebersold, Jamey. 2000. *Jazz Handbook*. New Albany, IN: Jamey Aebersold Jazz.
- Straus, Joseph N. 2012. *Elements of Music*. 3rd ed. Upper Saddle River, NJ: Pearson.

Assignments

1. Swing Rhythms video (.mscz; PDFs for C instruments, B♭ instruments, E♭ instruments, F instruments, and bass clef instruments). Asks students to make a video with a partner performing idiomatic swing rhythms. Download backing track

2. Jazz Rhythms by Jamey Aebersold (.pdf, .docx). Make a recording in which you perform these rhythms. Pick three rhythms that create syncopation in different ways, and explain how the beat is obscured to create syncopation (through ties? rests? etc.).

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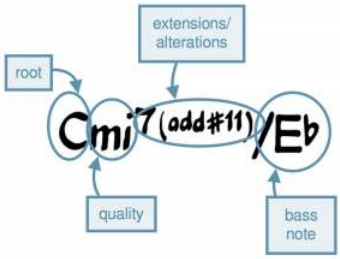
6.2: Chord Symbols

Key Takeaways

- Chord symbols tell you the root of the triad, the quality of the triad, any extensions to the triad, and any non-root bass note.
- Chord symbols don't reference a specific key. Instead, symbols are always assumed to be a certain quality unless otherwise indicated:
  - Triads are assumed to be major.
  - Sevenths added to the triad are assumed to be minor.
  - All other extensions and added tones are assumed to be major/perfect.
- Alterations are shown through sharp and flat symbols, or through plus and minus symbols. Both systems are prevalent in the real world; when writing your own charts, pick one system and stick with it consistently. This textbook will use the sharp/flat system of showing alterations.



Example 1. There are four components to a chord symbol: 1) the root of the triad, 2) the quality of the triad, 3) the presence of extensions beyond the triad, and 4) the bass note.

There are two systems of shorthand for discussing harmony used in this textbook: chord symbols and Roman numerals. Chord symbols are also sometimes called "lead sheet symbols" because you will find them on lead sheets, which are jazz scores that typically notate only a melody and these chord symbols.

Chord symbols can pack a lot of information into a few letters. A complex symbol is given in Example 1, with annotations to show the various possible components of a chord symbol.

Basics of Chord Symbols

Triads

Chord symbols are based on the major triad as the norm. If you see nothing but a note name as a chord symbol, this means to play a major triad. Other symbols are added to indicate other triad qualities, as summarized in Example 2.

[table id=16 /]

Example 2. Chord symbols for triads.

Notice that there are several ways to represent each non-major triad quality. This is because chord symbols were created along the way as jazz developed and were never completely standardized. The symbols in Examples 2 and 3 are not comprehensive, but you can likely decode other variations based on the ones here. It's good to be aware of all the possible ways of representing these different triad qualities, but stick to one method for yourself. In Examples 2 and 3, the symbols used in this textbook are given first.

Seventh chords

The most common addition to a triad is the interval of a seventh. An added seventh is indicated with the Arabic number 7 written after the root, superscript.

As with the triad, the numeral 7 by itself indicates a default quality: a minor seventh. Alterations to the symbol indicate other possibilities, resulting in the seventh-chord symbols summarized in Example 3:

Note: because triads are major by default and sevenths are minor by default, the symbol C^7 indicates a dominant-quality seventh chord (major triad + minor seventh).

[table id=17 /]

This table only shows the five traditional seventh-chord qualities, but others are possible, such as $m^{(maj7)}$, aug^{7}, and more. Again, these tables are not comprehensive, but when you encounter an unfamiliar symbol, you should be able to use your knowledge of basic symbols to figure out what it means.

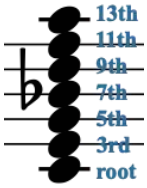
Bass notes

In much of jazz and pop, the bass note is the root of the chord. (Bassists may improvise around other notes, rather than strictly staying on the root of the chord, but this wouldn't affect how the harmony is written down.) For this reason, chord symbols are assumed to indicate root position chords unless otherwise indicated.

If the bass note should be something other than the root, this is shown with a slash followed by the letter name of the bass note. For example, C/E means to play a C major triad with an E in the bass.

Significantly, the bass note does not need to be a member of the chord! C/F♯ would indicate to play a C major triad over an F♯.

Extensions



Example 4. Adding more thirds beyond the seventh produces ninths, elevenths, and thirteenths.

Jazz harmony often involves not onlyplaying the notes explicitly indicated by the chord symbol, but also adding upper extensions. The term extension comes from the idea of *extending*the stack of thirds that creates harmonies. The seventhis the most common triadic extension, but jazz often makes use of higher extensions—stacking more and more thirds onto the basic triad results in the ninth, eleventh, and thirteenth (Example 4).

Interval size

You may notice that ninths, elevenths, and thirteenths are just compound versions of seconds, fourths, and sixth, respectively, so why use the more difficult-to-conceptualize compound intervals, instead of just calling these intervals seconds/fourths/sixths? There are two reasons:

1. The presence of an extension in a chord symbol implies the presence of all other extensions below it as well. So, an eleventh chord is not just a triad plus the eleventh—it's a triad plus an eleventh, ninth, and seventh.[1]
2. Extensions are often voiced (played) above the other chord members. In other words, in actual performed music, the extension really sounds a thirteenth above the root, not a sixth (for example).

Interval quality and alterations to extensions

While the default quality of the seventh is minor, extensions and additions are assumed to be major (ninths and thirteenths) or perfect (elevenths) unless otherwise indicated. The chord in Example 4, then, is simply a C^{13} chord: all the extensions are major/perfect intervals above C, except the seventh (B♭), which is minor.

Other interval qualities are shown with sharp and flat symbols that raise or lower the default pitch by a half step. So, a $C^{7(\sharp 11)}$ chord would include an F♯ above the root—an augmented eleventh—instead of the typical F♮.

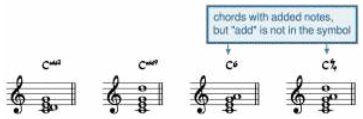
Example 5. Accidentals in chord symbols and in the corresponding notation—note that in chord symbols, sharp/flat signs indicated a bigger/smaller interval, not necessarily an actual sharp/flat note.

Note that in this context, these symbols are to be interpreted relatively. So, ♯11 really means "raise the eleventh" and ♭9 really means "lower the ninth"—as Example 5 shows, the altered note will not necessarily be a sharp or flat pitch.. This is discussed more below under "Chord Symbols vs. Roman Numerals."

For clarity, always write “7” before listing altered extensions. Furthermore, altered extensions often placed in parentheses, so that a performer can easily see that the accidental is to be applied to the extension, not to the root of the chord. If multiple altered extensions are used, slashes might also be used to clearly delineate the alterations, as shown in Example 5.

Added Notes (add) and Suspensions (sus)

add



Example 6. Examples of chords with added notes.

To indicate that a note is added to a chord *without* implying a seventh underneath, the word “add” is written into the symbol. C^{add9}, for example, is a C-major triad with a D voiced above the triad, but without any seventh: **C–E–G–D**. (Recall that C^{9} otherwise implies a minor seventh added to the C triad as well: **C–E–G–B♭–D**.) You can also add notes within a triad: C^{add2} indicates a C-major triad with an additional D that is voiced *inside* the triad: **C–D–E–G**.

In the case of an added sixth, we simply use the numeral 6 without “add”—for example, a C major triad with an added sixth is written as C^{6}. There are two reasons why this is acceptable (and normal) shorthand: one, the added sixth is especially common, and two, there is no possible interpretation that one might confuse it with. Another common addition to triads is the sixth and ninth together, which is also indicated without the word “add”: for example, C6_9.

sus

Example 7. Chords with suspensions (sus chords).

Another alteration is the suspended chord, abbreviated “sus,” which indicates that the third of the chord should be replaced with another interval above the root (Example 6). The term comes from a common type of suspension, in which the fourth above the bass resolves to the third above the bass. Indeed, a sus chord will often be followed by a non-sus chord with the same root (though this is not required by any means).

The default assumption is that the third of the chord is replaced with a perfect fourth above the root. Csus, then, would yield the notes **C–F–G**—the E of the C triad is replaced with F.

Occasionally, you may see a sus^{2} chord, which replaces the third with the major second above the root ($Csus^{2}$ = **C–D–G**).

To write the symbol for a seventh/extended chord with a suspension, the “sus” abbreviation comes *after* the extension, as in $C^{7}sus$. This is for clarity’s sake, since $Csus^{7}$ might look too much like $Csus^{2}$.

Try it!

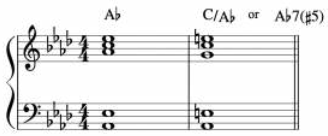
Check and see if you understand chord symbols by taking out a sheet of scrap paper and notating the harmonies indicated by the chord symbols below. As you complete each chord, you can pull the slider to the right to reveal the correct answer.

The original version of this chapter contained H5P content. You may want to remove or replace this element.

You can also view and listen to the answer on Musescore.com.

Chord Symbols vs. Roman Numerals

It’s important to understand that chord symbols are absolute labels, while Roman numerals are relative labels. Roman numerals are more theoretical and abstract, because they tell you the location of a chord *relative to* the key of the piece. Chord symbols, on the other hand, tell you exactly (*absolutely)* which notes are being played in this given chord, without reference to any key. It’s important to leave the relative thinking behind temporarily when you interpret chord symbols. Chord symbols do not reference keys.



Example 7. In many contexts, the simpler symbol C/A♭ is preferred to something more analytically descriptive, like $A♭^{7(\#5)}$.

Chord symbols are *not* analytical—they're a shorthand way of writing a score. In other words, the purpose of chord symbols is to get performers' fingers to the right notes at the right time. Chord symbols may represent things in a less functional sense if it means the symbol is easier to interpret. Example 7 is one such case: although the second chord really functions as an $A♭^{7(\#5)}$ chord, neighboring to the regular A♭ triad, the symbol C/A♭ is probably easier to process and thus preferred. (However, neither symbol is inherently right or wrong all the time—both will result in the right notes being played, and the better choice depends on context.)

Keeping these issues in mind helps in understanding the logic present in the system of chord symbols. Even though there is a lot of variation in chord symbols, learning a few rules will help you decipher any symbol.

Assignments

1. Chord symbols basics worksheet (.pdf, .mscz). Asks students to identify and write triads and seventh chords with chord symbols.
2. Chord symbols with extensions (.pdf, .mscz). Asks students to identify and write extended chords with chord symbols.

---

1. Although all the extensions below the highest extension are *implied*, they are not necessarily played. In fact, usually all the possible notes are *not* played, and some of the extensions between the highest and the seventh are omitted. The differences between what is notated, what is understood, and what is actually played are discussed more in the chapter on Jazz Voicings. 6.02: Chord Symbols#return-footnote-573-1

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6.3: Jazz Voicings

Key Takeaways

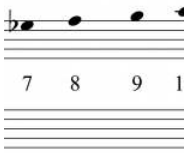
- Space chords to mimic the spacing of the harmonic series: use large, wide intervals in lower registers, and smaller, closer intervals in upper registers.
- Extensions should be voiced in the higher voices.
- If you double a note, usually double either the bass or the root of the chord.
- Omitting the fifth of the chord is almost always perfectly acceptable.
- Use smooth or “lazy” voice leading: move each voice as little as possible between chords to achieve a smooth, easy-to-perform sound. A common smooth voice-leading schema in jazz is to lead from the third of one chord to the seventh of the next, while another line connects the ninth of the first chord to the thirteenth of the second chord.
- Guidelines can be ignored, but this should be a conscious and deliberate decision to achieve a desired effect.

So far in this unit, you have written chords in an unvoiced format. While unvoiced chords are useful for conceptualizing harmony, you would not want to perform these tall stacks of thirds. This chapter will discuss how to voice these harmonies in a manner that is idiomatic to jazz. We will focus on voicings that play the root in the left hand at all times so that the harmony is always clear, although in performance, the root is often omitted (because it is covered by the bassist).

Spacing

The common spacing of chord members in musical textures has much to do with acoustics. We discuss pitches as specific frequencies—for example, A 440, the note to which most orchestras tune, refers to pitch A that has a frequency of 440 Hertz (Hz). But in fact, when an acoustic instrument plays A 440, 440 Hz is only one of the frequencies that is activated at that moment in time. The instrument will also activate the harmonics above that pitch, because the vibrating body causes other, shorter vibrations to occur simultaneously. These harmonics are part of what create an instrument’s unique timbre.

The harmonic series is approximated in Example 1.[1]



Example 1. The harmonic series, as approximated in notation.

Note that the pitches are spaced widely apart in the lower harmonics, but become closer and closer together in the upper harmonics: the distance between partials 1 and 2 is an octave, but beginning at partial 13, the distance between subsequent partials is only a half step.

In general, spacing in music approximates the harmonic series: notes are further apart in lower registers, and closer together in higher registers. Putting notes close together in a low register tends to sound muddy and dissonant, even when the chords are consonant. When notes are spaced wide apart in the upper registers, the upper note will sound quite prominent and isolated in the texture (though this can sometimes be a good thing).

Remember that the bass line is probably played by the upright bass—and this instrument sounds an octave lower than written, so its lowest note is an E_1, three Es below middle C. It’s normal for the bass to be in a register very much apart from the rest of the ensemble.

Chord extensions should be left in the upper registers of the texture. Recall that this is reflected in their names—a thirteenth is not the same as a sixth in jazz harmony. Voice the thirteenth somewhere above the seventh of the chord; otherwise, it will sound like the sixth.

Doubling

In general, a safe note to double is the bass note. Most often, the bass note is a relatively stable member of the chord. Because it’s the foundation of the texture, it sounds good to double the bass.

Another good option is to double the root of the chord, even if it is not in the bass. The root note, like the bass, is typically a stable tone, and will strengthen the chord when doubled.

Omitting Notes

Jazz harmonies often contain many notes, thanks to the common practice of extending the harmonies. It often wouldn't be desirable for all these notes to be given equal weight in the voicing, so it's common to omit some notes when voicing these extended harmonies.

The most common note to omit is the fifth of the chord. Because the fifth is an early pitch in the harmonic series (partial 3), it tends to strengthen the root of the chord without adding much character on its own. Listen and compare the various chords in Example 2, and notice that removing the fifth does very little to alter the overall sound of the chord, whereas omitting the seventh or root alters the sound substantially!

A link to an interactive elements can be found at the bottom of this page.

Example 2. Omitting the fifth is common, as it does not substantially alter the sound. The seventh and root are hardly ever omitted.

Omitting the root runs the risk of destabilizing the entire chord. However, if there is a bass player in the performing ensemble, you may deliberately omit the root in the other voices. The bassist will typically provide the root of the harmony and ensure that the chord sounds stable. The last chord in Example 2, then, would sound just fine if a bassist were playing a G below that voicing.

When dealing with extended chords, it becomes possible or desirable to omit other members of the chord besides the fifth, but it is difficult to generalize here. Usually, omitting tones is done to avoid excessive dissonance with other important chord members.

Smooth Voice Leading

We have been discussing harmonies as vertical entities so far: as a stack of notes that go bottom-to-top on the page. Vertical thinking is used a lot in music theory and by pianists and guitarists, but for almost everyone else, music is experienced horizontally: as a sequence of notes in time. It's important for musicians to be able to think of music both vertically *and* horizontally through voice leading.

Voice leading in jazz and many other styles should generally be smooth—that is, voices should ideally move as little as possible when going to a new chord (except the bass, which often leaps). Smooth voice leading helps different chords sound more logically connected (Example 3). When writing your own chord progressions, it may be helpful to imagine your voices as lazy: they want to move as little as possible! The smallest possible move is the common tone: not moving at all, but instead remaining on a single tone that is common to both chords. The next most preferable movement is movement by whole or half step. Skips (movement by third) are also easy to perform and easy to sing, and there are many situations that will force you to skip when voice leading.

Leaps are primarily used to provide contrast and excitement in voice leading. They are to be used sparingly, and with good reason. Leaps sound most natural when they are within a single chord: because the chord underpinning the horizontal movement is staying the same, it's easy for the voice to leap within that chord. When the chord is changing, though, adding leaps tends to make the chords sound disconnected and can make the piece difficult to perform. Leaping over a chord change is certainly possible, but it may take extra practice, and remember: your voices are lazy!

A link to an interactive elements can be found at the bottom of this page.

Example 3. Smooth voice leading helps chords sound connected to one another.

Jazz Voice Leading Paradigms

Throughout the Jazz section of the textbook, we will assume that the bass is playing the root of the chord at all times. So when discussing jazz voice leading, we will focus instead on the upper voices only.

Two upper voices: the 3–7 voice leading paradigm

If you are writing for only two voices above the bass, you should typically use the third and seventh of the chord (omitting the fifth). This produces smooth voice leading between any two chords whose roots are related by fifth or by second. as illustrated in Example 4. If the two chords are related by fifth (e.g., C^7–F^7 or G^7–Cma^7), then one voice will alternate between the third and the seventh of the chord, and the other voice will do the same but in the opposite order. If the two chords are related by second, then

the voices would move in parallel motion, and one voice would play the thirds of each chord while the other voice plays the sevenths of each chord. Notice that this yields only two kinds of intervals in the right hand: fourths and fifths.

A link to an interactive elements can be found at the bottom of this page.

Example 4. The 3–7 voice leading paradigm as applied to a ii–V–I progression (left) and a V–IV–I progression (right).

Three upper voices: adding extensions

A beginner may want to add the chord fifths when incorporating a third upper voice, but a more stylistically appropriate option is often to add extensions to the chord and continue to omit the chordal fifth. In particular, we can build on the two-voice 3–7 paradigm by adding a third line on top that alternates between ninths and thirteenths. Example 5 duplicates the voice leading from Example 4, but adds this third voice.

A link to an interactive elements can be found at the bottom of this page.

Example 5. A paradigm for jazz voicing with three upper voices. The two lower voices use the 3–7 paradigm; another smooth line is formed by adding a top voice connecting ninths and thirteenths (shown in blue).

Extensions are often altered from their default major quality. It can be difficult for a beginner to know when to alter extensions. As a starting point, try the extension that fits within the overall key, as in Example 5—note that there are no accidentals added in the top voice. If the diatonic version of the extension sounds awkward, experiment with raising or lowering the extension, and let your ear be your guide in choosing which variation of the extension sounds best. Example 6, which you may also download as a handout, demonstrates the most common extensions for chords of certain qualities, organized from simple to complex. But you shouldn't randomly select from these options—what sounds most fitting often depends on the surrounding chords, not just the quality of that chord alone. Experimenting with these extensions will help a beginner to develop a sense of what sounds most stylistic.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Common extensions to add for each chord quality.

Guidelines versus Rules

Most of the above principles are not really rules that you must follow, but rather guidelines for writing stylistically. The guidelines here represent what is most common in jazz music.

Guidelines are not always followed, but knowing them empowers you to *choose* not to follow them with the full understanding of the resulting sound. In other words, feel free to break the rules, but make sure you know why you're doing it!

Further reading

- Coker, Jerry. 1984. *Jazz Keyboard for Pianists and Non-Pianists: Class or Individual Study*. Miami: Alfred Music.

Resources

- Common chord symbols with extensions handout, by Brendan Schnabel.

Assignments

1. Voicing worksheet (.pdf, .mscz). Asks students to identify common voice leading patterns in a voiced jazz texture and to write voiced chord progressions with good voice leading.

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1. The notes of the harmonic series do not conform to twelve-tone equal temperament, but they have been notated at the nearest pitch for the sake of convenience. 6.03: Jazz Voicings#return-footnote-578-1

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6.4: ii–V–I

Key Takeaways

- ii^7–V^7–Ima^7 in major, or ii$^{\varnothing 7}$–V^7–i^7 in minor, is a fundamentally important progression in traditional jazz.
- The ii–V–I progression can be identified through a combination of root motion by fifths plus its distinctive sequence of chord qualities (mi7–7–ma7 in major, or ∅7–7–mi7 in minor).
- Because this progression is so important to jazz, the concept of applied chords can expand to include applied subdominant chords—i.e., the ii chord.
- Incomplete ii–V–Is, i.e., ii–Vs, can also be identified because the combination of root motion and quality is so distinctive.

Chapter Playlist

Example 1 shows final cadences from four jazz tunes. Look at the harmonies—a pattern should be apparent. (You can listen to the tunes through the the Spotify playlist for this chapter.)

A link to an interactive elements can be found at the bottom of this page.

Example 1. "Afternoon in Paris," "All the Things You Are," "My Funny Valentine," and "Joy Spring" all share similar harmonic progressions at their final cadences: ii–V–I.

All the examples end in perfect authentic cadences (PACs). But the similarities don't end there: each PAC is preceded by the ii chord. So we have three chords, each related to the next by fifth.

This ii–V–I progression is one of the most important progressions in jazz music. You can find it reliably at cadences, but also as a building block that occurs throughout a tune. When the progression occurs in a major key, as in the snippets in Example 1, the chord qualities of these chords are mi7–7–ma7. When the tune is in minor, the shift in mode changes the quality of the harmonies to ∅7–7–mi7 (the V chord is major whether you are in a major or minor key). Both of these progressions and a typical voice-leading pattern are summarized in Example 2.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Prototypical harmonies and voice leadings in ii–V–I progressions, in both major and minor modes.

ii–V–I as Schema

Schema is a useful concept in music theory, used in many ways within this book (pop harmony, for one). Put simply, schemas are common patterns our brains can recognize, even when variations are altering a specific presentation of that schema.

The ii–V–I progression is an example of a schema. It happens so frequently that informed listeners can recognize the schema in many formats. Some examples of alterations are given in Example 3. In "Misty," the ma^7 chord is replaced with a 6 chord (this occurred in "My Funny Valentine" in Example 2 also). In "Prelude to a Kiss," the typically dominant-quality V chord is replaced with an augmented chord (the minor seventh is preserved). The V chord is altered in "A Night in Tunisia," but this time, the fifth is lowered instead of raised.

A link to an interactive elements can be found at the bottom of this page.

Example 3. The ii–V–I is still recognizable, even if alterations occur.

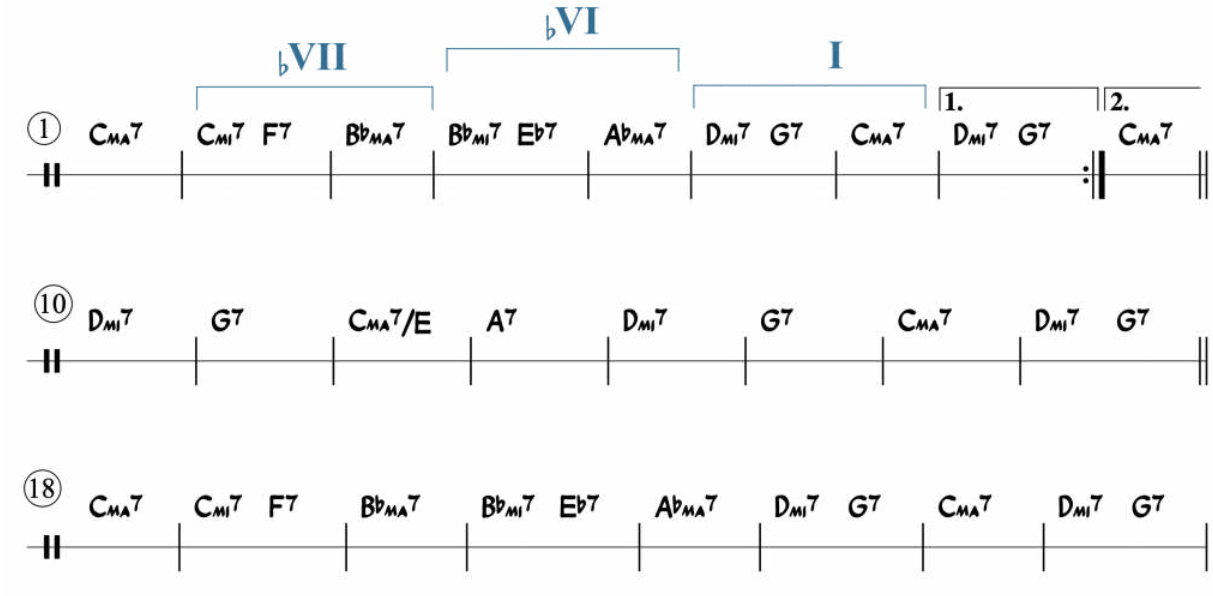
Applied ii–Vs

An important marker of dominant-function chords is the chord's quality. This is most obvious in the case of the dominant seventh quality, since it has "dominant" in the name. Fully diminished chords also have dominant function.

The compositional technique of applied chords capitalizes on the relationship between quality and function by taking dominant chords out of their key and dropping them into a new key. The applied dominant chords retain their function as dominant chords even when applied to a chord other than I (this concept is fully explained in the Tonicization chapter).

The omnipresence of ii–V–I as a schema in jazz means that in this style, we can have not only applied dominants, but applied ii chords as well. In other words, the entire ii–V–I progression can be used in keys other than the tonic key to tonicize another chord. The association between these chord qualities and root motions is so strong that a ii–V progression need not even resolve to its I chord to create the effect of a ii–V.

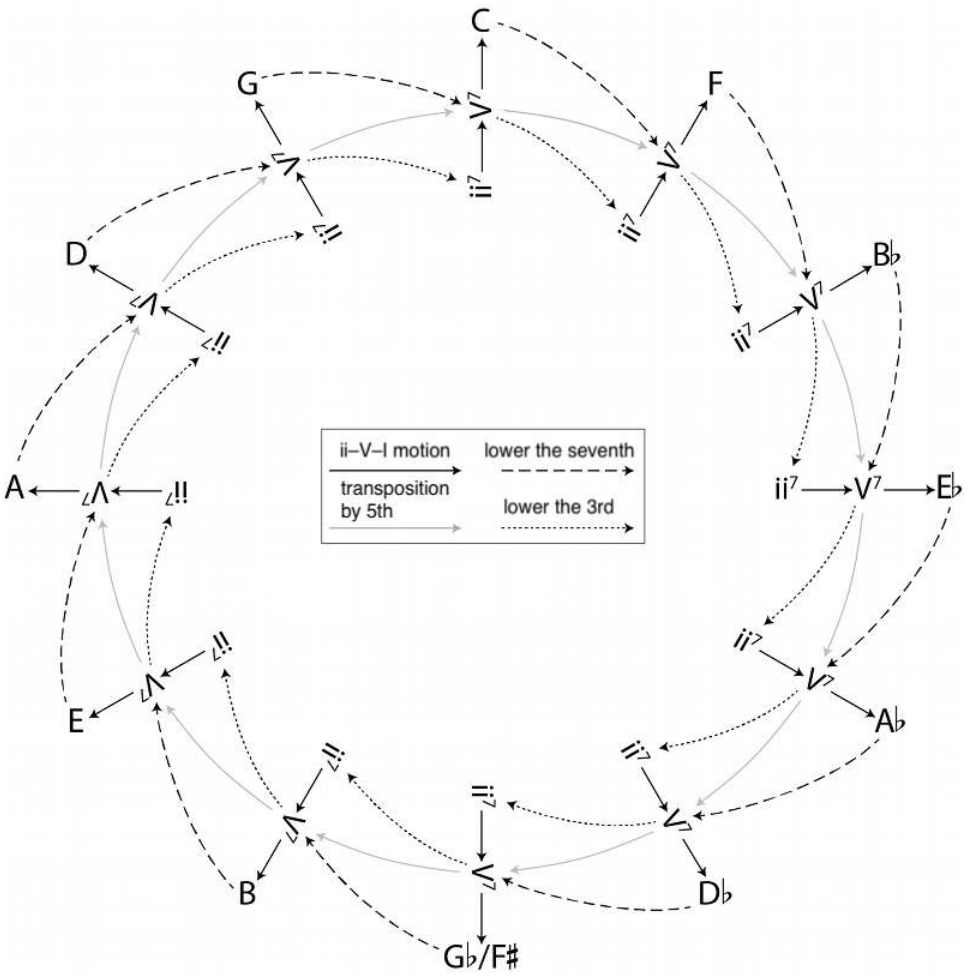
Take the rest of the A section of “Afternoon in Paris” as an example (Example 4). Not only does it end with a ii–V–I progression, but it begins with two other ii–V–Is: one tonicizing B♭ major, which is ♭VII in the key of C, immediately followed by another in A♭ major, which is ♭VI in the key of C.



Example 4. “Afternoon in Paris” by John Lewis uses ii–V–I progressions in different keys in sequence.

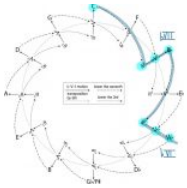
ii–V space

By relating all possible ii–V–I motions together, we can come up with a space in which these progressions operate, and visualize how the ii–V–Is in “Afternoon in Paris” are related. This idea comes from Michael McClimon (2017), and his “ii–V space” is reproduced in Example 5. The space is arranged as the circle of fifths (note the letter names at the end of each progression), with each chord in the circle preceded by a ii–V.



Example 5. McClimon's ii–V space relates ii–V progressions of keys related by fifth.

There are four different variations of arrows in Example 5, and each signifies a different transformation from the first chord to the chord at the other end of the arrow. The two solid arrows have to do with root motion: the black arrows connect chords within a ii–V–I schema, while the gray arrows show the circle-of-fifths relationships. The dashed arrows show changes to chord quality. The larger dashes indicate that the chord is the same except that the seventh has been lowered, so each larger-dashed arrow connects a ma7 chord to a (dom)7 chord with the same root. The smaller dashes show that the chord is the same, but the third has been lowered: each smaller-dashed arrow connects a 7 chord to a mi7 chord with the same root.



Example 6. "Afternoon in Paris" transforms Ima^7 chords into minor seventh chords, thus changing their function: they become ii^7 chords.

Example 6 traces the progressions in "Afternoon in Paris" that were annotated in Example 4. Notice how the space helps to illustrate the logic of the progression: by transforming the preceding Ima^7 chords into ii^7 chords, it forces a modulation down by whole step.

Understanding a piece through the ii–V schema

The logic of a chromatic progression like the one in Lee Morgan's "Ceora" becomes more intelligible when viewed through this lens. An analysis originally by McClimon is explained in the video below (Example 7).

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Example 7. “Ceora” by Lee Morgan is entirely composed of ii–V–Is.

Turnarounds

A particularly common version of applied ii–Vs comes in what is called the turnaround. In the broadest sense, a turnaround is a progression that serves to loop back to the original tonic chord, and the typical progression that achieves this is I–vi–ii–V–I. Using the concept of applied chords, we can substitute a V^7/ii for the vi chord, since they share the same root. But we can also precede that V^7 with its ii chord—effectively, a ii/ii (two of two). Thus, the ii chord of the turnaround is tonicized with its own ii–V–(I) progression. This tonicized version of the turnaround is a very common variant (Example 8).

A link to an interactive elements can be found at the bottom of this page.

Example 8. The turnaround schema has diatonic and chromatic variants.

Further reading

- Aebersold, Jamey. 1974. *The II–V^7–I Progression*. Vol. 3. Jamey Aebersold Play-A-Long Series. New Albany, IN: Jamey Aebersold Jazz.
- McClimon, Michael. 2017. “Transformations in Tonal Jazz: ii–V Space.” *Music Theory Online* 23 (1). http://mtosmt.org/issues/mto.17.23.1/mto.17.23.1.mcclimon.html.

Assignments

1. ii–V–I worksheet (.pdf, .docx). Worksheet playlist Note that these lead sheets are not public domain and thus cannot be posted here; however, the lead sheets are not difficult to find if you search the internet or ask around.
2. Composing with ii–V–I worksheet (.pdf, .mscz, .musicxml). This functions as a preparatory assignment for the Bebop Composition.

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6.5: Embellishing Chords

Key Takeaways

This chapter presents two ways of adding new harmonies to an existing chord progression.

- An applied ii chord, as in the ii–V–I schema, can be used to embellish a dominant-quality chord. In other words, preceding a dominant-quality chord with the mi7 or ∅7 chord a fifth above it creates the effect of a ii–V.
- Common-tone diminished seventh chords (CT^{o7}) create neighboring motion in all voices that embellish a chord. The root of the chord of resolution is always shared as a member of the CT^{o7}—hence the term "common tone." *(Note: See this chapter for more information on CT^{o7} chords in Western classical music.*)

Jazz performers often aim to add their own twist to existing jazz standards. One way of doing this is to add new chords that embellish existing chords in the progression. This chapter explores two ways that performers improvise by embellishing harmonies in jazz.

This chapter will use the opening few bars of "Mood Indigo" by Duke Ellington (1930) as a backdrop and add embellishing chords to it. If you take a moment to familiarize yourself with the tune, the following discussions will make more sense. Listen to Louis Armstrong's interpretation of this song, embedded below, while following the chords of the first few bars, given here.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Chords for the first four measures of "Mood Indigo" by Duke Ellington.

Embellishing Applied Chords

Applied V^7

Any chord in a progression can be embellished by preceding it with an applied dominant chord. Example 2 takes the surprising G♭ chord of measure 7, divides it in half, and replaces the first half note of the chord with its applied V^7 chord. In principle, this can be done with any chord in the progression.[1]

A link to an interactive elements can be found at the bottom of this page.

Example 2. Inserting a $D♭^7$ chord before the $G♭^7$ chord creates an applied V of G♭, which is not present in the original chord progression of "Mood Indigo."

Applied ii

The chapter on ii–V–I discusses the use of applied ii–V–Is, i.e., ii–V–I progressions that occur in keys other than the tonic key. Many jazz tunes have these applied ii–Vs built in, but a performer could add their own as well. A dominant chord can often be embellished by adding its ii chord before it, transforming it into a ii–V schema.

"Mood Indigo" by Duke Ellington begins with the progression **B♭–C^7–Cmi^7–F^7–B♭**. That first C^7 could be embellished by adding a Gmi^7 before it, creating a temporary ii–V that then proceeds to another ii–V. Rhythmically, this means cutting the duration of the C^7 into two halves and replacing the first half with the applied ii chord. The result is the progression in Example 3 below.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Inserting a Gm^7 chord before the C^7 chord creates a ii–V in F, which is not present in the original chord progression of "Mood Indigo."

Common-Tone Diminished Seventh Chords (CT^{o7})

Example 4. Common-tone diminished sevenths share a common tone with the root of the chord being embellished, shown here with ties.

The common-tone diminished seventh chord (hereafter CT^{o7}) is a voice-leading chord, which means that the chord is not based on a particular scale degree like most other harmonies, but rather the result of more basic embellishing patterns. In this case, the embellishing motion is the neighbor motion. To create a CT^{o7}, the root of the chord being embellished is kept as a common tone (hence the name), and all other voices move by step to the notes of the diminished seventh chord that includes that common tone. This is best explained in notation, as in Example 4.

The CT^{o7} can be used to prolong any chord. Rhythmically, the chord would be inserted somewhere in the middle of the total duration of the harmony, leaving the prolonged harmony on either side of it (as in Example 4). Another option is to skip the initial statement of the prolonged harmony and instead jump straight into the CT^{o7}. Example 5 adds both types of CT^{o7} to "Mood Indigo," the melody of which is particularly suggestive of CT^{o7} embellishments. In this example, the CT^{o7} chords are not given their own Roman numerals, to show that they do not significantly affect the harmonic progression of the phrase—instead, they embellish the chords around them with chromatic neighbor tones. Similarly, the CT^{o7} chords are not shown with chord symbols, because these chords are often not written into lead sheets but improvised by the performers.

A link to an interactive elements can be found at the bottom of this page.

Example 5. A CT^{o7} embellishes the opening B♭ chord, inserted on beat 3 of the whole-note harmony. A CT^{o7} also embellishes the C^{7} chord, displacing the C^{7} by a half note.

Embellishing Chords in a Lead Sheet

As with substitutions, embellishments are not always represented the same way in a lead sheet.

- There may not be any embellishing chord notated, and instead, the performers are improvising this addition as they play.
- The embellishing chord may be built into the chord progression and thus be notated in the chord symbols.
- The embellishing chord may be indicated as an alternate harmonization and shown in the chord symbols with parentheses around the embellishing chords.

This is illustrated in Example 6 with different ways of showing a CT^{o7} in "Mood Indigo" by Duke Ellington.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Embellishing chords can be (a) unwritten and improvised by performers, (b) written into the chord symbols, or (c) indicated as an alternative harmonization with parentheses.

Further reading

- Levine, Mark. 1995. *The Jazz Theory Book*. Petaluma, CA: Sher Music.

Assignments

1. Bebop composition. Asks students to build on knowledge of swing rhythms, ii–V–I, embellishing chords, and substitutions to create a composition in a bebop style.
   - PDF: Complete instructions + template
   - MSCZ: Template for lead sheet, template for voicings
   - DOCX: instructions only

---

1. The G♭ chord is itself a tritone substitution for C^{7}, which would be the applied V^{7} of F^{7}. Tritone substitutions are discussed in another chapter.6.05: Embellishing Chords#return-footnote-591-1

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6.6: Substitutions

Key Takeaways

This chapter discusses methods for altering chord progressions through chord substitution.

- A progression that moves by fifth can substitute the first chord with the dominant chord that shares the same root. This makes the first chord an applied chord to the second chord.
- Mode mixture is when a piece in a major key uses chords borrowed from the parallel minor key (or vice versa, though this is less common).
  - In jazz, the most common mixture chords are substituting ii$^{\varnothing 7}$ for ii^{7} and adding ♭9 to a V^{7} chord.
  - The most common mixture chords, including ii$^{\varnothing 7}$ and V$^{7\flat 9}$, substitute *le* for *la* (\downarrow\hat6 for \natural\hat6).
- Tritone substitutions replace a dominant chord with another dominant chord a tritone away. The name refers both to the interval between the original and substituted chords and to the fact that the two chords share the same tritone.

Creating new interpretations of old favorite tunes is one of the cornerstones of jazz, and because of this, the concept of chord substitutions is extremely important. Substitutions provide a way for performers and arrangers to put a new spin on more well-trodden harmonic progressions. This chapter uses the turnaround as a basic progression to be altered, but these substitutions can be applied anywhere in a harmonic progression.

Applied Chords as Substitutions

As discussed in the Tonicization chapter, an applied chord can be productively related to the diatonic chord with which it shares a root note.

Because root motion by fifth is extremely common in jazz, there are many opportunities for performers to simply substitute the first chord in a fifth-wise chord progression with the dominant seventh built on the same root. One especially common place where this is implemented is in the turnaround, where, because each chord is related to the next by fifth, a chain of applied V^{7}s is a common variant (Example 1).

A link to an interactive elements can be found at the bottom of this page.

Example 1. When a progression has root motion by fifth, the quality of the first chord can be changed to dominant seventh in order to transform it into an applied V^{7}.

Mode Mixture

“All of You” by Cole Porter is a composition that has mode mixture built into it. Listen to this recording by Ella Fitzgerald (transcribed in Example 2), conveniently in C major, and observe how the alternation between A♮ (*la*, \hat6) and A♭ (*le*, \downarrow\hat6) catches the ear and imbues a sense of sentimentality in the song. A♭ here can be understood as being borrowed from the parallel minor (C minor), a practice known as mode mixture.

A link to an interactive elements can be found at the bottom of this page.

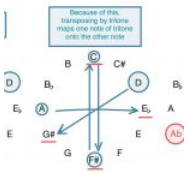
Example 2. “All of You” by Cole Porter uses a minor iv chord (Fmi) and a half-diminished ii chord (D$^{\varnothing 7}$) even though the tonic is major.

$$(\hat{6}) \tag{6.6.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 3. Mixture chords are most effective when they involve \mathit{\downarrow\hat6}. Mixture and diatonic versions of the same chord have the same function.

Tritone Substitutions



Example 4. Mapping the twelve-tone chromatic collection onto a circle helps to illuminate the symmetry of a tritone.

While the above methods of substitution are common in pop and classical styles as well, the tritone substitution is unique to jazz. Tritone subs take the place of V^7 chords, either applied or diatonic. The "tritone" part of the name comes from two key roles of tritones in these substitutions:

1. The substituted chord is a tritone away from the chord it is replacing.
2. The chords are related because they share the same tritone.

This relationship is best explained graphically, as in Example 4: because the tritone evenly divides the twelve-tone collection, transposing by tritone maps the tritone onto itself. Speaking practically, the bottom line is that any dominant seventh chord can be replaced by the dominant seventh chord a tritone away, and the progression still functions the same way.

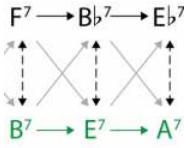
One way to recognize a tritone sub is by its chromatic resolution downward by a minor second.

Example 5 shows how tritone substitutions are commonly used in the turnaround.

- As discussed above, it's common to replace the diatonic chords with applied chords that share the same root, yielding a progression consisting entirely of V^7 chords—this is shown in the right-hand harmonization on the top row.
- From there, tritone substitutions can be used for any V^7 chord.
- Most commonly, every other chord is replaced with a tritone sub, yielding a chromatic bass line and smooth voice leading, as in the bottom row of harmonizations.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Because tritone substitutions can replace any applied dominant chord, in progressions moving by fifth like the turnaround, chords may first be (conceptually) substituted with their applied variants, and then tritone substitutions can be used to create a chromatic bass line.



Example 6. The tritone substitution space parallels the diatonic space.

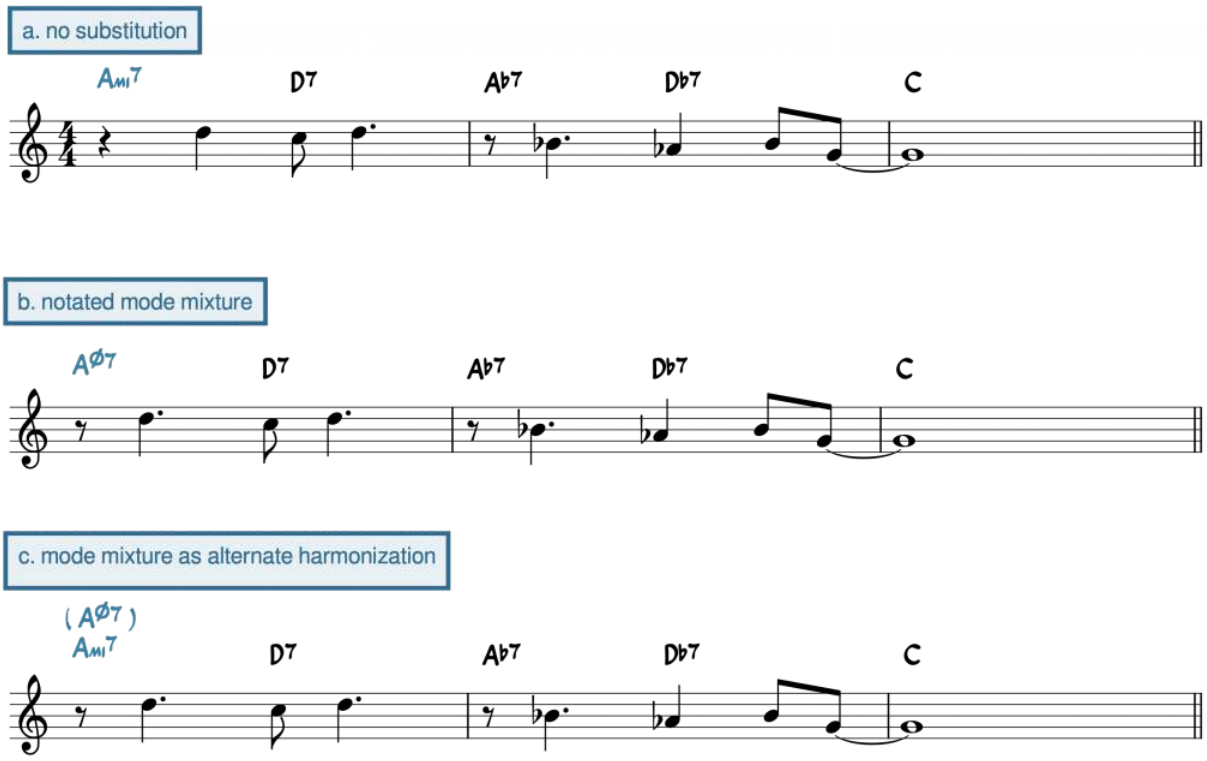
The ii–V–I chapter visualized the ii–V–I schema within a voice-leading space constructed by Michael McClimon (2017). McClimon further visualizes the tritone substitution as a kind of shadowing space behind the typical ii–V space (Example 6). Click here to view his animation of the progression of "Blues for Alice" and its movement through the ii–V space with tritone substitutions. Notice that the tritone-substituted V^7 chord is preceded by its ii^7 chord, and that both chords are in the green space that McClimon places behind the foreground ii–V space.

Substitutions in a Lead Sheet

As with embellishing chords, substitutions are not always represented the same way in a lead sheet.

- There may not be any substitution notated, and instead the performers are improvising this addition as they play.
- The substitution may be built into the chord progression and thus be notated in the chord symbols.
- The substitution may be indicated as an alternate harmonization and shown in chord symbols with parentheses around the substituted chords.

This is illustrated in Example 7, with different ways of showing a modally mixed $ii^{\varnothing 7}$ chord in "Satin Doll" by Duke Ellington.



Example 7. Substitutions can be (a) improvised and not notated in the score at all, (b) written directly into the chord symbols, or (c) written in parentheses to indicate that the substitution is optional.

Further reading

- Levine, Mark. 1995. *The Jazz Theory Book*. Petaluma, CA: Sher Music.
- McClimon, Michael. 2017. "Transformations in Tonal Jazz: ii–V Space." *Music Theory Online* 23 (1). http://mtosmt.org/issues/mto.17.23.1/mto.17.23.1.mcclimon.html.

Assignments

1. Bebop composition. Asks students to build on knowledge of swing rhythms, ii–V–I, embellishing chords, and substitutions to create a composition in a bebop style.
   - PDF: Complete instructions + template
   - MSCZ: Template for lead sheet, template for voicings
   - DOCX: instructions only

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6.7: Chord-Scale Theory

Key Takeaways

Chord-Scale Theory is an approach to improvising that relates chords to scales.

- The name “Chord-Scale Theory” comes from the idea that the notes of a thirteenth chord can be rearranged as a seven-note scale.
- To determine chord-scales, identify key centers and chord functions through Roman numeral analysis.
- Roman numerals can be related to mode numbers. For example, if a chord is a **ii** chord in a major key, the **second** mode (dorian) can be used to color that chord.
- When playing chord-scales, place chord tones on the downbeat to connect improvised melodies to the chord progression.

This book covers modes from many different angles. For more information on modes, check Introduction to Diatonic Modes (general), Modal Schemas (pop), Diatonic Modes (20th/21st-c.), and Analyzing with Modes, Scales, and Collections (20th-/21st-c.).

Chapter Playlist

One of the challenges of improvising jazz is making choices about pitches while also paying attention to groove, interaction, and narrative form. The Chord-Scale Theory is a method, taught at the Berklee College of Music and many other colleges and universities, that facilitates pitch choices in jazz improvisation. Chord-Scale Theory is based on George Russell’s *Lydian Chromatic Concept of Tonal Organization* ([1953] 2001), and it was popularized by jazz educators Jamey Aebersold, David Baker, and Jerry Coker.

The basic concept is that every chord comes from a parent scale; or, to put it another way, every chord in a progression can be colored by a related scale. For example, a Dmi^7 chord extended to the thirteenth consists of the notes D, F, A, C, E, G, and B, which are identical to the notes of the D dorian mode stacked in thirds (Example 1). Therefore, when confronting a Dmi^7 chord in a chord progression, an improvising musician could choose to improvise using the notes of the D dorian mode to create new melodies.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A Dmi^{13} chord and a D dorian scale have identical pitches.

Basic Chord-Scale Relationships

Starting a major scale on each of its seven notes will yield seven different modes. Each of the modes will have a different pattern of half steps and whole steps and thus a different color. (For more information, see Introduction to Diatonic Modes and/or Diatonic Modes).

Since the ii–V–I schema is so common in jazz standards, the three chord-scale relationships in Example 2 are often taught first. Example 3 shows these three relationships within the context of a ii–V–I progression in C.

[table id=49 /]

Example 2. Basic chord-scale relationships.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Chord-scale relationships in a ii–V–I progression in C.

A beginning improviser might approach a song consisting mainly of ii–V–I progressions by simply applying the dorian mode to minor seventh chords, the mixolydian mode to dominant seventh chords, and the ionian mode to major seventh chords. As Example 4 shows, an improvised melody can imply a harmony by placing chord tones on the downbeats, and a seven-note mode can be thought of as a four-note seventh chord with three passing tones or extensions (ninth, eleventh, thirteenth).

A link to an interactive elements can be found at the bottom of this page.

Example 4. The basic chord-scale relationships for ii–V–I as they might be used in “Tune Up” by Miles Davis (1953).

Chord-Scales and Major Keys

There are many more possible chord-scale relationships beyond those above. The seven notes of the diatonic scale suggest seven basic chord-scale relationships, as summarized in Examples 5 and 6.

[table id=50 /]

Example 5. Chord-scale relationships between Roman numerals and modes.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Chord-scale relationships for all diatonic harmonies in C.

A similar approach to the one above can be used to derive more chord-scale relationships from the melodic minor, harmonic minor, and harmonic major modes. To learn more about this, consult Further Reading below.

Applying Chord-Scales to Progressions within a Key

Reorganizing these relationships by chord quality reveals the choices listed in Example 7 for matching chord qualities to scales. For example, when improvising on a minor seventh chord, a musician can choose from three chord-scales: dorian, phrygian, or aeolian (Example 8).

[table id=51 /]

Example 7. The same chord-scale relationships as in Example 5, rearranged by chord quality.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Chord-scale choices for a minor-seventh chord.

However, it's important to realize that Chord-Scale Theory does not imply that the key modulates each time the chord changes. In other words, these chord-scales are not key centers. Since each mode will imply different extensions, identifying chord functions through Roman numeral analysis helps an improviser choose chord-scales that best fit the key center.

For example, the opening measures of "Fly Me to the Moon" (1954) contain six of the seven diatonic chord-scale relationships in a circle-of-fifths root movement (Example 9). The chord progression in this example is clearly in the key of C, not seven different keys. Rather than simply coloring each minor chord with a dorian mode and each major chord with an ionian mode, differentiating between the vi and ii chords and between the I and IV chords will result in a more natural-sounding improvised line.

A link to an interactive elements can be found at the bottom of this page.

Example 9. These chord-scales applied to "Fly Me to the Moon" by Bart Howard (1954) distinguish between different chords of the same quality, because the chords still have different functions.

Example 10 is the a transcription of the first chorus of John Coltrane's improvised solo on "Giant Steps" (1960), transposed to B♭ for tenor saxophone. Because of the fast tempo and unusual key center relationships, Coltrane improvises melodies that consist mainly of arpeggios and scale fragments. Note how he uses the ionian mode on major chords, the mixolydian mode (with a passing tone between *do* and *te* [\hat{1} and downarrow\hat{7}] in m. 9) on dominant seventh chords, and the dorian mode on minor chords.

A link to an interactive elements can be found at the bottom of this page.

Example 10. Transcription of the first chorus of "Giant Steps" by John Coltrane (1960).

Limitations of Chord-Scale Theory

Some jazz educators have pointed out limitations of the Chord-Scale approach, such as:

- **The absence of voice leading between chords.** Chord-Scale Theory can lead a student to see each chord as a new key center, instead of viewing an entire chord progression as derived from a parent scale. This can result in choppy, un-melodic improvisation that lacks smooth voice leading between chords.
- **Lack of the chromaticism commonly used in bebop and blues-based styles.** Chord-Scale Theory generally does not account for neighbor tones, passing tones, secondary leading tones, and blue notes employed by bebop musicians such as Charlie Parker, Dizzy Gillespie, and Bud Powell.
- **The anachronism of applying a 1960s modal concept to tunes from 1920–50.** Louis Armstrong and Charlie Parker did not think in terms of chord-scales. Educators such as Hal Galper and Hal Crook emphasize the importance of melodic embellishment, chord tone improvisation, and blues-based improvisation before delving into chord-scale relationships.

- **The avoidance of the oral tradition.** Chord-Scale Theory emphasizes the eye and intellect rather than the ear and intuition. Practicing chord-scale relationships does not substitute for transcribing improvised jazz solos, memorizing tunes, improvising along with recordings, or jamming with other musicians as the preferred methods of learning the oral tradition of jazz improvisation.

Further Reading

- Haerle, Dan. 1982. *The Jazz Language: A Theory Text for Jazz Composition and Improvisation*. Hialeah, FL: Alfred Music.
- Nettles, Barrie, and Richard Graf. 2015. *The Chord Scale Theory & Jazz Harmony*. Mainz: Alfred Music.
- Russell, George. (1953) 2001. *The Lydian Chromatic Concept of Tonal Organization: The Art and Science of Tonal Gravity by George Russell*. 4th edition. Brookline, MA: Concept Publishing Company.

Assignments

1. Coming soon!

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6.8: Blues Harmony

Key Takeaways

- Blues harmony differs from tonal and jazz harmony in a number of important ways, especially in the treatment of the dominant seventh chord.
- In a standard 12-bar blues, all chords are dominant seventh chords.
- The blues is a schema that can have many alterations without ceasing to qualify as “a blues.”
- Common variations on the 12-bar blues are the 16-bar blues, the minor blues, and the jazz blues.
- The jazz blues blends jazz and blues harmonic languages together.

Chapter playlist

The blues is an extraordinarily important genre in U.S. popular music. Not only is the tradition itself very old, with roots reaching back to the music of enslaved African Americans, but it continues to exert influence on 21st-century popular music.

The documentation on the history of the blues is quite limited due to its age, but the earliest blues songs existed in the late 1800s, and it seems to have grown out from earlier African American musical styles, such as field hollers and work songs, as well as microtonal and rhythmic characteristics of West African music. In this sense, although jazz musicians very frequently play the blues, the blues as a tradition has distinct origins from jazz. Jazz developed first in New Orleans through a mix of African, Caribbean, and European influences. The result of this distinction is that many of the truisms of jazz or tonal music do not hold true in the blues. Among the biggest harmonic differences are:

- Dominant-quality seventh chords can have any function (tonic, dominant, or subdominant).
- Plagal cadences provide structural closure, instead of authentic cadences.
- Major and minor thirds are freely mixed together, and even used simultaneously (sometimes written in chord symbols as a major/dominant chord with a ♯9 extension).

This chapter introduces some of the most common forms of the blues encountered in the 20th and 21st centuries.

12-Bar Blues

The blues is a schema: a frame of reference for understanding lots of different chord progressions. Blues progressions can all be understood as outgrowths from a basic prototype.

The 12-bar blues progression is composed of three phrases, typically four bars each. A major difference between the blues and more traditionally tonal music is that it emphasizes plagal cadences instead of authentic cadences. At its most basic, the harmony progresses as shown in Example 1:

1. The first phrase is entirely tonic harmony (I).
2. The second phrase contains two bars of subdominant (IV) and two bars of tonic (I).
3. The final phrase begins with one bar of dominant (V) followed by one bar of subdominant (IV) and two bars of tonic (I).
4. All chords are dominant seventh chords and do not fit into a single key.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A basic 12-bar blues.

This is the simplest version of the 12-bar blues, but innumerable variations exist upon these changes. One of the most common additions is that the second bar may move to IV, then return to I in the third bar. Another especially common trick is to employ some type of turnaround in the final bar or two of the progression, from something as simple as a V^7 chord to a full III–VI–II–V progression. It can be difficult to find a blues tune that doesn’t make some alteration from the basic form shown in Example 1. “You Can’t Do That” by the Beatles (1964) is nearly the same, but it does add a V chord in the final bar as a turnaround.

Example 2. 16-bar blues.

Closely related is the 16-bar blues progression, which is composed of four 4-bar phrases, usually two iterations of tonic followed by subdominant and dominant (Example 2). “Hoochie Coochie Man” by Muddy Waters (1954) is one example of a 16-bar blues. Notice that the final phrase may or may not end with a turnaround. The 16-bar blues is not as common as the 12-bar blues, but it has somewhat heightened frequency in blues-based rock music.

Most commonly, the blues is in “major” (which, in this context, simply means that the tonic harmony has a major third above it—many pitches in a major blues fall outside the major scale). But another common variation on the blues is a minor blues. In a minor blues, the i and iv chords are minor sevenths instead of dominant sevenths; the V stays dominant. Because the motion from the major V to the minor iv can sound anticlimactic, the minor blues also typically replaces the V–IV–I motion in the third phrase with a ii–V–I (Example 3).

A link to an interactive elements can be found at the bottom of this page.

Example 3. A typical minor blues.

Jazz Blues

As mentioned in the introduction to this chapter, the blues treats harmony differently from jazz, and one of the large differences is the reliance upon plagal rather than authentic cadences. The jazz blues is a variant of the 12-bar blues that mitigates this somewhat by adding several ii–V progressions to the blues.

Like the 12-bar blues, the jazz blues is composed of three 4-bar phrases. A basic version of the jazz blues is presented in Example 4.

Notice that the jazz blues mixes typical blues harmony (i.e., the use of non-V dominant seventh chords and plagal resolutions) with jazz harmonic schemas: specifically, it uses ii–Vs and turnarounds. In bar 8, instead of remaining on tonic, there is an applied ii–V that leads to the ii chord in bar 9. And in the third phrase, the V–IV–I of the standard blues is replaced with a ii–V–I more common to jazz.

A link to an interactive elements can be found at the bottom of this page.

Example 4. The jazz blues adds ii–V progressions, replacing structural plagal cadences.

One recording that performs the blues this way is the Lincoln Center Jazz Orchestra performing Duke Ellington’s “C Jam Blues.” This is easiest to hear during the solo sections; however, not every repetition of this blues contains every chord shown in Example 4.

Examples of Variations

The blues can be varied extensively yet still qualify as the blues. This chapter’s Spotify playlist goes through several tracks that have some slight variations on the schemas outlined above:

- “Runaway Blues” by Ma Rainey (1928) uses a IV in the first tonic phrase, and it also embellishes the final V with an applied V/V.
- “Empty Bed Blues, Pt. 1” by Bessie Smith (1928) follows a basic 12-bar blues but precedes most new harmonies with a tonicizing ii–V progression.
- “Surfin’ USA” by the Beach Boys (1963) presents a 16-bar blues, but the first two phrases each begin with two bars of V before two bars of I.
- “The Thrill is Gone” as recorded by B.B. King (1970) is in minor, and it replaces the ii–V of the final phrase with ♭VI–V.

Musicians who have developed a familiarity with the blues will have no trouble recognizing the blues in a tune even with these variations and more.

Assignments

1. Worksheet on 12-bar blues (.pdf, .mscz). Asks students to write basic and jazz 12-bar blues progressions, voiced and unvoiced, and to analyze altered blues progressions. Worksheet playlist
2. Worksheet on 12-bar blues, no jazz (.pdf, .mscz). Same as Assignment 1, but simplified: aks students to write basic 12-bar blues progressions, voiced and unvoiced, and to identify unusual chords in altered blues progressions. Worksheet playlist

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6.9: Blues Melodies and the Blues Scale

Key Takeaways

- In a blues song with a sung text, the lyrics consist of a line that is repeated, then followed by a contrasting line (**aab**). The melody often follows this structure as well.
- Blues melodies often leave large gaps to allow for call-and-response between the melodic instrument and other instruments.
- The blues scale is like a minor pentatonic scale with an additional chromatic passing tone: *do–me–fa–fi–sol–te* (\hat1-\downarrow\hat3-\hat4-\uparrow\hat4-\hat5-\downarrow\hat7).
- The blues scale can be rotated to begin on its second note, creating a major blues scale: *do–re–ri–mi–sol–la* (\hat1-\hat2-\uparrow\hat2-\hat3-\hat5-\hat6).

This chapter discusses some of the trends in blues melodies that shaped the blues as we know it today. As an example, this text will focus on one of the earliest recorded blues songs, “Gulf Coast Blues” by Clarence Williams, as recorded by the enormously commercially successful blues singer Bessie Smith in 1923.

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=610

Example 1. “Gulf Coast Blues” (1923), recording by Bessie Smith and Clarence Williams.

Phrase and Lyric Structure

Much blues music is sung, and so lyrics play an important role in this genre. The four-bar phrases that make up the 12-bar blues are commonly matched with lyrics that have an **aab** structure: the first line is stated and then repeated (sometimes with some alteration), and the third line contrasts. “Gulf Coast Blues” by Clarence Williams (1923) is one example of this (Example 2). The repeated lyric will often be set to a repeated melody, mimicking the **aab** structure of the lyrics, though this does not happen in “Gulf Coast Blues.”

[table id=26 /]

Example 2. Lyrics of “Gulf Coast Blues” by Clarence Williams.

Another essential part of blues phrase structure is the notion of call-and-response, a feature likely inherited from the work songs of enslaved Africans and African Americans. The vocal, lyricized melody takes on the role of the “call” while an instrumental filler takes on the role of the “response.” Notice that in “Gulf Coast Blues,” each lyric labeled with an **a** is sung entirely and exclusively in the first two measures of the phrase. Example 3 annotates a transcription of “Gulf Coast Blues” to show this call-and-response relationship.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Call-and-response in the melody of “Gulf Coast Blues.”

The Blues Scale

$$(\hat{5}) \tag{6.9.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 4. The C blues scale creates stylistic clashes with the I and V chords of C major.

$$(\hat{3}/\downarrow\hat{3}) \tag{6.9.2}$$

$$(\hat{3}/\downarrow\hat{3}) \tag{6.9.3}$$

The “major” blues scale

$$(\downarrow\hat{3}) \tag{6.9.4}$$

A link to an interactive elements can be found at the bottom of this page.

Example 5. Rotating the blues scale to begin on its second note yields the major blues scale.

Compared to the minor blues scale, the major blues scale is less dissonant with major chords. When improvising, it can be helpful to think of improvising with the major blues scale over the major chords of the blues progression. But remember that using the blues scale (with flatted thirds and sevenths) over major chords is also a perfectly normal practice.

Assignments

1. Blues scales worksheet (.pdf, .mscz). Asks students to spell scales and transcribe a melody that uses the blues scale. Worksheet playlist
2. Improvising with the blues scale (.pdf, .mscz). Video assignment. Asks students to pair off and create videos with call-and-response improvisation. Backing track available here.
3. Blues composition (.pdf, .docx). Asks students to synthesize information about blues harmony and blues melody.

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CHAPTER OVERVIEW

Chapter 7: Popular Music

7.1: Rhythm and Meter in Pop Music
7.2: Drumbeats
7.3: Melody and Phrasing
7.4: Introduction to Form in Popular Music
7.5: AABA Form and Strophic Form
7.6: Verse-Chorus Form
7.7: Introduction to Harmonic Schemas in Pop Music
7.8: Blues-Based Schemas
7.9: Four-Chord Schemas
7.10: Classical Schemas (in a Pop Context)
7.11: Puff Schemas
7.12: Modal Schemas
7.13: Pentatonic Harmony
7.14: Fragile, Absent, and Emergent Tonics

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7.1: Rhythm and Meter in Pop Music

Key Takeaways

- Straight syncopation can be understood as taking a square rhythm and shifting some of the notes early by half the duration.
- Other syncopations are derived from dividing a unit into nearly even parts.
- A particularly common nearly even syncopation is the tresillo pattern of 3+3+2.

The Drumbeats chapter contains more details on rhythm within drum parts.

Chapter Playlist

Straight Syncopation

In contemporary pop/rock music, syncopation typically involves taking a series of notes of equal durations, cutting the duration of the first note in half, and shifting the remaining notes early by that half duration.

For example, a series of four quarter notes, all sounding on the beat, can be transformed in this way by making the first note into an eighth note and sounding each successive quarter note one eighth note early—all on the offbeats.

This process can occur on any metrical level. The unit of syncopation (the duration of the first note, and the amount of shift applied to the following notes) is always half the duration of the straight notes. All of the following syncopations are relatively common in contemporary pop/rock music:

- If the duration of the series of "straight" notes is two beats, they will be syncopated by changing the first note to a single beat and shifting each of the other notes early by a beat.
- If the duration of the straight notes is one beat, they will be syncopated by a division (one half beat in simple meter).
- If the straight notes are each divisions, they will be syncopated by shifting each note by a subdivision.

As a convention, when we take a series of notes that each have a duration of one beat and shift them early by half a beat, we will call that *beat-level syncopation* (Example 1). When we take a series of notes that each have a duration of one division and shift them early by a subdivision, we will call that *division-level syncopation*.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Straight syncopation moves the attacks forward by half the value of the metric level.

Transcribing straight syncopations

Straight syncopated rhythms are easily identified by the frequently occurring off-beat rhythms. For example, if you listen to a song and conduct or tap the counting pulse, you may notice several notes in a row that are articulated between these pulses, with no notes articulated right on a pulse—this indicates syncopation.

Once you identify a syncopated passage—which may only involve two or three notes—figure out the metrical level on which the syncopation occurs. For example, in simple meter, if no notes are articulated directly on the counting pulse beats and one note is articulated in between each beat, the syncopation is occurring at the beat level. If no notes are articulated directly on the counting pulse beats and *two* notes are articulated in between each beat, listen to the passage again while tapping the *division*. If no notes are articulated directly on the division taps and one note is articulated in between each tap, the syncopation is occuring at the division level.

Determining the metrical level allows you to identify the durational value of the shift. If the syncopation occurs on the beat level (one note sounding between each counting pulse beat), the value of syncopation is a division: each beat-length note has been shifted one division early. If the syncopation occurs on the division level, the value of syncopation is a subdivision: each division-length note has been shifted one subdivision early.

Lastly, determine how the syncopated pattern begins. Does the offbeat pattern simply begin offbeat? Or does the pattern begin with two quick notes back-to-back as in Example 1—one short note on the beat followed by the first of the longer syncopated notes?

Once you have determined the level of syncopation, the duration of the shift, and whether or not the pattern begins with a truncated onbeat note, the rhythmic pattern should be easy to notate. If, however, you are still having difficulty, try using the lyric syllables and the stress patterns of the lyrics to help you keep track of the individual notes and which ones are on or off the beat. Writing lyrics down before notating the rhythm can be a big help.

Tresillo

Drawing on its roots in African and Cuban musical traditions, another common rhythmic pattern in pop/rock is to divide a beat (or two beats) into three almost-equal groups: for example, dividing a half note into two dotted eighth notes and an eighth note (3+3+2). This pattern approximates a triplet while still maintaining the simple division of beats by 2, 4, 8, etc., creating an experience of something like a "fake triplet." The term for this rhythmic pattern is *tresillo* (Example 2). A tresillo pattern can be heard after the opening cuatro solo of "Despacito" by Luis Fonsi and Daddy Yankee (2016) in the bass and bass drum. The *tresillo* pattern is extremely common, even in pop music that otherwise doesn't seem to draw on Afro-Cuban music.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Tresillo rhythms.

The tresillo is actually more common than "real" triplets in most pop/rock genres, but true triplets do occur, so take care to distinguish between the two. "Cathedrals" by Jump, Little Children (1998) juxtaposes both, and it's an excellent example for practicing performing and identifying tresillo patterns and real triplets. In Example 3, notice that the violins play quarter-note triplets against simple eighth notes in the guitar, but the guitar begins a tresillo accent pattern after the triplets stop.

A link to an interactive elements can be found at the bottom of this page.

Example 3. "Cathedrals" by Jump, Little Children (1:01).

While tresillo patterns occur most often in 3+3+2 groupings, 3+2+3 and 2+3+3 are also possible.

The tresillo pattern can be expanded: in Example 4, the 3+3+2 pattern is doubled, resulting in 3+3+3+3+2+2. Nicole Biamonte (2014) refers to this pattern as the *double tresillo*. In the opening of "Electric Co." by U2 (1980), the guitar plays subdivisions (sixteenths) grouped 3+3+3+3+2+2, while the kick drum plays straight beats (quarters) under the hi-hat playing straight subdivisions.

A link to an interactive elements can be found at the bottom of this page.

Example 4. The double tresillo.

Further Reading

- Biamonte, Nicole. 2014. "Formal Functions of Metric Dissonance in Rock Music." *Music Theory Online* 20 (2). http://www.mtosmt.org/issues/mto.14.20.2/mto.14.20.2.biamonte.html.

Assignments

1. Transcribing rhythms worksheet (.pdf, .mscz). Asks students to transcribe and identify straight syncopations as well as tresillo rhythms in "Sorry" by Beyoncé (2016). Worksheet Playlist

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7.2: Drumbeats

Key Takeaways

- The backbeat is common to most pop drumbeats. The backbeat is an accented articulation on beats two and four in quadruple meters, usually played by the snare drum.
- The kick drum is often syncopated.
- Cymbals—hi-hats, ride, and crash—often play regular pulses at the beat, beat division, or beat subdivison level.
- Common drumbeats other than the basic rock beat include double-time, half-time, four-on-the-floor, and dembow.
- Quadruple meters are by far the most common meter in pop music; simple triple is the next most common. A simple triple drumbeat in pop music will often have a snare hit on beat three.

Chapter Playlist

Drumbeats are the rhythmic cornerstone of many genres of popular music, including rap, rock, and jazz. Sometimes a drumbeat is performed on a drum kit, sometimes it's sampled from an existing recording or programmed into a sequencer or DAW (digital audio workstation). In this primer, we'll learn about the instrument itself, notating drum set parts, and the features of drumbeats that are common to many styles of music. We'll also learn how a few particular drumbeats are associated with specific genres.

The Acoustic Drum Kit

Example 1 illustrates six common components of a drum kit, each of which is described further below.

Example 1. A standard acoustic drum kit.

Instrument Audio	Description

	Instrument Audio	Description
1.	Snare drum 0:00 / 0:00	A drum with metal wires stretched underneath that buzz when the drum is struck. This results in a noisy sound (that is, one that fills out much of the audible frequency spectrum). Played with force, it sounds like wood cracking or like a thunderclap. Played softly, it offers a range of effects from clicks and taps to buzzing rolls.
2.	Kick drum (or bass drum) 0:00 / 0:00	The lowest-pitched drum in the kit, played with a foot pedal. It is originally based on a modified concert bass drum, and some still sound with the same booming quality. Other kick-drum sounds have a dull thud, or a sub-bass effect that (over the right speakers) is felt in the body as much as it is heard.
3.	Toms (or tom-toms) 0:00 / 0:00	Drums with a more focused pitch fundamental than the snare and are higher-pitched than the kick. There are often two or three toms on a drum kit, each with a distinct pitch. The pitch can be a more or less prominent feature of the toms' sound.
4.	Ride cymbal 0:00 / 0:00	A large suspended cymbal. Depending on the thickness of the cymbal, the ride may sound like a warm wash of sound (thinner rides, common in jazz) or a sharp, high-pitched crunch (thicker rides, common in metal music). High, pure ringing sounds can be produced by playing the "bell" of the ride, located in the middle of the cymbal.
5.	Hi-hat cymbals 0:00 / 0:00	A pair of cymbals of the same size; the bottom cymbal is upside-down so only their edges touch. The cymbals are open by default and close when a foot pedal is pressed. When struck, the hi-hats' timbre depends on how open or closed the two cymbals are. The hi-hat is most often struck while closed, producing a characteristic, bright "tick tick tick"; the open sound has a more aggressive crashing or rattling quality; and a wide range of intermediate timbres are also available. When played with the foot pedal only, the cymbals make a splashing effect.
6.	Crash and accent cymbals 0:00 / 0:00	Depending on size, contour, and playing technique, these can produce a variety of crashing, splashing, sizzling, and barking sounds. They range in size (6–18" diameters are common) and thickness. Some have shapes and contours unlike other cymbals, or are augmented with rivets or large holes.

The drum kit is uniquely modular—that is, most (some might say all) of its constituent parts are optional. Other auxiliary percussion add-ons found on some drum kits include cowbells, tambourines, wood blocks, and electronic pads that can trigger programmed sounds. The sheer variety of drum kit elements and their various configurations is near-limitless.

Not all pop music uses an acoustic drum kit for its percussion. Drum machines, electronic drum sets, and plug-ins for digital audio workstations allow further customization for music composition and production. Most of the sounds used in electronic percussion are samples or imitations of acoustic instruments.

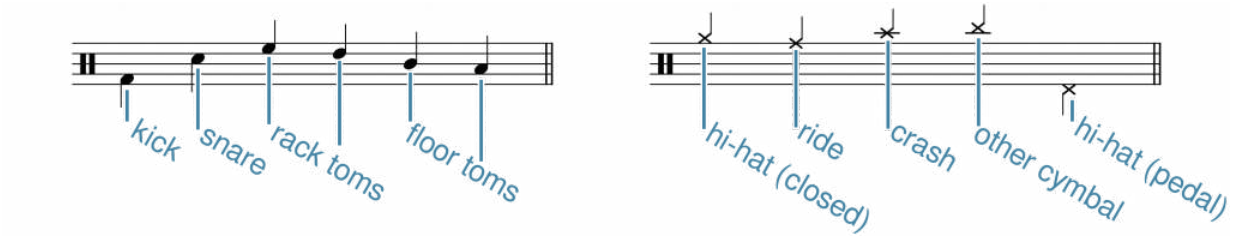
Five-Line Staff Notation for Drum Kit

Many drumbeats are created, performed, and recorded without ever being written down. But drummers, arrangers, and other music-industry professionals often use a five-line staff to communicate the details of a drumbeat. Drum kit notation is not fully standardized due to the improvisatory and modular nature of its performance practice, but the conventions given below and used

throughout this textbook represent a particularly common method. Best practice is always to include explanatory notes and/or a drum key whenever the notation could be at all ambiguous.

Example 2 shows how each line and space of the staff denotes a different part of the drum kit:

- **Clef:** as a percussion instrument, the drums take a percussion clef.
- **Notehead type:** standard oval noteheads are used for drums (snare, kick, tom, etc.), while cross (x) noteheads are used for cymbals.
- **Placement:**
  - The kick drum uses the bottom-most space on the staff.
  - The snare takes the third space from the bottom.
  - The toms are shown on the other lines and spaces in the staff.
  - Hi-hats occupy the space above the staff.
  - The ride takes the uppermost line.
  - Other crash and accent cymbals use ledger lines above the staff.
  - When the hi-hat is played with the foot pedal, rather than with drumsticks, this is notated in the space just below the staff.
- **Unusual instruments:** Other elements and effects may not have a standard representation, and should be labeled to avoid confusion.



Example 2. Common notation for various parts of the drum kit. Using these particular stem directions and notehead types are important for clarity.

When notating a drum part, separate things into two voices, as in Example 3:

1. The cymbals, which usually keep a steady pulse; notated with upstems.
2. The kick and snare drum, which often cooperate to articulate the characteristic features of a drumbeat; notated with downstems.

A link to an interactive elements can be found at the bottom of this page.

Example 3. The standard rock beat with kick on beats one and three, a snare backbeat on two and four, and regular eighth notes in the hi-hat.

Exceptions to these rules can often be justified. For example, when the hi-hat is played with the foot pedal, it may be stemmed either direction: up to show coordination with other cymbal articulations, or down to show coordination between the feet (that is, with the kick drum). Notated drum fills are another place where this two-voice rule may be broken, because a regular cymbal pulse will often stop so that the drummer can use both hands to play snare, toms, etc.

The Snare Drum and the Backbeat

Most popular songs are in a simple quadruple meter (usually notated by transcribers as $\mathbf{^4_4}$), and most popular music drumbeats in this meter have a backbeat. The backbeat refers to beats two and four, usually played by the snare drum. Example 3 above shows how a snare-drum backbeat is one layer of the basic rock beat: kick-drum hits on beats one and three alternate with the snare backbeat, complemented by a regular eighth-note pulse in the hi-hat. The same alternation of kick and snare hits underpins the “boom-bap” beat found in much golden-age hip hop.

In many genres the snare backbeat is the most stable of the three layers. Below, we’ll see how the kick and cymbal layers can be manipulated to change the character of a groove, without sacrificing the familiarity of the backbeat. Two common ways that songwriters and producers modify the backbeat are:

- Giving the backbeat rhythm to instruments other than the snare drum
- Speeding up or slowing down the backbeat rhythm enough to alter its relationship to the tempo of a groove.

Each technique is discussed further below.

Non-Snare Backbeats

The snare isn't the only instrument that can play the backbeat. In Queen's "We Will Rock You" (**Example 4**), the basic rock beat is made with stomping feet and clapping hands instead of drums. In hip hop and electronic music, it's common to replace snare hits with hand claps or finger snaps. Multiple backbeat sounds can also be layered together to create a variety of backbeat timbres (as in **Examples 8** and **9** below).

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=627

Example 4. A backbeat without drums in Queen's "We Will Rock You" (1977).

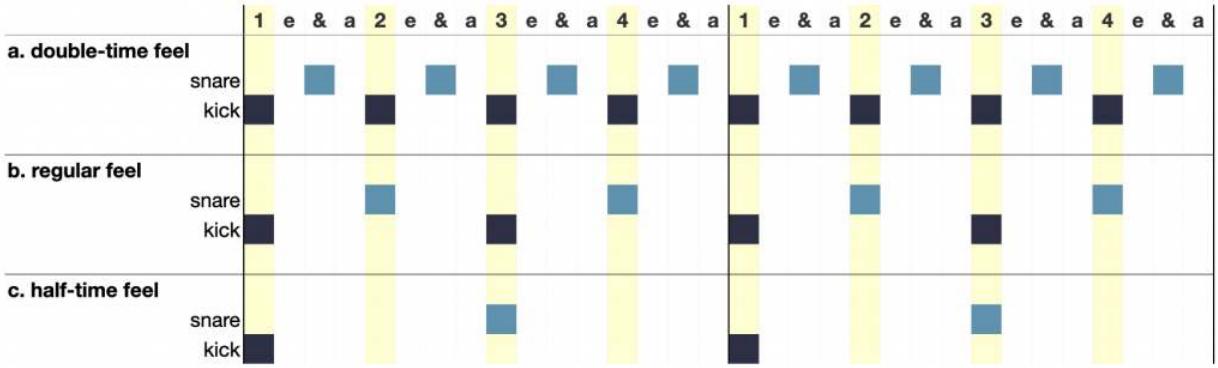
In many jazz subgenres, including swing and bop, the drummer might play a backbeat on the hi-hats by closing the two cymbals together with a foot pedal (see Swing Rhythms for more information). The result is usually a short, sharp, percussive sound, similar in many ways to the timbre of the snare drum. This hi-hat backbeat was the precursor to the snare backbeat. **Example 5**, from Ella Fitzgerald's rendition of "Fascinating Rhythm," shows a hi-hat backbeat on beats two and four (and one eighth-note anticipation). Notice how the snare in this example plays a syncopated rhythm, whereas the hi-hat is much more regular.

A link to an interactive elements can be found at the bottom of this page.

Example 5. A typical jazz backbeat on the hi-hats in Ella Fitzgerald's recording of "Fascinating Rhythm" (1959).

Half- and Double-Time Feels

When the tempo is 80–160 bpm, the rhythm of the kick and snare in a basic rock beat will likely be understood as the beat or tactus. Such drumbeats can be said to have a normal feel, in which the drums and tempo work together to establish a clear groove that would be easy to dance to. Sometimes grooves use the same alternation of kick and snare to suggest a tempo above 160 bpm or slower than 80 bpm. These fast and slow drumbeats might still support the tempo for a groove, if that tempo is also felt as notably fast or slow. Other times, however, the rest of the groove still suggests a tactus of 80–160 bpm *despite* the unusually fast or slow backbeat. In such cases, we use the terms double-time and half-time to describe the misalignment of the drums with the rest of the groove (Example 6).



Example 6. Box notation illustrating (a) double-time, (b) normal, and (c) half-time feels. The yellow shading indicates the tactus, which would be the same for all three feels. Dark blue is used for kick drum, and light blue for snare.

The main groove of Metallica's "Trapped Under Ice" has a double-time feel (see **Example 7**). The snare suggests a backbeat alternating at a tempo of about 320 bpm—a pace at which it's uncomfortable to count "1 2 3 4," let alone move your body. Headbanging fans are more likely to lock into a tactus half the speed of the backbeat (160 bpm). The disagreement between the unusually fast drums and the slower (but still fast!) tactus gives this song a frantic, driving energy. Later in the song (2:00), the drums shift to a normal feel.

A link to an interactive elements can be found at the bottom of this page.

Example 7. A double-time backbeat in Metallica's "Trapped Under Ice" (1984).

Phil Collins's "Take Me Home" has a tempo of 119 bpm, right in the middle of the preferred tempo range for a tactus. The song's slow backbeat would suggest a tempo of only 60 bpm—too slow for most listeners (see Example 8). If we instead keep time at the 119-bpm pulse, we hear a half-time drumbeat. The tension between the slow pacing of the backbeat (with a clap substituting for snare), the skittering sixteenth-note hi-hats, and the syncopated toms and woodblock, supported by a similarly fast synth ostinato, gives this groove a fractured feeling, at once relaxed and anxious.

A link to an interactive elements can be found at the bottom of this page.

Example 8. A half-time backbeat in Phil Collins's "Take Me Home" (1985).

Dembow

The snare drum doesn't always play the backbeat, and one non-backbeat snare pattern is particularly noteworthy. Dembow refers to both a genre of music and a rhythmic pattern common in that genre and in others (e.g., reggaeton, dance hall). In its simplest form, the dembow drumbeat has a kick drum on all four beats and snare drum playing the last two parts of a tresillo (3+3+2) rhythm. The chorus of Bad Bunny's "Moscow Mule" is one example (see **Example 9**, 0:52).

A link to an interactive elements can be found at the bottom of this page.

Example 9. A dembow pattern in Bad Bunny's "Moscow Mule" (2022).

The Kick Drum

Whereas the snare-drum backbeat is the most common feature of a quadruple meter groove, the kick drum pattern is more flexible. As we've seen, kick drum played on beats one and three is a common option, forming part of the basic rock beat. Another common pattern is called four on the floor: the kick drum plays every quarter note, usually alongside a snare-drum backbeat, as in Blondie's "Heart of Glass" (**Example 10**), or with no snare at all.

A link to an interactive elements can be found at the bottom of this page.

Example 10. A four-to-the-floor + backbeat pattern in Blondie's "Heart of Glass" (1978).

Syncopation is more common in the bass drum than in the snare of pop drumbeats. **Example 11** shows the drumbeat of Kendrick Lamar's "HUMBLE.", which has a consistent backbeat provided by the hand claps, but plenty of straight syncopation in the kick drum. Note that the kick still enters reliably on the downbeat of each measure, despite syncopation elsewhere.

A link to an interactive elements can be found at the bottom of this page.

Example 11. Kick drum syncopation in Kendrick Lamar's "HUMBLE." (2017). The "o" over some hi-hats indicates the cymbals are opened slightly with the foot pedal. The "x" in the snare space indicates claps.

Cymbals

The cymbals also can have varying rhythms in relation to the snare backbeat. The most common rhythmic options are consistent eighth notes or sixteenth notes, though steady quarter notes are by no means rare. Other patterns are also possible, like in "Heart of Glass" where the hi-hats mostly play only the off-beats (see **Example 10** above). The hi-hats are the most common cymbal used to keep this pulse in many genres; the ride cymbal is also common; the crash cymbal is an option used most often for slower-paced pulses and/or in more aggressive sounding grooves and genres.

The next two examples show the range of options for cymbals in drumbeats. The first is from Xiao Zhan's "Made to Love,"[1] with a consistent sixteenth-note pulse in the hi-hats (**Example 12**; you can also hear a snappy non-snare sample for the backbeat and, starting around 0:10, a syncopated kick drum). The second example is from Dream Theater's "As I Am" (see **Example 13**). The

song's first drumbeat (at 0:55) is a half-time backbeat with quarter notes on the china cymbal and downbeats marked by the crash cymbal. The next groove (1:14) speeds up a little and shifts to a normal feel with the crash playing eighth notes.

A link to an interactive elements can be found at the bottom of this page.

Example 12. Sixteenth-note hi-hats in Xiao Zhan's "Made to Love" (2020).

A link to an interactive elements can be found at the bottom of this page.

Example 13. Two drumbeats using accent cymbals (china and crash) in Dream Theater's "As I Am" (2003; 0:55).

Compound Quadruple and Simple Triple Drumbeats

Most pop music is in simple quadruple meter, but the next most common meters in most popular music genres are compound quadruple and simple triple.

In compound quadruple time, the basic rock beat is simply adjusted for the new three-part beat division: the kick drum still plays on one and three, the snare still plays the backbeat on two and four, and cymbals (or some other instrument) still articulates the beat division. These three elements make up the drumbeat in "If You Don't Know Me by Now," by Harold Melvin & the Blue Notes (see **Example 14**).[2]

A link to an interactive elements can be found at the bottom of this page.

Example 14. A slow compound quadruple drumbeat in Harold Melvin & the Blue Notes's "If You Don't Know me By Now" (1972).

In simple triple time, it isn't possible to alternate kick and snare hits of equal length in each measure. The most common approach is to delay the snare "backbeat" until the third beat of every measure; this is what happens in Paramore's "That's What You Get" (see **Example 15**). After an intro with exuberant "3 e + a" fills on the snare, the drums settle into the groove transcribed below. The tresillo kick-drum rhythm keeps things interesting while delaying the snare hit. The second verse of this song (0:27) is also notable: the drums shift to a basic rock beat (as if in quadruple meter) while the rest of the band keeps playing in the triple meter established up to this point.

A link to an interactive elements can be found at the bottom of this page.

Example 15. A 3/4 drumbeat in Paramore's "That's What You Get" (2007).

Try it!

Use this quiz to check your comprehension of the chapter.

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Further Reading

- Brennan, Matthew, Joseph Michael Pignato, and Daniel Akira Stadnicki, editors. 2021. *The Cambridge Companion to the Drum Kit*. Cambridge: Cambridge University Press.
- de Clercq, Trevor. 2020. "Rhythmic Influence in the Rock Revolution." In *The Cambridge Companion to Rhythm* 182–95, edited by Russell Hartenberger and Ryan McClelland. Cambridge: Cambridge University Press.
- Geary, David. 2019. "Analyzing Drums and Other Beats in Twenty-First Century Popular Music." Ph.D. diss., Indiana University.
- Ohriner, Mitchell. 2020. "Rhythm in Contemporary Rap Music." In *The Cambridge Companion to Rhythm* 196–213, edited by Russell Hartenberger and Ryan McClelland. Cambridge: Cambridge University Press.

Assignments

1. Drumbeats (.pdf, .mscz). Asks students to identify features of drumbeats and transcribe them. Worksheet playlist

1. "Made to Love" is also known as "Spotlight," or in Chinese, "光点" ("Guāngdiǎn"). 7.02: Drumbeats#return-footnote-627-1
2. Note that the tempo is just 31 bpm! The tactus is likely to be felt at the eighth-note beat division level. 7.02: Drumbeats#return-footnote-627-2

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7.3: Melody and Phrasing

Key Takeaways

Sections in pop/rock music typically consist of two, three, or four phrases. These phrases are usually organized as follows:

- Two-part: *aa′*
- Three-part: *aa′b* (often a 12-bar blues)
- Four-part: *srdc* (statement, restatement/response, departure, conclusion)

This chapter discusses the structure of song sections such as a verse, chorus, or bridge. Each section consists of at least two phrases—in pop/rock music, a phrase is a musical unit that typically lasts for four bars and corresponds to one line of the lyrics. In labeling these structures, phrases are designated by lowercase letters.

Two-Part

A section is two-part when the phrases that make up the section can be grouped into a first half and a second half. In two-part sections, the second half is usually based on the same music as the first half, and thus it is labeled *aa′*. Often these two halves begin the same but have different endings, participating in an antecedent–consequent (weak → strong) relationship.

The chorus to "Livin' on a Prayer" (1'33") has an *aa′* structure (Example 1). The first four-bar phrase ("Oh, we're half-way there…") and the second four-bar phrase ("Take my hand…") have identical melody and harmony (so they both get the letter *a*), but different lyrics (so the second *a* is marked as "*a* prime": *a′*). Note that in many songs, this relationship is not as clear cut. However, if the two phrases *begin* with *similar* musical material, give them the same letter. New lyrics, new musical endings, or musical variations simply warrant a "prime."

Very rarely, a section's phrases can be grouped into two clear halves based on different music. Such a section is labeled *ab*.

[table id=27 /]

Example 1. *"Livin' on a Prayer."*

Three-Part

A section containing three phrases is a three-part section. If the first two phrases are based on the same music and the third is different, the section is labeled *aa′b*.

12-bar blues progressions are the most common example of a three-part *aa′b* section. "Hound Dog" contains *aa′b* strophes (Example 2).

[table id=28 /]

Example 2. *"Hound Dog."*

Four-Part

A section composed of four phrases often contains a sentential structure (presentation → continuation → cadential/conclusion). In pop/rock music, this often appears as a basic musical idea in the first phrase, a repetition or "response" to it in the second, contrasting material in the third phrase (often employing fragmentation, acceleration of harmonic rhythm, and movement away from tonic harmony), and a conclusion in the fourth phrase—either with a return to the basic idea and tonic harmony or with still newer material that forms a strong melodic, rhythmic, and harmonic conclusion. Walter Everett (2001, 132) has called such a four-phrase sentential structure in pop/rock music *srdc* (statement, restatement/response, departure, conclusion).

In conventional lettering, an *srdc* section could employ an *aaba* structure (with statement material returning as a restatement and again as the conclusion), or an *aabc* structure (where the conclusion material is new). Occasionally *abcd* or *abca* are possible, but only if *b* is a clear response to *a*, not simply new material.

An *srdc* structure tends to tend to divide neatly into halves: *sr* and *dc*.

Bobby Darin's "Dream Lover" (Example 3) provides a classic example of a four-part *srdc* phrase structure.

[table id=29 /]

Example 3. *"Dream Lover."*

Further Reading

- Everett, Walter. 2001. *The Beatles as Musicians: The Quarry Men through Rubber Soul*. New York: Oxford University Press.

Assignments

1. Worksheet on Section Structures (.pdf, .docx). Asks students to identify two-, three-, and four-part phrase organizations within sections. Worksheet playlist

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7.4: Introduction to Form in Popular Music

Key Takeaways

- This chapter addresses foundational concepts of form in music. (For discussions of specific forms, see the following two chapters: AABA and strophic formand verse-chorus form.)
- Pop forms can be related to one another through the concepts of core and auxiliary sections.
- Sections can be defined through their formal and harmonic functions.

Those interested in the connections between pop and classical forms may wish to cross-reference Formal Sections in General.

Sections within Pop Forms

In pop/rock music, a section typically spans between 8 and 24 bars and includes 2–4 phrases. (Some auxiliary sections may contain a single phrase.) A section presents a single formal function (such as strophe, bridge, prechorus, etc.) and presents a complete two-, three-, or four-part pattern. A section typically sets a stanza of lyrics.

Section boundaries are usually made apparent by poetic structure (the end of a couplet or stanza) or by surface features of the song such as:

- a clear rhythmic, harmonic, and melodic arrival
- a change in instrumentation or volume
- a return to the beginning of a previously heard section

For instance, take the transition from a verse section to a chorus section at 2:42 in U2's "Pride (In the Name of Love)." The section boundary is delineated by a number of features simultaneously:

- The text closes out the verse's quatrain with a (more-or-less) rhyming lyric ("sky"–"pride") before beginning a new stanza.
- The end of the verse is signaled by a drum fill, a common end-of-phrase or end-of-section gesture.
- The general dynamic gets louder very quickly.
- The guitar becomes more active and is doubled by a second guitar part.
- The lead vocals rise in register.
- Background vocals are added to the lead vocal part.

All of these features help delineate the boundary between sections, and most of them also give the new section (the chorus) a higher energy level than the previous section (the verse).

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=633

Terminology and Basic Concepts

The definitions used here are based on the research of Jay Summach (2012).

core section: Core sections form the main musical and poetic content of a song. Examples of core sections in pop forms include verse, chorus, strophe, or bridge sections.

auxiliary section: Auxiliary modules help to frame the core modules, introducing them, providing temporary relief from them, or winding down from them. They can include introduction, outro, or coda sections.

lyric-variant: A section or phrase is lyric-variant if each time it appears it brings (mostly) different lyrics.

lyric-invariant: A section or phrase is lyric-invariant if each time it appears it brings (mostly) the same lyrics. Lyric invariance tends to come at points of formal closure (tail refrains at the ends of strophes, choruses at the end of a verse-chorus song's formal cycle).

music-variant: A section or phrase is music-variant if each time it appears it brings (mostly) different music.

music-invariant: A section or phrase is music-invariant if each time it appears it brings (mostly) the same music.

on-tonic: A phrase or section is on-tonic when it begins with tonic harmony (I in root position).

off-tonic: A phrase or section is off-tonic when it begins on a harmony other than tonic.

harmonically closed: A phrase or section is harmonically closed when it ends with tonic harmony (I in root position).

harmonically open: A phrase or section is harmonically open when it ends on a harmony other than tonic.

turnaround: The use of a non-tonic chord (usually dominant) at the end of a harmonically closed unit to transition into the beginning of the following on-tonic unit. The song "Woolly Bully" by Sam the Sham and the Pharaohs contains a turnaround at the end of many of its strophes. One of these occurs at 0:54 — a simple V^7 chord to prepare the return of I as the next strophe begins.[1]

closing rhetoric: Closing rhetoric involves common patterns and techniques that signal that the end of the song is likely coming soon. Typical patterns and techniques include immediate repetition of a core section (except for the first core section) or part of a core section, thinning out of the texture, late-song intensification, fadeout, and bringing a previously harmonically open section to a point of harmonic closure. Closing rhetoric is typically found in outros, codas, and the last core section of a song (A or C).

Analytical Notation

What follows are notational conventions for analyses of musical form in this text.

Capital letters

Sections are labeled with capital letters according to function:

- A section that functions as a strophe is labeled with an **A**
- A section that functions as a bridge is **B**
- A verse is labeled **V**
- A chorus is labeled **C**
- And so on—more sections are introduced in the following chapters.

Lowercase letters

Phrases are labeled with bolded lowercase letters according to their musical content. If two phrases use more or less the same musical framework (harmony, melody, and rhythm), they receive the same letter. Letters are assigned in the same manner as poetic rhymes: the first phrase is *a*, and any phrase that follows based on the same music is also *a* (primes are used for slight variations, such as new text or altered instrumentation); the next phrase with new musical material is b; and so on. These letters do *not* correspond to functions.

The single exception to this convention is when phrases within a section demonstrate a sentential progression (*srdc*), in which case the first phrase (statement) is labeled *s*; restatement/response, *r*; departure, *d*; conclusion, *c*.

Further Reading

- Summach, Jason. 2012. "Form in Top-20 Rock Music, 1955–89." Ph.D. diss., Yale University.

1. Interestingly in this song, the guitarist doesn't always remember the turnarounds. Notice that at 0:28, the bass and baritone saxophone play the dominant, but the guitarist keeps tonic. At 1:18, the singer yells, "Watch it now! Watch it! Watch it!" as if warning the guitarist not to miss the turnaround in the next bar. He does the same in 2:08. When the guitarist gets the turnaround with the rest of the band, the singer yells, "You got it! You got it!" as if congratulating the guitarist. 7.04: Introduction to Form in Popular Music#return-footnote-633-1

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7.5: AABA Form and Strophic Form

Key Takeaways

- Strophic form consists only of repeated strophes. Its form would be abbreviated as AAA.
- AABA form, also known as 32-bar song form, consists of a twice-repeated strophe (AA), followed by a contrasting bridge (B), followed by another repetition of the initial strophe (A).
- AABA and strophic form were especially common in older pop music (1960s and earlier).
- AABA and strophic form both have strophe sections as the main section, which features the primary lyrical and musical content of the song.

Chapter Spotify Playlist

Strophic Form

Songs that repeat the same basic multi-phrase unit throughout are in strophic form (sometimes abbreviated AAA because the same basic material, A, is repeated), and the basic unit that is repeated is called a strophe. Strophic form is more common in blues, early hip hop, and early rock-and-roll; verse-chorus form took over many pop genres after around 1970.[1]

Example 1 uses “School Day (Ring Ring Goes the Bell)” by Chuck Berry as an exemplar of strophic form. This song contains multiple sections, all of which have the same basic underlying music. These sections are the strophes. Though the lyrics change, the section beginning at 0:24 contains the same—or, at least, very similar—melody, harmony, and phrase structure as the prior and following sections. Even the instrumental sections at 0:41 and 1:21 have the same underlying pattern, just a different melody in the form of a guitar solo. The entire song is a repetition of this same basic pattern, or slight variations of it, modeled at 0:19–0:41.

A link to an interactive elements can be found at the bottom of this page.

Example 1. “School Day (Ring Ring Goes the Bell)” by Chuck Berry (1957).

While “School Day” is composed entirely of strophes, it is important to note that strophic songs can also contain so-called auxiliary sections such as intros, outros, and codas. An example of a strophic song with auxiliary sections is “Faded Love” by Patsy Cline. Follow the form chart in Example 2 as you listen to this song, and notice that the intro, outro, and interlude do not change the fundamental strophic form significantly.

A link to an interactive elements can be found at the bottom of this page.

Example 2. “Faded Love” by Patsy Cline (1963).

However, if a song has more than one main musical idea other than strophes and auxiliary sections, it is not strophic. It could be AABA form, which is discussed below, or verse-chorus form, discussed in the next chapter.

“Faded Love” also incorporates a refrain in its strophes, which is an important component of many strophic songs. A refrain is a recurring lyric and musical motive within a strophe (or any larger section that has varying lyric material). The refrain often contains the title lyric of a song, as it does here.

32-Bar Song Form (AABA)

Another formal structure that is more common in early rock-and-roll is AABA form, also called 32-bar song form because in earlier “Golden Age” songs that make use of this structure, each section is eight measures long. AABA form, like strophic form, relies on the strophe to communicate the main lyric and musical ideas of the song, but it adds a contrasting bridge section in the middle.

As an example, listen to “I Want to Hold Your Hand” by the Beatles (Example 3). After a brief introduction, the song begins with two strophes. However, where “Blue Suede Shoes” followed this with an instrumental strophe, the Beatles move to a bridge at 0:52. This new section builds tension by contrasting and withholding the main strophe theme before it returns at 1:11. Note that the song begins and ends with the strophe, and the strophe contains the title lyrics. For many people, it’s also the the more memorable part of the song. Thus, the strophe is still the primary section. But now it has a secondary section to add interest and tension: the bridge (and an auxiliary section, the intro, to help get the song off the ground).

A link to an interactive elements can be found at the bottom of this page.

Example 3. “I Want to Hold Your Hand” by The Beatles (1963).

After the initial **AABA** cycle, "I Want to Hold Your Hand" repeats **B** and **A** again. This is typical for an **AABA** song—in almost all cases, they have a complete **AABA** cycle followed by either another complete cycle (**AABA**) or an incomplete one (typically **BA**). Once the first **AABA** cycle is complete, there tend not to be any new lyrics, only repetition of the whole or the end of the main cycle.

Sections of **AABA** and Strophic Forms

The pop form terminology used here and throughout *OMT* is based on the research of Jay Summach (2012).

Strophe (**A**)

As a main section, the function of a strophe section is to present the primary lyric and musical content and to provide a point at which the song might satisfyingly end.

In strophic form (**AAA**), strophes are the only core sections. Each strophe tends to set a stanza of text, with music that is self-contained and harmonically closed.

In 32-bar form (**AABA**), the strophe's functions—holding primary music/text and providing harmonic stability—are elevated through contrast with the bridge section. In **AABA** songs, strophe function often involves the prolongation of tonic harmony. Strophes tend to be shorter in **AABA** songs than in strophic songs.

In both forms, *srdc* is by far the most common internal pattern for strophes. For three-part strophes, the 12-bar blues progression is the most common pattern.

Bridge (**B**)

Bridges are contrasting sections, and share many traits with the continuation function of classical form. Bridge sections tend to play a transitional role (neither the point from which to depart nor the point of arrival) in the formal cycle. This generates heightened expectation for the return of **A** by contrasting with **A** and temporarily withholding it. A bridge section "must be followed by [the primary section] in order for its function to be satisfied" (Summach 2012, 79). Bridge sections tend to emphasize non-tonic harmonies and commonly end on dominant harmony.

As the next chapter discusses, in verse-chorus songs, bridge sections are more free than in **AABA** form to contrast verse and chorus sections without a strong need to build expectation for the return of the chorus. In an **AABA** song, building expectation for the return of the strophe and arriving on dominant harmony in preparation of that return are essential to bridge function.

Introduction (**I**)

Introduction sections transition from the unmetered silence that precedes the song to the musical activity of the first core section. They tend to be short and untexted/instrumental, and they tend to present musical material from one or more core sections to come. This is often accomplished by the building up of musical material, perhaps through layering (e.g., one instrument at a time) or through a more generic building of energy.

Occasionally intros include non-core material. Such intros often correspond to an outro based on the same material, and together they create a "bookend" effect. It is also possible to have multiple intro sections in a row, with each based on different music.[2]

Outros (**O**) and Codas (**X**)

Outros function as a transition from song back to silence, and thus decrease energy. Often this is accomplished in the recording studio by way of a fadeout. When an outro section is present, it is almost always based on material from the last core section that preceded it. Otherwise, outros tend to draw material from the intro, creating a "bookend" effect. Outros exhibit closing rhetoric.

A coda is a song-ending section that presents new material—in other words, it is an outro not based on music previously heard. Like outros, codas exhibit closing rhetoric.

Muse's "Resistance" is useful for distinguishing between these two terms, since it has both a coda and an outro. The coda, which contains new musical and narrative material, begins at 4:05, following the final chorus. This new section, which brings something of a conclusion (if an open-ended one) to the narrative, gives way to a song-ending outro at 4:54. Aside from the clear change in content and texture at 4:54, the outro is recognizable as an outro (versus a coda) by the return of material from the introduction, creating the "bookend" effect.

Interludes

Instrumental interludes are common in pop forms. They are shorter than a full section and clearly serve to simply link and provide contrast between two more important sections. But be careful not to overuse this label! Before simply calling something an "interlude," ensure there is no better, more descriptive label (such as bridge, postchorus, etc.).

Refrains

A refrain is a lyric-invariant passage within a section that is otherwise lyric-variant. A refrain is too short to form its own section—typically a single phrase or even less.

A refrain is most often the last line or so of a section's text (tail refrain); occasionally, it is the material at the beginning of a section's text (head refrain). "Cathedrals" by Jump, Little Children (1998) contains a head refrain. Each strophe begins with the same line: "In the shadows of tall buildings.…" "Faded Love" and "I Want to Hold Your Hand," each discussed in this chapter, both contain tail refrains at the ends of their strophes, emphasizing the title lyrics.

Further Reading

- Duinker, Ben. 2020. "Song Form and the Mainstreaming of Hip-Hop Music." *Current Musicology* 107: 93–135. https://doi.org/10.52214/cm.v107i.7177.
- Summach, Jason. 2012. "Form in Top-20 Rock Music, 1955–89." Ph.D. diss., Yale University.

Assignments

1. AABA and Strophic Form (.pdf, .docx). Uses BriFormer web app to create form diagrams of pop songs in AABA or strophic form.

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1. Strophic form in hip-hop can be related to the "cypher," a live performance tradition in which various rappers (MCs) took turns improvising verses over a repeating beat (Duinker 2020). 7.05: AABA Form and Strophic Form#return-footnote-637-1
2. Dexys Midnight Runners's "Come On Eileen" contains several different intro sections with different musical content. 7.05: AABA Form and Strophic Form#return-footnote-637-2

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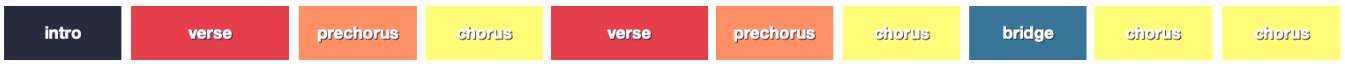
7.6: Verse-Chorus Form

Key Takeaways

- Verse-chorus form is a versatile song form that rapidly took over rock-and-roll in the 1960s and has dominated the genre ever since.
- In verse-chorus form, the title lyrics, the most memorable music, and the main narrative are split between two core sections: the verse and the chorus.

Verse-chorus form is so named because the two most important sections are the verse and the chorus. Other possible sections in verse-chorus form are prechorus, bridge, and postchorus.

A prototypical verse-chorus form song is illustrated in Example 1.



Example 1. A prototypical verse-chorus form, not referencing a specific song. Click to enlarge.

"Livin' on a Prayer" by Bon Jovi follows a typical verse-chorus form (Example 2). It also illustrates common usage of five core sections in verse-chorus forms.

A link to an interactive elements can be found at the bottom of this page.

Example 2. "Livin' on a Prayer" by Bon Jovi (1986).

Cycles

Notice that the sections used in "Livin' on a Prayer" recur and seem to follow a pattern. Sections within a verse-chorus form have certain prototypical orderings and groupings. The verse, prechorus, chorus, and postchorus sections, for example, always progress in this order (though they don't all need to be present). These groupings are referred to as cycles. In "Livin' on a Prayer":

- After an extended intro, the first cycle begins:
  - A verse at 0:47
  - At 1:18, a prechorus increases energy and tension…
  - …into the chorus at 1:34.
- After a brief interlude, this cycle is repeated beginning at 1:54.
- A final cycle at 3:00 begins with a guitar solo (functioning as a bridge and replacing the verse in this cycle).
- The cycle is followed by repetitions of the chorus, and a fadeout ends the song.

Sections within Verse-Chorus Form

Terms, concepts, definitions, and notational guidelines are taken from common convention and a combination of the resources listed below under Further Reading.

Verse (**V**)

- Verse sections are lyric-variant and often contain lyrics that advance the narrative.
- Until the 1960s, verse sections tended to be harmonically closed.
- Beginning in the 1960s, verse sections became more and more likely to be harmonically open (Summach 2012, 114).
- Verses (like strophes) tend to begin on-tonic.

Prechorus (**P**)

- Prechorus sections can be recognized most easily by energy gain.
- They bear many of the functional characteristics of the *d* phrase in *srdc*—fragmentation, acceleration of harmonic rhythm, movement away from tonic harmony, and harmonic openness.[1]

Chorus (**C**)

- Chorus sections are lyric-invariant and contain the primary lyrical material of the song (the title lyrics and/or lyrical hook).

- Chorus function is also typified by heightened musical intensity relative to the verse, including features like "a more dense or active instrumental texture; prominent background vocals; and/or a higher register melody" (Summach 2012, 106).
- Choruses most frequently (but not exclusively) begin on-tonic.
- Although the terms chorus and refrain are often used interchangeably when speaking colloquially, take care to keep them separate when discussing music theory. Chorus sections are distinct from refrains because choruses constitute an entire section by themselves, whereas refrains are *contained within* a section (as described below).

Postchorus (**Z**)

- A postchorus is a short section that follows a chorus and serves only to close the cycle (not to introduce or transition to the beginning of the next cycle) (Spicer 2011, para. 9).
- A clear postchorus can be heard in "Independent Women, Pt. 1" by Destiny's Child at 1:18, beginning with the lyric "Girl, I didn't know you could get down like that."

Bridge (**B**)

Bridge sections are a flexible section type in verse-chorus form.

- In verse-chorus form songs, the bridge tends to appear once, followed by the last chorus (or the last prechorus and chorus) of the song.
- Within a cycle, bridges will replace the verse and/or prechorus sections instead of being added in as an extra element. Thus, you will not usually see all five core section types in a single cycle.
- A verse-chorus song may not have a bridge at all.

Each of these points contrasts with the way bridges are used in **AABA** form.

Standout Lyrics within Sections

Refrain

While refrains are primarily associated with **AABA** form and strophic form, they can occasionally be used within sections of a verse-chorus form song. However, take note that refrains are distinct from choruses—refrains are a lyric *within* a section, whereas a chorus is an entire standalone section.

Climb

A climb is a phrase with prechorus function. Like the refrain, because it is only one phrase long, a climb is too short to be its own section. The climb is always the last phrase of a strophe or verse.

An example of a climb is in "Come On Eileen" by Dexys Midnight Runners (1982): listen for the one-phrase climb at the end of its verses and bridge ("Tu-ra-lu-ra…"), as heard at 1:13.

Further Reading

- Barna, Alyssa. 2018. "The Dance Chorus in Recent Top-40 Music." *SMT-V* 6 (4). https://vimeo.com/societymusictheory/smtv06-4barna.
- Covach, John. 2005. "Form in Rock Music: A Primer." In *Engaging Music: Essays in Music Analysis*, edited by Deborah Stein, 65–76. New York: Oxford University Press.
- Everett, Walter. 1999. *The Beatles as Musicians: Revolver through the Anthology*. New York: Oxford University Press.
- Spicer, Mark. 2011. "(Per)Form in(g) Rock: A Response." *Music Theory Online* 17 (3). http://www.mtosmt.org/issues/mto.11.17.3/mto.11.17.3.spicer.html.
- Stroud, Cara. 2014. "The Postchorus in Millennial Dance Pop." Paper presented at the Graduate Association of Musicologists *und* Theorists Conference, Denton, TX.
- Summach, Jay. 2011. "The Structure, Function, and Genesis of the Prechorus." *Music Theory Online* 17 (3). http://www.mtosmt.org/issues/mto.11.17.3/mto.11.17.3.summach.html. Reading Guide
- Summach, Jason. 2012. "Form in Top-20 Rock Music, 1955–89." Ph.D. diss., Yale University.

Assignments

1. Pop Music Form—The Shape of Music Around You (.pdf). Writing assignment that asks students to find songs on their own; identify them as strophic, AABA, or verse-chorus; name the sections of the song; and justify their analyses using form vocabulary.
2. Verse-Chorus Form (.pdf, .docx). Uses BriFormer web app to create form diagrams of pop songs in verse-chorus form. One straightforward example, and one challenging example.

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1. This is because prechorus sections originate historically in the *d* section of an *srdc* pattern. Think of an *srdc* strophe becoming longer until *sr* forms its own two-part verse section, *d* forms its own prechorus section, and *c* forms its own chorus section. 7.06: Verse-Chorus Form#return-footnote-644-1

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7.7: Introduction to Harmonic Schemas in Pop Music

Key Takeaways

- Pop harmony can be understood through harmonic schemas—particularly common chord progressions.
- These schemas can be altered while still maintaining their resemblance to the prototype.

There are a number of common stock chord progressions that recur in many pop/rock songs. These stock progressions, or schemas, will often occur in cyclical patterns in a song; that is, the same progression will repeat multiple times in a row. This is particularly common in choruses of verse-chorus songs, but it also happens in verses, strophes, and bridges. Knowledge of pop schemas is helpful for identifying harmonies by ear, since in addition to listening for bass scale degrees and considering whether the harmonies are in root position or first inversion, you can listen for common patterns that you have heard in other songs. Example 1 succinctly summarizes the most common forms of each schema.

[table id=54 /]

Example 1. Summary of common pop harmonic schemas.

A crucial feature of schemas is that they can be altered while still remaining recognizable as a manifestation of that schema. Think of the term “bird.” If someone asks you to imagine a bird without any extra context, you may not imagine a specific species of bird, but you would probably imagine a bird that looks something like a sparrow or robin. Your imaginary bird is your mental prototype for the schema “bird.” You can recognize all kinds of birds as being birds even if they do not look exactly like your imaginary bird—ostriches, penguins, flamingos, and swans are all clearly birds, despite their significant differences in appearance, behavior, and habitat. In the same way, you can and should recognize harmonic schemas as manifestations of the schemas listed here, even when they undergo some form of variation. Common variations include chromatic inflection or chord inversion, and are summarized in the final column of Example 1.

The following chapters group together certain schemas that share several qualities, and go into detail about each individual schema and its most common variations.

- Blues-based schemas
  - 12-bar blues
  - 16-bar blues
  - double plagal
  - extended plagal
- Four-chord schemas
  - doo-wop
  - singer/songwriter
  - hopscotch
- Classical schemas
  - lament
  - circle-of-fifths
- Puff schemas
- Modal schemas

Assignments

1. Identifying schemas (.pdf, .docx). Asks students to identify schemas in pop songs from a wide pool of possibilities, including blues-based schemas, four-chord schemas, puff schemas, and classical schemas. Worksheet playlist

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7.8: Blues-Based Schemas

Key Takeaways

Blues-based schemas all include some kind of plagal motion.

- Many songs simply use the two-chord vamp I–IV (very common in R&B and soul music).
- The "plagal sigh" schema, IV–iv–I, includes the scale-degree voice-leading *la–le–sol* (\hat{6}-\downarrow\hat{6}-\hat{5}) and can often be found at phrase endings.
- "Applied" IV chords can be used to create a double-plagal schema: ♭VII–IV–I.
- These applied IV chords can be used to create extended plagal progressions such as ♭VI–♭III–♭VII–IV–I.

Chapter Playlist

Blues-based schemas, or "flat-side" schemas, are those that mostly employ harmonies found on the "flat side" of the circle of fifths. We draw the connection to the blues here because of its propensity for using the IV chord (the first chord found in the flat-wise direction on the circle of fifths), and for the general ubiquity of the flattened seventh scale degree in blues music.

Plagal Motion

The IV chord, while certainly an extremely frequent predominant/subdominant chord in common-practice repertoire, has an even more prominent place in pop/rock music. Perhaps borne out of the 5–6 neighboring motion found in shuffle-blues guitar accompaniment patterns (Example 1), an alternation between I and IV is a common occurrence in numerous genres (Example 2).

A link to an interactive elements can be found at the bottom of this page.

Example 1. The 5–6 shuffle pattern.

A link to an interactive elements can be found at the bottom of this page.

Example 2. The plagal IV–I pattern.

In "Soul Man" by Sam and Dave, the chord progression used in the verse (Example 3) consists of an alternation of I and IV—listen carefully to the bass.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Sam and Dave, "Soul Man" (1967).

A similar oscillation between I and IV can be found in the verse to "In the Midnight Hour" by Wilson Pickett (Example 4). Perhaps unsurprisingly, this track features the same guitarist and bassist as "Soul Man" (Steve Cropper and Donald "Duck" Dunn, respectively).

A link to an interactive elements can be found at the bottom of this page.

Example 4. Wilson Pickett, "In the Midnight Hour" (1965).

This kind of chord progression isn't limited to soul and R&B, of course. The beginning of "After the Gold Rush" by Neil Young (Example 5) features a similar progression (it deviates after the the words "…drummers drummin'…"; also, note the discrepancy between the melody notes and the chords throughout).

A link to an interactive elements can be found at the bottom of this page.

Example 5. Neil Young, "After the Gold Rush" (1970).

Minor iv

$$(\hat{6} - \downarrow \hat{6} - \hat{5}) \tag{7.8.1}$$

This descent has been referred to by J. Kent Williams and Frank Lehman as a "plagal sigh" in Golden Era American popular song and Classic Hollywood film scores, respectively.[1] Both authors consider this gesture to invoke a sense of nostalgia and sentimentality. Indeed, even in pop music, musicians typically use this progression in conjunction with lyrics that suggest sentimentality.

"Wake Me Up When September Ends" by Green Day (Example 6) exhibits both of the tendencies discussed above: motion from IV–iv–I and a sense of nostalgia and sentimentality in the lyrics.

A link to an interactive elements can be found at the bottom of this page.

Example 6. Green Day, “Wake Me Up When September Ends” (2005).

Double-Plagal

The “double-plagal” progression (Walter Everett’s term) is an expansion of the plagal progression discussed above to include the IV/IV chord prior to the IV chord.[2] This is perhaps more simply explained as ♭VII–IV–I. The most famous instance of the double-plagal progression is likely the coda from “Hey Jude” by the Beatles (Example 7).

A link to an interactive elements can be found at the bottom of this page.

Example 7. The Beatles, “Hey Jude” (1968).

Extended Plagal

The “applied IV” chord can be used in sequence, similar to the descending-fifths progression in common-practice music. In the version of “Hey Joe” by Jimi Hendrix (1966), the verse consists of three iterations of the plagal motion in a descending-fourths pattern, which results in the progression ♭VI–♭III–♭VII–IV–I, in the key of E major.

A link to an interactive elements can be found at the bottom of this page.

Example 8. Jimi Hendrix, “Hey Joe” (1966).

Recognizing Blues-Based Schemas

In all of these examples, the sense of forward motion is created by the harmonic motion from IV to I. The other alterations, such as IV/IV (♭VII) or minor iv, are extra embellishments on this essential plagal motion.

Further reading

- Williams
- Lehman
- Everett

Assignments

1. Listening for blues-based schemas (.pdf, .docx). Asks students to identify blues-based schemas, their use, and any variations in three pop songs. Worksheet playlist
2. Identifying schemas (.pdf, .docx). Asks students to identify schemas in pop songs from a wide pool of possibilities, including blues-based schemas, four-chord schemas, puff schemas, and classical schemas. Worksheet playlist

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1. [reference] 7.08: Blues-Based Schemas#return-footnote-652-1
2. [citation] 7.08: Blues-Based Schemas#return-footnote-652-2

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7.9: Four-Chord Schemas

Key Takeaways

I, IV, V, and vi are the most common harmonies in pop music, and they can be arranged into several schemas, each with a distinct sound. Each schema can have variations, such as chord substitution or rotation, while still remaining recognizable as that schema.

- The doo-wop schema is **I–vi–IV–V**, and it was common in 1960s pop music. Common variations:
  - I–vi–ii–V (ii substitutes for IV)
  - IV–V–I–vi (rotation)
- The singer/songwriter schema is **vi–IV–I–V or I–V–vi–IV**, and it was common in 1990s singer/songwriter music. It can also be understood in its relative minor: **i–VI–III–VII.** A common variation is IV–I–V–vi (rotation).
- The hopscotch schema is **IV–V–vi–I**, and it is common in recent pop music (since 2010). It can also be understood in its relative minor: **VI–VII–i–III.** A common variation is VI–V–i–III (V substitutes for VII in minor).

Chapter Playlist

The progressions discussed in this chapter all have something in common. They use the same four chords: I, IV, V, and vi, which are probably the most common chords in all of pop music. Because of this, they all sound somewhat similar; the difference is in the order of the chords.

Doo-wop

Example 1 shows music notation, chord symbols, and Roman numerals for the doo-wop schema: **I–vi–IV–V,** or **C–Ami–F–G** in C major.

A link to an interactive elements can be found at the bottom of this page.

Example 1. The doo-wop schema (left) and a common variation of it that replaces IV with ii (right).

The name for this cyclical chord progression comes from its common use in rock ballads from the 1950s and early 1960s, such as "Duke of Earl" by Gene Chandler (1962). However, it has continued to be used frequently ever since: examples include the verse and chorus of "Friday" by Rebecca Black (2011) and the chorus of "Total Eclipse of the Heart" by Bonnie Tyler (1983) (starts at 0:49).

Substituting ii for IV

Because ii and IV share the same function in this chord progression, ii can be swapped out for IV, as in Otis Redding's "Try a Little Tenderness" (1966).

Rotation

Because the doo-wop schema is typically employed in cycles, it can also start on a different chord in the cycle and then proceed through the same succession of chords (rotation). For example, "Viva la Vida" by Coldplay (2008) works through a cyclical repetition of the same succession of chords, but the phrases begin on IV rather than I (Example 2).

A link to an interactive elements can be found at the bottom of this page.

Example 2. Rotated doo-wop progression in Coldplay, "Viva la Vida."

Singer/Songwriter

The singer/songwriter schema may be the best known of all the four-chord schemas. A common Roman numeral analysis for this schema is **vi–IV–I–V**, or **Ami–F–C–G** in C major, but the rotation starting with I is also exceedingly common. On top of that, either rotation may be understood as having either the major tonic or the relative minor tonic. This is best understood through Example 3.

A link to an interactive elements can be found at the bottom of this page.

Example 3. The singer/songwriter schema in its two common rotations.

Like the 1950s doo-wop, this is a four-chord cyclical progression. It has been around for some time and can be found in a variety of musical styles, but it became increasingly common beginning in the mid-1990s with singer/songwriters such as Sarah McLachlan,

Jewel, and Joan Osborne,

Tonal ambiguity

One important feature of this progression is that it does not, on its own, clearly communicate a definitive tonic chord. This property is known as tonal ambiguity. An example is "Despacito" by Luis Fonsi and Daddy Yankee (2017). The chord progression, Bmi–G–D–A, can sound like vi–IV–I–V in D major or like i–VI–III–VII in B minor to different listeners (Example 4). One reason the singer/songwriter schema is ambiguous is because there is no authentic cadence: the two potential cadential motions are either plagal (IV–I) or stepwise (VII–i). Without a strong harmonic cadence, listeners might only be able to determine the tonic chord—if at all—by the progressions before and after the singer/songwriter schema, which chords in the cycle begin and end it, and the important pitches of the melody.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Both D major and B minor are plausible tonic chords for "Despacito" because of its use of the tonally ambiguous singer/songwriter schema.

In fact, some songwriters take advantage of this duality in songs that modulate back and forth between relative major and minor keys, as well as in songs with some parallel ambiguity in the text (hence its usefulness for those mid-1990s songwriters). An example is "What About Love" by Heart (1982), which has an obvious D minor intro, a D minor/F major verse (begins at 0:23) using the singer/songwriter progression, and a chorus obviously in F major (begins at 1:10)—listen while following along with the chart below (Example 5).

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=658

[table id=6 /]

Rotations

As discussed above, this schema has two equally common rotations that start the progression on I and vi. From time to time, the singer/songwriter progression might also begin on the IV chord, resulting in a "deceptive" variant of this progression that ends with V–vi—a deceptive cadence (**IV–I–V–vi**). The chorus (starts at 1:11) of "Alejandro" by Lady Gaga (2009) uses this rotation of the singer/songwriter schema.

Hopscotch

In recent years (since about 2010), another type of four-chord schema has become increasingly common: **IV–V–vi–I,** or **VI–VII–i–III in minor**. Examples include "Dancing with a Stranger" by Sam Smith (2019) and "No Brainer" by DJ Khaled, Justin Bieber, and Quavo (2018). We will refer to this as the hopscotch schema because of its root motion: step, step, skip.

Like the singer/songwriter schema, the hopscotch schema can be tonally ambiguous. In other words, in the progression **F–G–Ami–C**, either Ami or C might sound like tonic (Example 6). There is often no definitive cadential motion, especially moving into the C chord.

A link to an interactive elements can be found at the bottom of this page.

Example 6. The hopscotch schema, with annotations showing the "step-step-skip" pattern.

Replacing VII in minor with V

$$(\hat{7}) \qquad (7.9.1)$$

A link to an interactive elements can be found at the bottom of this page.

Example 7. The hopscotch schema with V replacing VII, meaning the G of the VII is replaced with the G♯ of the V chord.

Recognizing by Ear

All of these four-chord schemas sound similar to one another, since they all use I, IV, V, and vi. All the schemas can be rotated, so it's not simply a matter of seeing where the progression begins and ends! Instead, try listening to *how the major tonic is approached* (Example 8).

A link to an interactive elements can be found at the bottom of this page.

Example 8. Each schema approaches the major tonic from a different chord.

- In the doo-wop schema, the tonic is approached with very traditional authentic motion, as in classical music.
- In the singer/songwriter schema, the major tonic is approached with plagal motion.
- In the hopscotch schema, the major tonic is approached by a skip (not related to any traditional cadence).

Even if you think the real tonic is the minor tonic, listening to the approach to the major tonic will help distinguish among these four-chord schema options. Listening to the approach to the minor tonic may not be helpful, since both the singer/songwriter and the hopscotch schemas approach the minor tonic by step.

Further reading

- Axis of Awesome. 2011. *4 Chords* . YouTube. https://www.youtube.com/channel/UCb4jjgJb5rtQqQN5GcypFow .
- Doll, Christopher. 2017. *Hearing Harmony: Toward a Tonal Theory for the Rock Era*. Ann Arbor: University of Michigan Press.
- Richards, Mark. 2017. "Tonal Ambiguity in Popular Music's Axis Progressions." *Music Theory Online* 23 (3). http://mtosmt.org/issues/mto.17.23.3/mto.17.23.3.richards.html.

Assignments

1. Identifying Four-Chord Schemas (.pdf, .docx). Students must identify which schema is used in a number of songs, each of which clearly presents the schema. Worksheet playlist
2. Variations on Four-Chord Schemas (.pdf, .docx). Using songs that put slight variations on the schemas discussed in this chapter, asks students to identify schemas and variations on the schemas. Worksheet playlist
3. Identifying schemas (.pdf, .docx). Asks students to identify schemas in pop songs from a wide pool of possibilities, including blues-based schemas, four-chord schemas, puff schemas, and classical schemas. Worksheet playlist

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7.10: Classical Schemas (in a Pop Context)

Key Takeaways

The schemas discussed in this chapter are all based on those often found in common-practice music.

- The lament schema is a four-chord schema that descends down the minor tetrachord from the tonic to the dominant: *do–te–le–sol* (\hat1-\downarrow\hat7-\downarrow\hat6-\hat5). Most typically, this is harmonized by I–♭VII–♭VI–V, however, *te* (\downarrow\hat7) can be harmonized in numerous ways.
- The circle-of-fifths schema is at least four chords in length, and it consists of chords whose roots descend by perfect fifth. This schema has many possible variations and does not necessarily start on the tonic.

Chapter Playlist

Lament

The "lament" progression is so named because in early classical music, this chord progression (almost always in minor) was used as the ground bass for songs of lament. Examples include "Dido's Lament" by Henry Purcell, from the opera *Dido and Aeneas*, and J.S. Bach's "Crucifixus," from his Mass in B Minor. For more on those classical cases, see the Ground Bass chapter.

$$(\hat{1}-\downarrow\hat{7}-\downarrow\hat{6}-\hat{5}) \tag{7.10.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 1. *Dire Straits, Sultans of Swing" (1978)*

$$(\downarrow\hat{7}) \tag{7.10.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 2. *Muse, "Thoughts of a Dying Atheist" (2004)*

Circle-of-Fifths

In this schema, each chord's root moves down by fifth to the next root. This progression often happens in minor, beginning on i and ending on the relative major. Like the "singer/songwriter" progression, there is some key ambiguity in this progression, as the starting chord is easily considered tonic, but the motion from VII to III can easily be heard as V–I in the relative major key. And indeed, it can be used to move from the relative minor to the relative major.

The chorus of Aqua's "Barbie Girl" provides a somewhat tonally ambiguous example of the circle-of-fifths schema (see Example 3).

A link to an interactive elements can be found at the bottom of this page.

Example 3. *Aqua, "Barbie Girl" (1997).*

The verse of Muse's "Thoughts of a Dying Atheist" also includes a four-chord circle-of-fifths schema, immediately following the lament discussed above. This progression immediately repeats, returning to the initial minor key. However, the second time through, this lament–circle-of-fifths pattern leads to a chorus in the relative major (taking the III chord as the new tonic).

Longer examples of the circle-of-fifths schema can be found in pop/rock music, too.

Radiohead's "You and Whose Army?" (Example 5) presents a slightly more complex instance of a circle-of-fifths schema. Here we get a chromatic sequence of the schema, in which each pair of fifth-related chords functions locally as an applied ii–V progression of the following chord, much like the applied ii–V progressions found in jazz. Like "Barbie Girl," "You and Whose Army?" is tonally ambiguous. The circle-of-fifths schema propels the music forward, without ever strongly confirming the tonic. Both E major and C♯ minor are viable interpretations, and thus have both been provided in the analysis below.

A link to an interactive elements can be found at the bottom of this page.

Example 5. *Radiohead, "You and Whose Army?" (2004).*

Assignments

1. Classical schemas (.pdf, .docx). Asks students to identify the chord progressions of various songs that use classical schemas. Worksheet playlist
2. Identifying schemas (.pdf, .docx). Asks students to identify schemas in pop songs from a wide pool of possibilities, including blues-based schemas, four-chord schemas, puff schemas, and classical schemas. Worksheet playlist

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7.11: Puff Schemas

Key Takeaways

- Puff schemas are based on a I–iii–IV progression.
- Common variations:
  - I–III♯–IV
  - i–III–iv

Chapter playlist

While many of the schemas discussed in other chapters are commonly used as repeating chord loops, others are more often used as a building block within a goal-oriented phrase. Puff schemas, which use the mediant triad (iii), are one such schema. The name comes from its use at the outset of phrases in the song “Puff, the Magic Dragon” by Peter, Paul and Mary (1963).

[table id=19 /]

Example 1. The puff schema begins most of the phrases in “Puff, the Magic Dragon.”

The puff schema is typically found in the opening of phrases, as it is here (Example 1). Again, the puff schema is not typically looped, so the chords that come after the IV chord can vary. In “Puff,” the fourth chord is I. But in “Let’s Get It On” by Marvin Gaye, the IV chord progresses to V (Example 2). “House of the Rising Sun” by the Animals (1964) is an example of the puff schema in a minor-key song (Example 3); here, a major IV progresses to VI, demonstrating how the puff schema can involve varied chord quality.

[table id=20 /]

Example 2. The phrases in “Let’s Get It On” begin with a puff schema before finishing with a V–I motion.

[table id=21 /]

Example 3. “House of the Rising Sun” uses the puff schema in minor. The IV chord is also major instead of the typical minor.

I–III♯–IV

One particularly common chromatic variant of the puff schema raises the third of the iii chord to make it a major III♯ chord: I–III♯–IV. This progression is prominently featured in Radiohead’s debut single, “Creep” (1993). It combines the puff schema with a plagal schema with mode mixture (Example 4).

[table id=24 /]

Example 4. “Creep” by Radiohead uses the puff schema with a major III♯ chord. (Each column = two measures.)

$$(\hat{5} - \sharp\hat{5} - \hat{6}) \tag{7.11.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 5. Chromatic line in I–III♯–IV.

III♯–IV as Deceptive Motion

In many cases, a III♯ chord should be interpreted as an applied chord: a V/vi. The III♯ chord, acting as V/vi, does sound good when followed by vi. A progression like C–E–Ami–F can be understood as a variation on the singer/songwriter schema, in which a V/vi replaces the V chord.

Especially in a song that uses a progression like C–E–Ami–F, moving from E straight to F in another progression could be understood as deceptively resolving the III♯ chord:

- E–Ami is a V–i progression in the key of A minor.
- Ami is vi in the key of C major, so in C major, we can analyze E–Ami as V/vi–vi.
- E–F is a V–VI progression in the key of A minor, a deceptive resolution of the V chord.
- In C major, E–F may still sound like a deceptive resolution of the V/vi chord.

The play between deceptive and authentic resolutions of III♯ as a V/vi chord is a remarkable feature of the progressions used in “Weekend Wars” by MGMT (2007). Setting up the puff schema with an authentic V/vi–vi progression prepares the listener to experience the puff progression as a deceptive resolution (Example 6).

[table id=25 /]

Example 6. “Weekend Wars” by MGMT.

Further Reading

- Doll, Christopher. 2017. *Hearing Harmony: Toward a Tonal Theory for the Rock Era*. Ann Arbor: University of Michigan Press.

Assignments

1. Puff schemas (.pdf, .docx). Asks students to identify the chord progressions of various songs that use the puff schema. Worksheet playlist
2. Identifying schemas (.pdf, .docx). Asks students to identify schemas in pop songs from a wide pool of possibilities, including blues-based schemas, four-chord schemas, puff schemas, and classical schemas. Worksheet playlist

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7.12: Modal Schemas

Key Takeaways

- Many pop songs use harmonic progressions that imply modes other than major/minor.
- A modal schema may be used without the entire song being strictly within that mode.
- Modes may be compared to major and natural minor to understand what characterizes their sound (their color notes)
- Mixolydian schemas:
  - **Double plagal** ♭VII–IV–I
  - **Subtonic shuttle** I–♭VII
- Aeolian schemas:
  - **Subtonic shuttle** i–♭VII (same as mixolydian, but with a minor tonic)
  - **Aeolian shuttle** i–♭VII–♭VI–♭VII
  - **Aeolian cadence** ♭VI–♭VII–i (or I)
  - **Lament** i–♭VII–♭VI–v
- Dorian schemas:
  - **Dorian shuttle** i–IV
- Lydian schemas:
  - **Lydian shuttle** I–II♯
  - **Lydian cadence** II♯–IV–I

This book covers modes from many different angles. For more information on modes, check Introduction to Diatonic Modes (general), Chord-Scale Theory (jazz), Diatonic Modes (20th/21st-c.), and Analyzing with Modes, Scales, and Collections (20th-/21st-c.).

Chapter Playlist

"Mode" is a really complicated term. The article on mode in *Grove Music Online* (Powers et al. 2001), which is the standard academic encyclopedia for musicology, is 238 pages long and has nine authors. This means that, even if you think you already know about modes, you may want to set that knowledge aside before learning how modes are used in pop music.

This chapter discusses modes as they appear in certain schematic chord progressions in pop and rock music. Most of this information is based on the work of Nicole Biamonte (2010) and Philip Tagg (2011). After showing the function of modal harmonies as they compare to diatonic harmonies, common modal schemas will be introduced, grouped by the mode they borrow from.

Grouping modes by whether the tonic is major or minor helps with aural identification of modal passages. This grouping is represented in Example 1. The top line shows modes whose

is a major third above tonic (*mi*): major, mixolydian, and lydian. The bottom line shows modes whose

is a minor third above tonic (*me*): aeolian, dorian, and phrygian. Example 1 also illustrates what differentiates certain modes from major or minor. Each mode has exactly one pitch shown in a lighter color; this pitch is inflected when compared to major/minor. These special pitches are referred to as the color note of each mode.[1] These relationships are shown with the dotted slurs.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Modes grouped by major vs. minor tonic, with dotted slurs connecting the distinctive color pitch of each mode with its major/minor counterpart.

Function of Modal Harmonies

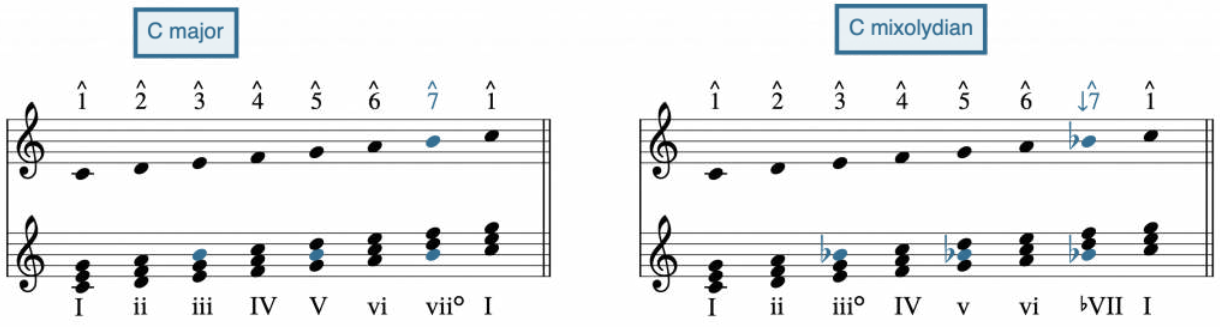
You may already have learned about tonic, subdominant, and dominant function in diatonic harmony. Modal harmonies basically align in function with their diatonic counterparts, although the additional modal inflections create greater overlap between these functions. This is summarized in Example 2.

Example 2. Modal harmony allows many more “flavors” of the same chord to be implemented without changing the function of the chord.

This illustration of harmonic function may help you to understand why certain modal progressions seem as goal-oriented as diatonic progressions.

Mixolydian: ♭VII

Mixolydian’s color note is *te* (\downarrow\hat{7}), as shown in Example 3. In major-mode pop songs, the ♭VII chord is borrowed from the mixolydian mode. ♭VII typically has dominant function, and you might think of it as a substitute for the traditional major-mode V chord in both the double plagal and mixolydian cadence schemas (Example 4).



$$\downarrow\hat{7} \tag{7.12.1}$$

A link to an interactive elements can be found at the bottom of this page.

Example 4. The double plagal schema and the mixolydian cadence schema are two especially common mixolydian chord progressions.

Double plagal

The double plagal schema, ♭VII–IV–I, which is discussed further in the blues-based schemas chapter, is also a mixolydian schema, due to the major tonic and the $\downarrow\hat{7}$ (*te*).

Subtonic shuttle

Example 5. “Tired of Waiting for You” by the Kinks uses the subtonic shuttle in its intro and verses. Transcription begins at 0:07.

The most distinctive chord progression in mixolydian is the subtonic shuttle, ♭VII–I, or B♭–C in C major (Example 4 above). The subtonic shuttle is used continuously throughout the intro and first verse of “Tired of Waiting for You” by the Kinks (1965), where the instrumental parts shuttle between I and ♭VII throughout, while the melody emphasizes $\downarrow\hat{7}$ (*te*) as an embellishment and melodic goal (Example 5).

Aeolian: ♭VII and ♭VI

$$(\downarrow\hat{6}, \downarrow\hat{7}) \tag{7.12.2}$$

A link to an interactive elements can be found at the bottom of this page.

Example 6. The subtonic shuttle, aeolian shuttle, aeolian cadence, and lament schemas are four common aeolian chord progressions.

Example 7. “Somebody That I Used to Know” by Gotye features the subtonic shuttle in its intro/verses and the aeolian shuttle in its choruses. The Intro transcription begins at 0:04, and the Chorus transcription begins at 1:32.

Subtonic shuttle

The subtonic shuttle was introduced as a mixolydian progression, but the same progression can be used in aeolian. The difference is only in the quality of the tonic chord. If it’s major, then the subtonic shuttle implies mixolydian; if it’s minor, then the subtonic shuttle implies aeolian. In other words, ♭VII–i, or B♭–Cmi in C minor, is the minor version of the subtonic shuttle. This subtonic shuttle is used in the intro and verses of “Somebody That I Used to Know” by Gotye (2011, Example 7).

Aeolian shuttle

Another common shuttle in aeolian is i–♭VII–♭VI–♭VII. This progression can be understood as a shuttle between i and ♭VI, with a passing ♭VII chord along the way. This progression is featured clearly in the chorus of “Somebody That I Used to Know” by Gotye (2011, Example 7).

Example 8. The Fellowship Theme from the Lord of the Rings soundtrack by Howard Shore concludes its phrases with an aeolian cadence. Transcription begins at 0:27.

Aeolian cadence

In the aeolian shuttle schema, the consistent shuttling back and forth between I and ♭VI makes it difficult for a true cadence to be implied—a cadence means that a goal has been reached, but a circular progression like the aeolian shuttle doesn't seem to have a goal. The aeolian cadence ♭VI–♭VII–i, or A♭–B♭–Cmi, is similar to the aeolian shuttle, but it's goal-oriented: it cadences on the tonic chord, and it does not tend to be used as a loop. The aeolian cadence very frequently uses a picardy third, which means all the chords are major: ♭VI–♭VII–I, or A♭–B♭–C.

The aeolian cadence has a lot of cultural associations for many people and is typically associated with success and heroism. This cadence concludes the phrases of the Fellowship Theme from *Lord of the Rings* (Example 8, begins at 0:27). The aeolian cadence has also been called the Mario cadence, since the well-known fanfare at the end of each level of Super Mario Bros. uses this progression; the progression is often heard as a fanfare in other video games, such as Final Fantasy. In all of these examples, the cadence concludes with a picardy third.

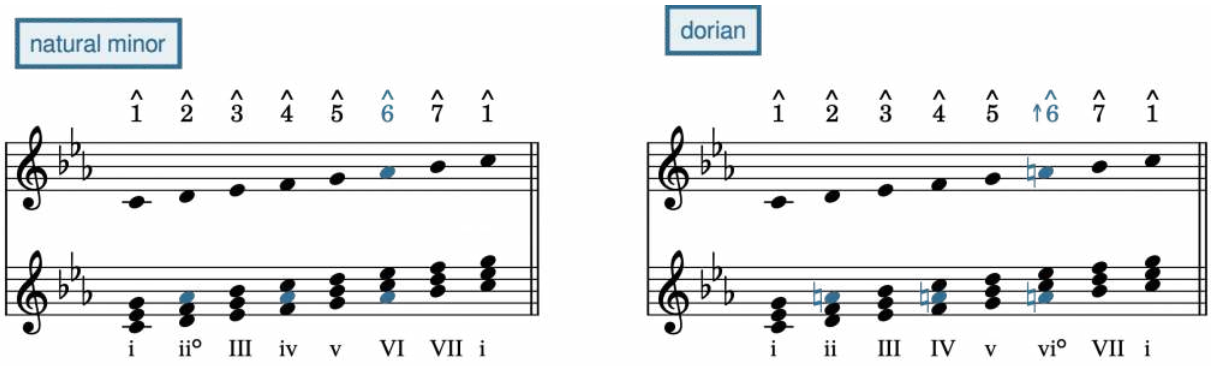
Example 9. "I Don't Like You" by Eva Simons uses a lament schema with ♭VII and minor v.

Lament

$$(\downarrow \hat{7}) \tag{7.12.3}$$

Dorian: IV with a Minor Tonic

$$(\hat{6} \text{ instead of} \downarrow \hat{6}) \tag{7.12.4}$$



Example 10. Dorian is distinguished from the natural minor scale by its \uparrow\hat{6} (la), which alters the quality of the IV and ii chords. (vi° is not used.)

Example 11. "Get Lucky" is in B dorian and features a characteristic IV–i motion every four bars (shown here by the arrows) to emphasize Bmi as tonic.

The dorian mode is especially associated with funk, disco, and its derivative genres, where the dorian shuttle is especially pervasive. One example of many is "Dance, Dance, Dance" by CHIC (1979). Some people who haven't listened to much music from these genres have trouble aurally recognizing the dorian shuttle and hear it instead as ii–V. Listening to a lot of funk and disco should help you learn to hear that "ii chord" as a i chord, even in more ambiguously dorian songs like Daft Punk's "Get Lucky" (2013, Example 11).

Dorian shuttle

$$(\uparrow \hat{6}) \tag{7.12.5}$$

A link to an interactive elements can be found at the bottom of this page.

Example 12. The dorian shuttle uses minor i and major IV. It can be expanded to arch up to i^7.

Lydian: II♯

$$(\uparrow \hat{4}) \tag{7.12.6}$$

Example 13: Lydian is like major with a raised scale-degree 4. This results in a major II chord. (iv° and vii are not used.)

Example 13. Lydian is like major with \uparrow\hat{4} (fi). This results in a major II chord. (iv° and vii are not used.)

If II♯ goes to V, as it typically does in classical music, the chord should be understood as as a secondary dominant V/V instead. But in pop tunes, II♯ often leads elsewhere, necessitating the II♯ label.

Very few pop songs are truly in the lydian mode all the way through the song, but many major-mode pop songs use a major II♯ chord in place of the typical minor ii, giving a brief lydian flavor while remaining overall in the major mode.

II♯ can have either subdominant or dominant function, and each is used in the following two schemas (Example 14).

A link to an interactive elements can be found at the bottom of this page.

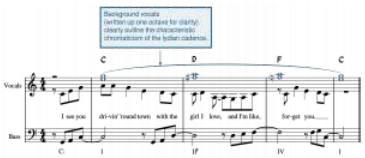
Example 14. The II♯ chord is the characteristic chord of lydian and is used in both of these schemas.

Lydian shuttle

The most basic lydian chord progression is a simple shuttle between II♯ and I. Identifying this chord progression correctly can be tricky: because few pop songs are truly in lydian throughout, this II♯ chord is often neutralized later in the chord progression with a IV chord or a ii chord, which means the song is overall in major, but with a brief II♯ chord. This progression can be heard with some alterations in the opening of "Sara" by Fleetwood Mac (1979). "Sara" expands the lydian shuttle to include a Ima^7 chord to harmonize an arching melody, and it also uses a tonic pedal underneath the II♯ chord. Later on in the song, the II♯ is neutralized by the use of a doo-wop schema. This is illustrated by Mark Spicer.

If the II♯ chord is never neutralized, it's possible that the chord progression isn't really I–II♯, but another shuttle that relates roots by step. For example, Taylor Swift's "Starlight" (2012) has verses that alternate between A and B major chords (begins at 0:26), but they are IV–V in E major, *not* a lydian shuttle. This becomes clear in the chorus (0:56), which is harmonized with a rotation of the doo-wop schema. The subtonic shuttle discussed earlier in this chapter is another chord progression that relates two major chords by step. Remember that lydian is rare in pop music, and be careful when identifying this progression!

$$(\uparrow \hat{4} - \hat{5}) \tag{7.12.7}$$



Example 15: "Forget You" loops a lydian cadence throughout the song. The background vocals always have the characteristic chromatic line.

Lydian cadence

$$(\uparrow \hat{4}) \tag{7.12.8}$$

Identifying Modes by Ear

If you are not used to playing in and listening to modes, it can be daunting to identify and distinguish modes by ear. Here is a step-by-step process for aurally distinguishing all the modes discussed here, illustrated as a flowchart in Example 16.

1. Identify the quality of tonic.

EXAMPLE 16. Flowchart illustrating the process of identifying modes by ear.

Listen for the tonic pitch. Then, listen for the whole tonic chord. Is the third of that chord major or minor? This distinguishes the major-ish modes (major, mixolydian, lydian) from the minor-ish modes (minor, aeolian, dorian).

2. Listen for $\hat{7}$ (*ti* or *te*).

Compare the $\hat{7}$ to the leading tone (*ti*) a half step below tonic that we typically hear in minor and major songs. If $\hat{7}$ is a *whole step* below tonic (*te*), then it's lowered, which means that the song is (at least temporarily) in a mode.

If you heard a major tonic and $\hat{7}$ is lowered (*te*), then you are in **mixolydian.**

If you heard a minor tonic and $\hat{7}$ is raised (*ti*), then you are in **minor.**

If your mode is not already identified, proceed to step 3.

3. Listen for other raised color notes—*fi* $(\uparrow\hat{4})$ in major, and *la* $(\uparrow\hat{6})$ in minor.

If $\hat{7}$ did not identify the mode for you, listen for other raised color notes.

If $\hat{4}$ is raised (*fi*) in a major-tonic mode, you are in **lydian.** If it is not, you are in **major.**

If $\hat{6}$ is raised (*la*) in a minor-tonic mode, you are in **dorian.** If not, you are in **aeolian.**

Further reading

- Biamonte, Nicole. 2010. "Triadic Modal and Pentatonic Patterns in Rock Music." *Music Theory Spectrum* 32 (2): 95–110. doi.org/10.1525/mts.2010.32.2.95.
- Everett, Walter. 2009. *The Foundations of Rock: From Blue Suede Shoes to Suite: Judy Blue Eyes*. Oxford: Oxford University Press.
- Persichetti, Vincent. 1961. *Twentieth-Century Harmony*. New York: W. W. Norton.
- Powers, Harold S. et al. "Mode." In *Grove Music Online*. New York: Oxford University Press. www.oxfordmusiconline.com/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000043718.
- Spicer, Mark. 2017. "Fragile, Emergent, and Absent Tonics in Pop and Rock Songs." *Music Theory Online* 23 (2). http://mtosmt.org/issues/mto.17.23.2/mto.17.23.2.spicer.html.
- Tagg, Philip. 2011. *Everyday Tonality: Towards a Tonal Theory of What Most People Hear*. 1.3. New York: The Mass Media Music Scholars' Press.

Assignments

1. Identifying Modal Schemas (.docx, .pdf). Asks students to aurally identify various modal schemas. Worksheet playlist
2. Modal reharmonization composition exercise (.mscz, .pdf). Asks students to reharmonize Rihanna's "Desperado" (2016) with modal schemas.

---

1. Vincent Persichetti (1961) referred to these pitches as "characteristic notes." 7.12: Modal Schemas#return-footnote-682-1
2. "Forget You" is the classroom-friendly version of the more explicit original. 7.12: Modal Schemas#return-footnote-682-2

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7.13: Pentatonic Harmony

Key Takeaways

- As discussed in the previous chapter:
  - Many pop songs use harmonic progressions that imply modes other than major/minor.
  - A modal schema may be used without the entire song being strictly within that mode.
- The pentatonic collection is
  - a five-note collection
  - a subset of the diatonic collection (that's also explainable in terms of fifths)
  - not one of the diantonic modes, because it has fewer notes, but it can be considered alongside them, especially in this context.
- Chord progressions can be understood in terms of the pentatonic based on their bass notes, whether the chords are major, minor or anything else.
  - Partly for this reason, it's common to see the "same" scale degree in more than one form (e.g., *mi* and *me* $(\hat{3}, \downarrow\hat{3})$)

This book covers modes from many different angles. For more information on modes, check Introduction to Diatonic Modes (general), Chord-Scale Theory (jazz), Diatonic Modes (20th/21st-c.), and Analyzing with Modes, Scales, and Collections (20th-/21st-c.).

Rock music, and popular music more generally, owes a great debt to the blues tradition. One of the most pervasive pitch collections in pop and rock music is the pentatonic collection, a five-note collection also firmly rooted in the blues.

Basic Scale Materials

The pentatonic scale is related to the blues scale and the diatonic scale: it is a subset of both of those collections that is distinctive for containing only 5 pitches and no semitones. As a 5-pitch collection, there are 5 different rotations of the pentatonic collection (just like there are 7 rotations of the diatonic). In this case (unlikely some 5-note collections) all 5 rotations are different from each other.[1] In popular music, the pentatonic scale is typically found in one of two rotations: the "major pentatonic" and the "minor pentatonic" scales. Example 1 shows these two main rotations (on the top stave) and then all 5 (on the bottom).[2]

A link to an interactive elements can be found at the bottom of this page.

Example 1. Pentatonic scales.

"Scale Degree conflict" a.k.a. "Cross Relations"

In rock music, a harmonic system based on the pentatonic scale is typically created by using the scale as *chord roots*. The chords can be major triads, minor triads, power chords (chords with a root and fifth but no third), or anything else (including sevenths, added notes etc.). Note that this flexibility in terms of the chord "quality" means that the total pitch collection is often *not exclusively pentatonic*: often, the chord tones combine to make a collection that doesn't correspond to the pentatonic, or even any of the 7-note modes we've encountered so far.

Example 2 shows how this can be understood in terms of a "conflict" or "cross relation" between scale degrees.[3] Both staves show major triads built on the notes of the pentatonic scale.

- The first collection (upper stave) is built on the pentatonic in "rotation 1" and includes:
  - *ti* and *te* $(\hat{7}, \downarrow\hat{7})$ colored blue);
- The second collection (lower stave) builds on pentatonic "rotation 4". It includes both
  - *mi* and *me* $(\hat{3}, \downarrow\hat{3})$, colored blue) and also
  - *la* and *le* $(\hat{6}, \downarrow\hat{6})$ (colored purple).

A link to an interactive elements can be found at the bottom of this page.

Example 2. Pentatonic harmony derived from two different rotations of the pentatonic scale.

“Scale Degree” / “Cross Relation” conflict through parallel triads

Example 2 shows major triads on pentatonic scale degrees specifically. This is quite a common example of how cross-relations arise in popular music chord cycles. Nicole Biamonte and others have noted that its probably not a coincidence this fits so well on the guitar: melodies and chord roots based on the pentatonic, with parallel (“barre”) chords that are all major.[4]

Example 3 shows an excerpt from “Higher Ground” by Stevie Wonder (1973), in which the pervasive harmonic loop can be understood as derived from the pentatonic scale. Note that the while first *chord quality* is somewhat ambiguous (arguably at least based on parallel major triads with or without added tones), the bass is perfectly clear.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Stevie Wonder, “Higher Ground” (1973).

Fifths and Fifth Progressions in light of the Pentatonic

The pentatonic collection is a subset of the diatonic collection and both have the notable property that they can be constructed by successive fifths. For example:

- the diatonic collection can be built from hey succession of fifths like F-C-G-D-A-E-B (in order: C-D-E-F-G-A-B), and
- the pentatonic collection can be formed from the central five of these: C-G-D-A-E (in order: C-D-E-G-A).

That being the case, chord progressions like the cycle of fifths can feature in the pentatonic case, or at least *part of that cycle* can. Likewise, other chord progressions organised around fifths can be understood in terms of the pentatonic.

For example, successive pairs of fifths a tone apart give progressions like:[5]

- D-A, C-G, …
- G-C, A-D, …

The first of these (D-A-C-G) is the chord progression of TLC’s hit song *Waterfalls* (1994/5). Once again, we can keep the *quality of the chord* (major, minor, …) separate from the *bass* here.

As so often, the distinction between different categories gets complicated. For example, we could also view this view this D-A-C-G progression in terms of **Double plagal** Mixolydian schema (♭VII–IV–I), but with a V, so I–V–♭VII–IV–(I). So if this progression could be pentatonic and/or mixolydian, what really makes a quintessential pentatonic progression.[6]

Quintessential Pentatonic?

What makes a progression seem a better fit for *pentatonic* that some other mode like mixolydian? This is a good and open question, especially because considering that:

- most of the progressions we’ve seen have fewer than five chords in them (they’re a “subset” of the full collection, whether modal, pentatonic or anything else),
- the quality of those chords and the overall pitch content are quite flexible.

There’s no easy answer – many progressions could be described in terms of either pentatonic or other modes. And that clarity (or otherwise) is related to many factors. For example, if the tonic/final is not clear and we consider only the notes, then *all* pentatonic progressions are subsets of *all* diatonic modes because the pentatonic collection is a subset of the diatonic. Usually though we have some sense of the tonic/final and can narrow it down to ambiguities like “minor pentatonic or aeolian subset.”[7] This question (and possible answers) are also related to considerations other than chords: how does the main melody work?, what about any improvised solos?, and (crucially) what is the style/genre context?

Are there any progressions with all five notes of the pentatonic? Why yes, there (occasionally) are. Let’s close by considering an example of a 5-chord pentatonic progression that also draws together many of the topics discussed above.

Hey Joe, where you going with that progression of fourths?

“Hey Joe” has been performed and recorded by countless artists, probably most famously by Jimi Hendrix and the Jimi Hendrix Experience.[8]

The (main) chord progression is a sequence of five chords, with the interval of a descending 4ths (or rising fifth) between each, that ends on the tonic. Example 3 shows this progression with a tonic root of E (as is the case in the Hendrix version, 1966). The scale degree conflicts are highlighted as they were above:

- *mi* and *me* (\hat3, \downarrow\hat3), colored blue) and also
- *la* and *le* (\hat6, \downarrow\hat6) (colored purple).

A link to an interactive elements can be found at the bottom of this page.

Example 3. “Hey Joe”, chord progression, e.g., as recorded by Jimi Hendrix, (1966).

Biamonte (2010) includes this example, noting the chain of fourths, and seeing this kind of progression in terms of pentatonic mode in rotation 4 (look back to Examples 1 & 2). Pentatonic rotation 4 seems to be relatively common and it also seems to attract *longer chord chains* (include 5) than other rotations and contexts do (where 2–4 is typical).[9]

In any case, a full 5-chord progression hitting all and only the notes of the pentatonic makes a pretty strong case for a pentatonic reading. But even here, it’s ambiguous. This pentatonic rotation is a subset of several diatonic modes, including the Aeolian (without \hat2, \hat5). And this progression of descending fourths could be heard, once again, in terms of an extended version of the **Double plagal** – now a “quintuple plagal” perhaps? – which we first encountered in terms of the mixolydian. In that reading, the double plagal (♭VII–IV–I) is now extended as shown on Example 3 (♭VI–♭III–♭VII–IV–I).

All we can advise is to practice analysing parts separately and combine them freely. In encountering a new piece, you might ask:

- what is the *overall tonic*?
- what are the *chord roots* ?
- what is the pitch collection in the *chords* overall (i.e., not only the roots)?
- what is the pitch collection in the *piece* overall (i.e., not only the chords)?

Having considered those questions separately, you’re well placed to consider combining them:

- do the *chord roots* and the *overall tonic* combine to suggest a mode (whether pentatonic or aeolian, etc.)?
- do the rest of the chord tones fit this or suggest some other origin like parallel writing?
- does the rest of the pitch content fit or not?
- how does all of this relate to other pieces you know and wider questions of style/genre?

Finally, don’t feel the need to come up with categorical, comprehensive answers every time: you can recognise the case for both pentatonic and Aeolian, and view those readings as equal, or come down in favour of one while still recognising the other.

Further reading

- Biamonte, Nicole. 2010. “Triadic Modal and Pentatonic Patterns in Rock Music.” *Music Theory Spectrum* 32 (2): 95–110. doi.org/10.1525/mts.2010.32.2.95.
- Lewandowski, Stephan. 2010. »›Fallende Quintanstiege‹. Ein Modellversuch«, *Zeitschrift der Gesellschaft für Musiktheorie* 7/1, 85–97. https://doi.org/10.31751/508
- Spicer, Mark. 2017. “Fragile, Emergent, and Absent Tonics in Pop and Rock Songs.” *Music Theory Online* 23 (2). http://mtosmt.org/issues/mto.17.23.2/mto.17.23.2.spicer.html.
- Tagg, Philip. 2011. *Everyday Tonality: Towards a Tonal Theory of What Most People Hear*. 1.3. New York: The Mass Media Music Scholars’ Press.

Assignments

1. Coming soon!

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1. See more in the chapter on collections. 7.13: Pentatonic Harmony#return-footnote-684-1
2. See Biamonte (2010, p.104) for more on the significance of the "minor pentatonic" and the reasons for assigning it as "rotation 1". 7.13: Pentatonic Harmony#return-footnote-684-2
3. See also this book's chapter on "modal mixture". 7.13: Pentatonic Harmony#return-footnote-684-3
4. Biamonte further notes that the preference for major quality (and likewise power chords) may be related to the use of "distorted timbres, which render major triads somewhat dissonant, but minor triads significantly more so." (Biamonte 2010, p.104)7.13: Pentatonic Harmony#return-footnote-684-4
5. Lewandowski calls these two progressions the *fallender Quintanstieg* (broadly, falling (progression of) rising fifths, and the *steigender Quintfall* (rising (progression of) falling fifths). 7.13: Pentatonic Harmony#return-footnote-684-5
6. Excuse pun! 7.13: Pentatonic Harmony#return-footnote-684-6
7. For more on distinguishing modes, see the previous chapter. 7.13: Pentatonic Harmony#return-footnote-684-7

8. "Hey Joe" was the first single released by the Jimi Hendrix Experience in 1966. While the exact origins of this song are not totally clear, it was certainly already a cover song by 1966. It seems that lots of artists are attracted to this song, perhaps partly because of the chord progression discussed here. 7.13: Pentatonic Harmony#return-footnote-684-8
9. See Biamonte 2010, Ex.22, p.107. 7.13: Pentatonic Harmony#return-footnote-684-9

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7.14: Fragile, Absent, and Emergent Tonics

Key Takeaways

- Most songs have a clear tonic.
- Tonal ambiguity arises when there is not enough information to confidently assign a tonic chord.
- Tonal ambiguity occurs in pop songs in one of three ways:
  - Fragile tonic: the tonic chord is used in the song but is weakened through inversion or another similar technique.
  - Emergent tonic: the tonic chord is withheld until a triumphant moment, such as the chorus.
  - Absent tonic: the tonic chord is implied through melodic and harmonic conventions, yet never explicitly stated.

Chapter Playlist

Although many pop songs are harmonically simple, using only a handful of chords in root position, this simplicity can sometimes lead to tonal ambiguity. One way that tonal ambiguity is created is through de-emphasizing the tonic chord. According to pop theorist Mark Spicer (2017), whose work is the basis of this chapter, much tonal ambiguity in pop music occurs through one of three techniques: fragile, absent, and emergent tonics.

Fragile tonic

The fragile tonic technique is one in which the tonic chord is used in the song, but is weakened through inversion or another similar technique. Fragile tonics can be found in music by artists who seem to have composed at the piano, as in Sufjan Stevens's "Oh God Where Are You Now" (2003). The tonic chord, G♭, is most often in first inversion; it only appears in root position as an incomplete passing chord in the midst of a contrapuntal series of parallel tenths in the C phrase (Example 1). Otherwise, first-inversion E♭ minor chords are found where tonic chords may otherwise be expected.

A link to an interactive elements can be found at the bottom of this page.

Example 1. "Oh God Where Are You Now? (In Pickerel Lake? Pigeon? Marquette? Mackinaw?)" by Sufjan Stevens uses a fragile tonic.

Fragile tonics usually connect to a theme in the lyrics of loneliness, vulnerability, and sensitivity. The Sufjan Stevens song in Example 1 follows this principle: the narrator in the lyrics seems to be desperate for comfort from God, and thus in a vulnerable state. Another example of a song that uses a fragile tonic to emphasize vulnerability is Elton John, "Somebody Saved My Life Tonight" (1975) (see Spicer 2017).

Emergent Tonics

Songs with emergent tonics withhold the tonic chord until a triumphant moment, such as the chorus. The song will begin by using other chords, especially the relative major/minor, some of which may sound like tonic at first; but later in the song, the true tonic is revealed to be another chord that either did not sound like tonic initially or was not present at all.

Emergent tonics often accompany lyrical themes of triumph and overcoming, and this is just what happens in "Let It Go" from the movie *Frozen*. Listen to the song while following the form chart below (Example 2), which explains how the tonic emerges. The emergent tonic here emphasizes the theme of Elsa overcoming her self-doubt and owning her identity.

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=687

[table id=7 /]

Example 2. Form chart of “Let It Go.”

You could also understand this song as using a different key for each section—F aeolian for the verses, E♭ mixolydian for the prechoruses, and A♭ major for the choruses. This is certainly what seems to be going on when first listening to the intro and prechorus.

While that is a perfectly acceptable analysis, notice how analyzing this song as belonging entirely to A♭ major allows for a nice narrative parallel between the chord progression and the lyrics: In the first verse, Elsa (the singer) begins the song describing a bleak, cold night, accompanied in the harmony by chords that emphasize the vi chord instead of tonic. In the prechorus, as Elsa wrestles with a choice between pleasing society (“be the good girl”) or letting it go, she is accompanied by repeating IV and V chords increasingly demanding a resolution. Right when Elsa makes up her mind—she decides to “let it go”—A♭ major, the tonic, finally brings resolution to the oscillation between IV and V in the prechorus, underscoring Elsa’s inner transformation.

Another example of an emergent tonic is “Little Red Corvette” by Prince (1982), which seems to be in B♭ minor until D♭ emerges as the true tonic chord in the chorus (see Spicer 2017).

Absent Tonics

The most extreme manipulation of our sense of tonic occurs when a song has an absent tonic. An absent tonic never actually materializes as a heard harmony in the song, but instead is established only melodically and by using familiar harmonic progressions that do not involve the tonic.

“Last Friday Night” by Katy Perry (2012) is an example of a song with an absent tonic. The progression is very conventional—**IV–ii–vi–V**—but I never sounds. The melody, as can be seen in Example 3, strongly outlines F♯ major in the chorus, with repeated descending

(*mi–re–do*) lines. This melody, combined with the familiarity of the chord progression, allows F♯ to sound like tonic even when it never occurs in the accompaniment.

A link to an interactive elements can be found at the bottom of this page.

Example 3. The chorus of “Last Friday Night” by Katy Perry.

As with fragile and emergent tonics, absent tonics can also be interpreted as representations of lyrical themes. In the case of “Last Friday Night,” the absent tonic may depict the disconnect between constant partying and a need to function in the real world.

Further reading

- Spicer, Mark. 2017. “Fragile, Emergent, and Absent Tonics in Pop and Rock Songs.” *Music Theory Online* 23 (2). http://mtosmt.org/issues/mto.17.23.2/mto.17.23.2.spicer.html

Assignments

1. Reharmonizing to avoid tonic (.pdf, .mscz). Asks students to reharmonize a song that uses the singer/songwriter schema to instead use fragile, absent, or emergent tonic techniques.

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CHAPTER OVERVIEW

Chapter 8: 20th- and 21st-Century Techniques

8.1: Twentieth-Century Rhythmic Techniques
8.2: Pitch and Pitch Class
8.3: Intervals in Integer Notation
8.4: Pitch-Class Sets, Normal Order, and Transformations
8.5: Set Class and Prime Form
8.6: Interval-Class Vectors
8.7: Analyzing with Set Theory (or not!)
8.8: Diatonic Modes
8.9: Collections
8.10: Analyzing with Modes, Scales, and Collections

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8.1: Twentieth-Century Rhythmic Techniques

Key Takeaways

- Asymmetrical meters contain measures which are divided into unequal groupings of beats or divisions, creating an uneven metrical pulse.
- Ametric music may or may not have an explicit meter signature, and does not have any perceivable meter.
- In some cases, the meter written in the score may not be the meter that the listener perceives, which is an issue of perceived versus notated meter.
- Changing meter is a method of composition which incorporates any change of meter.
- Polymeter occurs when two or more meters are performed simultaneously.
- Metric modulation is a rhythmic technique that smooths out abrupt tempo changes by introducing subdivisions or groups of beats in the first tempo that match durations in the new tempo.
- Timeline notation is a contemporary metric technique that uses seconds as the measure of time, rather than traditional bar lines and meters.
- Feathered beaming is a gradual change in the speed of notes within a single beam.
- Ostinato is a repeated rhythmic or pitched musical idea.

Chapter Playlist

Many composers in the twentieth century expanded the traditional rhythmic palette of Western art music. Below, nine less traditional rhythmic techniques are discussed. These rhythmic techniques were not necessarily "new;" many of them were found in non-Western music or even Western music before 1900. However, Western composers did incorporate them more frequently after this year.

Asymmetrical Meter

Music in asymmetrical meters contain measures which are divided into unequal groupings of beats or divisions, creating an uneven metrical pulse. It is important to note that the term "asymmetrical meter" is not universally adopted, and such meters are known by other names, such as "mixed meters," "complex meters," and "non-isochronous meters," among others. Listen to Example 1, whose meter is $\begin{smallmatrix}5\\8\end{smallmatrix}$. Notice the division of the two beats; one is grouped into three eighth notes, and the other into two eighth notes. This creates a feeling of a long pulse followed by a short pulse:

A link to an interactive elements can be found at the bottom of this page.

Example 1. Asymmetrical meter in Stephen Sondheim's "Ladies In Their Sensitivities" (1979).

This song is found in the musical *Sweeny Todd* (1979) whose music is by Stephen Sondheim. The off-kilter feeling of the $\begin{smallmatrix}5\\8\end{smallmatrix}$ meter reinforces the anxious thought process of the singer; he is a servant, recommending his boss for a shave, and is hesitant to do so because of the difference in his social position.

Now listen to Example 2, which is also in $\begin{smallmatrix}5\\8\end{smallmatrix}$ meter. Notice how the division of the two beats is grouped in the opposite manner of the last example, with the first beat divided into two eighth notes, and the second beat into three eighth notes:

A link to an interactive elements can be found at the bottom of this page.

Example 2. Asymmetrical meter in Rolf Rudin's "Aufbruch" (2008), measures 141–149.

The $\begin{smallmatrix}5\\8\end{smallmatrix}$ measures juxtapose the more metrically typical $\begin{smallmatrix}3\\4\end{smallmatrix}$ measures, creating a call and response texture between the woodwinds and brass. The character of the woodwinds is much more lively and playful as compared to the staunch and powerful brass.

There are other asymmetrical time signatures whose beat division unit is the eighth note, such as $\begin{smallmatrix}7\\8\end{smallmatrix}$, $\begin{smallmatrix}11\\8\end{smallmatrix}$, $\begin{smallmatrix}13\\8\end{smallmatrix}$, etc. Usually we can identify the groupings of the meter's subdivisions by either how the notes are beamed, or via explicit directions written in the music (e.g. a $\begin{smallmatrix}7\\8\end{smallmatrix}$ meter signature may be written as $\begin{smallmatrix}(2+2+3)\\8\end{smallmatrix}$, $\begin{smallmatrix}(3+2+2)\\8\end{smallmatrix}$, or another way).

Now listen to Example 3, which is in the time signature $\begin{smallmatrix}13\\8\end{smallmatrix}$ (3+3+3+2+2), beginning at 0:17. Try counting along with the example!

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=693

Example 3. Asymmetrical meter in Andrew Lloyd Webber's "Skinbleshanks: The Railway Cat."

This song is found in the musical *Cats* (1981), with music written by Andrew Lloyd Webber. The $\begin{smallmatrix}13\\8\end{smallmatrix}$ section could have been written in a prototypical $\begin{smallmatrix}12\\8\end{smallmatrix}$ meter; however, adding an extra eighth note reinforces the lively nature of the character by not allowing the listener to fall into a regular rhythmic pattern.

Asymmetrical meters can have other beat units, such as the sixteenth note or quarter note. Some examples you may encounter are $\begin{smallmatrix}5\\4\end{smallmatrix}$, $\begin{smallmatrix}7\\16\end{smallmatrix}$, or $\begin{smallmatrix}5\\2\end{smallmatrix}$. The beats of these time signatures are still divided or grouped unequally, though their beat unit changes. Observe Example 4, which is first written in $\begin{smallmatrix}7\\4\end{smallmatrix}$ and rewritten in $\begin{smallmatrix}7\\8\end{smallmatrix}$:

A link to an interactive elements can be found at the bottom of this page.

Example 4. Asymmetrical meter in "Unsquare Dance" (1961) written by the Dave Brubeck Quartet.

This is an excerpt of the "Unsquare Dance" (1961) by the Dave Brubeck Quartet. A typical square dance is in a quadruple meter; however, this "unsquare dance" is in an asymmetrical meter, which diverts the listener's expectations. Notice how the rhythm can be written in both $\begin{smallmatrix}7\\4\end{smallmatrix}$ and $\begin{smallmatrix}7\\8\end{smallmatrix}$ meters, while still sounding the same.

Ametric Music

Music written ametrically does not have any perceivable meter. Ametric music may or may not have an explicit meter signature, and is not necessarily played or sung in a strict metrical style. In other words, the notes may still have rhythmic values, but rhythmic durations might not result in a perceivable beat pattern. This technique may allow for a performer's own improvisation and phrasing, and is employed in some cadenzas, passages of free improvisation, Gregorian chant, and post-tonal music. Listen to Example 5, a post-tonal song that does not have a time signature:

A link to an interactive elements can be found at the bottom of this page.

Example 5. Ameter in Charles Ives's "The Cage" (c. 1904).

"The Cage" (circa 1904) is a song written by American composer Charles Ives. The ametric nature of the song supports the anxious behavior of the leopard who is pacing his enclosure. Without a strict metrical pulse and explicit meter signature, the rhythm of the piano is erratic, which showcases the leopard's temperament from his long-term confinement.

Perceived vs. Notated meter

In some cases, the written meter may not be the meter that the listener perceives; furthermore, different listeners could hear different meters in a given passage of music. Musicians call this is an issue of perceived versus notated meter. Sometimes, this results in a perception of ameter, or music without a perceivable beat, such as in example 6:

A link to an interactive elements can be found at the bottom of this page.

Example 6. Perceived versus notated meter in measures 1–8 of Edgard Varèse's "Density 21.5" (1936).

Though "Density 21.5" (1936) uses a written common time signature, the listener perceives ameter due to various syncopations, tuplet rhythms, and obscured bar lines.

However, in some cases, the notated meter is different than the aurally perceived meter, as seen in Example 7:

A link to an interactive elements can be found at the bottom of this page.

Example 7. Notated meter different than the aural perception of a work.

In this excerpt, the time signature of $\begin{smallmatrix}3\\4\end{smallmatrix}$ is implied, as seen by the dotted barlines. This is not written however, as the excerpt is notated in $\begin{smallmatrix}4\\4\end{smallmatrix}$. Additionally, the pattern of accents and the harmonic resolutions of the phrase further imply a $\begin{smallmatrix}3\\4\end{smallmatrix}$ meter.

Changing Meter

Changing meter is a method of composition which incorporates any change of meter. There are no limits or rules to changing the meter, and it can happen multiple times within a piece, even measure to measure. Listen to Example 8, which features several metric changes from $\begin{smallmatrix}2\\4\end{smallmatrix}$ to $\begin{smallmatrix}5\\8\end{smallmatrix}$ to $\begin{smallmatrix}6\\8\end{smallmatrix}$ to $\begin{smallmatrix}5\\8\end{smallmatrix}$ to $\begin{smallmatrix}6\\8\end{smallmatrix}$ to $\begin{smallmatrix}3\\8\end{smallmatrix}$:

A link to an interactive elements can be found at the bottom of this page.

Example 8. Changing meter in measures 54–60 of Tui St. George Tucker's "Libera Me" from *Requiem (1995).*

This is measures 54–60 of Tui St. George Tucker's "Libera Me" from her *Requiem* (1995). The "Libera Me" text fearfully depicts judgement day: "Deliver me, O Lord, from death eternal in that awful day," proceeds the line of text from this excerpt "When the heavens are shaken…" Tucker paints this chaos musically in part through changing meter, showing how the "heavens are shaken" through the this metric instability.

It is also important to note that the subdivision of the meter can change from simple to compound or vice versa, as seen in Example 9:

A link to an interactive elements can be found at the bottom of this page.

Example 9. Changing meter in measures 10–19 of Andreas Markis's "Agean Festival Overture" (1967).

This is a condensed score of measures 10–19 of Andreas Markis' *Aegean Festival Overture* (1967). It is common for Greek folk music to incorporate changing meter, and Markis evokes this folk style by including this compositional technique.

Changing meter doesn't always include a constant subdivision. Instead, it can have a constant beat and a changing subdivision. This is explored in more detail below (see Metric Modulation).

Polymeter

Polymeter occurs when two or more meters are performed simultaneously. This technique can be heard in many modernist works—those created after ~1900—and the meters can be explicit or implicit. Explicit metrical notation means that two or more meters are actually written, while implicit polymeter is only implied. Example 10 demonstrates this concept explicitly:

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Example 10. Polymeter in Béla Bartók's "Ara táskor" (Harvest Song) (1931).

Example 10 shows "Ara táskor" ("Harvest Song") (1931) written by Béla Bartók for two violins. Notice that Bartók uses more than one meter simultaneously beginning in m. 11. Bartók was heavily inspired by folk music, and he chose to write in polymeter in

order to imitate this style.

Now observe Example 11, which shows implicit polymeter:

A link to an interactive elements can be found at the bottom of this page.

Example 11. Polymeter in Maurice Ravel's "String Quartet in F Major," Second Movement (1902).

$$\begin{matrix}3\\4\end{matrix} \tag{8.1.1}$$

Another way of thinking about " implicit polymeter" is as a type of grouping dissonance. For a more in-depth discussion, read the chapter on Metrical Dissonance.

.Metric Modulation

Metric modulation is a means of smoothing out abrupt tempo changes by introducing subdivisions or groups of beats in the first tempo that match durations in the new tempo.[1] In this way, the change is near indeterminable by the listener, and is only recognized in retrospect. Metric modulations are most commonly notated with a "note value = note value" (for example, ♩ = ♩) indication above the music. Observe Example 12 and the metric modulation which occurs in m. 4:

A link to an interactive elements can be found at the bottom of this page.

Example 12. Metric modulation in which the division of the beat is kept the same.

Notice how the eighth note division stays the same between the $\begin{smallmatrix}3\\4\end{smallmatrix}$ and $\begin{smallmatrix}9\\8\end{smallmatrix}$ meters. Keeping the subdivision the same is one technique of metric modulation.

Now observe Example 13:

A link to an interactive elements can be found at the bottom of this page.

Example 13. Metric modulation in which the beat is kept the same.

Notice how the quarter note beat of the first meter becomes the dotted quarter note beat of the new meter. In this case, the eighth note division becomes faster.

Now observe metric modulations in the context of the composition "Canaries" written by Elliott Carter in example 14:

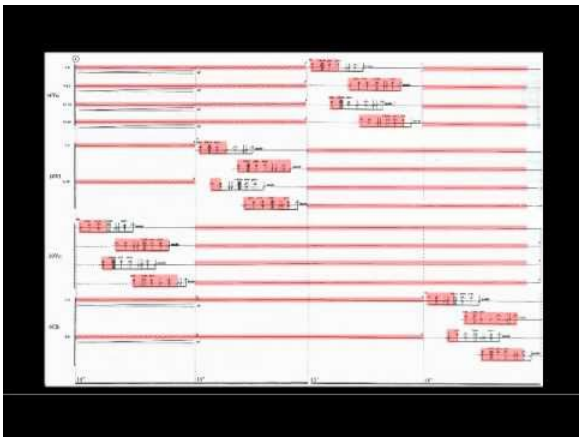
A link to an interactive elements can be found at the bottom of this page.

Example 14. Metric modulation in measures 1–24 of Elliott Carter's "Canaries" from "8 Pieces for 4 Timpani" (1949).

Elliott Carter is well-known for his metric modulations. In this example, six measures from the end, Carter sets up the transition to the $\begin{smallmatrix}3\\8\end{smallmatrix}$ meter by adding triplets into the prior $\begin{smallmatrix}3\\4\end{smallmatrix}$ measure. This creates the effect of having the $\begin{smallmatrix}3\\8\end{smallmatrix}$ measure seem like an extension of the previous triplet rather than a meter change. By doing this, Carter creates a seamless transition between the two meters. Carter also uses the $\begin{smallmatrix}3\\8\end{smallmatrix}$ measure as a transition to the next $\begin{smallmatrix}3\\4\end{smallmatrix}$ measure by keeping the eighth note the same, again making the transition between the two meters quite seamless.

Timeline Notation

Timeline notation is a contemporary metric technique that uses seconds as the measure of time, rather than traditional bar lines and meters. Composers indicate groups of seconds in uneven groupings or an even grid. This technique often results in a feeling of ameter. Timeline notation can also be accompanied by graphic notation, in which pitch and durations are specified by nonstandard symbols, as seen in Example 15:



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Example 15. Timeline notation in Krzysztof Penderecki's "Threnody for the Victims of Hiroshima" (1960).

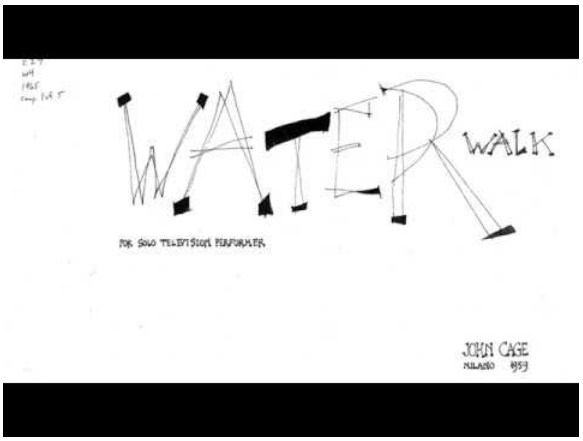
Threnody for the Victims ofHiroshima (1960) was written by Krzystof Penderecki. It was originally called *8'37"*; later, it was renamed to *Threnody*, and was eventually dedicated to the victims of the bombing of Hiroshima in 1964. This composition features timeline notation, graphic notation, and extended string techniques to create a jarring chaos that evokes programmatic sounds such as sirens or screams.

Example 16 shows the timeline notation from one of the systems on the ninth page of *Threnody*:

Example 16. Timeline notation from "Threnody for the Victims of Hiroshima," page 9.

Notice how the number of seconds is split unevenly on this timeline. First there is a section that is 10 seconds in length, then one that is 7 seconds, followed by two more that are 10 seconds and 5 seconds respectively.

Now observe timeline notation in an even grid, as seen in Example 17:



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Example 17. Timeline notation in John Cage's "Water Walk for Solo Television Performer" (1959).

Water Walk for Solo Television Performer (1959) is a composition written by John Cage that was premiered on the television program "Lascia o Raddoppia" in Milan in 1959. The composition calls for 34 different objects, as well as a prerecorded single track tape. Most of the materials relate to water in some way; some objects include a bath tub, rubber duck, ice cubes, etc. Additionally, Cage also calls for five radios and a grand piano.

Example 18 shows the timeline notation from one of the systems on the first page of *Water Walk*:

Example 18. Timeline notation from “Water Walk for Solo Television Performer” (1959), page 1.

Notice how the number of seconds is evenly split on this timeline, increasing by five seconds in each interval.

Feathered Notes

Feathered beaming notates a gradual change in the speed of notes within a single beam. One can distinguish deceleration from acceleration based upon whether the value of the beam’s final note is longer or shorter than the note that the beam began with. Feathered notes are shown in Example 19:

A link to an interactive elements can be found at the bottom of this page.

Example 19. Feathered notes.

In Example 19, the first line shows an acceleration while the second line shows a deceleration. Feathered notes are considered to be an extended technique, most often heard in contemporary compositions, sometimes including cadenzas and ametric works. Due to the unpredictable nature of the acceleration or deceleration of the rhythm, feathered notes are not usually found in strictly metered compositions.

Ostinato

An ostinato is a repeated rhythmic or pitched musical idea. This repetition can be a single measure or multiple measures. Now listen to Example 20, one of the most well-known examples of an ostinato:

A link to an interactive elements can be found at the bottom of this page.

Example 20. Ostinati in measures 1–16 of Gustav Holst’s “Mars, the Bringer of War” (1918).

“Mars the Bringer of War” (1918) is the fourth movement of Gustav Holst’s suite *The Planets*, a programmatic work where each movement is named for a planet. The underlying ostinato in this movement creates both a foreboding and militaristic atmosphere, supporting the war-like nature of the of the Roman god Mars for whom the planet is named.

Online Resources

- Asymmetrical Meter (lcsproductions.net)
- Introduction to Asymmetrical Meters (Ash Stemke)
- Compound and Asymmetric Meter (learnmusictheory.net)
- Creating Interesting Motion with Time Signature Changes (David Bawiec)
- Advanced Rhythm and Meter/Percieved vs. Notated Meter (Frank Koonce)
- Songs that use Polymeter and Polyrhythm (David Bennett)
- Intro to Metric Modulation (Philippe Macnab-Seguin)
- Metric Modulation (Beyond Music Theory)
- Feathered Notes (Steinberg.org)
- Ostinato (Music Theory Academy)

Assignments from the Internet

- Advanced Rhythm and Meter Aural Skills (.pdf)

Assignments

1. Coming soon!

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1. Jane Piper Clendinning and Elizabeth West Marvin, *The Musician's Guide to Theory and Analysis*, 3rd ed. (New York: W.W. Norton & Company, 2016), 834. 8.01: Twentieth-Century Rhythmic Techniques#return-footnote-693-1

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8.2: Pitch and Pitch Class

Key Takeaways

- Set theory often relies on the distinction between pitch versus pitch class.
- Pitch classes are best represented with integer notation, where C=0.

Pitch

Pitches are discrete tones with individual frequencies.

The concept of pitch, then, does not imply octave equivalence. C_4 is a pitch, and it is not the same pitch as C_3.

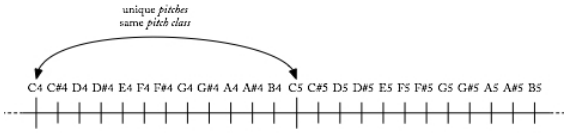
Pitch Class

Throughout set theory, the word "class" means "group." So a pitch class is a group of pitches—all pitches related by octave equivalence and enharmonic equivalence. You have probably encountered both of these concepts before, even if not by name.

Our system of letter names for notes implies octave equivalence: equivalence between pitches that are spelled the same but are any number of octaves apart. C_4 is the same as C_3 is the same as C_9, and so on, because they are all Cs (Example 1).

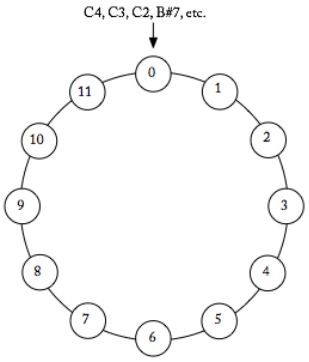
$$(\downarrow \hat{6}) \tag{8.2.1}$$

In summary, pitch classes are groups of pitches related by octave and enharmonic equivalence. $A♭_4$, $A♭_3$, $G♯_2$, etc. are all members of the same pitch class.



Example 1. Pitch versus pitch class.

Integer Notation



Example 2. The twelve pitch classes represented as a clock face.

If notes are enharmonically equivalent, then the system of seven letter names does not work well to describe the twelve pitch classes. Instead, in set theory, we use integer notation, which assigns a number between 0 and 11 to each pitch class (Example 2). All Cs, and any notes that are enharmonically equivalent to C (B♯, for example), are pitch class 0. All C♯s, and any notes that are enharmonically equivalent to C♯ (D♭, for example) are pitch class 1, and so on. To summarize with a few of the most common note names:

0. C (B♯, etc.)
1. C♯, D♭
2. D (C𝄪, etc.)
3. D♯, E♭

4. E (F♭, etc.)
5. F (E♯, etc.)
6. F♯, G♭
7. G (F𝄪, etc.)
8. G♯, A♭
9. A (G𝄪, etc.)
10. A♯, B♭
11. B (C♭, etc.)

Practice

Test your recall of integer names by filling in the blanks.

The original version of this chapter contained H5P content. You may want to remove or replace this element.

Further reading

- Straus, Joseph N. 2016. *Introduction to Post-Tonal Theory*. 4th ed. Upper Saddle River, NJ: Prentice Hall.

Resources

- Blank clock faces (integer notation)
- Blank clock faces (letter names)
- Set Theory Quick Reference Sheet: summarizes the definitions of pitch vs. pitch class, intervals vs. interval classes, and sets vs. set classes.

Assignments

1. Pitch and pitch class (.pdf, .mscz). Asks students to translate between pitch class integers, note names, and staff notation.

---

1. Post-tonal music is extremely various. Composers have individual compositional styles, aesthetic goals, and unique conceptions of pitch. All this is to say that you must approach a composition with flexibility. For example: because it is quasi-tonal, Debussy's music often benefits from a view that does not assume enharmonic equivalence. But sometimes it does. You must rely on your musical intuitions when analyzing this music, and you should also be willing to approach pitch in these compositions from multiple perspectives until you find one that seems most appropriate. 8.02: Pitch and Pitch Class#return-footnote-701-1

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8.3: Intervals in Integer Notation

Key Takeaways

- When analyzing atonal music, intervals may be better understood as a number of semitones, rather than using tonal interval names.
- There are four types of interval:
  - Ordered pitch intervals measure the number of semitones between pitches, and indicate direction with a plus or minus sign (+/−).
  - Unordered pitch intervals measure the number of semitones between pitches, but do not indicate direction (no +/−).
  - Ordered pitch class intervals measure the distance between two pitches in pitch class space (the clock face), always moving clockwise (ascending). This is similar to measuring time on a 12-hour clock: 9–5 is 8 hours, never 4.
  - Interval classes (unordered pitch class intervals) represent the smallest possible distance in semitones between two pitch classes; therefore, an interval class is always ≤6.
- Ordered pitch intervals are as specific as possible: they measure specific pitches (in specific octaves) and represent the directionality of the interval.
- Interval classes are the most abstract type of interval: they represent the smallest possible distance between two pitch classes.

In tonal music, because intervals are dependent upon the pitches that create them, the consonance and dissonance of intervals is determined *by tonality itself*. Imagine the interval created by G and B♭, a minor third. In the context of G minor, this is a consonant interval. Respelled as G and A♯, perhaps in the context of B minor, it creates a dissonant augmented second. From a tonal perspective, then, the two intervals are different in these different tonal contexts, even though they are the same keys on a piano keyboard (Example 1).

A link to an interactive elements can be found at the bottom of this page.

Example 1. Even though B♭ and A♯ are the same key on the keyboard, the intervals of a minor third and an augmented second are distinct in tonal theory.

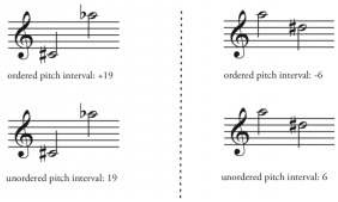
Contrast this with atonal music. Because atonal music has no tonality, the distinction between B♭ and A♯ no longer matters. In this context, the intervals G–B♭ and G–A♯ *are* the same. For this reason, we will not use tonal interval names like “minor third.” Instead, we will measure the intervals by the number of semitones between the pitches or pitch classes.

We can describe intervals according to two types of information: **pitches vs. pitch classes,** and **ordered vs. unordered** intervals. Combined, this makes four types of intervals, summarized in Example 2. Each of these interval types is explained below.

[table id=18 /]

Example 2. Four interval types in atonal theory.

Pitch Intervals (ordered and unordered)



Example 3. The top row of examples shows ordered pitch intervals: the number of semitones between the pitches, with a plus or minus sign to indicate direction. The bottom row shows unordered intervals, which simply disregard the direction and thus drop the plus or minus sign.

Pitch intervals are the distance between pitches as measured in semitones, which is to say that octave is taken into consideration. Thus, the interval C_4–E_4 is 4: four semitones are between these notes. But if that E is moved up an octave (C_4–E_5), the interval becomes 16: four semitones between C and E, plus an octave (twelve semitones) between the lower E and the higher E.

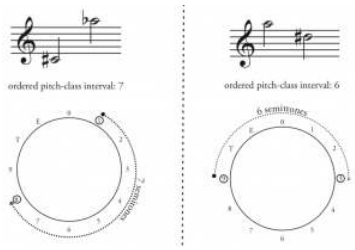
Within pitch intervals, there are ordered and unordered variants. To create an ordered pitch interval, simply add a plus or minus sign to indicate whether the interval is ascending or descending. Unordered pitch intervals, by contrast, do not indicate which

direction the pitches move in—they are thus more suitable for harmonic intervals. The differences between ordered and unordered pitch intervals are summarized in Example 3.

Ordered Pitch-Class Intervals

Pitch-class intervals are the distance between pitch classes as measured in semitones in pitch class space—that is, around the clock face. Returning to our C_4–E_5 interval, we are now interested just in the pitch classes C and E, without reference to a specific octave.

Ordered pitch-class intervals measure the distance between pitch classes, always ascending. This is visualized most easily by picturing the twelve tones around a clock face, then measuring the interval by going around the circle clockwise. Thus, from C to E = 4, but E to C = 8 (Example 4). In everyday life, this is similar to measuring time on a twelve-hour clock, or calculating the duration of a shift at work: if you arrive at work at 9:00 am and work until 5:00 pm, that's 8 hours; the ordered pitch class interval from A (pc 9) to F (pc 5) is also 8.

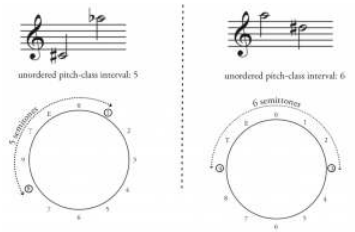


Example 4. Ordered pitch class intervals always travel clockwise around the clock face.

Interval Classes (IC)

Unordered pitch-class intervals are usually called interval classes. Interval class is the smallest possible distance between two pitch classes. On the clock face, this means traveling either clockwise or counter-clockwise, whichever is shortest. Interval class is a useful concept because it relates intervals, their inversions, and any compound versions of those intervals. You should be able to connect this concept to the concept of pitch vs. pitch class: a pitch class is a pitch, its enharmonic respelling(s), and any octave displacements of those spellings.

This means that there are only six interval classes: 1, 2, 3, 4, 5, and 6. If you reach the pitch class interval of 7, it becomes shorter to move counter-clockwise, and 7 becomes 5. For the same reason, 8 becomes 4, 9 becomes 3, and so on. Both C–E and E–C are interval class 4 (Example 5).



Example 5. Unordered pitch class intervals are also known as interval classes. Interval classes measure the smallest possible distance between pitch classes.

Summary

Using various combinations of pitch interval, pitch-class interval, ordered, and unordered, we arrive at four different conceptions of interval.To wrap your mind around each of these and begin to understand their various analytical uses, think of them on a sliding scale of most concrete (the ordered pitch interval) to most abstract (the unordered pitch-class interval). You can find this related to other concepts in the Set Theory Quick Reference Sheet.

In tonal music, it's useful to distinguish between a thirteenth and a sixth in some situations, but not others. In the same way, as you analyze atonal music, you will find that different types of intervals are useful for describing different types of phenomena.

Further reading

- Straus, Joseph N. 2016. *Introduction to Post-Tonal Theory*. 4th ed. Upper Saddle River, NJ: Prentice Hall.

Resources

- Blank clock faces (integer notation)
- Blank clock faces (letter names)
- Set Theory Quick Reference Sheet: summarizes the definitions of pitch vs. pitch class, intervals vs. interval classes, and sets vs. set classes.

Assignments

1. Intervals (.pdf, .docx). Asks students to identify interval types (integer notation) within pieces of music. Worksheet playlist

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8.4: Pitch-Class Sets, Normal Order, and Transformations

Key Takeaways

- A pitch-class set (pc set) is a group of pitch classes.
- The standard way of naming a pitch class set is by its normal order: the smallest possible arrangement of pitch classes, in ascending order.
- To transpose a set (T_n), add *n* to each integer of the set.
- To invert a set (I_n), first invert the set (take each integer's complement mod 12), then transpose by *n*. Alternately, subtract each integer of the set from *n* ($n–x=y$).
- The clock face may help you perform any of these tasks.

Pitch-Class Sets

When we talk about a group of pitch classes as a unit, we call that group a pitch-class set, often abbreviated "pc set." Any group of pitch classes can be a pitch-class set.

Normal Order

Normal order is the most compressed way to write a given collection of pitch classes, in ascending order. Normal order has a lot in common with the concept of root position. Root position is a standard way to order the pitch classes of triads and seventh chords so that we can classify and compare them easily. Normal order does the same, but in a more generalized way so as to apply to chords containing a variety of notes and intervals.

Following are a mathematical and a visual method for determining normal order.

Mathematical method

Process	Example set: $G\sharp_4$, A_2, $D\sharp_3$, A_4
1. Write as a collection of pitch classes (eliminating duplicates) such that they would fit within a single octave if played in ascending order. There are multiple possible options.	8,9,3
2.Duplicate the first pitch class at the end.	8,9,3,8
3. Find the largest ordered pitch-class interval between adjacent pitch classes.	8 to 9: 1 9 to 3: 6 3 to 8: 5 **9 to 3 is the biggest interval.**
4. Rewrite the collection beginning with the pitch class to the right of the largest interval and write your answer in square brackets.	[3,8,9]

Occasionally you'll have a a tie for largest interval in step 3. In these cases, the ordering that is most closely packed to one side or the other is the normal form. If there is still a tie, choose the set most closely packed to the bottom.

Visual method (clock face method)

If you don't like the process described above, the video in Example 1 clearly explains how to use the clock face to quickly find normal order.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Using the clock face to find normal form.

Transposition

In post-tonal music, transposition is often associated with motion: take a chord, motive, melody, and when it is transposed, the aural effect is of *moving* that chord, motive, or melody in some direction. In two disconnected passages from Claude Debussy's *La*

cathédrale engloutie, the opening motive <D, E, B> or <2, 4, 11> is transposed four semitones higher to <F♯, G♯, D♯> or <6, 8, 3> in m. 18 (both in blue in Example 2), representing the cathedral's slow ascent above the water. When we hear the passage at m. 18, we recognize its relationship to the passage in m. 1 because the same set of ordered intervals return, but starting on a different pitch. Transposition preserves intervallic content, and not only that, it preserves the specific arrangement of the intervals.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Transposition of a motive, ordered and unordered.

The same motive is preserved in a more obscured fashion going from m. 18 into m. 19 (in red in Example 2). Here, the unordered pitch class set is transposed, but not the ordered set from before. This may not look as much like a transposition as the first two sets of motives, but if the pitches are put into normal order, the transposed intervallic relationship becomes clear.

Transposition is often abbreviated T_n, where *n*, the index number of a transformation, represents the ordered pitch-class interval between the two sets. Transposition is an operation—something that is *done* to a pitch, pitch class, or collection of these things. Alternatively, transposition can also be a *measurement*—representing the distance between things.

Transposing a set

To transpose a set by T_n, add *n* to every integer in that set (mod 12, meaning numbers wrap around after reaching 12, like on a clock face).

Given the collection of pitch classes in m. 1 above and transposition by T_4:

$$\begin{array}{r} [11, 2, 4] \\ +\quad 4\,4\,4 \\ \hline [3, 6, 8] \end{array}$$

The result is the pitch classes in m. 18.

T_4 [11, 2, 4] = [3, 6, 8]

Identifying transpositions and calculating the index number

To determine the transpositional relationship *between* two sets, subtract the first set from the second. If the numbers that result are all the same, the two sets are related by that T_n. For example, to label the arrows in Example 1, an analyst would "subtract" the pitch class integers of m. 1 from the pitch-class integers in m. 18. Note that both sets should be in normal order.

$$\begin{array}{r} [3, 6, 8] \\ -[11, 2, 4] \\ \hline 4\,4\,4 \end{array}$$

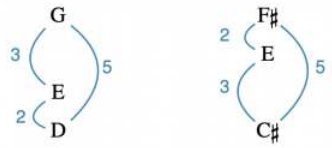
[3, 6, 8] and [11, 2, 4] are related by T_4.

Inversion

Inversion, like transposition, is often associated with motion that connects similar objects. The passage in Example 3 from Chen Yi's *Duo Ye* (2000) is an example: just as in the transpositionally related passages, these two gestures have the same intervallic content, so our ears recognize them as very similar. Unlike transposition, however, the interval content of these two gestures is not *arranged* in the same way: both have the same intervals, but the [1, 4, 6] set has the interval 3 on the bottom instead of on the top (Example 4).

A link to an interactive elements can be found at the bottom of this page.

Example 3. [2, 4, 7] is inverted to become [1, 4, 6].



Example 4. These two sets both have the same intervals (a 2, a 3, and a 5), but the intervals are arranged differently.

General inversion

If you are asked to invert a set and are not given an index number, assume you are inverting the set mod 12. This means taking the complement of each number mod 12. The complement of each integer *x* mod 12 is the number *y* that is the difference between *x* and 12. For example, the complement of 4 is 8: 4+8=12. The complement of 6 is 6: 6+6=12. The complement of 0 is 0: 0+0=0, which is 12 mod 12.

Inverting [2, 4, 7] in this way would yield [5, 8, 10].

I_n: Invert-then-transpose method

Sometimes, sets are inverted and then transposed, as in Example 3. The abbreviation for this is I_n.

In Example 3, the first set [2, 4, 7] is inverted by I_8. To invert a set by I_8, follow this process, in this order:

1. **Invert:** [2, 4, 7] becomes [5, 8, 10].
2. **Transpose:** adding 8 to every number in [5, 8, 10] yields [1, 4, 6].

I_n: Subtraction method

You can calculate the new set created by I_n by subtracting all the pitch classes of your first set from *n*.

What is I_8 of [2, 4, 7]?

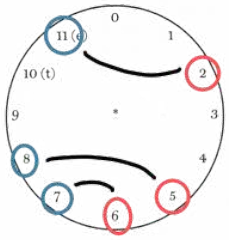
$$\begin{array}{r} 8\,8\,8 \\ -[2,4,7] \\ \hline [6,4,1] \end{array}$$

I_8 [2, 4, 7] = [1, 4, 6].

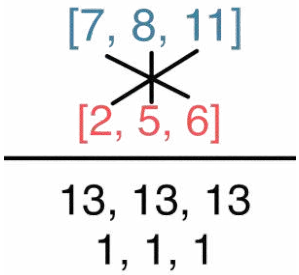
Identifying inversions and their index numbers

Any two pitches related by inversion can be added together to form the index number. This makes sense as a logical extension of the subtraction method above: if the inverted pitch *y* is the result of *n*–*x*, then it is also true that $n = x + y$.

Another way to visualize this is on the clock face. If you have two sets that are 1) both in normal order and 2) related by inversion, the notes within each set will map onto one another in reverse order, as shown in Example 5 below. Write the two sets in normal form on top of one another, then add the opposing integers of each set together as illustrated in Example 6 to yield the index number of the I relation. If the sum of each number pair is 12 or more, subtract 12 so that your *n* is in mod 12.



Example 5. Two inversionally related sets have integers that pair together in reverse order to form a mirror-like relationship. These paired intervals always sum to the same number, which is the index number of the inversion.



Example 6. For two 3-note sets, the leftmost integer in one set is added to the rightmost of the second, the middle numbers are added together, and the rightmost element of the first set is added to the leftmost of the second. This is the cross-addition method for finding the index number of inversions.

Using the Clock Face to Transpose and Invert

If you prefer a more visual method for transposing and inverting, watch the video lesson in Example 7.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Using the clock face for transposition and inversion of pitch class sets.

Further reading

- Straus, Joseph N. 2016. *Introduction to Post-Tonal Theory*. 4th ed. Upper Saddle River, NJ: Prentice Hall.

Resources

- Blank clock faces (integer notation)
- Blank clock faces (letter names)
- Set Theory Quick Reference Sheet: summarizes the definitions of pitch vs. pitch class, intervals vs. interval classes, and sets vs. set classes.

Assignments

1. Normal form and transformations (.pdf, .docx). Asks students to find normal form of various sets, calculate transformations of sets, and identify T_n/I_n relationships in “Nacht” by Arnold Schoenberg.
2. Composition prep worksheet (.pdf, .docx). Prepares students for the set class composition by asking them to find sets and transformations.

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8.5: Set Class and Prime Form

Key Takeaways

- A set class is a group of pitch-class sets related by transposition or inversion.
- Set classes are named by their prime form: the version of the set that is transposed to zero and is most compact to the left (compared with its inversion).
- You can find prime form mathematically or by using the clock face.
- All possible set classes are summarized in the set class table, and are available on Wikipedia and many other websites.

The simplest way to define set class is "a group of pitch-class sets related by transposition or inversion." This may initially seem confusing, but it's just another kind of class. As you have learned in other chapters, "class" is another name for "group." Recall the other kinds of classes you have already learned about.

- Pitch vs. pitch class: A pitch occurs at a specific octave, and often we conceive of it with a specific spelling. A pitch class is a *group of pitches* that is related by transposition or inversion.
- Interval vs. interval class: An interval has a specific distance in semitones, while an interval class is a *group of intervals* that are inversions of each other or related by octaves.

Introduction

Pitch-class set vs. set class (pitch-class set class) is the topic of this chapter. The reason the definition of "set class" may seem more confusing is that it involves two kinds of groups: classes and sets.

- A class is a group that is related in some way.
- A set is a group that is not necessarily related in any specific way.

As an analogy, consider biology and the way different living things are categorized. Plants in the same class are are all biologically related in a specific way: *Angiospermae* is a class of plants that produce flowers. But we can group together plants for other reasons: the group of plants in someone's front yard, for example. That would be a set of plants, but not a class of plants.

So a pitch-class set is a group of pitches that the analyst decides to put together for some reason. The pitch-class set class—a term that is very unwieldy, so theorists have agreed to shorten it to the last two words, set class—is the group of groups of pitches that are all related by transposition or inversion.

Why transposition and inversion?

One way of analyzing a lot of post-tonal music is by studying the transpositional and inversional relationships between pitch-class sets. Take the short example below: two passages from Béla Bartók's "Subject and Reflection" (Example 1). Comparing across the two passages, the two sets that comprise the right hand, [10, 0, 2, 3, 5] and [3, 5, 7, 8, 10], are related by T_5. The two left-hand sets are also related in the same way. Now looking within each passage, the right and left hands are related to each other by inversion. In the first passage, they are related by I_8; in the second, by I_6.

A link to an interactive elements can be found at the bottom of this page.

Example 1. T_n and I_n relationships between passages in "Subject and Reflection."

To quickly explain why these snippets of notes all sound the same, we can say **they are all members of the same set class.**

Major and minor triads may be a helpful and more familiar example. Major and minor triads all sound "the same" compared to tone clusters, quartal harmonies, or even augmented or diminished triads. The reason for that is that all major and minor triads are transpositionally or inversionally related to one another.

- Triads of the same quality are transpositionally related.
  - T_2 of a C major triad [0, 4, 7] is a D major triad [2, 6, 9]
  - T_2 of an A minor triad [9, 0, 4] is a B minor triad [11, 2, 6].
- Triads of opposite quality (major vs. minor) are inversionally related.
  - I_0 of a C major triad [0, 4, 7] is an F minor triad [5, 8, 0].
  - I_2 of a C major triad [0, 4, 7] is a G minor triad [7, 10, 2].

Prime Form

Just as pitch class sets are named by their normal form, set classes are named by their prime form: the version of the set that is transposed to zero and is most compact to the left (compared with its inversion).

Set classes are named by their prime form, just as.

Note that prime form is just a label for a set class. It does not have any special status—it's not significant if a composer uses [0, 1, 4] as a pitch-class set just because it shares the same integers as the prime form (014).

Mathematical process

Here is the process to put a pitch-class set in prime form, with an example using the motive from Example 1.

Step	Example
1. Put the pitch class set in normal order.	[10, 0, 2, 3, 5]
2. Transpose the set so that the first pitch class is 0.	T_2 = [0, 2, 4, 5, 7]
3. Invert the results from Step 2 and put the result in normal order.	I_0 = [5, 7, 8, 10, 0]
4. Transpose the set from Step 3 so that the first pitch class is 0.	T_7 = [0, 2, 3, 5, 7]
5. Compare the sets in Step 2 and Step 4. Whichever set is most compact to the left is the prime form. Write the prime form in parentheses with no commas.	(02357) is the prime form (Example 1).

Using the clock face

The video in Example 2 explains the differences between normal form and prime form and reviews how to find each by using the clock face.

A link to an interactive elements can be found at the bottom of this page.

Example 2. Video lesson on prime form.

The Set Class Table

There are a finite number of set classes and prime forms. Many resources, such as Wikipedia, have tables of these set classes, arranged by the cardinality of the set classes. You'll notice another number-based name for each set class in the format X–X; this is the Forte number of the set. Set class tables also pair sets together by their complements (the set which, together with the original set, will complete the twelve-tone collection). Other features of the set class table, such as the interval class vector, are discussed in later chapters.

Further reading

- Straus, Joseph N. 2016. *Introduction to Post-Tonal Theory*. 4th ed. Upper Saddle River, NJ: Prentice Hall.

Resources

- Blank clock faces (integer notation)
- Blank clock faces (letter names)
- Set Theory Quick Reference Sheet: summarizes the definitions of pitch vs. pitch class, intervals vs. interval classes, and sets vs. set classes.

Assignments

1. Set Class Composition prep worksheet (.pdf, .docx). Prepares students for the set class composition by asking them to find sets and transformations.
2. Set Class Composition (.pdf, .docx). Builds on the prep worksheet. Asks students to compose and analyze a 24-bar ABA form piece for unaccompanied solo instrument using set classes.

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8.6: Interval-Class Vectors

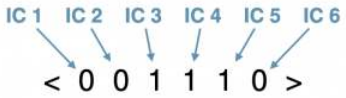
Key Takeaways

- The overall sound of a set class is characterized in part by the intervals between the pitch classes.
- An interval class vector is a tally of each interval class inside the set, written as a six-digit number enclosed in angle brackets (<xxxxxx>).
- Each digit in the interval class vector corresponds to the count of a certain interval class: the first digit is the number of IC 1s, the second is the number of IC 2s, and so on. For example, in a C major triad, there are 0 of IC 1, 0 of IC 2, 1 of IC 3, 1 of IC 4, 1 of IC 5, and 0 of IC 6; so, our interval-class vector is <001110>.
- Interval class vectors may be helpful for recognizing set classes as they occur in pieces of music: if you know what the possible interval classes are within a set class, you might look for those interval classes in the piece.
- Sets containing a greater number of pitch classes have, correspondingly, more and/or higher numbers in their interval-class vector. Each trichord has 3 available interval classes (and so the vector should always total to 3), each tetrachord has 6 (and so should sum to 6), each pentachord has 10, and so forth.

The quality of any sonority can be roughly quantified by summarizing all the intervals it contains. Because all of the intervals contained in a sonority contribute to its overall sound, we must find the interval class (IC) formed by each pitch class in a set, not just those that are next to each other.

Let's try a simple example first: a C major triad. There are three possible interval classes to be made using the pitch classes of this triad: between its root and third, third and fifth, and root and fifth. C–E is a major third (IC 4), E–G is a minor third (IC 3), and C–G is a perfect fifth (IC 5).

Interval class vectors summarize this as a six-digit number enclosed in angled brackets; each digit corresponds to the count of a certain interval class, as shown in Example 1. The IC vector for the C major triad is <001110>, which shows that the C major triad has:



, with arrows pointing to each digit in the vector and labelling them IC 1, IC 2, IC 3, IC 4, IC 5, and IC 6." width="300" height="96">

Example 1.

Each digit in an interval-class vector corresponds to an interval class: the first digit is for IC 1, the second is for IC 2, etc. The number shown in the vector indicates how many of that interval class are present in the set.

- 0 of IC 1
- 0 of IC 2
- 1 of IC 3
- 1 of IC 4
- 1 of IC 5
- 0 of IC 6

Method

To figure out the interval-class vector, we're going to simply figure out the interval class created by each combination of two pitches in the sonority. Here is a three-step process for creating an interval-class vector:

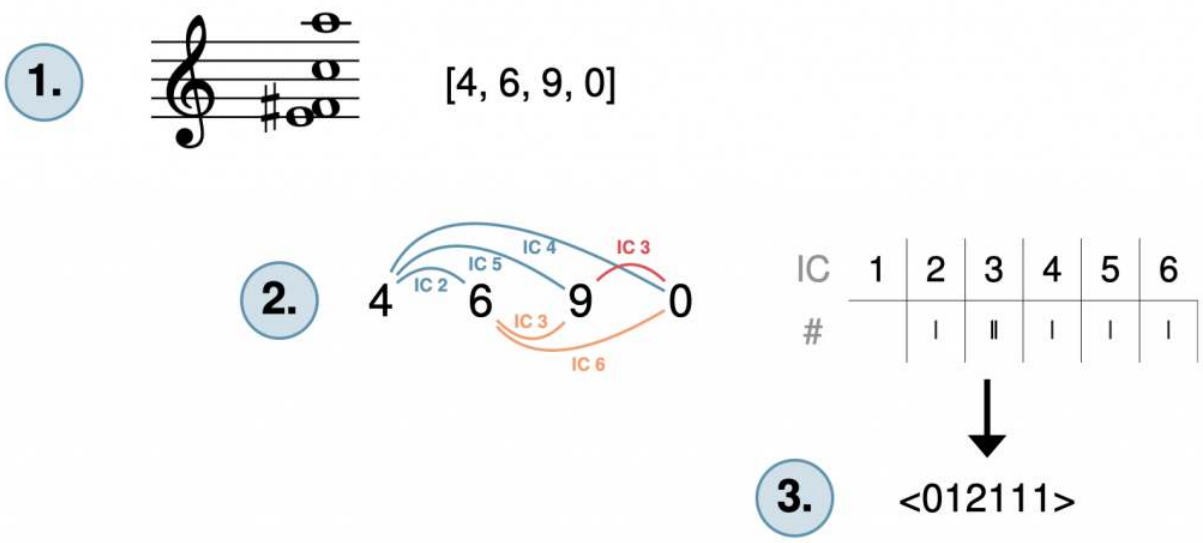
1. Write the set in normal form.
2. Find the interval class for every combination of two pitch classes. Record your results on a tally chart.
3. Convert the tallies in each column (including empty columns) to numerals, and enclose these totals in angle brackets < >.

We contain the vector in angled brackets to differentiate it from other strings of integers that might appear in our analysis, like normal form (which gets square brackets) or prime form (which uses parentheses).

Example 2 illustrates this process with the collection of pitches E_4, $F\sharp_4$, C_5, and A_5:

1. The normal form of this set is [4, 6, 9, 0].

2. Count each interval class between each pair of pitch classes and keep track using a chart of tally marks:
    1. Begin on the leftmost pitch class (here, 4) and calculate the interval class between it and every pitch class to the right. These interval classes are shown with blue arcs in Example 2.
    2. Move to the right one pitch class (here, 6) and calculate the interval class between it and every pitch class *to the right* (don't count to the left, because you already counted that interval class in step 2a). These interval classes are shown with orange arcs.
    3. Move to the right one pitch class (here, 9) and calculate the interval class between it and every pitch class to the right. Because we have a four-pitch-class set, this is the final interval class, shown with a red arc.
3. Converting the tally marks from step 2 into numerals yields the interval-class vector <012111>.



." width="1024" height="457">

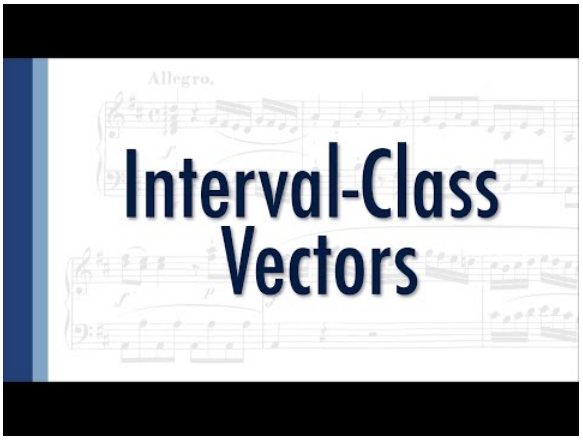
Example 2.

Illustration of how to count interval classes in a pitch class set to create an interval-class vector.

Sets containing a greater number of pitch classes will naturally have more and/or higher numbers in their interval class vectors because there are a lot more intervals at play. Each trichord has three available interval classes (and so the vector should always total to three), each tetrachord has six (and so should sum to six), each pentachord has ten, and so forth.

One way of checking your work after calculating an interval-class vector is to add the number of interval classes up and ensure they total the correct number. If you know the prime form of your set, you can also check against a list of set classes, such as this list from Wikipedia, since they typically include interval-class vectors for each set class.

Example 3 is a video lesson of the above information.



A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=727

Example 3. Video lesson on interval-class vectors.

Interval-class vectors in analysis

The interval-class vector tells us what intervals a composer may exploit from a particular set, which gives us the set's particular sound and/or associations. Some sets contain a more or less even distribution of all the interval classes and are especially prized by atonal composers for these properties, while others are especially heavy on one interval class or another and may contain none of a particular interval class.

Interval-class vectors also help us to make aural-analytical connections between two or more sets that may not appear to be immediately related. If they share a similar distribution of interval classes, they will also sound similar in a free-atonal context.

Assignments

1. Worksheet on Interval-Class Vectors (.pdf, .docx). Asks students to calculate interval-class vectors for several sets.

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8.7: Analyzing with Set Theory (or not!)

Key Takeaways

- Be aware of why you are grouping some sets together and not others (segmentation).
- Create analytical unity by relating sets to one another.
- Remember that composers wrote free atonal music before set theory was invented.
- Be aware of the limitations of set theory: it does not discuss any non-pitch aspects of the music, and it even neglects to address many pitched aspects.

There are many issues with the analysis of music using pitch-class sets—some generic to many forms of analysis, some more specifically relevant to set theory.

The flexibility of set theory is a double-edged sword. Because any group of pitches can be a set, analysts can move beyond triadic harmony and analyze music based on any sort of pitch organization. But by the same token, because any group of pitches can be a set, analysts could "prove" anything they want to. For instance, consider a motivic analysis in which the motive is a single interval. By locating this one interval wherever possible, an analyst could claim that a work has motivic unity. While that interval may indeed be found throughout the piece, the frequency of the interval's appearance is unlikely to be meaningful on its own, so it's up to the analyst to set out how and why it assumes musical meaning for them in the given context. In short, analysts should always be aware of the basis, significance, and perceptibility of their observations.

Following are several potential pitfalls of using set theory, along with ways to bolster any claims you make using set theory.

Segmentation

The emphasis on numbers (via pc integers) can make set theory seem more "scientific" than it really is. And because set theory relationships are factual—for example, a pitch-class set is related transpositionally to another set, or it isn't—it's easy to end up with an unfalsifiable analysis that may still be ineffective in describing the music. For example, every single piece with notes in it could be described in terms of one-note "sets," all of which are equivalent to each other. Clearly this is not a helpful analytical statement!

The best way to ensure that your set theory claims are useful is to be aware of your process of segmentation: how you've divided up the piece into pitch-class sets. Here are just some of the reasons why an analyst might group notes together:

- The contiguity of the grouping. There's a strong case for grouping together notes that are simultaneous or that happen in direct succession. You could make a case for uniting notes that are far away from each other and excluding many other notes in between, but it will take more explaining.
- Shared rhythmic profile. It's common to segment sets based on what is set off by rests, or based on a shared rhythmic motive, or any other number of rhythmic connections.
- Shared metric placement
- Shared timbre and texture
- Shared articulation
- Shared register (high range, low range)

Joseph Straus (2016, 70) summarizes the importance of segmentation eloquently:

In all of your musical segmentations, strive for a balance between imaginative seeking and musical common sense. On the one hand, do not restrict yourself to the obvious groupings (although these are often a good place to start). Interesting relationships may not be apparent the first, second, or third time through, and you need to be thorough and persistent in your investigations. On the other hand, you have to stay within the boundaries of what can be meaningfully heard. You can't pluck notes out in some random way, just because they form a set that you are interested in.

Relationships Between Sets

Simply identifying sets is not analytically interesting on its own. Here are some ways to relate sets to one another and create a sense of unity among them.

- Find multiple instances of the same set class, and then relate them to each other by transposition and inversion. You might calculate transpositional/inversional relationships from one set to the following set, or from the first set to all the others, or any

other configuration. Your relationships should all involve notes that actually appear in the score—don't bother relating sets to the normal form that corresponds to the prime form, for example, unless that normal form actually appears in the piece.
- See if different sets belong to the same superset. That superset might be a familiar mode or collection.
- Relate pairs of notes across sets by symmetry across an axis of inversion or emphasis on a pitch class center.

Theory Following Practice

On a broader level, much if not most music theory is retrospective: the terms and techniques for dealing with a repertoire emerge after the fact; they exist to make sense of music that exists. This is by no means always true: many composer-theorists have developed ideas about how music might be organized, and then implemented those ideas. A significant example of this is serialism. But set theory is a retrospective theory, popularized by Allen Forte decades after the repertoire it is meant for was composed. As such, we should take care to separate set theory from the compositional acts and intentions of those composers. Arnold Schoenberg (1950), for instance, felt that a structure for free atonal music was impossible, hence his subsequent development of the serial technique.

Just because a theory was developed after the fact does not make the theory any more or less valid (composers historically have been at least as active in obfuscating their methods as clarifying them!), but it's worth keeping in mind.

What Set Theory Won't Tell You

Be sure to consider all the things that set theory does not address in any capacity:

- History and context
- Any non-pitch parameters (though this depends on how the analyst approaches questions like segmentations)
- Pitch parameters like voice leading, spacing, or order (again, depending on the analytical approach)

This list includes many aspects of music that are important to listeners and performers. You may want to take care to address these issues in your analysis through other means, because a set theory analysis will often ignore them.

Further reading

- Buchler, Michael. 2017. "A Case Against Teaching Set Classes to Undergraduates." *Engaging Students: Essays in Music Pedagogy* 5. http://flipcamp.org/engagingstudents5/essays/buchler.html.
- Schoenberg, Arnold. 1950. *Style and Idea*. New York: Philosophical Library.
- Straus, Joseph N. *Introduction to Post-Tonal Theory*. 4th ed. Upper Saddle River, NJ: Prentice Hall, 2016.

Assignments

1. Guided analysis of "Wie bin ich Froh!" by Anton Webern (.pdf, .docx). Recording
2. Segmentation worksheet (.pdf, .docx). Asks students to justify the given segmentations by explaining what the grouped pitches have in common.
3. Atonal analysis using pc sets (.pdf, .mscz). Open-ended prompt asks students to use set theory to analyze an excerpt. Recording

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8.8: Diatonic Modes

Key Takeaways

- Church modes originated in the medieval era, and are classified by their use of the diatonic collection, their final, the relationships of other pitches to that final, and their range.
- In the 20th and 21st centuries, diatonic modes are also understood as rotations of the major scale, without range requirements, but with the concept of a pitch-class center or tonic.
- Non-Western musical cultures have their own methods of organizing pitch into modes. These "modes" are usually more than simple pitch collections and can include characteristic gestures, embellishments, and protocols for use. Examples include Indian raga, Arabic maqam, Balinese pelog and slendro, Jewish prayer modes, Persian dastgah, and Japanese scales.
- Modes, conceived in terms of parallel relationships, with an emphasis on the color notes of each mode:
  - Ionian: Identical to major
  - Mixolydian: Like major with a
  - Lydian: Like major with a
  - Aeolian: Identical to natural minor; no raised leading tone
  - Dorian: Like natural minor with a
  - Phrygian: Like natural minor with a
- Modes, conceived in terms of relative relationships:
  - Ionian: White notes starting on C
  - Dorian: White notes starting on D
  - Phrygian: …starting on E
  - Lydian: …starting on F
  - Mixolydian: …starting on G
  - Aeolian: …starting on A

This book covers modes from many different angles. For more information on modes, check Introduction to Diatonic Modes (general), Chord-Scale Theory (jazz), Modal Schemas (pop), and Analyzing with Modes, Scales, and Collections (20th-/21st-c.).

At the turn of the 20th century, many composers were rethinking the materials of music. This is one reason the term "common practice" is used to distinguish the major-minor music that dominated Western classical music for the 200 years or so prior—something changed around 1900. You'll also hear talk of the "emancipation of the dissonance" connected to this, and the emergence of atonality out of ever-more-radical chromatic maneuvers. The history of music is much more complex than this simple take, but there is some truth to it: a lot of composers were interested in reinventing what and how they composed, similar to the emergence of abstract art around the same time.

The use of modes has a place in all of this, encapsulating many of the ways in which one can broaden the compositional palette. In this chapter, we'll go through some of the most interesting, famous, and significant options, starting, as many composers did, by looking back to what came before.

Church Modes

The dominance of major and minor in Western classical music emerged out of an earlier practice centered on the use of modes. This collection of modes is often called church, white-note, or Gregorian modes. These modes correspond to rotations of the C major scale, using the same collection of pitches but a different tonic (more properly referred to as a final in this context).

This already introduces us to a fundamental tenet of what a mode generally comprises: both a diatonic collection of pitches and a final. These are the first two items on the list below, followed by two other particularly useful concepts for understanding church modes:

1. The diatonic collection and the intervallic relationships between those pitches
2. The final, which acts as a referential point
3. Further hierarchical levels between the pitch in the mode and its final
4. Melodic shapes and range

1–3 will be familiar from tonal music, but 4 may not be. Range is a defining characteristic of the church modes, as each mode has an authentic and a plagal version.

Example 1 summarizes the modes by their final, their tenor, and their range. Authentic modes are on the left, while plagal modes (those beginning with "hypo-") are on the right. Tenors are usually a fifth above the final in authentic modes and a third above the final in plagal modes (except where noted with an exclamation point). Example 2 provides the same summary, but in notation.

[table id=81 /]

Example 1. The historical church modes summarized.

A link to an interactive elements can be found at the bottom of this page.

Example 2. The historical church modes summarized in notation.

Diatonic Modes in the 20th and 21st centuries

Another summary of diatonic modes (and assignments on them) can be found in Introduction to Diatonic Modes and the Chromatic "Scale."

When modes were revisited as a compositional concept in the 20th century, many concepts from church modes were maintained, while other distinctions were erased. The notion of authentic/plagal modes ("hypo-" modes) was dropped, as the range of many pieces spans more than one octave. Additionally, Glarean's later modes, aeolian and ionian, were just as important as the original authentic church modes.

Color notes

As a listener, you may experience modes as sounding similar to major or minor, but with certain inflected notes—color notes.[1] Modes will sound major-ish or minor-ish based on the quality of the third above the tonic. The major-ish modes are mixolydian and lydian; the minor-ish modes are aeolian, dorian, and phrygian.

Example 3 lists each mode, the quality of the third above the tonic, its color note that distinguishes it from major/natural minor, and its pitches parallel and relative to C major.

[table id=30 /]

Example 3. Important characteristics of each mode.

Example 4 provides a brief summary of this information. The modes are grouped by whether the tonic chord is major or minor, which helps with aural identification of modal passages (as discussed further below). The top line shows modes whose \hat3 is a major third above tonic (*do–mi*): major, mixolydian, and lydian. The bottom line shows modes whose \hat3 is a minor third above tonic (*do–me*): aeolian, dorian, and phrygian. The dotted slurs connect the distinctive color note of each mode with its major/minor counterpart.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Modes grouped by major vs. minor tonic, with color notes shown in blue.

Hearing modal tonics

Because many listeners are so enculturated to hear all music as being major or minor, 20th and 21st century composers who wish to create a modal sound will often spend extra energy on emphasizing the tonic pitch of their chosen mode. (Note that this may or may not involve emphasizing a tonic *chord*!) Following are several ways in which composers may create a sense of tonic in modal music.

- repeating the tonic pitch
- agogic accents (using longer note values) on the tonic pitch, including using a drone of the tonic pitch
- metrical accents on the tonic pitch
- using the tonic pitch as the lowest pitch
- cadencing on the tonic pitch

Identifying modes

If you are not used to playing in and listening to modes, it can be daunting to identify and distinguish modes. Here is a step-by-step process for distinguishing all the modes discussed here, illustrated as a flowchart in Example 5.

Example 5. Flowchart illustrating the process of identifying modes.

1. Identify the quality of tonic.

Listen for the tonic pitch. Then, listen for the whole tonic chord. Is the third of that chord major or minor? This distinguishes the major-ish modes (major, mixolydian, lydian) from the minor-ish modes (minor, aeolian, dorian).

2. Listen and look for $\hat{\mathsf{7}}$ (*ti* or *te*).

Compare the $\hat{7}$ to the leading tone (*ti*) a half step below tonic that we typically hear in minor and major pieces. If $\hat{7}$ is a *whole step* below tonic (*te*), then it's lowered, which means that the piece is (at least temporarily) in a mode.

If you heard a major tonic and $\hat{7}$ is lowered (*te*), then you are in **mixolydian.**

If you heard a minor tonic and $\hat{7}$ is raised (*ti*), then you are in **minor.**

If your mode is not already identified, proceed to step 3.

3. Listen and look for other color notes— *fi* ($\uparrow\hat{\mathsf{4}}$) in major, *la* ($\uparrow\hat{\mathsf{6}}$) in minor, or *ra* ($\downarrow\hat{2}$) in minor.

If $\hat{7}$ did not identify the mode for you, listen and look for other raised color notes.

If $\hat{4}$ is raised (*fi*) in a major-tonic mode, you are in **lydian.** If it is not, you are in **major.**

If $\hat{2}$ is lowered (*ra*) in a minor-tonic mode, you are in **phrygian.** If $\hat{6}$ is raised (*la*) in a minor-tonic mode, you are in **dorian.** If neither $\hat{7}$, $\hat{6}$, nor $\hat{2}$ is altered (*te*, *le*,*re*), you are in **aeolian.**

Modes in a Global Context

Almost all cultures in any place and time have had music, and the vast majority of them have organized pitch into what Western music theory considers types of modes. So, as you might imagine, there are a lot of options for composers prepared to look out beyond the Western tradition to explore. Around 1900, composers in Europe and North America began to do just that. Composers drew on music of the African diaspora (which would come to exert a huge influence over all forms of music making in the 20th century), the ancient ragas of India, China, the Balkans, and many more besides. Clearly, there's no way we can do justice to such a huge topic here—nor indeed could 20th-century Western classical music, which often flattened out nuances of these complex systems. Following is an incomplete list of non-European sources of mode-like pitch collections:

- Indian raga
- Arabic maqam and Turkish makam
- Balinese pelog and slendro
- Jewish prayer modes
- Persian dastgah
- Japanese scales

Each of these systems of pitch organization is related to the concept of mode discussed here, but each has nuances and practices that distinguish them from the diatonic modes, even if the pitches are identical.

Further Reading

- Persichetti, Vincent. 1961. *Twentieth-Century Harmony*. New York: W. W. Norton.

Assignments

1. Identifying modes (.pdf, .mscz). Asks students to identify 20th-century modes versus major/minor, circle inflected pitches, and explain how a pitch center is articulated. Music examples are transcribed from the TV show *Great British Bake Off (*music by Tom Howe, © Accorder Music Publishing, used with permission). Worksheet playlist
2. Additional beginner's worksheets can be found in Introduction to Diatonic Modes and the Chromatic "Scale."

1. Vincent Persichetti (1961) referred to these notes as "characteristic notes." 8.08: Diatonic Modes#return-footnote-739-1

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8.9: Collections

Key Takeaways

This chapter introduces a number of pitch collections that appealed to many composers in the 20th century:

- diatonic collection, as separate from major/minor scales or diatonic modes
- pentatonic collection: a five-note collection that corresponds to the black keys of the piano; can also be generated as a stack of five perfect fifths or through the pitch interval pattern 2–2–3–2–3
- whole-tone collection: a six-note collection that is made up entirely of notes separated by whole steps
- octatonic collection: an eight-note collection that is formed by alternating whole- and half steps
- hexatonic collection: a six-note collection generated with the pitch interval pattern 1–3–1–3–1–3
- acoustic collection: a seven-note collection similar to the mixolydian mode but with a $\uparrow\hat{4}$; corresponds roughly to the lowest partials of the harmonic series

Other pitch collections introduced include:

- Olivier Messiaen's "modes of limited transposition": a group of scales that cannot be transposed in 12 unique ways
- The "distance model" of generating collections with a repeating pattern of pitch intervals

Chapter Playlist

Beyond the use of major/minor and the diatonic modes, there are four new(ish) collections that occupy a special place in the 20th century: the pentatonic, whole-tone, octatonic, and acoustic collections. This chapter discusses these collections along with some important questions of modal properties and extra-musical meaning.

Diatonic Collection and Pandiatonicism

You have probably encountered the concept of the diatonic collection many times already, especially in the chapters on modes in pop and in 20th-/21st-century music, or even when you first learned about major and minor keys. The diatonic collection is the basis of much Western music.

In the 20th and 21st centuries, composers sometimes used the diatonic collection, but without making any attempt to make a specific pitch sound like the the pitch center. Such examples are not tonal, nor are they modal; instead, they are considered pandiatonic. Igor Stravinsky often wrote pandiatonic passages; many can be heard throughout the opening of his ballet *Petrushka*.

Pentatonic Collection

The pentatonic collection is prevalent in music across the globe. It is a collection built with the interval pattern ma2–ma2–mi3–ma2–mi3. The pentatonic collection can be described with reference to the diatonic modes in multiple different ways (Example 1).

a. Using the scale degrees of a major scale, a pentatonic scale can be formed with $\hat{1}\text{, }\hat{2}\text{, }\hat{3}\text{, }\hat{5}\text{, and }\hat{6}$.
b. If you think of the diatonic collection as a stack of perfect fifths (F, C, G, D, A, E, B), then the pentatonic is a narrower form of the same collection: C, G, D, A, E.
c. Finally, if you visualize the piano, note that the complement of C, D, E, F, G, A, B, C (the white notes) is G♭, A♭, B♭, D♭, E♭ (the black notes). The black-note collection is, once again, the pentatonic.

A link to an interactive elements can be found at the bottom of this page.

Example 1. (a–c) Three ways of generating a pentatonic collection, and (d) a rotation of the pentatonic collection.

What the pentatonic collection removes from the diatonic is the two notes that create half steps ($\hat{4}$ and $\hat{7}$, if you are thinking in terms of major scale degrees). The absence of semitones arguably makes the pentatonic more readily rotatable and considered as a collection, without a strong emphasis on a particular note as tonic. Any member of the collection easily functions as a tonal center. For example, there are five unique modes of the collection given in (a) of Example 1, formed by rotating the collection so that each pitch class becomes tonic: C pentatonic (C, D, E, G, A), D pentatonic (D, E, G, A, C), E pentatonic (E, G, A, C, D), and so on. Letter (d) of Example 1 gives an especially common rotation of the pentatonic collection that is referred to as the minor pentatonic.

The pentatonic scale is especially common as a basis for melodic composition. One example can be heard during the first movement of Chen Yi's percussion concerto, at the entrance of the strings at 2:13. Notice that the pentatonic melody is sometimes

accompanied by atonal-sounding chords in the brass. Pentatonic melodies don't need to be harmonized within the pentatonic collection, and in fact often aren't; after all, there are only two possible triads in the pentatonic collection (C major and A minor, for example, in the collection C–D–E–G–A).

Whole-Tone Collection

The whole-tone collection is exactly what it sounds like: a scale made up entirely of six whole steps. Similar to the pentatonic scale, the whole-tone scale is rotationally ambiguous, since there is only one size of step. Composers often exploit this ambiguity by using the whole-tone collection to produce an unsettled feeling in the listener (in film and TV, one famous trope is to use the whole-tone scale to accompany a dream sequence).

There are only two unique whole-tone collections: one that contains the even-numbered pitch classes [0, 2, 4, 6, 8, 10] and one that contains the odd-numbered pitch classes [1, 3, 5, 7, 9, 11]. If you need to distinguish between these two collections in an analysis, you can use the abbreviations WT_0 and WT_1: "WT" stands for "whole tone," and the subscript number indicates the pitch C (0) or C♯ (1) (Example 2).

A link to an interactive elements can be found at the bottom of this page.

Example 2. There are only two whole-tone collections. Transposing WT_1 up a half step would yield WT_0 again.

Octatonic Collection

The octatonic collection is built with an alternation of whole steps and half steps, leading to a total of eight distinct pitches (Example 3). Jazz musicians refer to this as the diminished scale, as it fits well with a fully diminished seventh chord. (Of course, there can be other scales that have eight distinct pitches, but this is the one called the octatonic scale.)

A link to an interactive elements can be found at the bottom of this page.

Example 3. There are only three octatonic collections.

The interval content of this collection is very homogeneous, and this intervallic consistency leads to one of its most interesting properties. As shown in Example 3, there are only three possible octatonic collections. When we transpose the first collection above ($OCT_{0,1}$) by 3—adding 3 to each of the integers in the collection—<0, 1, 3, 4, 6, 7, 9, 10> becomes <3, 4, 6, 7, 9, 10, 0, 1>, which is the same as the first collection, just starting on a different pitch. If you need to distinguish between these two collections in an analysis, you can use the abbreviations $OCT_{0,1}$, $OCT_{1,2}$, and $OCT_{2,3}$: "OCT" is an abbreviation of "octatonic," and the subscript numbers represent pitches that create a half step unique to that scale (C,C♯; C♯,D; and D,E♭, respectively).

Joan Tower frequently uses the octatonic collection, and it is particularly audible in the opening of her piece *Silver Ladders.*

Unlike the other collections discussed here, the octatonic collection appears with some frequency prior to the 20th century, especially in Russia.[1] The octatonic collection can produce several familiar triadic harmonies, as shown in Example 4: eight major/minor triads (and four diminished triads, not shown), and four each of every type of seventh chord except the major seventh chord. However, there are no chords related by root motion by fifth, so no tonic/dominant motion is possible. Instead, there is a plethora of root motion by third. Frédéric Chopin uses the octatonic over a $B♭^7$ chord in his Ballade in G minor (Example 5). Thanks to all those triadic harmonies, it's a versatile mode that can imply tonal associations while also inviting a freer movement among tonalities not traditionally regarded as being closely related.

A link to an interactive elements can be found at the bottom of this page.

Example 4. The octatonic collection contains many triadic harmonies.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Octatonic collections in Chopin's Ballade in G minor (1836).

Hexatonic Collection

The hexatonic collection is a six-note collection that is formed by alternating minor seconds and minor thirds. The name "hexatonic" refers to its six notes, and while there are other possible scales with six notes (for example, the blues scale), the name "hexatonic collection" always refers to this particular group of notes. Like octatonic collections, hexatonic collections can only be transposed four times before returning to the same group of notes again (Example 6), and they are similarly named according to their lowest semitone (e.g., $HEX_{0,1}$ is the hexatonic collection containing C–C♯).

A link to an interactive elements can be found at the bottom of this page.

Example 6. Four possible hexatonic collections.

Again like octatonic collections, hexatonic collections contain triads but do not suggest a particular tonic chord or home key. As shown in Example 7, each collection contains three major triads, three minor triads, and two augmented triads. Juxtaposing two augmented triads that are one semitone apart is another way of generating the hexatonic scale.

A link to an interactive elements can be found at the bottom of this page.

Example 7. Triads present in a hexatonic collection.

Acoustic Collection

The acoustic collection is based on the lowest intervals of the overtone series. This is significant because there has long been an association between those lowest intervals and the notion of musical consonance. The result is a mode that resembles the major scale but with a $\uparrow\hat{4}$ and $\downarrow\hat{7}$ (Example 8).

A link to an interactive elements can be found at the bottom of this page.

Example 8. The acoustic scale is derived from the notes of the overtone series.

New Ways of Organizing Pitch

Many composers of the 20th and 21st centuries have looked for new ways of generating pitch collections for their music.

Messiaen's modes of limited transposition

Olivier Messiaen was interested in composing with collections that can only be transposed a few times before they repeat themselves, such as the octatonic collection. Messiaen's "modes of limited transposition," as he called them, are shown in the table in Example 9 and in notation in Example 10. The numbers in parentheses refer to pitch intervals in semitones.

[table id=80 /]

Example 9. Messiaen's Modes of Limited Transposition.

A link to an interactive elements can be found at the bottom of this page.

Example 10. Messiaen's modes of limited transposition, beginning on C.

These are not the only collections that have limited transpositions: other subsets/supersets of these collections may also have this property. Even within this set, Mode 1 is a subset of Modes 3 and 6. [2]

Distance model modes

Distance model modes involve a more restricted set of modes of limited transposition. These modes are formed with an alternation between two intervals, such as:

- 1:2 = alternating semi and whole tones (the octatonic mode again)
- 1:3 = semitones and minor thirds, sometimes called the hexatonic mode/collection, or in pitch-class set parlance, the "magic" hexachord
- 1:5 = semitones and perfect fourths

This style of organization is strongly associated with Béla Bartók, as we'll see in the next chapter.

Other modes

This is just the tip of the iceberg, even for 20th-century classical music. Among the other main areas to explore are:

- Microtonal modes, beloved of Ligeti and the spectral school, which focus on alternate tuning systems and avoid any assumption of the equal-tempered 12.
- Synthetic modes, derived by alteration of diatonic, as in the non-standard key signatures of certain movements in Bartók's *Mikrokosmos*.
- One-off cases like the "scala enigmatica" of Verdi's *Ave Maria* (which is hardly used as a scale/mode in any other case).

Important Considerations with Collections

Why do some of these modes keep cropping up in different contexts? Again, that's a big issue that has attracted a great deal of theoretical attention. Here are some highlights:

- **Correspondence to the natural overtone series**. One hypothesis is that people like modes that see the important pitches align with those low down in the harmonic series, and thus with what are conventionally called consonances (octaves, fifths, etc.). Clearly the acoustic collection is a particularly literal implementation of this idea.
- **Symmetry** is a key preoccupation of 20th-century composers. One reason for this is the desire to create a new kind of order not rooted (pun intended…) in the "from-the-bass-up" world of the overtone series and fundamental bass harmony. Symmetry can be internal to scale, as in the rotational symmetry of the modes of limited transposition, or else between scales, as in Bartók's *Cantata Profana*.
- **Maximal evenness.** A prominent theory of modal construction emphasizes the even distribution of pitches in the space.[3] Think of the diatonic modes again. The diatonic collection is made up of mostly whole tones, with only two semitones that are as far away from each other as possible. This maximized spacing between the semitones means that the pitches of the diatonic collection are maximally even.

Further reading

- Agmon, Eytan. 1990. "Equal Divisions of the Octave in a Scarlatti Sonata." *In Theory Only* 11 (5): 1–8.
- Clough, John, and Jack Douthett. 1991. "Maximally Even Sets." *Journal of Music Theory* 35, no. 1–2 (Spring–Autumn): 93–173.

Assignments

1. Worksheet on collections (.pdf, .mscz). Asks students to spell one example of each of the collections from this chapter.
2. Analyze Lili Boulanger's resplendent *Hymne au Soleil*. Identify modes and collections used, along with related techniques. Scores can be found on IMSLP and MuseScore. Both include the original French text and an English translation in the underlay.

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1. Agmon (1990) even sees it in a Scarlatti sonata (K. 319 b.62ff). 8.09: Collections#return-footnote-742-1
2. The acoustic scale does not have this property, so it does not appear. 8.09: Collections#return-footnote-742-2
3. This emerges primarily from Clough and Douthett 1991. 8.09: Collections#return-footnote-742-3

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8.10: Analyzing with Modes, Scales, and Collections

Key Takeaways

So far, most of our discussion has focused on defining modes, collections, and their properties. As always, there is much more to analyzing with these materials than simply knowing terms. This chapter provides some guidance on how to go from theory to practice.

Please note that this book covers modes from many different angles. For more information on modes, check Introduction to Diatonic Modes (general), Chord-Scale Theory (jazz), Modal Schemas (pop), and Diatonic Modes (20th/21st-c.).

Chapter Playlist

In Theory

So, you're faced with a new piece of music, and you get the sense that it might be worth considering a modal view. It sure isn't "tonal" in the common-practice sense, but neither does it seem "atonal," "serial," or the like. How do you go about identifying the modes used, and making analytical observations on that basis? 20th-century music has a wider range of possible modes and may not have a key signature or any other notational shortcut for identifying the mode. As such, it's especially important to be able to identify modes from musical cues.

Firstly, let's review some of the different considerations that can go into the definition of a mode:

1. A collection of pitches in a particular intervallic relationship (e.g., C, D, E, F, G, A, B)
2. A tonic or final that acts as a primary or referential point (e.g., C)
3. Further hierarchical levels of importance (such as the dominant/subdominant)
4. Melodic shapes and ranges

No. 1 reminds us that modes can be transposed. While we often present the early modes in their "white-note" transposition (with dorian on D, for instance), in 20th-century music, you can just as easily have them on other pitches such as dorian on E and phrygian on D. This leads to the frankly confusing terminology "D mode on G." Don't forget that you can also have chromatic notes in modal music—not every pitch used needs to be in the scale. So the question is, how many exceptions are too many?

No. 2 helps to separate all the possibilities that No. 1 throws into the mix. If you only have white notes, which of those white notes is the modal final? Any and all musical parameters might contribute to the case for one of those pitches as tonic; for a useful starting point, try the widely applicable "first, last, loudest, longest" maxim (Cohn 2012, 47, after Harrison 1994, 75ff.). Pitches that dominate in those ways tend to be more salient. Do phrases tend to start and/or end on a certain pitch, or do they emphasize that pitch in other ways, perhaps with strong metrical positions or by reserving it for the top of the melodic contour?

$$(\hat{5}) \tag{8.10.1}$$

$$(\uparrow \hat{4}) \tag{8.10.2}$$

Range considerations were fundamental to the definition of church modes in terms of authentic vs. plagal forms, and this has been a key consideration for defining modes in many other types of music, as have melodic shapes.

In Practice

The above considerations have to do with identifying a prevailing mode, but how does an analyst use this information to create a compelling interpretation of the piece? Well, the challenge of coming up with a modal reading can become part of that interpretation. Here are some starting points for pivoting from identification to interpretation:

- Firstly, how easy was it to come up with a tonal reading? Is this a piece with its structure on display or deeply hidden? What might that say about the emotional valence of the work?
- Can you characterize the mode in general and its use in this piece? Is the raised lydian fourth "exciting" or even "aspirational"; is the phrygian second perhaps "lamenting"?
- How clearly and separately are these modes set out? When we move from one mode to another, are there common tones, or even a common final? Just like in tonality, "modulations" among modes can be regarded as close or remote, partly on this basis.
- How are the properties and distribution of modes related to wider considerations? Do mode changes align with moments that seem like section boundaries for other reasons?

Consider the three moments below, which come from Béla Bartók's *From the Island of Bali*. Is the same mode in operation throughout, or does it change? What pitches are in/out of the mode(s)? Does a modal final present itself? Are there any moments where two modes are combined? Some suggestions follow the images, so decide on what you think before scrolling down to compare notes.

Bartók's From the Island of Bali: Extract 1

Bartók's From the Island of Bali: Extract 2

Bartók's From the Island of Bali: Extract 3

The first case is wonderfully ambiguous in relation to both mode and final. If you put the hands together, the pitches constitute a neat octatonic mode, but if you keep them apart, then it's the 1:5 distance model mode often associated with Bartók, also known as set class (0167). There's good Bartókian symmetry in all of this, and very little sense of a single modal final emerging.

In the latter two cases, there is a strong tonic arrival on the first downbeat, suggesting G♭ and E♭ as the respective tonics for these sections. However, notice how closely the pitches relate to the opening. First we have [B, C, F, G♭], which were the exact pitches of the right hand at the start. (Do you spot the one "chromatic" note in this reading? A𝄪 could be interpreted as a chromatic upper neighbor that doesn't really fit the mode.)

Later we have [A, B♭, D, E♭], which are a close variant on those of the left hand. This change indicates a move from that opening ambiguity to a passage quite neatly redolent of E♭ major, which is swiftly undone as the piece goes back to the technical and emotional place where it started.

So we have a balance between unity and variety, as well as trajectory for the piece overall.

Modes, Collections and Musical Meaning

All of these modes come with extramusical interpretive associations.

For instance, we've been focusing on 20th-century instances of modal writing, but they do appear in common-practice tonal music, often with associations back to the pre-tonal music from which those modes came: for example, Beethoven's use of dorian in the "Credo" of his Missa Solemnis (1824).

$$(\downarrow \hat{2}) \tag{8.10.3}$$

Specific modes also attract meanings from their inherent properties. We have already seenthe whole-tone modes' un-rootedness, which lends itself most naturally to certain extramusical associations, as showcased in Claude Debussy's "Voiles" (1909). Likewise the octatonic is often invoked as some kind of exotic, timeless, magical topic, as in the celesta arpeggios of "Dance of the Sugar Plum Fairy" from Pyotr Ilyich Tchaikovsky's *The Nutcracker* (1892).

Finally, and as always with meaning, apart from the materials itself and the composers' intentions, it ultimately comes down to your associations and inferences.

Further Reading

- Cohn, Richard. 2012. *Audacious Euphony: Chromaticism and the Consonant Triad's Second Nature*. New York: Oxford University Press.
- Harrison, Daniel. 1994. *Harmonic Function in Tonal Music*. Chicago: University of Chicago Press.
- Persichetti, Vincent. 1961. *Twentieth-Century Harmony*. New York: W. W. Norton.

Assignments

1. Analyze Lili Boulanger's resplendent *Hymne au Soleil*. Identify modes and collections used, along with related techniques and materials, and linking these (where you consider it appropriate) to possible "meanings" of the work. Scores can be found on IMSLP and MuseScore. Both include the original French text and an English translation in the underlay.

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CHAPTER OVERVIEW

Chapter 9: Twelve-Tone Music

9.1: Basics of Twelve-Tone Theory
9.2: Naming Conventions for Rows
9.3: Row Properties
9.4: Analysis Examples – Webern Op. 21 and 24
9.5: History and Context of Serialism

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9.1: Basics of Twelve-Tone Theory

Key Takeaways

- Twelve-tone composition involves using all twelve pitch classes roughly equally. That means it (usually) isn't appropriate to look for a key, mode, tonic pitch, or other tonal elements.
- Composers often use a fixed ordering of the twelve pitch classes called a row, but also adapt it in various ways, notably through:
  - Transposition (T)
  - Inversion (I)
  - Retrograde (R)
  - Retrograde inversion (RI)
- In practice, there is a great variety of how composers approach the task of composing with twelve tones.

Chapter Playlist

Twelve-tone music is most often associated with a compositional technique, or style, called serialism, though these terms are not equivalent:

- "Serialism" is a broad designator referring to the ordering of things. In television, for instance, a serialized show is one in which the episodes are aired in a specific order to tell a continuous story. Serialism in music involves putting musical elements in some kind of order, whether they are pitches, durations, dynamics, or something else. So note that not all serial pieces use a twelve-tone row.
- "Twelve-tone composition" refers more specifically to music based on orderings of the twelve pitch classes.

This style of composition is commonly associated with a group of composers (sometimes called the "Second Viennese School") whose members included Arnold Schoenberg, Anton Webern, and Alban Berg.[1] But twelve-tone compositional techniques and the ideas associated with them have been influential for many composers, and serial and twelve-tone music is still being written today. Much of this music shares similar axioms, which we outline in the following chapters, but it's important to stress that composers have used these basic ideas to cultivate a wide range of different approaches, and that the emphasis for most composers is on the music, with the technique as an important but subsidiary consideration.

Rows

Twelve-tone music is based on a series (sometimes called a row) that contains all twelve pitch classes in a particular order. This order is not the same in each piece—in fact, there are 479,001,600 rows to choose from![2] Some of these row forms have been used in multiple works, as they contain properties that several composers may favor, while many others have never been used at all.

Operations

There are four main ways in which composers move a row around without fundamentally changing it. We call these "operations" (in the mathematical sense rather than the medical one).

- **Transposition (T).** Take all the pitches and move them up or down by a specified number of semitones. Transposition is a familiar process from tonal music, but note that (as in set theory) we're always working in transposition by semi-tones here and never diatonic steps.
- **Inversion (I).** Reverse the direction of the intervals: rising intervals becoming falling intervals, and vice versa. Again, this is just like melodic inversion in other contexts, and once again, we're only dealing with exact inversion, preserving the interval size in terms of semitones (not using diatonic inversion or generic intervals here).
- **Retrograde (R).** Reverse the order of pitches so the last comes first, and vice versa. This, too, has a precedent in tonal music with the "retrograde" (also known as the "crab" or "cancrizans") canon, for instance, though it's a lot rarer in tonal music than transposition and inversion.
- **Retrograde inversion (RI).** As the name suggests, this really involves combining two of the operations described above: the retograde and the inversion. The order in which you do those operations does matter, but we'll return to that later on.

Twelve-tone rows that can be related to each other by transposition, inversion, and/or retrograde operations are considered to be forms of the same row. Unless a row has certain properties that allow it to map onto itself when transposed, inverted, or retrograded, there will be 48 forms of the row: the four types—prime (P), inversion (I), retrograde (R), and retrograde inversion

(RI)—each transposed to begin on all of the twelve pitch classes. As such, a row produces a collection of 48 forms in what is called a row class.

A fake example

To get a sense of the basic operations the composers perform on tone rows, let's start with a fake example: an ascending chromatic scale starting on C (Example 1). Composers tend to prefer more interesting tone rows, but we'll start with this simple case for illustration. Row forms also don't usually commit to placing pitches in a specific octave, but we'll set it out in musical notation and with treble and bass clefs to show the inversions nice and clearly.

A link to an interactive elements can be found at the bottom of this page.

Example 1. A chromatic scale in four forms: prime, retrograde, inversion, and retrograde inversion.

Prime form

The prime form of the row (top left in Example 1 above) is the main form to which all other forms are related. In some pieces, one form of the row will clearly dominate the texture. If that is not the case, we generally choose the most salient row at the beginning of the work and label it **P** (for "prime"). If more than one row seems equally prominent at the beginning, then simply choose one (flip a coin!). The decision of which to call "prime" is not always important, but it's useful to allocate a single row form to serve as a point of reference.

Any row form that is the same as, or a strict transposition of, that opening prime form is also a prime form. Once you have labeled the main prime form at the beginning of the piece, any subsequent row that is an exact transposition of that row is prime. Likewise, any row that exhibits the same succession of ordered pitch-class intervals is also a prime form.

Since **P** can be transposed to any pitch-class level, we distinguish them with subscripts. There are multiple common systems for deciding the numbering. The simplest, which we will follow in this book, is to number the row by its starting pitch class. If the prime form begins on G (pitch class 7), it is $\mathbf{P_7}$; on B (pitch class 11) it is $\mathbf{P_{11}}$. The Naming Conventions chapter has more on this subject.

Retrograde form

A retrograde form of the row takes a prime form and exactly reverses the pitch classes. Its interval content, then, is the reverse of the prime forms. Retrograde forms are labeled R followed by a subscript denoting the last pitch class in the row. This will ensure that if two row forms are exact retrogrades of each other, they will have the same subscript.

For example, if a row has the exact reverse interval structure of the prime forms and ends on F♯ (6), it is $\mathbf{R_6}$, regardless of its first pitch.

Inversion form

A row form that exactly inverts the interval structure of the prime form (for example, 3 semitones up becomes 3 semitones down)[3] is in inversion form. Inversion forms are labeled according to the first pitch class of the row form. An inversion-form row that begins on E♭ (3) is $\mathbf{I_3}$.

Note that this label is not always the same as the inversion operation that produces it. If you begin with $\mathbf{P_0}$, the inversion operation and the resulting row form will have the same subscript. Otherwise, they will be different. Take care not to confuse them.

Retrograde inversion form

The relationship of the retrograde inversion (**RI**) to the inversion (**I**) is the same as that between retrograde (**R**) and prime (**P**). Retrograde inversion forms reverse the pitch classes of inversion forms and are named for the last pitch class in the row form.

A real example

Now that we've got the basic idea, let's see how this works in a real musical context, using the same layout and taking as our example the row form in Elisabeth Lutyens's *Motet (Excerpta Tractati Logico-Philosophici)*, Op. 27.[4]
A link to an interactive elements can be found at the bottom of this page.

Example 2. The row form in Elisabeth Lutyens, *Motet (Excerpta Tractati Logico-Philosophici)*, Op. 27.

Enter the Matrix

As one final piece of technical, terminological preamble, we introduce the matrix (plural: matrices). This is a neat, compact way of setting out all of the 48 rows in a row class on one 12-by-12 grid. By convention:

- A prime form of the row ($\mathbf{P_n}$) always appears along the top row *left to right*. For this explanation, let's assume we are beginning with $\mathbf{P_0}$.
- Because $\mathbf{R_0}$ is exactly the same as P_0 in reverse, you already have R_0 also on that top row, by reading from *right to left*.
- $\mathbf{I_0}$ begins on the same pitch as P_0, so we set that out in the other direction: down along the first column, *top to bottom*.
- $\mathbf{RI_0}$ is to I_0 as R_0 is to P_0, so again, we read RI forms along the same axis as I, in the opposite direction: *bottom to top*.

Example 3 is the row matrix for the Lutyens *Motet* from Example 2. We'll take another look at matrices in the Naming Conventions chapter.

	$\mathbf{I_0}$	$\mathbf{I_{11}}$	$\mathbf{I_3}$	$\mathbf{I_7}$	$\mathbf{I_8}$	$\mathbf{I_4}$	$\mathbf{I_2}$	$\mathbf{I_6}$	$\mathbf{I_5}$	$\mathbf{I_1}$	$\mathbf{I_9}$	$\mathbf{I_{10}}$	
$\mathbf{P_0}$	0	11	3	7	8	4	2	6	5	1	9	10	$\mathbf{R_{10}}$
$\mathbf{P_1}$	1	0	4	8	9	5	3	7	6	2	10	11	$\mathbf{R_{11}}$
$\mathbf{P_9}$	9	8	0	4	5	1	11	3	2	10	6	7	$\mathbf{R_7}$
$\mathbf{P_5}$	5	4	8	0	1	9	7	11	10	6	2	3	$\mathbf{R_3}$
$\mathbf{P_4}$	4	3	7	11	0	8	6	10	9	5	1	2	$\mathbf{R_2}$
$\mathbf{P_8}$	8	7	11	3	4	0	10	2	1	9	5	6	$\mathbf{R_6}$
$\mathbf{P_{10}}$	10	9	1	5	6	2	0	4	3	11	7	8	$\mathbf{R_8}$
$\mathbf{P_6}$	6	5	9	1	2	10	8	0	11	7	3	4	$\mathbf{R_4}$
$\mathbf{P_7}$	7	6	10	2	3	11	9	1	0	8	4	5	$\mathbf{R_5}$
$\mathbf{P_{11}}$	11	10	2	6	7	3	1	5	4	0	8	9	$\mathbf{R_9}$
$\mathbf{P_3}$	3	2	6	10	11	7	5	9	8	4	0	1	$\mathbf{R_1}$
$\mathbf{P_2}$	2	1	5	9	10	6	4	8	7	3	11	0	$\mathbf{RI_0}$
	$\mathbf{RI_2}$	$\mathbf{RI_1}$	$\mathbf{RI_5}$	$\mathbf{RI_9}$	$\mathbf{RI_{10}}$	$\mathbf{RI_6}$	$\mathbf{RI_4}$	$\mathbf{RI_8}$	$\mathbf{RI_7}$	$\mathbf{RI_3}$	$\mathbf{RI_{11}}$	$\mathbf{RI_0}$	

Example 3. Row matrix for Lutyens, *Motet*.

From Theory to Practice

In general, then, the basics of twelve-tone technique stipulate that:

1. Pitch classes are played **in the order specified** by the row.
2. Once a pitch class has been played, **it isn't repeated** until the next row.

Those are the basic "rules" of which all twelve-tone composers are at least aware, but as we said at the outset, composers vary widely in what they actually do with this technique in practice. To that effect, let's take some "exceptional" examples right from the beginning.

Twelve-tone serial, but not so strict

Luigi Dallapiccola's *Piccola Musica Notturna* (literally "little night music," 1954) certainly features in the canon of well-known twelve-tone works, but note how right from the beginning, and throughout, there is a free and easy attitude to repeating pitches and even motivic figures. There is a row, but it unfolds gradually, undogmatically. This is key to Dallapiccola's style, to the luxuriant atmosphere of this piece, and to much "serial" music in which some form of deviation from strict practice is extremely common.

All told, to my ears at least, this piece has as much to do with the world of Claude Debussy (as a "night time" complement to Debussy's *Prélude à l'après-midi d'un faune*, perhaps?) as to the "strict" serialists.

Serial but not twelve-tone

Likewise, we also get music that's clearly not twelve-tone serial, but that uses strict serial techniques. Listen to *The Lamb* by John Tavener. The pitch classes in the soprano melody at the beginning ("Little lamb, who made thee?") are G, B, A, F♯, G. The soprano then repeats that melody for the second line ("Dost thou know who made thee?"), while the altos sing the inversion:

- Soprano (prime): G–B–A–F♯–G
- Alto (inversion): G–E♭–F–A♭–G

Then the soprano sings a longer tune ("Gave thee life and bid thee feed / By the stream and o'er the mead") with the second half as a a strict retrograde of the first:

- "Gave thee life and bid thee feed" (prime): G–B–A–F♯–E♭–F–A♭
- "By the stream and o'er the mead" (retrograde): A♭–F–E♭–F♯–A–B–G

Again, we get this melody a second time ("Gave thee clothing of delight / Softest clothing wooly bright") with the altos now singing the inversion:

- Soprano (prime then retrograde): G–B–A–F♯–E♭–F–A♭ | A♭–F–E♭–F♯–A–B–G
- Alto (inversion then retrograde inversion): G–E♭–F–A♭–B–A–F♯ | F♯–A–B–A♭–F–E♭–G

Clearly this is a highly serial way of writing. Then again, this passage has a very clear modal final on G, and the two parts (soprano and alto separately) can be considered in terms of standard chord modes. (See Diatonic Modes to review.)

What do we know?

So, there is a wide range of approaches to making music with the basics of the twelve-tone technique, and it's not always clear what counts. Those differences notwithstanding, at a minimum, twelve-tone rows are used somehow in the construction of:

- **Themes.** That said, note that serial themes are not always (or even often) exactly twelve notes in length, or complete row statements.
- **Motives.** This is pertinent, for instance, in cases where the row form includes several iterations of a smaller cell (see the Row Properties chapter for more information).
- **Chords.** As we're generally not working within tonal constraints (and even when we occasionally are), there are many different chordal configurations possible. The row's properties give rise to the particular construction of chords used.

Assignments

1. Chose any row from the Twelve-Tone Anthology that interests you and write out:
   - The row matrix with all 48 row forms (i.e., with numbers on the grid as shown above)
   - $\mathbf{P_0}$, $\mathbf{R_0}$, $\mathbf{I_0}$, $\mathbf{RI_0}$ in musical notation

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1. The "First Viennese School" (by this logic) centers on Haydn, Mozart, and Beethoven. 9.01: Basics of Twelve-Tone Theory#return-footnote-751-1
2. This number comes from the mathematical expression 12! (read: "12 factorial"), which means 12 × 11 × 10 … × 2 × 1. 9.01: Basics of Twelve-Tone Theory#return-footnote-751-2
3. Or, equivalently, or 9 semitones up, [pb_glossary id="1402"]modulo 12[/pb_glossary]. 9.01: Basics of Twelve-Tone Theory#return-footnote-751-3
4. This is the row form given by Lutyens in the BL Add. Ms. 64789. manuscript (f.48b). Credit and thanks to Laurel Parsons for providing this. 9.01: Basics of Twelve-Tone Theory#return-footnote-751-4

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9.2: Naming Conventions for Rows

Key Takeaways

- This chapter goes through the different ways of representing twelve-tone material:
  - pitches by pitch name or pitch class;
  - rows and transformations with P_0 starts on C (fixed zero) or P_0 starts wherever we chose (moveable zero)
  - matrices, setting out these different row conventions.
- When reading other writing on twelve-tone music, be prepared for any of these conventions to be used. But in your own work, simply choose one you feel comfortable with and use it consistently.

In analyzing twelve-tone music, there are different conventions for labeling rows, transformations, and even pitches and intervals. This chapter compares the main approaches that you're most likely to encounter in analytical writings. The focus is on rows and matrices, but before we get to that, let's deal first with the pitches themselves.

Pitch

As we've seen earlier in the book, it is useful in some analytical contexts to use pitch-class notation (integers from 0 for C to 11 for B) as an alternative to spelling out those pitches (e.g., C♯ vs D♭). This convention is mostly associated with non-tonal music (including most twelve-tone music), where it can be handy for performing the kinds of mathematical operations we've seen (in both pitch-class set analysis and twelve-tone music) and for sidestepping questions of pitch spelling. There's often still a logic to the pitch spellings used in a twelve-tone piece, but that logic is often of a different and perhaps less generalizable kind. For instance, using specific pitch spellings in a row-form representation usually doesn't reflect a hierarchy or tonality in the same way that the pitches of a scale do in tonal music.

Rows

For rows, the main difference in notation and labeling centers on a single choice about which pitch to organize our rows around:

1. the **same pitch** in all contexts (conventionally, that pitch is C)
2. a pitch that's **important to the musical context** in question

For instance, in the Basics of Twelve-Tone Theory chapter, we set out the row of Elisabeth Lutyens's *Motet* starting on C, which gave us the twelve-tone row 0–11–3–7–8–4–2–6–5–1–9–10. Alternatively, we could set out the P_0 starting on D, as the first voice to enter (alto) starts on D_4 and proceeds to sing the first hexachord of this prime-form row on that pitch level.[1] That would give us a P_0 of 2–1–5–9–10–6–4–8–7–3–11–0.

Option 1: P_0 starts on C (fixed zero)

In this convention, whatever you decide the prime form to be, the transposition of that form starting on C is P_0. This is probably the most common convention today, and sometimes called "zero-centered" or "fixed-zero" (by analogy to tonal solfège systems).

As we have set P_0 to begin on C, I_0 also begins on C, and R_0 and RI_0 will *end* on C. This separation of P_0 and I_0 from R_0 and RI_0 makes sense because we prefer P_0 and R_0 to be exact retrogrades of one other (and likewise I_0 and RI_0). We could theoretically have an even more consistently "zero-centered" system in which all of P_0, I_0, R_0 and RI_0 begin on C, but that's not a convention that people have widely adopted.

In summary:

- P_0 starts with C
- I_0 starts with C (same pitch class as P_0)
- R_0 starts with the last note of P_0 (by definition, not C)
- RI_0 starts with the last note of I_0 (by definition, not C)

Option 2: P_0 starts wherever we chose (moveable zero)

In the alternative method, the P_0 form is assigned to either the first form of the row or the one that is most meaningful—regardless of what pitch class begins the row. Depending on the context, this may be evident from the piece, deduced from the analysis, or

allocated semi-arbitrarily. Transpositions and other operations are then worked out in the same way, in relation to that P_0 form. This convention is sometimes called “original-centered” or “movable-zero” (to continue the solfège analogy).

In summary:

- P_0 takes a transposition (and thus starts with a pitch) chosen by the analyst
- I_0 still starts with the same note as P_0
- R_0 still starts with the last note of P_0
- RI_0 still starts with the last note of I_0

Same? Different? Better? Worse?

As the two summaries suggest, these naming conventions are actually not so different. It bears repeating that for all naming systems, transposition and the other operations all work in the same way, so it’s mostly just a matter of where you start: which row form you use as the referential form to relate others to.

And as is so often the case when multiple parallel naming conventions emerge, there are both benefits and downsides to each approach. If you’re analyzing music that makes you want to assign P_0 in a musically sensitive way, then the moveable-zero convention may suit your purposes. But if you go down that route, then you’ll probably feel compelled to come up with a “good” reason for the pitch level of P_0 in all your analyses, and that may not always be appropriate. The fixed-zero system has the benefit of clarity and consistency. That’s probably why it’s become more common in recent scholarship, but that doesn’t necessarily make it “better.”

Indeed, in many cases, it won’t even be clear which orientation should be P and which I (or R for that matter). Unfortunately, there isn’t yet a widely recognized system for making such determinations.

Matrices

Before we wrap this up, there’s one final confusion to add to the pile: how to set out these conventions on the row matrix. Here are three types.

Type 1

First, here’s a reminder of the matrix we saw for the Lutyens example in the last chapter (**P_0** starts on C and is in the top row). This is probably the most common and standard form.

	I_0	**I_{11}**	**I_3**	**I_7**	**I_8**	**I_4**	**I_2**	**I_6**	**I_5**	**I_1**	**I_9**	**I_{10}**	
P_0	0	11	3	7	8	4	2	6	5	1	9	10	**R_{10}**
P_1	1	0	4	8	9	5	3	7	6	2	10	11	**R_{11}**
P_9	9	8	0	4	5	1	11	3	2	10	6	7	**R_7**
P_5	5	4	8	0	1	9	7	11	10	6	2	3	**R_3**
P_4	4	3	7	11	0	8	6	10	9	5	1	2	**R_2**
P_8	8	7	11	3	4	0	10	2	1	9	5	6	**R_6**
P_{10}	10	9	1	5	6	2	0	4	3	11	7	8	**R_8**
P_6	6	5	9	1	2	10	8	0	11	7	3	4	**R_4**
P_7	7	6	10	2	3	11	9	1	0	8	4	5	**R_5**
P_{11}	11	10	2	6	7	3	1	5	4	0	8	9	**R_9**
P_3	3	2	6	10	11	7	5	9	8	4	0	1	**R_1**
P_2	2	1	5	9	10	6	4	8	7	3	11	0	**RI_0**

	RI_2	RI_1	RI_5	RI_9	RI_{10}	RI_6	RI_4	RI_8	RI_7	RI_3	RI_{11}	RI_0	

Type 2

Now here's the same matrix, with P_0 still on the top row, but with that P_0 starting on D. Note how the lists of row forms stay the same ($\mathbf{P_0}$, $\mathbf{P_1}$, $\mathbf{P_9}$…), but the pitches have moved around.

	I_0	I_{11}	I_3	I_7	I_8	I_4	I_2	I_6	I_5	I_1	I_9	I_{10}	
$\mathbf{P_0}$	2	1	5	9	10	6	4	8	7	3	11	0	$\mathbf{R_{10}}$
$\mathbf{P_1}$	3	2	6	10	11	7	5	9	8	4	0	1	$\mathbf{R_{11}}$
$\mathbf{P_9}$	11	10	2	6	7	3	1	5	4	0	8	9	$\mathbf{R_7}$
$\mathbf{P_5}$	7	6	10	2	3	11	9	1	0	8	4	5	$\mathbf{R_3}$
$\mathbf{P_4}$	6	5	9	1	2	10	8	0	11	7	3	4	$\mathbf{R_2}$
$\mathbf{P_8}$	10	9	1	5	6	2	0	4	3	11	7	8	$\mathbf{R_6}$
$\mathbf{P_{10}}$	0	11	3	7	8	4	2	6	5	1	9	10	$\mathbf{R_8}$
$\mathbf{P_6}$	8	7	11	3	4	0	10	2	1	9	5	6	$\mathbf{R_4}$
$\mathbf{P_7}$	9	8	0	4	5	1	11	3	2	10	6	7	$\mathbf{R_5}$
$\mathbf{P_{11}}$	1	0	4	8	9	5	3	7	6	2	10	11	$\mathbf{R_9}$
$\mathbf{P_3}$	5	4	8	0	1	9	7	11	10	6	2	3	$\mathbf{R_1}$
$\mathbf{P_2}$	4	3	7	11	0	8	6	10	9	5	1	2	$\mathbf{RI_0}$
	RI_2	RI_1	RI_5	RI_9	RI_{10}	RI_6	RI_4	RI_8	RI_7	RI_3	RI_{11}	RI_0	

Type 3

Perhaps most confusing of all is a kind of hybrid version where we still have the D version on the top row, but now we label it $\mathbf{P_2}$. So:

- We organize the row class around a chosen pitch/transposition (here D).
- We still label the row forms around the alternative option ($\mathbf{P_0}$ starts on C).

Note how this time, comparing it with the version above, the pitches have stayed the same, but the lists of row forms have changed ($\mathbf{P_x}$, $\mathbf{P_y}$…).

	I_2	I_1	I_5	I_9	I_{10}	I_6	I_4	I_8	I_7	I_3	I_{11}	I_0	
$\mathbf{P_2}$	2	1	5	9	10	6	4	8	7	3	11	0	$\mathbf{R_2}$
$\mathbf{P_3}$	3	2	6	10	11	7	5	9	8	4	0	1	$\mathbf{R_3}$
$\mathbf{P_{11}}$	11	10	2	6	7	3	1	5	4	0	8	9	$\mathbf{R_{11}}$
$\mathbf{P_7}$	7	6	10	2	3	11	9	1	0	8	4	5	$\mathbf{R_7}$
$\mathbf{P_6}$	6	5	9	1	2	10	8	0	11	7	3	4	$\mathbf{R_6}$
$\mathbf{P_{10}}$	10	9	1	5	6	2	0	4	3	11	7	8	$\mathbf{R_{10}}$
$\mathbf{P_0}$	0	11	3	7	8	4	2	6	5	1	9	10	$\mathbf{R_0}$

P_8	8	7	11	3	4	0	10	2	1	9	5	6	**R_8**
P_9	9	8	0	4	5	1	11	3	2	10	6	7	**R_9**
P_1	1	0	4	8	9	5	3	7	6	2	10	11	**R_1**
P_5	5	4	8	0	1	9	7	11	10	6	2	3	**R_5**
P_4	4	3	7	11	0	8	6	10	9	5	1	2	**R_4**
	RI_2	**RI_1**	**RI_5**	**RI_9**	**RI_{10}**	**RI_6**	**RI_4**	**RI_8**	**RI_7**	**RI_3**	**RI_{11}**	**R_{I0}**	

Summary

In summary, the first row can read:

- **P_0**, starting on 0
- **P_0**, starting on n (here 2)
- **P_n**, starting on n

All of these naming and matrix-generating conventions are out there. It's best simply to be aware of these options and check that you have the right convention in mind when you come across one (especially where the matrices neglect to explicitly label the row names).

Further Reading

- Parsons, Laurel, 1999. "Music and Text in Elisabeth Lutyens's Wittgenstein Motet." *Canadian University Music Review* 20 (1): 71–100.

Assignments

1. Chose any row from the Twelve-Tone Anthology that interests you and write out the row matrix with all 48 row forms (i.e., with numbers on the grid as shown above) in each of the three ways shown above. (Then choose your favorite method and never do this again!)

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1. The actual row distribution is a bit more complicated. See Parsons 1999 for an analysis and discussion. 9.02: Naming Conventions for Rows#return-footnote-753-1

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9.3: Row Properties

Key Takeaways

- Some rows are used more by composers than others. Often this is because of the row's properties.
- This chapter explains some row properties that are especially common:
  - all interval
  - derived rows
  - Invariance
  - Hexachordal combinatoriality
  - Partially-ordered sets
- The Twelve-Tone Anthology has more detail on this topic.

Twelve-tone composers may view the notes in a tone row as equal, but they do not appear to feel the same way about different row forms. Instead, rows with certain properties have disproportionately attracted composers' attention. This chapter surveys some of the special types of properties and row forms to look out for. A recurring focus is on the properties of the smaller constituent parts of a row—its internal segments. There are two ways to view these constituent parts: overlapping and discrete.

Overlapping Segments and the "All-Interval" Row

Considering every "overlapping" segment of a row means looking at segments starting at each pitch in turn. For instance, for dyads (two pitches, one interval), we look at pitches 1 and 2, then 2 and 3, followed by 3 and 4, and so on. By considering two pitches at a time and stepping forward by one, there's always one pitch overlapping. That specific approach gives us the interval content of a row and allows us to identify our first notable row type: the all-interval row.

While all standard twelve-tone rows include all twelve distinct pitches, only some also feature all eleven distinct intervals between neighboring pitches (Example 1). There are 1,928 distinct row forms with this all interval property, but again, some of them have appealed to composers more than others. One true-by-definition property of these rows is that there is a tritone between each pair of notes around the central pair, i.e., between notes 1 and 12, 2 and 11, 3 and 10, 4 and 9, 5 and 8, and 6 and 7. In Example 1, for instance, the row starts with A and ends with D♯, and so on.

A link to an interactive elements can be found at the bottom of this page.

Example 1. An all-interval row from Luigi Nono, *Il Canto Sospeso*.

This example of an all-interval row is a linear layout of the so-called "Grandmother chord" (credited to Nicolas Slonimsky). To produce this succession of pitches, start with a semitone up (interval class 1), then a tone down (interval class 10), and continue to alternate odd and even intervals with the odd intervals getting successively larger and the even ones smaller. As a consequence, the resulting pitch succession can be viewed as two interleaved chromatic scales (as shown in Example 1) which is essentially a chromatic wedge and can therefore be seen to have precedents in tonal works such as fugues by Bach (BWV 548) and Shostakovich (24 Preludes and Fugues, Op. 87, no. 15).[1]

Discrete Segments and "Derived" Rows

The alternative segmentation method is to look at the discrete (non-overlapping) parts of a row. This is perhaps the most common way of thinking about row forms. Given this constraint, a twelve-tone row can be divided into six dyads, four trichords, three tetrachords, or two hexachords. The fact that there are so many of these options is a property of the number 12 and one of the benefits of having a 12-based system.

In turning from overlapping to discrete segments, we also tend to turn our attention from considerations of "all" to "only." Specifically, it has been a preoccupation of some serial composers to find and use row forms featuring several instances of only one pitch class set.

Example 2 is a classic example from Anton Webern's String Quartet, Op. 28. The brackets below the notes indicate the three discrete tetrachords belonging to the same set class: (0123), a chromatic tetrachord. Slurs above show a similar consistency in the discrete dyads, which are all semitones.

A link to an interactive elements can be found at the bottom of this page.

Example 2. A row from Anton Webern's String Quartet Op. 28, divided into discrete segments. Notice the limited number of set classes and intervals.

Rows with this property are sometimes called derived rows, meaning that the whole row can be considered to be made out of ("derived" from) one pitch-class set. It's worth also noting the more specific use of the term, where a new row with this property is derived more directly from an existing one with the relevant set as one of its subsegments. For instance, the row above might have been derived from another row that happened to have a (0123) subsegment in it.

From a compositional and listener-oriented perspective, derived rows are very suggestive. Because the set-class content of a row doesn't change when it's transposed, inverted, etc., these set classes will circulate constantly throughout a piece, even as different row forms are used. Therefore, a derived row guarantees the regular recurrence of set classes, which can be helpful in cultivating a particular type of unity.

(Segmental) Invariance

Invariance refers to the preservation of something. Any musical attribute (such as a series of intervals, dynamics, rhythms, or pitches) may be kept the same from one context to another. While other parts of the music change, the aspect in question is not varied: hence the term "invariant." In twelve-tone theory, we are mostly concerned with intervallic invariance and pitch-class segmental invariance. The first type, intervallic invariance, is very common. Any time a row is transposed, the ordered intervallic content of the row is unchanged. (Likewise, retrograde inversion creates retrograde intervallic invariance.)

Segmental invariance is rarer and warrants separate comment here. Where a pitch-class segment of a row remains in place when that row is transformed, we say that the segment is "held invariant" (Example 3). The upper staff reproduces the row as we saw it in Example 2 (with the discrete tetrachords shown), and the lower staff sets out the same row transposed up four semitones (or, equivalently, down eight), i.e., as P_4. Notice that these two different rows (P_0 and P_4) comprise the same tetrachords, not only in terms of set class, but in terms of absolute pitches:

- The first four pitches of P_0 (the first measure in the example) are the last four pitches of P_4. This is shown in light blue.
- The middle four pitches of P_0 (the second measure in the example) are the first four pitches of P_4. This is shown in red.
- The last four pitches of P_0 (the final measure in the example) are the middle four pitches of P_4. This is shown in navy.

We say that these tetrachords are *invariant segments*. These segments are held invariant because they share the same relationship with one another as that shared between the rows: because the tetrachords are related by T_8, when the whole row is transposed by T_8, those tetrachords are "held invariant." Put another way, when the first tetrachord is transposed up four semitones, it *becomes* the last tetrachord, so the same thing happens when the whole row is transposed by that interval.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Segmental invariance in Anton Webern's String Quartet Op. 28.

To determine when and if a pitch-class segment of a row will be held invariant:

1. Find an equivalent set-class elsewhere in the row. This may be a dyad, trichord, tetrachord, etc.
2. Determine the transpositional or inversional relationship between them.
3. When the row is transposed or inverted by that *same* relationship a segment will be held invariant.

Hexachords

While discussion of derived rows typically focuses on subsegments of three or four notes, the two discrete hexachords of a row (i.e., the two halves, pitches 1–6 and 7–12) have attracted at least as much attention from theorists and composers over the years, not least in terms of hexachordal combinatoriality.

Hexachordal combinatoriality

For a standard twelve-tone row with each pitch stated exactly once, the first hexachord (half) of P_0 complements the second half: they make up the total chromatic collection together. Since the first hexachord of R_0 has the same pitches as the second hexachord of P_0 by definition, we can also observe that the first hexachords of P_0 and R_0 are complementary—giving you the total chromatic collection. This illustrates that we can also find complementary hexachords by comparing two row forms.

By definition, this relation holds between P_0 and R_0, and all other P–R and I–RI pairs (e.g., I_4-RI_4). This "combinatoriality" relation becomes meaningful when it holds between rows related by other transformations, i.e., between a P–P, P–I, or P–RI pair.

Using Milton Babbitt's terminology, we distinguish between two degrees of this relation:

- **Semi-combinatorial** pairs are related by one such transformation: transposition (P–P), inversion (P–I), or retrograde inversion (P–RI).
- **All-combinatorial** pairs are related by each such serial transformation. There are only six distinct rows with this property where this relation holds between the row and transformations of itself. Repertoire examples include the row of Webern's *Symphonie* (as explored further in the next chapter).

(014589): The "magic hexachord"

Just as the properties of some rows have attracted composers, so too have some hexachords. We'll introduce just one "celebrity" hexachord here: set class (014589), the so-called "magic hexachord" (also known as the "hexatonic collection," "hexatonic set class," or "Ode-to-Napoleon hexachord"). This hexachord has the following properties:

- Creates all-combinatorial rows unusually readily, for instance, by transposition in three ways (+/-2 and 6 semitones). Only the whole-tone collection (02468t) exceeds this, with combinatoriality by transposition of any odd-numbered interval.
- Related to the 1:3 "distance model" mode discussed in the Collections chapter.
- Many internal triads: this set contains within it all the pitches of the hexatonic cycle discussed in the neo-Riemannian chapter.
- Has only one possible five-note subset, set class (01458).
- Has only one possible seven-note superset: (0124589), which is the complement of that five-note subset, (01458).
- Used in many pieces, including Webern's *Konzert* (as discussed in the next chapter), Schoenberg's *Ode to Napoleon* (hence one of its names), and works by Maderna and Nono.

"Partially ordered" sets

When is "serial" music not really serial? Surprising as it might seem, the answer is "often." In the strict sense that twelve-tone music is supposed to be consistently based on a fixed succession of the twelve pitches in a simple (transposed and/or inverted) version of a referential row, much of what we call "serial" music doesn't actually work like that.

A key example of this is the idea of a "partially ordered" set (another term borrowed from mathematics), which gives us a more flexible constraint than all twelve pitches being in a fixed order. Derived rows provide a good introduction to this situation. As we've seen, derived rows comprise one context in which we focus on the constituent segments (tetrachords, for instance) of a row and their set class. It's a small step from this to a "row" that is defined more by the content of those segments than by any specific ordering.

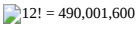
Example 4 shows Webern's Op. 28 row one more time (upper staff), and it creates a new row by reversing each pair of pitches (lower staff). The second case has the same dyadic and tetrachordal segments as the first, but the internal order of those segments has changed. By definition, we still have a row with all twelve pitches, but a different one.

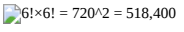
A link to an interactive elements can be found at the bottom of this page.

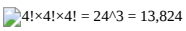
Example 4. Partially re-ordered row created from Anton Webern's row in String Quartet, Op. 28.

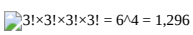
We provide the Webern example for illustration; really, this is a concept introduced later, by Milton Babbitt, and the kinds of re-ordering can get a lot more complex. While this practice clearly deviates from the "strict" definition of twelve pitches in a fixed order, what they share is a constant turning over of the total chromatic collection (aggregate). Moreover, even in "strict" serialism, composers still use chords (several pitches sounding at once), which necessitates thinking more in the partially ordered sense than in the strictly serial sense. In short, at least some form of this thinking is very, very common indeed.

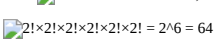
Finally, how significant is it for rows to be related by partial ordering? First, recall that there are hundreds of millions of different orderings of the twelve pitches. Well, there are fewer when you fix the hexachords in place (and fewer still for smaller subsegments), but still a lot! Here are some numbers:

- Any ordering of the 12 pitches: 

- Hexachords fixed: 

- Tetrachords fixed: 

- Trichords fixed: 

- Dyads fixed: 

So this alone might be considered weak grounds for meaningful relation between row forms, especially as the interval content changes with each pitch permutation. As so often in analysis, it all comes down to how the composer actually uses the property in practice.

Other Special Types of Row Forms

This chapter has surveyed only a few of the many row properties that composers have explored. We end simply with a short list of some others, as a nod to the huge range out there.

Symmetrical interval progressions: While a strictly symmetrical succession of *pitches* is obviously not possible (given that we don't repeat pitches within the row), a symmetrical succession of *intervals* is, and rows with this property are popular among some composers.

"Cyclic series" rows (George Perle): This term and property refer to rows in which the pairs of notes separated by one all form the same interval, i.e., the interval between pitches 1 and 3 is the same as that between 2 and 4, and so on.

Rows with more or fewer than twelve notes: Some composers have explored serial processes with tone rows longer or shorter than twelve notes. Clearly this leads to slightly different properties (e.g., repeating notes in the case of rows with more than twelve notes), but the compositional processes and priorities can be the same. And as we noted at the start of this section, "serial" thought is not limited to twelve-tone thinking anyway. Examples include:

Ruth Crawford Seeger, *Diaphonic Suite No. 1:*	7–9–8–11–0–5–1–7 (9 notes)
Ruth Crawford Seeger, String Quartet:	2–4–5–3–6–9–8–7–1–0 (10 notes)
Elizabeth Lutyens, *Requiescat In Memoriam Igor Stravinsky:*	6–8–4–2–11–0–3–1–5–7–10 (11 notes)
Elizabeth Lutyens, *Chamber Concerto*, Op. 8, no. 1, mvmt. I:	3–2–5–6–11–0–7–1–9–10–2–6–8–5–4 (15 notes)

Assignments

1. Head to the Twelve-Tone Anthology and pick any row listed in the sections on derived rows (e.g., "6x Same Dyad (interval)" or "4x Same Trichord").
   - Write out the full row in musical notation.
   - Put slur lines over each repeated segment (e.g., 4 x 3 notes in the "4x Same Trichord").
   - Separately (e.g., below), write out those subsegments as chords.

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1. That the wedge is the subject of a fugue in both these cases, and therefore a central focus, recurring frequently throughout, perhaps strengthens the connection. 9.03: Row Properties#return-footnote-755-1

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9.4: Analysis Examples – Webern Op. 21 and 24

Key Takeaways

- When approaching twelve-tone music, it's easy to get bogged down simply identifying row forms and lose sight of the bigger picture.
  - A list of row forms used in a twelve-tone work is similar to a list of keys in a tonal work—useful, but not enough on its own to be called an analysis.
- This chapter considers two iconic works of early twelve-tone music – Webern's Op. 21 and Op. 24 – with analysis of both the
  - technical details of constructing symmetrical row and composing serial canons, with
  - wider issues about the work to consider, such as the meaning of a "Symphony" and "Concerto" in this context.
- Scores may be found on IMSLP.org (Op. 21; Op. 24)

Webern: *Symphonie* Op. 21 (1928)

Even the title of Anton Webern's Symphonie Op. 21 raises questions. Why would Webern choose to call this a symphony? If we think of a symphony as having certain types of key relations, then is an atonal symphony an oxymoron? Commentators have a range of reactions to this question:

- "in choosing the most resonant of classical titles Webern stressed the extent to which it could still be relevant to a work in which only certain structural principles remain valid." (Whittall 1977, 163).
- "There is little or nothing in its formal procedures to compare with those of the traditional symphony." (Taruskin 2010, 728).

Keep these questions in mind as we consider the nuts and bolts of the work.

Row form

A link to an interactive elements can be found at the bottom of this page.

Example 1. The row of Op. 21, along with the trichordal and hexachordal divisions.

Webern frequently chooses what you might think of as "neat" row forms, and this work is no exception (see Example 1). The row breaks up neatly into two equivalent hexachords that are instances not simply of the same pitch-class set but of set 6-1 specifically: half a chromatic scale. In short, each fills the total chromatic collection of half the twelve-tone space.

Further, those hexachords are each set out with one instance of trichord (013) and one of (014). Altogether, the four trichord cells map out as (013), (014), (014), (013). These two trichords are further linked by their shared melodic shape: each involves a third (major or minor) and a semitone.

Here is the row matrix, with the symmetry of P_0 and R_6 highlighted by showing the first six notes of each in bold. [1]

	I_0	I_9	I_{10}	I_{11}	I_7	I_8	I_2	I_1	I_5	I_4	I_3	I_6	
P_0	**9**	**6**	**7**	**8**	**4**	**5**	11	10	2	1	0	3	R_0
P_3	0	9	10	11	7	8	2	1	5	4	3	6	R_3
P_2	11	8	9	10	6	7	1	0	4	3	2	5	R_2
P_1	10	7	8	9	5	6	0	11	3	2	1	4	R_1
P_5	2	11	0	1	9	10	4	3	7	6	5	8	R_5
P_4	1	10	11	0	8	9	3	2	6	5	4	7	R_4
P_{10}	7	4	5	6	2	3	9	8	0	11	10	1	R_{10}
P_{11}	8	5	6	7	3	4	10	9	1	0	11	2	R_{11}
P_7	4	1	2	3	11	0	6	5	9	8	7	10	R_7
P_8	5	2	3	4	0	1	7	6	10	9	8	11	R_8

P_9	6	3	4	5	1	2	8	7	11	10	9	0	R_9
P_6	3	0	1	2	10	11	**5**	**4**	**8**	**7**	**6**	**9**	$\mathbf{R_6}$
	RI_0	RI_9	RI_{10}	RI_{11}	RI_7	RI_8	RI_2	RI_1	RI_5	RI_4	RI_3	RI_6	

Example 2. Row matrix for Op. 21.

Overall, the row is retrograde equivalent, which is to say, if you play it backwards (R), you have a transposed version of the original (P). When we have equivalences of this kind, there are no longer 48 distinct row forms. Here we have pairs of equivalent rows, and so there are 24 distinct forms (48 divided by 2).

Webern brings out this symmetrical row by overlapping the ends of row forms with the beginning of the next.

Movement 1

Webern describes the first movement as a "double canon in contrary motion," where "contrary motion" means the same thing as "inversion." You could think of the overall form as ‖:A:‖:BA′:‖ as follows:

- **A**: From m. 1 to the double bar (mm. 23-25).
- **B**: palindromic: m. 35 as the midpoint of mm. 25–43 in the clarinet (or mm. 26–42 in the cello).
- **A′**: "row recapitulation" from m. 43 (rows only, not motivic rhythm, etc.).

Does that remind you of something symphonic? The repeat markings and the material distribution are loosely suggestive of the Exposition and Development–Recapitulation repeats in sonata form works, or at least rounded binary.

So that might be chalked up in favor of the symphonic reading. On the other hand, the extensive symmetry of the row doesn't end there. Bailey (1991, 96) has described the middle section especially as a symmetrical "tour de force." Recapitulations and cyclic forms are one thing, but for Western classical music, serious adherence to symmetry is a peculiarly 20th-century concept. Speaking about a chordal version of this issue, the British composer Jonathan Harvey once described the symmetrical strategy of moving the bass into the middle as "our revolution" (1982, 2).

Another key consideration at odds with the notion of sonata form is the extensive canons in each section. For instance, in the opening, there's a double canon between pairs of parts (P_0 and I_0; I_8 and P_4) as follows:

[table id=82 /]

Example 3. Canons in the beginning of Op. 21.

Notice the similar timbral sequences in the two pairs. For instance, in the first pair, we have a horn part, then a clarinet part, and finally a lower string instrument before returning symmetrically back the way we came. Breaking up the melodic line in this way is sometimes called *Klangfarbenmelodie* (sound-color melody) and is not unique to the atonalists. Mahler loved to share out melodies this way, for instance (see Orchestration). Perhaps Webern's most iconic example of this technique is his orchestration of J.S. Bach's Ricercar from the *Musical Offering*.

Movement 2: Variations; a double canon with retrograde

With the second movement, there's no disputing the title: "Variations" is certainly apt, and the structure is brought out in typically Webernian fashion using all the parameters. Here's a brief synopsis in note form of what's going on:

Theme (related to the coda)

- Measures 1–11.
- Phrases divide into two groupings of 5.5 + 5.5 measures; m. 6 is the midpoint.
- Row I_8 is in the clarinet; I_2 in the other parts.
- Uses hexachordal combinatoriality.

Variation 1 (related to variation 7)

- Measures 11–23; beginning elides with the theme.
- A double canon at the quarter note: violin 1 pairs up with cello; violin 2 with viola.
- Across those pairs, violin 1 (I_3) is R-related to violin 2 (I_9); the viola (P_7) is likewise R-related to cello (P_1).

- Phrases divide into 6 + 6 measures; the midpoint is m. 17 for the violins, m. 18 for the viola and cello. The violins swap rows, as do the viola and cello.
- The ending elides with variation 2.

Variation 2 (related to variation 6)

- Measures 23–34.
- Phrases divide into 6 + 6 measures (midpoint at m. 29).
- However, there is a free third part (horn 1). The on-beats play P_8 while the off-beats play I_7, so the eighth notes are alternating between the two rows.
- The ending elides with variation 3.

Variation 3 (related to variation 5)

- Measures 34–44.
- Phrases divide into 1 + 4 + 1 + 4 + 1 measures; midpoint in m. 39.
- Symmetrical melodic figure in each part, and sixteenth-note motion.

Variation 4

- Measures 45–55.
- Webern himself describes this variation as the midpoint of the movement.
- Phrases divide into 5 + 1 + 5; m. 50 is the midpoint.

Variation 5 (related to variation 3)

- Measures 56–67.
- Pitches are presented in four-note cells:
  - Viola, cello: [5, 6, 7, 8]
  - Violins: [11, 0, 1, 2]
  - Harp: [3, 4, 10, 9]
- These four-note cells create a twelve-tone aggregate, but the composition is not row-based.
- Each part has a symmetrical melodic figure.

Variation 6 (related to variation 2)

- Measures 67–77.
- Canon at the quarter note between the bass clarinet and clarinet parts.
- Free third part (horn 1), the retrograde of the free part in Variation 2.
- Midpoint in m. 73.

Variation 7 (related to variation 1)

- Measures 78–88.
- Triple canon: cello/violin 1, viola/violin 2, and clarinet/bass clarinet. Each line of the three canons is distinguished by timbre and rhythm.
- Midpoint in m. 83.

Coda (related to the theme)

- Measures 89–99.
- Phrases are divided into 5.5 + 5.5 measures, with m. 94 as the midpoint.

Issues

You'll have noticed some recurring themes in the analysis above; perhaps the most all-pervasive among them is the symmetry Webern adopts from the internal structure of the row, right up to the organization of whole movements.

Does this make it thoroughly modern? Or does the symmetry contribute to a new kind of goal-directed (teleological) music typical since at least Beethoven? How do we feel about the occasional direct historical precedent like the entirely symmetrical Minuet and Trio in Haydn's 47th symphony?

Most importantly, what is the aural effect of all this symmetry? Did the Harvey quote above make you bristle? There are reasons based in acoustics for why composers have historically tended to build up chords from the actual bass after all. Similarly, we can't really "hear" linear symmetry (hear in reverse) the same way that we can see symmetry in a painting, for instance. That said, Webern has gone to considerable lengths (at least in places) to illuminate the structure of the work. For Cook, "everything [in the Symphonie] is designed to make the series audible" (1987, 295).

Perhaps we should consider this alongside other 20th-century "symphonies with a twist." Think of Stravinsky's many "Symphonies" ("in C," "of Psalms," "of Winds"), none of them numbered in the traditional way. If nothing else, these works seem to speak of a conviction to the musical traditions these composers inherited, just as Schoenberg was so keen to locate his apparently radical, modernist works in that tradition, and particularly as heir to the work of Brahms.

Webern: *Konzert* Op. 24 (1934)

Webern's *Konzert* (Concerto) raises many of the same technical and wider musical issues as the Symphonie. It has a similarly "neat" row (Example 4), and a similarly suggestive title, apparently alluding to a long-standing musical tradition.

The row

A link to an interactive elements can be found at the bottom of this page.

Example 4. The row of Webern's Konzert (Op. 24) along with the trichordal and hexachordal divisions.

Once again, we have two equal hexachords of set class (014589) and a meaningful division into four trichords. This time, those trichords are all instances of the same set class: (014). This structural division is made abundantly clear in the first few measures, in which the row is set out in its four parts in separate instruments, pulse values, and registers. This is followed by a rest in all instruments. You couldn't hope to a see a clearer row "exposition."

But that's not all. If you permute the order of those trichord cells, you can get other, related row forms:

- Obviously, reversing the order of the cells can give you a P/R pair of rows (P = 1234; R = 4321).
- Additionally in this case, the order 2143 gives you an I row, and so the reverse of that (3412) is an RI row.

That being the case, we have a set of four equivalent rows, and thus only twelve distinct row forms this time. For instance, P_0 is the same as RI_7 starting that rotation from the seventh note, as shown by the bold in the matrix below. This all amounts to a particularly clear and determined level of coherence.

Example 5 gives the row matrix. Again (and perhaps more surprisingly this time) this arrangement does not correspond to the allocation of P_0 by Webern in the sketches.

	I_0	I_{11}	I_3	I_4	I_8	I_7	I_9	I_5	I_6	I_1	I_2	I_{10}	
P_0	**11**	**8**	**2**	**3**	**7**	**6**	8	4	5	0	1	9	R_0
P_1	0	11	3	4	8	**7**	9	5	6	1	2	10	R_1
P_9	8	7	11	0	4	**3**	5	1	2	9	10	6	R_9
P_8	7	6	10	11	3	**2**	4	0	1	8	9	5	R_8
P_4	3	2	6	7	11	**10**	0	8	9	4	5	1	R_4
P_5	4	3	7	8	0	**11**	1	9	10	5	6	2	R_5
P_3	2	1	5	6	10	9	11	7	8	3	4	0	R_3
P_7	6	5	9	10	2	1	3	11	0	7	8	4	R_7
P_6	5	4	8	9	1	0	2	10	11	6	7	3	R_6
P_{11}	10	9	1	2	6	5	7	3	4	11	0	8	R_{11}
P_{10}	9	8	0	1	5	4	6	2	3	10	11	7	R_{10}
P_2	1	0	4	5	9	8	10	6	7	2	3	11	R_2

	RI_0	RI_{11}	RI_3	RI_4	RI_8	RI_7	RI_9	RI_5	RI_6	RI_1	RI_2	RI_{10}

Example 5. Row matrix for Op. 24.

Cell

Each cell can also be understood as an *ordered* trichord, like a miniature three-note row. Each iteration of the cell involves interval class 4 and interval class 1 in opposite directions. Across the four iterations in a row, we get each of the four ways of setting this out. In the case of P_0, this involves <−1, +4>, <+4, −1>, <−4, +1>, and <+1, −4>.

That being the case (and at the risk of confusing matters), we could think of the P, R, I, and RI versions not just of each row, but of each cell. Continuing to work on the basis of P_0, we have:

1. P: <−1, +4>
2. RI: <+4, −1>
3. R: <−4, +1>
4. I: <+1, −4>

In this way, each cell is related to every other as shown in Example 6:

[table id=83 /]

Example 6. Relationships between ordered trichords in the row for Op. 24.

It's hardly surprising given all of this that Webern was a fan of the "Sator Square": a two-dimensional Latin palindrome that can be read in any direction and still make sense (Example 7).

S	A	T	O	R
A	R	E	P	O
T	E	N	E	T
O	P	E	R	A
R	O	T	A	S

Example 7. The Sator Square.

That all said, the four-trichord approach is not the only way of using the row. It's focal in the first movement, while the second movement primarily employs cells of two and four notes, highlighting interval class 1 (usually set out as a major seventh).

Discussion

Once again, we have the looming question of a tradition with highly codified expectations. What kind of concerto might this be? The idea of a piano concerto finds some support in the distribution of row forms across the work. For instance, that first exposition of the row falls to instruments other than the piano, and then there's the full-ensemble rest and a second exposition of the row on the piano alone. Conceptually at least, this is a neat fit for the double exposition of concerto first movements—one of the main hallmarks by which sonata form in concertos differs from other contexts.

Are we clutching at straws on the basis of just two statements of the row? Maybe, but then again, Webern is no stranger to the practice of cultivating comparable processes on the very small and large scale, so it's worth paying attention to these kinds of clues as possible "statements of intention" in the same way that we should take notice of the first highly chromatic event in a Schubert sonata.

In this work, the relationship between piano and orchestra continues to reward analytical attention. After those first few measures, the first major section of the movement moves from that initial clear, *successive* separation of piano from ensemble to a situation where they remain separate in terms of row forms, but sound *simultaneously*. You can analyze the whole work in terms of this relation, and there are many moments where there appears to be both a structural boundary and a change in the relation between piano and ensemble. Examples include the separation in m. 50 and rejoining in m. 63.

Even if you find this line of reasoning compelling, you still face choices at every turn. For instance, you may see the piano's ubiquity in the slower, quieter second movement (highly reminiscent of the traditional second movement) as a lyrical, dominant,

soloistic part, or the opposite – in an accompanimental role. Alternatively, if you reject all of this in favor of an equality among the instruments (matching the equality among the tones, perhaps), then you may find more palatable the idea of reading this as a Concerto for Orchestra?

As with all music, there's more than one way to look at this piece, and as with all analysis, we're much more concerned with a view ("a way" of understanding the work) than trying to find comprehensive solution ("the way"). In short, the analysis of twelve-tone music is just like other forms of analysis: understanding the technical elements is necessary but not sufficient, and there's always plenty of room for creative vitality.

Further Reading

- Bailey, Kathryn. 1991. *Twelve-Note Music of Anton Webern: Old Forms in a New Language*. Cambridge: Cambridge University Press.
- Cook, Nicholas. 1987. *A Guide to Musical Analysis*. London: Dent.
- Harvey, Jonathan. 1982. "Reflection after Composition." *Tempo*, no. 140, 2–4.
- Taruskin, Richard. 2010. "In Search of Utopia." In *Music in the Early Twentieth Century*, chapter 12. New York: Oxford University Press. www.oxfordwesternmusic.com/v...iv1-012010.xml
- Whittall, Arnold. 1977. *Music since the First World War*. New York: Oxford University Press.

Assignments

- Try your own analysis of another work from this time, such as Webern's *Variations for piano*, Op. 27, using a similar combination of technical row analysis with contextual discussion.

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1. Note that this is sometimes set out in an alternative format, with P and I the other way around. Bailey (1991, appendix II) after Webern's sketches uses this alternative format. These kinds of decisions are often not clearly "better" one way or the other. 9.04: Analysis Examples Webern Op. 21 and 24#return-footnote-758-1

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9.5: History and Context of Serialism

Key Takeaways

Serialism is much discussed and anthologized; in addition to all of the technical and analytical details, it's worth taking a moment at the end of this section to consider:

- where it came from: not only Schoenberg, but also Hauer and others
- what it's "really" about: a new world order, and if so an equalising or totalising one?
- tonal precedents in Bach and Haydn, and "tonal tone rows" in (for example) Alban Berg, Hale Smith, and Benjamin Britten
- "total" or "integral" serialism in (for example) Ruth Crawford Seeger, Milton Babbitt, Olivier Messiaen, Karlheinz Stockhausen, Pierre Boulez.

Why Serialism? What's the Attraction?

Some grand narratives of 20th-century music cast atonality as a logical consequence of a historical trend toward ever more chromaticism, and serialism as a matter of creating a radically different kind of structure out of the total chromatic. It would appear to achieve that end, at least for composers who joined Schoenberg in viewing it as a "method of composing with twelve tones which are related only with one another" (1950, 107)—contrast that with the fundamentally hierarchical tonal system. It may not be coincidental that it emerged in interwar Europe, when there may well have been a desire to start anew.

Equal tones? A new world order? Maybe, but the method has served a wide range of composers with correspondingly diverse aims, so it's not so straightforward to summarize. There's also a totalizing angle here that's rather less utopian. Schoenberg is famously alleged to have described "his" discovery as one "which will ensure the supremacy of German music for the next hundred years" (qtd. in Stuckenschmidt 1977, 277). Schoenberg may or may not have actually said this, but Boulez definitely did later describe every composer to have remained "outside the serial experiments" since their discovery as "useless" ("Schönberg est mort," *Score*, 1952, reproduced in *Notes of an Apprenticeship*, 1968, 274).

A Series of Precedents?

There is a great deal of precedent for general forms of musical thinking pertinent to serial technique, from simple melodic inversion to furiously complex crab canons, and certain works like Bach's *Art of Fugue* are notable partly for the strictness and comprehensiveness of design in general, and the healthy dose of "mirror writing" in particular.

In these cases, the mirror is usually "horizontal," giving versions of the twelve-tone technique's I-form. The R-form of retrograde symmetry (given by a "vertical" mirror, if you will) is a primarily 20th-century concern, serial and otherwise. Non-serial 20th-century examples include a great deal of Bartók, the prelude/postlude pair in Hindemith's *Ludus Tonalis*, and Britten's *Cantata Academica* mvt. 2 (tellingly titled *Alla rovescio*). There are earlier examples, such as the *Menuet al Roverso* from Haydn's Symphony no. 47 in G, but they are very rare.

There are (equally rare and also rather dubious) cases of tonal works that are said to exhibit the specifically twelve-tone practice of rotating through all the pitches. Often-cited examples include the choice of keys in the development of the finale to Mozart's Symphony no. 40.

Conversely, there are 20th-century composers who wrote music that is serially organized in the sense that we would recognize, but in such a way as to embrace the sound world of an extended tonality (Example 1). Examples of this include:

- **Alban Berg's *Violin Concerto***, with its row centered on triads and fifths.
- **Hale Smith's *Evocation***, which the composer notes to have an "affinity" with jazz. Among the "jazzy" and/or "tonal" elements of this piece is the foregrounding of set [0,2,7], which the scholar Horace J. Maxile Jr. links to "the quartal harmonic and improvisational stylings of bop and post-bop schools" (2004, 125).
- **Benjamin Britten's *Turn of the Screw***, which adopts a similarly quartal structure in the row from which both the theme and tonal centers for the acts are serially organized.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Tonal Tone Rows by FourScoreAndMore

Speaking of "tonal serialism," the trappings of tonality are not limited to pitch: what composers do with the other parameters is equally important. It's often observed (usually critically) that Schoenberg's early serial works may have used the twelve-tone

technique in the pitch domain, but still adopted tonal forms, rhythms, and idioms such as waltzes.

The Emergence and Evolution of the Twelve-Tone Technique

Schoenberg is intimately associated with the twelve-tone technique and was quite content to describe it as "his" discovery (as above), though many people arrived at the idea largely independently around the same time, notably including Josef Matthias Hauer and Herbert Eimert. Schoenberg famously discussed relevant considerations like the "emancipation of the dissonance" early on, but his thoughts on serialism only emerged later, after those two others.

Hauer's theory as expressed in his *Zwölftontechnik: Die Lehre von den Tropen* (1926) is notable for its early formalization of the twelve-tone technique and for organizing the millions of possibilities into 44 "tropes" (types) of tone rows in four groups based on symmetries among the unordered hexachords (with the prefixes Poly-, Mono-, Endo-, and Exo-).

After the first generation of "classic" serialists, we start to see a wider range of serial practices emerge, including a move toward "integral" or "total" serialism, which applies serial technique to parameters other than pitch, particularly rhythm, dynamics, and articulation. I say "after," but Ruth Crawford Seeger was already writing what later came to be known as integral or total serialism as early as c. 1930.

The most frequently cited examples came later, in a burst around 1950:

- Milton Babbitt: *Three Compositions for Piano* (1947)
- Olivier Messiaen: *Mode de valeurs et d'intensités for piano* (1949–50)
- Karlheinz Stockhausen: *Kreuzspiel* for oboe, bass clarinet, piano, and two percussion (1951)
- Pierre Boulez: *Structures 1* for two pianos (1952)

There were also signs of this mentality already in those "classic" early works. For instance, in the first movement of Webern's Symphonie Op.21 (discussed further in this chapter), the exposition sees pitch classes fixed in specific registers, and his Op. 27 *Variations for Piano* has pitches, durations, and dynamics all aligned (for instance, B and G♯ are always eight notes, legato, and forte).

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CHAPTER OVERVIEW

Chapter 10: Orchestration

10.1: Core Principles of Orchestration

10.2: Subtle Color Changes

10.3: Transcription from Piano

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10.1: Core Principles of Orchestration

Key Takeaways

We begin by thinking of orchestration very simply in terms of how to combine elements, both:

- “simultaneously” (or “vertically” if you prefer) for voicing chords, doubling melody lines, and handling texture;
- “successively” (or “horizontally”) for effects like orchestral crescendos.

Simultaneous (Vertical) Combinations

To b(lend) or not to b(lend) … that is the question … for “simultaneous” orchestration. For most tonal orchestrators, the default answer is a very clear “yes, blend!”

Voicing chords

As a rule of thumb for tutti orchestration, blend by treating each section as if it were self-contained. This applies to the large sections (winds, brass, strings), and often also to the smaller sub-sections (e.g., flutes) in the case of larger orchestras where there are greater numbers of each. For each section, follow the principles you learned in four-part writing. That’s right, **the principles you’ve already learned about chordal writing still apply.** Specifically, you’ll need to consider:

- The inclusion of all (or at least the most important) harmonic pitches.
- The number and prominence of each pitch, including avoiding the overdoubling of the third in a triad.
- The gaps between voices:
  - We now see the densest packing in the middle.
  - Continue to use larger gaps in the bass register (e.g., the octaves given by cello and double bass notated on the same pitch but sounding an octave apart).
  - Continue to use smaller gaps higher up in the treble clef range.
  - We tend to see more activity in the very highest registers in orchestral scores than in most other contexts; it’s usually best to return to wider spacing in those highest registers.

We have terminology for the different types of chord spacing as summarized in Example 1:

Example 1. Chord spacing types.

Context determines the best choice among these. For a blended sound, we often use integrated “interlocking” voicing, taking care to balance the different strengths of each instrument according to the register; conversely, to achieve a different color for each note, use wider spacing. [1]

Doubling lines

The approach to blending in doubling lines again involves finding a compatible balance of (equally strong) instruments and registers. The second part (m.1 4ff.) of Mozart 40/iii is effectively a two-part invention and an intriguing example of blended, balanced lines. Both of the two parts are played in each of the three octaves, and by both winds and strings.

Mozart 40 iii

As always, this default is not a law like that of gravity in physics; composers will diverge from this blended practice for creative and compositional effect in just the same way that they do with any other parameter. Perhaps the most famous example of an odd doubling is provided by Schubert 8/i. The first theme (m. 13) sees the extraordinary doubling of a single oboe and clarinet in unison. While some commentators have seen this as an error, it’s probably deliberate on Schubert’s part as a way of creating an unsettled feel that entirely befits the mood of the music. It also contrasts with a second theme (reh. A, m. 42): a cello theme accompanied by the optimally blended viola and clarinet in thirds.

Schubert 8 i

Texture

The choice of instruments, register, and more can help support and define the wider texture. For instance:

- Polyphonic writing: Tends to see instruments and groups balanced and blended. Examples include fugues and the Mozart invention just discussed.
- Melody and accompaniment: Foregrounds the melodic instrument by placing it in its best range, often at the top of the texture (as in other contexts), and with other accompanimental parts contrasting in:
  - Timbre, accompanying a solo woodwind line by full strings, for instance.
  - Register (as discussed).
  - Texture, with less or a different kind of rhythmic activity. This is similar to the kind of complementary rhythmic patterns you often find in polyphonic music: in both cases, we're trying to have more than one element at once, but keep them noticeably distinct.

Successive (Horizontal) Combinations

We'll look here at forms of succession on two timescales: at the level of individual notes (small scale) and of whole sections (large scale).

Firstly, once again, **everything you've learned about voice-leading still applies**. (Yes, this will be a recurring mantra.) Most of the time, it will be eminently possible to reduce apparently complex orchestral scores down to a two-, three-, or four-part texture with clear and consistent doublings and with "correct" voice-leading.

In handling successive sections, antiphony is a highly favored method for distributing material, creating timbral variety, and articulating the form. This can take the form of whole blocks of material being passed from strings to winds (common in early orchestral scores of the Baroque era), or of more subtle effects. For instance, look at the first page of "In the Hall of the Mountain King" from Grieg's *Peer Gynt* suite:

Grieg Mountain King

At the repeat of the tune, the only variation is antiphony (strings-to-winds). The material (both tune and accompaniment) and register are identical. Later, this strings-to-winds principle continues to the upper voices as the register expands upward. Let's take a closer look at that crescendo.

Crescendos

We have a range of tools at our disposal for achieving an effective orchestral crescendo. Apart from mere dynamic markings, we can:

- **Add instruments**, often moving from the "lightest" to "heaviest" instruments: broadly, strings-wind-brass-percussion (e.g., Grieg rehearsal mark A).
- **Expand the overall range**, often upward from the bass or outward from the center (e.g., Grieg rehearsal marks A and B).
- **Diversify the note values used**, adding sustained, longer notes and/or tremolo, shorter ones, perhaps through note repetitions (e.g., Grieg rehearsal mark B).

Take a look at rehearsal mark B in the Grieg, and notice the:

- **Forces and register:** We now have the full orchestral and full register in use except for one instrument, the piccolo, which is reserved for the top C♯, four measures later. The piccolo is removed at rehearsal mark C and reintroduced at rehearsal mark D for a similar effect. Likewise, the final page briefly removes the bass for the *piano* passage before the final ***fff*** chord.
- **Wider range of note values:** The accompanimental figure (16th-16th-8th on the weak beats), first introduced by the viola part at rehearsal mark A, has now become focal, adding rhythmic density to the score. This is further enhanced by the upper strings playing the theme with repeated (sixteenth) notes and the timpani roll. Conversely, the horns introduce longer (half) notes, lending a more sustained sound to the previously staccato accompaniment.

As an aside, it's worth noting that moving from lightest to heaviest instruments (strings-winds-brass-percussion) is related to overall playing time: the strings generally play the most, the percussion the least. This is partly for pragmatic reasons: brass players would keel over from exhaustion if you had them play the string parts—there's just too much playing time and not enough resting time in between. You'll find that the best choices for pragmatic reasons and musical ones often go together in this way.

Holding a timbre back for effect

Percussion parts are the clearest indication of the practice of holding a timbre back for effect. One of the essential skills of the percussionist is being able to count hundreds of measures of rest and then come in with a bang at the crucial, climatic moment. Here's an extract from the triangle part for Mahler 4/iii. At reh. 12, a crash cymbal marks the moment of arrival, and the triangle leads a glorious texture, full of all the rich effects described above (register, texture, sustain, and note density). The triangle is one of those instruments that can be pretty well guaranteed to cut through most any texture and make an impact. The glockenspiel and piccolo are also good in this role.

Mahler 4 iii Triangle

Mahler 4 iii, reh.12

This holding back of a timbre is very often for loud and/or climactic moments, but not always. For instance, reserving an entirely new sound until near the end of a work can be extremely effective. Perhaps the most iconic example is to be found in Debussy's *Prélude à l'après-midi d'un faune*, where the antique cymbal is not used until near the end. (This is a "new" sonority for the piece, and even for Western audiences of the time.) The crucial moment comes at reh. 10, (8'56" in the following recording), but clearly the effect depends on listening to the wider context.

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=771

Dovetailing parts

Finally, in an approach somewhat complementary to antiphony, orchestrators will often "dovetail" parts: share a continuous line out between different voices. This can be:

- related to antiphony (the melodic line moves from part to part)
- or the opposite: ensuring continuity/cohesion within a line on instruments for which that would be impractical
- tailored in subtle ways to demarcate a rhythm

Take a look at Smetana's *Vltava* to this effect:

- At the opening, the flutes dovetail, overlapping by one note on the downbeat. This is easy to play, and it allows them to share the long line. It could be more seamless, though, by slurring onto the downbeat, rather than separating that note with a staccato. The resultant effect is of a fluid line, but with the beats clearly demarcated.
- When the clarinets enter, we have dovetailing both within and between those subsections: the flute continues as before, the clarinets follow suit, and this leads to further pairs of Fl.1 + Cl.2 and Cl.1, Fl.2.
- The strings take a different approach at their entrance at m. 36. The line continues to be shared out among the string parts, but the groupings break it up into clear 6+3+3 (2+1+1) rhythms. This follows a period of syncopated accents in the winds.

This gives some sense of how much variety can be achieved within the simple dovetail pattern. It can get even more detailed, as in the following passage from Rachmaninoff 3/ii (reh. 42). The example shows the dense dovetailing among the oboes, bassoons, and violin parts. (Click here for scores on IMSLP to see this accompaniment in context). This rhythm saturates the four options: every sixteenth sees the entry of one part. It is both:

- *dovetailed within* the wind and string sections without overlap: i.e., one or other part is always playing, but never both (oboes or bassoons; violins 1 or violins 2)

- and *dovetailed between* those sections with winds patterns starting on the 2nd and 4th sixteenths, and violins starting on the 1st and 3rd (after the first beat).

The texture makes great use of the resources at hand, sparkles with detail, and gives the players interesting parts to think about (an important and easily overlooked consideration).

A link to an interactive elements can be found at the bottom of this page.

Symphony No.3, Op.44 – Sergei Rachmaninoff by openmusictheory

Assignments

1. Dovetailing: transcribe the sixteenth-notes part (piano right hand) of Louise Reichardt's *Unruhiger Schlaf* (12 Gesänge, no. 6) for two clarinets, dovetailing regularly every quarter or half note. A score is available online here and for download here.
2. Look at the extract from Hensel's Overture in C major below. How does the combination of bassoon and 'cello relate to topics discussed in this chapter?

A link to an interactive elements can be found at the bottom of this page.

Overture in C Major – Fanny Hensel by openmusictheory

Further Reading

- For a recent article on this topic (even more recent than this chapter!), see McAdams, Stephen, Meghan Goodchild, and Kit Soden. 2022. 'A Taxonomy of Orchestral Grouping Effects Derived from Principles of Auditory Perception'. *Music Theory Online* 28 (3). https://mtosmt.org/issues/mto.22.28.3/mto.22.28.3.mcadams.html.

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1. For more textbook examples, see Adler (2002, 253); Piston (1955, 396). 10.01: Core Principles of Orchestration#return-footnote-771-1

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10.2: Subtle Color Changes

Key Takeaways

The previous chapter dealt with some important but relatively unsubtle color changes. Here, we hone in on some of the finer methods for making detailed changes of this kind, organizing the chapter around the apparent motivations for these changes, seeking to create:

- a timbral cadence
- a smooth structural boundary;
- an “attack-sustain” (“resonance”) effect
- a seamless orchestral crescendo
- a timbrally nuanced melody

For a timbral cadence

Apart from changing the timbral distribution between sections (after a cadence), some composers make changes for the cadence itself, emphasizing the cadential moment. This is related to the more formal considerations of holding back a timbre discussed in the previous chapter.

Classical-era orchestral composers sometimes used wind parts in this way. Here’s an example from the opening of Mozart’s Piano Concerto K453, movement 3. The strings begin, and the timbral cadences are marked by the addition of winds (highlighted in the example).

Mozart K453

Shostakovich provides some extraordinary 20th-century examples of this device. Consider the end of Shostakovich 11/iii. The outer sections of this movement are effectively one long viola solo, and the timbral addition of unison violins at the end is integral to formalizing the end of the theme. The melodic contour and discontinuation of the countersubject are also contributing, but the harmony is deeply ambiguous. In the following recording, the theme plays from 0’50” and the timbral cadences fall at the ends of the sections (4’50” and 12’40”).

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=781

This device is not unique to orchestral music. For instance, Blink 182 uses the same effect to close verses in the song “I Miss You”: here the timbral cadence is achieved by the addition of the other vocalist (e.g., at 0’55”).

To finesse a structural boundary

Timbral additions can also be used in the opposite sense: to finesse a structural boundary and actively connect the two sections. This is a favored device of Brahms. Brahms 2/iii opens with a gracious oboe theme, and it is the return of the oboe (in tandem with motivic handling and other matters) that finesses the return to the A section at m. 101/107.

Brahms 2 iii

It is the oboe again that Brahms adds to round out the first cadence of Brahms 4/i. (Note also the cello-viola dovetailing here.)

Brahms 4 i

For the “attack-sustain” (“resonance”) effect

One technique beloved of 20th-century composers is the “attack-sustain” or “resonance” effect. Acoustics teaches us that the very start of a note has a very different profile from the rest, and composers seem to be striving for something similar in orchestral writing that casts some instruments in an “attacking” role (shorter notes at the start) and others as “sustain” (longer notes starting together on the same pitches).

Examples abound and are not limited to the 20th century. For instance:

- Mozart: Magic Flute overture. When the brass parts enter, the horns are long, while the trumpets and trombones are short.
- Mozart: Dies Irae (from the Requiem): again, trumpets and drums are short; others long.
- Beethoven: The opening of Symphony 1/i is an iconic example, and not only for the extraordinary harmonies. The winds’ ***fp*** chords achieve the attack-sustain pair on their own, and are enhanced by string pizzicato (attack only).

In the 20th century, Schoenberg’s groundbreaking “Farben” (no. 3 from *Five Orchestral Pieces*) includes this effect (e.g., see the harp at reh. 2), and Britten uses it to magnificent effect in movement iii of the Four Sea Interludes. Play the following example from c. 0’45”.

A Spotify element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=781

Britten uses penetrating instruments for the attacks (including the harp again) and sets the resonance on sustained flute lines, as shown in this small excerpt:

“Attack-sustain” detail from Britten’s *Four Sea Interludes*

(Note the octave transposition of the harp harmonics.) Later in the movement (around reh. 3), the same device appears with xylophone and piccolo on attack, and trumpet sustaining.

This practice is related to the wider device of employing different articulations on doublings of the same melodic line. Clear examples include:

- Debussy: *La Mer* / iii (fig. 55). The oboe has repeated notes; the flute does not.
- Sibelius: *En Saga*: m. 189, (viola pizz. + arco); m. 290 (trumpet staccato with oboe legato), then oboe with viola.

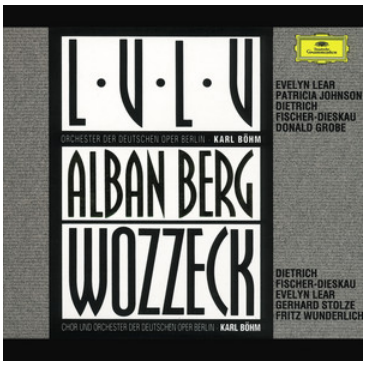
This, in turn, is related to the practice of having string parts play melodies tremolo for loud sections as seen in the Grieg example from the previous chapter.

For a seamless orchestral crescendo

That Grieg example displayed the kind of step-by-step orchestral crescendo that some composers turned into an extremely subtle process. Consider the following example of two extracts from Wagner's *Parsifal*. The melody is in unison, and in both cases, a timbre is added at the top of the crescendo. In both cases, a higher, brighter version of an instrument already in the mix is added. In the second case, this is partly for registral reasons (the oboe replaces the bassoon in a high register); in both cases it transforms the sound, very subtly adding a timbral dimension to mark the moment in question.

Wagner – Parsifal extracts

Once again, it falls to the 20th century to furnish us with the truly iconic example of this process. Listen to this short crescendo from niente from Berg's *Wozzeck* (preferably on good speakers, and having warned the neighbors!). Dramatically, this is the murder scene; musically, it is one huge orchestral crescendo on the pitch B_3. See if you can pick out some of the successively entering instruments, and then scroll down for the answer.



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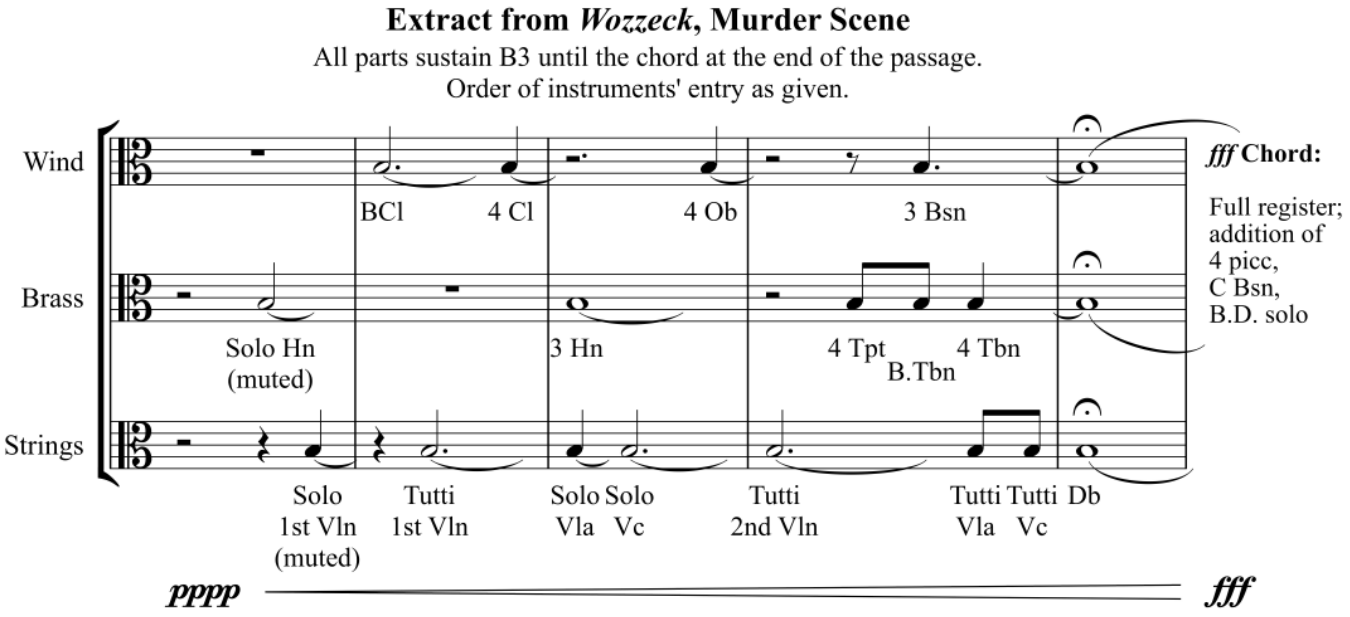
This reduction sets out the process:



Summary of the instrument entrances in the B3 unison of Berg's *Wozzeck*

In a landmark book about sound spectra, Robert Cogan described the beginning of this passage as "almost entirely fundamental": that is, almost a pure sine wave, with strictly minimized upper partials. We begin ***pppp*** with the muted French horn: an entirely appropriate choice in that it has the least spectrally active sound available in the standard symphony orchestra and, partly by

definition, also the most distant one. Not only do the players sit near the back, but their instrument projects the sound backwards, further increasing the distance and ensuring that the majority of the audience hears primarily wall-reflected sound. Between this and the use of a mute, a great deal of high-register spectral content is removed, leaving that nearly pure fundamental. The mute on the solo violin, which is next to enter, has a similar spectral-auditory effect. When the bass clarinet joins the sound, some higher spectra are introduced, though few, as the instrument is high in its range and produces only odd-numbered partials. What follows continues this crescendo not only of sound, but of instrument types and spectral content. Naturally, the heavy brass are last to enter, burnishing the end to this spectral progression with brilliance.

For timbrally nuanced melodies

Finally, many composers since around 1900 have used timbral variation to create a kind of "kaleidoscope" melody. This is most commonly known as *Klangfarbenmelodie* ("sound-color melody"). The term *Klangfarbenmelodie* was coined by Schoenberg in his *Harmonielehre* (1911) and employed most notably in his "Farben" (no. 3 from *Five Orchestral Pieces*). It is also related to musical pointillism, in which one melody passes among many instruments to color a single line. Examples include Webern's iconic *Konzert*, Op. 24, in which timbre helps to articulate the structural divisions of the row (about this, see this chapter), but also in a great deal of Mahler. See, for instance, this example from the beginning of Mahler 7/iii, in which a pointillist start begins to coalesce.

We'll end this chapter with an extraordinary example: Webern's orchestration of Bach's *Ricercata* from the Musical Offering. The work is at once a faithful, note-for-note transcription of the original and an analysis-by-orchestration of its motives and melodic contour. It is more of a compositional orchestration than an arrangement or transcription per se. The image below provides a reduction of the exposition. There is a staff for each presentation of the theme (corresponding to the six entrances of the fugal voices).

A Musical Offering

Webern's instrumental distribution of the fugal subject theme follows a palindromic, possibly even double palindromic design. Dotted lines beneath each staff demonstrate the first, primary, clear and consistent palindrome; those over the top set out the second, which is not so consistently used, and which may be less effective in accounting for the last two instrumental choices than the square brackets that illuminate how these two instruments often repeat an earlier pairing. The asterisks above the staff indicate notes doubled by the harp, the first of which serves to articulate the first timbral recurrence (initiating the palindrome), while the latter two identify the end of the theme. The diagonal arrows further speculate on the possible relation between the successive instrumental timbres of the first answer and those that begin the next two subject-answer statements.

Finally, the last two systems show how Sofia Gubaidulina's violin concerto *Offertorium* takes up this double palindromic instrumentation of Bach's theme. That timbral design is not consistent throughout (hence only presenting the first two instances of the theme), but instead relates to an overall formal process that truncates one note from the beginning and end of the theme at each successive presentation. This continues up to a central point, after which the process is symmetrically reversed.

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Clearly these are highly specific modernist examples in which symmetry is paramount, but again, we can see pre-echoes of this kind of idea in pre-20th-century music. For instance, there are symmetrical timbral schemes in:

- Schubert 8/ii: the melody moves from the clarinet (in minor) to oboe (major) in the exposition; the process is reversed in the recapitulation (oboe-clarinet).

- Brahms 3/iii: the theme and accompaniment move from strings to winds in the first section and from winds to strings in the reprise.

Both cases reflect their larger forms just as Webern and Gubaidulina do.

Assignments

1. Coming soon!

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10.3: Transcription from Piano

Key Takeaways

When orchestrating piano music, it's often best to think of this task in terms of *translation* rather than *transcription*, focusing on the core musical idea "behind" any (piano or orchestral) version, and asking:

- What is the piano effect trying to create? How might this (or something similar) be best achieved by the orchestra?
- What extra rhythms—and perhaps parts—could be extracted from the harmony, register, accents.

The several examples focus primarily on works that are well known in both the piano and orchestral repertoires, then end with my own orchestration of a piano piece by Bartók.

Some orchestral composers write for piano first, others write directly for orchestra,[1] while others still (perhaps most) sketch scores in a short-score format to begin with that is neither one nor the other. While composers use a variety of approaches, it will be most useful for us to focus on the first task: orchestrating from piano music. Among the reasons for this:

- There exists so much wonderful music in both piano and orchestral forms.
- It makes you consider closely the similarities and differences between two contexts.

It's best to think of this task in terms of going back to the core ("pre-pianistic") idea and rewriting, re-realizing that idea for orchestra. You might like to think of this as analogous to translation, rather than mere transcription.

This chapter will begin with some basic principles, then move on to some magnificent examples of piano-orchestral pairs in the repertoire. I'll finish by putting my own neck on the block, going through an orchestration of my own after a piano piece by Bartók.

Basic Principles

Firstly, start by reading the original closely—*really* closely. Ask yourself:

- What is the piano effect trying to create? How might this (or something similar) be best achieved by the orchestra?
- What extra rhythms—and perhaps parts—could be extracted from the harmony, register, accents.

Examples for extracting "additional" material from piano music include:

- Extending notes: If the piano's sustain pedal is down, you may wish to add parts sustaining each of the notes beyond their notated length (to the notated length of the pedal changes).
- Extracting accents: Accents of all kinds can be separated off into separate parts in the manner of the "attack-sustain" effect discussed in the previous chapter, in which some parts play the music "as written," while others provide the attack only.

Examples that require reworking include:

- Oscillating figures such as broken octaves. This is a pianistic solution that usually needs reworking for other instrumental forces. Many other instruments can repeat notes more readily than the piano. (Don't forget to consider the register and rhythmic levels; as a rule of thumb, maintain at least those of the original.)
- Arpeggiation. Large florid arpeggiations, by contrast, are better suited to the piano than most other instruments. You will likely want to break them up into multiple parts, dovetailed together to give the continuous impression of the original.

Brief examples

Let's see this in practice with two examples from the piano repertoire. Consider how you would orchestrate them, then compare your result with the possible solutions below (but remember that there are always many different viable ways to do this—the solutions here are examples). Plan on realizing the Chopin example for string quartet and the Beethoven for classical orchestra.

Chopin: Prelude Op. 28, no. 13

Beethoven Op. 13

In the Chopin prelude, the left-hand distribution invites reworking for orchestral instruments. Here is a solution that re-distributes the material over two parts (viola and cello). Even if you decide to do some kind of redistribution in principle, there are a lot of different ways to realize it. I like this particular solution because it separates "main" chord notes (cello) from a broken thirds figure (viola), and in so doing, it brings out the very slight metrical dissonance hinted at in the original (here: \mathbf{^{12}_8} in the cello vs. \mathbf{^6_4} in all other parts).

You may have noticed an elephant in the room here—I've changed the key. Whether and when it is appropriate to do this depends on context. For an orchestration of all 24 preludes, it would be best to leave the keys as they are; in doing just one or two, we're freer to make changes like this move from F♯ to F in order to "fit" better on the string instruments, including hitting more open strings in the cello (which helps make some of the more unwieldly lines later on more practical).

Incidentally, earlier music is more likely to impel you to change keys between keyboard and orchestral versions. At least Baroque and Classical composers generally used a narrower set of keys for their orchestral works than they did in keyboard music.

Turning to the Beethoven, we have broken octaves in the left hand, a variable number of chord notes in the right, a crescendo, a growing tessitura, and some ***sfz*** chords. Here is a solution with viola, cello, bass, and timpani sharing that C pedal across three octaves and three different pulse values. Note also:

- Where parts are added: first on the ***sfz***, then twice in the next measure on the basis of motivic parallels and accelerating the rate of change.
- The use of horns in E♭ and trumpets in C—a common device for composers of the time working with "natural" brass instruments (see the Fifth Symphony, for instance).

Transcription Case Studies

Now let's turn to some longer-range examples, including some of the most celebrated repertoire examples, and some specific questions:

1. Mahler 4/iv (piano and orchestral versions both by Mahler)
2. Bach: Partita BWV1006 (for violin) orchestrated by Bach as Cantata 29, mvt. 1
3. Mussorgsky: "Gnomus" from *Pictures at an Exhibition* (orch. Ravel and Stokowski)
4. Stravinsky: "Danse Sacrale" from *The Rite of Spring* (piano and orchestral versions both by Stravinsky)
5. Bartók: VIII from *Eight Improvisations on Hungarian Peasant Songs* (orch. Gotham)

Mahler 4/iv (piano and orchestral versions both by Mahler)

Question: How variously might you orchestrate "the same" material?

Here are some extracts from Mahler 4/iv with red boxes highlighting orchestrations of the arpeggiated accompaniment pattern. The extracts show Mahler creating a set of timbral variations on a single, simple idea. (Note that the pages are each separate extracts from the movement; they don't run continuously together.)

As so often in Mahler, this music began life as a song forming part of a song cycle for voice and piano and was only later integrated into this symphony. The harp features in each of these extracts and is almost identical to the equivalent part of the original piano accompaniment, so we have that point of reference on the score and can see what else Mahler does with it.

- At the start (first page, m. 1,) we have a rather lovely distribution that's a long way from the simplest, easiest option: the violas take the D_3 alone, while the cellos take the short, fast B_4-G_2 leap across a long glissando. Note further differences from the harp such as:
  - all the dynamic and articulation markings added in those string parts
  - the cohesive elements: overlapping the viola and cello parts, and the horn pedal on D_4 (sounding pitch)
- In measure 4 (still on the first page), we start with clarinet 2 doubling the harp exactly, before moving to …
- Rehearsal mark 1, with a distribution of the harp part on to the bass clarinet and clarinet 2. This distribution resembles the opening in use of similarly paired parts (viola and cello; bass clarinet and clarinet 2), and in the separation of the rhythm. The pitch distribution has changed (now ordered G_2-D_3-B_3), and the expressive glissando is gone. Cellos "double" the G and D, but on the beats, thus slightly "missing" the original D and creating a slightly heterophonic effect.
- Later in the movement (on the next page, marked p. 341 in this score and at 3'28" in the recording below), we see the cellos double the harp part directly. This G_2-D_3-B_3 version allows cellos to use two open strings, which makes for a gentle, easy spread that befits the mood. The Cor anglais now picks up the D_4 pedal.
- From rehearsal mark 12 (5'19"), the harp moves to a lower tessitura as part of the "winding down" at the end of this symphony. Accordingly, we move from cellos down to double basses, who double the downbeats much as the cellos did at figure 1, and again with an open string available (just one this time), but rhythmically simpler in this case, without the heterophonic effect.
- On the next and final page, you can see that this harp-bass doubling and the same low E_1 pitch (double bass open string) mark the final sonority of the symphony.

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Bach: Partita BWV1006 (for violin) orchestrated as Cantata 29, mvt 1 (orch. Bach)

This page provides scores for the violin part. Consider the following questions:

Question: How much can you get out of one single line? What is appropriate to draw out of the original, or simply to add?

Turn now to the opening of the orchestral score and note the following:

- m. 1: Addition of a new quarter-note part which is distributed over the trumpets on the one hand and the rest of the orchestra on the other, thus giving rhythmic life to a "mere" succession of chords on the beats. (See the Cruxifixus from the B minor Mass for another example of Bach using this device.)
- m. 2: Orchestral parts join in the solo parts' repeat of the opening rhythm. Note that they start on the second eighth note of the measure, reflecting the original rhythm and jumping on the moving train of sixteenth notes in that solo part.
- m. 4: A similar strategy, doubling the repeat of the solo line's melodic idea, this time on the second descent from D, and again from the exact position (second sixteenth note of the beat this time).
- mm. 9–12 following: Bringing out the melodic eighth-note motion with parallel thirds above and below, alternating by the measure (mm. 9 and 11 above, mm. 10 and 12 below). Note how mm. 10 and 12 also resemble the opening rhythm, if not its contour.
- mm. 14–16: A similar process, all below, but alternating thirds and sixths (effectively "swapping" F♯ and D between solo and orchestra).
- m. (13,)16: The pedal D in the solo line (m. 13) moves into a separate bass pedal (m. 16).
- m. 20: Orchestral chords verticalize the cycle of fifth harmonies and reduce the orchestra's metrical levels to measure-only.

Overall, note:

- How Bach has not only picked out implied lines, but been relatively free in the addition of germane material to thicken out the orchestral version. This does not imply any deficiency in the original; it's Bach's way of realizing the same material for different media.
- The key change from E for the violin to D for the orchestra (in connection with our discussion of the Chopin example above).
- How consistent this piece is with Lester's (1986, 138) observation that Bach will often project multiple metrical levels simultaneously and explicitly: here we have very explicit pulses at sixteenth, eighth, and quarter-note levels for most of the time.

Mussorgsky: "Gnomus" from *Pictures at an Exhibition* (orch. Ravel and Stokowski)

Pictures at an Exhibition is one of those works that orchestrators can't seem to resist, so it seems fitting to use that as the case study to ask:

Question: How have composers handled the same material differently?

Let's look at the "Gnomus" movement as an example. The picture in this case depicts a sketch for a toy nutcracker shaped as a deformed gnome; the music is accordingly fragmentary and ghoulish. Again, start with the piano original and come up with your own ideas for how to orchestrate it; we'll then go through each successive piece of material in the movement as realized by Mussorgsky (M), Ravel (R), and Stokowski (S). Mussorgsky and Ravel are on IMSLP; regrettably, the Stokowski is not.

m. 1: We start with a dramatic run of eighth notes across two registers.

- M slurs by the bar and changes the dynamics on repeat (***ff***/***p***).
- R follows the same slurs as M and uses the same low strings and wind timbre for both ***ff*** and ***p*** versions.
- S opts for multiple articulations of bar 1 (note the wind slurs by register and the strings' accents). Unlike R, S changes the orchestration for the m. 3 ***p***.
- Note how neither R nor M separates the part out into separate registers. The difficulty of the disjunct line works well for this pictorial effect.

mm. 2, 5: Pause note

- M: Note the notated ***sfz*** and remember the natural diminuendo of a piano chord's decay.
- R: The existing parts provide the attack; two horns provide the sustain with explicitly notated diminuendo. Note that the horns are muted the second time for the quieter version, and for timbral variety.
- S: Tutti on pause notes; no diminuendo.

mm. 8–9: Hemiola

- M: Indicated by ***sfz***s.
- R and S: Also use accents and some secondary (incomplete) parts.

m. 10: Treble flourish

- M: Dispenses even with accents in this case.
- R and S: Add percussion to the downbeat. (Note: S does not include the second phrase but proceeds straight to m. 17.)

m. 19: At the double bar

- M: High treble with accents on both beats.
- R (reh. 8): High winds with pizzicato for attacks (on the first beat, not the second). Tuba theme, with a little from the trumpet on the last note, likely for both practical reasons (allowing the tuba to breathe!) and perhaps for a timbral sleight of hand not unlike the horns at the beginning. The second time (reh. 9) sees the ethereal addition of harp and celesta on the main, accented material and of a string glissando that did not (almost could not) exist in the piano version.
- S (reh. 1): String pizzicato on beat 1 versus trumpets and accents on the second beat, which add an antiphonal effect to the passage.

mm. 36–37: Before the meno mosso

- R: Subito ***p***.
- S: Crescendo (sic, not diminuendo as in M) and the addition of timpani to the GP bar (then diminuendo).

m. 38: Meno mosso

- M: Slow parallel writing with the low E♭ as a kind of pedal inviting separation.
- R and S: Indeed allocate some part to the E♭ pedal only.
- S (fig. 2): Adds hairpins peaking at the half-bar.

m. 60:

- M: Loud, sequential descending passage.
- R (fig.14): Full winds plus trumpets 2 and 3; string glissandos on the lower part (which is now becoming a characteristic gesture of this orchestration).
- S (fig. 5): Flute, piccolo, horn, trumpet; strings tremolo but not glissando. The allocation of instrumental sections changes at fig. 6.

m. 72

- M: Low murmuring; treble upper part version of earlier material.
- R (fig. 15): Alternating bass clarinet and bassoon. Double basses and cellos share the note and glissando respectively. In the treble, we have flute, violin, and harp, a choice which could be seen as a combination of earlier versions.
- S (fig. 7): Full, low winds and bass drum, all playing throughout. Treble parts as previously (with the same swap).

m. 94: Big flourishing finish

- M: A spare treatment, with just two voices until the final chord.
- R (fig. 18): Addition of voices (note how those voices relate to the original pitches and which metrical positions they start on).

- S: Adds in a longer version of the C♭, perhaps mindful of the other moments in which this movement has focused on the single, sustained pitch. All part additions begin on downbeats, with the primary additions on the penultimate measure.

In general, Stokowski adopts an approach that:

- closely resembles Ravel's more distinctive additions (including even, e.g., the glissando additions)
- more freely changes the material (in cutting all repeats, for instance)
- tends to joins up successive sections somewhat (sustaining through rests, for instance), perhaps seeking to avoid this short work becoming too fragmentary

Stravinsky: "Danse Sacrale" from *The Rite of Spring* (bass part) (orch. Stravinky)

On now to another iconic piece of music that has a rich concert life in both piano and orchestral forms. We also return to:

- bass line considerations (and to a bass line that consists of few pitches)
- the orchestral crescendo, which has featured through this chapter and section

Here the material consists of strictly separate elements that are rhythmically reworked in a dizzying range of ways. Fundamentally, however, we have a simple alternation between a bass part on the beats and a treble response off-beat. The treble part takes a few different forms, mostly centered on short, sharp, accented chords, but also intermittently including the classic Stravinsky crescendo: a short, rapid crescendo from a metrically weak position to a strong one. This is not indicated in the piano version (it's not possible there for sustained chords) but is a highly distinctive feature of Stravinsky's orchestral writing, here with horns and trombones for the crescendo and more brass added to mark the downbeat.

Here we're going to focus on the longer-range orchestral crescendo in the bass and ask:

Question: How would you score the bass in the main, "A" sections (of this "rondo") as part of a gradual orchestral crescendo?

Like many, I first encountered this music aurally (and was blown away by it, of course!). Later, when I came to check out the score, the first thing that struck me was the bass line. I remembered the colossal forces involved, and the alternation between bass and treble, and I suppose I just assumed that the orchestration involved some kind of parity between the forces allocated to bass and treble. Instead, I found the bass very lightly scored (at least initially) and gradually changing throughout, creating timbral variety and a gradual crescendo both within sections (especially in the passage from reh. 186) and between them. Here's a brief summary of the process first entrances:

- Rehearsal mark 142 ff. (start): Double basses and timpani, initially alternating (i.e., only one at a time!), then briefly together on the first octave downbeat at reh. 144. The tuba is then added, for a new double bass and timpani alternation, the tuba siding with the basses (and the lower octave) until reh. 146, where the double basses and timpani are reunited (no tuba) for the more melodic D–F alternation.
- Rehearsal mark 167 ff. (c. 2'00'' in the recording below) sees bassoon and contrabassoon initially take the place of the tuba, and then alternate with it in the same pattern as before. Double basses and timpani remain.
- Rehearsal mark 180ff. (c. 3'00''): A brief snatch of the A section here sees no bassoons, but tuba, double basses, timpani and the introduction of the bass drum before the final section.
- Rehearsal mark 186ff. (c. 3'40"): This final section initially starts with all the action concentrated in the bass register (i.e., both "bass" and "treble" from before). Bassoons and tubas split, covering both the "treble" and "bass" between their members, so we're now more in the territory of self-contained subsections (rule of thumb from the first chapter than the more pointillistic approaches (see this chapter) we've seen so far. The double basses and bass drum are in, but the timpani is removed for the first time, returning only when the true treble range recommences at reh. 189.
- Rehearsal mark 190 sees the introduction of the bass clarinet, then two very low horns (VI and VIII) at reh. 192.
- Rehearsal mark 195 finally sees the true tutti with the bass clarinet, third bassoon and contrabassoons, horns VI and VIII, timpani, bass drum, and double basses, but not tubas—reallocated to the heavy brass for the "treble" off-beats.
- At the end of all of this variety, the single, unequivocal ***sfff*** bass cluster chord seems an especially fitting end, suitably prepared with equally garish flourishes in a genuinely treble register. Even here, the final downbeat does not feature all the bass instruments, but adds cellos for the first time and omits those of the wind section.

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Bartók: *Eight Improvisations on Hungarian Peasant Songs* (orch. Gotham)

I'll round out the chapter and section by putting my head on the block with a full orchestration of my own. If nothing else, this should help to avoid leaving the impression that only the likes of Bach, Ravel, and Gubaidulina can do this kind of thing (brilliant though they doubtless are).

Here are scores for this work on IMSLP:

- The original Bartók piano piece is on the main landing page.
- Click on the Arrangements and Transcriptions tab for my orchestration.

I began this process with extreme attention to Bartók's fascinating articulations and found more about what he means by them through engaging with his other scores, and by chancing upon his own glossary of articulations as used in his 1916 edition of J.S. Bach's *Anna Magdalena Notebook* (see the title pages). In orchestrating this work, apart from realizing the implications of the score (highly inviting to orchestrators!), I also sought to realize something of Bartók's own style.

Here are more specific comments for the successive decisions.

- m. 1: Increase the sound and density of the opening flourish by the addition of octaves, by introducing several simultaneous rhythmic modifications of the triplet, and by inviting the double basses to play a snap (a.k.a. "Bartók") pizz on their lowest string, preferably on the "correct" pitch C_0 (for basses with extensions), but if not, then still preferring the open string to shifting the pitch up the octave.
- m. 2: For the repeated chords (with the piano's pedal down), alter the octave to make use of the four horns in a favorable range and to outline the outer voices of that chord with a battery of open strings.
- m. 5: Where the piano part sees doubled octaves, the orchestral version attracts concomitantly more.
- m. 6: Suddenly, the piano pedal comes off, so that's a cue to thin the texture (removing the added bass, for instance). The trumpets serve to mark that moment and contribute to the gradual move from repeated off-beat chords to the more active figure and emerging secondary line.
- m. 9: "Con grazia" in this range and in this slightly rustic context calls for the oboe.
- m. 11: Suddenly the dynamics, texture, and tessitura change again. The glissando is another Bartók hallmark and, in combination with the high E harmonic, adds a bravura flourish.
- m. 13: The alternation of two pitches in the bass register a fourth or fifth apart is very suggestive of the timpani.
- m. 19–20: Here's a chance to flex out dovetailing muscles as part of covering a large range with crescendo.
- m. 21: Reserve something (percussion) for the final ***sff*** chord. The timpani flourish is a creative addition which brings that soloistic part to a climactic close along with the wider section.
- m. 22: "Leggiero" is the main cue here. Use like timbres for the clusters. Oboes fit the leggiero bill here, and flutes round the sound out a little.
- m. 23: The accent invites a little creative change: I opt for a solitary string pizz and sending flute up one octave for this note only.
- m. 24: Cor anglais and solo cello duet sonority begins before the "true" duet from m. 28. (VC (moving from oboe to VC-Cor 28 duet). Solo/altri exchange.
- m. 26: The equivalent accent to m. 23 is similar, but less directly implied by the piano part (deduced from the solo line).
- m. 28: The articulation in the cello melody here is a little fussy, but should help to bring out the section's "capriciousness."

- m. 29: Yet another reworking of the accompaniment accent, here as a slightly different violin figure (similar to both mm. 23 and 26 and the snare drum in m. 13).
- m. 35: The texture and register develop here, notably expanding the use of the woodwinds.
- m. 43: Bassoon and contrabassoon share the octave leaps of the original; double basses connect the two somewhat with a semitone version.
- m. 46: The higher octave here allows us to return to a timbre and gesture from earlier on: the “throwaway” high E harmonic on the violins.
- m. 48: Once again, the bass “line” is separated between the F pedal and the moving part.
- m. 51: A variety of solutions to the clear “attack-sustain” gesture here. The solo timbres are as before, lending some continuity to avoid too excessively fragmentary a feel.
- m. 53: This two-voice invention with occasionally double octaves is an orchestrator’s dream. Trombones take center stage, horns pick out the quarter-note exchange as a kind of “bell peal” which is joined on every other measure by tubular bell (suitably enough!).
- m. 63: Changes to the horn parts bring out the rhythmic acceleration.
- m. 65: Ruomoso? Al talone? All down? The *Rite of Spring* looms large.
- m. 67: Subito ***mf*** reduced the strings to pizz, but introduces winds in preparation for the crescendo.
- m. 69: The big tune returns! Having flirted with a *Rite of Spring*–esque all down passage before, it seems fitting to try the legato version here. Sound covered by brass and off-beats.
- m. 77: Note the move into a higher octave here (in both versions).
- m. 81: The sextuplet requires some reworking for orchestra: here some parts play all six notes, but in close position and octave doublings; other parts (generally the lower ones) pick out a triplet version. The snare drum continues this sextuplet through the downbeat (an addition to the original) up to the final chord.

Assignments

1. Coming soon!

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1. For instance, see Rimsky-Korsakov's Preface to his iconic *Principles of Orchestration*, 1891. 10.03: Transcription from Piano#return-footnote-788-1

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CHAPTER OVERVIEW

Chapter 11: Rhythm and Meter

11.1: Notating Rhythm [crosslist]
11.2: Simple Meter and Time Signatures [crosslist]
11.3: Compound Meter and Time Signatures [crosslist]
11.4: Other Rhythmic Essentials [crosslist]
11.5: Hypermeter
11.6: Metrical Dissonance
11.7: Swing Rhythms [crosslist]
11.8: Rhythm and Meter in Pop Music [crosslist]
11.9: Drumbeats [crosslist]
11.10: Twentieth-Century Rhythmic Techniques [crosslist]

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11.1: Notating Rhythm [crosslist]

Go to chapter

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11.2: Simple Meter and Time Signatures [crosslist]

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11.3: Compound Meter and Time Signatures [crosslist]

Go to chapter

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11.4: Other Rhythmic Essentials [crosslist]

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11.5: Hypermeter

Key Takeaways

- Hypermeter refers to the use of strong/weak metrical accent patterns at levels beyond the notated meter.
- Western classical music typically does this grouping by twos (and so then fours, eights, etc.), just like it does with metrical grouping within the notated meter.
- Grouping in threes is rarer in Western classical music, partly because it's rare to see grouping in 3s at more than one metrical level at all (within or beyond the meter).

We first met the idea of hypermeter briefly in the Other Rhythmic Essentials chapter. As discussed there, the strong–weak style of patterns we have seen within measures do not necessarily only operate within the measure and stop at the measure-length pulse. Especially when we have short measures and fast music (like a presto in $\mathbf{^3_4}$), there can be a strong sense of such metrical relations at "higher" multi-measure levels. In Western tonal music, just as the most common division/grouping within measures is by twos (and thus fours, eights etc), so it is also with hypermeter. That said, grouping by threes is also eminently possible, as are fives and sevens. When you look more closely, you notice that interesting composers frequently rove between these options fluidly in a way that would be extremely unusual at the counting (tactus or beat) level.

Hypermeter in 3s: "ritmo de tre battute"

One of the most famous, explicit notations of hypermeter is the "ritmo de tre battute" section of Ludwig van Beethoven's Symphony No. 9. This marking literally means "rhythm of three bars/measures", so here we have Beethoven explicitly stating that he intends for the measures to group in threes. In doing so, the instruction also makes explicit the assumption that the grouping had been in twos and fours up to that point. Example 1 reproduces the four-measure grouping seen in the Other Rhythmic Essentials chapter:

A link to an interactive elements can be found at the bottom of this page.

Example 1. 4-measure hypermeter at the start of Beethoven 9/iv from the Other Rhythmic Essentials chapter.

Now Example 2 shows the later "ritmo de tre battute" section (from m. 152) with comparable "hypermeter counts" as well as (editorial) double barlines to show each group of 3.

A link to an interactive elements can be found at the bottom of this page.

Example 2. 3-measure hypermeter from measure 152: "ritmo de tre battute."

Note that we're talking about the periodicity of the grouping here: that is, grouping in threes or fourss. There's plenty more to say about the phase: that is, which measure in the cycle should be counted as "1." There's a lot to argue for the phase shown in this movement, although the dominant-to-tonic movement in the first to second measure of the figure sure might make you wonder about starting the phase a measure later.

Finally, for the sake of comparison, Example 3 sets out that same "ritmo de tre battute" section re-notated explicitly in $\mathbf{^9_4}$ to place both 3-grouping metrical levels within the notated meter.

A link to an interactive elements can be found at the bottom of this page.

Example 3. The 3-measure hypermeter from Example 2, re-notated in $\mathit{^9_4}$.

Hypermeter in (Performance) Practice

Western classical notation uses measures and bar lines partly for coordination among musicians, but also to imply the meter of the music. The first beat of the measure—the downbeat—is taken to be the strongest beat of the measure.[1] Notating the same music in different time signatures makes a big difference: if you shift the music to put the downbeat at a different point in the cycle, you can expect the performance to sound different.

The same principle goes for hypermeter. In the Beethoven example above, where the hypermetrical grouping is in fours, musicians will tend to perform it with a kind of $\mathbf{^{12}_{\:4}}$ pattern in mind; where the "ritmo de tre battute" shifts us to thinking in terms of a three-measure hypermeter, then we get something like the $\mathbf{^9_4}$ shown in Example 3.

That all said, do not expect the conductor to start beating in triple meter! Why not? Well, if the music is notated in $\mathbf{^3_4}$, and the conductor is clearly beating in a triple meter pattern, then it would be entirely understandable for some musicians to think that the conducting relates to the $\mathbf{^3_4}$ time signature. Professional orchestral musicians know Beethoven's Ninth well enough to avoid this pitfall, but that cannot be assumed for less-known works, and why risk it anyway? Conductors know how to indicate hypermetrical structure without changing the beating pattern, just as they know how to indicate phrasing and other matters.

Additional Levels of 3s at the Fast End?

Like a compound triple time signature ($\mathbf{^9_4}$, $\mathbf{^9_8}$, etc.), "ritmo de tre battute" explicitly sets out two levels of three-grouping. Arguably, it's the two adjacent levels of three-groupings that's notable here—the fact that Beethoven notates it with one of those levels in the hypermeter is less significant.

So, can we have more than two levels of three-grouping? Well, $\mathbf{^{27}_{\:x}}$ time signatures are not seen (at least in this style), and neither is anything like "ritmo de 9 battute", but Beethoven does occasionally use three sets of three levels in his late style, i.e., adding another layer of triple at the "short" or "fast" end of the spectrum. This is always notated with triplets: another way to get three-grouping into the metrical structure without having to include it in the time signature. Examples include:

- In movement 4 of the String Quartet No. 14 (Op. 131), there is an "Adagio ma non troppo e semplice" section in $\mathbf{^9_4}$ time (from m. 186), so we already have two levels of threes right away (3×3 quarters). Later, it briefly uses eighth note triplets long enough to perhaps be called a metrical level (mm. 223–225, or 5–7 measures before the final Allegretto reprise).
- The second movement of Beethoven's last piano sonata (No. 32, Op. 111) is an "Arietta" in compound time signatures: $\mathbf{^{\:9}_{16}}$ at first but also $\mathbf{^{\:6}_{16}}$, and $\mathbf{^{12}_{16}}$ for some sections. Additionally, some of those sections use triplet sixteenth notes to give another three-level. When this happens in $\mathbf{^{\:9}_{16}}$, we have three levels of three-grouping that could have been written as $\mathbf{^{27}_{32}}$ (Example 4).That said, the hypermeter is regular, so 3×3×3 seems to be the limit for now. And the triplets in $\mathbf{^{\:6}_{16}}$ and $\mathbf{^{12}_{16}}$ add another three-grouping, but with two-grouping in the metrical levels.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Three sets of three-groupings (effectively 27!) in Beethoven's Op. 111.

Sensible Limits and the Psychology of Meter

Where do we stop looking for metrical levels above and below? Some accounts of hypermeter have extended the idea to entire movements, describing them, for example, in terms of a huge upbeat–downbeat pattern (see the end of Cooper and Meyer 1963). The psychology literature suggests a more modest scope, with meter giving way to form not necessarily at the limit of the notated measure, but also not far beyond. The idea is that we struggle to perceive metrical cycles and patterns when the pulse is too short (about 1/10 of a second) or too long (a few seconds, depending on the internal content). So in practice, it makes sense to consider hypermeter when the measure is very short (like the $\mathbf{^3_4}$ presto discussed above) but not for too many more levels beyond.

Not Limited, and Perhaps Not So Sensible Either

Composers, theorists, and especially composer-theorists reading this may be wondering about the extreme cases. Notwithstanding the psychological limits to meter as distinct from form, what's the structural limit, the *ne plus ultra*? In other words, how many levels of three-grouping can we stack on top of one another? Mark Gotham's "Sierpiński's Triangle" (Example 5) is a piece composed to group in threes at every structural level from, the individual notes right up to the highest formal units. The title "Sierpiński's Triangle" refers to a triangle-fractal pattern that shares something of the same structure. The musical piece is the first movement of a set titled *Tesselations*.

A link to an interactive elements can be found at the bottom of this page.

Example 5. Three-groupings all the way down (in meter and in form) as a compositional plan in "Sierpiński's Triangle" by Mark Gotham (download score).

Further Reading

- Cohn, Richard. 1992. "The Dramatization of Hypermetric Conflicts in the Scherzo of Beethoven's Ninth Symphony." *19th-Century Music* 15, no. 3: 188–206. doi.org/10.2307/746424.
- Cooper, Grosvenor and Leonard B. Meyer. 1963. The Rhythmic Structure of Music, University of Chicago Press, 1963.
- Gotham, Mark. *Tessellations.* 2014.

- Rosen, Charles. 1992. “Ritmi de tre battute in Schubert’s Sonata in C minor”, *Convention in Eighteenth- and Nineteenth-Century Music: Essays in Honor of Leonard G. Ratner*, edited by Wye J. Allanbrook, Janet M. Levy, and William P. Mahrt.

Assignments

1. Coming soon!

---

1. There are interesting cases like sarabandes, a Baroque dance style in which musicians familiar with the style know to place a stronger emphasis on beat 2 than beat 1. But that is a special stylistic exception; otherwise, we strongly associate downbeats with metrical accent. 11.05: Hypermeter#return-footnote-800-1

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11.6: Metrical Dissonance

Key Takeaways

- Metrical dissonance refers to the coexistence of two or more unaligned metrical layers in a single passage of music.
- Metrical dissonance can be divided into two types:
  1. Displacement dissonance, in which two or more layers with the same meter (or grouping structure) are displaced against each other
  2. Grouping dissonance, in which two or more layers with unique grouping structures (that are not simple multiples/factors of each other) can be heard simultaneously.
- Grouping dissonance often occurs with an ostinato—a repeating musical pattern within a context that is not similarly repeating.

Chapter Playlist

"Dissonance" is one of those multi-purpose terms with a range of uses both within and beyond musical analysis. Outside of music, terms such as *cultural* or *cognitive dissonance* usually have negative connotations, but music has a way of making a virtue of the "wrong" or "ill-fitting." Musical dissonance is not "bad" in the same sense as some of these other contexts (though stylistic norms may require proper handling and resolution, at least in the case of tonal counterpoint).

These same notions of consonance and dissonance have been applied to meter.[1] The modern conception of metrical dissonance was galvanized by Harald Krebs (1999).[2] This chapter is based on Krebs's theory, and categorizes metrical dissonance as either displacement dissonance or grouping dissonance, each of which is discussed further below.

Displacement Dissonance

Displacement dissonance occurs when one layer of the music seems to be out-of-sync with the surrounding context. Example 1 uses a familiar tune to illustrate: in 1a, the tune is in sync with the bass line; in 1b, it is an eighth note "late." Example 1b then is an example of displacement dissonance. Note that the final note of 1b arrives properly in sync with the bass; this kind of adjustment is common in real pieces as well, especially to create a sense of conclusion or arrival (e.g., at cadences). This is a simple example of displacement dissonance: when two layers imply the same meter, but one is offset from the other by a consistent rhythmic value. This rhythmic value is called the displacement index; so, the displacement index of Example 1b is +1♪.

A link to an interactive elements can be found at the bottom of this page.

Example 1. Illustration of displacement dissonance.

Listening to Examples 2a and 2b, one would likely default to beginning these passages on beat 1 of a $\mathbf{^3_4}$ measure, creating four bars of $\mathbf{^3_4}$. In the actual piece these lines are drawn from—Marie Jaëll's Impromptu—the two lines occur simultaneously, but the melody is offset from the bass line, moved forward by one eighth note (again, a displacement index of +1♪).

A link to an interactive elements can be found at the bottom of this page.

Example 2. Displacement dissonance (+1♪) in Marie Jaëll's Impromptu (1869; 4:43).

Example 3 provides another example from the **B** section (at 1:45 and 2:36, to the lyrics "you just call on me, brother, when you need a hand") of Bill Withers's iconic "Lean on me" (1972). In the **A** section of this song, the meter and grouping are clear and set the listener's metric expectations. In the **B** section, the hand claps create a strong sense of displacement dissonance. Hand claps are typically a snare-drum substitute in pop drumbeats, playing the backbeat on beats 2 and 4 of a quadruple meter. But here, the handclaps are on the 2nd and 6th eighth notes of the bar, suggesting a backbeat that occurs an eighth note early (−1♪).[3] The song's overarching meter may never be in doubt, but the rhythmic-metrical richness of this passage can be helpfully understood in terms of the systematic syncopations that potentially point to alternative displacements of the meter.

A link to an interactive elements can be found at the bottom of this page.

Example 3. Displacement dissonance (−1♪) in Bill Withers's "Lean on me" (2017; 1:45). Brackets indicate the displacements discussed in the text.

Grouping dissonance

Grouping dissonance is the combination of two layers with different internal grouping organization; more specifically, the two layers articulate groupings with different numbers of pulses (pulse cardinalities), and these cardinalities are not multiples/factors of one another. These layers can be referred to in terms of their cardinalities to distinguish them: for example, a "3-layer" and a "4-layer." Example 4 provides simple illustrations of grouping dissonance.

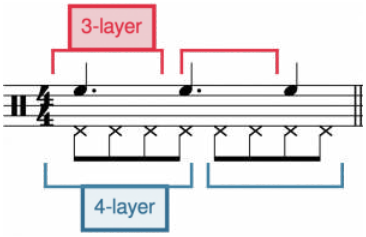
A link to an interactive elements can be found at the bottom of this page.

Example 4. Illustration of grouping dissonances.

The juxtaposition of 2- and 3-layers as in Example 4a is common enough to be known by a special name: the hemiola. The hemiola is a grouping dissonance found even in early Western concert music, such as G.F. Handel's *Water Music* Suite No. 2, mvt. II ("Alla hornpipe"), shown in Example 5. This sort of hemiola is often found at important cadences of pieces in triple meter, where two measures of triple meter (a 3-layer) can be interpreted as three groups of two beats (a 2-layer) instead. This dissonance heightens excitement and reinforces the sense of tension-and-release created by the familiar cadential harmonic progression.

A link to an interactive elements can be found at the bottom of this page.

Example 5. A hemiola in Handel's "Alla hornpipe" (*Water Music* Suite No. 2, mvt. II; 1733). The 2-layer implied in the surface rhythms of mm. 9–10 (red) create grouping dissonance with the 3-layer of the meter.



Example 6. The tresillo rhythm (top voice) can be understood as a 3:4 3-layer creating grouping dissonance with the 4-layer inherent in the meter.

Three-against-four (3:4) is another widespread rhythmic-metrical pattern that can be readily heard in terms of grouping dissonance. Example 4b sets out a complete cycle of this grouping dissonance, but partial cycles are more common in musical practice, especially in pop music—from classic jazz to electronic dance music (EDM). The Afro-Cuban tresillo rhythm can be viewed as a partial cycle of the 3-against-4 dissonance (Example 6).

Example 7 shows a partial 3:4 grouping dissonance (sixteenth-note pulse) from Calvin Harris's "I'm Not Alone" (2009). The song's overall simple quadruple meter is clear from the four-on-the-floor kick drum and handclap on the backbeat, but the synth and bass riffs creates metrical dissonance out a conflicting pattern based on groupings of three sixteenth notes. Note that the 3-layer breaks off with a 2-pulse-long grouping so that the riff has a downbeat arrival on every other measure.

A link to an interactive elements can be found at the bottom of this page.

Example 7. A 3-layer in the synth and bass create grouping dissonance with the 4-layer in the meter and drumbeat in Calvin Harris's "I'm Not Alone" (2009; 0:59).

Grouping dissonances and polyrhythms can often be easier to understand in box notation rather than traditional Western notation, which prioritizes metrical hierarchies in a way that might not be helpful when dealing with grouping dissonance. Example 8 is a box notation diagram illustrating "I'm Not Alone." In Western notation, we are forced to choose between unusual dotted rhythms or very frequent ties, both of which have advantages and disadvantages, but in box notation, this issue is entirely circumvented. The box notation also clarifies the mathematical properties of grouping dissonances. Any grouping dissonance will have a point of realignment, where both layers have a simultaneous attack point. This happens after *x* number of pulses, where *x* is the lowest common multiple between the cardinalities of the two layers. 12 is the lowest common multiple between 3 and 4, so a 3:4 grouping dissonance realigns every twelve pulses.

Example 8. Box notation showing a 3:4 grouping dissonance as in Calvin Harris's "I'm Not Alone."

Grouping dissonance via ostinati

A common musical device in many sorts of music is the ostinato: a rhythmic motive that repeats within a context that is not similarly repeating. If the length of the ostinato does not align with the prevailing meter, the ostinato can create a sense of grouping dissonance. In these cases, the rhythms on their own may not indicate a grouping dissonance, but combined with the pitch content of the ostinato, a grouping dissonance becomes audible.

Igor Stravinsky, a particular lover of metrical dissonance and other kinds of rhythmic surprise, creates grouping dissonance with an ostinato in the "Alleluia, laudate dominum" from *Symphony of Psalms* (Example 9). While the half notes that form the bass line of this excerpt are not themselves in conflict with the $\mathbf{^3_2}$ meter, the repeating pattern of four notes (E♭–B♭–F–B♭) suggests a four-beat grouping that does not align with the three-beat grouping of the melody and other lines. Listen to the example twice: the first time, conduct the $\mathbf{^3_2}$ meter of the melody; the second, conduct $\mathbf{^4_2}$ with the bass line.

A link to an interactive elements can be found at the bottom of this page.

Example 9. A 4-layer in the ostinato creates a grouping dissonance with the 3-layer in the other voices in Stravinsky's "Alleluia, laudate dominum" from *Symphony of Psalms* (6:37).

Changing Dissonance

Some music gets into a groove and sticks with it, but many do not: a piece may use metrical dissonance in some places and not others, creating a sense of tension-and-release. Consider the Bill Withers example above: the metrical dissonance in the **B** section contrasts with the **A** section that rhythmically very straight and without dissonance.

Let's close with an example of this technique of changing dissonance in Brahms well-known "Lullaby" ("Wiegenlied", Op. 49, No. 4).[4] The rhythm of the vocal melody is highly regular in the notated $\mathbf{^3_4}$. Now have a look at the piano accompaniment, shown in Example 10. The left hand (bass) is every bit as regular as the voice, but the right hand (treble) goes its own way:

a. We start with a rhythmic pattern suggesting three-eighth-note-long groupings that might fit better in $\mathbf{^6_8}$ rather than $\mathbf{^3_4}$, displaced by an eighth. (So before the voice even enters we arguably have both displacement and grouping dissonance!)
b. The grouping dissonance disappears almost immediately and shifts to displacement dissonance: we settle on a two eighth note grouping structure, but displacement by an eighth. This remains for the majority of the verse.
c. The opening double-dissonance briefly returns, before giving way to…
d. …the right hand (finally) playing a note on the downbeat! The dotted-quarter on beat 2 may still suggests displacement dissonance, but of a milder kind: displacement forward by a quarter note, to emphasize the second beat instead of the first (like a sarabande).
e. Finally, a measure later, we have all 6 eighth notes in the bar in a strong-weak alternation—no sense of dissonance at all.
f. The last four-bar pattern repeats.

This reading (which you may, of course, disagree with) describes a process of (slight) tension to release that is entirely in keeping with the mood of this lullaby.

A link to an interactive elements can be found at the bottom of this page.

Example 10. Changing metrical dissonance in Brahms' "Lullaby" ("Wiegenlied", Op. 49, No. 4).

Further Reading

- Gotham, Mark. 2022. "Towards a Cognitively Based Quantification of Metrical Dissonance." In *The Oxford Handbook of Time in Music*, edited by Mark Doffman, Emily Payne, and Toby Young. Oxford University Press. doi.org/10.1093/oxfordhb/9780190947279.013.12.
- Krebs, Harald. 1999. *Fantasy Pieces: Metrical Dissonance in the Music of Robert Schumann*. New York: Oxford University Press.

Assignments

1. Grouping Dissonance Composition Exercise (.pdf, .mscz). Asks students to compose two mini pieces with repeating motives of different lengths, creating grouping dissonance. References the pentatonic and hexatonic collections.

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1. Notwithstanding notable differences, there are sufficiently strong commonalities between tonal and metrical dissonance to set them out in comparable ways, based on the simplicity of the proportional relationships between the constituent parts. 11.06: Metrical Dissonance#return-footnote-804-1

2. Krebs, in turn, cites an 1837 article by composer Hector Berlioz ("Feuilleton du *Journal des Débats*, November 10, 1837") as the earliest explicit comparison using these terms. 11.06: Metrical Dissonance#return-footnote-804-2
3. Other instrumental parts could also potentially be heard as further layers of displacement dissonances. Starting with the bass guitar, while the anacrustic pattern (G–A–C) in the low register reinforces the main meter, there is also a prominent note in a higher register on beat 3 that asserts itself as a different voice. This potentially represents an alternative [latex]\mathbf{^4_4} [/latex] meter with a displacement index of one half note. The backbeat articulated with open hi-hat notes, in turn, could also be heard as a displacement dissonance (index of one quarter note), but note that many listeners will find this backbeat pattern so familiar that it actually reinforces the original meter. 11.06: Metrical Dissonance#return-footnote-804-3
4. View a full score transcription. 11.06: Metrical Dissonance#return-footnote-804-4

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11.7: Swing Rhythms [crosslist]

Go to chapter

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11.8: Rhythm and Meter in Pop Music [crosslist]

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11.9: Drumbeats [crosslist]

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11.10: Twentieth-Century Rhythmic Techniques [crosslist]

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CHAPTER OVERVIEW

Chapter 12: Anthology

12.1: Harmony Anthology

12.2: Meter Anthology

12.3: Twelve-Tone Anthology

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12.1: Harmony Anthology

Key Takeaways

- This is an anthology of a different kind and at a larger scale than the usual provision. Instead of showcasing a few, select examples (as the textbook chapters proper do), the goal here is to provide long lists of cases that at least one analyst sees in terms of the chord under discussion.
- Harmonic analysis is a reductive and subjective task and you should fully expect to disagree with some of the entries included here.
- The idea is to provide minimal curation, allowing you to roam freely among *potentially* relevant cases from across a broad repertoire, making up your own mind about what counts as an 'real' example.

Throughout this textbook, we have provided short examples of the musical subjects under discussion such as a specific chord or progression. These examples have included both simple, 'prototypical' versions to clarify how the idea works in principle, and also moments from real pieces in the repertoire.

Inevitably, these chapters only have space for a few such examples, so this final, 'anthology' section seeks to provide many more instances, enabling users to see a wider range of cases and with full context. No textbook or anthology can hope to capture the full range of ways in which these chords are used. Indeed, it's not always clear whether a moment constitutes a 'real' example of the chord at hand. Hopefully, this at least provides space to roam and explore those 'edge cases'.

This first instalment of that vision focuses primarily on harmonic matters and on a corpus of nineteenth century songs encoded as part of the OpenScore Lieder Corpus which releases its transcriptions under the CC0 licence meaning that they can be used for any purpose whatsoever without restriction.[1] The tables below list moments identified as relevant by human analysts. So while much of the grunt work of collating lists and retrieving examples etc. has been automated, the analysis itself has not.[2]

Each of the tables below gives the:

- song's metadata: composer, collection title, song name,
- measure number and Roman numeral (figure and key) for the moment in question.
- URL link through to check out (play, download, etc) the score online.

This page currently includes lists for:

- Augmented Sixth chords
- Augmented Triads
- Common Tone Diminished Sevenths
- Modal Mixture
- Neapolitan Sixth Chords

Please get in touch if you would like to see other chords or progressions represented here. For those interested in the computational side, all source material (scores, analyses, code, etc.) is available here.

Augmented Sixth chords

Click here for this textbook's chapter on this topic.

[table id=32 /]

Augmented Triads

Click here for this textbook's chapter on this topic.

[table id=34 /]

Common Tone Diminished Sevenths

Click here for this textbook's chapter on this topic.

[table id=85 /]

Modal Mixture

Click here for this textbook's chapter on this topic.

This table provides examples of modal mixture which is much more difficult define robustly than is the case for the Neapolitan sixth chords, for example. The list here provides examples where:

- Clearly mixed tone counts towards mixture and clearly non-mixed tone counts against it.
  - E.g., F-Ab-C-E in C major has both a clearly mixed tone (Ab, the minor sixth) and a clearly non-mixed tone (E, the major third).
  - Clearly clearly non-mixed tones do not necessarily preclude mixture if there are also strongly mixed tones.
- Mixture does not necessarily need to work in relation to all forms of the minor mode.
- "Chromatic" notes (that are not diatonic to the primary mode, shared between major and minor, nor mixed) are neutral
- Enharmonic spelling of the chord matters (so Ab might indicate mixture from c minor into C major, but G# probably does not);
- Secondary Roman numerals
  - can indicate mixture (are not necessarily excluded);
  - are considered against the home (primary rather than secondary) key. E.g., viio/V is considered against the I, primary tonic rather the V secondary.

Complex eh?! I'll provide a clear explanation and demonstration of all these options somewhere accessible soon. For now, every entry on this this makes at least a reasonably strong case for mixture.

[table id=31 /]

Neapolitan Sixth Chords

This table includes root position (bII) in addition to first inversion (bII6) chords, as well as seventh chords based on both.

Click here for this textbook's chapter on this topic.

[table id=33 /]

… and many more

Here, finally, are external links to corresponding anthologies on the same topics for other repertoire collections. These don't get the same focus here as they are slightly more experimental and the all important links to scores online are not currently possible. All the same, "more is more" for this large, exploratory style of anthology.

Corpus ↓; collection →	Applied	Augmented	Aug. Sixths	CTo 7th	Modal Mixture	Neapolitan
Early Choral	Early_Choral Applied	Early_Choral Augmented	Early_Choral Aug 6	Early_Choral Cto7	Early_Choral Mixture	Early_Choral Neapolitan
Keyboard Other	Keyboard_Other Applied	Keyboard_Other Augmented	Keyboard_Other Aug 6	Keyboard_Other Cto7	Keyboard_Other Mixture	Keyboard_Other Neapolitan
OpenScore-LiederCorpus	OpenScore-LiederCorpus Applied	OpenScore-LiederCorpus Augmented	OpenScore-LiederCorpus Aug 6	OpenScore-LiederCorpus Cto7	OpenScore-LiederCorpus Mixture	OpenScore-LiederCorpus Neapolitan
Piano_Sonatas	Piano_Sonatas Applied	Piano_Sonatas Augmented	Piano_Sonatas Aug 6	Piano_Sonatas Cto7	Piano_Sonatas Mixture	Piano_Sonatas Neapolitan
Quartets	Quartets Applied	Quartets Augmented	Quartets Aug 6	Quartets Cto7	Quartets Mixture	Quartets Neapolitan
Variations_and_Grounds	Variations_and_Grounds Applied	Variations_and_Grounds Augmented	Variations_and_Grounds Aug 6	Variations_and_Grounds Cto7	Variations_and_Grounds Mixture	Variations_and_Grounds Neapolitan

1. Here are links to the public-facing "version of record", the Github mirror (download all at once), the first report (2018), and the updated report (2021). 12.01: Harmony Anthology#return-footnote-816-1
2. For a longer discussion of (methods for) creating a digital age anthologies, you might like to check of a paper I published with DLfM in 2019, called ‘Moments Musicaux’.12.01: Harmony Anthology#return-footnote-816-2

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12.2: Meter Anthology

This is a placeholder chapter for forthcoming lists of moments that are notable for particular metrical techniques.

In the meantime, here is a list (from Gotham 2019) of passages in mixed meters (5s, 7s, …). The list is organised chronologically by year of composition and limited to notated music and cases in which a single mixed metrical pattern is sustained for at least four iterations such that it might realistically be internalised by a listener as a meter.
These (imperfect) criteria are intended to define a meaningful boundary for the collection guided by what meter 'is'.

[table id=53 /]

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12.3: Twelve-Tone Anthology

This page provides a list of rows used in the repertoire in the form of a:

- **Tabular list** of all the rows collected (roughly 1,600);
- **Musical representation** of those rows in 'open' values (quarter notes, no stems) and properties labelled;
- **Structured anthology**, re-organising the rows by property (e.g. with a list of the all-interval rows).

As the twelve-tone part of this textbook is at pains to point out, it's not always straightforward (or indeed musically relevant) to identify a single main row. Indeed it's not always clear what counts as 'serial'. That being the case, no list of this kind can aim to be 'definitive'. All the same, it's very useful to see at least some rows gathered together and compared. with all the relevant information: Row; Composer (Last Name(s), First Name(s)); Composition including opus number; Year; Source (e.g. URL or PDF). The row can be in any consistent text or numerical format such as 'A-Gs-G-Cs-F-Fs-C-E-Eb-D-B-Bb' or [0, 11, 10, 4, 8, 9, 3, 7, 6, 5, 2, 1]." id="return-footnote-820-1" href="#footnote-820-1" aria-label="Footnote 1">[1]

Tabular List

[table id=58 /]

Musical Notation

A link to an interactive elements can be found at the bottom of this page.

Rows in the Repertoire by FourScoreAndMore

Anthology

The full list of rows above presents examples of repertoire row usages.
The following sections interpret that list somewhat, looking for the presence of certain properties. For a longer introduction to what these properties mean, please see the Row Properties chapter.

Re-used Rows

We begin with rows used more than once in this collection. This takes account of transposition (by comparing P0 forms), but not inversion or retrograde equivalence. This list is short and largely limited to "famous" rows like the so-called "mother" chord (Berg, Ginastera, Klein) and cases of homage such as the Boulez-Messiaen and Payne-Lutyens pairs.

1. [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6]: Babbitt, Milton: Composition for Four Instruments; Schwantner, Joseph: In Aeternum (Derived Row)
2. [0, 1, 11, 2, 10, 3, 9, 8, 4, 6, 7, 5]: Babbitt, Milton: Relata I; Babbitt, Milton: Relata II
3. [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]: Babbitt, Milton: Semi-simple variations; Stockhausen, Karlheinz: Gruppen; Stockhausen, Karlheinz: Klavierstück IX; Stockhausen, Karlheinz: Klavierstück VII; Stockhausen, Karlheinz: Klavierstück X
4. [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6]: Babbitt, Milton: String Quartet, No.2; Morris, Robert: Roundelay, row 5
5. [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7]: Bach, Johann Sebastian: Chromatische Fantasie; Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 2
6. [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2]: Baker, David: "Status Symbol" from "The Black Experience"; Seiber, Mátyás: Ulysses; Spinner, Leopold: String Quartet, No.2, Op.7
7. [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6]: Barber, Samuel: Piano Sonata, Op.26; Slonimsky, Nicholas: No. 1242a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals)
8. [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]: Berg, Alban: Lyric Suite, Primary Row / mvt I; Berg, Alban: Schliesse mir die Augen Beide; Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III; Klein, Fritz: Die Maschine: Eine extonale Selbstsatire, Op.1; Klein, Fritz Heinrich: Variationen, Op.14; Slonimsky, Nicholas: No. 1317 Invertible Dodecaphonic Progressions – With all Different Intervals. (Mother Chord)
9. [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3]: Berg, Alban: Lyric Suite, mvt I; Eisler, Hanns: Der Zweck der Musik; Slonimsky, Nicholas: No. 1293a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns)
10. [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]: Boulez, Pierre: Le Marteau sans Maître, cycle of Bourreaux de solitude; Lackner, Peter: INITIUM TRIPLEX. 28. Juni 2016; für drei Tasteninstrumente; Lackner, Peter: Kanon für drei Klaviere. 28. 6. 2016;

Slonimsky, Nicholas: No. 648-654 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts); Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 1

11. [0, 11, 6, 5, 4, 3, 1, 10, 9, 7, 2, 8]: Boulez, Pierre: Structures Ia; Messiaen, Olivier: Mode de valeurs et d’intensités, Series 1
12. [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3]: Britten, Benjamin: The Turn of the Screw; Lackner, Peter: Kanon T2 à 6; Slonimsky, Nicholas: No. 1219a Fourths (Twelve-Tone Patterns); Slonimsky, Nicholas: No. 572 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts); Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 5
13. [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1]: Carter, Elliott: String Quartet, No.2 (sketch) 2; Slonimsky, Nicholas: No. 1269b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads); Slonimsky, Nicholas: No. 407 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 469 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 512 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts)
14. [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6]: Dallapiccola, Luigi: Canti di Liberazione; Dallapiccola, Luigi: Quaderno musicale di Annalibera; Dallapiccola, Luigi: Variazioni per orchestra
15. [0, 6, 11, 10, 1, 3, 5, 8, 7, 2, 4, 9]: Davies, Peter Maxwell: Five Pieces for Piano, Op.2, No.1; Davies, Peter Maxwell: Five Pieces for Piano, Op.2, No.1 (first row)
16. [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9]: Eisler, Hanns: Praeludium und Fuge über B-A-C-H for String Trio, Op.46; Slonimsky, Nicholas: No. 578 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts); Slonimsky, Nicholas: No. 579 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts); Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 11
17. [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]: Fine, Vivian: Chaconne for piano; Ginastera, Alberto: Quintet, Op.29, Row Class VII S; Slonimsky, Nicholas: No. 1232a (Twelve-Tone Spirals); Slonimsky, Nicholas: No. 1233a (Twelve-Tone Spirals); Slonimsky, Nicholas: No. 1234a (Twelve-Tone Spirals); Slonimsky, Nicholas: No. 1235a (Twelve-Tone Spirals); Slonimsky, Nicholas: No. 1318 Invertible Dodecaphonic Progressions – With all Different Intervals. (Grandmother Chord)
18. [0, 9, 3, 7, 4, 10, 2, 6, 1, 8, 11, 5]: Florey, Hans: Griechisch-lateinisches Quadrat der Ordnung 4 mit Fuge in Klangnotation; Hauer, Josef Matthias: Tanz [Zwölftonspiel] im langsamen 3/4 Takt für zwei Violinen, zwei Bratschen und Klavier zu zwei Händen; Hauer, Josef Matthias: Zwölftonmusik [Zwölftonspiel] für Klavier zu vier Händen. Februar 1959 (Fragment)
19. [0, 1, 4, 6, 5, 3, 11, 10, 9, 7, 8, 2]: Florey, Hans: Kanonvariationen; Hauer, Josef Matthias: 1. canonic Example from the theoretical work ‘Zwölftontechnik’
20. [0, 4, 6, 3, 8, 9, 7, 2, 1, 5, 11, 10]: Florey, Hans: Kleiner Doppelkanon; Florey, Hans: Magisches Quadrat der Ordnung 3
21. [0, 10, 1, 7, 4, 6, 5, 8, 3, 9, 2, 11]: Florey, Hans: Magischer Würfel mit 6 Spiegelpunkten; Florey, Hans: Sechs Kanonzyklen einunddesselben magischen Quadrates
22. [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]: Gielen, Michael: Six Songs, for bass, violin, viola, clarinet, bass clarinet, and piano; Lang, Bernhard: Der Reigen; Slonimsky, Nicholas: No. 1310 Invertible Dodecaphonic Progressions – With all Different Intervals
23. [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7]: Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 2; Ginastera, Alberto: Violin Concerto, Op.30
24. [0, 11, 1, 8, 2, 7, 5, 6, 4, 9, 3, 10]: Ginastera, Alberto: Quintet, Op.29, Row Class III 2; Ginastera, Alberto: Quintet, Op.29, Row Class VII 2
25. [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]: Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 1; Slonimsky, Nicholas: No. 655-657 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts); Slonimsky, Nicholas: No. 793 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts); Slonimsky, Nicholas: No. 822 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts); Slonimsky, Nicholas: No. 824 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts)
26. [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1]: Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 2; Slonimsky, Nicholas: No. 1266a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads)
27. [0, 9, 3, 2, 11, 6, 5, 1, 8, 7, 4, 10]: Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 3; Slonimsky, Nicholas: No. 1266b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads)
28. [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2]: Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 5; Slonimsky, Nicholas: No. 370 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts)
29. [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6]: Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 6; Slonimsky, Nicholas: No. 1231a Major Sevenths (Twelve-Tone Patterns)
30. [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7]: Gotham, Mark: Move On!; Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 5

31. [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5]: Hauer, Josef Matthias: ‘Salambo’, opera after Gustave Flaubert;, Op.60; Lackner, Peter: Salambo-Kanon (à 4); Bad Aussee, 2. Februar 2008; Matthias, Josef: Salambo, Op.60
32. [0, 9, 6, 11, 4, 1, 10, 5, 2, 8, 3, 7]: Hauer, Josef Matthias: Hausmusik [Zwölftonspiel] für Klavier zu vier Händen. September 1958; Hauer, Josef Matthias: Schulmusik für zwei Klaviere. 3. Oktober 1958; Hauer, Josef Matthias: Tanz [Zwölftonspiel] im langsamen 3/4 Takt für Violine, Bratsche und Klavier zu vier Händen. 6. September 1958; Hauer, Josef Matthias: Zwölftonspiel 22. Mai 1958; für zwei Violinen, Bratsche, Cello und Klavier zu zwei Händen; Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen
33. [0, 5, 7, 3, 9, 6, 11, 2, 8, 4, 1, 10]: Hauer, Josef Matthias: Nomos; Hauer, Josef Matthias: Nomos, Op.19 (bb.1-36)
34. [0, 9, 8, 5, 10, 2, 11, 6, 3, 7, 4, 1]: Hauer, Josef Matthias: Zwölftonspiel 26. August 1948; für Violine und Klavier; Hauer, Josef Matthias: Zwölftonspiel für Violine allein mit einer Zwölftonreihe von Dr. Ernst Weidinger
35. [0, 9, 6, 2, 3, 10, 8, 5, 4, 7, 11, 1]: Hauer, Josef Matthias: Zwölftonspiel 28. August 1948; für Violine und Klavier; Hauer, Josef Matthias: Zwölftonspiel 31. August 1948; für Violine (Flöte) und Klavier; Hauer, Josef Matthias: Zwölftonspiel 31. August 1948; für Violine und Klavier; 2. Fassung; Hauer, Josef Matthias: Zwölftonspiel für Violine und Cembalo [Klavier]. 27. August 1948
36. [0, 4, 2, 9, 10, 6, 11, 1, 7, 3, 8, 5]: Hauer, Josef Matthias: Zwölftonspiel 5. September 1957; für Violine, Bratsche und Klavier; Hauer, Josef Matthias: Zwölftonspiel 9. September 1957; für vier Solostimmen [S, A, T, B], Violine, Bratsche und Klavier
37. [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5]: Hauer, Josef Matthias: Zwölftonspiel für Flöte, Horn, Violine, Bratsche, Cello und Klavier; Hauer, Josef Matthias: Zwölftonspiel für Violine und Klavier; Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche und Cello (‘Ins Räumliche übertragen’). 3. September 1953; Hauer, Josef Matthias: Zwölftonspiel in drei Teilen für zwei Violinen, Bratsche und Cello. 31. Juli 1953
38. [0, 6, 11, 4, 2, 9, 3, 1, 5, 7, 10, 8]: Hauer, Josef Matthias: Zwölftonspiel für Klavier. 11. Juni 1955; Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. Mai 1955
39. [0, 5, 7, 4, 6, 1, 9, 3, 8, 11, 10, 2]: Hauer, Josef Matthias: Zwölftonspiel für Orchester. 28. 9. 1954; hauer, Josef Matthias: Zwölftonspiel für Oechester. 28. 9. 1954
40. [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6]: Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.1; Slonimsky, Nicholas: No. 642 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts)
41. [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5]: Krenek, Ernst: Studies in Counterpoint; Krenek, Ernst: Studies in Counterpoint (i); Krenek, Ernst: Suite, Op.84 for solo cello
42. [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6]: Krenek, Ernst: Studies in Counterpoint (ii); Krenek, Ernst: Symeon, der Stylit
43. [0, 6, 3, 5, 9, 11, 7, 1, 4, 2, 10, 8]: Lackner, Peter: ‘Der Winter’; Lackner, Peter: Kanon für Klavierquartett. 27. April 1991
44. [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5]: Lackner, Peter: ‘Euphorbia obesa’. Kanon für Oboe, Englischhorn und Fagott.; Lackner, Peter: Kanon für zwei Violinen und Klavier. 1. Dezember 2004
45. [0, 3, 5, 11, 7, 10, 1, 8, 4, 9, 6, 2]: Lackner, Peter: ‘Lied des Harfenmädchens’ für Frauenstimme und Klavier; Lackner, Peter: ‘Lied des Harfenmädchens II’ für Flöte, Klarinette, Posaune, Violine, Cello und Klavier
46. [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6]: Lackner, Peter: ‘Ständchen’ für zwei Violinen und zwei Bratschen. 1913,2013; Lackner, Peter: Kanon für Violine, Bratsche und Klavier; Lackner, Peter: Kanon á 4
47. [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8]: Lackner, Peter: ‘Wo ist der Freund’ (erstes Lied aus dem Zyklus ‘Wilde Erdbeeren’ für Singstimme und Klavier); Lackner, Peter: Moebius-Band für Flöte, Violine, Violoncello und Klavier; Lackner, Peter: Moebius-Band für sechs Violinen
48. [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6]: Lackner, Peter: 2. Kanonzyklus; Lackner, Peter: Kanon für Flöte und Elektronik. Februar 1999
49. [0, 6, 8, 10, 1, 3, 5, 11, 9, 7, 4, 2]: Lackner, Peter: 3. Kanonzyklus; Lackner, Peter: Kanon für Klavier
50. [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8]: Lackner, Peter: 4. Kanonzyklus; Lackner, Peter: Kanon für Flöte, Akkordeon, zwei Violinen, Bratsche und Klavier; Lackner, Peter: Kanon für Klavier. April 2000
51. [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3]: Lackner, Peter: KANON für A, O & Gsellmanns Weltmaschine. 8. Oktober 1958,2008; Lackner, Peter: Kanon für Streichquartett. 22.September 2003
52. [0, 2, 7, 3, 5, 10, 6, 8, 1, 9, 11, 4]: Lackner, Peter: Kanon T3 à 4; Slonimsky, Nicholas: No. 499 Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts)
53. [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8]: Lackner, Peter: Kanon für Cello und Klavier; Lackner, Peter: Kanon für Klavier. 5. April 1989; Lackner, Peter: Kanon für Violine und Violoncello
54. [0, 1, 10, 7, 9, 4, 5, 11, 8, 6, 2, 3]: Lackner, Peter: Kanon für Klavier zu vier Händen. Frühling 1984; Lackner, Peter: Kanon für zwei Violinen und Klavier. Frühjahr 1984

55. [0, 11, 3, 10, 6, 2, 7, 8, 4, 9, 1, 5]: Lackner, Peter: Kanon für acht Instrumente. Dezember 1991, März 2007; Lackner, Peter: Kanon für drei Bratschen
56. [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5]: Liszt, Franz: Eine Faust Symphonie; Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 1; Slonimsky, Nicholas: No. 1271a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads)
57. [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]: Luo, Zhong-Rong: Chang'e; Slonimsky, Nicholas: No. 1246a Crossing Fourths (Crossing Intervals); Wuorinen, Charles: Third Piano Sonata
58. [0, 2, 7, 5, 10, 8, 6, 3, 1, 11, 9, 4]: Luo, Zhong-Rong: Dusk, row 1; Luo, Zhong-Rong: Evening
59. [0, 2, 5, 7, 4, 11, 6, 8, 1, 3, 9, 10]: Luo, Zhong-Rong: Sonatina, mvt 2; Luo, Zhong-Rong: String Quartet, No.3, row 2
60. [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7]: Lutosławski, Witold: Musique Funébre (Funeral Music); Schnittke, Alfred: Piano Sonata, No.1, mvt 2, mm. 72-76; Slonimsky, Nicholas: No. 875 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts)
61. [0, 6, 11, 10, 8, 7, 9, 1, 3, 2, 4, 5]: Lutyens, Elisabeth: The Valley of Hatsu'se; Payne, Antony: Miniature Variations on a Theme of E.L.
62. [0, 7, 2, 3, 6, 9, 10, 1, 4, 5, 8, 11]: Maderna, Bruno: Quartetto; Maderna, Bruno: Streichquartett (Basisreihe 1)
63. [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]: Messiaen, Olivier: Livre d'orgue; Nono, Luigi: Canti per tredeci; Nono, Luigi: Cori di Didone; Nono, Luigi: Il canto sospeso; Nono, Luigi: La terra e la compagna (sketch), Series 1; Zimmermann, Bernd Alois: 'Ich wandte mich um und sah alles Unrecht das geschah unter der Sonne'
64. [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]: Morris, Robert: Knot Lilacs; Morris, Robert: Not Lilacs; Slonimsky, Nicholas: No. 1302 Invertible Dodecaphonic Progressions – With all Different Intervals
65. [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11]: Nono, Luigi: Ha venido; Wolpe, Stefan: Four Studies on Basic Rows, No.4, "Basic Row" 6
66. [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10]: Nono, Luigi: Intolleranza, Tenor 2; Slonimsky, Nicholas: No. 637 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts)
67. [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2]: Nono, Luigi: Variazioni canoniche sulla serie dell'Op.41 di Arnold Schönberg; Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 2)
68. [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]: Sande, Henrik: 4032 Töne für Klavier sechshändig; Slonimsky, Nicholas: No. 1220a Fifths (Twelve-Tone Patterns); Slonimsky, Nicholas: No. 1221a Fifths (Twelve-Tone Patterns); Slonimsky, Nicholas: No. 1222aFifths (Twelve-Tone Patterns); Slonimsky, Nicholas: No. 574 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts); Wolpe, Stefan: Four Studies on Basic Rows, No.4, "Basic Row" 7
69. [0, 2, 3, 6, 7, 11, 1, 9, 4, 8, 5, 10]: Santoro, Claudio: Invenções a duas vozes (Two-Part inventions); Santoro, Claudio: Sonata 1942
70. [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7]: Schnittke, Alfred: Concerto Grosso, No.3, monogram 1; Schnittke, Alfred: Concerto Grosso, No.3
71. [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5]: Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, new row; Slonimsky, Nicholas: No. 813 Interpolation of Three Notes (Quinquetone Progression; Equal Division of Five Octaves into Six Parts)
72. [0, 11, 9, 7, 2, 4, 6, 5, 3, 1, 8, 10]: Slonimsky, Nicholas: No. 1237a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals); Slonimsky, Nicholas: No. 1297a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns)
73. [0, 11, 2, 9, 4, 7, 6, 5, 8, 3, 10, 1]: Slonimsky, Nicholas: No. 1239a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals); Slonimsky, Nicholas: No. 1250a Crossing Seconds (Crossing Intervals)
74. [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11]: Slonimsky, Nicholas: No. 1265 Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads); Slonimsky, Nicholas: No. 1265a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads)
75. [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11]: Slonimsky, Nicholas: No. 1269a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads); Slonimsky, Nicholas: No. 753 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts)
76. [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7]: Slonimsky, Nicholas: No. 1271b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads); Wolpe, Stefan: Four Studies on Basic Rows, No.4, "Basic Row" 8
77. [0, 11, 1, 10, 2, 9, 6, 5, 7, 4, 8, 3]: Slonimsky, Nicholas: No. 1298a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns); Slonimsky, Nicholas: No. 1300a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns)
78. [0, 3, 8, 4, 7, 5, 6, 9, 2, 10, 1, 11]: Slonimsky, Nicholas: No. 1298b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns); Slonimsky, Nicholas: No. 1300b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns)

79. [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2]: Slonimsky, Nicholas: No. 388 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts); Slonimsky, Nicholas: No. 390 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts)
80. [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2]: Slonimsky, Nicholas: No. 389 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts); Slonimsky, Nicholas: No. 391 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts)
81. [0, 8, 7, 3, 11, 10, 6, 2, 1, 9, 5, 4]: Slonimsky, Nicholas: No. 410 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 466 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts)
82. [0, 10, 5, 3, 1, 8, 6, 4, 11, 9, 7, 2]: Slonimsky, Nicholas: No. 415 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 505 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts)
83. [0, 11, 4, 3, 2, 7, 6, 5, 10, 9, 8, 1]: Slonimsky, Nicholas: No. 417 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 500 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts)
84. [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4]: Slonimsky, Nicholas: No. 420 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 456 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 503 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts)
85. [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5]: Slonimsky, Nicholas: No. 459 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts); Slonimsky, Nicholas: No. 508 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts)
86. [0, 6, 7, 8, 9, 10, 11, 5, 4, 3, 2, 1]: Slonimsky, Nicholas: No. 643 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts); Slonimsky, Nicholas: No. 644 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts)
87. [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 5, 10]: Slonimsky, Nicholas: No. 749 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts); Slonimsky, Nicholas: No. 799 Infra-Infrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts)
88. [0, 8, 1, 11, 10, 7, 5, 9, 4, 6, 3, 2]: Stockhausen, Karlheinz: Klavierstück “V.5 or Pre-VI” (row of original 1954 version); Stockhausen, Karlheinz: Klavierstück VIII
89. [0, 11, 3, 2, 9, 1, 7, 8, 4, 10, 5, 6]: Zappa, Frank: Brown Shoes Don’t Make It; Zappa, Frank: Waltz

All-Interval

All-interval rows go through all 11 different intervals (1, 2, 3, … 11) between neighbouring pitches in the row.

1. Babbitt, Milton: Du, row i, [0, 9, 2, 10, 11, 1, 7, 5, 4, 8, 3, 6]
2. Babbitt, Milton: Du, row ii, [0, 5, 2, 10, 9, 7, 1, 3, 4, 8, 11, 6]
3. Babbitt, Milton: Partitions, [0, 7, 9, 10, 2, 11, 5, 8, 4, 3, 1, 6]
4. Babbitt, Milton: Semi-simple variations, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
5. Babbitt, Milton: Sounds and Words, [0, 9, 2, 4, 8, 3, 11, 10, 1, 7, 5, 6]
6. Babbitt, Milton: String Quartet, No.2, [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6]
7. Babbitt, Milton: The Widow’s Lament in Springtime, [0, 11, 9, 2, 10, 7, 1, 4, 8, 3, 5, 6]
8. Babbitt, Milton: Three Compositions for Piano, No.1, [0, 5, 7, 4, 2, 3, 9, 1, 8, 11, 10, 6]
9. Berg, Alban: Lyric Suite, Primary Row / mvt I, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
10. Berg, Alban: Schliesse mir die Augen Beide, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
11. Carter, Elliott: A Symphony of Three Orchestras, [0, 8, 7, 10, 4, 5, 2, 9, 11, 3, 1, 6]
12. Carter, Elliott: Caténaires, [0, 8, 5, 3, 7, 9, 10, 4, 11, 2, 1, 6]
13. Carter, Elliott: Night Fantasies, [0, 10, 3, 11, 8, 7, 1, 2, 5, 9, 4, 6]
14. Carter, Elliott: String Quartet, No.3, [0, 11, 2, 9, 5, 3, 4, 8, 10, 7, 1, 6]
15. Dallapiccola, Luigi: Piccola musica notturna, [0, 9, 1, 3, 4, 11, 2, 8, 7, 5, 10, 6]
16. Fine, Vivian: Chaconne for piano, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
17. Gielen, Michael: Six Songs, for bass, violin, viola, clarinet, bass clarinet, and piano, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]
18. Ginastera, Alberto: Quintet, Op.29, Row Class VII S, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]

19. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
20. Klein, Fritz: Die Maschine: Eine extonale Selbstsatire, Op.1, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
21. Klein, Fritz Heinrich: Variationen, Op.14, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
22. Krenek, Ernst: Quaestio temporis, Op.170, [0, 3, 11, 4, 2, 1, 7, 8, 10, 5, 9, 6]
23. Krenek, Ernst: Studies in Counterpoint (ii), [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6]
24. Krenek, Ernst: Symeon, der Stylit, [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6]
25. Krenek, Ernst: Symphonic Piece for string Orchestra, Op.86, [0, 3, 4, 10, 2, 9, 11, 8, 7, 5, 1, 6]
26. Krenek, Ernst: Zwölf Variationen in Drei Sätzen, Op.79, [0, 1, 3, 10, 2, 5, 11, 7, 4, 9, 8, 6]
27. Lackner, Peter: 'Flügelaltar' für Klavier, [0, 9, 11, 10, 2, 7, 1, 8, 4, 5, 3, 6]
28. Lang, Bernhard: Der Reigen, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]
29. Lang, Bernhard: Monadologie XIII a; 'The Saucy Maid', [0, 1, 5, 2, 4, 9, 3, 10, 8, 11, 7, 6]
30. Lang, Klaus: 'Von der Ligurischen Küste zum Trasimenischen See'; Trauermusik für Violine und Klavier, [0, 5, 9, 8, 10, 7, 1, 4, 2, 3, 11, 6]
31. Luo, Zhong-Rong: Chang'e, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]
32. Messiaen, Olivier: Livre d'orgue, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
33. Morris, Robert: Knot Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]
34. Morris, Robert: Not Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]
35. Morris, Robert: Roundelay, row 5, [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6]
36. Nono, Luigi: Canti per tredeci, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
37. Nono, Luigi: Cori di Didone, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
38. Nono, Luigi: Il canto sospeso, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
39. Nono, Luigi: La terra e la compagna (sketch), Series 1, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
40. Schnittke, Alfred: String Quartet, No.1, [0, 2, 1, 10, 3, 11, 5, 9, 4, 7, 8, 6]
41. Slonimsky, Nicholas: No. 1232a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
42. Slonimsky, Nicholas: No. 1233a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
43. Slonimsky, Nicholas: No. 1234a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
44. Slonimsky, Nicholas: No. 1235a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
45. Slonimsky, Nicholas: No. 1245a Crossing Fifths (Crossing Intervals), [0, 5, 7, 10, 2, 3, 9, 8, 4, 1, 11, 6]
46. Slonimsky, Nicholas: No. 1246a Crossing Fourths (Crossing Intervals), [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]
47. Slonimsky, Nicholas: No. 1301 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 8, 3, 5, 11, 9, 2, 10, 7, 6]
48. Slonimsky, Nicholas: No. 1302 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]
49. Slonimsky, Nicholas: No. 1303 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 2, 3, 7, 10, 5, 11, 4, 1, 9, 8, 6]
50. Slonimsky, Nicholas: No. 1304 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Triad), [0, 3, 7, 8, 10, 5, 11, 4, 2, 1, 9, 6]
51. Slonimsky, Nicholas: No. 1305 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Sixth-Chord), [0, 3, 8, 10, 11, 7, 1, 5, 4, 2, 9, 6]
52. Slonimsky, Nicholas: No. 1306 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Triad), [0, 4, 7, 8, 3, 5, 11, 9, 2, 1, 10, 6]
53. Slonimsky, Nicholas: No. 1307 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Sixth-Chord), [0, 4, 9, 8, 11, 1, 7, 5, 2, 3, 10, 6]
54. Slonimsky, Nicholas: No. 1308 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Six-Four Chord), [0, 5, 8, 10, 9, 1, 7, 3, 4, 2, 11, 6]
55. Slonimsky, Nicholas: No. 1309 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Six-Four Chord), [0, 5, 9, 8, 10, 1, 7, 4, 2, 3, 11, 6]
56. Slonimsky, Nicholas: No. 1310 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]
57. Slonimsky, Nicholas: No. 1311 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 9, 10, 2, 5, 11, 8, 4, 3, 1, 6]

58. Slonimsky, Nicholas: No. 1312 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 10, 2, 3, 5, 11, 9, 8, 4, 1, 6]
59. Slonimsky, Nicholas: No. 1313 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 11, 2, 4, 3, 9, 10, 8, 5, 1, 6]
60. Slonimsky, Nicholas: No. 1314 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 2, 7, 4, 5, 9, 3, 11, 10, 1, 8, 6]
61. Slonimsky, Nicholas: No. 1315 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 4, 5, 2, 7, 9, 3, 1, 8, 11, 10, 6]
62. Slonimsky, Nicholas: No. 1317 Invertible Dodecaphonic Progressions – With all Different Intervals. (Mother Chord), [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
63. Slonimsky, Nicholas: No. 1318 Invertible Dodecaphonic Progressions – With all Different Intervals. (Grandmother Chord), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
64. Stockhausen, Karlheinz: Gruppen, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
65. Stockhausen, Karlheinz: Klavierstück IX, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
66. Stockhausen, Karlheinz: Klavierstück VII, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
67. Stockhausen, Karlheinz: Klavierstück X, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
68. Wuorinen, Charles: Third Piano Sonata, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]
69. Zimmermann, Bernd Alois: 'Ich wandte mich um und sah alles Unrecht das geschah unter der Sonne', [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]

Self Retrograde

We turn now to classes of row symmetry, beginning with self retrograde rows for which the prime form is transposition-equivalent to its retrograde. The section after this one deals with retrograde inversion symmetry, and rotational symmetry is included as part of the following sections on derived rows (starting with "6x Same Dyad").

1. Babbitt, Milton: Composition for Four Instruments, [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6]
2. Babbitt, Milton: Composition for Four Instruments, row i, [0, 10, 9, 8, 7, 5, 11, 1, 2, 3, 4, 6]
3. Babbitt, Milton: Composition for Four Instruments, row ii, [0, 9, 11, 2, 4, 1, 7, 10, 8, 5, 3, 6]
4. Babbitt, Milton: Composition for Four Instruments, row iii, [0, 4, 3, 8, 7, 11, 5, 1, 2, 9, 10, 6]
5. Babbitt, Milton: Composition for Four Instruments, row iv, [0, 4, 1, 8, 5, 9, 3, 11, 2, 7, 10, 6]
6. Babbitt, Milton: Du, row i, [0, 9, 2, 10, 11, 1, 7, 5, 4, 8, 3, 6]
7. Babbitt, Milton: Du, row ii, [0, 5, 2, 10, 9, 7, 1, 3, 4, 8, 11, 6]
8. Babbitt, Milton: Partitions, [0, 7, 9, 10, 2, 11, 5, 8, 4, 3, 1, 6]
9. Babbitt, Milton: Semi-simple variations, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
10. Babbitt, Milton: The Widow's Lament in Springtime, [0, 11, 9, 2, 10, 7, 1, 4, 8, 3, 5, 6]
11. Barber, Samuel: Piano Sonata, Op.26, [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6]
12. Berg, Alban: Lyric Suite, Primary Row / mvt I, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
13. Berg, Alban: Schliesse mir die Augen Beide, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
14. Carter, Elliott: Night Fantasies, [0, 10, 3, 11, 8, 7, 1, 2, 5, 9, 4, 6]
15. Fine, Vivian: Chaconne for piano, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
16. Gielen, Michael: Six Songs, for bass, violin, viola, clarinet, bass clarinet, and piano, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]
17. Ginastera, Alberto: Quintet, Op.29, Row Class VII S, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
18. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
19. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 6, [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6]
20. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.1, [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6]
21. Jung, Joachim: , [0, 11, 3, 10, 2, 1, 7, 8, 4, 9, 5, 6]
22. Klein, Fritz: Die Maschine: Eine extonale Selbstsatire, Op.1, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
23. Klein, Fritz Heinrich: Variationen, Op.14, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
24. Krenek, Ernst: Quaestio temporis, Op.170, [0, 3, 11, 4, 2, 1, 7, 8, 10, 5, 9, 6]
25. Lackner, Peter: 'Flügelaltar' für Klavier, [0, 9, 11, 10, 2, 7, 1, 8, 4, 5, 3, 6]
26. Lackner, Peter: 2. Kanonzyklus, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6]
27. Lackner, Peter: Kanon für Blockflötenquartett. April 2005, [0, 10, 11, 3, 1, 2, 8, 7, 9, 5, 4, 6]

28. Lackner, Peter: Kanon für Flöte solo und N. N., [0, 3, 7, 10, 2, 5, 11, 8, 4, 1, 9, 6]
29. Lackner, Peter: Kanon für Flöte und Elektronik. Februar 1999, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6]
30. Lackner, Peter: Kanon für Violine, Viola und Akkordeon. 11. Juni 2007, [0, 11, 1, 2, 3, 10, 4, 9, 8, 7, 5, 6]
31. Lackner, Peter: Kanon für Violine solo, [0, 11, 2, 7, 10, 9, 3, 4, 1, 8, 5, 6]
32. Lackner, Peter: Kanon für zwei Singstimmen und Ensemble zur Skulpturengruppe LEM von Axel Kirchmayr und einem Text von Hannes Waltl. September 2004, [0, 2, 9, 10, 5, 7, 1, 11, 4, 3, 8, 6]
33. Lackner, Peter: Kanon für zwei Trompeten, Horn, Posaune und Tuba. 1. Mai 1993, [0, 1, 2, 10, 3, 5, 11, 9, 4, 8, 7, 6]
34. Lackner, Peter: Kanon für zwei Violinen. Frühjahr 1992, [0, 2, 4, 7, 9, 11, 5, 3, 1, 10, 8, 6]
35. Lackner, Peter: kgV (3,4) [zweistimmiger Kanon für Klavier], [0, 10, 2, 3, 5, 7, 1, 11, 9, 8, 4, 6]
36. Lang, Bernhard: Der Reigen, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]
37. Lang, Bernhard: Hemma (Music Theatre Hemma Klagenfurt 2015), [0, 5, 10, 2, 3, 1, 7, 9, 8, 4, 11, 6]
38. Lang, Bernhard: Monadologie XIII a; ‘The Saucy Maid’, [0, 1, 5, 2, 4, 9, 3, 10, 8, 11, 7, 6]
39. Lang, Klaus: ‘Von der Ligurischen Küste zum Trasimenischen See’; Trauermusik für Violine und Klavier, [0, 5, 9, 8, 10, 7, 1, 4, 2, 3, 11, 6]
40. Luo, Zhong-Rong: Chang’e, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]
41. Messiaen, Olivier: Livre d’orgue, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
42. Morris, Robert: Knot Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]
43. Morris, Robert: Not Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]
44. Nono, Luigi: Canti per tredeci, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
45. Nono, Luigi: Cori di Didone, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
46. Nono, Luigi: Il canto sospeso, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
47. Nono, Luigi: La terra e la compagna (sketch), Series 1, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]
48. Riegebauer, Sigrid: Toccata, [0, 3, 1, 2, 11, 10, 4, 5, 8, 7, 9, 6]
49. Schnittke, Alfred: Concerto Grosso, No.3, monogram 3, [0, 11, 2, 1, 3, 4, 10, 9, 7, 8, 5, 6]
50. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, [0, 2, 3, 1, 4, 5, 11, 10, 7, 9, 8, 6]
51. Schnittke, Alfred: String Quartet, No.1, [0, 2, 1, 10, 3, 11, 5, 9, 4, 7, 8, 6]
52. Schwantner, Joseph: In Aeternum (Derived Row), [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6]
53. Seiber, Mátyás: String Quartet, No.2, [0, 2, 3, 1, 4, 11, 5, 10, 7, 9, 8, 6]
54. Slonimsky, Nicholas: No. 1215a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 7, 2, 9, 4, 11, 6]
55. Slonimsky, Nicholas: No. 1229a Major Sevenths (Twelve-Tone Patterns), [0, 11, 10, 9, 8, 7, 1, 2, 3, 4, 5, 6]
56. Slonimsky, Nicholas: No. 1231a Major Sevenths (Twelve-Tone Patterns), [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6]
57. Slonimsky, Nicholas: No. 1232a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
58. Slonimsky, Nicholas: No. 1233a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
59. Slonimsky, Nicholas: No. 1234a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
60. Slonimsky, Nicholas: No. 1235a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
61. Slonimsky, Nicholas: No. 1242a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6]
62. Slonimsky, Nicholas: No. 1245a Crossing Fifths (Crossing Intervals), [0, 5, 7, 10, 2, 3, 9, 8, 4, 1, 11, 6]
63. Slonimsky, Nicholas: No. 1246a Crossing Fourths (Crossing Intervals), [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]
64. Slonimsky, Nicholas: No. 1301 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 8, 3, 5, 11, 9, 2, 10, 7, 6]
65. Slonimsky, Nicholas: No. 1302 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6]
66. Slonimsky, Nicholas: No. 1303 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 2, 3, 7, 10, 5, 11, 4, 1, 9, 8, 6]
67. Slonimsky, Nicholas: No. 1304 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Triad), [0, 3, 7, 8, 10, 5, 11, 4, 2, 1, 9, 6]
68. Slonimsky, Nicholas: No. 1305 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Sixth-Chord), [0, 3, 8, 10, 11, 7, 1, 5, 4, 2, 9, 6]
69. Slonimsky, Nicholas: No. 1306 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Triad), [0, 4, 7, 8, 3, 5, 11, 9, 2, 1, 10, 6]

70. Slonimsky, Nicholas: No. 1307 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Sixth-Chord), [0, 4, 9, 8, 11, 1, 7, 5, 2, 3, 10, 6]
71. Slonimsky, Nicholas: No. 1308 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Six-Four Chord), [0, 5, 8, 10, 9, 1, 7, 3, 4, 2, 11, 6]
72. Slonimsky, Nicholas: No. 1309 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Six-Four Chord), [0, 5, 9, 8, 10, 1, 7, 4, 2, 3, 11, 6]
73. Slonimsky, Nicholas: No. 1310 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6]
74. Slonimsky, Nicholas: No. 1311 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 9, 10, 2, 5, 11, 8, 4, 3, 1, 6]
75. Slonimsky, Nicholas: No. 1312 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 10, 2, 3, 5, 11, 9, 8, 4, 1, 6]
76. Slonimsky, Nicholas: No. 1313 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 11, 2, 4, 3, 9, 10, 8, 5, 1, 6]
77. Slonimsky, Nicholas: No. 1314 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 2, 7, 4, 5, 9, 3, 11, 10, 1, 8, 6]
78. Slonimsky, Nicholas: No. 1315 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 4, 5, 2, 7, 9, 3, 1, 8, 11, 10, 6]
79. Slonimsky, Nicholas: No. 1316 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 7, 4, 5, 9, 2, 8, 3, 11, 10, 1, 6]
80. Slonimsky, Nicholas: No. 1317 Invertible Dodecaphonic Progressions – With all Different Intervals. (Mother Chord), [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6]
81. Slonimsky, Nicholas: No. 1318 Invertible Dodecaphonic Progressions – With all Different Intervals. (Grandmother Chord), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6]
82. Slonimsky, Nicholas: No. 642 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6]
83. Spinner, Leopold: Ich lieb' eine Blume for Four-part mixed Choir, [0, 11, 2, 4, 9, 7, 1, 3, 10, 8, 5, 6]
84. Spinner, Leopold: Sonata for Clarinet and Piano, Op.17, [0, 3, 4, 1, 2, 5, 11, 8, 7, 10, 9, 6]
85. Spinner, Leopold: Sonatina for Cello and Piano, Op.26, [0, 1, 11, 2, 4, 3, 9, 10, 8, 5, 7, 6]
86. Spinner, Leopold: Sonatina for Wind Instruments, Op.23, [0, 9, 1, 5, 4, 2, 8, 10, 11, 7, 3, 6]
87. Stockhausen, Karlheinz: Gruppen, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
88. Stockhausen, Karlheinz: Klavierstück IX, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
89. Stockhausen, Karlheinz: Klavierstück VII, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
90. Stockhausen, Karlheinz: Klavierstück X, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6]
91. Webern, Anton: Symphony, Op.21, [0, 3, 2, 1, 5, 4, 10, 11, 7, 8, 9, 6]
92. Wuorinen, Charles: Third Piano Sonata, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6]
93. Zimmermann, Bernd Alois: 'Ich wandte mich um und sah alles Unrecht das geschah unter der Sonne', [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6]

Self Retrograde Inversion

These rows have a palindromic interval succession meaning that the prime is transposition-equivalent to its retrograde-inversion.

1. Bach, Johann Sebastian: Chromatische Fantasie, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7]
2. Bartók, Béla: String Quartet, No.4, [0, 5, 6, 11, 4, 9, 10, 3, 8, 1, 2, 7]
3. Bennett, Richard Rodney: Five Studies for Piano, [0, 3, 5, 6, 11, 9, 4, 2, 7, 8, 10, 1]
4. Berg, Alban: Lyric Suite, mvt I, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3]
5. Berg, Alban: Lyric Suite, mvt VI, [0, 2, 4, 7, 9, 11, 6, 8, 10, 1, 3, 5]
6. Berger, Arthur: Chamber Music for Thirteen Players, [0, 1, 11, 7, 10, 9, 6, 5, 8, 4, 2, 3]
7. Boulez, Pierre: Le Marteau sans Maître, cycle of Bourreaux de solitude, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
8. Britten, Benjamin: The Turn of the Screw, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3]
9. Carter, Elliott: String Quartet, No.2 (sketch) 1, [0, 4, 8, 3, 7, 11, 6, 10, 2, 9, 1, 5]
10. Carter, Elliott: String Quartet, No.2 (sketch) 2, [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1]
11. Carter, Elliott: String Quartet, No.2 (sketch) 3, [0, 2, 4, 6, 8, 10, 1, 3, 5, 7, 9, 11]

12. Dallapiccola, Luigi: Cinque canti, [0, 11, 5, 8, 6, 2, 7, 3, 1, 4, 10, 9]
13. Dallapiccola, Luigi: Dialoghi, [0, 1, 10, 2, 6, 4, 5, 3, 7, 11, 8, 9]
14. Dallapiccola, Luigi: Requiescant (alternative view), [0, 2, 1, 7, 11, 8, 9, 6, 10, 4, 3, 5]
15. Dallapiccola, Luigi: Ulisse [opera], [0, 2, 1, 3, 9, 8, 11, 10, 4, 6, 5, 7]
16. Denisov, Edison: Concerto for Guitar and Orchestra, Row 1, [0, 6, 10, 4, 8, 2, 3, 9, 1, 7, 11, 5]
17. Denisov, Edison: Octet for Winds, mvt 2, row B, [0, 6, 11, 5, 4, 10, 9, 3, 2, 8, 1, 7]
18. Eisler, Hanns: Der Zweck der Musik, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3]
19. Eisler, Hanns: Praeludium und Fuge über B-A-C-H for String Trio, Op.46, [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9]
20. Fano, Michel: Sonata for Two Pianos, [0, 6, 10, 7, 9, 8, 3, 2, 4, 1, 5, 11]
21. Finney, Ross Lee: Sonata Quasi una Fantasia, [0, 1, 3, 2, 4, 5, 6, 7, 9, 8, 10, 11]
22. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 4, [0, 9, 10, 11, 6, 5, 8, 7, 2, 3, 4, 1]
23. Ginastera, Alberto: Quintet, Op.29, Row Class III 1, [0, 11, 1, 8, 2, 7, 10, 3, 9, 4, 6, 5]
24. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III S, [0, 6, 11, 5, 8, 2, 7, 1, 4, 10, 3, 9]
25. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 1, [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
26. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 2, [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1]
27. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 4, [0, 2, 1, 5, 3, 4, 7, 8, 6, 10, 9, 11]
28. Hartmann, Karl Amadeus: Symphony, No.4, [0, 1, 3, 2, 11, 4, 5, 10, 7, 6, 8, 9]
29. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 3, [0, 1, 4, 6, 8, 10, 5, 7, 9, 11, 2, 3]
30. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 6, [0, 2, 4, 6, 7, 10, 5, 8, 9, 11, 1, 3]
31. Krenek, Ernst: Symphonic Elegy for String Orchestra, Op.105, [0, 1, 9, 11, 10, 2, 3, 7, 6, 8, 4, 5]
32. Lackner, Peter: 'Euphorbia obesa'. Kanon für Oboe, Englischhorn und Fagott., [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5]
33. Lackner, Peter: INITIUM TRIPLEX. 28. Juni 2016; für drei Tasteninstrumente, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
34. Lackner, Peter: KANON für A, O & Gsellmanns Weltmaschine. 8. Oktober 1958,2008, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3]
35. Lackner, Peter: Kanon T2 à 6, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3]
36. Lackner, Peter: Kanon für Klavier. 15. Juni 1992, [0, 10, 3, 8, 6, 5, 2, 1, 11, 4, 9, 7]
37. Lackner, Peter: Kanon für Schwegel, diatonisches Hackbrett und Violine, [0, 8, 4, 10, 6, 2, 5, 1, 9, 3, 11, 7]
38. Lackner, Peter: Kanon für Streichquartett. 22.September 2003, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3]
39. Lackner, Peter: Kanon für drei Klaviere. 28. 6. 2016, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
40. Lackner, Peter: Kanon für zwei Gitarren. September 2001, [0, 5, 3, 9, 11, 6, 7, 2, 4, 10, 8, 1]
41. Lackner, Peter: Kanon für zwei Violinen und Klavier. 1. Dezember 2004, [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5]
42. Lackner, Peter: TACET (drittes Lied aus dem Zyklus 'Wilde Erdbeeren'), [0, 2, 9, 5, 8, 11, 4, 7, 10, 6, 1, 3]
43. Leibowitz, René: Trois pièces pour piano, Op.19, [0, 4, 3, 1, 2, 5, 6, 9, 10, 8, 7, 11]
44. Ligeti, György: Le Grand Macabre, [0, 6, 5, 11, 10, 4, 9, 3, 2, 8, 7, 1]
45. Liszt, Franz: Eine Faust Symphonie, [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5]
46. Luo, Zhong-Rong: String Quartet, No.2, [0, 3, 5, 10, 6, 8, 11, 1, 9, 2, 4, 7]
47. Lutosławski, Witold: Musique Funébre (Funeral Music), [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7]
48. Maderna, Bruno: Improvvisazione N. 1, [0, 11, 4, 8, 3, 2, 7, 6, 1, 5, 10, 9]
49. Nono, Luigi: Ha venido, [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11]
50. Nono, Luigi: Intolleranza, Alto, [0, 6, 7, 1, 2, 8, 9, 3, 4, 10, 11, 5]
51. Nono, Luigi: Intolleranza, Baritone, [0, 2, 7, 9, 4, 6, 11, 1, 8, 10, 3, 5]
52. Nono, Luigi: Intolleranza, Tenor 1, [0, 6, 11, 5, 10, 4, 9, 3, 8, 2, 7, 1]
53. Nono, Luigi: Sarà dolce tacere, [0, 10, 5, 3, 8, 6, 1, 11, 4, 2, 9, 7]
54. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 1, [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5]
55. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 2, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7]
56. Sande, Henrik: 4032 Töne für Klavier sechshändig, [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]
57. Schnittke, Alfred: Concerto, No.2 for Violin and Chamber Orchestra, [0, 11, 1, 2, 10, 3, 4, 9, 5, 6, 8, 7]
58. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 6, [0, 11, 2, 1, 9, 10, 7, 8, 4, 3, 6, 5]
59. Schnittke, Alfred: Concerto Grosso, No.3, monogram 1, [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7]
60. Schnittke, Alfred: Concerto Grosso, No.3, [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7]
61. Schnittke, Alfred: Piano Sonata, No.1, mvt 2, mm. 72-76, [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7]
62. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 1, [0, 3, 6, 10, 2, 11, 8, 5, 9, 1, 4, 7]
63. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, new row, [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5]

64. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.31, [0, 11, 9, 10, 8, 7, 6, 5, 3, 4, 2, 1]
65. Schnittke, Alfred: Viola Concerto, [0, 11, 5, 2, 1, 6, 3, 8, 7, 4, 10, 9]
66. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 1), [0, 11, 3, 4, 8, 7, 2, 1, 5, 6, 10, 9]
67. Schoenberg, Arnold: Serenade, mvt 5, “Tanzscene”, Op.24, [0, 1, 3, 6, 7, 9, 8, 10, 11, 2, 4, 5]
68. Schwantner, Joseph: …and the mountains rising nowhere, [0, 11, 8, 7, 4, 3, 2, 1, 10, 9, 6, 5]
69. Schwantner, Joseph: Elixir (Consortium VIII), m.22, [0, 1, 4, 5, 8, 9, 6, 7, 10, 11, 2, 3]
70. Schwantner, Joseph: Modus Caelestis (A), [0, 6, 7, 1, 11, 5, 4, 10, 8, 2, 3, 9]
71. Schwantner, Joseph: Modus Caelestis (m. 39), [0, 6, 11, 10, 5, 9, 4, 8, 3, 2, 7, 1]
72. Slonimsky, Nicholas: No. 1214a Thirds (Twelve-Tone Patterns), [0, 4, 8, 11, 3, 7, 6, 10, 2, 5, 9, 1]
73. Slonimsky, Nicholas: No. 1216a Foutths (Twelve-Tone Patterns), [0, 5, 10, 3, 7, 2, 9, 4, 8, 1, 6, 11]
74. Slonimsky, Nicholas: No. 1217a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 11, 6, 1, 8, 4, 9, 2, 7]
75. Slonimsky, Nicholas: No. 1218a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 6, 11, 4, 9, 2, 7]
76. Slonimsky, Nicholas: No. 1219a Fourths (Twelve-Tone Patterns), [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3]
77. Slonimsky, Nicholas: No. 1220a Fifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]
78. Slonimsky, Nicholas: No. 1221a Fifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]
79. Slonimsky, Nicholas: No. 1222aFifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]
80. Slonimsky, Nicholas: No. 1224a Sixths (Twelve-Tone Patterns), [0, 9, 6, 3, 7, 10, 1, 4, 8, 5, 2, 11]
81. Slonimsky, Nicholas: No. 1254a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 1]
82. Slonimsky, Nicholas: No. 1255a [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 2, 5, 8, 11, 3]
83. Slonimsky, Nicholas: No. 1258b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 7, 2, 10, 6, 4, 1, 9]
84. Slonimsky, Nicholas: No. 1260a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 6, 9, 1, 5, 8, 11, 3]
85. Slonimsky, Nicholas: No. 1265 Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11]
86. Slonimsky, Nicholas: No. 1265a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11]
87. Slonimsky, Nicholas: No. 1266a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1]
88. Slonimsky, Nicholas: No. 1269a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11]
89. Slonimsky, Nicholas: No. 1269b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1]
90. Slonimsky, Nicholas: No. 1270a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 11, 3, 5, 9, 1]
91. Slonimsky, Nicholas: No. 1270b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 2, 10, 6, 3, 11, 7, 5, 1, 9]
92. Slonimsky, Nicholas: No. 1271a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5]
93. Slonimsky, Nicholas: No. 1271b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7]
94. Slonimsky, Nicholas: No. 1293a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3]
95. Slonimsky, Nicholas: No. 1296a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 8, 3, 4, 11, 6, 1, 2, 9, 10, 5]
96. Slonimsky, Nicholas: No. 230 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 6, 5, 11, 4, 10, 9, 3, 8, 2, 1, 7]
97. Slonimsky, Nicholas: No. 258 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 10, 9, 4, 3, 2, 1, 8, 7, 6, 5]

98. Slonimsky, Nicholas: No. 270 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 9, 7, 4, 2, 1, 11, 8, 6, 5, 3]
99. Slonimsky, Nicholas: No. 277 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 7, 5, 4, 2, 11, 9, 8, 6, 3, 1]
100. Slonimsky, Nicholas: No. 407 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1]
101. Slonimsky, Nicholas: No. 453 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 10, 3, 2, 1, 6, 5, 4, 9, 8, 7]
102. Slonimsky, Nicholas: No. 459 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5]
103. Slonimsky, Nicholas: No. 469 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1]
104. Slonimsky, Nicholas: No. 496 [Shostakovitch: Prelude No, 2] Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 2, 4, 3, 5, 7, 6, 8, 10, 9, 11, 1]
105. Slonimsky, Nicholas: No. 508 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5]
106. Slonimsky, Nicholas: No. 512 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1]
107. Slonimsky, Nicholas: No. 570 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 3, 2, 5, 4, 7, 6, 9, 8, 11, 10, 1]
108. Slonimsky, Nicholas: No. 572 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3]
109. Slonimsky, Nicholas: No. 574 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]
110. Slonimsky, Nicholas: No. 576 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 9, 2, 11, 4, 1, 6, 3, 8, 5, 10, 7]
111. Slonimsky, Nicholas: No. 578 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9]
112. Slonimsky, Nicholas: No. 579 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9]
113. Slonimsky, Nicholas: No. 641 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 7, 6, 5, 4, 8, 9, 10, 11]
114. Slonimsky, Nicholas: No. 648-654 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
115. Slonimsky, Nicholas: No. 655-657 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
116. Slonimsky, Nicholas: No. 692 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 3, 5, 8, 10, 11, 1, 4, 6, 7, 9]
117. Slonimsky, Nicholas: No. 698 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 5, 7, 8, 10, 1, 3, 4, 6, 9, 11]
118. Slonimsky, Nicholas: No. 736 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 7, 9, 8, 10, 3, 5, 4, 6, 11, 1]
119. Slonimsky, Nicholas: No. 753 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11]
120. Slonimsky, Nicholas: No. 793 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
121. Slonimsky, Nicholas: No. 813 Interpolation of Three Notes (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5]
122. Slonimsky, Nicholas: No. 822 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
123. Slonimsky, Nicholas: No. 823 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 1, 10, 11, 8, 9, 6, 7, 4, 5, 2, 3]

124. Slonimsky, Nicholas: No. 824 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
125. Slonimsky, Nicholas: No. 875 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7]
126. Slonimsky, Nicholas: No. 903 Inter-Ultrapolation (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 4, 8, 5, 9, 1, 10, 2, 6, 3, 7, 11]
127. Slonimsky, Nicholas: No. 997 Infra-Interpolation (Diapente Progression; Equal Division of Seven Octaves into Twelve Parts), [0, 8, 4, 7, 3, 11, 2, 10, 6, 9, 5, 1]
128. Spinner, Leopold: Fantasy for Piano, Op.9 , [0, 1, 4, 5, 2, 3, 8, 9, 6, 7, 10, 11]
129. Spinner, Leopold: Ricercata, Op.21, [0, 11, 8, 10, 2, 1, 4, 3, 7, 9, 6, 5]
130. Spinner, Leopold: Sonata for Piano, Op.3, [0, 9, 8, 6, 7, 10, 1, 4, 5, 3, 2, 11]
131. Spinner, Leopold: Trio for Violin, Cello, and Piano, Op.6, [0, 1, 7, 4, 10, 9, 6, 5, 11, 8, 2, 3]
132. Spinner, Leopold: Variations for Violin and Piano, Op.19, [0, 8, 9, 1, 2, 4, 3, 5, 6, 10, 11, 7]
133. Urbanner, Erich: Adagio, [0, 3, 1, 11, 10, 9, 8, 7, 6, 4, 2, 5]
134. Wang, Jian-Zhong: Five Pieces for Piano no. 1, “Pastorale” (variant), [0, 3, 5, 7, 4, 2, 11, 9, 6, 8, 10, 1]
135. Webern, Anton: Cantata I, Op.29, [0, 8, 11, 10, 2, 1, 4, 3, 7, 6, 9, 5]
136. Webern, Anton: String Quartet, Op.28, [0, 11, 2, 1, 5, 6, 3, 4, 8, 7, 10, 9]
137. Webern, Anton: Variations for Orchestra, Op.30, [0, 1, 4, 3, 2, 5, 6, 9, 8, 7, 10, 11]
138. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 1, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
139. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 10, [0, 10, 1, 11, 4, 2, 5, 3, 8, 6, 9, 7]
140. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 11, [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9]
141. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 2, [0, 2, 4, 6, 8, 10, 11, 1, 3, 5, 7, 9]
142. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 3, [0, 3, 1, 4, 2, 5, 6, 9, 7, 10, 8, 11]
143. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 4, [0, 4, 8, 2, 6, 10, 3, 7, 11, 5, 9, 1]
144. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 5, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3]
145. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 6, [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11]
146. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 7, [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5]
147. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 8, [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7]
148. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 9, [0, 9, 1, 10, 2, 11, 6, 3, 7, 4, 8, 5]
149. Zillig, Wilfried: Das Opfer, [0, 11, 3, 4, 8, 7, 10, 9, 1, 2, 6, 5]

6x Same Dyad (interval)

These next four sections set out cases where the discrete sub-segments of a row all form the same pitch class set. The pitch class set in question is given after the row in prime form and rows which are also self-rotational are identified (with the self-rotational interval pattern). This first section presents cases of 6x the same dyad (pitches 1-2, 3-4, 5-6, 7-8, 9-10, and 11-12).

1. Babbitt, Milton: Composition for Four Instruments, [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], pc set (0, 3)
2. Babbitt, Milton: Composition for Four Instruments, row ii, [0, 9, 11, 2, 4, 1, 7, 10, 8, 5, 3, 6], pc set (0, 3)
3. Bach, Johann Sebastian: Chromatische Fantasie, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7], pc set (0, 3)
4. Baker, David: “Status Symbol” from “The Black Experience”, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 3)
5. Bartók, Béla: String Quartet, No.4, [0, 5, 6, 11, 4, 9, 10, 3, 8, 1, 2, 7], pc set (0, 5)
6. Boulez, Pierre: Le Marteau sans Maître, cycle of Bourreaux de solitude, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], pc set (0, 1), self-rotational interval pattern 1-1-
7. Britten, Benjamin: The Turn of the Screw, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], pc set (0, 5), self-rotational interval pattern 5-9-
8. Carter, Elliott: String Quartet, No.2 (sketch) 3, [0, 2, 4, 6, 8, 10, 1, 3, 5, 7, 9, 11], pc set (0, 2)
9. Denisov, Edison: Concerto for Guitar and Orchestra, Row 1, [0, 6, 10, 4, 8, 2, 3, 9, 1, 7, 11, 5], pc set (0, 6)
10. Denisov, Edison: Octet for Winds, mvt 2, row B, [0, 6, 11, 5, 4, 10, 9, 3, 2, 8, 1, 7], pc set (0, 6)
11. Eisler, Hanns: Praeludium und Fuge über B-A-C-H for String Trio, Op.46, [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], pc set (0, 1), self-rotational interval pattern 11-3-
12. Finney, Ross Lee: Sonata Quasi una Fantasia, [0, 1, 3, 2, 4, 5, 6, 7, 9, 8, 10, 11], pc set (0, 1)
13. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 8, [0, 1, 7, 6, 8, 9, 3, 2, 4, 5, 11, 10], pc set (0, 1)
14. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III S, [0, 6, 11, 5, 8, 2, 7, 1, 4, 10, 3, 9], pc set (0, 6)

15. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 1, [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], pc set (0, 1), self-rotational interval pattern 11-11-
16. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 2, [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1], pc set (0, 3)
17. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 5, [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2], pc set (0, 5)
18. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 6, [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], pc set (0, 1)
19. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.14, [0, 2, 5, 7, 8, 10, 11, 9, 6, 4, 3, 1], pc set (0, 2)
20. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.19, [0, 1, 4, 5, 8, 9, 11, 10, 7, 6, 3, 2], pc set (0, 1)
21. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.29, [0, 1, 6, 7, 8, 9, 11, 10, 5, 4, 3, 2], pc set (0, 1)
22. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.31, [0, 1, 2, 3, 6, 7, 11, 10, 9, 8, 5, 4], pc set (0, 1)
23. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.6, [0, 2, 4, 6, 8, 10, 9, 7, 5, 3, 1, 11], pc set (0, 2)
24. Hendler, Maximilian: 'Die vollständige Ordnung der symmetrischen zwölftönigen Modi', No.1, [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], pc set (0, 1)
25. Hendler, Maximilian: aus den fünf Liedern nach Texten von Elisabeth Pöschl : 'Sonnenaufgang' für Singstimme und Klavier, Op.44-1, [0, 11, 2, 1, 5, 6, 4, 3, 8, 7, 9, 10], pc set (0, 1)
26. Kalodiki, Georgia: Six Sketches for piano, [0, 7, 6, 1, 2, 9, 8, 3, 4, 11, 5, 10], pc set (0, 5)
27. Lackner, Peter: INITIUM TRIPLEX. 28. Juni 2016; für drei Tasteninstrumente, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], pc set (0, 1), self-rotational interval pattern 1-1-
28. Lackner, Peter: Kanon T2 à 6, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], pc set (0, 5), self-rotational interval pattern 5-9-
29. Lackner, Peter: Kanon T4 á 3, [0, 5, 7, 2, 4, 9, 11, 6, 8, 1, 3, 10], pc set (0, 5)
30. Lackner, Peter: Kanon für Flöte solo und N. N., [0, 3, 7, 10, 2, 5, 11, 8, 4, 1, 9, 6], pc set (0, 3)
31. Lackner, Peter: Kanon für drei Klaviere. 28. 6. 2016, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], pc set (0, 1), self-rotational interval pattern 1-1-
32. Lackner, Peter: Moebiusband I für zwei Melodieinstrumente, [0, 6, 8, 2, 7, 1, 11, 5, 3, 9, 4, 10], pc set (0, 6)
33. Lackner, Peter: Trauermusik für Fagott, Kontrafagott und Pauke, [0, 6, 2, 8, 10, 4, 11, 5, 9, 3, 1, 7], pc set (0, 6)
34. Ligeti, György: Le Grand Macabre, [0, 6, 5, 11, 10, 4, 9, 3, 2, 8, 7, 1], pc set (0, 6)
35. Lutosławski, Witold: Musique Funébre (Funeral Music), [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7], pc set (0, 6), self-rotational interval pattern 6-11-
36. Mamlok, Ursula: Haiku Settings, No.5, [0, 11, 8, 7, 4, 3, 5, 6, 9, 10, 1, 2], pc set (0, 1)
37. Nono, Luigi: Ha venido, [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11], pc set (0, 6), self-rotational interval pattern 6-7-
38. Nono, Luigi: Intolleranza, Alto, [0, 6, 7, 1, 2, 8, 9, 3, 4, 10, 11, 5], pc set (0, 6), self-rotational interval pattern 6-1-
39. Nono, Luigi: Intolleranza, Baritone, [0, 2, 7, 9, 4, 6, 11, 1, 8, 10, 3, 5], pc set (0, 2)
40. Nono, Luigi: Intolleranza, Soprano 1, [0, 3, 4, 7, 8, 5, 6, 9, 10, 1, 2, 11], pc set (0, 3)
41. Nono, Luigi: Intolleranza, Tenor 1, [0, 6, 11, 5, 10, 4, 9, 3, 8, 2, 7, 1], pc set (0, 6), self-rotational interval pattern 6-5-
42. Nono, Luigi: Intolleranza, Tenor 2, [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10], pc set (0, 1)
43. Nono, Luigi: La terra e la compagna (sketch), Series 2, [0, 6, 1, 7, 11, 5, 2, 8, 10, 4, 3, 9], pc set (0, 6)
44. Nono, Luigi: La terra e la compagna (sketch), Series 3, [0, 9, 6, 3, 1, 4, 7, 10, 11, 8, 5, 2], pc set (0, 3)
45. Nono, Luigi: Sarà dolce tacere, [0, 10, 5, 3, 8, 6, 1, 11, 4, 2, 9, 7], pc set (0, 2)
46. Nono, Luigi: Variazioni canoniche sulla serie dell'Op.41 di Arnold Schönberg, [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], pc set (0, 1)
47. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 2, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7], pc set (0, 3)
48. Pärt, Arvo: Diagrams, [0, 11, 2, 1, 3, 4, 9, 10, 7, 8, 6, 5], pc set (0, 1)
49. Reynolds, Roger: Ambages, [0, 1, 4, 5, 7, 6, 8, 9, 10, 11, 2, 3], pc set (0, 1)
50. Rochberg, George: String Quartet, No.2 with soprano solo, [0, 11, 6, 5, 1, 2, 8, 7, 3, 4, 9, 10], pc set (0, 1)
51. Sande, Henrik: 4032 Töne für Klavier sechshändig, [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], pc set (0, 5), self-rotational interval pattern 7-7-
52. Schnittke, Alfred: Concerto Grosso, No.1, mvt 2, [0, 11, 2, 1, 8, 7, 10, 9, 6, 5, 4, 3], pc set (0, 1)
53. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 6, [0, 11, 2, 1, 9, 10, 7, 8, 4, 3, 6, 5], pc set (0, 1)
54. Schnittke, Alfred: Concerto Grosso, No.3, monogram 3, [0, 11, 2, 1, 3, 4, 10, 9, 7, 8, 5, 6], pc set (0, 1)

55. Schnittke, Alfred: Piano Sonata, No.1, mvt 2, mm. 72-76, [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7], pc set (0, 6), self-rotational interval pattern 6-11-
56. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 2, [0, 3, 7, 10, 2, 11, 6, 9, 1, 4, 8, 5], pc set (0, 3)
57. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, new row, [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5], pc set (0, 3)
58. Schnittke, Alfred: String Quartet, No.4, mvt 2, m.40, [0, 5, 10, 3, 2, 7, 8, 1, 6, 11, 4, 9], pc set (0, 5)
59. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.31, [0, 11, 9, 10, 8, 7, 6, 5, 3, 4, 2, 1], pc set (0, 1)
60. Schnittke, Alfred: Symphony, No.7, mvt 3, row y, [0, 1, 11, 10, 8, 9, 7, 6, 5, 4, 3, 2], pc set (0, 1)
61. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 1), [0, 11, 3, 4, 8, 7, 2, 1, 5, 6, 10, 9], pc set (0, 1)
62. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 2), [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], pc set (0, 1)
63. Schwantner, Joseph: …and the mountains rising nowhere, [0, 11, 8, 7, 4, 3, 2, 1, 10, 9, 6, 5], pc set (0, 1)
64. Schwantner, Joseph: Elixir (Consortium VIII), m.22, [0, 1, 4, 5, 8, 9, 6, 7, 10, 11, 2, 3], pc set (0, 1)
65. Schwantner, Joseph: In Aeternum (Derived Row), [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], pc set (0, 3)
66. Schwantner, Joseph: Modus Caelestis (A), [0, 6, 7, 1, 11, 5, 4, 10, 8, 2, 3, 9], pc set (0, 6)
67. Seiber, Mátyás: Concert Piece for Violin and Piano, [0, 1, 7, 6, 11, 10, 4, 5, 9, 8, 2, 3], pc set (0, 1)
68. Seiber, Mátyás: Ulysses, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 3)
69. Slonimsky, Nicholas: No. 1215a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 7, 2, 9, 4, 11, 6], pc set (0, 5)
70. Slonimsky, Nicholas: No. 1216a Foutths (Twelve-Tone Patterns), [0, 5, 10, 3, 7, 2, 9, 4, 8, 1, 6, 11], pc set (0, 5)
71. Slonimsky, Nicholas: No. 1217a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 11, 6, 1, 8, 4, 9, 2, 7], pc set (0, 5)
72. Slonimsky, Nicholas: No. 1218a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 6, 11, 4, 9, 2, 7], pc set (0, 5), self-rotational interval pattern 5-5-
73. Slonimsky, Nicholas: No. 1219a Fourths (Twelve-Tone Patterns), [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], pc set (0, 5), self-rotational interval pattern 5-9-
74. Slonimsky, Nicholas: No. 1220a Fifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], pc set (0, 5), self-rotational interval pattern 7-7-
75. Slonimsky, Nicholas: No. 1221a Fifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], pc set (0, 5), self-rotational interval pattern 7-7-
76. Slonimsky, Nicholas: No. 1222aFifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], pc set (0, 5), self-rotational interval pattern 7-7-
77. Slonimsky, Nicholas: No. 1224a Sixths (Twelve-Tone Patterns), [0, 9, 6, 3, 7, 10, 1, 4, 8, 5, 2, 11], pc set (0, 3)
78. Slonimsky, Nicholas: No. 1227a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 4, 2, 8, 6, 1, 11, 9, 7, 5, 3], pc set (0, 2)
79. Slonimsky, Nicholas: No. 1228a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 2, 4, 8, 6, 11, 1, 5, 3, 7, 9], pc set (0, 2)
80. Slonimsky, Nicholas: No. 1229a Major Sevenths (Twelve-Tone Patterns), [0, 11, 10, 9, 8, 7, 1, 2, 3, 4, 5, 6], pc set (0, 1)
81. Slonimsky, Nicholas: No. 1230a Major Sevenths (Twelve-Tone Patterns), [0, 11, 3, 4, 8, 7, 1, 2, 6, 5, 9, 10], pc set (0, 1)
82. Slonimsky, Nicholas: No. 1231a Major Sevenths (Twelve-Tone Patterns), [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], pc set (0, 1)
83. Slonimsky, Nicholas: No. 1265 Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11], pc set (0, 3)
84. Slonimsky, Nicholas: No. 1265a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11], pc set (0, 3)
85. Slonimsky, Nicholas: No. 1266a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1], pc set (0, 3)
86. Slonimsky, Nicholas: No. 1294a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 9, 4, 7, 5, 2, 6, 3, 10, 1, 11, 8], pc set (0, 3)
87. Slonimsky, Nicholas: No. 1296a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 8, 3, 4, 11, 6, 1, 2, 9, 10, 5], pc set (0, 5)
88. Slonimsky, Nicholas: No. 230 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 6, 5, 11, 4, 10, 9, 3, 8, 2, 1, 7], pc set (0, 6)
89. Slonimsky, Nicholas: No. 258 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 10, 9, 4, 3, 2, 1, 8, 7, 6, 5], pc set (0, 1)
90. Slonimsky, Nicholas: No. 270 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 9, 7, 4, 2, 1, 11, 8, 6, 5, 3], pc set (0, 2)
91. Slonimsky, Nicholas: No. 277 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 7, 5, 4, 2, 11, 9, 8, 6, 3, 1], pc set (0, 2)

92. Slonimsky, Nicholas: No. 370 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2], pc set (0, 5)
93. Slonimsky, Nicholas: No. 388 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2], pc set (0, 3)
94. Slonimsky, Nicholas: No. 389 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2], pc set (0, 3)
95. Slonimsky, Nicholas: No. 390 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2], pc set (0, 3)
96. Slonimsky, Nicholas: No. 391 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2], pc set (0, 3)
97. Slonimsky, Nicholas: No. 570 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 3, 2, 5, 4, 7, 6, 9, 8, 11, 10, 1], pc set (0, 3), self-rotational interval pattern 3-11-
98. Slonimsky, Nicholas: No. 572 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], pc set (0, 5), self-rotational interval pattern 5-9-
99. Slonimsky, Nicholas: No. 574 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], pc set (0, 5), self-rotational interval pattern 7-7-
100. Slonimsky, Nicholas: No. 576 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 9, 2, 11, 4, 1, 6, 3, 8, 5, 10, 7], pc set (0, 3), self-rotational interval pattern 9-5-
101. Slonimsky, Nicholas: No. 578 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], pc set (0, 1), self-rotational interval pattern 11-3-
102. Slonimsky, Nicholas: No. 579 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], pc set (0, 1), self-rotational interval pattern 11-3-
103. Slonimsky, Nicholas: No. 637 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10], pc set (0, 1)
104. Slonimsky, Nicholas: No. 638 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 9, 10, 4, 3, 1, 2, 8, 7, 5, 6], pc set (0, 1)
105. Slonimsky, Nicholas: No. 641 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 7, 6, 5, 4, 8, 9, 10, 11], pc set (0, 1)
106. Slonimsky, Nicholas: No. 642 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], pc set (0, 1)
107. Slonimsky, Nicholas: No. 645 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 11, 10, 8, 9, 7, 6, 4, 5, 3, 2], pc set (0, 1)
108. Slonimsky, Nicholas: No. 648-654 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], pc set (0, 1), self-rotational interval pattern 1-1-
109. Slonimsky, Nicholas: No. 655-657 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], pc set (0, 1), self-rotational interval pattern 11-11-
110. Slonimsky, Nicholas: No. 692 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 3, 5, 8, 10, 11, 1, 4, 6, 7, 9], pc set (0, 2)
111. Slonimsky, Nicholas: No. 698 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 5, 7, 8, 10, 1, 3, 4, 6, 9, 11], pc set (0, 2)
112. Slonimsky, Nicholas: No. 736 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 7, 9, 8, 10, 3, 5, 4, 6, 11, 1], pc set (0, 2)
113. Slonimsky, Nicholas: No. 793 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], pc set (0, 1), self-rotational interval pattern 11-11-
114. Slonimsky, Nicholas: No. 813 Interpolation of Three Notes (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5], pc set (0, 3)
115. Slonimsky, Nicholas: No. 822 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], pc set (0, 1), self-rotational interval pattern 11-11-
116. Slonimsky, Nicholas: No. 823 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 1, 10, 11, 8, 9, 6, 7, 4, 5, 2, 3], pc set (0, 1), self-rotational interval pattern 1-9-
117. Slonimsky, Nicholas: No. 824 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], pc set (0, 1), self-rotational interval pattern 11-11-

118. Slonimsky, Nicholas: No. 875 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7], pc set (0, 6), self-rotational interval pattern 6-11-
119. Slonimsky, Nicholas: No. 909 Infra-Inter-Ultrapolation (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 9, 3, 6, 5, 2, 8, 11, 10, 7, 1, 4], pc set (0, 3)
120. Spinner, Leopold: Fantasy for Piano, Op.9 , [0, 1, 4, 5, 2, 3, 8, 9, 6, 7, 10, 11], pc set (0, 1)
121. Spinner, Leopold: Sonata for Clarinet and Piano, Op.17, [0, 3, 4, 1, 2, 5, 11, 8, 7, 10, 9, 6], pc set (0, 3)
122. Spinner, Leopold: Sonata for Violin and Piano, Op.1, [0, 7, 6, 1, 3, 8, 5, 10, 2, 9, 4, 11], pc set (0, 5)
123. Spinner, Leopold: String Quartet, No.2, Op.7, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 3)
124. Spinner, Leopold: String Quartet, Op.2, [0, 1, 7, 6, 11, 10, 4, 5, 8, 9, 3, 2], pc set (0, 1)
125. Talma, Louise: Three Bagatelles, Bagatelle 3, [0, 3, 4, 1, 5, 8, 10, 7, 2, 11, 6, 9], pc set (0, 3)
126. Webern, Anton: String Quartet, Op.28, [0, 11, 2, 1, 5, 6, 3, 4, 8, 7, 10, 9], pc set (0, 1)
127. Webern, Anton: String Trio, Op.20, [0, 11, 6, 5, 10, 9, 1, 2, 7, 8, 4, 3], pc set (0, 1)
128. Wolpe, Stefan: Four Studies on Basic Rows, No.1 – Study on Tritones, [0, 6, 7, 1, 2, 8, 11, 5, 10, 4, 9, 3], pc set (0, 6)
129. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 1, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], pc set (0, 1), self-rotational interval pattern 1-1-
130. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 10, [0, 10, 1, 11, 4, 2, 5, 3, 8, 6, 9, 7], pc set (0, 2)
131. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 11, [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], pc set (0, 1), self-rotational interval pattern 11-3-
132. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 2, [0, 2, 4, 6, 8, 10, 11, 1, 3, 5, 7, 9], pc set (0, 2)
133. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 3, [0, 3, 1, 4, 2, 5, 6, 9, 7, 10, 8, 11], pc set (0, 3)
134. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 5, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], pc set (0, 5), self-rotational interval pattern 5-9-
135. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 6, [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11], pc set (0, 6), self-rotational interval pattern 6-7-
136. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 7, [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], pc set (0, 5), self-rotational interval pattern 7-7-
137. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 9, [0, 9, 1, 10, 2, 11, 6, 3, 7, 4, 8, 5], pc set (0, 3)
138. Zillig, Wilfried: Das Opfer, [0, 11, 3, 4, 8, 7, 10, 9, 1, 2, 6, 5], pc set (0, 1)
139. Zimmerman, Bernd Alois: Perspektiven, [0, 2, 10, 8, 4, 6, 3, 1, 5, 7, 11, 9], pc set (0, 2)

4x Same Trichord

Now for cases of 4x the same trichord (pitches 1-3, 4-6, 7-9 and 10-12).

1. Apostel, Hans Erich: Fischerhaus-Serenade, Op.45, [0, 4, 8, 3, 11, 7, 1, 9, 5, 2, 10, 6], pc set (0, 4, 8)
2. Babbitt, Milton: Composition for Four Instruments, [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], pc set (0, 1, 4)
3. Babbitt, Milton: Composition for Four Instruments, row i, [0, 10, 9, 8, 7, 5, 11, 1, 2, 3, 4, 6], pc set (0, 1, 3)
4. Babbitt, Milton: Composition for Four Instruments, row ii, [0, 9, 11, 2, 4, 1, 7, 10, 8, 5, 3, 6], pc set (0, 1, 3)
5. Babbitt, Milton: Composition for Four Instruments, row iii, [0, 4, 3, 8, 7, 11, 5, 1, 2, 9, 10, 6], pc set (0, 1, 4)
6. Babbitt, Milton: Composition for Four Instruments, row iv, [0, 4, 1, 8, 5, 9, 3, 11, 2, 7, 10, 6], pc set (0, 1, 4)
7. Baker, David: “Status Symbol” from “The Black Experience”, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 1, 4)
8. Barber, Samuel: Piano Sonata, Op.26, [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6], pc set (0, 4, 8)
9. Bennett, Richard Rodney: Five Studies for Piano, [0, 3, 5, 6, 11, 9, 4, 2, 7, 8, 10, 1], pc set (0, 2, 5)
10. Berg, Alban: Lulu, whole-tone row, [0, 2, 4, 6, 10, 8, 11, 7, 9, 1, 3, 5], pc set (0, 2, 4)
11. Berg, Alban: Lyric Suite, mvt I, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], pc set (0, 2, 4)
12. Berg, Alban: Lyric Suite, mvt VI, [0, 2, 4, 7, 9, 11, 6, 8, 10, 1, 3, 5], pc set (0, 2, 4)
13. Berio, Luciano: Cinque Variazioni, [0, 2, 4, 1, 3, 5, 8, 10, 6, 7, 9, 11], pc set (0, 2, 4)
14. Berio, Luciano: Sequenza I, [0, 11, 10, 9, 8, 7, 4, 6, 5, 3, 1, 2], pc set (0, 1, 2)
15. Carter, Elliott: String Quartet, No.2 (sketch) 1, [0, 4, 8, 3, 7, 11, 6, 10, 2, 9, 1, 5], pc set (0, 4, 8), self-rotational interval pattern 4-4-7-
16. Carter, Elliott: String Quartet, No.2 (sketch) 2, [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], pc set (0, 4, 8), self-rotational interval pattern 8-8-11-
17. Carter, Elliott: String Quartet, No.2 (sketch) 3, [0, 2, 4, 6, 8, 10, 1, 3, 5, 7, 9, 11], pc set (0, 2, 4)
18. Cordero, Roque: Sonata breve, [0, 1, 4, 11, 10, 7, 5, 8, 9, 6, 3, 2], pc set (0, 1, 4)

19. Crosse, Gordon: Elegy for Small Orchestra, Op.1, [0, 11, 3, 1, 9, 10, 5, 6, 2, 4, 8, 7], pc set (0, 1, 4)
20. Denisov, Edison: Concerto for Guitar and Orchestra, Row 1, [0, 6, 10, 4, 8, 2, 3, 9, 1, 7, 11, 5], pc set (0, 2, 6)
21. Denisov, Edison: Five Etudes for Solo Bassoon, row B, [0, 11, 6, 5, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 6)
22. Denisov, Edison: Five Etudes for Solo Bassoon, row C, [0, 6, 11, 5, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 6)
23. Denisov, Edison: Five Etudes for Solo Bassoon, row E, [0, 1, 7, 6, 5, 11, 10, 4, 3, 8, 2, 9], pc set (0, 1, 6)
24. Denisov, Edison: Five Etudes for Solo Bassoon, row G, [0, 11, 5, 10, 4, 3, 9, 8, 2, 1, 6, 7], pc set (0, 1, 6)
25. Denisov, Edison: Five Etudes for Solo Bassoon, row J, [0, 6, 5, 11, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 6)
26. Denisov, Edison: Octet for Winds, mvt 2, row B, [0, 6, 11, 5, 4, 10, 9, 3, 2, 8, 1, 7], pc set (0, 1, 6)
27. Dessau, Paul: Les Voix, [0, 11, 6, 8, 9, 3, 4, 10, 5, 7, 2, 1], pc set (0, 1, 6)
28. Eisler, Hanns: Der Zweck der Musik, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], pc set (0, 2, 4)
29. Eisler, Hanns: Gegen den Krieg, Op.55, [0, 3, 2, 5, 4, 7, 6, 8, 9, 10, 1, 11], pc set (0, 1, 3)
30. Finney, Ross Lee: Fantasy in Two Movements for solo violin, [0, 1, 3, 5, 4, 2, 11, 10, 8, 6, 7, 9], pc set (0, 1, 3)
31. Finney, Ross Lee: Sonata Quasi una Fantasia, [0, 1, 3, 2, 4, 5, 6, 7, 9, 8, 10, 11], pc set (0, 1, 3)
32. Ginastera, Alberto: Cantata para América Mágica, Op.27, [0, 7, 6, 5, 10, 11, 8, 1, 2, 9, 4, 3], pc set (0, 1, 6)
33. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 1, [0, 1, 6, 7, 8, 2, 10, 11, 5, 4, 9, 3], pc set (0, 1, 6)
34. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 2, [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7], pc set (0, 1, 3)
35. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 5, [0, 1, 7, 6, 5, 11, 2, 8, 9, 10, 4, 3], pc set (0, 1, 6)
36. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 4, [0, 2, 1, 5, 3, 4, 7, 8, 6, 10, 9, 11], pc set (0, 1, 2)
37. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 6, [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], pc set (0, 1, 5)
38. Ginastera, Alberto: Violin Concerto, Op.30, [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7], pc set (0, 1, 3)
39. Gotham, Mark: Move On!, [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7], pc set (0, 1, 4)
40. Harrison, Lou: Untitled Piano Piece, [0, 10, 4, 3, 9, 7, 2, 8, 6, 1, 11, 5], pc set (0, 2, 6)
41. Hauer, Josef Matthias: Nomos, Op.19 (bb.362-365), [0, 7, 5, 3, 10, 8, 4, 2, 9, 6, 11, 1], pc set (0, 2, 7)
42. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.15, [0, 1, 3, 6, 7, 9, 11, 10, 8, 5, 4, 2], pc set (0, 1, 3)
43. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.18, [0, 3, 4, 6, 9, 10, 11, 8, 7, 5, 2, 1], pc set (0, 1, 4)
44. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.19, [0, 1, 4, 5, 8, 9, 11, 10, 7, 6, 3, 2], pc set (0, 1, 4)
45. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.30, [0, 1, 2, 6, 7, 8, 11, 10, 9, 5, 4, 3], pc set (0, 1, 2)
46. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.6, [0, 2, 4, 6, 8, 10, 9, 7, 5, 3, 1, 11], pc set (0, 2, 4)
47. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.1, [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], pc set (0, 1, 2)
48. Huber, Klaus: Zwei Sätze, [0, 3, 1, 10, 11, 8, 6, 9, 7, 2, 4, 5], pc set (0, 1, 3)
49. Ives, Charles: On the Antipodes, [0, 3, 11, 8, 4, 7, 10, 9, 6, 2, 5, 1], pc set (0, 1, 4)
50. Jung, Joachim: , [0, 11, 3, 10, 2, 1, 7, 8, 4, 9, 5, 6], pc set (0, 1, 4)
51. Krenek, Ernst: Symphonic Elegy for String Orchestra, Op.105, [0, 1, 9, 11, 10, 2, 3, 7, 6, 8, 4, 5], pc set (0, 1, 4)
52. Lackner, Peter: ‘An alle Außerirdischen’. Kanon für drei Singstimmen, Kontrabaß und Klavier, [0, 4, 9, 7, 11, 2, 5, 1, 8, 10, 6, 3], pc set (0, 3, 7)
53. Lackner, Peter: ‘Euphorbia obesa’. Kanon für Oboe, Englischhorn und Fagott., [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5], pc set (0, 2, 4)
54. Lackner, Peter: 2. Kanonzyklus, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6], pc set (0, 2, 4)
55. Lackner, Peter: Das Buch der Wandlungen I für Frauenstimmen und,oder Klavier, [0, 8, 3, 5, 1, 10, 7, 11, 4, 2, 6, 9], pc set (0, 3, 7)
56. Lackner, Peter: KANON für A, O & Gsellmanns Weltmaschine. 8. Oktober 1958,2008, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3], pc set (0, 2, 4)
57. Lackner, Peter: Kanon T3 à 4, [0, 2, 7, 3, 5, 10, 6, 8, 1, 9, 11, 4], pc set (0, 2, 7), self-rotational interval pattern 2-5-8-
58. Lackner, Peter: Kanon T6 á 2, [0, 10, 8, 3, 1, 5, 6, 4, 2, 9, 7, 11], pc set (0, 2, 4)
59. Lackner, Peter: Kanon für Blockflötenquartett. April 2005, [0, 10, 11, 3, 1, 2, 8, 7, 9, 5, 4, 6], pc set (0, 1, 2)
60. Lackner, Peter: Kanon für Flöte solo und N. N., [0, 3, 7, 10, 2, 5, 11, 8, 4, 1, 9, 6], pc set (0, 3, 7)
61. Lackner, Peter: Kanon für Flöte und Elektronik. Februar 1999, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6], pc set (0, 2, 4)

62. Lackner, Peter: Kanon für Klavierquartett, [0, 8, 6, 11, 3, 9, 1, 5, 7, 2, 10, 4], pc set (0, 2, 6)
63. Lackner, Peter: Kanon für Klavierquartett. 27. Juni 1991, [0, 2, 6, 9, 11, 3, 7, 5, 1, 10, 8, 4], pc set (0, 2, 6)
64. Lackner, Peter: Kanon für Klaviertrio, [0, 2, 4, 9, 5, 7, 3, 1, 11, 6, 10, 8], pc set (0, 2, 4)
65. Lackner, Peter: Kanon für Orgel, zweimanualiges Cembalo oder Klavier, [0, 7, 2, 11, 4, 9, 6, 8, 1, 5, 3, 10], pc set (0, 2, 7)
66. Lackner, Peter: Kanon für Orgel. 21. November 1994, 4. Februar 1995, [0, 8, 5, 1, 4, 9, 2, 11, 7, 3, 10, 6], pc set (0, 3, 7)
67. Lackner, Peter: Kanon für Schwegel, diatonisches Hackbrett und Violine, [0, 8, 4, 10, 6, 2, 5, 1, 9, 3, 11, 7], pc set (0, 4, 8)
68. Lackner, Peter: Kanon für Schwegel und zwei Geigen, [0, 6, 4, 2, 10, 8, 9, 3, 5, 7, 11, 1], pc set (0, 2, 6)
69. Lackner, Peter: Kanon für Streichquartett. 22.September 2003, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3], pc set (0, 2, 4)
70. Lackner, Peter: Kanon für Violine solo, [0, 11, 2, 7, 10, 9, 3, 4, 1, 8, 5, 6], pc set (0, 1, 3)
71. Lackner, Peter: Kanon für drei Violinen I, II August 1998, [0, 2, 10, 4, 8, 6, 1, 9, 11, 5, 3, 7], pc set (0, 2, 4)
72. Lackner, Peter: Kanon für zwei Gitarren. September 2001, [0, 5, 3, 9, 11, 6, 7, 2, 4, 10, 8, 1], pc set (0, 2, 5)
73. Lackner, Peter: Kanon für zwei Singstimmen und Ensemble zur Skulpturengruppe LEM von Axel Kirchmayr und einem Text von Hannes Waltl. September 2004, [0, 2, 9, 10, 5, 7, 1, 11, 4, 3, 8, 6], pc set (0, 2, 5)
74. Lackner, Peter: Kanon für zwei Violinen, [0, 7, 4, 5, 9, 2, 3, 8, 11, 10, 6, 1], pc set (0, 3, 7)
75. Lackner, Peter: Kanon für zwei Violinen. Frühjahr 1992, [0, 2, 4, 7, 9, 11, 5, 3, 1, 10, 8, 6], pc set (0, 2, 4)
76. Lackner, Peter: Kanon für zwei Violinen und Klavier. 1. Dezember 2004, [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5], pc set (0, 2, 4)
77. Lackner, Peter: Trauermusik für Fagott, Kontrafagott und Pauke, [0, 6, 2, 8, 10, 4, 11, 5, 9, 3, 1, 7], pc set (0, 2, 6)
78. Lackner, Peter: kgV (3,4) [zweistimmiger Kanon für Klavier], [0, 10, 2, 3, 5, 7, 1, 11, 9, 8, 4, 6], pc set (0, 2, 4)
79. Lang, Bernhard: 'Der Golem' nach Gustav Meyrinck, [0, 4, 7, 8, 11, 3, 5, 2, 9, 1, 10, 6], pc set (0, 3, 7)
80. Leibowitz, René: Trois pièces pour piano, Op.19, [0, 4, 3, 1, 2, 5, 6, 9, 10, 8, 7, 11], pc set (0, 1, 4)
81. Ligeti, György: Le Grand Macabre, [0, 6, 5, 11, 10, 4, 9, 3, 2, 8, 7, 1], pc set (0, 1, 6)
82. Liszt, Franz: Eine Faust Symphonie, [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5], pc set (0, 4, 8), self-rotational interval pattern 4-4-3-
83. Luo, Zhong-Rong: Three Piano Pieces, "Arabeque", row 2, [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 10, 5], pc set (0, 2, 7)
84. Lutyens, Elisabeth: Motet (Excerota Tractati Logico-Philosophici), Op.27, [0, 11, 3, 7, 8, 4, 2, 6, 5, 1, 9, 10], pc set (0, 1, 4)
85. Mamlok, Ursula: Haiku Settings, No.5, [0, 11, 8, 7, 4, 3, 5, 6, 9, 10, 1, 2], pc set (0, 1, 4)
86. Moevs, Robert: Musica da Camera, [0, 1, 11, 3, 4, 2, 9, 10, 8, 7, 5, 6], pc set (0, 1, 2)
87. Morris, Robert: Sung Song, [0, 3, 7, 6, 9, 2, 10, 5, 1, 8, 4, 11], pc set (0, 3, 7)
88. Nono, Luigi: Incontri, [0, 2, 3, 8, 9, 6, 4, 5, 7, 11, 1, 10], pc set (0, 1, 3)
89. Nono, Luigi: Variazioni canoniche sulla serie dell'Op.41 di Arnold Schönberg, [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], pc set (0, 1, 4)
90. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 1, [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5], pc set (0, 4, 8), self-rotational interval pattern 4-4-3-
91. Pärt, Arvo: Diagrams, [0, 11, 2, 1, 3, 4, 9, 10, 7, 8, 6, 5], pc set (0, 1, 3)
92. Rochberg, George: Sonata-Fantasia, [0, 11, 10, 4, 5, 6, 9, 8, 7, 1, 2, 3], pc set (0, 1, 2)
93. Sande, Henrik: 'Volkslied' für zwei Singstimmen und Klavier. 24. 12. 2015, [0, 2, 4, 5, 7, 9, 10, 8, 6, 3, 1, 11], pc set (0, 2, 4)
94. Schnittke, Alfred: Concerto Grosso, No.3, monogram 3, [0, 11, 2, 1, 3, 4, 10, 9, 7, 8, 5, 6], pc set (0, 1, 3)
95. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.31, [0, 11, 9, 10, 8, 7, 6, 5, 3, 4, 2, 1], pc set (0, 1, 3)
96. Schnittke, Alfred: Symphony, No.7, mvt 3, row y, [0, 1, 11, 10, 8, 9, 7, 6, 5, 4, 3, 2], pc set (0, 1, 2)
97. Schoenberg, Arnold: Die Jakobsleiter, [0, 1, 4, 3, 7, 6, 11, 2, 10, 9, 5, 8], pc set (0, 1, 4)
98. Schoenberg, Arnold: Modern Psalms, The First Psalm, Op.50c, [0, 11, 8, 4, 7, 3, 1, 5, 2, 6, 9, 10], pc set (0, 1, 4)
99. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 1), [0, 11, 3, 4, 8, 7, 2, 1, 5, 6, 10, 9], pc set (0, 1, 4)
100. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 2), [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], pc set (0, 1, 4)
101. Schoenberg, Arnold: Serenade, mvt 5, "Tanzscene", Op.24, [0, 1, 3, 6, 7, 9, 8, 10, 11, 2, 4, 5], pc set (0, 1, 3)
102. Schoenberg, Arnold: Suite, Op.29, [0, 4, 3, 7, 11, 8, 9, 6, 5, 1, 2, 10], pc set (0, 1, 4)
103. Schoenberg, Arnold: Three Songs, No.3, "Madchenlied", Op.48, [0, 6, 8, 10, 2, 4, 9, 5, 3, 11, 7, 1], pc set (0, 2, 6)
104. Schwantner, Joseph: …and the mountains rising nowhere, [0, 11, 8, 7, 4, 3, 2, 1, 10, 9, 6, 5], pc set (0, 1, 4)
105. Schwantner, Joseph: Elixir (Consortium VIII), m.22, [0, 1, 4, 5, 8, 9, 6, 7, 10, 11, 2, 3], pc set (0, 1, 4)
106. Schwantner, Joseph: In Aeternum (Derived Row), [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], pc set (0, 1, 4)
107. Schwantner, Joseph: In Aeternum (Principal Row), [0, 4, 11, 6, 10, 5, 1, 9, 2, 7, 3, 8], pc set (0, 1, 5)
108. Seiber, Mátyás: Ulysses, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 1, 4)
109. Slonimsky, Nicholas: No. 1214a Thirds (Twelve-Tone Patterns), [0, 4, 8, 11, 3, 7, 6, 10, 2, 5, 9, 1], pc set (0, 4, 8)
110. Slonimsky, Nicholas: No. 1215a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 7, 2, 9, 4, 11, 6], pc set (0, 2, 7)
111. Slonimsky, Nicholas: No. 1223a Sixths (Twelve-Tone Patterns), [0, 8, 4, 1, 5, 9, 6, 2, 10, 7, 11, 3], pc set (0, 4, 8)

112. Slonimsky, Nicholas: No. 1225a Sixths (Twelve-Tone Patterns), [0, 8, 4, 7, 11, 3, 6, 2, 10, 1, 5, 9], pc set (0, 4, 8)
113. Slonimsky, Nicholas: No. 1226a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 8, 2, 4, 6, 1, 11, 9, 3, 5, 7], pc set (0, 2, 4)
114. Slonimsky, Nicholas: No. 1229a Major Sevenths (Twelve-Tone Patterns), [0, 11, 10, 9, 8, 7, 1, 2, 3, 4, 5, 6], pc set (0, 1, 2)
115. Slonimsky, Nicholas: No. 1231a Major Sevenths (Twelve-Tone Patterns), [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], pc set (0, 1, 5)
116. Slonimsky, Nicholas: No. 1242a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6], pc set (0, 4, 8)
117. Slonimsky, Nicholas: No. 1251a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 6, 9, 2, 5, 8, 11, 4], pc set (0, 3, 7)
118. Slonimsky, Nicholas: No. 1251b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 6, 2, 10, 7, 4, 1, 9], pc set (0, 3, 7)
119. Slonimsky, Nicholas: No. 1252a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 5, 9, 2, 6, 8, 11, 4], pc set (0, 3, 7)
120. Slonimsky, Nicholas: No. 1252b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 10, 6, 2, 11, 7, 4, 1, 9], pc set (0, 3, 7)
121. Slonimsky, Nicholas: No. 1253a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 5, 8, 11, 3, 6, 9, 2], pc set (0, 3, 7)
122. Slonimsky, Nicholas: No. 1253b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 1, 9, 6, 4, 11, 7, 5, 2, 10], pc set (0, 3, 7)
123. Slonimsky, Nicholas: No. 1254a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 1], pc set (0, 3, 7)
124. Slonimsky, Nicholas: No. 1254b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 1, 10, 6, 4, 11, 7, 5, 2, 9], pc set (0, 3, 7)
125. Slonimsky, Nicholas: No. 1255a [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 2, 5, 8, 11, 3], pc set (0, 3, 7)
126. Slonimsky, Nicholas: No. 1255b [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 2, 9, 6, 5, 1, 10, 7, 4, 11], pc set (0, 3, 7)
127. Slonimsky, Nicholas: No. 1256a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 5, 8, 11, 4, 6, 9, 1], pc set (0, 3, 7)
128. Slonimsky, Nicholas: No. 1256b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 4, 2, 11, 7, 5, 1, 8, 6, 3, 10], pc set (0, 3, 7)
129. Slonimsky, Nicholas: No. 1269a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11], pc set (0, 4, 8), self-rotational interval pattern 4-4-1-
130. Slonimsky, Nicholas: No. 1269b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], pc set (0, 4, 8), self-rotational interval pattern 8-8-11-
131. Slonimsky, Nicholas: No. 1270a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 11, 3, 5, 9, 1], pc set (0, 4, 8)
132. Slonimsky, Nicholas: No. 1270b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 2, 10, 6, 3, 11, 7, 5, 1, 9], pc set (0, 4, 8)
133. Slonimsky, Nicholas: No. 1271a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5], pc set (0, 4, 8), self-rotational interval pattern 4-4-3-
134. Slonimsky, Nicholas: No. 1271b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7], pc set (0, 4, 8), self-rotational interval pattern 8-8-9-
135. Slonimsky, Nicholas: No. 1272a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 6, 9, 5, 2, 11, 8, 4], pc set (0, 3, 7)
136. Slonimsky, Nicholas: No. 1272b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 6, 1, 2, 5, 9, 8, 4, 11], pc set (0, 3, 7)
137. Slonimsky, Nicholas: No. 1273a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 5, 9, 6, 2, 11, 8, 4], pc set (0, 3, 7)
138. Slonimsky, Nicholas: No. 1273b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 5, 1, 2, 6, 9, 8, 4, 11], pc set (0, 3, 7)
139. Slonimsky, Nicholas: No. 1274a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 5, 9, 6, 2, 11, 8, 3], pc set (0, 3, 7)

140. Slonimsky, Nicholas: No. 1274b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 5, 1, 2, 6, 9, 8, 3, 11], pc set (0, 3, 7)
141. Slonimsky, Nicholas: No. 1275a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 9, 6, 1, 11, 8, 3], pc set (0, 3, 7)
142. Slonimsky, Nicholas: No. 1275b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 5, 2, 1, 6, 9, 8, 3, 11], pc set (0, 3, 7)
143. Slonimsky, Nicholas: No. 1276a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 5, 2, 11, 8, 3], pc set (0, 3, 7)
144. Slonimsky, Nicholas: No. 1276b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 6, 1, 2, 5, 9, 8, 3, 11], pc set (0, 3, 7)
145. Slonimsky, Nicholas: No. 1277a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 5, 8, 4, 11, 9, 6, 1], pc set (0, 3, 7)
146. Slonimsky, Nicholas: No. 1277b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 5, 2, 4, 8, 11, 9, 6, 1], pc set (0, 3, 7)
147. Slonimsky, Nicholas: No. 1290a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 1, 5, 6, 2, 10, 7, 3, 11], pc set (0, 4, 8)
148. Slonimsky, Nicholas: No. 1290b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 5, 1, 10, 2, 6, 7, 3, 11], pc set (0, 4, 8)
149. Slonimsky, Nicholas: No. 1291a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 3, 11, 9, 5, 1], pc set (0, 4, 8)
150. Slonimsky, Nicholas: No. 1291b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 6, 2, 11, 3, 7, 9, 5, 1], pc set (0, 4, 8)
151. Slonimsky, Nicholas: No. 1292a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 6, 2, 1, 9, 5], pc set (0, 4, 8)
152. Slonimsky, Nicholas: No. 1292b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 7, 3, 2, 6, 10, 9, 5, 1], pc set (0, 4, 8)
153. Slonimsky, Nicholas: No. 1293a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], pc set (0, 2, 4)
154. Slonimsky, Nicholas: No. 1293b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 1, 11, 10, 8, 6, 9, 7, 5, 4, 2], pc set (0, 1, 3)
155. Slonimsky, Nicholas: No. 1296a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 8, 3, 4, 11, 6, 1, 2, 9, 10, 5], pc set (0, 1, 5)
156. Slonimsky, Nicholas: No. 1297b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 10, 8, 1, 3, 5, 6, 4, 2, 7, 9, 11], pc set (0, 2, 4)
157. Slonimsky, Nicholas: No. 1316 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 7, 4, 5, 9, 2, 8, 3, 11, 10, 1, 6], pc set (0, 3, 7)
158. Slonimsky, Nicholas: No. 230 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 6, 5, 11, 4, 10, 9, 3, 8, 2, 1, 7], pc set (0, 1, 6)
159. Slonimsky, Nicholas: No. 405 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 7, 5, 3, 10, 8, 6, 1, 11, 9, 4, 2], pc set (0, 2, 7), self-rotational interval pattern 7-10-10-
160. Slonimsky, Nicholas: No. 407 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], pc set (0, 4, 8), self-rotational interval pattern 8-8-11-
161. Slonimsky, Nicholas: No. 410 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 7, 3, 11, 10, 6, 2, 1, 9, 5, 4], pc set (0, 1, 5), self-rotational interval pattern 8-11-8-
162. Slonimsky, Nicholas: No. 415 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 5, 3, 1, 8, 6, 4, 11, 9, 7, 2], pc set (0, 2, 7), self-rotational interval pattern 10-7-10-
163. Slonimsky, Nicholas: No. 417 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 4, 3, 2, 7, 6, 5, 10, 9, 8, 1], pc set (0, 1, 5), self-rotational interval pattern 11-5-11-
164. Slonimsky, Nicholas: No. 420 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4], pc set (0, 1, 5), self-rotational interval pattern 11-8-8-
165. Slonimsky, Nicholas: No. 453 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 10, 3, 2, 1, 6, 5, 4, 9, 8, 7], pc set (0, 1, 2), self-rotational interval pattern 11-11-5-

166. Slonimsky, Nicholas: No. 456 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4], pc set (0, 1, 5), self-rotational interval pattern 11-8-8-
167. Slonimsky, Nicholas: No. 459 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5], pc set (0, 2, 4), self-rotational interval pattern 10-10-7-
168. Slonimsky, Nicholas: No. 466 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 7, 3, 11, 10, 6, 2, 1, 9, 5, 4], pc set (0, 1, 5), self-rotational interval pattern 8-11-8-
169. Slonimsky, Nicholas: No. 469 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], pc set (0, 4, 8), self-rotational interval pattern 8-8-11-
170. Slonimsky, Nicholas: No. 482 Infra-Interpolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 1, 3, 2, 4, 6, 5, 7, 9, 8, 10], pc set (0, 1, 2), self-rotational interval pattern 11-2-2-
171. Slonimsky, Nicholas: No. 485 Infra-Interpolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 2, 3, 1, 5, 6, 4, 8, 9, 7, 11], pc set (0, 2, 4), self-rotational interval pattern 10-4-1-
172. Slonimsky, Nicholas: No. 493 Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 1, 5, 3, 4, 8, 6, 7, 11, 9, 10, 2], pc set (0, 1, 5), self-rotational interval pattern 1-4-10-
173. Slonimsky, Nicholas: No. 496 [Shostakovitch: Prelude No, 2] Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 2, 4, 3, 5, 7, 6, 8, 10, 9, 11, 1], pc set (0, 2, 4), self-rotational interval pattern 2-2-11-
174. Slonimsky, Nicholas: No. 499 Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 2, 7, 3, 5, 10, 6, 8, 1, 9, 11, 4], pc set (0, 2, 7), self-rotational interval pattern 2-5-8-
175. Slonimsky, Nicholas: No. 500 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 4, 3, 2, 7, 6, 5, 10, 9, 8, 1], pc set (0, 1, 5), self-rotational interval pattern 11-5-11-
176. Slonimsky, Nicholas: No. 503 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4], pc set (0, 1, 5), self-rotational interval pattern 11-8-8-
177. Slonimsky, Nicholas: No. 505 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 5, 3, 1, 8, 6, 4, 11, 9, 7, 2], pc set (0, 2, 7), self-rotational interval pattern 10-7-10-
178. Slonimsky, Nicholas: No. 508 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5], pc set (0, 2, 4), self-rotational interval pattern 10-10-7-
179. Slonimsky, Nicholas: No. 512 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], pc set (0, 4, 8), self-rotational interval pattern 8-8-11-
180. Slonimsky, Nicholas: No. 639 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 5, 4, 3, 6, 7, 8, 11, 10, 9], pc set (0, 1, 2)
181. Slonimsky, Nicholas: No. 640 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 10, 7, 8, 9, 6, 5, 4, 1, 2, 3], pc set (0, 1, 2)
182. Slonimsky, Nicholas: No. 642 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], pc set (0, 1, 2)
183. Slonimsky, Nicholas: No. 746 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 1, 5, 9, 10, 2, 6, 7, 11, 3, 4, 8], pc set (0, 1, 5), self-rotational interval pattern 1-4-4-
184. Slonimsky, Nicholas: No. 749 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 5, 10], pc set (0, 2, 7), self-rotational interval pattern 2-5-2-
185. Slonimsky, Nicholas: No. 753 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11], pc set (0, 4, 8), self-rotational interval pattern 4-4-1-
186. Slonimsky, Nicholas: No. 754 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 5, 7, 9, 2, 4, 6, 11, 1, 3, 8, 10], pc set (0, 2, 7), self-rotational interval pattern 5-2-2-
187. Slonimsky, Nicholas: No. 794 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 10, 11, 9, 7, 8, 6, 4, 5, 3, 1, 2], pc set (0, 1, 2), self-rotational interval pattern 10-1-10-
188. Slonimsky, Nicholas: No. 795 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 8, 1, 9, 5, 10, 6, 2, 7, 3, 11, 4], pc set (0, 1, 5), self-rotational interval pattern 8-5-8-
189. Slonimsky, Nicholas: No. 799 Infra-Infrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 5, 10], pc set (0, 2, 7), self-rotational interval pattern 2-5-2-
190. Slonimsky, Nicholas: No. 903 Inter-Ultrapolation (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 4, 8, 5, 9, 1, 10, 2, 6, 3, 7, 11], pc set (0, 4, 8), self-rotational interval pattern 4-4-9-
191. Slonimsky, Nicholas: No. 915 Miscellaneous Patterns (Diatessaron Progression; Equal Division of Five Octaves into Twelve Parts), [0, 10, 2, 8, 4, 6, 5, 3, 7, 1, 9, 11], pc set (0, 2, 4)

192. Slonimsky, Nicholas: No. 997 Infra-Interpolation (Diapente Progression; Equal Division of Seven Octaves into Twelve Parts), [0, 8, 4, 7, 3, 11, 2, 10, 6, 9, 5, 1], pc set (0, 4, 8), self-rotational interval pattern 8-8-3-
193. Smith, Hale: Contours for Orchestra, [0, 5, 6, 4, 10, 11, 7, 2, 1, 3, 9, 8], pc set (0, 1, 6)
194. Spinner, Leopold: Chamber Symphony, Op.28, [0, 11, 10, 6, 4, 5, 2, 1, 3, 7, 8, 9], pc set (0, 1, 2)
195. Spinner, Leopold: Ricercata, Op.21, [0, 11, 8, 10, 2, 1, 4, 3, 7, 9, 6, 5], pc set (0, 1, 4)
196. Spinner, Leopold: Sonata for Clarinet and Piano, Op.17, [0, 3, 4, 1, 2, 5, 11, 8, 7, 10, 9, 6], pc set (0, 1, 4)
197. Spinner, Leopold: Sonata for Piano, Op.3, [0, 9, 8, 6, 7, 10, 1, 4, 5, 3, 2, 11], pc set (0, 1, 4)
198. Spinner, Leopold: Sonatina for Cello and Piano, Op.26, [0, 1, 11, 2, 4, 3, 9, 10, 8, 5, 7, 6], pc set (0, 1, 2)
199. Spinner, Leopold: String Quartet, No.2, Op.7, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 1, 4)
200. Spinner, Leopold: Trio for Clarinet, Cello and Piano, [0, 1, 7, 6, 5, 11, 10, 3, 4, 2, 9, 8], pc set (0, 1, 6)
201. Spinner, Leopold: Trio for Violin, Cello, and Piano, Op.6, [0, 1, 7, 4, 10, 9, 6, 5, 11, 8, 2, 3], pc set (0, 1, 6)
202. Stravinsky, Igor: Fanfare for a New Theater, [0, 11, 1, 3, 4, 2, 5, 7, 6, 8, 10, 9], pc set (0, 1, 2)
203. Talma, Louise: Six Etudes, Etude 4, [0, 1, 5, 9, 4, 8, 7, 6, 11, 2, 10, 3], pc set (0, 1, 5)
204. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 5, [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7], pc set (0, 1, 4)
205. Wang, Jian-Zhong: Five Pieces for Piano no. 1, “Pastorale” (variant), [0, 3, 5, 7, 4, 2, 11, 9, 6, 8, 10, 1], pc set (0, 2, 5)
206. Weber, Ben: Fantasia (Variations), Op.25, [0, 1, 5, 9, 10, 2, 6, 11, 7, 4, 3, 8], pc set (0, 1, 5)
207. Webern, Anton: Op.32 (un-finished), initial sketch, [0, 1, 9, 11, 3, 2, 7, 6, 10, 8, 4, 5], pc set (0, 1, 4)
208. Webern, Anton: Op.32 (un-finished), later sketch, [0, 1, 2, 11, 10, 9, 5, 4, 3, 6, 7, 8], pc set (0, 1, 2)
209. Webern, Anton: Cantata I, Op.29, [0, 8, 11, 10, 2, 1, 4, 3, 7, 6, 9, 5], pc set (0, 1, 4)
210. Webern, Anton: Concerto for Nine Instruments (Konzert), Op.24, [0, 11, 3, 4, 8, 7, 9, 5, 6, 1, 2, 10], pc set (0, 1, 4)
211. Wolpe, Stefan: Four Studies on Basic Rows, No.1 – Study on Tritones, [0, 6, 7, 1, 2, 8, 11, 5, 10, 4, 9, 3], pc set (0, 1, 6)
212. Wolpe, Stefan: Four Studies on Basic Rows, No.2 – Study on Thirds, [0, 11, 9, 8, 10, 7, 6, 5, 3, 2, 4, 1], pc set (0, 1, 3)
213. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 2, [0, 2, 4, 6, 8, 10, 11, 1, 3, 5, 7, 9], pc set (0, 2, 4)
214. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 3, [0, 3, 1, 4, 2, 5, 6, 9, 7, 10, 8, 11], pc set (0, 1, 3)
215. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 4, [0, 4, 8, 2, 6, 10, 3, 7, 11, 5, 9, 1], pc set (0, 4, 8)
216. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 8, [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7], pc set (0, 4, 8), self-rotational interval pattern 8-8-9-
217. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 9, [0, 9, 1, 10, 2, 11, 6, 3, 7, 4, 8, 5], pc set (0, 1, 4)
218. Wuorinen, Charles: Second Sonata, Voice 3, [0, 2, 4, 3, 5, 1, 9, 7, 11, 10, 8, 6], pc set (0, 2, 4)
219. Zhou, Jin-Min: Piano Quintet, Scherzo, [0, 10, 5, 4, 6, 11, 7, 9, 2, 3, 1, 8], pc set (0, 2, 7)
220. Zillig, Wilfried: Das Opfer, [0, 11, 3, 4, 8, 7, 10, 9, 1, 2, 6, 5], pc set (0, 1, 4)
221. Zimmerman, Bernd Alois: Perspektiven, [0, 2, 10, 8, 4, 6, 3, 1, 5, 7, 11, 9], pc set (0, 2, 4)

3x Same Tetrachord

Next up we have cases of 3x the same tetrachord (pitches 1-4, 5-8, and 8-12).

1. Argento, Dominick: A Water Bird Talk, Bird Row, [0, 7, 2, 1, 10, 9, 3, 8, 5, 4, 11, 6], pc set (0, 1, 2, 7)
2. Babbitt, Milton: Woodwind Quartet, [0, 3, 1, 2, 11, 10, 8, 9, 5, 7, 6, 4], pc set (0, 1, 2, 3)
3. Bach, Johann Sebastian: Chromatische Fantasie, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-2-
4. Bartók, Béla: String Quartet, No.4, [0, 5, 6, 11, 4, 9, 10, 3, 8, 1, 2, 7], pc set (0, 1, 6, 7), self-rotational interval pattern 5-1-5-5-
5. Berg, Alban: Lulu, Schigolch, [0, 2, 3, 1, 4, 5, 6, 7, 8, 9, 11, 10], pc set (0, 1, 2, 3)
6. Dallapiccola, Luigi: Ulisse [opera], [0, 2, 1, 3, 9, 8, 11, 10, 4, 6, 5, 7], pc set (0, 1, 2, 3)
7. David, Johann Nepomuk: Sonata for violin, Op.58, No.1, [0, 2, 3, 9, 11, 10, 5, 8, 1, 6, 4, 7], pc set (0, 1, 3, 6)
8. Denisov, Edison: Five Etudes for Solo Bassoon, row A, [0, 6, 1, 7, 8, 3, 2, 9, 10, 5, 11, 4], pc set (0, 1, 6, 7)
9. Denisov, Edison: Five Etudes for Solo Bassoon, row B, [0, 11, 6, 5, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 6, 7)
10. Denisov, Edison: Five Etudes for Solo Bassoon, row C, [0, 6, 11, 5, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 6, 7)
11. Denisov, Edison: Five Etudes for Solo Bassoon, row D, [0, 6, 1, 7, 8, 3, 2, 9, 10, 11, 5, 4], pc set (0, 1, 6, 7)
12. Denisov, Edison: Five Etudes for Solo Bassoon, row E, [0, 1, 7, 6, 5, 11, 10, 4, 3, 8, 2, 9], pc set (0, 1, 6, 7)
13. Denisov, Edison: Five Etudes for Solo Bassoon, row F, [0, 6, 1, 7, 3, 2, 8, 9, 10, 5, 11, 4], pc set (0, 1, 6, 7)
14. Denisov, Edison: Five Etudes for Solo Bassoon, row J, [0, 6, 5, 11, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 6, 7)
15. Denisov, Edison: Octet for Winds, mvt 2, row B, [0, 6, 11, 5, 4, 10, 9, 3, 2, 8, 1, 7], pc set (0, 1, 6, 7)
16. Finney, Ross Lee: Sonata Quasi una Fantasia, [0, 1, 3, 2, 4, 5, 6, 7, 9, 8, 10, 11], pc set (0, 1, 2, 3)

17. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 3, [0, 5, 6, 11, 2, 1, 8, 7, 10, 4, 9, 3], pc set (0, 1, 6, 7)
18. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 4, [0, 9, 10, 11, 6, 5, 8, 7, 2, 3, 4, 1], pc set (0, 1, 2, 3)
19. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 8, [0, 1, 7, 6, 8, 9, 3, 2, 4, 5, 11, 10], pc set (0, 1, 6, 7), self-rotational interval pattern 1-6-11-2-
20. Ginastera, Alberto: Sonata for Cello and Piano, Op.49, [0, 3, 2, 1, 10, 11, 8, 9, 5, 4, 7, 6], pc set (0, 1, 2, 3)
21. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III S, [0, 6, 11, 5, 8, 2, 7, 1, 4, 10, 3, 9], pc set (0, 1, 6, 7), self-rotational interval pattern 6-5-6-3-
22. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 2, [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-5-
23. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 5, [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2], pc set (0, 1, 6, 7), self-rotational interval pattern 7-6-5-10-
24. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen; mit einer Zwölftonreihe von Dr. Fritz Racek, [0, 2, 9, 11, 4, 3, 6, 1, 10, 8, 5, 7], pc set (0, 2, 3, 5)
25. Hendler, Maximilian: aus den fünf Liedern nach Texten von Elisabeth Pöschl : ‘Sonnenaufgang’ für Singstimme und Klavier, Op.44-1, [0, 11, 2, 1, 5, 6, 4, 3, 8, 7, 9, 10], pc set (0, 1, 2, 3)
26. Huber, Klaus: Zwei Sätze, [0, 3, 1, 10, 11, 8, 6, 9, 7, 2, 4, 5], pc set (0, 2, 3, 5)
27. Jelinek, Hanns: Zwölftonwerk, Op.15, [0, 10, 5, 7, 3, 6, 1, 8, 11, 9, 2, 4], pc set (0, 2, 5, 7)
28. Kalodiki, Georgia: Six Sketches for piano, [0, 7, 6, 1, 2, 9, 8, 3, 4, 11, 5, 10], pc set (0, 1, 6, 7)
29. Lackner, Peter: Kanon T4 á 3, [0, 5, 7, 2, 4, 9, 11, 6, 8, 1, 3, 10], pc set (0, 2, 5, 7), self-rotational interval pattern 5-2-7-2-
30. Lang, Bernhard: HIOB Musiktheater für Orchester, Chor und Solisten, [0, 9, 11, 10, 5, 8, 6, 7, 2, 3, 1, 4], pc set (0, 1, 2, 3)
31. Li, Bao-Shu: Träumerei of Jiuzhai Gou, [0, 5, 7, 2, 4, 11, 9, 6, 3, 1, 8, 10], pc set (0, 2, 5, 7)
32. Ligeti, György: Le Grand Macabre, [0, 6, 5, 11, 10, 4, 9, 3, 2, 8, 7, 1], pc set (0, 1, 6, 7)
33. Luo, Zhong-Rong: String Quartet, No.2, [0, 3, 5, 10, 6, 8, 11, 1, 9, 2, 4, 7], pc set (0, 2, 5, 7)
34. Morris, Robert: Beautiful Beast, [0, 1, 3, 6, 5, 10, 7, 4, 9, 8, 11, 2], pc set (0, 1, 3, 6)
35. Morris, Robert: On the Go, [0, 9, 2, 3, 5, 8, 10, 11, 1, 4, 7, 6], pc set (0, 1, 3, 6)
36. Nono, Luigi: Intolleranza, Baritone, [0, 2, 7, 9, 4, 6, 11, 1, 8, 10, 3, 5], pc set (0, 2, 5, 7), self-rotational interval pattern 2-5-2-7-
37. Nono, Luigi: Intolleranza, Tenor 2, [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10], pc set (0, 1, 2, 3), self-rotational interval pattern 1-2-11-2-
38. Nono, Luigi: La terra e la compagna (sketch), Series 3, [0, 9, 6, 3, 1, 4, 7, 10, 11, 8, 5, 2], pc set (0, 3, 6, 9)
39. Nono, Luigi: Sarà dolce tacere, [0, 10, 5, 3, 8, 6, 1, 11, 4, 2, 9, 7], pc set (0, 2, 5, 7), self-rotational interval pattern 10-7-10-5-
40. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 2, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-2-
41. Pärt, Arvo: Symphony, No.2, [0, 3, 1, 2, 4, 7, 5, 6, 8, 11, 9, 10], pc set (0, 1, 2, 3), self-rotational interval pattern 3-10-1-2-
42. Rochberg, George: String Quartet, No.2 with soprano solo, [0, 11, 6, 5, 1, 2, 8, 7, 3, 4, 9, 10], pc set (0, 1, 6, 7)
43. Schnittke, Alfred: Concerto Grosso, No.1, mvt 2, [0, 11, 2, 1, 8, 7, 10, 9, 6, 5, 4, 3], pc set (0, 1, 2, 3)
44. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 6, [0, 11, 2, 1, 9, 10, 7, 8, 4, 3, 6, 5], pc set (0, 1, 2, 3)
45. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, new row, [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-1-
46. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.31, [0, 11, 9, 10, 8, 7, 6, 5, 3, 4, 2, 1], pc set (0, 1, 2, 3)
47. Schnittke, Alfred: Symphony, No.7, mvt 3, row y, [0, 1, 11, 10, 8, 9, 7, 6, 5, 4, 3, 2], pc set (0, 1, 2, 3)
48. Schnittke, Alfred: Violin Sonata 2, [0, 10, 11, 9, 6, 8, 7, 5, 4, 1, 2, 3], pc set (0, 1, 2, 3)
49. Schwantner, Joseph: Modus Caelestis (A), [0, 6, 7, 1, 11, 5, 4, 10, 8, 2, 3, 9], pc set (0, 1, 6, 7)
50. Seiber, Mátyás: Concert Piece for Violin and Piano, [0, 1, 7, 6, 11, 10, 4, 5, 9, 8, 2, 3], pc set (0, 1, 6, 7)
51. Seiber, Mátyás: Sonata for Violin and Piano, [0, 1, 11, 10, 7, 6, 8, 9, 4, 3, 5, 2], pc set (0, 1, 2, 3)
52. Slonimsky, Nicholas: No. 1216a Foutths (Twelve-Tone Patterns), [0, 5, 10, 3, 7, 2, 9, 4, 8, 1, 6, 11], pc set (0, 2, 5, 7)
53. Slonimsky, Nicholas: No. 1217a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 11, 6, 1, 8, 4, 9, 2, 7], pc set (0, 2, 5, 7)
54. Slonimsky, Nicholas: No. 1224a Sixths (Twelve-Tone Patterns), [0, 9, 6, 3, 7, 10, 1, 4, 8, 5, 2, 11], pc set (0, 3, 6, 9)
55. Slonimsky, Nicholas: No. 1241a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 9, 6, 3, 11, 5, 2, 8, 7, 10, 1, 4], pc set (0, 3, 6, 9)
56. Slonimsky, Nicholas: No. 1265 Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-4-
57. Slonimsky, Nicholas: No. 1265a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-4-

58. Slonimsky, Nicholas: No. 1266a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-5-
59. Slonimsky, Nicholas: No. 216 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 5, 10, 7, 4, 9, 2, 11, 8, 1, 6, 3], pc set (0, 2, 5, 7), self-rotational interval pattern 5-5-9-9-
60. Slonimsky, Nicholas: No. 221 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 6, 11, 9, 4, 10, 3, 1, 8, 2, 7, 5], pc set (0, 1, 3, 6), self-rotational interval pattern 6-5-10-7-
61. Slonimsky, Nicholas: No. 230 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 6, 5, 11, 4, 10, 9, 3, 8, 2, 1, 7], pc set (0, 1, 6, 7), self-rotational interval pattern 6-11-6-5-
62. Slonimsky, Nicholas: No. 258 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 10, 9, 4, 3, 2, 1, 8, 7, 6, 5], pc set (0, 1, 2, 3), self-rotational interval pattern 11-11-11-7-
63. Slonimsky, Nicholas: No. 262 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 10, 5, 4, 3, 2, 9, 8, 7, 6, 1], pc set (0, 1, 2, 7), self-rotational interval pattern 11-11-7-11-
64. Slonimsky, Nicholas: No. 270 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 9, 7, 4, 2, 1, 11, 8, 6, 5, 3], pc set (0, 2, 3, 5), self-rotational interval pattern 10-11-10-9-
65. Slonimsky, Nicholas: No. 277 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 7, 5, 4, 2, 11, 9, 8, 6, 3, 1], pc set (0, 2, 5, 7), self-rotational interval pattern 10-9-10-11-
66. Slonimsky, Nicholas: No. 340 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 2, 9, 4, 3, 6, 1, 8, 7, 10, 5], pc set (0, 2, 3, 5), self-rotational interval pattern 11-3-7-7-
67. Slonimsky, Nicholas: No. 348 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 1, 7, 4, 2, 5, 11, 8, 6, 9, 3], pc set (0, 1, 3, 6), self-rotational interval pattern 10-3-6-9-
68. Slonimsky, Nicholas: No. 359 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 3, 9, 4, 2, 7, 1, 8, 6, 11, 5], pc set (0, 1, 3, 6), self-rotational interval pattern 10-5-6-7-
69. Slonimsky, Nicholas: No. 370 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2], pc set (0, 1, 6, 7), self-rotational interval pattern 7-6-5-10-
70. Slonimsky, Nicholas: No. 371 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 7, 2, 5, 4, 11, 6, 9, 8, 3, 10, 1], pc set (0, 2, 5, 7), self-rotational interval pattern 7-7-3-11-
71. Slonimsky, Nicholas: No. 388 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2], pc set (0, 3, 6, 9), self-rotational interval pattern 3-6-9-10-
72. Slonimsky, Nicholas: No. 389 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2], pc set (0, 3, 6, 9), self-rotational interval pattern 9-6-3-10-
73. Slonimsky, Nicholas: No. 390 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2], pc set (0, 3, 6, 9), self-rotational interval pattern 3-6-9-10-
74. Slonimsky, Nicholas: No. 391 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2], pc set (0, 3, 6, 9), self-rotational interval pattern 9-6-3-10-
75. Slonimsky, Nicholas: No. 637 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10], pc set (0, 1, 2, 3), self-rotational interval pattern 1-2-11-2-
76. Slonimsky, Nicholas: No. 638 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 9, 10, 4, 3, 1, 2, 8, 7, 5, 6], pc set (0, 1, 2, 3), self-rotational interval pattern 11-10-1-6-
77. Slonimsky, Nicholas: No. 641 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 7, 6, 5, 4, 8, 9, 10, 11], pc set (0, 1, 2, 3)
78. Slonimsky, Nicholas: No. 645 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 11, 10, 8, 9, 7, 6, 4, 5, 3, 2], pc set (0, 1, 2, 3), self-rotational interval pattern 1-10-11-10-
79. Slonimsky, Nicholas: No. 646 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 11, 6, 8, 9, 7, 2, 4, 5, 3, 10], pc set (0, 1, 2, 7), self-rotational interval pattern 1-10-7-2-
80. Slonimsky, Nicholas: No. 647 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 2, 11, 5, 8, 10, 7, 1, 4, 6, 3, 9], pc set (0, 1, 3, 6), self-rotational interval pattern 2-9-6-3-
81. Slonimsky, Nicholas: No. 685 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 1, 3, 6, 8, 9, 11, 2, 4, 5, 7, 10], pc set (0, 1, 3, 6), self-rotational interval pattern 1-2-3-2-
82. Slonimsky, Nicholas: No. 692 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 3, 5, 8, 10, 11, 1, 4, 6, 7, 9], pc set (0, 2, 3, 5), self-rotational interval pattern 2-1-2-3-
83. Slonimsky, Nicholas: No. 698 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 5, 7, 8, 10, 1, 3, 4, 6, 9, 11], pc set (0, 2, 5, 7), self-rotational interval pattern 2-3-2-1-

84. Slonimsky, Nicholas: No. 734 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 5, 11, 10, 8, 1, 7, 6, 4, 9, 3, 2], pc set (0, 1, 2, 7), self-rotational interval pattern 5-6-11-10-
85. Slonimsky, Nicholas: No. 735 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 6, 9, 11, 8, 2, 5, 7, 4, 10, 1, 3], pc set (0, 1, 3, 6), self-rotational interval pattern 6-3-2-9-
86. Slonimsky, Nicholas: No. 736 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 7, 9, 8, 10, 3, 5, 4, 6, 11, 1], pc set (0, 2, 5, 7), self-rotational interval pattern 2-5-2-11-
87. Slonimsky, Nicholas: No. 813 Interpolation of Three Notes (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5], pc set (0, 3, 6, 9), self-rotational interval pattern 3-3-3-1-
88. Slonimsky, Nicholas: No. 909 Infra-Inter-Ultrapolation (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 9, 3, 6, 5, 2, 8, 11, 10, 7, 1, 4], pc set (0, 3, 6, 9), self-rotational interval pattern 9-6-3-11-
89. Spinner, Leopold: Sonatina for Piano, Op.22, [0, 3, 2, 1, 9, 10, 11, 8, 5, 4, 7, 6], pc set (0, 1, 2, 3)
90. Spinner, Leopold: String Quartet, Op.2, [0, 1, 7, 6, 11, 10, 4, 5, 8, 9, 3, 2], pc set (0, 1, 6, 7)
91. Stravinsky, Igor: Agon, “Double Pas-de-Deux”, [0, 11, 1, 2, 9, 8, 10, 7, 5, 6, 4, 3], pc set (0, 1, 2, 3)
92. Webern, Anton: String Quartet, Op.28, [0, 11, 2, 1, 5, 6, 3, 4, 8, 7, 10, 9], pc set (0, 1, 2, 3)
93. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 10, [0, 10, 1, 11, 4, 2, 5, 3, 8, 6, 9, 7], pc set (0, 1, 2, 3), self-rotational interval pattern 10-3-10-5-
94. Yun, Isang: Garak, [0, 3, 6, 1, 4, 5, 7, 10, 9, 11, 8, 2], pc set (0, 1, 3, 6)

2x Same Hexachord

Finally, we have the relatively common condition of 2x the same hexachord (pitches 1-6 and 7-12).

1. Apostel, Hans Erich: Fischerhaus-Serenade, Op.45, [0, 4, 8, 3, 11, 7, 1, 9, 5, 2, 10, 6], pc set (0, 1, 4, 5, 8, 9)
2. Argento, Dominick: A Water Bird Talk, Lecturer Row, [0, 9, 5, 10, 2, 6, 3, 11, 8, 4, 1, 7], pc set (0, 1, 3, 5, 8, 9)
3. Argento, Dominick: From the Diary of Virginia Woolf, [0, 7, 6, 2, 11, 5, 3, 1, 8, 9, 4, 10], pc set (0, 1, 2, 5, 7, 8)
4. Atterberg, Kurt: Symphony 9 [Bbm], Op.54, ‘Sinfonia visionaria’, [0, 1, 5, 6, 7, 4, 8, 11, 10, 9, 2, 3], pc set (0, 1, 2, 3, 6, 7)
5. Babbitt, Milton: All Set, [0, 4, 5, 11, 6, 10, 7, 3, 1, 2, 9, 8], pc set (0, 1, 2, 6, 7, 8)
6. Babbitt, Milton: Arie da Capo, [0, 7, 8, 6, 2, 1, 10, 5, 11, 9, 4, 3], pc set (0, 1, 2, 6, 7, 8)
7. Babbitt, Milton: Composition for Four Instruments, [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], pc set (0, 1, 2, 3, 4, 5)
8. Babbitt, Milton: Composition for Four Instruments, row i, [0, 10, 9, 8, 7, 5, 11, 1, 2, 3, 4, 6], pc set (0, 2, 3, 4, 5, 7)
9. Babbitt, Milton: Composition for Four Instruments, row ii, [0, 9, 11, 2, 4, 1, 7, 10, 8, 5, 3, 6], pc set (0, 2, 3, 4, 5, 7)
10. Babbitt, Milton: Composition for Four Instruments, row iii, [0, 4, 3, 8, 7, 11, 5, 1, 2, 9, 10, 6], pc set (0, 1, 4, 5, 8, 9)
11. Babbitt, Milton: Composition for Four Instruments, row iv, [0, 4, 1, 8, 5, 9, 3, 11, 2, 7, 10, 6], pc set (0, 1, 4, 5, 8, 9)
12. Babbitt, Milton: Composition for Synthesizer, [0, 9, 1, 8, 4, 5, 7, 2, 3, 6, 10, 11], pc set (0, 1, 4, 5, 8, 9)
13. Babbitt, Milton: Composition for Tenor and Six Instruments, [0, 11, 7, 5, 6, 1, 4, 3, 10, 8, 2, 9], pc set (0, 1, 2, 6, 7, 8)
14. Babbitt, Milton: Composition for Twelve Instruments, [0, 1, 4, 9, 5, 8, 3, 10, 2, 11, 6, 7], pc set (0, 1, 4, 5, 8, 9)
15. Babbitt, Milton: Composition for Viola and Piano, [0, 3, 4, 8, 11, 7, 9, 2, 1, 5, 10, 6], pc set (0, 1, 4, 5, 8, 9)
16. Babbitt, Milton: Du, row i, [0, 9, 2, 10, 11, 1, 7, 5, 4, 8, 3, 6], pc set (0, 1, 2, 3, 4, 5)
17. Babbitt, Milton: Du, row ii, [0, 5, 2, 10, 9, 7, 1, 3, 4, 8, 11, 6], pc set (0, 2, 4, 5, 7, 9)
18. Babbitt, Milton: Groupwise, [0, 5, 4, 6, 10, 11, 2, 9, 3, 1, 8, 7], pc set (0, 1, 2, 6, 7, 8)
19. Babbitt, Milton: My Complements to Roger, [0, 3, 7, 8, 11, 4, 2, 6, 1, 9, 10, 5], pc set (0, 1, 4, 5, 8, 9)
20. Babbitt, Milton: My Ends Are My Beginnings, [0, 11, 4, 8, 7, 3, 5, 6, 9, 2, 10, 1], pc set (0, 1, 4, 5, 8, 9)
21. Babbitt, Milton: Paraphrases, [0, 11, 3, 10, 8, 1, 7, 5, 4, 6, 2, 9], pc set (0, 2, 3, 4, 5, 7)
22. Babbitt, Milton: Partitions, [0, 7, 9, 10, 2, 11, 5, 8, 4, 3, 1, 6], pc set (0, 2, 3, 4, 5, 7)
23. Babbitt, Milton: Relata I, [0, 1, 11, 2, 10, 3, 9, 8, 4, 6, 7, 5], pc set (0, 1, 2, 3, 4, 5)
24. Babbitt, Milton: Relata II, [0, 1, 11, 2, 10, 3, 9, 8, 4, 6, 7, 5], pc set (0, 1, 2, 3, 4, 5)
25. Babbitt, Milton: Semi-simple variations, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], pc set (0, 1, 2, 3, 4, 5)
26. Babbitt, Milton: String Quartet, No.2, [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6], pc set (0, 1, 2, 3, 4, 5)
27. Babbitt, Milton: String Quartet, No.3, [0, 11, 6, 7, 5, 1, 10, 2, 9, 3, 4, 8], pc set (0, 1, 2, 6, 7, 8)
28. Babbitt, Milton: String Quartet, No.4, [0, 2, 9, 7, 11, 10, 1, 8, 4, 3, 5, 6], pc set (0, 2, 3, 4, 5, 7)
29. Babbitt, Milton: Tableaux, [0, 11, 4, 6, 10, 5, 2, 1, 7, 9, 8, 3], pc set (0, 1, 2, 6, 7, 8)
30. Babbitt, Milton: The Crowded Air, [0, 8, 5, 7, 10, 6, 11, 1, 9, 3, 2, 4], pc set (0, 1, 2, 3, 5, 7)
31. Babbitt, Milton: The Widow’s Lament in Springtime, [0, 11, 9, 2, 10, 7, 1, 4, 8, 3, 5, 6], pc set (0, 2, 3, 4, 5, 7)
32. Babbitt, Milton: Three Compositions for Piano, No.1, [0, 5, 7, 4, 2, 3, 9, 1, 8, 11, 10, 6], pc set (0, 2, 3, 4, 5, 7)

33. Babbitt, Milton: Two Sonnets of Gerard Manley Hopkins, [0, 2, 3, 4, 7, 5, 11, 6, 10, 9, 8, 1], pc set (0, 2, 3, 4, 5, 7)
34. Babbitt, Milton: Vision and Prayer, [0, 11, 8, 3, 7, 4, 10, 9, 2, 6, 1, 5], pc set (0, 1, 4, 5, 8, 9)
35. Babbitt, Milton: Woodwind Quartet, [0, 3, 1, 2, 11, 10, 8, 9, 5, 7, 6, 4], pc set (0, 1, 2, 3, 4, 5)
36. Baker, David: “Status Symbol” from “The Black Experience”, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 1, 4, 5, 8, 9)
37. Barber, Samuel: Piano Sonata, Op.26, [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6], pc set (0, 1, 4, 5, 8, 9)
38. Bartók, Béla: Violin Concerto, No.2, mvt 1, [0, 2, 8, 1, 9, 4, 10, 6, 3, 7, 11, 5], pc set (0, 1, 4, 5, 6, 8)
39. Bartók, Béla: Violin Concerto, No.2, mvt 3, [0, 8, 2, 9, 1, 4, 10, 7, 6, 3, 11, 5], pc set (0, 1, 4, 5, 6, 8)
40. Beecroft, Norma: Improvvisazioni Concertanti, No.1, [0, 1, 11, 9, 3, 2, 7, 6, 10, 8, 4, 5], pc set (0, 1, 2, 3, 4, 6)
41. Bennett, Richard Rodney: Five Studies for Piano, [0, 3, 5, 6, 11, 9, 4, 2, 7, 8, 10, 1], pc set (0, 1, 3, 6, 7, 9)
42. Berg, Alban: Altenberg Lieder, [0, 1, 11, 10, 2, 9, 3, 8, 7, 6, 5, 4], pc set (0, 1, 2, 3, 4, 5)
43. Berg, Alban: Lulu, Lulu (title character) row, [0, 2, 3, 5, 7, 9, 1, 10, 11, 4, 6, 8], pc set (0, 2, 3, 5, 7, 9)
44. Berg, Alban: Lulu, Primary / Main / Basic Row, [0, 4, 5, 2, 7, 9, 6, 8, 11, 10, 3, 1], pc set (0, 2, 4, 5, 7, 9)
45. Berg, Alban: Lulu, Schigolch, [0, 2, 3, 1, 4, 5, 6, 7, 8, 9, 11, 10], pc set (0, 1, 2, 3, 4, 5)
46. Berg, Alban: Lulu, Schoolboy row, [0, 2, 6, 10, 4, 7, 8, 3, 5, 9, 11, 1], pc set (0, 1, 3, 5, 7, 9)
47. Berg, Alban: Lulu, permutation of main row, [0, 4, 2, 7, 9, 6, 8, 11, 3, 1, 5, 10], pc set (0, 2, 3, 5, 7, 9)
48. Berg, Alban: Lulu, whole-tone row, [0, 2, 4, 6, 10, 8, 11, 7, 9, 1, 3, 5], pc set (0, 2, 4, 6, 8, 10)
49. Berg, Alban: Lyric Suite, Primary Row / mvt I, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], pc set (0, 2, 4, 5, 7, 9)
50. Berg, Alban: Lyric Suite, mvt I, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 2-2-1-2-2-9-
51. Berg, Alban: Lyric Suite, mvt III, [0, 11, 7, 1, 2, 9, 3, 8, 10, 4, 5, 6], pc set (0, 1, 2, 3, 5, 7)
52. Berg, Alban: Lyric Suite, mvt VI, [0, 2, 4, 7, 9, 11, 6, 8, 10, 1, 3, 5], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 2-2-3-2-2-7-
53. Berg, Alban: Schliesse mir die Augen Beide, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], pc set (0, 2, 4, 5, 7, 9)
54. Berger, Arthur: Chamber Music for Thirteen Players, [0, 1, 11, 7, 10, 9, 6, 5, 8, 4, 2, 3], pc set (0, 1, 2, 3, 4, 6)
55. Berio, Luciano: Chamber Music, [0, 9, 3, 5, 7, 10, 2, 11, 4, 6, 8, 1], pc set (0, 2, 3, 5, 7, 9)
56. Berio, Luciano: Cinque Variazioni, [0, 2, 4, 1, 3, 5, 8, 10, 6, 7, 9, 11], pc set (0, 1, 2, 3, 4, 5)
57. Berio, Luciano: Sequenza I, [0, 11, 10, 9, 8, 7, 4, 6, 5, 3, 1, 2], pc set (0, 1, 2, 3, 4, 5)
58. Bischof, Rainer: ‘Und so sink ich leise in mich selbst hinein’. Österreichischer Liederzyklus für Mezzosopran und Violine, Op.17, [0, 6, 5, 11, 4, 9, 3, 2, 8, 7, 1, 10], pc set (0, 1, 2, 5, 7, 8)
59. Boulez, Pierre: 2nd Piano Sonata, mvt II, Section 1, [0, 2, 1, 11, 3, 9, 8, 10, 7, 6, 5, 4], pc set (0, 1, 2, 3, 4, 6)
60. Boulez, Pierre: Le Soleil des eaux, series I, [0, 6, 10, 2, 5, 1, 7, 11, 3, 4, 8, 9], pc set (0, 1, 4, 5, 6, 8)
61. Boulez, Pierre: Le Soleil des eaux, series II, [0, 6, 10, 2, 5, 1, 4, 7, 11, 8, 3, 9], pc set (0, 1, 4, 5, 6, 8)
62. Boulez, Pierre: Le Soleil des eaux, series III, [0, 11, 7, 2, 6, 5, 4, 8, 10, 1, 3, 9], pc set (0, 1, 2, 5, 7, 8)
63. Boulez, Pierre: Notations, [0, 2, 7, 6, 1, 8, 4, 9, 5, 11, 10, 3], pc set (0, 1, 2, 6, 7, 8)
64. Boulez, Pierre: Pli selon pli, [0, 1, 8, 6, 7, 9, 4, 5, 11, 3, 2, 10], pc set (0, 1, 2, 3, 6, 7)
65. Boulez, Pierre: Structures Ia, [0, 11, 6, 5, 4, 3, 1, 10, 9, 7, 2, 8], pc set (0, 1, 2, 3, 6, 7)
66. Cage, John: Sonata for Clarinet, [0, 1, 10, 11, 9, 7, 6, 5, 4, 8, 3, 2], pc set (0, 1, 2, 3, 4, 6)
67. Cage, John: Sonata for Clarinet, mvt 2, [0, 11, 9, 10, 8, 6, 5, 4, 3, 7, 2, 1], pc set (0, 1, 2, 3, 4, 6)
68. Cage, John: Two pieces for Piano, [0, 11, 8, 3, 4, 2, 9, 7, 1, 5, 10, 6], pc set (0, 1, 2, 4, 5, 8)
69. Carlos, Juan: Canciones y Baladas, Balada II, [0, 4, 10, 6, 3, 8, 7, 2, 5, 9, 1, 11], pc set (0, 1, 3, 5, 7, 9)
70. Carter, Elliott: Night Fantasies, [0, 10, 3, 11, 8, 7, 1, 2, 5, 9, 4, 6], pc set (0, 1, 3, 4, 5, 8)
71. Carter, Elliott: String Quartet, No.2 (sketch) 3, [0, 2, 4, 6, 8, 10, 1, 3, 5, 7, 9, 11], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 2-2-2-2-2-3-
72. Coltrane, John: Miles Mode, [0, 3, 5, 2, 7, 9, 10, 8, 1, 11, 6, 4], pc set (0, 2, 3, 5, 7, 9)
73. Copland, Aaron: Inscape, (“Y form” or “Row 1”), [0, 4, 3, 11, 2, 7, 6, 8, 10, 9, 5, 1], pc set (0, 1, 3, 4, 5, 8)
74. Cordero, Roque: Concerto for Violin, mvt 2A, [0, 11, 6, 4, 7, 8, 5, 9, 3, 10, 1, 2], pc set (0, 1, 4, 5, 6, 8)
75. Cordero, Roque: Soliloquios, [0, 1, 5, 11, 3, 2, 9, 8, 4, 10, 6, 7], pc set (0, 1, 2, 3, 4, 6)
76. Cordero, Roque: Violin Concerto mvt 1-3, [0, 11, 6, 4, 8, 7, 5, 1, 3, 2, 10, 9], pc set (0, 1, 4, 5, 6, 8)
77. Crosse, Gordon: Elegy for Small Orchestra, Op.1, [0, 11, 3, 1, 9, 10, 5, 6, 2, 4, 8, 7], pc set (0, 1, 2, 3, 4, 6)
78. Dallapiccola, Luigi: ‘Intermezzo’ from the ‘Ciaccona’ (of ‘Ciaccona, intermezzo e adagio’), [0, 5, 6, 3, 8, 9, 7, 11, 10, 2, 1, 4], pc set (0, 1, 3, 4, 6, 9)
79. Dallapiccola, Luigi: Canti di Liberationi, No.2, [0, 5, 8, 3, 1, 9, 10, 4, 2, 11, 7, 6], pc set (0, 1, 3, 5, 8, 9)

80. Dallapiccola, Luigi: Canti di Liberazione, [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6], pc set (0, 1, 3, 5, 8, 9)
81. Dallapiccola, Luigi: Cinque canti, [0, 11, 5, 8, 6, 2, 7, 3, 1, 4, 10, 9], pc set (0, 1, 3, 6, 7, 9)
82. Dallapiccola, Luigi: Commiato, [0, 6, 5, 3, 9, 11, 10, 8, 7, 1, 2, 4], pc set (0, 1, 3, 6, 7, 9)
83. Dallapiccola, Luigi: Dialoghi, [0, 1, 10, 2, 6, 4, 5, 3, 7, 11, 8, 9], pc set (0, 2, 3, 4, 6, 8)
84. Dallapiccola, Luigi: Il Prigioniero, “Hope”, [0, 1, 2, 3, 11, 5, 4, 10, 6, 7, 9, 8], pc set (0, 1, 2, 3, 4, 6)
85. Dallapiccola, Luigi: Il prigioniero, “Prayer”, [0, 3, 6, 11, 9, 2, 1, 7, 8, 4, 5, 10], pc set (0, 1, 3, 4, 6, 9)
86. Dallapiccola, Luigi: Liriche greche c: Sex Carmina Alcaei, [0, 3, 5, 6, 2, 9, 8, 7, 4, 1, 10, 11], pc set (0, 1, 3, 4, 6, 9)
87. Dallapiccola, Luigi: Quaderno musicale di Annalibera, [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6], pc set (0, 1, 3, 5, 8, 9)
88. Dallapiccola, Luigi: Quattro liriche di Antonio Machado, i, iv, [0, 3, 5, 6, 8, 9, 11, 10, 7, 4, 2, 1], pc set (0, 1, 3, 4, 6, 9)
89. Dallapiccola, Luigi: Requiescant, [0, 2, 1, 3, 4, 6, 7, 9, 8, 10, 5, 11], pc set (0, 1, 2, 3, 4, 6)
90. Dallapiccola, Luigi: Requiescant (alternative view), [0, 2, 1, 7, 11, 8, 9, 6, 10, 4, 3, 5], pc set (0, 1, 2, 3, 6, 7)
91. Dallapiccola, Luigi: Tempus, ‘Exhortatio’, [0, 11, 9, 3, 5, 6, 4, 7, 8, 2, 1, 10], pc set (0, 1, 3, 6, 7, 9)
92. Dallapiccola, Luigi: Tempus, ‘Ploratus’, [0, 1, 7, 6, 10, 4, 3, 2, 5, 11, 9, 8], pc set (0, 1, 3, 6, 7, 9)
93. Dallapiccola, Luigi: Ulisse [opera], [0, 2, 1, 3, 9, 8, 11, 10, 4, 6, 5, 7], pc set (0, 1, 2, 3, 6, 7)
94. Dallapiccola, Luigi: Variazioni per orchestra, [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6], pc set (0, 1, 3, 5, 8, 9)
95. Davies, Peter Maxwell: Five Pieces for Piano, Op.2, No.2, [0, 7, 11, 1, 3, 5, 8, 6, 4, 9, 10, 2], pc set (0, 1, 2, 4, 6, 8)
96. Davies, Peter Maxwell: Sonata for Trumpet and Piano, Op.1, [0, 7, 6, 2, 11, 10, 8, 9, 1, 5, 3, 4], pc set (0, 1, 4, 5, 6, 8)
97. Denisov, Edison: Concerto for Guitar and Orchestra, Row 1, [0, 6, 10, 4, 8, 2, 3, 9, 1, 7, 11, 5], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 6-4-6-4-6-1-
98. Denisov, Edison: Five Etudes for Solo Bassoon, row A, [0, 6, 1, 7, 8, 3, 2, 9, 10, 5, 11, 4], pc set (0, 1, 2, 5, 7, 8)
99. Denisov, Edison: Five Etudes for Solo Bassoon, row B, [0, 11, 6, 5, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 2, 6, 7, 8)
100. Denisov, Edison: Five Etudes for Solo Bassoon, row C, [0, 6, 11, 5, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 2, 6, 7, 8)
101. Denisov, Edison: Five Etudes for Solo Bassoon, row D, [0, 6, 1, 7, 8, 3, 2, 9, 10, 11, 5, 4], pc set (0, 1, 2, 5, 7, 8)
102. Denisov, Edison: Five Etudes for Solo Bassoon, row E, [0, 1, 7, 6, 5, 11, 10, 4, 3, 8, 2, 9], pc set (0, 1, 2, 6, 7, 8)
103. Denisov, Edison: Five Etudes for Solo Bassoon, row F, [0, 6, 1, 7, 3, 2, 8, 9, 10, 5, 11, 4], pc set (0, 1, 2, 3, 6, 7)
104. Denisov, Edison: Five Etudes for Solo Bassoon, row I, [0, 6, 1, 7, 2, 8, 3, 10, 5, 11, 9, 4], pc set (0, 1, 2, 6, 7, 8)
105. Denisov, Edison: Five Etudes for Solo Bassoon, row J, [0, 6, 5, 11, 4, 10, 9, 3, 2, 7, 1, 8], pc set (0, 1, 2, 6, 7, 8)
106. Denisov, Edison: Octet for Winds, mvt 2, row A, [0, 1, 3, 2, 4, 5, 8, 7, 6, 11, 9, 10], pc set (0, 1, 2, 3, 4, 5)
107. Denisov, Edison: Octet for Winds, mvt 2, row B, [0, 6, 11, 5, 4, 10, 9, 3, 2, 8, 1, 7], pc set (0, 1, 2, 6, 7, 8)
108. Dessau, Paul: >Guernica< for piano, [0, 7, 6, 2, 10, 11, 5, 9, 1, 3, 4, 8], pc set (0, 1, 4, 5, 6, 8)
109. Dessau, Paul: Les Voix, [0, 11, 6, 8, 9, 3, 4, 10, 5, 7, 2, 1], pc set (0, 1, 3, 4, 6, 9)
110. Eder, Helmut: Concerto for violin and orchestra, Op.32, [0, 9, 6, 2, 11, 3, 8, 1, 7, 5, 10, 4], pc set (0, 1, 3, 4, 6, 9)
111. Eisler, Hanns: Der Zweck der Musik, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 2-2-1-2-2-9-
112. Eisler, Hanns: Deutsche Symphonie, mvt 5, [0, 1, 3, 5, 8, 9, 6, 11, 10, 4, 2, 7], pc set (0, 1, 3, 5, 8, 9)
113. Eisler, Hanns: Deutsche Symphonie, mvt 8, [0, 3, 1, 11, 2, 10, 8, 9, 6, 7, 5, 4], pc set (0, 1, 2, 3, 4, 5)
114. Eisler, Hanns: Deutsche Symphonie, mvt 9, [0, 4, 1, 10, 8, 6, 3, 11, 9, 2, 5, 7], pc set (0, 1, 3, 5, 7, 9)
115. Eisler, Hanns: Deutsche Symphonie, mvts 1, 10, [0, 10, 6, 1, 11, 7, 5, 8, 9, 3, 4, 2], pc set (0, 1, 2, 3, 6, 7)
116. Eisler, Hanns: Five Pieces for Orchestra, mvt 3, [0, 3, 2, 1, 5, 4, 6, 9, 8, 11, 10, 7], pc set (0, 1, 2, 3, 4, 5)
117. Eisler, Hanns: Five Pieces for Orchestra, mvt 4, [0, 10, 9, 8, 6, 7, 3, 4, 5, 11, 1, 2], pc set (0, 1, 2, 3, 4, 6)
118. Eisler, Hanns: Five Pieces for Orchestra, mvt 5, [0, 2, 6, 4, 10, 9, 11, 1, 7, 5, 8, 3], pc set (0, 1, 3, 5, 7, 9)
119. Eisler, Hanns: Gegen den Krieg, Op.55, [0, 3, 2, 5, 4, 7, 6, 8, 9, 10, 1, 11], pc set (0, 2, 3, 4, 5, 7)
120. Eisler, Hanns: Man lebt von einem Tage zu dem andern (“Kantate im Exil”), [0, 10, 11, 3, 1, 8, 7, 4, 2, 6, 9, 5], pc set (0, 2, 3, 4, 5, 7)
121. Eisler, Hanns: Palmström, Op.5, No.5, [0, 10, 11, 9, 8, 1, 7, 6, 5, 3, 4, 2], pc set (0, 1, 2, 3, 4, 5)
122. Eisler, Hanns: Sonata for Piano, No.2 (“in Form von Variationen”), Op.6, row variant 1, [0, 4, 6, 3, 2, 1, 9, 10, 7, 8, 5, 11], pc set (0, 1, 2, 3, 4, 6)
123. Eisler, Hanns: Sonata for Piano, No.2 (“in Form von Variationen”), Op.6, row variant 2, [0, 4, 3, 2, 6, 1, 9, 10, 7, 8, 5, 11], pc set (0, 1, 2, 3, 4, 6)
124. Eisler, Hanns: Sonata for Piano, No.2 (“in Form von Variationen”), Op.6, row variant 5, [0, 3, 2, 4, 6, 1, 9, 10, 7, 8, 5, 11], pc set (0, 1, 2, 3, 4, 6)
125. Eisler, Hanns: String Quartet, [0, 9, 3, 2, 11, 1, 4, 5, 10, 7, 8, 6], pc set (0, 1, 2, 3, 4, 6)

126. Eisler, Hanns: Suite for Orchestra, No.1, mvt 4, [0, 4, 2, 3, 1, 11, 7, 10, 9, 8, 6, 5], pc set (0, 1, 2, 3, 4, 5)
127. Eisler, Hanns: Variations for Piano, [0, 3, 10, 6, 5, 8, 1, 11, 2, 4, 7, 9], pc set (0, 2, 3, 5, 7, 9)
128. Eisler, Hanns: Zwei Elegien, No.2 (An die Überlebenden), [0, 1, 4, 3, 2, 6, 8, 11, 10, 9, 5, 7], pc set (0, 1, 2, 3, 4, 6)
129. Evans, Bill: Twelve Tone Tune, [0, 10, 2, 3, 1, 11, 4, 6, 9, 8, 5, 7], pc set (0, 1, 2, 3, 4, 5)
130. Evans, Bill: Twelve Tone Tune Two, [0, 9, 11, 1, 10, 3, 2, 6, 4, 5, 8, 7], pc set (0, 1, 2, 3, 4, 6)
131. Fano, Michel: Sonata for Two Pianos, [0, 6, 10, 7, 9, 8, 3, 2, 4, 1, 5, 11], pc set (0, 1, 2, 3, 4, 6)
132. Fine, Vivian: Chaconne for piano, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
133. Fine, Vivian: Four Songs, No.2, “Comfort To A Youth That Had Lost His Love”, [0, 1, 2, 6, 9, 10, 11, 3, 5, 4, 7, 8], pc set (0, 1, 2, 4, 5, 8)
134. Finney, Ross Lee: Concerto for Alto Sax, [0, 1, 3, 4, 6, 9, 11, 10, 8, 7, 5, 2], pc set (0, 1, 3, 4, 6, 9)
135. Finney, Ross Lee: Fantasy in Two Movements for solo violin, [0, 1, 3, 5, 4, 2, 11, 10, 8, 6, 7, 9], pc set (0, 1, 2, 3, 4, 5)
136. Finney, Ross Lee: Sonata Quasi una Fantasia, [0, 1, 3, 2, 4, 5, 6, 7, 9, 8, 10, 11], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 1-2-11-2-1-1-
137. Florey, Hans: Die Aussicht, [0, 9, 11, 8, 2, 10, 5, 6, 7, 4, 3, 1], pc set (0, 1, 2, 3, 4, 6)
138. Florey, Hans: Hexaeder für Klavier, [0, 9, 4, 8, 5, 10, 11, 3, 2, 6, 1, 7], pc set (0, 1, 4, 5, 6, 8)
139. Florey, Hans: Hälfte des Lebens, [0, 3, 4, 1, 7, 11, 6, 9, 10, 8, 2, 5], pc set (0, 1, 2, 4, 5, 8)
140. Florey, Hans: I Ging, [0, 7, 2, 10, 11, 6, 5, 1, 9, 8, 4, 3], pc set (0, 1, 4, 5, 6, 8)
141. Florey, Hans: Magischer Würfel mit 6 Spiegelpunkten, [0, 10, 1, 7, 4, 6, 5, 8, 3, 9, 2, 11], pc set (0, 1, 3, 6, 7, 9)
142. Florey, Hans: Sechs Kanonzyklen einunddesselben magischen Quadrates, [0, 10, 1, 7, 4, 6, 5, 8, 3, 9, 2, 11], pc set (0, 1, 3, 6, 7, 9)
143. Florey, Hans: Triptychon, [0, 8, 9, 3, 7, 2, 1, 10, 5, 6, 11, 4], pc set (0, 1, 2, 5, 7, 8)
144. Florey, Hans: Zwölftonspiel für Streichquartett. 3. Dezember 1965, [0, 10, 2, 5, 3, 4, 1, 8, 9, 6, 7, 11], pc set (0, 1, 2, 3, 5, 7)
145. Gerhard, Roberto: Capriccio for Solo Flute, [0, 11, 9, 3, 1, 10, 8, 6, 4, 7, 2, 5], pc set (0, 1, 2, 3, 4, 6)
146. Gerhard, Roberto: Chaconne for Unaccompanied Violin, [0, 11, 4, 2, 1, 3, 9, 10, 8, 6, 5, 7], pc set (0, 1, 2, 3, 4, 5)
147. Gerhard, Roberto: Hymnody, [0, 10, 11, 8, 2, 9, 4, 5, 1, 6, 7, 3], pc set (0, 1, 2, 3, 4, 6)
148. Gerhard, Roberto: Libra, [0, 6, 1, 7, 2, 8, 4, 9, 5, 10, 11, 3], pc set (0, 1, 2, 6, 7, 8)
149. Gerhard, Roberto: String Quartet, [0, 7, 8, 2, 6, 10, 9, 11, 4, 5, 1, 3], pc set (0, 1, 2, 4, 6, 8)
150. Gerhard, Roberto: String Quartet, No.2, [0, 1, 5, 2, 8, 7, 10, 9, 6, 11, 4, 3], pc set (0, 1, 2, 5, 7, 8)
151. Gerhard, Roberto: The Plague, [0, 1, 9, 11, 8, 10, 4, 5, 6, 2, 3, 7], pc set (0, 1, 2, 3, 4, 5)
152. Gerhard, Roberto: Three Impromptus, [0, 8, 1, 10, 4, 6, 7, 5, 3, 2, 9, 11], pc set (0, 1, 3, 5, 7, 9)
153. Gielen, Michael: Six Songs, for bass, violin, viola, clarinet, bass clarinet, and piano, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6], pc set (0, 1, 2, 3, 4, 5)
154. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 1, [0, 1, 6, 7, 8, 2, 10, 11, 5, 4, 9, 3], pc set (0, 1, 2, 6, 7, 8)
155. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 2, [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-3-1-1-9-5-
156. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 3, [0, 5, 6, 11, 2, 1, 8, 7, 10, 4, 9, 3], pc set (0, 1, 2, 3, 6, 7)
157. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 4, [0, 9, 10, 11, 6, 5, 8, 7, 2, 3, 4, 1], pc set (0, 1, 2, 3, 6, 7)
158. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 5, [0, 1, 7, 6, 5, 11, 2, 8, 9, 10, 4, 3], pc set (0, 1, 2, 6, 7, 8)
159. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 7, [0, 1, 8, 2, 7, 6, 5, 11, 9, 10, 4, 3], pc set (0, 1, 2, 6, 7, 8)
160. Ginastera, Alberto: Quintet, Op.29, Row Class III 1, [0, 11, 1, 8, 2, 7, 10, 3, 9, 4, 6, 5], pc set (0, 1, 2, 3, 6, 7)
161. Ginastera, Alberto: Quintet, Op.29, Row Class III 2, [0, 11, 1, 8, 2, 7, 5, 6, 4, 9, 3, 10], pc set (0, 1, 2, 3, 6, 7)
162. Ginastera, Alberto: Quintet, Op.29, Row Class V, [0, 5, 4, 7, 3, 2, 6, 9, 8, 1, 10, 11], pc set (0, 2, 3, 4, 5, 7)
163. Ginastera, Alberto: Quintet, Op.29, Row Class VII 1, [0, 9, 10, 11, 4, 3, 6, 2, 1, 5, 8, 7], pc set (0, 1, 2, 3, 6, 7)
164. Ginastera, Alberto: Quintet, Op.29, Row Class VII 2, [0, 11, 1, 8, 2, 7, 5, 6, 4, 9, 3, 10], pc set (0, 1, 2, 3, 6, 7)
165. Ginastera, Alberto: Quintet, Op.29, Row Class VII S, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
166. Ginastera, Alberto: Quintet, Op.29, mvt.III, [0, 7, 3, 10, 2, 6, 9, 1, 4, 8, 11, 5], pc set (0, 1, 3, 5, 8, 9)
167. Ginastera, Alberto: Sonata for Cello and Piano, Op.49, [0, 3, 2, 1, 10, 11, 8, 9, 5, 4, 7, 6], pc set (0, 1, 2, 3, 4, 5)
168. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], pc set (0, 2, 4, 5, 7, 9)
169. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 3, [0, 9, 3, 2, 11, 6, 5, 1, 8, 7, 4, 10], pc set (0, 1, 3, 4, 6, 9)

170. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 4, [0, 2, 1, 5, 3, 4, 7, 8, 6, 10, 9, 11], pc set (0, 1, 2, 3, 4, 5)
171. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 6, [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], pc set (0, 1, 4, 5, 8, 9)
172. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 7, [0, 9, 10, 11, 8, 7, 6, 3, 4, 5, 2, 1], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 9-1-1-9-11-11-
173. Ginastera, Alberto: Turbae ad Passionem Gregorianam, Op.43, mvt II, [0, 5, 1, 7, 6, 11, 8, 2, 3, 4, 9, 10], pc set (0, 1, 2, 6, 7, 8)
174. Ginastera, Alberto: Violin Concerto, Op.30, [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-3-1-1-9-5-
175. Goehr, Alexander: Piano Trio, Op.20, [0, 6, 7, 4, 3, 8, 5, 9, 11, 2, 10, 1], pc set (0, 1, 2, 4, 5, 8)
176. Goeyvaerts, Karel: Violin concerto, No.2, [0, 11, 7, 1, 2, 9, 10, 8, 5, 6, 3, 4], pc set (0, 1, 2, 3, 5, 7)
177. Gotham, Mark: 4x4x4x4, row 3, [0, 2, 6, 10, 7, 4, 11, 9, 8, 3, 5, 1], pc set (0, 1, 3, 5, 7, 9)
178. Gotham, Mark: 4x4x4x4, row 4, [0, 2, 6, 10, 1, 4, 5, 3, 8, 9, 11, 7], pc set (0, 2, 3, 4, 6, 8)
179. Gotham, Mark: Move On!, [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7], pc set (0, 1, 3, 6, 7, 9)
180. Hamel, Peter Michael: ‘Klangspirale’ für 13 Spieler oder drei Orchestergruppen, [0, 10, 5, 9, 3, 4, 1, 6, 8, 11, 2, 7], pc set (0, 1, 2, 5, 7, 8)
181. Hartmann, Karl Amadeus: Symphony, No.4, [0, 1, 3, 2, 11, 4, 5, 10, 7, 6, 8, 9], pc set (0, 1, 2, 3, 4, 5)
182. Hauer, Jose Matthias: XXXII. Zwölftonspiel; für Violine, Bratsche und Cello, [0, 2, 6, 1, 10, 9, 5, 8, 11, 7, 4, 3], pc set (0, 1, 2, 4, 5, 8)
183. Hauer, Josef Matthias: ‘Atonale Musik’. Klavierstücke 1922., Op.20, [0, 7, 4, 9, 5, 8, 3, 11, 2, 6, 1, 10], pc set (0, 1, 3, 4, 5, 8)
184. Hauer, Josef Matthias: ‘Der Menschen Weg’, Op.67, [0, 8, 5, 4, 10, 2, 7, 9, 1, 3, 11, 6], pc set (0, 1, 3, 5, 7, 9)
185. Hauer, Josef Matthias: ‘Die schwarze Spinne’, Op.62, [0, 4, 10, 1, 5, 8, 11, 2, 7, 9, 6, 3], pc set (0, 1, 3, 5, 8, 9)
186. Hauer, Josef Matthias: ‘Emilie vor ihrem Brauttag’ (Friedrich Hölderlin) für Altsolo und Orchester, Op.58, [0, 8, 3, 4, 11, 6, 9, 10, 2, 1, 5, 7], pc set (0, 1, 3, 5, 8, 9)
187. Hauer, Josef Matthias: ‘Salambo’, opera after Gustave Flaubert;, Op.60, [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5], pc set (0, 2, 3, 4, 6, 8)
188. Hauer, Josef Matthias: ‘Tanz tibetanischer Mönche’ im langsamen 3/4 Takt) [Zwölftonspiel]. 8. September 1956, [0, 7, 8, 6, 3, 1, 11, 2, 10, 5, 9, 4], pc set (0, 1, 2, 5, 7, 8)
189. Hauer, Josef Matthias: ‘Wandlungen’ (chamber-oratorio for stage or concert, for six solo-voices, choir and orchestra; after words of Friedrich Hölderlin), Op.53, [0, 5, 11, 4, 10, 1, 6, 8, 9, 3, 7, 2], pc set (0, 1, 2, 3, 6, 7)
190. Hauer, Josef Matthias: Baustein, [0, 8, 11, 1, 6, 10, 4, 2, 3, 5, 9, 7], pc set (0, 1, 2, 3, 5, 7)
191. Hauer, Josef Matthias: Fünfte Tanzfantasie für kleines Orchester, Opus 66, [0, 10, 4, 7, 8, 11, 6, 2, 5, 9, 3, 1], pc set (0, 1, 2, 4, 5, 8)
192. Hauer, Josef Matthias: Harmonie – Melodie – Rhythmus – in kristallischer Bindung – im vierfachen Kontrapunkt [Zwölftonspiel] für Zwölftonorchester, [0, 2, 10, 9, 6, 5, 1, 4, 7, 11, 8, 3], pc set (0, 1, 3, 5, 8, 9)
193. Hauer, Josef Matthias: Hausmusik [Zwölftonspiel] für zwei Violinen und Klavier, [0, 1, 5, 3, 7, 10, 9, 6, 11, 4, 2, 8], pc set (0, 2, 3, 5, 7, 9)
194. Hauer, Josef Matthias: Kammermusik [Zwölftonspiel] für Flöte, Oboe, Baßklarinette, Fagott, zwei Violinen, Bratsche, Cello und Klavier zu vier Händen. 24. Jänner 1957, [0, 9, 3, 7, 5, 10, 1, 6, 11, 4, 2, 8], pc set (0, 2, 3, 5, 7, 9)
195. Hauer, Josef Matthias: Klavierstücke mit Überschriften nach Worten von Friedrich Hölderlin, Op.25 ;, No.10, [0, 6, 11, 10, 9, 5, 2, 3, 7, 1, 4, 8], pc set (0, 1, 2, 3, 6, 7)
196. Hauer, Josef Matthias: Langsamer Walzer [Zwölftonspiel] für Orchester. 10. Jänner 1957, [0, 8, 10, 2, 3, 6, 1, 9, 7, 4, 11, 5], pc set (0, 1, 3, 5, 7, 9)
197. Hauer, Josef Matthias: Langsamer Walzer [Zwölftonspiel] für zwei Violinen, Bratsche, Cello und Klavier zu zwei Händen, [0, 6, 2, 11, 10, 7, 3, 4, 5, 9, 1, 8], pc set (0, 1, 4, 5, 6, 8)
198. Hauer, Josef Matthias: Nomos, Op.19 (bb.106-108), [0, 10, 6, 1, 7, 4, 9, 5, 3, 8, 11, 2], pc set (0, 1, 3, 6, 7, 9)
199. Hauer, Josef Matthias: Nomos, Op.19 (bb.117-118), [0, 4, 5, 11, 7, 10, 3, 9, 6, 2, 1, 8], pc set (0, 1, 2, 5, 7, 8)
200. Hauer, Josef Matthias: Nomos, Op.19 (bb.119-120), [0, 10, 8, 6, 5, 7, 9, 2, 3, 1, 11, 4], pc set (0, 1, 2, 3, 5, 7)
201. Hauer, Josef Matthias: Nomos, Op.19 (bb.123-124), [0, 8, 11, 5, 3, 7, 4, 9, 1, 6, 10, 2], pc set (0, 1, 3, 5, 8, 9)
202. Hauer, Josef Matthias: Nomos, Op.19 (bb.125-126), [0, 11, 1, 10, 6, 8, 9, 5, 7, 3, 2, 4], pc set (0, 1, 2, 3, 5, 7)
203. Hauer, Josef Matthias: Nomos, Op.19 (bb.134-137), [0, 2, 1, 4, 5, 9, 6, 8, 10, 7, 11, 3], pc set (0, 1, 3, 4, 5, 8)
204. Hauer, Josef Matthias: Nomos, Op.19 (bb.138-140), [0, 3, 4, 2, 5, 6, 8, 7, 10, 11, 1, 9], pc set (0, 1, 2, 3, 4, 6)

205. Hauer, Josef Matthias: Nomos, Op.19 (bb.139-141), [0, 2, 10, 1, 11, 9, 8, 5, 6, 4, 7, 3], pc set (0, 1, 2, 3, 4, 5)
206. Hauer, Josef Matthias: Nomos, Op.19 (bb.141-143), [0, 10, 11, 3, 5, 6, 7, 2, 1, 4, 8, 9], pc set (0, 1, 2, 5, 7, 8)
207. Hauer, Josef Matthias: Nomos, Op.19 (bb.142-143), [0, 11, 10, 1, 5, 3, 8, 6, 9, 4, 7, 2], pc set (0, 1, 2, 3, 5, 7)
208. Hauer, Josef Matthias: Nomos, Op.19 (bb.143-145), [0, 9, 10, 2, 1, 11, 4, 6, 7, 5, 8, 3], pc set (0, 1, 2, 3, 4, 5)
209. Hauer, Josef Matthias: Nomos, Op.19 (bb.159-161), [0, 5, 1, 8, 10, 4, 6, 7, 3, 9, 11, 2], pc set (0, 1, 3, 5, 8, 9)
210. Hauer, Josef Matthias: Nomos, Op.19 (bb.171-174), [0, 7, 1, 3, 9, 6, 8, 11, 10, 5, 4, 2], pc set (0, 1, 3, 6, 7, 9)
211. Hauer, Josef Matthias: Nomos, Op.19 (bb.175-178), [0, 10, 1, 2, 6, 5, 3, 4, 8, 9, 7, 11], pc set (0, 1, 4, 5, 6, 8)
212. Hauer, Josef Matthias: Nomos, Op.19 (bb.192-193), [0, 9, 6, 2, 8, 4, 7, 10, 1, 3, 5, 11], pc set (0, 1, 3, 5, 7, 9)
213. Hauer, Josef Matthias: Nomos, Op.19 (bb.196-197), [0, 2, 8, 6, 11, 5, 4, 10, 7, 3, 1, 9], pc set (0, 1, 3, 6, 7, 9)
214. Hauer, Josef Matthias: Nomos, Op.19 (bb.213-216), [0, 2, 6, 1, 10, 4, 5, 8, 11, 7, 3, 9], pc set (0, 2, 3, 4, 6, 8)
215. Hauer, Josef Matthias: Nomos, Op.19 (bb.224-228), [0, 1, 9, 3, 4, 5, 10, 11, 6, 2, 8, 7], pc set (0, 1, 2, 4, 5, 8)
216. Hauer, Josef Matthias: Nomos, Op.19 (bb.228-230), [0, 2, 9, 6, 5, 10, 7, 3, 8, 1, 4, 11], pc set (0, 1, 3, 5, 8, 9)
217. Hauer, Josef Matthias: Nomos, Op.19 (bb.231-233), [0, 6, 10, 3, 2, 8, 9, 5, 4, 1, 11, 7], pc set (0, 1, 3, 5, 7, 9)
218. Hauer, Josef Matthias: Nomos, Op.19 (bb.234-237), [0, 11, 3, 1, 7, 4, 9, 6, 5, 10, 2, 8], pc set (0, 1, 2, 4, 5, 8)
219. Hauer, Josef Matthias: Nomos, Op.19 (bb.241-243), [0, 2, 8, 1, 4, 9, 5, 6, 3, 11, 10, 7], pc set (0, 1, 4, 5, 6, 8)
220. Hauer, Josef Matthias: Nomos, Op.19 (bb.257-262), [0, 7, 3, 8, 4, 2, 9, 1, 11, 6, 10, 5], pc set (0, 1, 4, 5, 6, 8)
221. Hauer, Josef Matthias: Nomos, Op.19 (bb.262-263), [0, 11, 2, 5, 1, 6, 9, 7, 10, 3, 4, 8], pc set (0, 1, 2, 3, 6, 7)
222. Hauer, Josef Matthias: Nomos, Op.19 (bb.272-276), [0, 1, 5, 3, 7, 2, 8, 10, 4, 6, 11, 9], pc set (0, 1, 2, 3, 5, 7)
223. Hauer, Josef Matthias: Nomos, Op.19 (bb.284-287), [0, 1, 11, 7, 6, 4, 10, 5, 2, 8, 3, 9], pc set (0, 1, 2, 5, 7, 8)
224. Hauer, Josef Matthias: Nomos, Op.19 (bb.288-291), [0, 2, 10, 7, 4, 6, 11, 3, 5, 1, 8, 9], pc set (0, 1, 3, 5, 7, 9)
225. Hauer, Josef Matthias: Nomos, Op.19 (bb.292-294), [0, 9, 2, 6, 3, 5, 10, 1, 11, 7, 4, 8], pc set (0, 1, 3, 4, 6, 9)
226. Hauer, Josef Matthias: Nomos, Op.19 (bb.325-328), [0, 5, 4, 2, 7, 6, 3, 11, 1, 8, 10, 9], pc set (0, 1, 2, 3, 5, 7)
227. Hauer, Josef Matthias: Nomos, Op.19 (bb.328-332), [0, 3, 2, 7, 6, 10, 9, 11, 8, 5, 1, 4], pc set (0, 1, 3, 5, 8, 9)
228. Hauer, Josef Matthias: Nomos, Op.19 (bb.331-334), [0, 4, 3, 2, 1, 11, 7, 10, 5, 6, 8, 9], pc set (0, 1, 2, 3, 4, 5)
229. Hauer, Josef Matthias: Nomos, Op.19 (bb.362-365), [0, 7, 5, 3, 10, 8, 4, 2, 9, 6, 11, 1], pc set (0, 2, 4, 5, 7, 9)
230. Hauer, Josef Matthias: Nomos, Op.19 (bb.366-371), [0, 5, 1, 7, 3, 2, 4, 8, 11, 6, 10, 9], pc set (0, 1, 2, 3, 5, 7)
231. Hauer, Josef Matthias: Nomos, Op.19 (bb.372-375), [0, 8, 6, 1, 10, 11, 5, 9, 7, 4, 3, 2], pc set (0, 1, 2, 3, 5, 7)
232. Hauer, Josef Matthias: Nomos, Op.19 (bb.387-390), [0, 3, 7, 4, 10, 1, 11, 9, 6, 8, 2, 5], pc set (0, 1, 3, 4, 6, 9)
233. Hauer, Josef Matthias: Nomos, Op.19 (bb.403-409), [0, 11, 2, 10, 8, 1, 5, 3, 4, 6, 7, 9], pc set (0, 1, 2, 3, 4, 6)
234. Hauer, Josef Matthias: Nomos, Op.19 (bb.422-425), [0, 6, 4, 2, 10, 9, 8, 5, 11, 7, 1, 3], pc set (0, 1, 3, 5, 7, 9)
235. Hauer, Josef Matthias: Nomos, Op.19 (bb.425-427), [0, 8, 10, 7, 4, 2, 3, 5, 6, 11, 1, 9], pc set (0, 1, 3, 5, 7, 9)
236. Hauer, Josef Matthias: Nomos, Op.19 (bb.430-432), [0, 6, 8, 10, 9, 2, 7, 1, 3, 4, 5, 11], pc set (0, 2, 3, 4, 6, 8)
237. Hauer, Josef Matthias: Nomos, Op.19 (bb.438-441), [0, 1, 10, 8, 9, 4, 3, 5, 7, 11, 6, 2], pc set (0, 1, 2, 4, 5, 8)
238. Hauer, Josef Matthias: Nomos, Op.19 (bb.441-445), [0, 1, 9, 8, 10, 4, 6, 5, 7, 2, 3, 11], pc set (0, 1, 2, 4, 5, 8)
239. Hauer, Josef Matthias: Nomos, Op.19 (bb.451-453), [0, 2, 4, 1, 6, 11, 3, 8, 9, 7, 5, 10], pc set (0, 1, 2, 3, 5, 7)
240. Hauer, Josef Matthias: Nomos, Op.19 (bb.452-455), [0, 5, 7, 8, 1, 2, 3, 4, 6, 11, 10, 9], pc set (0, 1, 2, 5, 7, 8)
241. Hauer, Josef Matthias: Nomos, Op.19 (bb.457-458), [0, 3, 4, 5, 8, 1, 6, 11, 9, 10, 2, 7], pc set (0, 1, 3, 4, 5, 8)
242. Hauer, Josef Matthias: Nomos, Op.19 (bb.463-464), [0, 4, 6, 7, 3, 9, 1, 10, 8, 11, 5, 2], pc set (0, 1, 3, 4, 6, 9)
243. Hauer, Josef Matthias: Nomos, Op.19 (bb.479-483), [0, 6, 10, 9, 7, 8, 11, 4, 5, 3, 2, 1], pc set (0, 1, 2, 3, 4, 6)
244. Hauer, Josef Matthias: Nomos, Op.19 (bb.494-496), [0, 7, 8, 5, 6, 11, 2, 3, 9, 4, 1, 10], pc set (0, 1, 2, 3, 6, 7)
245. Hauer, Josef Matthias: Nomos, Op.19 (bb.50-53), [0, 2, 10, 4, 5, 3, 6, 7, 1, 8, 9, 11], pc set (0, 1, 2, 3, 5, 7)
246. Hauer, Josef Matthias: Nomos, Op.19 (bb.501-503), [0, 5, 7, 1, 3, 2, 6, 10, 11, 8, 9, 4], pc set (0, 1, 2, 3, 5, 7)
247. Hauer, Josef Matthias: Nomos, Op.19 (bb.503-507), [0, 10, 1, 2, 3, 5, 7, 11, 4, 8, 9, 6], pc set (0, 2, 3, 4, 5, 7)
248. Hauer, Josef Matthias: Nomos, Op.19 (bb.511-514), [0, 10, 1, 4, 6, 2, 9, 7, 11, 8, 5, 3], pc set (0, 2, 3, 4, 6, 8)
249. Hauer, Josef Matthias: Nomos, Op.19 (bb.517-521), [0, 2, 10, 11, 6, 4, 5, 1, 3, 9, 8, 7], pc set (0, 1, 2, 4, 6, 8)
250. Hauer, Josef Matthias: Nomos, Op.19 (bb.528-531), [0, 6, 7, 5, 8, 10, 9, 11, 4, 2, 1, 3], pc set (0, 1, 2, 3, 5, 7)
251. Hauer, Josef Matthias: Nomos, Op.19 (bb.60-63), [0, 4, 1, 2, 9, 8, 10, 5, 11, 3, 6, 7], pc set (0, 1, 4, 5, 6, 8)
252. Hauer, Josef Matthias: Nomos, Op.19 (bb.72-73), [0, 1, 7, 11, 4, 3, 9, 6, 5, 2, 10, 8], pc set (0, 1, 2, 4, 5, 8)
253. Hauer, Josef Matthias: Nomos, Op.19 (bb.73-78), [0, 8, 7, 2, 4, 11, 1, 3, 6, 5, 10, 9], pc set (0, 1, 3, 5, 8, 9)
254. Hauer, Josef Matthias: Nomos, Op.19 (bb.84-87), [0, 10, 1, 11, 5, 3, 2, 6, 7, 8, 9, 4], pc set (0, 1, 2, 3, 5, 7)
255. Hauer, Josef Matthias: Nomos, Op.19 (bb.93-94), [0, 1, 10, 8, 6, 2, 9, 4, 11, 7, 5, 3], pc set (0, 1, 2, 4, 6, 8)
256. Hauer, Josef Matthias: Nomos, Op.19 (row 1), [0, 8, 9, 5, 4, 6, 10, 11, 7, 1, 2, 3], pc set (0, 1, 2, 4, 5, 8)

257. Hauer, Josef Matthias: Nomos, Op.19 (row 2), [0, 6, 10, 4, 3, 2, 8, 7, 11, 9, 5, 1], pc set (0, 2, 3, 4, 6, 8)
258. Hauer, Josef Matthias: Paraphonie [Zwölftonspiel] für Bratsche und Klavier, [0, 4, 10, 5, 8, 1, 11, 7, 2, 9, 6, 3], pc set (0, 1, 3, 5, 8, 9)
259. Hauer, Josef Matthias: Romantische Phantasie für Orchester, [0, 10, 8, 5, 1, 9, 4, 11, 3, 7, 6, 2], pc set (0, 1, 3, 4, 5, 8)
260. Hauer, Josef Matthias: Sakraler Tanz [Zwölftonspiel] für Orchester, [0, 3, 10, 8, 5, 2, 9, 1, 11, 6, 4, 7], pc set (0, 2, 3, 5, 7, 9)
261. Hauer, Josef Matthias: Sechste Suite für Orchester, Op.47, [0, 9, 6, 2, 8, 3, 10, 11, 7, 4, 5, 1], pc set (0, 1, 3, 6, 7, 9)
262. Hauer, Josef Matthias: Symphonische Stücke für Streichorchester, Klavier und Harmonium, Op.49, [0, 4, 6, 3, 2, 8, 1, 11, 10, 7, 9, 5], pc set (0, 2, 3, 4, 6, 8)
263. Hauer, Josef Matthias: Tanz im langsamen 3/4 Takt [Zwölftonspiel] für zwei Violinen, zwei Bratschen und Klavier zu zwei Händen, [0, 3, 10, 2, 11, 6, 8, 7, 4, 9, 1, 5], pc set (0, 1, 2, 4, 5, 8)
264. Hauer, Josef Matthias: VIII. Zwölftonspiel für Orchester. Juni 1943, [0, 5, 10, 8, 4, 2, 11, 9, 3, 1, 7, 6], pc set (0, 1, 3, 5, 7, 9)
265. Hauer, Josef Matthias: Violinkonzert, Op.54 (9. März – 6. April 1928), [0, 7, 6, 8, 4, 11, 1, 10, 5, 9, 2, 3], pc set (0, 1, 4, 5, 6, 8)
266. Hauer, Josef Matthias: XXI. Zwölftonspiel für Orchester; mit einer Zwöfftonreihe, die in sechs Tropen steht, und vom Kulturreferenten der Stadt Wien Dr. Viktor Matejka gewählt wurde. Erster Teil 2,4-Takt (Halbe = 50) mit achttaktigen Perioden; zweiter Teil im 3/4 Takt (punktierte Halbe = 40) mit sechstaktigen Perioden, [0, 3, 4, 9, 11, 10, 1, 7, 6, 2, 5, 8], pc set (0, 1, 2, 3, 6, 7)
267. Hauer, Josef Matthias: XXII. Zwölftonspiel für Klavier, [0, 2, 11, 6, 7, 10, 1, 3, 8, 4, 9, 5], pc set (0, 1, 4, 5, 6, 8)
268. Hauer, Josef Matthias: XXIII. Zwölftonspiel für Klavierquintett, [0, 4, 11, 9, 10, 2, 6, 3, 7, 5, 8, 1], pc set (0, 1, 2, 3, 5, 7)
269. Hauer, Josef Matthias: XXIV. Zwölftonspiel für Klavier, [0, 2, 9, 3, 8, 1, 4, 7, 11, 5, 6, 10], pc set (0, 1, 2, 3, 6, 7)
270. Hauer, Josef Matthias: XXIX. Zwölftonspiel für Cembalo; mit der Sokolowski-Reihe zu Bachs Geburtstag, [0, 11, 2, 1, 4, 3, 10, 5, 8, 9, 6, 7], pc set (0, 1, 2, 3, 4, 5)
271. Hauer, Josef Matthias: XXXII. Zwölftonspiel für Violine, zwei Bratschen und Cello (2/2), [0, 7, 4, 3, 11, 2, 5, 1, 10, 9, 6, 8], pc set (0, 1, 3, 4, 5, 8)
272. Hauer, Josef Matthias: Zwölftonspiel (Weihnachten 1947) für Klarinette, Violine, Bratsche, Cello und Klavier, [0, 6, 2, 10, 8, 3, 11, 4, 9, 7, 5, 1], pc set (0, 1, 3, 5, 7, 9)
273. Hauer, Josef Matthias: Zwölftonspiel 10. Juli 1957; für Klavier zu vier Händen, [0, 8, 10, 6, 2, 11, 1, 3, 9, 4, 7, 5], pc set (0, 2, 3, 4, 6, 8)
274. Hauer, Josef Matthias: Zwölftonspiel 15. Juni 1957; für Flöte, Oboe, Bassklarinette, Fagott, zwei Violinen, Viola, Violoncello & Klavier vierhändig, [0, 6, 4, 8, 3, 11, 9, 2, 7, 1, 10, 5], pc set (0, 1, 3, 5, 8, 9)
275. Hauer, Josef Matthias: Zwölftonspiel 2. Juni 1948 für Streichquartett und Klavier, [0, 3, 10, 6, 2, 11, 1, 4, 7, 9, 5, 8], pc set (0, 1, 2, 4, 5, 8)
276. Hauer, Josef Matthias: Zwölftonspiel 26. Juli 1957, für Flöte, Oboe, Bassklarinette, Fagott und Streichquartett, [0, 4, 1, 6, 8, 2, 10, 7, 3, 9, 11, 5], pc set (0, 1, 2, 4, 6, 8)
277. Hauer, Josef Matthias: Zwölftonspiel 3. Mai 1958; für Streichsextett, [0, 4, 10, 3, 7, 1, 8, 2, 11, 6, 9, 5], pc set (0, 1, 3, 4, 6, 9)
278. Hauer, Josef Matthias: Zwölftonspiel 5. September 1957; für Violine, Bratsche und Klavier, [0, 4, 2, 9, 10, 6, 11, 1, 7, 3, 8, 5], pc set (0, 1, 3, 5, 7, 9)
279. Hauer, Josef Matthias: Zwölftonspiel 7. April 1957; für zwei Violinen, Bratsche, Cello und Klavier zu vier Händen, [0, 6, 2, 9, 10, 4, 11, 3, 7, 1, 5, 8], pc set (0, 1, 3, 5, 7, 9)
280. Hauer, Josef Matthias: Zwölftonspiel 9. September 1957; für vier Solostimmen [S, A, T, B], Violine, Bratsche und Klavier, [0, 4, 2, 9, 10, 6, 11, 1, 7, 3, 8, 5], pc set (0, 1, 3, 5, 7, 9)
281. Hauer, Josef Matthias: Zwölftonspiel Jänner 1957; für zwei Violinen, Bratsche und Cello, [0, 10, 6, 2, 8, 3, 5, 7, 9, 4, 1, 11], pc set (0, 1, 3, 5, 7, 9)
282. Hauer, Josef Matthias: Zwölftonspiel Oktober 1956; für Klavier zu vier Händen, [0, 9, 6, 2, 8, 3, 10, 5, 1, 11, 7, 4], pc set (0, 1, 3, 6, 7, 9)
283. Hauer, Josef Matthias: Zwölftonspiel für Flöte, Horn, Violine, Bratsche, Cello und Klavier, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], pc set (0, 1, 2, 4, 6, 8)
284. Hauer, Josef Matthias: Zwölftonspiel für Gitarre. 24. 7. 1949, [0, 6, 10, 2, 5, 9, 1, 4, 7, 3, 11, 8], pc set (0, 1, 3, 5, 8, 9)
285. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 11. Juni 1955, [0, 6, 11, 4, 2, 9, 3, 1, 5, 7, 10, 8], pc set (0, 2, 3, 5, 7, 9)
286. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 17. Juli 1952, [0, 6, 4, 9, 2, 10, 7, 11, 1, 8, 5, 3], pc set (0, 1, 3, 5, 7, 9)
287. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 2. Juni 1955, [0, 10, 2, 7, 3, 6, 4, 8, 1, 9, 11, 5], pc set (0, 1, 3, 5, 8, 9)
288. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 24. Dezember 1946, [0, 1, 2, 6, 10, 5, 11, 4, 3, 9, 7, 8], pc set (0, 1, 4, 5, 6, 8)
289. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 7. Juni 1955, [0, 4, 10, 7, 11, 8, 3, 1, 5, 6, 2, 9], pc set (0, 1, 2, 4, 5, 8)

290. Hauer, Josef Matthias: Zwölftonspiel für Klavier. März 1953, [0, 6, 8, 7, 5, 10, 2, 3, 11, 4, 9, 1], pc set (0, 1, 2, 3, 5, 7)
291. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, Violine, Bratsche, Cello und Kontrabaß (melischer Entwurf vom 29.8.1954), [0, 4, 2, 7, 9, 6, 8, 3, 11, 5, 10, 1], pc set (0, 2, 3, 5, 7, 9)
292. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, mit einer Zwölftonreihe von Nikolaus Fheodoroff. 10. Juli 1952, [0, 10, 6, 8, 9, 7, 11, 3, 1, 5, 2, 4], pc set (0, 1, 2, 3, 4, 6)
293. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, mit einer Zwölftonreihe von Nikolaus Fheodoroff. 8. Juli 1952, [0, 2, 10, 6, 8, 7, 5, 9, 11, 3, 1, 4], pc set (0, 1, 2, 4, 6, 8)
294. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, zwei Violinen, Bratsche und Cello. 19. Oktober 1954, [0, 6, 11, 2, 1, 5, 3, 8, 10, 7, 9, 4], pc set (0, 1, 2, 3, 6, 7)
295. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 13. März 1952, [0, 5, 9, 10, 8, 1, 4, 3, 6, 7, 11, 2], pc set (0, 1, 3, 4, 5, 8)
296. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 24. Juni 1952, [0, 6, 10, 7, 9, 3, 4, 1, 8, 5, 11, 2], pc set (0, 1, 3, 4, 6, 9)
297. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 26. Juni 1952, [0, 6, 2, 10, 9, 5, 3, 4, 8, 7, 11, 1], pc set (0, 1, 3, 5, 8, 9)
298. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 30. Juni 1952, I, [0, 2, 10, 4, 11, 8, 1, 7, 5, 3, 6, 9], pc set (0, 2, 3, 4, 6, 8)
299. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. Mai 1955, [0, 6, 11, 4, 2, 9, 3, 1, 5, 7, 10, 8], pc set (0, 2, 3, 5, 7, 9)
300. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen und Akkordeon (Hausorchester), [0, 7, 2, 9, 6, 4, 11, 3, 10, 8, 1, 5], pc set (0, 2, 3, 5, 7, 9)
301. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen und Streichquartett, [0, 7, 2, 10, 6, 8, 3, 11, 9, 4, 1, 5], pc set (0, 1, 2, 4, 6, 8)
302. Hauer, Josef Matthias: Zwölftonspiel für Oechester. 28. 9. 1954, [0, 8, 9, 6, 10, 4, 11, 1, 2, 5, 3, 7], pc set (0, 2, 3, 4, 6, 8)
303. Hauer, Josef Matthias: Zwölftonspiel für Orchester. September 1957, [0, 8, 6, 10, 5, 7, 2, 4, 1, 9, 11, 3], pc set (0, 1, 2, 3, 5, 7)
304. Hauer, Josef Matthias: Zwölftonspiel für Violine, Cello und Klavier zu vier Händen, [0, 10, 6, 1, 8, 3, 11, 7, 2, 5, 9, 4], pc set (0, 2, 3, 5, 7, 9)
305. Hauer, Josef Matthias: Zwölftonspiel für Violine und Klavier, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], pc set (0, 1, 2, 4, 6, 8)
306. Hauer, Josef Matthias: Zwölftonspiel für Violine und Klavier. 3. April 1955, [0, 2, 6, 4, 9, 10, 5, 3, 7, 8, 11, 1], pc set (0, 1, 3, 5, 7, 9)
307. Hauer, Josef Matthias: Zwölftonspiel für Orchester. 28. 9. 1954, [0, 5, 7, 4, 6, 1, 9, 3, 8, 11, 10, 2], pc set (0, 1, 2, 3, 6, 7)
308. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, [0, 2, 3, 11, 1, 10, 8, 6, 4, 9, 7, 5], pc set (0, 1, 2, 3, 4, 5)
309. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche, Cello und Klavier. 16. April 1958, [0, 3, 8, 2, 9, 1, 11, 5, 7, 4, 6, 10], pc set (0, 1, 2, 3, 6, 7)
310. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche und Cello (‘Ins Räumliche übertragen’). 3. September 1953, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], pc set (0, 1, 2, 4, 6, 8)
311. Hauer, Josef Matthias: Zwölftonspiel in drei Teilen für zwei Violinen, Bratsche und Cello. 31. Juli 1953, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], pc set (0, 1, 2, 4, 6, 8)
312. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.10, [0, 4, 6, 7, 8, 10, 9, 5, 3, 2, 1, 11], pc set (0, 2, 3, 4, 6, 8)
313. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.11, [0, 4, 5, 6, 8, 9, 7, 3, 2, 1, 11, 10], pc set (0, 1, 2, 4, 5, 8)
314. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.12, [0, 3, 6, 7, 9, 10, 11, 8, 5, 4, 2, 1], pc set (0, 1, 3, 4, 6, 9)
315. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.13, [0, 3, 5, 7, 8, 10, 9, 6, 4, 2, 1, 11], pc set (0, 2, 4, 5, 7, 9)
316. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.14, [0, 2, 5, 7, 8, 10, 11, 9, 6, 4, 3, 1], pc set (0, 2, 3, 5, 7, 9)
317. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.15, [0, 1, 3, 6, 7, 9, 11, 10, 8, 5, 4, 2], pc set (0, 1, 3, 6, 7, 9)
318. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.16, [0, 1, 3, 5, 7, 10, 9, 8, 6, 4, 2, 11], pc set (0, 2, 3, 5, 7, 9)

319. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.17, [0, 1, 3, 5, 8, 9, 7, 6, 4, 2, 11, 10], pc set (0, 1, 3, 5, 8, 9)
320. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.18, [0, 3, 4, 6, 9, 10, 11, 8, 7, 5, 2, 1], pc set (0, 1, 3, 6, 7, 9)
321. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.19, [0, 1, 4, 5, 8, 9, 11, 10, 7, 6, 3, 2], pc set (0, 1, 4, 5, 8, 9)
322. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.2, [0, 1, 2, 3, 4, 10, 9, 8, 7, 6, 5, 11], pc set (0, 1, 2, 3, 4, 6)
323. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.20, [0, 1, 2, 5, 7, 8, 11, 10, 9, 6, 4, 3], pc set (0, 1, 2, 5, 7, 8)
324. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.21, [0, 1, 2, 5, 6, 10, 9, 8, 7, 4, 3, 11], pc set (0, 1, 4, 5, 6, 8)
325. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.22, [0, 1, 2, 4, 8, 9, 7, 6, 5, 3, 11, 10], pc set (0, 1, 4, 5, 6, 8)
326. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.23, [0, 3, 4, 5, 9, 10, 11, 8, 7, 6, 2, 1], pc set (0, 1, 2, 5, 7, 8)
327. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.24, [0, 3, 4, 7, 8, 10, 9, 6, 5, 2, 1, 11], pc set (0, 1, 3, 5, 8, 9)
328. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.25, [0, 3, 5, 6, 8, 9, 7, 4, 2, 1, 11, 10], pc set (0, 1, 3, 4, 6, 9)
329. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.26, [0, 3, 4, 6, 7, 8, 5, 2, 1, 11, 10, 9], pc set (0, 1, 2, 4, 5, 8)
330. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.27, [0, 2, 4, 5, 6, 7, 3, 1, 11, 10, 9, 8], pc set (0, 1, 2, 3, 5, 7)
331. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.28, [0, 5, 7, 8, 9, 10, 11, 6, 4, 3, 2, 1], pc set (0, 2, 3, 4, 5, 7)
332. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.29, [0, 1, 6, 7, 8, 9, 11, 10, 5, 4, 3, 2], pc set (0, 1, 2, 3, 6, 7)
333. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.3, [0, 2, 3, 4, 5, 10, 11, 9, 8, 7, 6, 1], pc set (0, 1, 2, 3, 5, 7)
334. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.30, [0, 1, 2, 6, 7, 8, 11, 10, 9, 5, 4, 3], pc set (0, 1, 2, 6, 7, 8)
335. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.31, [0, 1, 2, 3, 6, 7, 11, 10, 9, 8, 5, 4], pc set (0, 1, 2, 3, 6, 7)
336. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.32, [0, 1, 2, 3, 4, 6, 11, 10, 9, 8, 7, 5], pc set (0, 1, 2, 3, 4, 6)
337. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.4, [0, 2, 3, 4, 8, 10, 9, 7, 6, 5, 1, 11], pc set (0, 1, 2, 4, 6, 8)
338. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.5, [0, 2, 4, 5, 8, 10, 11, 9, 7, 6, 3, 1], pc set (0, 1, 3, 5, 7, 9)
339. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.6, [0, 2, 4, 6, 8, 10, 9, 7, 5, 3, 1, 11], pc set (0, 2, 4, 6, 8, 10)
340. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.7, [0, 2, 4, 6, 8, 9, 7, 5, 3, 1, 11, 10], pc set (0, 1, 3, 5, 7, 9)
341. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.8, [0, 2, 4, 6, 7, 8, 5, 3, 1, 11, 10, 9], pc set (0, 1, 2, 4, 6, 8)
342. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.9, [0, 4, 6, 8, 9, 10, 11, 7, 5, 3, 2, 1], pc set (0, 2, 3, 4, 6, 8)
343. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.1, [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], pc set (0, 1, 2, 3, 4, 5)
344. Hendler, Maximilian: aus den fünf Liedern nach Texten von Elisabeth Pöschl : ‘Sonnenaufgang’ für Singstimme und Klavier, Op.44-1, [0, 11, 2, 1, 5, 6, 4, 3, 8, 7, 9, 10], pc set (0, 1, 2, 3, 6, 7)

345. Hendler, Maximilian: aus den fünf Liedern nach Texten von Karl Hans Haysen für Singstimme und Klavier : ‘Erkenntnis’, Op.45-2, [0, 9, 2, 4, 7, 11, 8, 10, 5, 1, 6, 3], pc set (0, 2, 4, 5, 7, 9)
346. Huber, Klaus: Zwei Sätze, [0, 3, 1, 10, 11, 8, 6, 9, 7, 2, 4, 5], pc set (0, 2, 3, 4, 5, 7)
347. Husa, Karel: Poème for Viola and Chamber Orchestra, mvt 1, [0, 6, 5, 7, 8, 11, 9, 10, 3, 4, 2, 1], pc set (0, 1, 2, 3, 6, 7)
348. Husa, Karel: Poème for Viola and Chamber Orchestra, mvt 3, [0, 3, 1, 2, 4, 10, 9, 11, 7, 8, 6, 5], pc set (0, 1, 2, 3, 4, 6)
349. Ives, Charles: On the Antipodes, [0, 3, 11, 8, 4, 7, 10, 9, 6, 2, 5, 1], pc set (0, 1, 4, 5, 8, 9)
350. Ives, Charles: Tone Roads, No.3, [0, 11, 1, 3, 2, 10, 5, 8, 4, 7, 6, 9], pc set (0, 1, 2, 3, 4, 5)
351. Johnston, Ben: String Quartet, No.6, [0, 5, 10, 9, 3, 7, 11, 6, 1, 2, 8, 4], pc set (0, 2, 3, 5, 7, 9)
352. Jung, Joachim: , [0, 11, 3, 10, 2, 1, 7, 8, 4, 9, 5, 6], pc set (0, 1, 2, 3, 4, 5)
353. Kahn, Erich Itor: Bagatelle für Rene Leibowitz, [0, 1, 2, 4, 6, 3, 10, 11, 5, 7, 9, 8], pc set (0, 1, 2, 3, 4, 6)
354. Kalodiki, Georgia: Six Sketches for piano, [0, 7, 6, 1, 2, 9, 8, 3, 4, 11, 5, 10], pc set (0, 1, 2, 5, 7, 8)
355. Klein, Fritz: Die Maschine: Eine extonale Selbstsatire, Op.1, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], pc set (0, 2, 4, 5, 7, 9)
356. Klein, Fritz Heinrich: Die Maschine. Eine extonale Selbstsatire von Heautontimorumenus., Op.1 (Das Maschinen-Thema), [0, 5, 7, 9, 3, 2, 11, 6, 8, 10, 4, 1], pc set (0, 2, 3, 5, 7, 9)
357. Klein, Fritz Heinrich: Variationen, Op.14, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], pc set (0, 2, 4, 5, 7, 9)
358. Klenau, Paul von: Elisabeth von England, [0, 2, 8, 11, 7, 1, 4, 10, 3, 6, 5, 9], pc set (0, 1, 2, 3, 6, 7)
359. Kokkonen, Joonas: Cello Concerto, mov. 2, row “II/A”, [0, 2, 7, 4, 3, 5, 6, 1, 11, 8, 10, 9], pc set (0, 2, 3, 4, 5, 7)
360. Kokkonen, Joonas: Cello Concerto, mov. 2, row “II/B”, [0, 2, 3, 1, 4, 5, 7, 8, 6, 9, 10, 11], pc set (0, 1, 2, 3, 4, 5)
361. Kokkonen, Joonas: Cello Concerto, mov. 2, row “II/C”, [0, 9, 11, 10, 7, 2, 6, 3, 5, 4, 1, 8], pc set (0, 2, 3, 4, 5, 7), self-rotational interval pattern 9-2-11-9-7-4-
362. Kokkonen, Joonas: Woodwind Quintet, mov. 1, rows “I/A” and “I/B”, [0, 2, 11, 9, 10, 1, 3, 6, 4, 5, 7, 8], pc set (0, 1, 2, 3, 4, 5)
363. Krenek, Ernst: Eight Piano Pieces, [0, 10, 1, 7, 6, 11, 5, 8, 3, 9, 2, 4], pc set (0, 1, 2, 3, 6, 7)
364. Krenek, Ernst: Karl V, King Francis Row, [0, 10, 5, 6, 11, 3, 9, 4, 2, 7, 1, 8], pc set (0, 1, 2, 5, 7, 8)
365. Krenek, Ernst: Kette, Kreis, und Spiegel (Circle, Chain and Mirror), Op.160, [0, 5, 6, 9, 8, 4, 10, 7, 11, 3, 1, 2], pc set (0, 1, 2, 4, 5, 8)
366. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 1, [0, 2, 4, 5, 8, 10, 6, 7, 9, 11, 1, 3], pc set (0, 1, 3, 5, 7, 9)
367. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 2, [0, 2, 3, 6, 8, 10, 5, 7, 9, 11, 1, 4], pc set (0, 1, 3, 5, 7, 9)
368. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 3, [0, 1, 4, 6, 8, 10, 5, 7, 9, 11, 2, 3], pc set (0, 1, 3, 5, 7, 9)
369. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 4, [0, 3, 5, 7, 9, 11, 6, 8, 10, 1, 2, 4], pc set (0, 1, 3, 5, 7, 9)
370. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 5, [0, 2, 4, 6, 8, 9, 5, 7, 10, 11, 1, 3], pc set (0, 1, 3, 5, 7, 9)
371. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 6, [0, 2, 4, 6, 7, 10, 5, 8, 9, 11, 1, 3], pc set (0, 1, 3, 5, 7, 9)
372. Krenek, Ernst: Quaestio temporis, Op.170, [0, 3, 11, 4, 2, 1, 7, 8, 10, 5, 9, 6], pc set (0, 1, 2, 3, 4, 5)
373. Krenek, Ernst: Sechs Vermessene, Op.168, [0, 3, 1, 6, 2, 4, 10, 5, 9, 7, 8, 11], pc set (0, 1, 2, 3, 4, 6)
374. Krenek, Ernst: Sestina, Op.161, [0, 8, 11, 10, 4, 6, 7, 1, 5, 3, 9, 2], pc set (0, 1, 2, 4, 6, 8)
375. Krenek, Ernst: Sonata, No.3, Op.92, No.4, [0, 10, 5, 8, 3, 2, 6, 7, 1, 9, 11, 4], pc set (0, 2, 3, 5, 7, 9)
376. Krenek, Ernst: String Quartet, No.6, Op.78, [0, 10, 11, 8, 1, 9, 3, 7, 2, 4, 6, 5], pc set (0, 1, 2, 3, 4, 5)
377. Krenek, Ernst: Studies in Counterpoint, [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5], pc set (0, 1, 2, 3, 6, 7)
378. Krenek, Ernst: Studies in Counterpoint (i), [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5], pc set (0, 1, 2, 3, 6, 7)
379. Krenek, Ernst: Studies in Counterpoint (ii), [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6], pc set (0, 1, 2, 3, 6, 7)
380. Krenek, Ernst: Suite, Op.84 for solo cello, [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5], pc set (0, 1, 2, 3, 6, 7)
381. Krenek, Ernst: Symeon, der Stylit, [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6], pc set (0, 1, 2, 3, 6, 7)
382. Krenek, Ernst: Symphonic Elegy for String Orchestra, Op.105, [0, 1, 9, 11, 10, 2, 3, 7, 6, 8, 4, 5], pc set (0, 1, 2, 3, 4, 5)
383. Krenek, Ernst: Zwölf Variationen in Drei Satzen, [0, 1, 3, 10, 2, 5, 11, 7, 4, 9, 6, 8], pc set (0, 2, 3, 4, 5, 7)
384. Krenek, Ernst: Zwölf Variationen in Drei Sätzen, Op.79, [0, 1, 3, 10, 2, 5, 11, 7, 4, 9, 8, 6], pc set (0, 2, 3, 4, 5, 7)
385. Krenek, Ernst: concert for organ and string-orchestra, Op.230, [0, 11, 8, 4, 3, 6, 7, 5, 2, 9, 10, 1], pc set (0, 1, 3, 5, 8, 9)
386. Kukuck, Felicitas: ‘Der Gottesknecht’: 6. Kantate, [0, 11, 10, 1, 2, 3, 8, 9, 6, 5, 7, 4], pc set (0, 1, 2, 3, 4, 5)
387. Kukuck, Felicitas: ‘Wo bist Du Trost’; motet, [0, 11, 10, 7, 6, 1, 2, 5, 4, 3, 9, 8], pc set (0, 1, 2, 3, 6, 7)
388. Lackner, Peter: ‘An alle Außerirdischen’. Kanon für drei Singstimmen, Kontrabaß und Klavier, [0, 4, 9, 7, 11, 2, 5, 1, 8, 10, 6, 3], pc set (0, 2, 4, 5, 7, 9)
389. Lackner, Peter: ‘Davongeflogene Seelen’ für Singstimme, Violoncello und Klavier, [0, 10, 4, 7, 6, 1, 9, 11, 5, 2, 3, 8], pc set (0, 1, 3, 6, 7, 9)
390. Lackner, Peter: ‘Der Winter’, [0, 6, 3, 5, 9, 11, 7, 1, 4, 2, 10, 8], pc set (0, 1, 3, 6, 7, 9)

391. Lackner, Peter: ‘Es fiel ein Reif in der Frühlingsnacht’ für Singstimme und ein Melodie-Instrument, [0, 9, 4, 7, 2, 5, 1, 8, 10, 11, 3, 6], pc set (0, 2, 4, 5, 7, 9)
392. Lackner, Peter: ‘Euphorbia obesa’. Kanon für Oboe, Englischhorn und Fagott., [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5], pc set (0, 2, 4, 6, 8, 10)
393. Lackner, Peter: ‘Flügelaltar’ für Klavier, [0, 9, 11, 10, 2, 7, 1, 8, 4, 5, 3, 6], pc set (0, 2, 3, 4, 5, 7)
394. Lackner, Peter: ‘Hexentanz’ für Violine und Klavier, [0, 3, 5, 7, 8, 4, 1, 10, 11, 2, 6, 9], pc set (0, 1, 3, 4, 5, 8)
395. Lackner, Peter: ‘INKE TAN MAGROV’ für Singstimme und Klavier, [0, 6, 5, 10, 8, 3, 7, 1, 2, 9, 11, 4], pc set (0, 2, 3, 5, 7, 9)
396. Lackner, Peter: ‘Ständchen’ für zwei Violinen und zwei Bratschen. 1913,2013, [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6], pc set (0, 1, 3, 5, 8, 9)
397. Lackner, Peter: ‘Venus-Quadrat’ für Violine und Klavier, [0, 7, 2, 5, 9, 10, 11, 6, 8, 4, 3, 1], pc set (0, 2, 4, 5, 7, 9)
398. Lackner, Peter: ‘Wo ist der Freund’ (erstes Lied aus dem Zyklus ‘Wilde Erdbeeren’ für Singstimme und Klavier), [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8], pc set (0, 1, 3, 4, 6, 9)
399. Lackner, Peter: 1. Kanonzyklus, [0, 7, 5, 9, 1, 3, 11, 8, 4, 6, 10, 2], pc set (0, 1, 3, 5, 7, 9)
400. Lackner, Peter: 2. Kanonzyklus, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6], pc set (0, 2, 4, 5, 7, 9)
401. Lackner, Peter: 3. Kanonzyklus, [0, 6, 8, 10, 1, 3, 5, 11, 9, 7, 4, 2], pc set (0, 2, 3, 5, 7, 9)
402. Lackner, Peter: 4. Kanonzyklus, [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8], pc set (0, 1, 2, 4, 6, 8)
403. Lackner, Peter: 5. Kanonzyklus, [0, 7, 11, 9, 1, 3, 5, 8, 10, 6, 2, 4], pc set (0, 2, 3, 4, 6, 8)
404. Lackner, Peter: AGNI MEI (Kanon für Klavier. 5. Juni 2015), [0, 4, 10, 11, 1, 2, 8, 7, 3, 6, 9, 5], pc set (0, 1, 2, 3, 4, 6)
405. Lackner, Peter: Das Buch der Wandlungen I für Frauenstimmen und,oder Klavier, [0, 8, 3, 5, 1, 10, 7, 11, 4, 2, 6, 9], pc set (0, 2, 4, 5, 7, 9)
406. Lackner, Peter: Florianische Reihe, [0, 3, 9, 7, 4, 11, 5, 2, 8, 6, 1, 10], pc set (0, 1, 3, 5, 8, 9)
407. Lackner, Peter: INKE TAN MAGROV für Singstimme und Klavier (zweites Lied aus dem Zyklus ‘Wilde Erdbeeren’), [0, 2, 9, 5, 8, 11, 3, 1, 6, 10, 7, 4], pc set (0, 1, 3, 4, 6, 9)
408. Lackner, Peter: KANON für A, O & Gsellmanns Weltmaschine. 8. Oktober 1958,2008, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3], pc set (0, 2, 4, 6, 8, 10)
409. Lackner, Peter: Kanon-Polska für zwei Bratschen. 6. Juni 1993, [0, 6, 3, 1, 10, 8, 5, 11, 2, 4, 7, 9], pc set (0, 2, 3, 5, 7, 9)
410. Lackner, Peter: Kanon T6 á 2, [0, 10, 8, 3, 1, 5, 6, 4, 2, 9, 7, 11], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 10-10-7-10-4-1-
411. Lackner, Peter: Kanon für B. L., 7. Oktober 2017, [0, 9, 10, 5, 3, 7, 11, 2, 1, 6, 8, 4], pc set (0, 2, 3, 5, 7, 9)
412. Lackner, Peter: Kanon für Blockflötenquartett. April 2005, [0, 10, 11, 3, 1, 2, 8, 7, 9, 5, 4, 6], pc set (0, 1, 2, 3, 4, 5)
413. Lackner, Peter: Kanon für Cello und Klavier, [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8], pc set (0, 1, 3, 5, 8, 9)
414. Lackner, Peter: Kanon für Flöte, Akkordeon, zwei Violinen, Bratsche und Klavier, [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8], pc set (0, 1, 2, 4, 6, 8)
415. Lackner, Peter: Kanon für Flöte solo und N. N., [0, 3, 7, 10, 2, 5, 11, 8, 4, 1, 9, 6], pc set (0, 2, 4, 5, 7, 9)
416. Lackner, Peter: Kanon für Flöte und Elektronik. Februar 1999, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6], pc set (0, 2, 4, 5, 7, 9)
417. Lackner, Peter: Kanon für Hammerklavier. März 2016, [0, 2, 1, 5, 7, 3, 11, 9, 10, 6, 4, 8], pc set (0, 1, 2, 3, 5, 7)
418. Lackner, Peter: Kanon für Kammerorchester, [0, 9, 11, 6, 2, 4, 7, 10, 8, 1, 5, 3], pc set (0, 2, 3, 5, 7, 9)
419. Lackner, Peter: Kanon für Klavier, [0, 6, 8, 10, 1, 3, 5, 11, 9, 7, 4, 2], pc set (0, 2, 3, 5, 7, 9)
420. Lackner, Peter: Kanon für Klavier. 15. Juni 1992, [0, 10, 3, 8, 6, 5, 2, 1, 11, 4, 9, 7], pc set (0, 2, 3, 5, 7, 9)
421. Lackner, Peter: Kanon für Klavier. 21. Juni 1998, [0, 7, 6, 5, 1, 4, 3, 8, 9, 10, 2, 11], pc set (0, 1, 2, 3, 6, 7)
422. Lackner, Peter: Kanon für Klavier. 26. Juni 1983, [0, 7, 5, 9, 4, 8, 6, 1, 11, 3, 10, 2], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 7-10-4-7-4-10-
423. Lackner, Peter: Kanon für Klavier. 27. Juni, 26. September 2002, [0, 9, 4, 1, 2, 8, 7, 10, 3, 6, 5, 11], pc set (0, 1, 4, 5, 6, 8)
424. Lackner, Peter: Kanon für Klavier. 5. April 1989, [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8], pc set (0, 1, 3, 5, 8, 9)
425. Lackner, Peter: Kanon für Klavier. April 2000, [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8], pc set (0, 1, 2, 4, 6, 8)
426. Lackner, Peter: Kanon für Klavier zu vier Händen, [0, 10, 5, 3, 7, 8, 6, 4, 11, 9, 1, 2], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 10-7-10-4-1-10-
427. Lackner, Peter: Kanon für Klavier zu vier Händen. 12. Juni 1996, [0, 4, 2, 8, 11, 10, 5, 1, 3, 9, 6, 7], pc set (0, 2, 3, 4, 6, 8)
428. Lackner, Peter: Kanon für Klavier zu vier Händen. Frühling 1984, [0, 1, 10, 7, 9, 4, 5, 11, 8, 6, 2, 3], pc set (0, 1, 3, 4, 6, 9)
429. Lackner, Peter: Kanon für Klavierquartett, [0, 8, 6, 11, 3, 9, 1, 5, 7, 2, 10, 4], pc set (0, 1, 3, 4, 6, 9)
430. Lackner, Peter: Kanon für Klavierquartett. 27. April 1991, [0, 6, 3, 5, 9, 11, 7, 1, 4, 2, 10, 8], pc set (0, 1, 3, 6, 7, 9)
431. Lackner, Peter: Kanon für Klavierquartett. 27. Juni 1991, [0, 2, 6, 9, 11, 3, 7, 5, 1, 10, 8, 4], pc set (0, 1, 3, 4, 6, 9)

432. Lackner, Peter: Kanon für Klaviertrio, [0, 2, 4, 9, 5, 7, 3, 1, 11, 6, 10, 8], pc set (0, 2, 4, 5, 7, 9)
433. Lackner, Peter: Kanon für Orgel, zweimanualiges Cembalo oder Klavier, [0, 7, 2, 11, 4, 9, 6, 8, 1, 5, 3, 10], pc set (0, 2, 4, 5, 7, 9)
434. Lackner, Peter: Kanon für Orgel. 21. November 1994, 4. Februar 1995, [0, 8, 5, 1, 4, 9, 2, 11, 7, 3, 10, 6], pc set (0, 1, 4, 5, 8, 9)
435. Lackner, Peter: Kanon für Schwegel, diatonisches Hackbrett und Violine, [0, 8, 4, 10, 6, 2, 5, 1, 9, 3, 11, 7], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 8-8-6-8-8-3-
436. Lackner, Peter: Kanon für Schwegel und zwei Geigen, [0, 6, 4, 2, 10, 8, 9, 3, 5, 7, 11, 1], pc set (0, 2, 4, 6, 8, 10)
437. Lackner, Peter: Kanon für Schwegelpfeife in A und Geige, [0, 9, 7, 2, 10, 4, 3, 6, 8, 1, 5, 11], pc set (0, 2, 3, 5, 7, 9)
438. Lackner, Peter: Kanon für Streichquartett, [0, 9, 3, 5, 1, 11, 7, 10, 4, 2, 6, 8], pc set (0, 2, 3, 4, 6, 8)
439. Lackner, Peter: Kanon für Streichquartett. 22.September 2003, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3], pc set (0, 2, 4, 6, 8, 10)
440. Lackner, Peter: Kanon für Streichquartett. 3. Jänner 1990, [0, 6, 4, 8, 11, 3, 1, 7, 9, 5, 2, 10], pc set (0, 1, 3, 5, 8, 9)
441. Lackner, Peter: Kanon für Streichquartett und Orgel. 21. November 1993, [0, 10, 2, 5, 4, 7, 1, 11, 3, 9, 8, 6], pc set (0, 2, 3, 5, 7, 9)
442. Lackner, Peter: Kanon für Tenor-Hackbrett. 19. März 2014, [0, 8, 4, 6, 9, 1, 11, 3, 7, 5, 2, 10], pc set (0, 1, 3, 5, 8, 9)
443. Lackner, Peter: Kanon für Violine, Bratsche und Klavier, [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6], pc set (0, 1, 3, 5, 8, 9)
444. Lackner, Peter: Kanon für Violine, Viola und Akkordeon. 11. Juni 2007, [0, 11, 1, 2, 3, 10, 4, 9, 8, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
445. Lackner, Peter: Kanon für Violine solo, [0, 11, 2, 7, 10, 9, 3, 4, 1, 8, 5, 6], pc set (0, 2, 3, 4, 5, 7)
446. Lackner, Peter: Kanon für Violine und Violoncello, [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8], pc set (0, 1, 3, 5, 8, 9)
447. Lackner, Peter: Kanon für acht Instrumente. Dezember 1991, März 2007, [0, 11, 3, 10, 6, 2, 7, 8, 4, 9, 1, 5], pc set (0, 1, 2, 4, 5, 8)
448. Lackner, Peter: Kanon für drei Bratschen, [0, 11, 3, 10, 6, 2, 7, 8, 4, 9, 1, 5], pc set (0, 1, 2, 4, 5, 8)
449. Lackner, Peter: Kanon für drei Violinen I, II August 1998, [0, 2, 10, 4, 8, 6, 1, 9, 11, 5, 3, 7], pc set (0, 2, 4, 6, 8, 10)
450. Lackner, Peter: Kanon für sechs Instrumente. 16. März 2009, [0, 7, 6, 3, 2, 10, 1, 8, 11, 5, 4, 9], pc set (0, 1, 3, 5, 8, 9)
451. Lackner, Peter: Kanon für sechs Posaunen. Herbst 1996, [0, 9, 1, 6, 4, 8, 11, 2, 10, 7, 5, 3], pc set (0, 1, 3, 5, 8, 9)
452. Lackner, Peter: Kanon für zwei Gitarren. September 2001, [0, 5, 3, 9, 11, 6, 7, 2, 4, 10, 8, 1], pc set (0, 1, 3, 6, 7, 9)
453. Lackner, Peter: Kanon für zwei Singstimmen und Ensemble zur Skulpturengruppe LEM von Axel Kirchmayr und einem Text von Hannes Waltl. September 2004, [0, 2, 9, 10, 5, 7, 1, 11, 4, 3, 8, 6], pc set (0, 2, 4, 5, 7, 9)
454. Lackner, Peter: Kanon für zwei Trompeten, Horn, Posaune und Tuba. 1. Mai 1993, [0, 1, 2, 10, 3, 5, 11, 9, 4, 8, 7, 6], pc set (0, 2, 3, 4, 5, 7)
455. Lackner, Peter: Kanon für zwei Violinen, [0, 7, 4, 5, 9, 2, 3, 8, 11, 10, 6, 1], pc set (0, 2, 4, 5, 7, 9)
456. Lackner, Peter: Kanon für zwei Violinen. Frühjahr 1992, [0, 2, 4, 7, 9, 11, 5, 3, 1, 10, 8, 6], pc set (0, 2, 4, 5, 7, 9)
457. Lackner, Peter: Kanon für zwei Violinen und Klavier. 1. Dezember 2004, [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5], pc set (0, 2, 4, 6, 8, 10)
458. Lackner, Peter: Kanon für zwei Violinen und Klavier. Frühjahr 1984, [0, 1, 10, 7, 9, 4, 5, 11, 8, 6, 2, 3], pc set (0, 1, 3, 4, 6, 9)
459. Lackner, Peter: Kanon à 3, [0, 11, 6, 10, 2, 7, 3, 4, 9, 5, 1, 8], pc set (0, 1, 4, 5, 6, 8)
460. Lackner, Peter: Kanon à 4 – 'Für Harald Fripertinger zum 50. Geburtstag', [0, 10, 3, 6, 5, 8, 1, 11, 9, 4, 7, 2], pc set (0, 2, 3, 5, 7, 9)
461. Lackner, Peter: Kanon á 4, [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6], pc set (0, 1, 3, 5, 8, 9)
462. Lackner, Peter: Kanon á 5 für Klaus Chudoba, [0, 2, 10, 8, 6, 11, 3, 1, 5, 7, 9, 4], pc set (0, 2, 3, 4, 6, 8)
463. Lackner, Peter: Moebius-Band für Flöte, Violine, Violoncello und Klavier, [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8], pc set (0, 1, 3, 4, 6, 9)
464. Lackner, Peter: Moebius-Band für sechs Violinen, [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8], pc set (0, 1, 3, 4, 6, 9)
465. Lackner, Peter: Moebiusband I für zwei Melodieinstrumente, [0, 6, 8, 2, 7, 1, 11, 5, 3, 9, 4, 10], pc set (0, 1, 2, 6, 7, 8)
466. Lackner, Peter: Moebiusband für Violine und Klavier (Chinesenfolter I), [0, 2, 4, 6, 10, 5, 1, 11, 9, 7, 3, 8], pc set (0, 1, 2, 4, 6, 8)
467. Lackner, Peter: Reihenspiel für Orgel, [0, 9, 6, 11, 5, 4, 10, 7, 2, 1, 8, 3], pc set (0, 1, 2, 5, 7, 8)
468. Lackner, Peter: Salambo-Kanon (à 4); Bad Aussee, 2. Februar 2008, [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5], pc set (0, 2, 3, 4, 6, 8)
469. Lackner, Peter: Sponsions-Kanon, [0, 4, 1, 10, 3, 7, 9, 5, 8, 11, 6, 2], pc set (0, 1, 3, 4, 6, 9)
470. Lackner, Peter: TACET (drittes Lied aus dem Zyklus 'Wilde Erdbeeren'), [0, 2, 9, 5, 8, 11, 4, 7, 10, 6, 1, 3], pc set (0, 1, 3, 4, 6, 9)
471. Lackner, Peter: Trauermusik für Fagott, Kontrafagott und Pauke, [0, 6, 2, 8, 10, 4, 11, 5, 9, 3, 1, 7], pc set (0, 2, 4, 6, 8, 10)

472. Lackner, Peter: kgV (3,4) [zweistimmiger Kanon für Klavier], [0, 10, 2, 3, 5, 7, 1, 11, 9, 8, 4, 6], pc set (0, 2, 4, 5, 7, 9)
473. Lang, Bernhard: 'Der Golem' nach Gustav Meyrinck, [0, 4, 7, 8, 11, 3, 5, 2, 9, 1, 10, 6], pc set (0, 1, 4, 5, 8, 9)
474. Lang, Bernhard: Der Reigen, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6], pc set (0, 1, 2, 3, 4, 5)
475. Lang, Bernhard: Hemma (Music Theatre Hemma Klagenfurt 2015), [0, 5, 10, 2, 3, 1, 7, 9, 8, 4, 11, 6], pc set (0, 2, 3, 4, 5, 7)
476. Lang, Bernhard: Monadologie XIII a; 'The Saucy Maid', [0, 1, 5, 2, 4, 9, 3, 10, 8, 11, 7, 6], pc set (0, 1, 3, 4, 5, 8)
477. Lang, Klaus: 'Von der Ligurischen Küste zum Trasimenischen See'; Trauermusik für Violine und Klavier, [0, 5, 9, 8, 10, 7, 1, 4, 2, 3, 11, 6], pc set (0, 2, 3, 4, 5, 7)
478. Leibowitz, René: String Quartet, No.3, Op.26, [0, 8, 9, 7, 6, 1, 2, 5, 4, 10, 11, 3], pc set (0, 1, 2, 3, 6, 7)
479. Leibowitz, René: Trois pièces pour piano, Op.19, [0, 4, 3, 1, 2, 5, 6, 9, 10, 8, 7, 11], pc set (0, 1, 2, 3, 4, 5)
480. Lewin, David: Just a Minute, Roger, [0, 11, 4, 5, 7, 3, 2, 6, 8, 1, 10, 9], pc set (0, 1, 4, 5, 6, 8)
481. Ligeti, György: Le Grand Macabre, [0, 6, 5, 11, 10, 4, 9, 3, 2, 8, 7, 1], pc set (0, 1, 2, 6, 7, 8), self-rotational interval pattern 6-11-6-11-6-5-
482. Lu, Shi-Lin: A Family of Red-Crowned Cranes, [0, 2, 9, 7, 4, 6, 11, 8, 1, 3, 10, 5], pc set (0, 2, 3, 5, 7, 9)
483. Lu, Yen: A Bird Flying By, [0, 6, 3, 4, 8, 7, 11, 5, 10, 2, 9, 1], pc set (0, 1, 2, 4, 5, 8)
484. Luo, Zhong-Rong: Chang'e, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6], pc set (0, 2, 4, 5, 7, 9)
485. Luo, Zhong-Rong: Dusk, row 1, [0, 2, 7, 5, 10, 8, 6, 3, 1, 11, 9, 4], pc set (0, 2, 3, 5, 7, 9)
486. Luo, Zhong-Rong: Dusk, row 2, [0, 3, 7, 5, 8, 10, 1, 11, 6, 2, 4, 9], pc set (0, 2, 4, 5, 7, 9)
487. Luo, Zhong-Rong: Evening, [0, 2, 7, 5, 10, 8, 6, 3, 1, 11, 9, 4], pc set (0, 2, 3, 5, 7, 9)
488. Luo, Zhong-Rong: Morning Glory, [0, 2, 5, 9, 7, 10, 3, 11, 1, 4, 6, 8], pc set (0, 2, 4, 5, 7, 9)
489. Luo, Zhong-Rong: Picking lotus flowers at the riverside, [0, 2, 5, 7, 10, 3, 1, 4, 6, 9, 11, 8], pc set (0, 2, 4, 5, 7, 9)
490. Luo, Zhong-Rong: Sonatina, mvt 3, [0, 2, 7, 4, 11, 8, 5, 9, 10, 1, 3, 6], pc set (0, 1, 3, 5, 8, 9)
491. Luo, Zhong-Rong: String Quartet, No.2, [0, 3, 5, 10, 6, 8, 11, 1, 9, 2, 4, 7], pc set (0, 2, 3, 5, 7, 9)
492. Luo, Zhong-Rong: String Quartet, No.3, row 1, [0, 2, 4, 7, 5, 10, 8, 1, 6, 3, 9, 11], pc set (0, 2, 3, 5, 7, 9)
493. Luo, Zhong-Rong: String Quartet, No.3, row 3, [0, 2, 7, 9, 11, 1, 3, 6, 10, 4, 5, 8], pc set (0, 1, 2, 3, 5, 7)
494. Luo, Zhong-Rong: Three Piano Pieces, "Arabeque", row 1, [0, 2, 5, 10, 6, 1, 3, 8, 11, 9, 7, 4], pc set (0, 1, 4, 5, 6, 8)
495. Luo, Zhong-Rong: Three Piano Pieces, "Arabeque", row 2, [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 10, 5], pc set (0, 2, 4, 5, 7, 9)
496. Lutyens, Elisabeth: Essence Of Our Happinesses, Op.69, mvt II, Part I, [0, 11, 1, 10, 2, 3, 8, 9, 5, 6, 4, 7], pc set (0, 1, 2, 3, 4, 5)
497. Lutyens, Elisabeth: Five Little Pieces for Clarinet and Piano, [0, 8, 4, 1, 10, 2, 9, 3, 5, 6, 11, 7], pc set (0, 2, 3, 4, 6, 8)
498. Lutyens, Elisabeth: Islands, Op.80, [0, 11, 7, 3, 8, 10, 9, 6, 4, 5, 1, 2], pc set (0, 1, 3, 4, 5, 8)
499. Lutyens, Elisabeth: Motet (Excerota Tractati Logico-Philosophici), Op.27, [0, 11, 3, 7, 8, 4, 2, 6, 5, 1, 9, 10], pc set (0, 1, 4, 5, 8, 9)
500. Lutyens, Elisabeth: Présages, Op.53, [0, 1, 11, 2, 10, 8, 5, 3, 4, 7, 9, 6], pc set (0, 1, 2, 3, 4, 6)
501. Lutyens, Elisabeth: Quincunx, Op.44, [0, 6, 11, 1, 5, 2, 7, 3, 4, 9, 10, 8], pc set (0, 1, 2, 3, 6, 7)
502. Lutyens, Elisabeth: The Numbered, Altered Primary Row (swap pitches 2 and 3), [0, 11, 10, 1, 2, 9, 3, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
503. Lutyens, Elisabeth: The Numbered, Primary Row, [0, 10, 11, 1, 2, 9, 3, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
504. Maderna, Bruno: Improvvisazione N. 1, [0, 11, 4, 8, 3, 2, 7, 6, 1, 5, 10, 9], pc set (0, 1, 2, 4, 5, 8)
505. Maderna, Bruno: Musica su due dimensioni, [0, 2, 9, 4, 6, 11, 8, 10, 1, 3, 5, 7], pc set (0, 2, 3, 5, 7, 9)
506. Mamlok, Ursula: Haiku Settings, No.5, [0, 11, 8, 7, 4, 3, 5, 6, 9, 10, 1, 2], pc set (0, 1, 4, 5, 8, 9)
507. Mamlok, Ursula: Panta Rhei, [0, 7, 4, 11, 8, 3, 10, 9, 6, 2, 5, 1], pc set (0, 1, 4, 5, 8, 9)
508. Mamlok, Ursula: Panta Rhei, secondary row (mvt 4, Piano), [0, 11, 8, 3, 4, 7, 2, 1, 6, 9, 10, 5], pc set (0, 1, 4, 5, 8, 9)
509. Martin, Frank: Petite complainte, [0, 11, 10, 6, 2, 4, 5, 9, 8, 7, 3, 1], pc set (0, 1, 2, 4, 6, 8)
510. Martino, Donald: Fantasy Variations, [0, 3, 1, 10, 2, 8, 11, 5, 6, 9, 7, 4], pc set (0, 1, 2, 3, 5, 7)
511. Martino, Donald: Notturno (Row B), [0, 7, 11, 10, 9, 8, 2, 1, 6, 3, 4, 5], pc set (0, 1, 2, 3, 4, 5)
512. Matthias, Hauer Josef: Zwölftonspiel für Holzbläser, Streicher und Klavier. April 1951, [0, 4, 9, 11, 7, 2, 3, 6, 8, 10, 5, 1], pc set (0, 2, 4, 5, 7, 9)
513. Matthias, Josef: Salambo, Op.60, [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5], pc set (0, 2, 3, 4, 6, 8)
514. Messiaen, Olivier: Livre d'orgue, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
515. Messiaen, Olivier: Mode de valeurs et d'intensités, Series 1, [0, 11, 6, 5, 4, 3, 1, 10, 9, 7, 2, 8], pc set (0, 1, 2, 3, 6, 7)
516. Mittendorfer, Josef: aleatoric row, [0, 2, 7, 1, 8, 6, 10, 5, 4, 11, 3, 9], pc set (0, 1, 2, 6, 7, 8)
517. Moevs, Robert: Musica da Camera, [0, 1, 11, 3, 4, 2, 9, 10, 8, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
518. Morris, Robert: By Far, [0, 1, 4, 11, 3, 2, 6, 7, 5, 10, 8, 9], pc set (0, 1, 2, 3, 4, 5)

519. Morris, Robert: Canonic Variations, [0, 3, 11, 1, 4, 8, 5, 6, 9, 10, 2, 7], pc set (0, 1, 3, 4, 5, 8)
520. Morris, Robert: Clash, [0, 3, 11, 10, 8, 1, 7, 9, 2, 6, 4, 5], pc set (0, 2, 3, 4, 5, 7)
521. Morris, Robert: Concerto for Piano and Strings, [0, 1, 6, 11, 7, 5, 10, 8, 4, 3, 2, 9], pc set (0, 1, 2, 6, 7, 8)
522. Morris, Robert: Cuts, [0, 10, 11, 7, 3, 8, 6, 9, 4, 5, 1, 2], pc set (0, 1, 3, 4, 5, 8)
523. Morris, Robert: Entanglements, [0, 3, 10, 5, 11, 6, 1, 7, 9, 2, 8, 4], pc set (0, 1, 2, 5, 7, 8)
524. Morris, Robert: Exchanges, [0, 4, 3, 1, 9, 5, 8, 6, 2, 10, 11, 7], pc set (0, 1, 2, 4, 5, 8)
525. Morris, Robert: Knot Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6], pc set (0, 1, 3, 4, 5, 8)
526. Morris, Robert: Not Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6], pc set (0, 1, 3, 4, 5, 8)
527. Morris, Robert: Pari Passu, row 1, [0, 6, 10, 11, 2, 3, 9, 1, 7, 8, 4, 5], pc set (0, 1, 2, 4, 5, 8)
528. Morris, Robert: Refrains, [0, 3, 4, 2, 6, 10, 1, 8, 11, 7, 5, 9], pc set (0, 2, 3, 4, 6, 8)
529. Morris, Robert: Roundelay, row 1, [0, 7, 4, 11, 9, 2, 6, 3, 10, 5, 8, 1], pc set (0, 2, 4, 5, 7, 9)
530. Morris, Robert: Roundelay, row 2, [0, 5, 9, 7, 8, 10, 4, 11, 1, 6, 2, 3], pc set (0, 2, 3, 4, 5, 7)
531. Morris, Robert: Roundelay, row 3, [0, 10, 9, 3, 4, 6, 8, 11, 2, 7, 1, 5], pc set (0, 1, 3, 6, 7, 9)
532. Morris, Robert: Roundelay, row 4, [0, 3, 11, 10, 7, 2, 6, 9, 5, 4, 1, 8], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 3-8-11-9-7-4-
533. Morris, Robert: Roundelay, row 5, [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6], pc set (0, 1, 2, 3, 4, 5)
534. Morris, Robert: Roundelay, row 6, [0, 10, 5, 11, 4, 6, 8, 7, 2, 3, 9, 1], pc set (0, 1, 2, 6, 7, 8)
535. Morris, Robert: Something New, [0, 9, 4, 8, 11, 7, 3, 6, 10, 5, 2, 1], pc set (0, 1, 3, 4, 5, 8)
536. Morris, Robert: Strange Flowers, Occasional Storms, [0, 1, 8, 3, 5, 4, 10, 6, 9, 7, 11, 2], pc set (0, 1, 3, 4, 5, 8)
537. Morris, Robert: Terrane, [0, 11, 1, 3, 2, 5, 6, 4, 9, 7, 8, 10], pc set (0, 1, 2, 3, 4, 6)
538. Morris, Robert: Three Musicians, [0, 9, 7, 6, 8, 1, 11, 2, 4, 5, 3, 10], pc set (0, 1, 2, 3, 6, 7)
539. Morris, Robert: Tournament for 12 trombones, [0, 7, 6, 4, 11, 8, 5, 9, 1, 3, 2, 10], pc set (0, 1, 4, 5, 6, 8)
540. Morris, Robert: Tête-à-Tête, [0, 3, 11, 10, 1, 8, 2, 6, 9, 5, 4, 7], pc set (0, 2, 3, 4, 5, 7)
541. Morris, Robert: …gradually…, [0, 1, 8, 3, 5, 4, 6, 7, 9, 11, 2, 10], pc set (0, 1, 3, 4, 5, 8)
542. Nichols, Jeff: …its darkening opposite, or Set Portrait in a Convex Mirror, [0, 4, 8, 7, 11, 2, 3, 6, 1, 9, 10, 5], pc set (0, 1, 3, 5, 8, 9)
543. Nono, Luigi: Canti per tredeci, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
544. Nono, Luigi: Composizione per orchestra, No.1, [0, 1, 7, 6, 2, 8, 4, 3, 5, 10, 11, 9], pc set (0, 1, 2, 6, 7, 8)
545. Nono, Luigi: Cori di Didone, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
546. Nono, Luigi: Il canto sospeso, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
547. Nono, Luigi: Incontri, [0, 2, 3, 8, 9, 6, 4, 5, 7, 11, 1, 10], pc set (0, 1, 3, 6, 7, 9)
548. Nono, Luigi: Intolleranza, Soprano 1, [0, 3, 4, 7, 8, 5, 6, 9, 10, 1, 2, 11], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 3-1-3-1-9-1-
549. Nono, Luigi: La terra e la compagna (sketch), Series 1, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
550. Nono, Luigi: La terra e la compagna (sketch), Series 2, [0, 6, 1, 7, 11, 5, 2, 8, 10, 4, 3, 9], pc set (0, 1, 2, 6, 7, 8)
551. Nono, Luigi: La terra e la compagna (sketch), Series 3, [0, 9, 6, 3, 1, 4, 7, 10, 11, 8, 5, 2], pc set (0, 1, 3, 4, 6, 9)
552. Nono, Luigi: La terra e la compagna (sketch), Series 5, [0, 7, 2, 4, 9, 10, 5, 1, 6, 11, 8, 3], pc set (0, 2, 3, 5, 7, 9)
553. Nono, Luigi: La terra e la compagna (sketch), Series 7, [0, 5, 3, 10, 7, 1, 8, 9, 2, 6, 11, 4], pc set (0, 2, 3, 5, 7, 9)
554. Nono, Luigi: La terra e la compagna (sketch), Series 8, [0, 4, 5, 11, 3, 6, 10, 2, 7, 9, 1, 8], pc set (0, 1, 2, 3, 6, 7)
555. Nono, Luigi: Variazioni canoniche sulla serie dell'Op.41 di Arnold Schönberg, [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], pc set (0, 1, 4, 5, 8, 9)
556. Papaioannou, Yannis: Songs of the Lake, No.1, [0, 8, 5, 7, 6, 11, 2, 10, 1, 3, 9, 4], pc set (0, 1, 2, 3, 6, 7)
557. Papaioannou, Yannis: Songs of the Lake, No.2, [0, 7, 4, 6, 5, 1, 9, 2, 8, 10, 3, 11], pc set (0, 1, 2, 3, 6, 7)
558. Papaioannou, Yannis: Songs of the Lake, No.4, [0, 5, 11, 9, 6, 10, 7, 2, 3, 1, 4, 8], pc set (0, 1, 2, 3, 6, 7)
559. Papaioannou, Yannis: Suite, "XP", [0, 4, 2, 1, 6, 8, 3, 9, 7, 10, 5, 11], pc set (0, 1, 2, 4, 6, 8)
560. Papaioannou, Yannis: Suite, "YP", [0, 10, 9, 8, 1, 4, 5, 7, 3, 6, 2, 11], pc set (0, 1, 2, 4, 5, 8)
561. Pentland, Barbara: String Quartet, No.3, [0, 11, 3, 6, 5, 9, 10, 8, 1, 2, 7, 4], pc set (0, 1, 3, 6, 7, 9)
562. Perle, George: First string quartet, [0, 1, 3, 6, 10, 9, 8, 7, 4, 5, 11, 2], pc set (0, 1, 3, 4, 6, 9)
563. Pousseur, Henri: Trois Chants Sacrés, [0, 10, 11, 4, 1, 5, 9, 6, 3, 7, 2, 8], pc set (0, 1, 2, 3, 6, 7)
564. Preßl, Hermann Markus: 'A 5' für Bassklarinette, Vibraphon und drei Bratschen, [0, 6, 5, 8, 10, 7, 3, 2, 4, 9, 1, 11], pc set (0, 1, 2, 3, 5, 7)
565. Preßl, Hermann Markus: Finstersonnen, [0, 3, 9, 6, 11, 5, 1, 2, 7, 8, 10, 4], pc set (0, 1, 3, 6, 7, 9)

566. Preßl, Hermann Markus: N. N. 50; ‘Die Zeremonie des Abschieds’, [0, 9, 4, 2, 7, 5, 8, 1, 6, 3, 11, 10], pc set (0, 2, 4, 5, 7, 9)
567. Preßl, Herrmann Markus: Fier Fafeln für Fier Fiolen, [0, 7, 8, 11, 9, 4, 6, 10, 1, 5, 3, 2], pc set (0, 1, 3, 4, 5, 8)
568. Pärt, Arvo: Diagrams, [0, 11, 2, 1, 3, 4, 9, 10, 7, 8, 6, 5], pc set (0, 1, 2, 3, 4, 5)
569. Pärt, Arvo: Perpetuum Mobile, [0, 11, 10, 5, 6, 9, 7, 1, 2, 8, 3, 4], pc set (0, 1, 2, 3, 6, 7)
570. Pärt, Arvo: Symphony, No.1, [0, 1, 2, 7, 6, 3, 5, 11, 10, 4, 9, 8], pc set (0, 1, 2, 3, 6, 7)
571. Reynolds, Roger: Ambages, [0, 1, 4, 5, 7, 6, 8, 9, 10, 11, 2, 3], pc set (0, 1, 2, 3, 6, 7)
572. Riegebauer, Sigrid: Toccata, [0, 3, 1, 2, 11, 10, 4, 5, 8, 7, 9, 6], pc set (0, 1, 2, 3, 4, 5)
573. Rochberg, George: Sonata-Fantasia, [0, 11, 10, 4, 5, 6, 9, 8, 7, 1, 2, 3], pc set (0, 1, 2, 6, 7, 8), self-rotational interval pattern 11-11-6-1-1-3-
574. Rochberg, George: String Quartet, No.2 with soprano solo, [0, 11, 6, 5, 1, 2, 8, 7, 3, 4, 9, 10], pc set (0, 1, 2, 3, 6, 7)
575. Rochberg, George: Symphony, No.2, [0, 8, 1, 4, 9, 5, 6, 2, 3, 10, 11, 7], pc set (0, 1, 4, 5, 8, 9)
576. Sande, Henrik: ‘Volkslied’ für zwei Singstimmen und Klavier. 24. 12. 2015, [0, 2, 4, 5, 7, 9, 10, 8, 6, 3, 1, 11], pc set (0, 2, 4, 5, 7, 9)
577. Santoro, Claudio: Peças para Piano, [0, 11, 4, 5, 1, 9, 2, 3, 7, 8, 6, 10], pc set (0, 1, 4, 5, 6, 8)
578. Santoro, Claudio: Preludes 18-20, [0, 9, 1, 3, 2, 8, 10, 4, 6, 5, 7, 11], pc set (0, 1, 2, 3, 6, 7)
579. Santoro, Claudio: Six Piano Pieces, [0, 10, 4, 1, 11, 2, 5, 6, 3, 9, 7, 8], pc set (0, 1, 2, 3, 4, 6)
580. Santoro, Claudio: Sonata, No.1, [0, 10, 3, 8, 11, 1, 2, 9, 7, 4, 5, 6], pc set (0, 2, 3, 4, 5, 7)
581. Schnittke, Alfred: Concerto, No.2 for Violin and Chamber Orchestra, [0, 11, 1, 2, 10, 3, 4, 9, 5, 6, 8, 7], pc set (0, 1, 2, 3, 4, 5)
582. Schnittke, Alfred: Concerto Grosso, No.1, mvt 2, [0, 11, 2, 1, 8, 7, 10, 9, 6, 5, 4, 3], pc set (0, 1, 2, 3, 6, 7)
583. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 6, [0, 11, 2, 1, 9, 10, 7, 8, 4, 3, 6, 5], pc set (0, 1, 2, 3, 4, 5)
584. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 7, [0, 3, 11, 9, 10, 1, 4, 2, 7, 8, 5, 6], pc set (0, 1, 2, 3, 4, 6)
585. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 8, [0, 11, 7, 9, 10, 8, 6, 5, 3, 4, 1, 2], pc set (0, 1, 2, 3, 4, 5)
586. Schnittke, Alfred: Concerto Grosso, No.3, monogram 1, [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7], pc set (0, 1, 3, 5, 8, 9)
587. Schnittke, Alfred: Concerto Grosso, No.3, monogram 3, [0, 11, 2, 1, 3, 4, 10, 9, 7, 8, 5, 6], pc set (0, 1, 2, 3, 4, 5)
588. Schnittke, Alfred: Concerto Grosso, No.3, [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7], pc set (0, 1, 3, 5, 8, 9)
589. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 1, [0, 3, 6, 10, 2, 11, 8, 5, 9, 1, 4, 7], pc set (0, 1, 2, 4, 5, 8)
590. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 2, [0, 3, 7, 10, 2, 11, 6, 9, 1, 4, 8, 5], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 3-4-3-4-9-7-
591. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, [0, 2, 3, 1, 4, 5, 11, 10, 7, 9, 8, 6], pc set (0, 1, 2, 3, 4, 5)
592. Schnittke, Alfred: String Quartet, No.1, [0, 2, 1, 10, 3, 11, 5, 9, 4, 7, 8, 6], pc set (0, 1, 2, 3, 4, 5)
593. Schnittke, Alfred: String Quartet, No.4, [0, 11, 10, 1, 3, 2, 4, 9, 8, 6, 5, 7], pc set (0, 1, 2, 3, 4, 5)
594. Schnittke, Alfred: String Quartet, No.4, mvt 2, m.40, [0, 5, 10, 3, 2, 7, 8, 1, 6, 11, 4, 9], pc set (0, 2, 4, 5, 7, 9)
595. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.122, [0, 1, 11, 2, 10, 3, 4, 9, 8, 7, 6, 5], pc set (0, 1, 2, 3, 4, 5)
596. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.31, [0, 11, 9, 10, 8, 7, 6, 5, 3, 4, 2, 1], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-10-1-10-11-11-
597. Schnittke, Alfred: Symphony, No.7, mvt 3, row X, [0, 1, 10, 11, 2, 3, 9, 4, 5, 8, 7, 6], pc set (0, 1, 2, 3, 4, 5)
598. Schnittke, Alfred: Symphony, No.7, mvt 3, row y, [0, 1, 11, 10, 8, 9, 7, 6, 5, 4, 3, 2], pc set (0, 1, 2, 3, 4, 5)
599. Schnittke, Alfred: Viola Concerto, [0, 11, 5, 2, 1, 6, 3, 8, 7, 4, 10, 9], pc set (0, 1, 2, 3, 6, 7)
600. Schnittke, Alfred: Violin Sonata 2, [0, 10, 11, 9, 6, 8, 7, 5, 4, 1, 2, 3], pc set (0, 1, 2, 3, 4, 6)
601. Schoenberg, Arnold: A Survivor From Warsaw, Op.46, [0, 1, 6, 2, 10, 9, 5, 4, 11, 3, 7, 8], pc set (0, 1, 2, 4, 5, 8)
602. Schoenberg, Arnold: A Survivor From Warsaw, Op.46 (alternative), [0, 1, 6, 2, 10, 9, 4, 7, 3, 8, 11, 5], pc set (0, 1, 2, 4, 5, 8)
603. Schoenberg, Arnold: Accompaniment to a Film Scene, Op.34, [0, 3, 11, 1, 10, 9, 6, 8, 7, 5, 2, 4], pc set (0, 1, 2, 3, 4, 6)
604. Schoenberg, Arnold: Fantasy for Piano Four Hands, II (fragment), [0, 3, 6, 1, 7, 8, 2, 5, 11, 4, 10, 9], pc set (0, 1, 2, 5, 7, 8)
605. Schoenberg, Arnold: Fantasy for Piano Four Hands, I, [0, 4, 2, 5, 3, 7, 11, 10, 1, 8, 9, 6], pc set (0, 2, 3, 4, 5, 7)
606. Schoenberg, Arnold: Fantasy for Violin and Piano, Op.47, [0, 11, 3, 1, 7, 9, 5, 6, 2, 4, 10, 8], pc set (0, 2, 3, 4, 6, 8)
607. Schoenberg, Arnold: Five Piano Pieces, Op.23, No.5, [0, 8, 10, 6, 7, 5, 9, 1, 3, 2, 11, 4], pc set (0, 1, 2, 3, 5, 7)
608. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.1, Op.27, No.1, [0, 11, 8, 2, 1, 7, 9, 10, 4, 3, 5, 6], pc set (0, 1, 2, 3, 6, 7)
609. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.2, Op.27, No.2, [0, 11, 4, 10, 2, 8, 3, 7, 6, 5, 9, 1], pc set (0, 2, 3, 4, 6, 8)
610. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.3, Op.27, No.3, [0, 11, 7, 9, 10, 8, 4, 5, 1, 3, 2, 6], pc set (0, 1, 2, 3, 4, 5)

611. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.4, Op.27, No.4, [0, 2, 9, 5, 7, 3, 10, 11, 1, 8, 4, 6], pc set (0, 2, 3, 5, 7, 9)
612. Schoenberg, Arnold: Modern Psalms, The First Psalm, Op.50c, [0, 11, 8, 4, 7, 3, 1, 5, 2, 6, 9, 10], pc set (0, 1, 4, 5, 8, 9)
613. Schoenberg, Arnold: Moses und Aron, [0, 1, 7, 5, 6, 4, 10, 8, 9, 11, 2, 3], pc set (0, 1, 2, 3, 6, 7)
614. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 1), [0, 11, 3, 4, 8, 7, 2, 1, 5, 6, 10, 9], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 11-4-1-4-11-7-
615. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 2), [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], pc set (0, 1, 4, 5, 8, 9)
616. Schoenberg, Arnold: Piano Concerto, Op.42, [0, 7, 11, 2, 1, 9, 3, 5, 10, 6, 8, 4], pc set (0, 1, 2, 3, 5, 7)
617. Schoenberg, Arnold: Prelude To A Suite From “Genesis”, Op.44, [0, 8, 4, 7, 6, 2, 1, 10, 3, 5, 11, 9], pc set (0, 1, 2, 4, 6, 8)
618. Schoenberg, Arnold: Psalm 130, De Profundis (unfinished), Op.50B, [0, 6, 5, 1, 11, 7, 4, 8, 9, 3, 2, 10], pc set (0, 1, 2, 6, 7, 8)
619. Schoenberg, Arnold: Serenade, mvt 4, “Sonett”, Op.24, [0, 10, 11, 7, 8, 9, 4, 2, 5, 1, 3, 6], pc set (0, 1, 2, 3, 4, 5)
620. Schoenberg, Arnold: Serenade, mvt 5, “Tanzscene”, Op.24, [0, 1, 3, 6, 7, 9, 8, 10, 11, 2, 4, 5], pc set (0, 1, 3, 6, 7, 9)
621. Schoenberg, Arnold: Six Pieces for Male Chorus, No.1, Op.35, [0, 9, 1, 3, 2, 11, 6, 8, 7, 4, 10, 5], pc set (0, 1, 2, 3, 4, 6)
622. Schoenberg, Arnold: Six Pieces for Male Chorus, No.2, Op.35, [0, 3, 1, 7, 6, 8, 11, 5, 4, 9, 10, 2], pc set (0, 1, 2, 5, 7, 8)
623. Schoenberg, Arnold: Six Pieces for Male Chorus, No.5, Op.35, [0, 6, 9, 1, 2, 10, 7, 3, 11, 5, 4, 8], pc set (0, 1, 2, 4, 5, 8)
624. Schoenberg, Arnold: Sonata For Organ, [0, 6, 10, 2, 8, 1, 7, 5, 9, 4, 11, 3], pc set (0, 1, 2, 4, 6, 8)
625. Schoenberg, Arnold: String Quartet, No.4, Op.37, [0, 11, 7, 8, 3, 1, 2, 10, 6, 5, 4, 9], pc set (0, 1, 4, 5, 6, 8)
626. Schoenberg, Arnold: String Trio, Op.45, [0, 8, 1, 7, 2, 11, 9, 6, 4, 5, 3, 10], pc set (0, 1, 2, 3, 6, 7)
627. Schoenberg, Arnold: Suite, Op.29, [0, 4, 3, 7, 11, 8, 9, 6, 5, 1, 2, 10], pc set (0, 1, 4, 5, 8, 9)
628. Schoenberg, Arnold: Suite for Piano, Op.25, [0, 1, 3, 9, 2, 11, 4, 10, 7, 8, 5, 6], pc set (0, 1, 2, 3, 4, 6)
629. Schoenberg, Arnold: Three Satires for Mixed Chorus, No.3, Op.28, No.3, [0, 1, 11, 3, 9, 5, 2, 4, 10, 6, 8, 7], pc set (0, 2, 3, 4, 6, 8)
630. Schoenberg, Arnold: Three Songs, No.2, “Tot”, Op.48, [0, 1, 7, 11, 8, 2, 6, 5, 10, 9, 3, 4], pc set (0, 1, 2, 3, 6, 7)
631. Schoenberg, Arnold: Three Songs, No.3, “Madchenlied”, Op.48, [0, 6, 8, 10, 2, 4, 9, 5, 3, 11, 7, 1], pc set (0, 2, 4, 6, 8, 10)
632. Schoenberg, Arnold: Three Times a Thousand Years, Op.50a, [0, 2, 11, 9, 10, 4, 3, 7, 5, 6, 8, 1], pc set (0, 1, 2, 3, 5, 7)
633. Schoenberg, Arnold: Two Piano Pieces, No.1, Op.33a, [0, 7, 2, 1, 11, 8, 3, 5, 9, 10, 4, 6], pc set (0, 1, 2, 3, 6, 7)
634. Schoenberg, Arnold: Two Piano Pieces, No.2, Op.33b, [0, 2, 6, 4, 10, 9, 7, 11, 8, 5, 1, 3], pc set (0, 1, 3, 5, 7, 9)
635. Schoenberg, Arnold: Variations for Orchestra, Op.31, [0, 6, 8, 5, 7, 11, 4, 3, 9, 10, 1, 2], pc set (0, 1, 2, 3, 6, 7)
636. Schoenberg, Arnold: Violin Concerto, Op.36, [0, 1, 6, 2, 7, 9, 3, 4, 10, 11, 5, 8], pc set (0, 1, 2, 5, 7, 8)
637. Schoenberg, Arnold: Violin Phantasy, Op.47, [0, 11, 3, 1, 7, 9, 6, 2, 10, 5, 8, 4], pc set (0, 2, 3, 4, 6, 8)
638. Schoenberg, Arnold: Von Heute Auf Morgen, Op.32, [0, 1, 7, 11, 9, 3, 6, 5, 2, 10, 8, 4], pc set (0, 2, 3, 4, 6, 8)
639. Schoenberg, Arnold: Wind Quintet, Op.26, [0, 4, 6, 8, 10, 9, 7, 11, 1, 3, 5, 2], pc set (0, 2, 3, 4, 6, 8)
640. Schuller, Gunther: Transformation, [0, 2, 4, 3, 8, 11, 9, 6, 5, 10, 7, 1], pc set (0, 1, 2, 4, 5, 8)
641. Schwantner, Joseph: …and the mountains rising nowhere, [0, 11, 8, 7, 4, 3, 2, 1, 10, 9, 6, 5], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 11-9-11-9-11-11-
642. Schwantner, Joseph: Elixir (Consortium VIII), [0, 8, 4, 3, 7, 11, 10, 6, 9, 5, 1, 2], pc set (0, 1, 4, 5, 8, 9)
643. Schwantner, Joseph: Elixir (Consortium VIII), m.22, [0, 1, 4, 5, 8, 9, 6, 7, 10, 11, 2, 3], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 1-3-1-3-1-9-
644. Schwantner, Joseph: In Aeternum (Derived Row), [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], pc set (0, 1, 2, 3, 4, 5)
645. Schwantner, Joseph: In Aeternum (Principal Row), [0, 4, 11, 6, 10, 5, 1, 9, 2, 7, 3, 8], pc set (0, 1, 2, 6, 7, 8)
646. Schwantner, Joseph: Modus Caelestis (A), [0, 6, 7, 1, 11, 5, 4, 10, 8, 2, 3, 9], pc set (0, 1, 2, 6, 7, 8)
647. Schwantner, Joseph: Modus Caelestis (m. 39), [0, 6, 11, 10, 5, 9, 4, 8, 3, 2, 7, 1], pc set (0, 1, 2, 3, 6, 7)
648. Schwantner, Joseph: Wild Angels of the Open Hills, 2, “Angels of the Shadowed Ancient Land,” m. 21, [0, 8, 9, 11, 3, 7, 6, 5, 2, 4, 10, 1], pc set (0, 1, 2, 4, 5, 8)
649. Searle, Humphrey: Toccata alla Passacaglia, Op.31, [0, 5, 6, 1, 10, 7, 9, 8, 3, 2, 4, 11], pc set (0, 1, 2, 5, 7, 8)
650. Seiber, Mátyás: Concert Piece for Violin and Piano, [0, 1, 7, 6, 11, 10, 4, 5, 9, 8, 2, 3], pc set (0, 1, 2, 3, 6, 7)
651. Seiber, Mátyás: Sonata for Violin and Piano, [0, 1, 11, 10, 7, 6, 8, 9, 4, 3, 5, 2], pc set (0, 1, 2, 3, 6, 7)
652. Seiber, Mátyás: String Quartet, No.2, [0, 2, 3, 1, 4, 11, 5, 10, 7, 9, 8, 6], pc set (0, 1, 2, 3, 4, 5)
653. Seiber, Mátyás: Ulysses, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 1, 4, 5, 8, 9)
654. Sengstschmid, Johann: Meditation für Orgel, Op.43a, [0, 6, 3, 1, 10, 8, 5, 2, 11, 9, 7, 4], pc set (0, 2, 3, 5, 7, 9)
655. Sessions, Roger: Piano Sonata, No.3, mvt 2, [0, 1, 5, 4, 8, 2, 11, 10, 6, 7, 3, 9], pc set (0, 1, 2, 4, 5, 8)
656. Sessions, Roger: When Lilacs Last in the Dooryard Bloom’d, [0, 2, 4, 10, 5, 8, 9, 1, 11, 7, 6, 3], pc set (0, 1, 3, 5, 7, 9)

657. Shapey, Ralph: String Quartet, No.9, [0, 8, 9, 3, 5, 1, 2, 6, 4, 10, 11, 7], pc set (0, 1, 3, 5, 8, 9)
658. Shostakovich, Dmitri: Symphony, No.14, mov. I, [0, 11, 9, 4, 3, 10, 8, 7, 5, 6, 1, 2], pc set (0, 1, 2, 3, 6, 7)
659. Slonimsky, Nicholas: No. 1214a Thirds (Twelve-Tone Patterns), [0, 4, 8, 11, 3, 7, 6, 10, 2, 5, 9, 1], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 4-4-3-4-4-11-
660. Slonimsky, Nicholas: No. 1215a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 7, 2, 9, 4, 11, 6], pc set (0, 2, 4, 5, 7, 9)
661. Slonimsky, Nicholas: No. 1216a Foutths (Twelve-Tone Patterns), [0, 5, 10, 3, 7, 2, 9, 4, 8, 1, 6, 11], pc set (0, 2, 4, 5, 7, 9)
662. Slonimsky, Nicholas: No. 1217a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 11, 6, 1, 8, 4, 9, 2, 7], pc set (0, 1, 2, 5, 7, 8)
663. Slonimsky, Nicholas: No. 1223a Sixths (Twelve-Tone Patterns), [0, 8, 4, 1, 5, 9, 6, 2, 10, 7, 11, 3], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 8-8-9-4-4-9-
664. Slonimsky, Nicholas: No. 1224a Sixths (Twelve-Tone Patterns), [0, 9, 6, 3, 7, 10, 1, 4, 8, 5, 2, 11], pc set (0, 1, 3, 4, 6, 9)
665. Slonimsky, Nicholas: No. 1225a Sixths (Twelve-Tone Patterns), [0, 8, 4, 7, 11, 3, 6, 2, 10, 1, 5, 9], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 8-8-3-4-4-3-
666. Slonimsky, Nicholas: No. 1226a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 8, 2, 4, 6, 1, 11, 9, 3, 5, 7], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 10-10-6-2-2-7-
667. Slonimsky, Nicholas: No. 1227a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 4, 2, 8, 6, 1, 11, 9, 7, 5, 3], pc set (0, 2, 4, 6, 8, 10)
668. Slonimsky, Nicholas: No. 1228a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 2, 4, 8, 6, 11, 1, 5, 3, 7, 9], pc set (0, 2, 4, 6, 8, 10)
669. Slonimsky, Nicholas: No. 1229a Major Sevenths (Twelve-Tone Patterns), [0, 11, 10, 9, 8, 7, 1, 2, 3, 4, 5, 6], pc set (0, 1, 2, 3, 4, 5)
670. Slonimsky, Nicholas: No. 1230a Major Sevenths (Twelve-Tone Patterns), [0, 11, 3, 4, 8, 7, 1, 2, 6, 5, 9, 10], pc set (0, 1, 4, 5, 8, 9)
671. Slonimsky, Nicholas: No. 1231a Major Sevenths (Twelve-Tone Patterns), [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], pc set (0, 1, 4, 5, 8, 9)
672. Slonimsky, Nicholas: No. 1232a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
673. Slonimsky, Nicholas: No. 1233a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
674. Slonimsky, Nicholas: No. 1234a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
675. Slonimsky, Nicholas: No. 1235a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
676. Slonimsky, Nicholas: No. 1236a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 9, 2, 4, 7, 5, 6, 8, 3, 1, 10], pc set (0, 2, 4, 5, 7, 9)
677. Slonimsky, Nicholas: No. 1237a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 9, 7, 2, 4, 6, 5, 3, 1, 8, 10], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 11-10-10-7-2-2-
678. Slonimsky, Nicholas: No. 1238a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 9, 7, 5, 3, 2, 4, 6, 8, 1, 10, 11], pc set (0, 2, 3, 5, 7, 9)
679. Slonimsky, Nicholas: No. 1239a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 2, 9, 4, 7, 6, 5, 8, 3, 10, 1], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 11-3-7-7-3-11-
680. Slonimsky, Nicholas: No. 1240a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 9, 2, 4, 7, 5, 3, 6, 8, 1, 10], pc set (0, 2, 4, 5, 7, 9)
681. Slonimsky, Nicholas: No. 1241a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 9, 6, 3, 11, 5, 2, 8, 7, 10, 1, 4], pc set (0, 1, 3, 6, 7, 9)
682. Slonimsky, Nicholas: No. 1242a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6], pc set (0, 1, 4, 5, 8, 9)
683. Slonimsky, Nicholas: No. 1244a Crossing Sixths (Crossing Intervals), [0, 3, 8, 7, 4, 11, 1, 2, 10, 5, 6, 9], pc set (0, 1, 4, 5, 8, 9)
684. Slonimsky, Nicholas: No. 1245a Crossing Fifths (Crossing Intervals), [0, 5, 7, 10, 2, 3, 9, 8, 4, 1, 11, 6], pc set (0, 2, 4, 5, 7, 9)
685. Slonimsky, Nicholas: No. 1246a Crossing Fourths (Crossing Intervals), [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6], pc set (0, 2, 4, 5, 7, 9)
686. Slonimsky, Nicholas: No. 1247a Crossing Thirds (Crossing Intervals), [0, 3, 4, 11, 7, 8, 10, 5, 2, 1, 6, 9], pc set (0, 1, 4, 5, 8, 9)
687. Slonimsky, Nicholas: No. 1248a Crossing Thirds (Crossing Intervals), [0, 5, 4, 1, 8, 9, 11, 6, 3, 2, 7, 10], pc set (0, 1, 4, 5, 8, 9)
688. Slonimsky, Nicholas: No. 1250a Crossing Seconds (Crossing Intervals), [0, 11, 2, 9, 4, 7, 6, 5, 8, 3, 10, 1], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 11-3-7-7-3-11-
689. Slonimsky, Nicholas: No. 1252a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 5, 9, 2, 6, 8, 11, 4], pc set (0, 2, 3, 5, 7, 9)

690. Slonimsky, Nicholas: No. 1252b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 10, 6, 2, 11, 7, 4, 1, 9], pc set (0, 2, 3, 5, 7, 9)
691. Slonimsky, Nicholas: No. 1254a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 1], pc set (0, 2, 3, 5, 7, 9)
692. Slonimsky, Nicholas: No. 1254b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 1, 10, 6, 4, 11, 7, 5, 2, 9], pc set (0, 2, 3, 5, 7, 9)
693. Slonimsky, Nicholas: No. 1255a [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 2, 5, 8, 11, 3], pc set (0, 1, 3, 6, 7, 9)
694. Slonimsky, Nicholas: No. 1255b [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 2, 9, 6, 5, 1, 10, 7, 4, 11], pc set (0, 1, 3, 6, 7, 9)
695. Slonimsky, Nicholas: No. 1256a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 5, 8, 11, 4, 6, 9, 1], pc set (0, 2, 4, 5, 7, 9)
696. Slonimsky, Nicholas: No. 1256b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 4, 2, 11, 7, 5, 1, 8, 6, 3, 10], pc set (0, 2, 4, 5, 7, 9)
697. Slonimsky, Nicholas: No. 1257a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 1, 6, 9, 2, 5], pc set (0, 1, 4, 5, 8, 9)
698. Slonimsky, Nicholas: No. 1257b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 3, 11, 7, 5, 2, 10, 6, 1, 9], pc set (0, 1, 4, 5, 8, 9)
699. Slonimsky, Nicholas: No. 1258a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 1, 5, 8, 11, 4], pc set (0, 1, 3, 5, 8, 9)
700. Slonimsky, Nicholas: No. 1258b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 7, 2, 10, 6, 4, 1, 9], pc set (0, 1, 3, 5, 8, 9)
701. Slonimsky, Nicholas: No. 1259a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 2, 6, 9, 1, 5, 7, 10, 3], pc set (0, 1, 3, 5, 7, 9)
702. Slonimsky, Nicholas: No. 1259b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 2, 10, 7, 5, 1, 9, 6, 3, 11], pc set (0, 1, 3, 5, 7, 9)
703. Slonimsky, Nicholas: No. 1260a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 6, 9, 1, 5, 8, 11, 3], pc set (0, 1, 3, 5, 7, 9)
704. Slonimsky, Nicholas: No. 1260b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 2, 10, 6, 5, 1, 9, 7, 4, 11], pc set (0, 1, 3, 5, 7, 9)
705. Slonimsky, Nicholas: No. 1263a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 1, 4, 8, 11, 5], pc set (0, 1, 3, 5, 8, 9)
706. Slonimsky, Nicholas: No. 1263b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 7, 6, 2, 9, 4, 1, 10], pc set (0, 1, 3, 5, 8, 9)
707. Slonimsky, Nicholas: No. 1265b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 3, 1, 10, 6, 4, 11, 7, 5, 2, 8], pc set (0, 1, 3, 4, 6, 9)
708. Slonimsky, Nicholas: No. 1266b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 3, 2, 11, 6, 5, 1, 8, 7, 4, 10], pc set (0, 1, 3, 4, 6, 9)
709. Slonimsky, Nicholas: No. 1267a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 4, 8, 11, 5, 6, 9, 2], pc set (0, 1, 3, 4, 6, 9)
710. Slonimsky, Nicholas: No. 1267b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 4, 1, 10, 7, 5, 2, 8, 6, 3, 11], pc set (0, 1, 3, 4, 6, 9)
711. Slonimsky, Nicholas: No. 1270a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 11, 3, 5, 9, 1], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 4-4-2-4-4-1-
712. Slonimsky, Nicholas: No. 1270b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 2, 10, 6, 3, 11, 7, 5, 1, 9], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 8-8-10-8-8-9-
713. Slonimsky, Nicholas: No. 1273a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 5, 9, 6, 2, 11, 8, 4], pc set (0, 2, 3, 5, 7, 9)
714. Slonimsky, Nicholas: No. 1273b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 5, 1, 2, 6, 9, 8, 4, 11], pc set (0, 2, 3, 5, 7, 9)
715. Slonimsky, Nicholas: No. 1275a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 9, 6, 1, 11, 8, 3], pc set (0, 2, 3, 5, 7, 9)

716. Slonimsky, Nicholas: No. 1275b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 5, 2, 1, 6, 9, 8, 3, 11], pc set (0, 2, 3, 5, 7, 9)
717. Slonimsky, Nicholas: No. 1276a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 5, 2, 11, 8, 3], pc set (0, 1, 3, 6, 7, 9)
718. Slonimsky, Nicholas: No. 1276b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 6, 1, 2, 5, 9, 8, 3, 11], pc set (0, 1, 3, 6, 7, 9)
719. Slonimsky, Nicholas: No. 1277a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 5, 8, 4, 11, 9, 6, 1], pc set (0, 2, 4, 5, 7, 9)
720. Slonimsky, Nicholas: No. 1277b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 5, 2, 4, 8, 11, 9, 6, 1], pc set (0, 2, 4, 5, 7, 9)
721. Slonimsky, Nicholas: No. 1278a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 6, 1, 9, 5, 2], pc set (0, 1, 4, 5, 8, 9)
722. Slonimsky, Nicholas: No. 1278b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 7, 3, 6, 10, 1, 9, 5, 2], pc set (0, 1, 4, 5, 8, 9)
723. Slonimsky, Nicholas: No. 1279a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 5, 1, 11, 8, 4], pc set (0, 1, 3, 5, 8, 9)
724. Slonimsky, Nicholas: No. 1279b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 6, 2, 1, 5, 9, 8, 4, 11], pc set (0, 1, 3, 5, 8, 9)
725. Slonimsky, Nicholas: No. 1280a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 2, 6, 9, 5, 1, 10, 7, 3], pc set (0, 1, 3, 5, 7, 9)
726. Slonimsky, Nicholas: No. 1280b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 6, 2, 5, 9, 1, 10, 7, 3], pc set (0, 1, 3, 5, 7, 9)
727. Slonimsky, Nicholas: No. 1281a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 6, 9, 5, 1, 11, 8, 3], pc set (0, 1, 3, 5, 7, 9)
728. Slonimsky, Nicholas: No. 1281b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 6, 2, 1, 5, 9, 8, 3, 11], pc set (0, 1, 3, 5, 7, 9)
729. Slonimsky, Nicholas: No. 1284a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 4, 1, 11, 8, 5], pc set (0, 1, 3, 5, 8, 9)
730. Slonimsky, Nicholas: No. 1284b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 6, 2, 1, 4, 9, 8, 5, 11], pc set (0, 1, 3, 5, 8, 9)
731. Slonimsky, Nicholas: No. 1286a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 2, 10, 8, 5, 11], pc set (0, 1, 3, 4, 6, 9)
732. Slonimsky, Nicholas: No. 1286b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 4, 1, 10, 2, 7, 8, 5, 11], pc set (0, 1, 3, 4, 6, 9)
733. Slonimsky, Nicholas: No. 1287a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 2, 5, 8, 4, 11, 10, 7, 1], pc set (0, 1, 3, 4, 6, 9)
734. Slonimsky, Nicholas: No. 1287b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 5, 2, 11, 4, 8, 7, 1, 10], pc set (0, 1, 3, 4, 6, 9)
735. Slonimsky, Nicholas: No. 1288a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 4, 8, 5, 11, 9, 6, 2], pc set (0, 1, 3, 4, 6, 9)
736. Slonimsky, Nicholas: No. 1288b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 4, 1, 11, 5, 8, 6, 2, 9], pc set (0, 1, 3, 4, 6, 9)
737. Slonimsky, Nicholas: No. 1290a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 1, 5, 6, 2, 10, 7, 3, 11], pc set (0, 1, 4, 5, 8, 9)
738. Slonimsky, Nicholas: No. 1290b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 5, 1, 10, 2, 6, 7, 3, 11], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 4-4-1-8-8-9-
739. Slonimsky, Nicholas: No. 1291a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 3, 11, 9, 5, 1], pc set (0, 2, 4, 6, 8, 10)
740. Slonimsky, Nicholas: No. 1291b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 6, 2, 11, 3, 7, 9, 5, 1], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 4-4-2-8-8-9-
741. Slonimsky, Nicholas: No. 1292a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 6, 2, 1, 9, 5], pc set (0, 1, 4, 5, 8, 9)

742. Slonimsky, Nicholas: No. 1292b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 7, 3, 2, 6, 10, 9, 5, 1], pc set (0, 1, 4, 5, 8, 9)
743. Slonimsky, Nicholas: No. 1293a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 2-2-1-2-2-9-
744. Slonimsky, Nicholas: No. 1293b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 1, 11, 10, 8, 6, 9, 7, 5, 4, 2], pc set (0, 2, 3, 4, 5, 7), self-rotational interval pattern 3-10-10-11-10-10-
745. Slonimsky, Nicholas: No. 1294a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 9, 4, 7, 5, 2, 6, 3, 10, 1, 11, 8], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 9-7-3-10-9-4-
746. Slonimsky, Nicholas: No. 1294b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 8, 11, 1, 10, 3, 6, 2, 5, 7, 4, 9], pc set (0, 2, 3, 4, 5, 7), self-rotational interval pattern 8-3-2-9-5-3-
747. Slonimsky, Nicholas: No. 1295a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 2, 5, 4, 3, 1, 6, 8, 11, 10, 9, 7], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 2-3-11-11-10-5-
748. Slonimsky, Nicholas: No. 1295b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 9, 10, 11, 8, 6, 1, 3, 4, 5, 2], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 7-2-1-1-9-10-
749. Slonimsky, Nicholas: No. 1296a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 8, 3, 4, 11, 6, 1, 2, 9, 10, 5], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 7-1-7-1-7-7-
750. Slonimsky, Nicholas: No. 1296b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 5, 10, 9, 2, 1, 6, 11, 4, 3, 8, 7], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 5-5-11-5-11-5-
751. Slonimsky, Nicholas: No. 1297a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 9, 7, 2, 4, 6, 5, 3, 1, 8, 10], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 11-10-10-7-2-2-
752. Slonimsky, Nicholas: No. 1297b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 10, 8, 1, 3, 5, 6, 4, 2, 7, 9, 11], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 10-10-5-2-2-1-
753. Slonimsky, Nicholas: No. 1298a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 1, 10, 2, 9, 6, 5, 7, 4, 8, 3], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-2-9-4-7-9-
754. Slonimsky, Nicholas: No. 1298b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 8, 4, 7, 5, 6, 9, 2, 10, 1, 11], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 3-5-8-3-10-1-
755. Slonimsky, Nicholas: No. 1299a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 9, 2, 7, 4, 5, 6, 3, 8, 1, 10, 11], pc set (0, 2, 4, 5, 7, 9), self-rotational interval pattern 9-5-5-9-1-1-
756. Slonimsky, Nicholas: No. 1299b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 10, 1, 8, 3, 6, 5, 4, 7, 2, 9], pc set (0, 2, 3, 4, 5, 7), self-rotational interval pattern 11-11-3-7-7-3-
757. Slonimsky, Nicholas: No. 1300a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 1, 10, 2, 9, 6, 5, 7, 4, 8, 3], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-2-9-4-7-9-
758. Slonimsky, Nicholas: No. 1300b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 8, 4, 7, 5, 6, 9, 2, 10, 1, 11], pc set (0, 1, 3, 4, 5, 8), self-rotational interval pattern 3-5-8-3-10-1-
759. Slonimsky, Nicholas: No. 1301 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 8, 3, 5, 11, 9, 2, 10, 7, 6], pc set (0, 1, 3, 4, 5, 8)
760. Slonimsky, Nicholas: No. 1302 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6], pc set (0, 1, 3, 4, 5, 8)
761. Slonimsky, Nicholas: No. 1303 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 2, 3, 7, 10, 5, 11, 4, 1, 9, 8, 6], pc set (0, 2, 4, 5, 7, 9)
762. Slonimsky, Nicholas: No. 1304 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Triad), [0, 3, 7, 8, 10, 5, 11, 4, 2, 1, 9, 6], pc set (0, 2, 4, 5, 7, 9)
763. Slonimsky, Nicholas: No. 1305 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Sixth-Chord), [0, 3, 8, 10, 11, 7, 1, 5, 4, 2, 9, 6], pc set (0, 1, 3, 4, 5, 8)
764. Slonimsky, Nicholas: No. 1306 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Triad), [0, 4, 7, 8, 3, 5, 11, 9, 2, 1, 10, 6], pc set (0, 1, 3, 4, 5, 8)
765. Slonimsky, Nicholas: No. 1307 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Sixth-Chord), [0, 4, 9, 8, 11, 1, 7, 5, 2, 3, 10, 6], pc set (0, 1, 3, 4, 5, 8)
766. Slonimsky, Nicholas: No. 1308 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Six-Four Chord), [0, 5, 8, 10, 9, 1, 7, 3, 4, 2, 11, 6], pc set (0, 1, 3, 4, 5, 8)
767. Slonimsky, Nicholas: No. 1309 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Six-Four Chord), [0, 5, 9, 8, 10, 1, 7, 4, 2, 3, 11, 6], pc set (0, 1, 3, 4, 5, 8)

768. Slonimsky, Nicholas: No. 1310 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6], pc set (0, 1, 2, 3, 4, 5)
769. Slonimsky, Nicholas: No. 1311 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 9, 10, 2, 5, 11, 8, 4, 3, 1, 6], pc set (0, 2, 4, 5, 7, 9)
770. Slonimsky, Nicholas: No. 1312 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 10, 2, 3, 5, 11, 9, 8, 4, 1, 6], pc set (0, 2, 4, 5, 7, 9)
771. Slonimsky, Nicholas: No. 1313 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 11, 2, 4, 3, 9, 10, 8, 5, 1, 6], pc set (0, 1, 3, 4, 5, 8)
772. Slonimsky, Nicholas: No. 1314 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 2, 7, 4, 5, 9, 3, 11, 10, 1, 8, 6], pc set (0, 2, 4, 5, 7, 9)
773. Slonimsky, Nicholas: No. 1315 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 4, 5, 2, 7, 9, 3, 1, 8, 11, 10, 6], pc set (0, 2, 4, 5, 7, 9)
774. Slonimsky, Nicholas: No. 1316 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 7, 4, 5, 9, 2, 8, 3, 11, 10, 1, 6], pc set (0, 2, 4, 5, 7, 9)
775. Slonimsky, Nicholas: No. 1317 Invertible Dodecaphonic Progressions – With all Different Intervals. (Mother Chord), [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], pc set (0, 2, 4, 5, 7, 9)
776. Slonimsky, Nicholas: No. 1318 Invertible Dodecaphonic Progressions – With all Different Intervals. (Grandmother Chord), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], pc set (0, 1, 2, 3, 4, 5)
777. Slonimsky, Nicholas: No. 639 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 5, 4, 3, 6, 7, 8, 11, 10, 9], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 1-1-3-11-11-3-
778. Slonimsky, Nicholas: No. 640 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 10, 7, 8, 9, 6, 5, 4, 1, 2, 3], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-11-9-1-1-9-
779. Slonimsky, Nicholas: No. 641 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 7, 6, 5, 4, 8, 9, 10, 11], pc set (0, 1, 2, 3, 6, 7)
780. Slonimsky, Nicholas: No. 642 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], pc set (0, 1, 2, 3, 4, 5)
781. Slonimsky, Nicholas: No. 643 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 6, 7, 8, 9, 10, 11, 5, 4, 3, 2, 1], pc set (0, 1, 2, 3, 4, 6)
782. Slonimsky, Nicholas: No. 644 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 6, 7, 8, 9, 10, 11, 5, 4, 3, 2, 1], pc set (0, 1, 2, 3, 4, 6)
783. Slonimsky, Nicholas: No. 915 Miscellaneous Patterns (Diatessaron Progression; Equal Division of Five Octaves into Twelve Parts), [0, 10, 2, 8, 4, 6, 5, 3, 7, 1, 9, 11], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 10-4-6-8-2-11-
784. Smith, Hale: Contours for Orchestra, [0, 5, 6, 4, 10, 11, 7, 2, 1, 3, 9, 8], pc set (0, 1, 2, 6, 7, 8)
785. Spinner, Leopold: Chamber Symphony, Op.28, [0, 11, 10, 6, 4, 5, 2, 1, 3, 7, 8, 9], pc set (0, 1, 2, 6, 7, 8)
786. Spinner, Leopold: Concert for Piano and Orchestra, Op.4, [0, 2, 1, 9, 11, 3, 4, 7, 5, 6, 10, 8], pc set (0, 1, 2, 3, 4, 6)
787. Spinner, Leopold: Fantasy for Piano, Op.9 , [0, 1, 4, 5, 2, 3, 8, 9, 6, 7, 10, 11], pc set (0, 1, 2, 3, 4, 5)
788. Spinner, Leopold: Fünf Lieder, Op.8, [0, 3, 4, 7, 8, 5, 11, 9, 10, 2, 6, 1], pc set (0, 1, 3, 4, 5, 8)
789. Spinner, Leopold: Ich lieb' eine Blume for Four-part mixed Choir, [0, 11, 2, 4, 9, 7, 1, 3, 10, 8, 5, 6], pc set (0, 2, 4, 5, 7, 9)
790. Spinner, Leopold: Ouverture for Orchestra, Op.5, [0, 11, 2, 10, 8, 1, 7, 5, 6, 9, 3, 4], pc set (0, 1, 2, 3, 4, 6)
791. Spinner, Leopold: Quintet, Op.14, [0, 6, 4, 2, 8, 5, 1, 9, 10, 11, 7, 3], pc set (0, 2, 3, 4, 6, 8)
792. Spinner, Leopold: Ricercata, Op.21, [0, 11, 8, 10, 2, 1, 4, 3, 7, 9, 6, 5], pc set (0, 1, 2, 3, 4, 6)
793. Spinner, Leopold: Sonata for Clarinet and Piano, Op.17, [0, 3, 4, 1, 2, 5, 11, 8, 7, 10, 9, 6], pc set (0, 1, 2, 3, 4, 5)
794. Spinner, Leopold: Sonata for Piano, Op.3, [0, 9, 8, 6, 7, 10, 1, 4, 5, 3, 2, 11], pc set (0, 1, 2, 3, 4, 6)
795. Spinner, Leopold: Sonata for Violin and Piano, Op.1, [0, 7, 6, 1, 3, 8, 5, 10, 2, 9, 4, 11], pc set (0, 1, 2, 5, 7, 8)
796. Spinner, Leopold: Sonatina for Cello and Piano, Op.26, [0, 1, 11, 2, 4, 3, 9, 10, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
797. Spinner, Leopold: Sonatina for Wind Instruments, Op.23, [0, 9, 1, 5, 4, 2, 8, 10, 11, 7, 3, 6], pc set (0, 1, 3, 4, 5, 8)
798. Spinner, Leopold: String Quartet, No.2, Op.7, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], pc set (0, 1, 4, 5, 8, 9)
799. Spinner, Leopold: String Quartet, Op.2, [0, 1, 7, 6, 11, 10, 4, 5, 8, 9, 3, 2], pc set (0, 1, 2, 3, 6, 7)
800. Spinner, Leopold: Trio for Clarinet, Cello and Piano, [0, 1, 7, 6, 5, 11, 10, 3, 4, 2, 9, 8], pc set (0, 1, 2, 6, 7, 8)
801. Spinner, Leopold: Trio for Violin, Cello, and Piano, Op.6, [0, 1, 7, 4, 10, 9, 6, 5, 11, 8, 2, 3], pc set (0, 1, 3, 4, 6, 9)
802. Spinner, Leopold: Variations for Violin and Piano, Op.19, [0, 8, 9, 1, 2, 4, 3, 5, 6, 10, 11, 7], pc set (0, 1, 4, 5, 6, 8)
803. Spinner, Leopold: Zwei Lieder, Op.24, [0, 11, 1, 4, 3, 7, 5, 6, 9, 8, 10, 2], pc set (0, 1, 2, 4, 5, 8)

804. Steinbauer, Othmar: Violinsonate, No.1, Op.15, [0, 5, 2, 10, 7, 3, 11, 8, 4, 1, 6, 9], pc set (0, 2, 4, 5, 7, 9)
805. Stockhausen, Karlheinz: Choral, [0, 1, 10, 6, 8, 3, 5, 2, 4, 11, 9, 7], pc set (0, 2, 3, 5, 7, 9)
806. Stockhausen, Karlheinz: Gruppen, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], pc set (0, 1, 2, 3, 4, 5)
807. Stockhausen, Karlheinz: Klavierstück IV row 3, [0, 7, 1, 10, 11, 9, 5, 8, 4, 3, 2, 6], pc set (0, 1, 2, 3, 4, 6)
808. Stockhausen, Karlheinz: Klavierstück IX, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], pc set (0, 1, 2, 3, 4, 5)
809. Stockhausen, Karlheinz: Klavierstück VII, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], pc set (0, 1, 2, 3, 4, 5)
810. Stockhausen, Karlheinz: Klavierstück X, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], pc set (0, 1, 2, 3, 4, 5)
811. Stockhausen, Karlheinz: Kreuzspiel, [0, 10, 9, 11, 7, 2, 8, 1, 4, 6, 5, 3], pc set (0, 2, 3, 4, 5, 7)
812. Stockhausen, Karlheinz: Licht, Eve formula, [0, 4, 3, 2, 5, 6, 10, 11, 9, 1, 7, 8], pc set (0, 1, 2, 3, 4, 6)
813. Stockhausen, Karlheinz: Plus-Minus, [0, 1, 7, 9, 8, 6, 3, 10, 2, 5, 11, 4], pc set (0, 1, 2, 3, 6, 7)
814. Stockhausen, Karlheinz: Tierkreis, Aries, [0, 3, 2, 9, 7, 8, 11, 6, 1, 5, 4, 10], pc set (0, 1, 2, 5, 7, 8)
815. Stockhausen, Karlheinz: Tierkreis, Cancer, [0, 7, 11, 10, 9, 8, 3, 6, 4, 1, 5, 2], pc set (0, 1, 2, 3, 4, 5)
816. Stockhausen, Karlheinz: Tierkreis, Sagittarius, [0, 6, 5, 2, 3, 4, 7, 8, 9, 10, 11, 1], pc set (0, 1, 2, 3, 4, 6)
817. Stockhausen, Karlheinz: Tierkreis, Scorpio, [0, 4, 3, 11, 7, 8, 10, 9, 2, 5, 1, 6], pc set (0, 1, 4, 5, 8, 9)
818. Stravinsky, Igor: A Sermon, a Narrative and a Prayer, [0, 1, 9, 11, 10, 7, 8, 3, 4, 6, 5, 2], pc set (0, 1, 2, 3, 4, 6)
819. Stravinsky, Igor: Agon, “Pas de deux”, “Four trios”, [0, 1, 4, 3, 2, 5, 6, 9, 8, 11, 10, 7], pc set (0, 1, 2, 3, 4, 5)
820. Stravinsky, Igor: Canticum Sacrum, II, [0, 11, 9, 6, 10, 8, 7, 5, 2, 4, 3, 1], pc set (0, 1, 2, 3, 4, 6)
821. Stravinsky, Igor: Canticum Sacrum, II & IV, [0, 11, 1, 3, 4, 2, 7, 6, 9, 5, 8, 10], pc set (0, 1, 2, 3, 4, 5)
822. Stravinsky, Igor: Elegy for J.F.K., [0, 6, 4, 2, 8, 9, 3, 1, 11, 10, 7, 5], pc set (0, 1, 3, 5, 7, 9)
823. Stravinsky, Igor: Fanfare for a New Theater, [0, 11, 1, 3, 4, 2, 5, 7, 6, 8, 10, 9], pc set (0, 1, 2, 3, 4, 5)
824. Stravinsky, Igor: Introitus “T. S. Eliot in Memoriam”, [0, 5, 6, 4, 8, 9, 3, 2, 1, 10, 11, 7], pc set (0, 1, 2, 4, 5, 8)
825. Stravinsky, Igor: Movements, [0, 1, 7, 5, 6, 11, 9, 8, 10, 3, 4, 2], pc set (0, 1, 2, 6, 7, 8)
826. Stravinsky, Igor: Requiem Canticles, 1st series, [0, 2, 10, 11, 1, 8, 6, 7, 9, 4, 3, 5], pc set (0, 1, 2, 3, 4, 6)
827. Stravinsky, Igor: Variations “Aldous Huxley in Memoriam”, [0, 10, 7, 9, 2, 8, 6, 11, 1, 5, 4, 3], pc set (0, 1, 2, 3, 5, 7)
828. Talma, Louise: Passacaglia and Fugue, [0, 4, 2, 9, 11, 7, 8, 3, 1, 6, 5, 10], pc set (0, 2, 4, 5, 7, 9)
829. Talma, Louise: Piano Sonata 2, mvt 4, first row, [0, 4, 8, 2, 5, 10, 1, 11, 6, 9, 7, 3], pc set (0, 1, 3, 5, 7, 9)
830. Talma, Louise: Six Etudes, Etude 1, [0, 3, 6, 8, 10, 2, 5, 7, 9, 1, 11, 4], pc set (0, 1, 3, 5, 7, 9)
831. Talma, Louise: Six Etudes, Etude 4, [0, 1, 5, 9, 4, 8, 7, 6, 11, 2, 10, 3], pc set (0, 1, 4, 5, 8, 9)
832. Talma, Louise: Six Etudes, Etude 5, [0, 4, 6, 11, 8, 3, 9, 1, 5, 7, 2, 10], pc set (0, 1, 3, 5, 8, 9)
833. Talma, Louise: Six Etudes, Etude 6, [0, 8, 6, 9, 4, 5, 2, 1, 3, 10, 7, 11], pc set (0, 1, 2, 4, 5, 8)
834. Talma, Louise: Three Bagatelles, Bagatelle 3, [0, 3, 4, 1, 5, 8, 10, 7, 2, 11, 6, 9], pc set (0, 1, 3, 4, 5, 8)
835. Toufektsis, Orestis: MIKRO-ALLAXI (EpiEnteka II), für 15 Musiker, [0, 8, 3, 7, 2, 4, 10, 11, 1, 6, 9, 5], pc set (0, 1, 4, 5, 6, 8)
836. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 1A, [0, 10, 9, 1, 4, 8, 7, 2, 5, 11, 3, 6], pc set (0, 1, 2, 4, 5, 8)
837. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 3, [0, 10, 8, 4, 3, 6, 5, 11, 9, 1, 2, 7], pc set (0, 1, 3, 5, 7, 9)
838. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 5, [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7], pc set (0, 1, 3, 6, 7, 9)
839. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 7, [0, 2, 11, 8, 5, 3, 10, 9, 1, 7, 6, 4], pc set (0, 1, 3, 4, 6, 9)
840. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 8, [0, 4, 3, 11, 6, 8, 2, 9, 10, 7, 1, 5], pc set (0, 1, 3, 5, 8, 9)
841. Tranchell, Peter: Septet : [for] 2 violins, oboe, clarinet, horn, bassoon, cello : fifth dodecafonia, [0, 2, 1, 10, 3, 4, 11, 6, 5, 9, 8, 7], pc set (0, 1, 2, 3, 4, 6)
842. Tranchell, Peter: Twice a Kiss sketch 1, [0, 9, 1, 2, 4, 8, 5, 7, 10, 6, 3, 11], pc set (0, 1, 4, 5, 6, 8)
843. Tranchell, Peter: Twice a Kiss sketch 2, [0, 9, 1, 2, 4, 8, 3, 11, 5, 6, 7, 10], pc set (0, 1, 4, 5, 6, 8)
844. Tranchell, Peter: Twice a Kiss sketch 3, [0, 1, 2, 4, 8, 9, 7, 5, 3, 6, 10, 11], pc set (0, 1, 4, 5, 6, 8)
845. Urbanner, Erich: Adagio, [0, 3, 1, 11, 10, 9, 8, 7, 6, 4, 2, 5], pc set (0, 1, 2, 3, 4, 6)
846. Volkonsky, Andrei: Musica Stricta, mvt 2, row A, [0, 6, 8, 9, 11, 10, 1, 7, 2, 3, 5, 4], pc set (0, 1, 2, 3, 4, 6)
847. Volkonsky, Andrei: Musica Stricta, mvt 2, row D, [0, 4, 9, 2, 8, 10, 11, 1, 3, 7, 5, 6], pc set (0, 1, 2, 4, 6, 8)
848. Volkonsky, Andrei: Musica Stricta, mvt 4, row G, [0, 6, 5, 4, 3, 2, 1, 11, 9, 10, 8, 7], pc set (0, 1, 2, 3, 4, 6)
849. Volkonsky, Andrei: Musica Stricta, mvt 4, row H, [0, 6, 4, 9, 8, 2, 7, 1, 11, 5, 10, 3], pc set (0, 1, 3, 5, 7, 9)
850. Wang, Jian-Zhong: Five Pieces for Piano no. 1, “Pastorale” (variant), [0, 3, 5, 7, 4, 2, 11, 9, 6, 8, 10, 1], pc set (0, 2, 3, 4, 5, 7)
851. Wang, Xi-Lin: A Dilapidated Tombstone, [0, 4, 6, 3, 2, 10, 11, 5, 8, 9, 7, 1], pc set (0, 2, 3, 4, 6, 8)
852. Weber, Ben: Fantasia (Variations), Op.25, [0, 1, 5, 9, 10, 2, 6, 11, 7, 4, 3, 8], pc set (0, 1, 3, 4, 5, 8)
853. Weber, Ben: Five Bagatelles for Piano, Op.2, mvt ii, [0, 1, 2, 9, 6, 7, 4, 8, 5, 11, 10, 3], pc set (0, 1, 2, 5, 7, 8)
854. Weber, Ben: Humoreske, Op.49, [0, 2, 4, 5, 7, 10, 1, 11, 9, 8, 6, 3], pc set (0, 2, 3, 5, 7, 9)

855. Webern, Anton: Op.32 (un-finished), initial sketch, [0, 1, 9, 11, 3, 2, 7, 6, 10, 8, 4, 5], pc set (0, 1, 2, 3, 4, 6)
856. Webern, Anton: Op.32 (un-finished), later sketch, [0, 1, 2, 11, 10, 9, 5, 4, 3, 6, 7, 8], pc set (0, 1, 2, 3, 4, 5)
857. Webern, Anton: 3 Lieder, “Erlösung”, Op.18, No.2, [0, 3, 11, 2, 10, 1, 9, 5, 8, 4, 7, 6], pc set (0, 1, 2, 3, 4, 5)
858. Webern, Anton: 3 Volkstexte, “Heiland, Unsere Missetaten…”, Op.17, No.3, [0, 9, 8, 7, 11, 10, 4, 5, 6, 3, 2, 1], pc set (0, 1, 2, 3, 4, 5)
859. Webern, Anton: 3 Volkstexte, “Liebste Jungfrau”, Op.17, No.2, [0, 11, 10, 6, 7, 1, 2, 5, 4, 3, 8, 9], pc set (0, 1, 2, 3, 6, 7)
860. Webern, Anton: Cantata I, Op.29, [0, 8, 11, 10, 2, 1, 4, 3, 7, 6, 9, 5], pc set (0, 1, 2, 3, 4, 6)
861. Webern, Anton: Concerto for Nine Instruments (Konzert), Op.24, [0, 11, 3, 4, 8, 7, 9, 5, 6, 1, 2, 10], pc set (0, 1, 4, 5, 8, 9)
862. Webern, Anton: Klavierstück, [0, 1, 2, 11, 10, 4, 5, 6, 9, 8, 7, 3], pc set (0, 1, 2, 3, 4, 6)
863. Webern, Anton: Quartet for Violin, Clarinet, Tenor Sax, And Piano, Op.22, [0, 9, 8, 11, 10, 2, 3, 4, 5, 7, 1, 6], pc set (0, 1, 2, 3, 4, 6)
864. Webern, Anton: String Quartet, Op.28, [0, 11, 2, 1, 5, 6, 3, 4, 8, 7, 10, 9], pc set (0, 1, 2, 3, 6, 7)
865. Webern, Anton: String Trio, Op.20, [0, 11, 6, 5, 10, 9, 1, 2, 7, 8, 4, 3], pc set (0, 1, 2, 3, 6, 7)
866. Webern, Anton: Symphony, Op.21, [0, 3, 2, 1, 5, 4, 10, 11, 7, 8, 9, 6], pc set (0, 1, 2, 3, 4, 5)
867. Webern, Anton: Three Songs on Texts by Hildegard Jone, Op.25, [0, 9, 8, 11, 6, 10, 7, 4, 3, 5, 2, 1], pc set (0, 1, 2, 3, 4, 6)
868. Webern, Anton: Variations for Orchestra, Op.30, [0, 1, 4, 3, 2, 5, 6, 9, 8, 7, 10, 11], pc set (0, 1, 2, 3, 4, 5)
869. Webern, Anton: Variations for Piano, Op.27, [0, 8, 7, 11, 10, 9, 3, 1, 4, 2, 6, 5], pc set (0, 1, 2, 3, 4, 5)
870. Westergaard, Peter: Mr. and Mrs. Discobbolos, [0, 2, 1, 4, 3, 5, 8, 6, 10, 7, 11, 9], pc set (0, 1, 2, 3, 4, 5)
871. Wilson, Olly: Piece for Four’, [0, 8, 9, 4, 2, 6, 7, 11, 10, 3, 5, 1], pc set (0, 1, 3, 5, 7, 9)
872. Wolpe, Stefan: Four Studies on Basic Rows, No.1 – Study on Tritones, [0, 6, 7, 1, 2, 8, 11, 5, 10, 4, 9, 3], pc set (0, 1, 2, 6, 7, 8)
873. Wolpe, Stefan: Four Studies on Basic Rows, No.2 – Study on Thirds, [0, 11, 9, 8, 10, 7, 6, 5, 3, 2, 4, 1], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 11-10-11-2-9-11-
874. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 2, [0, 2, 4, 6, 8, 10, 11, 1, 3, 5, 7, 9], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 2-2-2-2-2-1-
875. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 3, [0, 3, 1, 4, 2, 5, 6, 9, 7, 10, 8, 11], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 3-10-3-10-3-1-
876. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 4, [0, 4, 8, 2, 6, 10, 3, 7, 11, 5, 9, 1], pc set (0, 2, 4, 6, 8, 10), self-rotational interval pattern 4-4-6-4-4-5-
877. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 9, [0, 9, 1, 10, 2, 11, 6, 3, 7, 4, 8, 5], pc set (0, 1, 2, 3, 4, 5), self-rotational interval pattern 9-4-9-4-9-7-
878. Wuorinen, Charles: Flute Variations II, [0, 1, 3, 2, 5, 4, 9, 10, 6, 8, 7, 11], pc set (0, 1, 2, 3, 4, 5)
879. Wuorinen, Charles: Piano Concerto, No.3, [0, 5, 2, 1, 11, 3, 10, 9, 4, 6, 8, 7], pc set (0, 1, 2, 3, 4, 6)
880. Wuorinen, Charles: Reliquary for Igor Stravinsky, [0, 11, 7, 5, 6, 8, 2, 4, 9, 3, 1, 10], pc set (0, 1, 2, 3, 6, 7)
881. Wuorinen, Charles: Second Sonata, Source set, [0, 2, 10, 3, 5, 7, 6, 4, 1, 11, 9, 8], pc set (0, 2, 4, 5, 7, 9)
882. Wuorinen, Charles: Second Sonata, Voice 2, [0, 2, 10, 9, 11, 1, 6, 4, 7, 5, 3, 8], pc set (0, 1, 2, 3, 4, 5)
883. Wuorinen, Charles: Second Sonata, Voice 3, [0, 2, 4, 3, 5, 1, 9, 7, 11, 10, 8, 6], pc set (0, 1, 2, 3, 4, 5)
884. Wuorinen, Charles: Sonata for Piano, [0, 3, 2, 4, 5, 1, 11, 8, 9, 7, 6, 10], pc set (0, 1, 2, 3, 4, 5)
885. Wuorinen, Charles: Third Piano Sonata, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6], pc set (0, 2, 4, 5, 7, 9)
886. Yun, Isang: Funf Stücke für Klavier, Stück 1, Row 1, [0, 4, 2, 6, 5, 8, 7, 9, 3, 1, 10, 11], pc set (0, 2, 3, 4, 6, 8)
887. Yun, Isang: Funf Stücke für Klavier, Stück 1, Row 2, [0, 11, 10, 4, 2, 1, 3, 6, 5, 9, 7, 8], pc set (0, 1, 2, 3, 4, 6)
888. Yun, Isang: Funf Stücke für Klavier, Stück 3, Row 1, [0, 11, 1, 9, 10, 7, 5, 6, 8, 2, 3, 4], pc set (0, 1, 2, 3, 4, 6)
889. Yun, Isang: Funf Stücke für Klavier, Stück 3, Row 2, [0, 4, 2, 8, 5, 6, 7, 9, 3, 11, 10, 1], pc set (0, 2, 3, 4, 6, 8)
890. Yun, Isang: Funf Stücke für Klavier, Stück 4, [0, 1, 7, 8, 11, 3, 4, 9, 5, 2, 6, 10], pc set (0, 1, 4, 5, 6, 8)
891. Yun, Isang: Funf Stücke für Klavier, Stück 5, [0, 11, 6, 3, 2, 10, 9, 1, 5, 4, 8, 7], pc set (0, 1, 2, 4, 5, 8)
892. Yun, Isang: Gasa, [0, 11, 7, 8, 6, 5, 2, 9, 10, 1, 3, 4], pc set (0, 1, 2, 3, 6, 7)
893. Yun, Isang: Riul für Klarinette und Klavier, [0, 5, 6, 9, 8, 4, 3, 7, 1, 2, 11, 10], pc set (0, 1, 2, 4, 5, 8)
894. Zappa, Frank: Brown Shoes Don’t Make It, [0, 11, 3, 2, 9, 1, 7, 8, 4, 10, 5, 6], pc set (0, 1, 2, 3, 4, 6)
895. Zappa, Frank: Waltz, [0, 11, 3, 2, 9, 1, 7, 8, 4, 10, 5, 6], pc set (0, 1, 2, 3, 4, 6)
896. Zenk, Ludwig: An einen Springbrunnnen, Op.6, No.1, [0, 2, 3, 7, 6, 10, 9, 1, 5, 11, 4, 8], pc set (0, 1, 3, 5, 8, 9)
897. Zenk, Ludwig: Piano Sonata, Op.1, [0, 1, 8, 4, 6, 5, 2, 10, 9, 3, 11, 7], pc set (0, 1, 4, 5, 6, 8)
898. Zhou, Jin-Min: Piano Quintet, Scherzo, [0, 10, 5, 4, 6, 11, 7, 9, 2, 3, 1, 8], pc set (0, 1, 2, 6, 7, 8)

899. Zillig, Wilfried: Das Opfer, [0, 11, 3, 4, 8, 7, 10, 9, 1, 2, 6, 5], pc set (0, 1, 4, 5, 8, 9), self-rotational interval pattern 11-4-1-4-11-3-
900. Zimmerman, Bernd Alois: Perspektiven, [0, 2, 10, 8, 4, 6, 3, 1, 5, 7, 11, 9], pc set (0, 2, 4, 6, 8, 10)
901. Zimmermann, Bernd Alois: 'Ich wandte mich um und sah alles Unrecht das geschah unter der Sonne', [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], pc set (0, 1, 2, 3, 4, 5)
902. hauer, Josef Matthias: Zwölftonspiel für Oechester. 28. 9. 1954, [0, 5, 7, 4, 6, 1, 9, 3, 8, 11, 10, 2], pc set (0, 1, 2, 3, 6, 7)

Transposition Combinatorial

When two rows are combinatorial, the first hexachord of each complements the other meaning that they make up the total chromatic together. This list gives rows in this section that are combinatorial by transposition, i.e. combinatoriality holds between P0 and at least one transposition of P. The transposition(s) are given after the row. In this case, there is only one transposition-combinatorial hexachord, and only one interval, so they are all P0-P6

1. Carter, Elliott: Night Fantasies, [0, 10, 3, 11, 8, 7, 1, 2, 5, 9, 4, 6], P0-P6
2. Copland, Aaron: Inscape, ("Y form" or "Row 1"), [0, 4, 3, 11, 2, 7, 6, 8, 10, 9, 5, 1], P0-P6
3. Hauer, Josef Matthias: 'Atonale Musik'. Klavierstücke 1922., Op.20, [0, 7, 4, 9, 5, 8, 3, 11, 2, 6, 1, 10], P0-P6
4. Hauer, Josef Matthias: Nomos, Op.19 (bb.134-137), [0, 2, 1, 4, 5, 9, 6, 8, 10, 7, 11, 3], P0-P6
5. Hauer, Josef Matthias: Nomos, Op.19 (bb.457-458), [0, 3, 4, 5, 8, 1, 6, 11, 9, 10, 2, 7], P0-P6
6. Hauer, Josef Matthias: Romantische Phantasie für Orchester, [0, 10, 8, 5, 1, 9, 4, 11, 3, 7, 6, 2], P0-P6
7. Hauer, Josef Matthias: XXXII. Zwölftonspiel für Violine, zwei Bratschen und Cello (2/2), [0, 7, 4, 3, 11, 2, 5, 1, 10, 9, 6, 8], P0-P6
8. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 13. März 1952, [0, 5, 9, 10, 8, 1, 4, 3, 6, 7, 11, 2], P0-P6
9. Lackner, Peter: 'Hexentanz' für Violine und Klavier, [0, 3, 5, 7, 8, 4, 1, 10, 11, 2, 6, 9], P0-P6
10. Lackner, Peter: Kanon für Klavier. 26. Juni 1983, [0, 7, 5, 9, 4, 8, 6, 1, 11, 3, 10, 2], P0-P6
11. Lang, Bernhard: Monadologie XIII a; 'The Saucy Maid', [0, 1, 5, 2, 4, 9, 3, 10, 8, 11, 7, 6], P0-P6
12. Lutyens, Elisabeth: Islands, Op.80, [0, 11, 7, 3, 8, 10, 9, 6, 4, 5, 1, 2], P0-P6
13. Morris, Robert: Canonic Variations, [0, 3, 11, 1, 4, 8, 5, 6, 9, 10, 2, 7], P0-P6
14. Morris, Robert: Cuts, [0, 10, 11, 7, 3, 8, 6, 9, 4, 5, 1, 2], P0-P6
15. Morris, Robert: Knot Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6], P0-P6
16. Morris, Robert: Not Lilacs, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6], P0-P6
17. Morris, Robert: Roundelay, row 4, [0, 3, 11, 10, 7, 2, 6, 9, 5, 4, 1, 8], P0-P6
18. Morris, Robert: Something New, [0, 9, 4, 8, 11, 7, 3, 6, 10, 5, 2, 1], P0-P6
19. Morris, Robert: Strange Flowers, Occasional Storms, [0, 1, 8, 3, 5, 4, 10, 6, 9, 7, 11, 2], P0-P6
20. Morris, Robert: …gradually…, [0, 1, 8, 3, 5, 4, 6, 7, 9, 11, 2, 10], P0-P6
21. Nono, Luigi: Intolleranza, Soprano 1, [0, 3, 4, 7, 8, 5, 6, 9, 10, 1, 2, 11], P0-P6
22. Preßl, Herrmann Markus: Fier Fafeln für Fier Fiolen, [0, 7, 8, 11, 9, 4, 6, 10, 1, 5, 3, 2], P0-P6
23. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 2, [0, 3, 7, 10, 2, 11, 6, 9, 1, 4, 8, 5], P0-P6
24. Slonimsky, Nicholas: No. 1296b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 5, 10, 9, 2, 1, 6, 11, 4, 3, 8, 7], P0-P6
25. Slonimsky, Nicholas: No. 1298b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 8, 4, 7, 5, 6, 9, 2, 10, 1, 11], P0-P6
26. Slonimsky, Nicholas: No. 1300b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 8, 4, 7, 5, 6, 9, 2, 10, 1, 11], P0-P6
27. Slonimsky, Nicholas: No. 1301 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 8, 3, 5, 11, 9, 2, 10, 7, 6], P0-P6
28. Slonimsky, Nicholas: No. 1302 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 1, 4, 2, 9, 5, 11, 3, 8, 10, 7, 6], P0-P6
29. Slonimsky, Nicholas: No. 1305 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Sixth-Chord), [0, 3, 8, 10, 11, 7, 1, 5, 4, 2, 9, 6], P0-P6
30. Slonimsky, Nicholas: No. 1306 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Triad), [0, 4, 7, 8, 3, 5, 11, 9, 2, 1, 10, 6], P0-P6
31. Slonimsky, Nicholas: No. 1307 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Sixth-Chord), [0, 4, 9, 8, 11, 1, 7, 5, 2, 3, 10, 6], P0-P6

32. Slonimsky, Nicholas: No. 1308 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Six-Four Chord), [0, 5, 8, 10, 9, 1, 7, 3, 4, 2, 11, 6], P0-P6
33. Slonimsky, Nicholas: No. 1309 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Major Six-Four Chord), [0, 5, 9, 8, 10, 1, 7, 4, 2, 3, 11, 6], P0-P6
34. Slonimsky, Nicholas: No. 1313 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 11, 2, 4, 3, 9, 10, 8, 5, 1, 6], P0-P6
35. Slonimsky, Nicholas: No. 410 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 7, 3, 11, 10, 6, 2, 1, 9, 5, 4], P0-P6
36. Slonimsky, Nicholas: No. 417 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 4, 3, 2, 7, 6, 5, 10, 9, 8, 1], P0-P6
37. Slonimsky, Nicholas: No. 420 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4], P0-P6
38. Slonimsky, Nicholas: No. 456 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4], P0-P6
39. Slonimsky, Nicholas: No. 466 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 7, 3, 11, 10, 6, 2, 1, 9, 5, 4], P0-P6
40. Slonimsky, Nicholas: No. 493 Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 1, 5, 3, 4, 8, 6, 7, 11, 9, 10, 2], P0-P6
41. Slonimsky, Nicholas: No. 500 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 4, 3, 2, 7, 6, 5, 10, 9, 8, 1], P0-P6
42. Slonimsky, Nicholas: No. 503 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 7, 3, 2, 10, 6, 5, 1, 9, 8, 4], P0-P6
43. Slonimsky, Nicholas: No. 746 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 1, 5, 9, 10, 2, 6, 7, 11, 3, 4, 8], P0-P6
44. Slonimsky, Nicholas: No. 795 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 8, 1, 9, 5, 10, 6, 2, 7, 3, 11, 4], P0-P6
45. Spinner, Leopold: Fünf Lieder, Op.8, [0, 3, 4, 7, 8, 5, 11, 9, 10, 2, 6, 1], P0-P6
46. Spinner, Leopold: Sonatina for Wind Instruments, Op.23, [0, 9, 1, 5, 4, 2, 8, 10, 11, 7, 3, 6], P0-P6
47. Talma, Louise: Three Bagatelles, Bagatelle 3, [0, 3, 4, 1, 5, 8, 10, 7, 2, 11, 6, 9], P0-P6
48. Weber, Ben: Fantasia (Variations), Op.25, [0, 1, 5, 9, 10, 2, 6, 11, 7, 4, 3, 8], P0-P6

Inversion Combinatorial

These rows are combinatorial by inversion. There are 13 such hexachords and some are combinatorial in more that one transposition, so the specific forms are given in the form P0-IX, or P0-IX,Y in the case of more than one match.

1. Argento, Dominick: A Water Bird Talk, Lecturer Row, [0, 9, 5, 10, 2, 6, 3, 11, 8, 4, 1, 7], P0-I1
2. Argento, Dominick: From the Diary of Virginia Woolf, [0, 7, 6, 2, 11, 5, 3, 1, 8, 9, 4, 10], P0-I3
3. Atterberg, Kurt: Symphony 9 [Bbm], Op.54, ‘Sinfonia visionaria’, [0, 1, 5, 6, 7, 4, 8, 11, 10, 9, 2, 3], P0-I3
4. Babbitt, Milton: The Crowded Air, [0, 8, 5, 7, 10, 6, 11, 1, 9, 3, 2, 4], P0-I9
5. Bach, Johann Sebastian: Chromatische Fantasie, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7], P0-I7
6. Bartók, Béla: String Quartet, No.4, [0, 5, 6, 11, 4, 9, 10, 3, 8, 1, 2, 7], P0-I7
7. Bartók, Béla: Violin Concerto, No.2, mvt 1, [0, 2, 8, 1, 9, 4, 10, 6, 3, 7, 11, 5], P0-I7
8. Bartók, Béla: Violin Concerto, No.2, mvt 3, [0, 8, 2, 9, 1, 4, 10, 7, 6, 3, 11, 5], P0-I7
9. Beecroft, Norma: Improvvisazioni Concertanti, No.1, [0, 1, 11, 9, 3, 2, 7, 6, 10, 8, 4, 5], P0-I7
10. Bennett, Richard Rodney: Five Studies for Piano, [0, 3, 5, 6, 11, 9, 4, 2, 7, 8, 10, 1], P0-I1,7
11. Berg, Alban: Lulu, Lulu (title character) row, [0, 2, 3, 5, 7, 9, 1, 10, 11, 4, 6, 8], P0-I1
12. Berg, Alban: Lulu, Schoolboy row, [0, 2, 6, 10, 4, 7, 8, 3, 5, 9, 11, 1], P0-I3
13. Berg, Alban: Lulu, permutation of main row, [0, 4, 2, 7, 9, 6, 8, 11, 3, 1, 5, 10], P0-I5
14. Berg, Alban: Lyric Suite, mvt III, [0, 11, 7, 1, 2, 9, 3, 8, 10, 4, 5, 6], P0-I5
15. Berger, Arthur: Chamber Music for Thirteen Players, [0, 1, 11, 7, 10, 9, 6, 5, 8, 4, 2, 3], P0-I3
16. Berio, Luciano: Chamber Music, [0, 9, 3, 5, 7, 10, 2, 11, 4, 6, 8, 1], P0-I11
17. Bischof, Rainer: ‘Und so sink ich leise in mich selbst hinein’. Österreichischer Liederzyklus für Mezzosopran und Violine, Op.17, [0, 6, 5, 11, 4, 9, 3, 2, 8, 7, 1, 10], P0-I7

18. Boulez, Pierre: 2nd Piano Sonata, mvt II, Section 1, [0, 2, 1, 11, 3, 9, 8, 10, 7, 6, 5, 4], P0-I7
19. Boulez, Pierre: Le Soleil des eaux, series I, [0, 6, 10, 2, 5, 1, 7, 11, 3, 4, 8, 9], P0-I9
20. Boulez, Pierre: Le Soleil des eaux, series II, [0, 6, 10, 2, 5, 1, 4, 7, 11, 8, 3, 9], P0-I9
21. Boulez, Pierre: Le Soleil des eaux, series III, [0, 11, 7, 2, 6, 5, 4, 8, 10, 1, 3, 9], P0-I3
22. Boulez, Pierre: Pli selon pli, [0, 1, 8, 6, 7, 9, 4, 5, 11, 3, 2, 10], P0-I11
23. Boulez, Pierre: Structures Ia, [0, 11, 6, 5, 4, 3, 1, 10, 9, 7, 2, 8], P0-I1
24. Cage, John: Sonata for Clarinet, [0, 1, 10, 11, 9, 7, 6, 5, 4, 8, 3, 2], P0-I3
25. Cage, John: Sonata for Clarinet, mvt 2, [0, 11, 9, 10, 8, 6, 5, 4, 3, 7, 2, 1], P0-I1
26. Cage, John: Two pieces for Piano, [0, 11, 8, 3, 4, 2, 9, 7, 1, 5, 10, 6], P0-I9
27. Carlos, Juan: Canciones y Baladas, Balada II, [0, 4, 10, 6, 3, 8, 7, 2, 5, 9, 1, 11], P0-I5
28. Coltrane, John: Miles Mode, [0, 3, 5, 2, 7, 9, 10, 8, 1, 11, 6, 4], P0-I1
29. Cordero, Roque: Concerto for Violin, mvt 2A, [0, 11, 6, 4, 7, 8, 5, 9, 3, 10, 1, 2], P0-I9
30. Cordero, Roque: Soliloquios, [0, 1, 5, 11, 3, 2, 9, 8, 4, 10, 6, 7], P0-I9
31. Cordero, Roque: Violin Concerto mvt 1-3, [0, 11, 6, 4, 8, 7, 5, 1, 3, 2, 10, 9], P0-I9
32. Crosse, Gordon: Elegy for Small Orchestra, Op.1, [0, 11, 3, 1, 9, 10, 5, 6, 2, 4, 8, 7], P0-I5
33. Dallapiccola, Luigi: ‘Intermezzo’ from the ‘Ciaccona’ (of ‘Ciaccona, intermezzo e adagio’), [0, 5, 6, 3, 8, 9, 7, 11, 10, 2, 1, 4], P0-I7
34. Dallapiccola, Luigi: Canti di Liberationi, No.2, [0, 5, 8, 3, 1, 9, 10, 4, 2, 11, 7, 6], P0-I7
35. Dallapiccola, Luigi: Canti di Liberazione, [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6], P0-I7
36. Dallapiccola, Luigi: Cinque canti, [0, 11, 5, 8, 6, 2, 7, 3, 1, 4, 10, 9], P0-I3,9
37. Dallapiccola, Luigi: Commiato, [0, 6, 5, 3, 9, 11, 10, 8, 7, 1, 2, 4], P0-I1,7
38. Dallapiccola, Luigi: Dialoghi, [0, 1, 10, 2, 6, 4, 5, 3, 7, 11, 8, 9], P0-I9
39. Dallapiccola, Luigi: Il Prigioniero, “Hope”, [0, 1, 2, 3, 11, 5, 4, 10, 6, 7, 9, 8], P0-I9
40. Dallapiccola, Luigi: Il prigioniero, “Prayer”, [0, 3, 6, 11, 9, 2, 1, 7, 8, 4, 5, 10], P0-I7
41. Dallapiccola, Luigi: Liriche greche c: Sex Carmina Alcaei, [0, 3, 5, 6, 2, 9, 8, 7, 4, 1, 10, 11], P0-I1
42. Dallapiccola, Luigi: Quaderno musicale di Annalibera, [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6], P0-I7
43. Dallapiccola, Luigi: Quattro liriche di Antonio Machado, i, iv, [0, 3, 5, 6, 8, 9, 11, 10, 7, 4, 2, 1], P0-I7
44. Dallapiccola, Luigi: Requiescant, [0, 2, 1, 3, 4, 6, 7, 9, 8, 10, 5, 11], P0-I11
45. Dallapiccola, Luigi: Requiescant (alternative view), [0, 2, 1, 7, 11, 8, 9, 6, 10, 4, 3, 5], P0-I5
46. Dallapiccola, Luigi: Tempus, ‘Exhortatio’, [0, 11, 9, 3, 5, 6, 4, 7, 8, 2, 1, 10], P0-I1,7
47. Dallapiccola, Luigi: Tempus, ‘Ploratus’, [0, 1, 7, 6, 10, 4, 3, 2, 5, 11, 9, 8], P0-I3,9
48. Dallapiccola, Luigi: Ulisse [opera], [0, 2, 1, 3, 9, 8, 11, 10, 4, 6, 5, 7], P0-I7
49. Dallapiccola, Luigi: Variazioni per orchestra, [0, 1, 5, 8, 10, 4, 3, 7, 9, 2, 11, 6], P0-I7
50. Davies, Peter Maxwell: Five Pieces for Piano, Op.2, No.2, [0, 7, 11, 1, 3, 5, 8, 6, 4, 9, 10, 2], P0-I9
51. Davies, Peter Maxwell: Sonata for Trumpet and Piano, Op.1, [0, 7, 6, 2, 11, 10, 8, 9, 1, 5, 3, 4], P0-I3
52. Denisov, Edison: Five Etudes for Solo Bassoon, row A, [0, 6, 1, 7, 8, 3, 2, 9, 10, 5, 11, 4], P0-I5
53. Denisov, Edison: Five Etudes for Solo Bassoon, row D, [0, 6, 1, 7, 8, 3, 2, 9, 10, 11, 5, 4], P0-I5
54. Denisov, Edison: Five Etudes for Solo Bassoon, row F, [0, 6, 1, 7, 3, 2, 8, 9, 10, 5, 11, 4], P0-I11
55. Dessau, Paul: >Guernica< for piano, [0, 7, 6, 2, 10, 11, 5, 9, 1, 3, 4, 8], P0-I3
56. Dessau, Paul: Les Voix, [0, 11, 6, 8, 9, 3, 4, 10, 5, 7, 2, 1], P0-I1
57. Eder, Helmut: Concerto for violin and orchestra, Op.32, [0, 9, 6, 2, 11, 3, 8, 1, 7, 5, 10, 4], P0-I7
58. Eisler, Hanns: Deutsche Symphonie, mvt 5, [0, 1, 3, 5, 8, 9, 6, 11, 10, 4, 2, 7], P0-I7
59. Eisler, Hanns: Deutsche Symphonie, mvt 9, [0, 4, 1, 10, 8, 6, 3, 11, 9, 2, 5, 7], P0-I3
60. Eisler, Hanns: Deutsche Symphonie, mvts 1, 10, [0, 10, 6, 1, 11, 7, 5, 8, 9, 3, 4, 2], P0-I3
61. Eisler, Hanns: Five Pieces for Orchestra, mvt 4, [0, 10, 9, 8, 6, 7, 3, 4, 5, 11, 1, 2], P0-I11
62. Eisler, Hanns: Five Pieces for Orchestra, mvt 5, [0, 2, 6, 4, 10, 9, 11, 1, 7, 5, 8, 3], P0-I5
63. Eisler, Hanns: Sonata for Piano, No.2 (“in Form von Variationen”), Op.6, row variant 1, [0, 4, 6, 3, 2, 1, 9, 10, 7, 8, 5, 11], P0-I11
64. Eisler, Hanns: Sonata for Piano, No.2 (“in Form von Variationen”), Op.6, row variant 2, [0, 4, 3, 2, 6, 1, 9, 10, 7, 8, 5, 11], P0-I11
65. Eisler, Hanns: Sonata for Piano, No.2 (“in Form von Variationen”), Op.6, row variant 5, [0, 3, 2, 4, 6, 1, 9, 10, 7, 8, 5, 11], P0-I11

66. Eisler, Hanns: String Quartet, [0, 9, 3, 2, 11, 1, 4, 5, 10, 7, 8, 6], P0-I7
67. Eisler, Hanns: Variations for Piano, [0, 3, 10, 6, 5, 8, 1, 11, 2, 4, 7, 9], P0-I7
68. Eisler, Hanns: Zwei Elegien, No.2 (An die Überlebenden), [0, 1, 4, 3, 2, 6, 8, 11, 10, 9, 5, 7], P0-I11
69. Evans, Bill: Twelve Tone Tune Two, [0, 9, 11, 1, 10, 3, 2, 6, 4, 5, 8, 7], P0-I5
70. Fano, Michel: Sonata for Two Pianos, [0, 6, 10, 7, 9, 8, 3, 2, 4, 1, 5, 11], P0-I11
71. Fine, Vivian: Four Songs, No.2, “Comfort To A Youth That Had Lost His Love”, [0, 1, 2, 6, 9, 10, 11, 3, 5, 4, 7, 8], P0-I5
72. Finney, Ross Lee: Concerto for Alto Sax, [0, 1, 3, 4, 6, 9, 11, 10, 8, 7, 5, 2], P0-I11
73. Florey, Hans: Die Aussicht, [0, 9, 11, 8, 2, 10, 5, 6, 7, 4, 3, 1], P0-I3
74. Florey, Hans: Hexaeder für Klavier, [0, 9, 4, 8, 5, 10, 11, 3, 2, 6, 1, 7], P0-I11
75. Florey, Hans: Hälfte des Lebens, [0, 3, 4, 1, 7, 11, 6, 9, 10, 8, 2, 5], P0-I9
76. Florey, Hans: I Ging, [0, 7, 2, 10, 11, 6, 5, 1, 9, 8, 4, 3], P0-I3
77. Florey, Hans: Magischer Würfel mit 6 Spiegelpunkten, [0, 10, 1, 7, 4, 6, 5, 8, 3, 9, 2, 11], P0-I3,9
78. Florey, Hans: Sechs Kanonzyklen einunddesselben magischen Quadrates, [0, 10, 1, 7, 4, 6, 5, 8, 3, 9, 2, 11], P0-I3,9
79. Florey, Hans: Triptychon, [0, 8, 9, 3, 7, 2, 1, 10, 5, 6, 11, 4], P0-I1
80. Florey, Hans: Zwölftonspiel für Streichquartett. 3. Dezember 1965, [0, 10, 2, 5, 3, 4, 1, 8, 9, 6, 7, 11], P0-I11
81. Gerhard, Roberto: Capriccio for Solo Flute, [0, 11, 9, 3, 1, 10, 8, 6, 4, 7, 2, 5], P0-I5
82. Gerhard, Roberto: Hymnody, [0, 10, 11, 8, 2, 9, 4, 5, 1, 6, 7, 3], P0-I3
83. Gerhard, Roberto: String Quartet, [0, 7, 8, 2, 6, 10, 9, 11, 4, 5, 1, 3], P0-I11
84. Gerhard, Roberto: String Quartet, No.2, [0, 1, 5, 2, 8, 7, 10, 9, 6, 11, 4, 3], P0-I11
85. Gerhard, Roberto: Three Impromptus, [0, 8, 1, 10, 4, 6, 7, 5, 3, 2, 9, 11], P0-I3
86. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 3, [0, 5, 6, 11, 2, 1, 8, 7, 10, 4, 9, 3], P0-I9
87. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 4, [0, 9, 10, 11, 6, 5, 8, 7, 2, 3, 4, 1], P0-I1
88. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 8, [0, 1, 7, 6, 8, 9, 3, 2, 4, 5, 11, 10], P0-I11
89. Ginastera, Alberto: Quintet, Op.29, Row Class III 1, [0, 11, 1, 8, 2, 7, 10, 3, 9, 4, 6, 5], P0-I5
90. Ginastera, Alberto: Quintet, Op.29, Row Class III 2, [0, 11, 1, 8, 2, 7, 5, 6, 4, 9, 3, 10], P0-I5
91. Ginastera, Alberto: Quintet, Op.29, Row Class VII 1, [0, 9, 10, 11, 4, 3, 6, 2, 1, 5, 8, 7], P0-I5
92. Ginastera, Alberto: Quintet, Op.29, Row Class VII 2, [0, 11, 1, 8, 2, 7, 5, 6, 4, 9, 3, 10], P0-I5
93. Ginastera, Alberto: Quintet, Op.29, mvt.III, [0, 7, 3, 10, 2, 6, 9, 1, 4, 8, 11, 5], P0-I11
94. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III S, [0, 6, 11, 5, 8, 2, 7, 1, 4, 10, 3, 9], P0-I3,9
95. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 2, [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1], P0-I1
96. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 3, [0, 9, 3, 2, 11, 6, 5, 1, 8, 7, 4, 10], P0-I7
97. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 5, [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2], P0-I9
98. Goehr, Alexander: Piano Trio, Op.20, [0, 6, 7, 4, 3, 8, 5, 9, 11, 2, 10, 1], P0-I5
99. Goeyvaerts, Karel: Violin concerto, No.2, [0, 11, 7, 1, 2, 9, 10, 8, 5, 6, 3, 4], P0-I5
100. Gotham, Mark: 4x4x4x4, row 3, [0, 2, 6, 10, 7, 4, 11, 9, 8, 3, 5, 1], P0-I3
101. Gotham, Mark: 4x4x4x4, row 4, [0, 2, 6, 10, 1, 4, 5, 3, 8, 9, 11, 7], P0-I9
102. Gotham, Mark: Move On!, [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7], P0-I5,11
103. Hamel, Peter Michael: ‘Klangspirale’ für 13 Spieler oder drei Orchestergruppen, [0, 10, 5, 9, 3, 4, 1, 6, 8, 11, 2, 7], P0-I11
104. Hauer, Jose Matthias: XXXII. Zwölftonspiel; für Violine, Bratsche und Cello, [0, 2, 6, 1, 10, 9, 5, 8, 11, 7, 4, 3], P0-I5
105. Hauer, Josef Matthias: ‘Der Menschen Weg’, Op.67, [0, 8, 5, 4, 10, 2, 7, 9, 1, 3, 11, 6], P0-I11
106. Hauer, Josef Matthias: ‘Die schwarze Spinne’, Op.62, [0, 4, 10, 1, 5, 8, 11, 2, 7, 9, 6, 3], P0-I7
107. Hauer, Josef Matthias: ‘Emilie vor ihrem Brauttag’ (Friedrich Hölderlin) für Altsolo und Orchester, Op.58, [0, 8, 3, 4, 11, 6, 9, 10, 2, 1, 5, 7], P0-I1
108. Hauer, Josef Matthias: ‘Salambo’, opera after Gustave Flaubert;, Op.60, [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5], P0-I1
109. Hauer, Josef Matthias: ‘Tanz tibetanischer Mönche’ im langsamen 3/4 Takt) [Zwölftonspiel]. 8. September 1956, [0, 7, 8, 6, 3, 1, 11, 2, 10, 5, 9, 4], P0-I5
110. Hauer, Josef Matthias: ‘Wandlungen’ (chamber-oratorio for stage or concert, for six solo-voices, choir and orchestra; after words of Friedrich Hölderlin), Op.53, [0, 5, 11, 4, 10, 1, 6, 8, 9, 3, 7, 2], P0-I7
111. Hauer, Josef Matthias: Baustein, [0, 8, 11, 1, 6, 10, 4, 2, 3, 5, 9, 7], P0-I3
112. Hauer, Josef Matthias: Fünfte Tanzfantasie für kleines Orchester, Opus 66, [0, 10, 4, 7, 8, 11, 6, 2, 5, 9, 3, 1], P0-I1
113. Hauer, Josef Matthias: Harmonie – Melodie – Rhythmus – in kristallischer Bindung – im vierfachen Kontrapunkt [Zwölftonspiel] für Zwölftonorchester, [0, 2, 10, 9, 6, 5, 1, 4, 7, 11, 8, 3], P0-I1

114. Hauer, Josef Matthias: Hausmusik [Zwölftonspiel] für zwei Violinen und Klavier, [0, 1, 5, 3, 7, 10, 9, 6, 11, 4, 2, 8], P0-I9
115. Hauer, Josef Matthias: Kammermusik [Zwölftonspiel] für Flöte, Oboe, Baßklarinette, Fagott, zwei Violinen, Bratsche, Cello und Klavier zu vier Händen. 24. Jänner 1957, [0, 9, 3, 7, 5, 10, 1, 6, 11, 4, 2, 8], P0-I11
116. Hauer, Josef Matthias: Klavierstücke mit Überschriften nach Worten von Friedrich Hölderlin, Op.25 ;, No.10, [0, 6, 11, 10, 9, 5, 2, 3, 7, 1, 4, 8], P0-I1
117. Hauer, Josef Matthias: Langsamer Walzer [Zwölftonspiel] für Orchester. 10. Jänner 1957, [0, 8, 10, 2, 3, 6, 1, 9, 7, 4, 11, 5], P0-I7
118. Hauer, Josef Matthias: Langsamer Walzer [Zwölftonspiel] für zwei Violinen, Bratsche, Cello und Klavier zu zwei Händen, [0, 6, 2, 11, 10, 7, 3, 4, 5, 9, 1, 8], P0-I3
119. Hauer, Josef Matthias: Nomos, Op.19 (bb.106-108), [0, 10, 6, 1, 7, 4, 9, 5, 3, 8, 11, 2], P0-I3,9
120. Hauer, Josef Matthias: Nomos, Op.19 (bb.117-118), [0, 4, 5, 11, 7, 10, 3, 9, 6, 2, 1, 8], P0-I1
121. Hauer, Josef Matthias: Nomos, Op.19 (bb.119-120), [0, 10, 8, 6, 5, 7, 9, 2, 3, 1, 11, 4], P0-I9
122. Hauer, Josef Matthias: Nomos, Op.19 (bb.123-124), [0, 8, 11, 5, 3, 7, 4, 9, 1, 6, 10, 2], P0-I9
123. Hauer, Josef Matthias: Nomos, Op.19 (bb.125-126), [0, 11, 1, 10, 6, 8, 9, 5, 7, 3, 2, 4], P0-I3
124. Hauer, Josef Matthias: Nomos, Op.19 (bb.138-140), [0, 3, 4, 2, 5, 6, 8, 7, 10, 11, 1, 9], P0-I1
125. Hauer, Josef Matthias: Nomos, Op.19 (bb.141-143), [0, 10, 11, 3, 5, 6, 7, 2, 1, 4, 8, 9], P0-I7
126. Hauer, Josef Matthias: Nomos, Op.19 (bb.142-143), [0, 11, 10, 1, 5, 3, 8, 6, 9, 4, 7, 2], P0-I7
127. Hauer, Josef Matthias: Nomos, Op.19 (bb.159-161), [0, 5, 1, 8, 10, 4, 6, 7, 3, 9, 11, 2], P0-I7
128. Hauer, Josef Matthias: Nomos, Op.19 (bb.171-174), [0, 7, 1, 3, 9, 6, 8, 11, 10, 5, 4, 2], P0-I5,11
129. Hauer, Josef Matthias: Nomos, Op.19 (bb.175-178), [0, 10, 1, 2, 6, 5, 3, 4, 8, 9, 7, 11], P0-I9
130. Hauer, Josef Matthias: Nomos, Op.19 (bb.192-193), [0, 9, 6, 2, 8, 4, 7, 10, 1, 3, 5, 11], P0-I7
131. Hauer, Josef Matthias: Nomos, Op.19 (bb.196-197), [0, 2, 8, 6, 11, 5, 4, 10, 7, 3, 1, 9], P0-I3,9
132. Hauer, Josef Matthias: Nomos, Op.19 (bb.213-216), [0, 2, 6, 1, 10, 4, 5, 8, 11, 7, 3, 9], P0-I9
133. Hauer, Josef Matthias: Nomos, Op.19 (bb.224-228), [0, 1, 9, 3, 4, 5, 10, 11, 6, 2, 8, 7], P0-I11
134. Hauer, Josef Matthias: Nomos, Op.19 (bb.228-230), [0, 2, 9, 6, 5, 10, 7, 3, 8, 1, 4, 11], P0-I1
135. Hauer, Josef Matthias: Nomos, Op.19 (bb.231-233), [0, 6, 10, 3, 2, 8, 9, 5, 4, 1, 11, 7], P0-I7
136. Hauer, Josef Matthias: Nomos, Op.19 (bb.234-237), [0, 11, 3, 1, 7, 4, 9, 6, 5, 10, 2, 8], P0-I9
137. Hauer, Josef Matthias: Nomos, Op.19 (bb.241-243), [0, 2, 8, 1, 4, 9, 5, 6, 3, 11, 10, 7], P0-I7
138. Hauer, Josef Matthias: Nomos, Op.19 (bb.257-262), [0, 7, 3, 8, 4, 2, 9, 1, 11, 6, 10, 5], P0-I1
139. Hauer, Josef Matthias: Nomos, Op.19 (bb.262-263), [0, 11, 2, 5, 1, 6, 9, 7, 10, 3, 4, 8], P0-I9
140. Hauer, Josef Matthias: Nomos, Op.19 (bb.272-276), [0, 1, 5, 3, 7, 2, 8, 10, 4, 6, 11, 9], P0-I11
141. Hauer, Josef Matthias: Nomos, Op.19 (bb.284-287), [0, 1, 11, 7, 6, 4, 10, 5, 2, 8, 3, 9], P0-I9
142. Hauer, Josef Matthias: Nomos, Op.19 (bb.288-291), [0, 2, 10, 7, 4, 6, 11, 3, 5, 1, 8, 9], P0-I3
143. Hauer, Josef Matthias: Nomos, Op.19 (bb.292-294), [0, 9, 2, 6, 3, 5, 10, 1, 11, 7, 4, 8], P0-I1
144. Hauer, Josef Matthias: Nomos, Op.19 (bb.325-328), [0, 5, 4, 2, 7, 6, 3, 11, 1, 8, 10, 9], P0-I3
145. Hauer, Josef Matthias: Nomos, Op.19 (bb.328-332), [0, 3, 2, 7, 6, 10, 9, 11, 8, 5, 1, 4], P0-I11
146. Hauer, Josef Matthias: Nomos, Op.19 (bb.366-371), [0, 5, 1, 7, 3, 2, 4, 8, 11, 6, 10, 9], P0-I11
147. Hauer, Josef Matthias: Nomos, Op.19 (bb.372-375), [0, 8, 6, 1, 10, 11, 5, 9, 7, 4, 3, 2], P0-I3
148. Hauer, Josef Matthias: Nomos, Op.19 (bb.387-390), [0, 3, 7, 4, 10, 1, 11, 9, 6, 8, 2, 5], P0-I9
149. Hauer, Josef Matthias: Nomos, Op.19 (bb.403-409), [0, 11, 2, 10, 8, 1, 5, 3, 4, 6, 7, 9], P0-I5
150. Hauer, Josef Matthias: Nomos, Op.19 (bb.422-425), [0, 6, 4, 2, 10, 9, 8, 5, 11, 7, 1, 3], P0-I5
151. Hauer, Josef Matthias: Nomos, Op.19 (bb.425-427), [0, 8, 10, 7, 4, 2, 3, 5, 6, 11, 1, 9], P0-I1
152. Hauer, Josef Matthias: Nomos, Op.19 (bb.430-432), [0, 6, 8, 10, 9, 2, 7, 1, 3, 4, 5, 11], P0-I1
153. Hauer, Josef Matthias: Nomos, Op.19 (bb.438-441), [0, 1, 10, 8, 9, 4, 3, 5, 7, 11, 6, 2], P0-I3
154. Hauer, Josef Matthias: Nomos, Op.19 (bb.441-445), [0, 1, 9, 8, 10, 4, 6, 5, 7, 2, 3, 11], P0-I3
155. Hauer, Josef Matthias: Nomos, Op.19 (bb.451-453), [0, 2, 4, 1, 6, 11, 3, 8, 9, 7, 5, 10], P0-I9
156. Hauer, Josef Matthias: Nomos, Op.19 (bb.452-455), [0, 5, 7, 8, 1, 2, 3, 4, 6, 11, 10, 9], P0-I11
157. Hauer, Josef Matthias: Nomos, Op.19 (bb.463-464), [0, 4, 6, 7, 3, 9, 1, 10, 8, 11, 5, 2], P0-I5
158. Hauer, Josef Matthias: Nomos, Op.19 (bb.479-483), [0, 6, 10, 9, 7, 8, 11, 4, 5, 3, 2, 1], P0-I11
159. Hauer, Josef Matthias: Nomos, Op.19 (bb.494-496), [0, 7, 8, 5, 6, 11, 2, 3, 9, 4, 1, 10], P0-I9
160. Hauer, Josef Matthias: Nomos, Op.19 (bb.50-53), [0, 2, 10, 4, 5, 3, 6, 7, 1, 8, 9, 11], P0-I11
161. Hauer, Josef Matthias: Nomos, Op.19 (bb.501-503), [0, 5, 7, 1, 3, 2, 6, 10, 11, 8, 9, 4], P0-I11

162. Hauer, Josef Matthias: Nomos, Op.19 (bb.511-514), [0, 10, 1, 4, 6, 2, 9, 7, 11, 8, 5, 3], P0-I9
163. Hauer, Josef Matthias: Nomos, Op.19 (bb.517-521), [0, 2, 10, 11, 6, 4, 5, 1, 3, 9, 8, 7], P0-I7
164. Hauer, Josef Matthias: Nomos, Op.19 (bb.528-531), [0, 6, 7, 5, 8, 10, 9, 11, 4, 2, 1, 3], P0-I9
165. Hauer, Josef Matthias: Nomos, Op.19 (bb.60-63), [0, 4, 1, 2, 9, 8, 10, 5, 11, 3, 6, 7], P0-I7
166. Hauer, Josef Matthias: Nomos, Op.19 (bb.72-73), [0, 1, 7, 11, 4, 3, 9, 6, 5, 2, 10, 8], P0-I9
167. Hauer, Josef Matthias: Nomos, Op.19 (bb.73-78), [0, 8, 7, 2, 4, 11, 1, 3, 6, 5, 10, 9], P0-I5
168. Hauer, Josef Matthias: Nomos, Op.19 (bb.84-87), [0, 10, 1, 11, 5, 3, 2, 6, 7, 8, 9, 4], P0-I7
169. Hauer, Josef Matthias: Nomos, Op.19 (bb.93-94), [0, 1, 10, 8, 6, 2, 9, 4, 11, 7, 5, 3], P0-I5
170. Hauer, Josef Matthias: Nomos, Op.19 (row 1), [0, 8, 9, 5, 4, 6, 10, 11, 7, 1, 2, 3], P0-I7
171. Hauer, Josef Matthias: Nomos, Op.19 (row 2), [0, 6, 10, 4, 3, 2, 8, 7, 11, 9, 5, 1], P0-I11
172. Hauer, Josef Matthias: Paraphonie [Zwölftonspiel] für Bratsche und Klavier, [0, 4, 10, 5, 8, 1, 11, 7, 2, 9, 6, 3], P0-I7
173. Hauer, Josef Matthias: Sakraler Tanz [Zwölftonspiel] für Orchester, [0, 3, 10, 8, 5, 2, 9, 1, 11, 6, 4, 7], P0-I9
174. Hauer, Josef Matthias: Sechste Suite für Orchester, Op.47, [0, 9, 6, 2, 8, 3, 10, 11, 7, 4, 5, 1], P0-I1,7
175. Hauer, Josef Matthias: Symphonische Stücke für Streichorchester, Klavier und Harmonium, Op.49, [0, 4, 6, 3, 2, 8, 1, 11, 10, 7, 9, 5], P0-I1
176. Hauer, Josef Matthias: Tanz im langsamen 3/4 Takt [Zwölftonspiel] für zwei Violinen, zwei Bratschen und Klavier zu zwei Händen, [0, 3, 10, 2, 11, 6, 8, 7, 4, 9, 1, 5], P0-I7
177. Hauer, Josef Matthias: VIII. Zwölftonspiel für Orchester. Juni 1943, [0, 5, 10, 8, 4, 2, 11, 9, 3, 1, 7, 6], P0-I11
178. Hauer, Josef Matthias: Violinkonzert, Op.54 (9. März – 6. April 1928), [0, 7, 6, 8, 4, 11, 1, 10, 5, 9, 2, 3], P0-I9
179. Hauer, Josef Matthias: XXI. Zwölftonspiel für Orchester; mit einer Zwöfftonreihe, die in sechs Tropen steht, und vom Kulturreferenten der Stadt Wien Dr. Viktor Matejka gewählt wurde. Erster Teil 2,4-Takt (Halbe = 50) mit achttaktigen Perioden; zweiter Teil im 3/4 Takt (punktierte Halbe = 40) mit sechstaktigen Perioden, [0, 3, 4, 9, 11, 10, 1, 7, 6, 2, 5, 8], P0-I5
180. Hauer, Josef Matthias: XXII. Zwölftonspiel für Klavier, [0, 2, 11, 6, 7, 10, 1, 3, 8, 4, 9, 5], P0-I3
181. Hauer, Josef Matthias: XXIII. Zwölftonspiel für Klavierquintett, [0, 4, 11, 9, 10, 2, 6, 3, 7, 5, 8, 1], P0-I5
182. Hauer, Josef Matthias: XXIV. Zwölftonspiel für Klavier, [0, 2, 9, 3, 8, 1, 4, 7, 11, 5, 6, 10], P0-I7
183. Hauer, Josef Matthias: Zwölftonspiel (Weihnachten 1947) für Klarinette, Violine, Bratsche, Cello und Klavier, [0, 6, 2, 10, 8, 3, 11, 4, 9, 7, 5, 1], P0-I7
184. Hauer, Josef Matthias: Zwölftonspiel 10. Juli 1957; für Klavier zu vier Händen, [0, 8, 10, 6, 2, 11, 1, 3, 9, 4, 7, 5], P0-I3
185. Hauer, Josef Matthias: Zwölftonspiel 15. Juni 1957; für Flöte, Oboe, Bassklarinette, Fagott, zwei Violinen, Viola, Violoncello & Klavier vierhändig, [0, 6, 4, 8, 3, 11, 9, 2, 7, 1, 10, 5], P0-I1
186. Hauer, Josef Matthias: Zwölftonspiel 2. Juni 1948 für Streichquartett und Klavier, [0, 3, 10, 6, 2, 11, 1, 4, 7, 9, 5, 8], P0-I7
187. Hauer, Josef Matthias: Zwölftonspiel 26. Juli 1957, für Flöte, Oboe, Bassklarinette, Fagott und Streichquartett, [0, 4, 1, 6, 8, 2, 10, 7, 3, 9, 11, 5], P0-I11
188. Hauer, Josef Matthias: Zwölftonspiel 3. Mai 1958; für Streichsextett, [0, 4, 10, 3, 7, 1, 8, 2, 11, 6, 9, 5], P0-I9
189. Hauer, Josef Matthias: Zwölftonspiel 5. September 1957; für Violine, Bratsche und Klavier, [0, 4, 2, 9, 10, 6, 11, 1, 7, 3, 8, 5], P0-I5
190. Hauer, Josef Matthias: Zwölftonspiel 7. April 1957; für zwei Violinen, Bratsche, Cello und Klavier zu vier Händen, [0, 6, 2, 9, 10, 4, 11, 3, 7, 1, 5, 8], P0-I5
191. Hauer, Josef Matthias: Zwölftonspiel 9. September 1957; für vier Solostimmen [S, A, T, B], Violine, Bratsche und Klavier, [0, 4, 2, 9, 10, 6, 11, 1, 7, 3, 8, 5], P0-I5
192. Hauer, Josef Matthias: Zwölftonspiel Jänner 1957; für zwei Violinen, Bratsche und Cello, [0, 10, 6, 2, 8, 3, 5, 7, 9, 4, 1, 11], P0-I7
193. Hauer, Josef Matthias: Zwölftonspiel Oktober 1956; für Klavier zu vier Händen, [0, 9, 6, 2, 8, 3, 10, 5, 1, 11, 7, 4], P0-I1,7
194. Hauer, Josef Matthias: Zwölftonspiel für Flöte, Horn, Violine, Bratsche, Cello und Klavier, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], P0-I11
195. Hauer, Josef Matthias: Zwölftonspiel für Gitarre. 24. 7. 1949, [0, 6, 10, 2, 5, 9, 1, 4, 7, 3, 11, 8], P0-I1
196. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 11. Juni 1955, [0, 6, 11, 4, 2, 9, 3, 1, 5, 7, 10, 8], P0-I7
197. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 17. Juli 1952, [0, 6, 4, 9, 2, 10, 7, 11, 1, 8, 5, 3], P0-I5
198. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 2. Juni 1955, [0, 10, 2, 7, 3, 6, 4, 8, 1, 9, 11, 5], P0-I11
199. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 24. Dezember 1946, [0, 1, 2, 6, 10, 5, 11, 4, 3, 9, 7, 8], P0-I9
200. Hauer, Josef Matthias: Zwölftonspiel für Klavier. 7. Juni 1955, [0, 4, 10, 7, 11, 8, 3, 1, 5, 6, 2, 9], P0-I1
201. Hauer, Josef Matthias: Zwölftonspiel für Klavier. März 1953, [0, 6, 8, 7, 5, 10, 2, 3, 11, 4, 9, 1], P0-I9

202. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, Violine, Bratsche, Cello und Kontrabaß (melischer Entwurf vom 29.8.1954), [0, 4, 2, 7, 9, 6, 8, 3, 11, 5, 10, 1], P0-I5
203. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, mit einer Zwölftonreihe von Nikolaus Fheodoroff. 10. Juli 1952, [0, 10, 6, 8, 9, 7, 11, 3, 1, 5, 2, 4], P0-I11
204. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, mit einer Zwölftonreihe von Nikolaus Fheodoroff. 8. Juli 1952, [0, 2, 10, 6, 8, 7, 5, 9, 11, 3, 1, 4], P0-I11
205. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen, zwei Violinen, Bratsche und Cello. 19. Oktober 1954, [0, 6, 11, 2, 1, 5, 3, 8, 10, 7, 9, 4], P0-I9
206. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 24. Juni 1952, [0, 6, 10, 7, 9, 3, 4, 1, 8, 5, 11, 2], P0-I11
207. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 26. Juni 1952, [0, 6, 2, 10, 9, 5, 3, 4, 8, 7, 11, 1], P0-I1
208. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. 30. Juni 1952, I, [0, 2, 10, 4, 11, 8, 1, 7, 5, 3, 6, 9], P0-I5
209. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen. Mai 1955, [0, 6, 11, 4, 2, 9, 3, 1, 5, 7, 10, 8], P0-I7
210. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen und Akkordeon (Hausorchester), [0, 7, 2, 9, 6, 4, 11, 3, 10, 8, 1, 5], P0-I5
211. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu vier Händen und Streichquartett, [0, 7, 2, 10, 6, 8, 3, 11, 9, 4, 1, 5], P0-I11
212. Hauer, Josef Matthias: Zwölftonspiel für Oechester. 28. 9. 1954, [0, 8, 9, 6, 10, 4, 11, 1, 2, 5, 3, 7], P0-I11
213. Hauer, Josef Matthias: Zwölftonspiel für Orchester. September 1957, [0, 8, 6, 10, 5, 7, 2, 4, 1, 9, 11, 3], P0-I9
214. Hauer, Josef Matthias: Zwölftonspiel für Violine, Cello und Klavier zu vier Händen, [0, 10, 6, 1, 8, 3, 11, 7, 2, 5, 9, 4], P0-I5
215. Hauer, Josef Matthias: Zwölftonspiel für Violine und Klavier, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], P0-I11
216. Hauer, Josef Matthias: Zwölftonspiel für Violine und Klavier. 3. April 1955, [0, 2, 6, 4, 9, 10, 5, 3, 7, 8, 11, 1], P0-I5
217. Hauer, Josef Matthias: Zwölftonspiel für Orchester. 28. 9. 1954, [0, 5, 7, 4, 6, 1, 9, 3, 8, 11, 10, 2], P0-I3
218. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche, Cello und Klavier. 16. April 1958, [0, 3, 8, 2, 9, 1, 11, 5, 7, 4, 6, 10], P0-I7
219. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche und Cello (‘Ins Räumliche übertragen’). 3. September 1953, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], P0-I11
220. Hauer, Josef Matthias: Zwölftonspiel in drei Teilen für zwei Violinen, Bratsche und Cello. 31. Juli 1953, [0, 10, 7, 2, 8, 6, 3, 4, 9, 11, 1, 5], P0-I11
221. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.10, [0, 4, 6, 7, 8, 10, 9, 5, 3, 2, 1, 11], P0-I9
222. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.11, [0, 4, 5, 6, 8, 9, 7, 3, 2, 1, 11, 10], P0-I7
223. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.12, [0, 3, 6, 7, 9, 10, 11, 8, 5, 4, 2, 1], P0-I11
224. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.14, [0, 2, 5, 7, 8, 10, 11, 9, 6, 4, 3, 1], P0-I11
225. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.15, [0, 1, 3, 6, 7, 9, 11, 10, 8, 5, 4, 2], P0-I5,11
226. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.16, [0, 1, 3, 5, 7, 10, 9, 8, 6, 4, 2, 11], P0-I9
227. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.17, [0, 1, 3, 5, 8, 9, 7, 6, 4, 2, 11, 10], P0-I7
228. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.18, [0, 3, 4, 6, 9, 10, 11, 8, 7, 5, 2, 1], P0-I5,11
229. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.2, [0, 1, 2, 3, 4, 10, 9, 8, 7, 6, 5, 11], P0-I9
230. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.20, [0, 1, 2, 5, 7, 8, 11, 10, 9, 6, 4, 3], P0-I11
231. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.21, [0, 1, 2, 5, 6, 10, 9, 8, 7, 4, 3, 11], P0-I9
232. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.22, [0, 1, 2, 4, 8, 9, 7, 6, 5, 3, 11, 10], P0-I7

233. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.23, [0, 3, 4, 5, 9, 10, 11, 8, 7, 6, 2, 1], P0-I11
234. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.24, [0, 3, 4, 7, 8, 10, 9, 6, 5, 2, 1, 11], P0-I9
235. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.25, [0, 3, 5, 6, 8, 9, 7, 4, 2, 1, 11, 10], P0-I7
236. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.26, [0, 3, 4, 6, 7, 8, 5, 2, 1, 11, 10, 9], P0-I5
237. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.27, [0, 2, 4, 5, 6, 7, 3, 1, 11, 10, 9, 8], P0-I3
238. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.29, [0, 1, 6, 7, 8, 9, 11, 10, 5, 4, 3, 2], P0-I11
239. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.3, [0, 2, 3, 4, 5, 10, 11, 9, 8, 7, 6, 1], P0-I11
240. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.31, [0, 1, 2, 3, 6, 7, 11, 10, 9, 8, 5, 4], P0-I11
241. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.32, [0, 1, 2, 3, 4, 6, 11, 10, 9, 8, 7, 5], P0-I11
242. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.4, [0, 2, 3, 4, 8, 10, 9, 7, 6, 5, 1, 11], P0-I9
243. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.5, [0, 2, 4, 5, 8, 10, 11, 9, 7, 6, 3, 1], P0-I11
244. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.7, [0, 2, 4, 6, 8, 9, 7, 5, 3, 1, 11, 10], P0-I7
245. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.8, [0, 2, 4, 6, 7, 8, 5, 3, 1, 11, 10, 9], P0-I5
246. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.9, [0, 4, 6, 8, 9, 10, 11, 7, 5, 3, 2, 1], P0-I11
247. Hendler, Maximilian: aus den fünf Liedern nach Texten von Elisabeth Pöschl : ‘Sonnenaufgang’ für Singstimme und Klavier, Op.44-1, [0, 11, 2, 1, 5, 6, 4, 3, 8, 7, 9, 10], P0-I9
248. Husa, Karel: Poème for Viola and Chamber Orchestra, mvt 1, [0, 6, 5, 7, 8, 11, 9, 10, 3, 4, 2, 1], P0-I9
249. Husa, Karel: Poème for Viola and Chamber Orchestra, mvt 3, [0, 3, 1, 2, 4, 10, 9, 11, 7, 8, 6, 5], P0-I9
250. Johnston, Ben: String Quartet, No.6, [0, 5, 10, 9, 3, 7, 11, 6, 1, 2, 8, 4], P0-I11
251. Kahn, Erich Itor: Bagatelle für Rene Leibowitz, [0, 1, 2, 4, 6, 3, 10, 11, 5, 7, 9, 8], P0-I11
252. Kalodiki, Georgia: Six Sketches for piano, [0, 7, 6, 1, 2, 9, 8, 3, 4, 11, 5, 10], P0-I5
253. Klein, Fritz Heinrich: Die Maschine. Eine extonale Selbstsatire von Heautontimorumenus., Op.1 (Das Maschinen-Thema), [0, 5, 7, 9, 3, 2, 11, 6, 8, 10, 4, 1], P0-I1
254. Klenau, Paul von: Elisabeth von England, [0, 2, 8, 11, 7, 1, 4, 10, 3, 6, 5, 9], P0-I5
255. Krenek, Ernst: Eight Piano Pieces, [0, 10, 1, 7, 6, 11, 5, 8, 3, 9, 2, 4], P0-I3
256. Krenek, Ernst: Karl V, King Francis Row, [0, 10, 5, 6, 11, 3, 9, 4, 2, 7, 1, 8], P0-I7
257. Krenek, Ernst: Kette, Kreis, und Spiegel (Circle, Chain and Mirror), Op.160, [0, 5, 6, 9, 8, 4, 10, 7, 11, 3, 1, 2], P0-I7
258. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 1, [0, 2, 4, 5, 8, 10, 6, 7, 9, 11, 1, 3], P0-I11
259. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 2, [0, 2, 3, 6, 8, 10, 5, 7, 9, 11, 1, 4], P0-I7
260. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 3, [0, 1, 4, 6, 8, 10, 5, 7, 9, 11, 2, 3], P0-I3
261. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 4, [0, 3, 5, 7, 9, 11, 6, 8, 10, 1, 2, 4], P0-I1
262. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 5, [0, 2, 4, 6, 8, 9, 5, 7, 10, 11, 1, 3], P0-I7
263. Krenek, Ernst: Lamentatio Jeremiae Prophetae, Op.93, row 6, [0, 2, 4, 6, 7, 10, 5, 8, 9, 11, 1, 3], P0-I3
264. Krenek, Ernst: Sechs Vermessene, Op.168, [0, 3, 1, 6, 2, 4, 10, 5, 9, 7, 8, 11], P0-I11
265. Krenek, Ernst: Sestina, Op.161, [0, 8, 11, 10, 4, 6, 7, 1, 5, 3, 9, 2], P0-I1
266. Krenek, Ernst: Sonata, No.3, Op.92, No.4, [0, 10, 5, 8, 3, 2, 6, 7, 1, 9, 11, 4], P0-I9
267. Krenek, Ernst: Studies in Counterpoint, [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5], P0-I5
268. Krenek, Ernst: Studies in Counterpoint (i), [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5], P0-I5

269. Krenek, Ernst: Studies in Counterpoint (ii), [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6], P0-I5
270. Krenek, Ernst: Suite, Op.84 for solo cello, [0, 4, 3, 11, 10, 9, 1, 7, 8, 6, 2, 5], P0-I5
271. Krenek, Ernst: Symeon, der Stylit, [0, 3, 10, 4, 9, 11, 8, 7, 5, 1, 2, 6], P0-I5
272. Krenek, Ernst: concert for organ and string-orchestra, Op.230, [0, 11, 8, 4, 3, 6, 7, 5, 2, 9, 10, 1], P0-I1
273. Kukuck, Felicitas: 'Wo bist Du Trost'; motet, [0, 11, 10, 7, 6, 1, 2, 5, 4, 3, 9, 8], P0-I3
274. Lackner, Peter: 'Davongeflogene Seelen' für Singstimme, Violoncello und Klavier, [0, 10, 4, 7, 6, 1, 9, 11, 5, 2, 3, 8], P0-I3,9
275. Lackner, Peter: 'Der Winter', [0, 6, 3, 5, 9, 11, 7, 1, 4, 2, 10, 8], P0-I1,7
276. Lackner, Peter: 'INKE TAN MAGROV' für Singstimme und Klavier, [0, 6, 5, 10, 8, 3, 7, 1, 2, 9, 11, 4], P0-I7
277. Lackner, Peter: 'Ständchen' für zwei Violinen und zwei Bratschen. 1913,2013, [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6], P0-I5
278. Lackner, Peter: 'Wo ist der Freund' (erstes Lied aus dem Zyklus 'Wilde Erdbeeren' für Singstimme und Klavier), [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8], P0-I7
279. Lackner, Peter: 1. Kanonzyklus, [0, 7, 5, 9, 1, 3, 11, 8, 4, 6, 10, 2], P0-I11
280. Lackner, Peter: 3. Kanonzyklus, [0, 6, 8, 10, 1, 3, 5, 11, 9, 7, 4, 2], P0-I5
281. Lackner, Peter: 4. Kanonzyklus, [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8], P0-I9
282. Lackner, Peter: 5. Kanonzyklus, [0, 7, 11, 9, 1, 3, 5, 8, 10, 6, 2, 4], P0-I5
283. Lackner, Peter: AGNI MEI (Kanon für Klavier. 5. Juni 2015), [0, 4, 10, 11, 1, 2, 8, 7, 3, 6, 9, 5], P0-I7
284. Lackner, Peter: Florianische Reihe, [0, 3, 9, 7, 4, 11, 5, 2, 8, 6, 1, 10], P0-I5
285. Lackner, Peter: INKE TAN MAGROV für Singstimme und Klavier (zweites Lied aus dem Zyklus 'Wilde Erdbeeren'), [0, 2, 9, 5, 8, 11, 3, 1, 6, 10, 7, 4], P0-I3
286. Lackner, Peter: Kanon-Polska für zwei Bratschen. 6. Juni 1993, [0, 6, 3, 1, 10, 8, 5, 11, 2, 4, 7, 9], P0-I5
287. Lackner, Peter: Kanon für B. L., 7. Oktober 2017, [0, 9, 10, 5, 3, 7, 11, 2, 1, 6, 8, 4], P0-I11
288. Lackner, Peter: Kanon für Cello und Klavier, [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8], P0-I1
289. Lackner, Peter: Kanon für Flöte, Akkordeon, zwei Violinen, Bratsche und Klavier, [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8], P0-I9
290. Lackner, Peter: Kanon für Hammerklavier. März 2016, [0, 2, 1, 5, 7, 3, 11, 9, 10, 6, 4, 8], P0-I11
291. Lackner, Peter: Kanon für Kammerorchester, [0, 9, 11, 6, 2, 4, 7, 10, 8, 1, 5, 3], P0-I7
292. Lackner, Peter: Kanon für Klavier, [0, 6, 8, 10, 1, 3, 5, 11, 9, 7, 4, 2], P0-I5
293. Lackner, Peter: Kanon für Klavier. 15. Juni 1992, [0, 10, 3, 8, 6, 5, 2, 1, 11, 4, 9, 7], P0-I7
294. Lackner, Peter: Kanon für Klavier. 21. Juni 1998, [0, 7, 6, 5, 1, 4, 3, 8, 9, 10, 2, 11], P0-I3
295. Lackner, Peter: Kanon für Klavier. 27. Juni, 26. September 2002, [0, 9, 4, 1, 2, 8, 7, 10, 3, 6, 5, 11], P0-I7
296. Lackner, Peter: Kanon für Klavier. 5. April 1989, [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8], P0-I1
297. Lackner, Peter: Kanon für Klavier. April 2000, [0, 5, 3, 7, 11, 1, 9, 4, 6, 2, 10, 8], P0-I9
298. Lackner, Peter: Kanon für Klavier zu vier Händen. 12. Juni 1996, [0, 4, 2, 8, 11, 10, 5, 1, 3, 9, 6, 7], P0-I5
299. Lackner, Peter: Kanon für Klavier zu vier Händen. Frühling 1984, [0, 1, 10, 7, 9, 4, 5, 11, 8, 6, 2, 3], P0-I3
300. Lackner, Peter: Kanon für Klavierquartett, [0, 8, 6, 11, 3, 9, 1, 5, 7, 2, 10, 4], P0-I1
301. Lackner, Peter: Kanon für Klavierquartett. 27. April 1991, [0, 6, 3, 5, 9, 11, 7, 1, 4, 2, 10, 8], P0-I1,7
302. Lackner, Peter: Kanon für Klavierquartett. 27. Juni 1991, [0, 2, 6, 9, 11, 3, 7, 5, 1, 10, 8, 4], P0-I7
303. Lackner, Peter: Kanon für Schwegelpfeife in A und Geige, [0, 9, 7, 2, 10, 4, 3, 6, 8, 1, 5, 11], P0-I3
304. Lackner, Peter: Kanon für Streichquartett, [0, 9, 3, 5, 1, 11, 7, 10, 4, 2, 6, 8], P0-I7
305. Lackner, Peter: Kanon für Streichquartett. 3. Jänner 1990, [0, 6, 4, 8, 11, 3, 1, 7, 9, 5, 2, 10], P0-I1
306. Lackner, Peter: Kanon für Streichquartett und Orgel. 21. November 1993, [0, 10, 2, 5, 4, 7, 1, 11, 3, 9, 8, 6], P0-I1
307. Lackner, Peter: Kanon für Tenor-Hackbrett. 19. März 2014, [0, 8, 4, 6, 9, 1, 11, 3, 7, 5, 2, 10], P0-I11
308. Lackner, Peter: Kanon für Violine, Bratsche und Klavier, [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6], P0-I5
309. Lackner, Peter: Kanon für Violine und Violoncello, [0, 2, 9, 10, 6, 5, 1, 11, 4, 3, 7, 8], P0-I1
310. Lackner, Peter: Kanon für acht Instrumente. Dezember 1991, März 2007, [0, 11, 3, 10, 6, 2, 7, 8, 4, 9, 1, 5], P0-I7
311. Lackner, Peter: Kanon für drei Bratschen, [0, 11, 3, 10, 6, 2, 7, 8, 4, 9, 1, 5], P0-I7
312. Lackner, Peter: Kanon für sechs Instrumente. 16. März 2009, [0, 7, 6, 3, 2, 10, 1, 8, 11, 5, 4, 9], P0-I11
313. Lackner, Peter: Kanon für sechs Posaunen. Herbst 1996, [0, 9, 1, 6, 4, 8, 11, 2, 10, 7, 5, 3], P0-I11
314. Lackner, Peter: Kanon für zwei Gitarren. September 2001, [0, 5, 3, 9, 11, 6, 7, 2, 4, 10, 8, 1], P0-I1,7
315. Lackner, Peter: Kanon für zwei Violinen und Klavier. Frühjahr 1984, [0, 1, 10, 7, 9, 4, 5, 11, 8, 6, 2, 3], P0-I3
316. Lackner, Peter: Kanon à 3, [0, 11, 6, 10, 2, 7, 3, 4, 9, 5, 1, 8], P0-I3
317. Lackner, Peter: Kanon à 4 – 'Für Harald Fripertinger zum 50. Geburtstag', [0, 10, 3, 6, 5, 8, 1, 11, 9, 4, 7, 2], P0-I7
318. Lackner, Peter: Kanon á 4, [0, 4, 2, 8, 11, 7, 10, 5, 9, 1, 3, 6], P0-I5

319. Lackner, Peter: Kanon á 5 für Klaus Chudoba, [0, 2, 10, 8, 6, 11, 3, 1, 5, 7, 9, 4], P0-I3
320. Lackner, Peter: Moebius-Band für Flöte, Violine, Violoncello und Klavier, [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8], P0-I7
321. Lackner, Peter: Moebius-Band für sechs Violinen, [0, 3, 6, 2, 9, 11, 7, 4, 1, 5, 10, 8], P0-I7
322. Lackner, Peter: Moebiusband für Violine und Klavier (Chinesenfolter I), [0, 2, 4, 6, 10, 5, 1, 11, 9, 7, 3, 8], P0-I1
323. Lackner, Peter: Reihenspiel für Orgel, [0, 9, 6, 11, 5, 4, 10, 7, 2, 1, 8, 3], P0-I7
324. Lackner, Peter: Salambo-Kanon (à 4); Bad Aussee, 2. Februar 2008, [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5], P0-I1
325. Lackner, Peter: Sponsions-Kanon, [0, 4, 1, 10, 3, 7, 9, 5, 8, 11, 6, 2], P0-I9
326. Lackner, Peter: TACET (drittes Lied aus dem Zyklus 'Wilde Erdbeeren'), [0, 2, 9, 5, 8, 11, 4, 7, 10, 6, 1, 3], P0-I3
327. Leibowitz, René: String Quartet, No.3, Op.26, [0, 8, 9, 7, 6, 1, 2, 5, 4, 10, 11, 3], P0-I11
328. Lewin, David: Just a Minute, Roger, [0, 11, 4, 5, 7, 3, 2, 6, 8, 1, 10, 9], P0-I1
329. Lu, Shi-Lin: A Family of Red-Crowned Cranes, [0, 2, 9, 7, 4, 6, 11, 8, 1, 3, 10, 5], P0-I5
330. Lu, Yen: A Bird Flying By, [0, 6, 3, 4, 8, 7, 11, 5, 10, 2, 9, 1], P0-I5
331. Luo, Zhong-Rong: Dusk, row 1, [0, 2, 7, 5, 10, 8, 6, 3, 1, 11, 9, 4], P0-I11
332. Luo, Zhong-Rong: Evening, [0, 2, 7, 5, 10, 8, 6, 3, 1, 11, 9, 4], P0-I11
333. Luo, Zhong-Rong: Sonatina, mvt 3, [0, 2, 7, 4, 11, 8, 5, 9, 10, 1, 3, 6], P0-I5
334. Luo, Zhong-Rong: String Quartet, No.2, [0, 3, 5, 10, 6, 8, 11, 1, 9, 2, 4, 7], P0-I7
335. Luo, Zhong-Rong: String Quartet, No.3, row 1, [0, 2, 4, 7, 5, 10, 8, 1, 6, 3, 9, 11], P0-I1
336. Luo, Zhong-Rong: String Quartet, No.3, row 3, [0, 2, 7, 9, 11, 1, 3, 6, 10, 4, 5, 8], P0-I5
337. Luo, Zhong-Rong: Three Piano Pieces, "Arabeque", row 1, [0, 2, 5, 10, 6, 1, 3, 8, 11, 9, 7, 4], P0-I9
338. Lutyens, Elisabeth: Five Little Pieces for Clarinet and Piano, [0, 8, 4, 1, 10, 2, 9, 3, 5, 6, 11, 7], P0-I7
339. Lutyens, Elisabeth: Présages, Op.53, [0, 1, 11, 2, 10, 8, 5, 3, 4, 7, 9, 6], P0-I5
340. Lutyens, Elisabeth: Quincunx, Op.44, [0, 6, 11, 1, 5, 2, 7, 3, 4, 9, 10, 8], P0-I9
341. Maderna, Bruno: Improvvisazione N. 1, [0, 11, 4, 8, 3, 2, 7, 6, 1, 5, 10, 9], P0-I9
342. Maderna, Bruno: Musica su due dimensioni, [0, 2, 9, 4, 6, 11, 8, 10, 1, 3, 5, 7], P0-I7
343. Martin, Frank: Petite complainte, [0, 11, 10, 6, 2, 4, 5, 9, 8, 7, 3, 1], P0-I7
344. Martino, Donald: Fantasy Variations, [0, 3, 1, 10, 2, 8, 11, 5, 6, 9, 7, 4], P0-I7
345. Matthias, Josef: Salambo, Op.60, [0, 6, 9, 2, 8, 10, 4, 7, 1, 11, 3, 5], P0-I1
346. Messiaen, Olivier: Mode de valeurs et d'intensités, Series 1, [0, 11, 6, 5, 4, 3, 1, 10, 9, 7, 2, 8], P0-I1
347. Morris, Robert: Entanglements, [0, 3, 10, 5, 11, 6, 1, 7, 9, 2, 8, 4], P0-I7
348. Morris, Robert: Exchanges, [0, 4, 3, 1, 9, 5, 8, 6, 2, 10, 11, 7], P0-I11
349. Morris, Robert: Pari Passu, row 1, [0, 6, 10, 11, 2, 3, 9, 1, 7, 8, 4, 5], P0-I7
350. Morris, Robert: Refrains, [0, 3, 4, 2, 6, 10, 1, 8, 11, 7, 5, 9], P0-I11
351. Morris, Robert: Roundelay, row 3, [0, 10, 9, 3, 4, 6, 8, 11, 2, 7, 1, 5], P0-I5,11
352. Morris, Robert: Terrane, [0, 11, 1, 3, 2, 5, 6, 4, 9, 7, 8, 10], P0-I9
353. Morris, Robert: Three Musicians, [0, 9, 7, 6, 8, 1, 11, 2, 4, 5, 3, 10], P0-I11
354. Morris, Robert: Tournament for 12 trombones, [0, 7, 6, 4, 11, 8, 5, 9, 1, 3, 2, 10], P0-I9
355. Nichols, Jeff: …its darkening opposite, or Set Portrait in a Convex Mirror, [0, 4, 8, 7, 11, 2, 3, 6, 1, 9, 10, 5], P0-I5
356. Nono, Luigi: Incontri, [0, 2, 3, 8, 9, 6, 4, 5, 7, 11, 1, 10], P0-I1,7
357. Nono, Luigi: Intolleranza, Baritone, [0, 2, 7, 9, 4, 6, 11, 1, 8, 10, 3, 5], P0-I5
358. Nono, Luigi: La terra e la compagna (sketch), Series 3, [0, 9, 6, 3, 1, 4, 7, 10, 11, 8, 5, 2], P0-I11
359. Nono, Luigi: La terra e la compagna (sketch), Series 5, [0, 7, 2, 4, 9, 10, 5, 1, 6, 11, 8, 3], P0-I3
360. Nono, Luigi: La terra e la compagna (sketch), Series 7, [0, 5, 3, 10, 7, 1, 8, 9, 2, 6, 11, 4], P0-I9
361. Nono, Luigi: La terra e la compagna (sketch), Series 8, [0, 4, 5, 11, 3, 6, 10, 2, 7, 9, 1, 8], P0-I1
362. Nono, Luigi: Sarà dolce tacere, [0, 10, 5, 3, 8, 6, 1, 11, 4, 2, 9, 7], P0-I7
363. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 2, [0, 3, 6, 9, 11, 2, 5, 8, 10, 1, 4, 7], P0-I7
364. Papaioannou, Yannis: Songs of the Lake, No.1, [0, 8, 5, 7, 6, 11, 2, 10, 1, 3, 9, 4], P0-I9
365. Papaioannou, Yannis: Songs of the Lake, No.2, [0, 7, 4, 6, 5, 1, 9, 2, 8, 10, 3, 11], P0-I3
366. Papaioannou, Yannis: Songs of the Lake, No.4, [0, 5, 11, 9, 6, 10, 7, 2, 3, 1, 4, 8], P0-I1
367. Papaioannou, Yannis: Suite, "XP", [0, 4, 2, 1, 6, 8, 3, 9, 7, 10, 5, 11], P0-I11
368. Papaioannou, Yannis: Suite, "YP", [0, 10, 9, 8, 1, 4, 5, 7, 3, 6, 2, 11], P0-I3
369. Pentland, Barbara: String Quartet, No.3, [0, 11, 3, 6, 5, 9, 10, 8, 1, 2, 7, 4], P0-I1,7
370. Perle, George: First string quartet, [0, 1, 3, 6, 10, 9, 8, 7, 4, 5, 11, 2], P0-I5

371. Pousseur, Henri: Trois Chants Sacrés, [0, 10, 11, 4, 1, 5, 9, 6, 3, 7, 2, 8], P0-I7
372. Preßl, Hermann Markus: ‘A 5’ für Bassklarinette, Vibraphon und drei Bratschen, [0, 6, 5, 8, 10, 7, 3, 2, 4, 9, 1, 11], P0-I9
373. Preßl, Hermann Markus: Finstersonnen, [0, 3, 9, 6, 11, 5, 1, 2, 7, 8, 10, 4], P0-I1,7
374. Pärt, Arvo: Perpetuum Mobile, [0, 11, 10, 5, 6, 9, 7, 1, 2, 8, 3, 4], P0-I1
375. Pärt, Arvo: Symphony, No.1, [0, 1, 2, 7, 6, 3, 5, 11, 10, 4, 9, 8], P0-I11
376. Reynolds, Roger: Ambages, [0, 1, 4, 5, 7, 6, 8, 9, 10, 11, 2, 3], P0-I3
377. Rochberg, George: String Quartet, No.2 with soprano solo, [0, 11, 6, 5, 1, 2, 8, 7, 3, 4, 9, 10], P0-I9
378. Santoro, Claudio: Peças para Piano, [0, 11, 4, 5, 1, 9, 2, 3, 7, 8, 6, 10], P0-I7
379. Santoro, Claudio: Preludes 18-20, [0, 9, 1, 3, 2, 8, 10, 4, 6, 5, 7, 11], P0-I7
380. Santoro, Claudio: Six Piano Pieces, [0, 10, 4, 1, 11, 2, 5, 6, 3, 9, 7, 8], P0-I7
381. Schnittke, Alfred: Concerto Grosso, No.1, mvt 2, [0, 11, 2, 1, 8, 7, 10, 9, 6, 5, 4, 3], P0-I5
382. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 7, [0, 3, 11, 9, 10, 1, 4, 2, 7, 8, 5, 6], P0-I5
383. Schnittke, Alfred: Concerto Grosso, No.3, monogram 1, [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7], P0-I7
384. Schnittke, Alfred: Concerto Grosso, No.3, [0, 5, 1, 4, 10, 8, 11, 9, 3, 6, 2, 7], P0-I7
385. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 1, [0, 3, 6, 10, 2, 11, 8, 5, 9, 1, 4, 7], P0-I7
386. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, new row, [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5], P0-I5
387. Schnittke, Alfred: Viola Concerto, [0, 11, 5, 2, 1, 6, 3, 8, 7, 4, 10, 9], P0-I9
388. Schnittke, Alfred: Violin Sonata 2, [0, 10, 11, 9, 6, 8, 7, 5, 4, 1, 2, 3], P0-I1
389. Schoenberg, Arnold: A Survivor From Warsaw, Op.46, [0, 1, 6, 2, 10, 9, 5, 4, 11, 3, 7, 8], P0-I5
390. Schoenberg, Arnold: A Survivor From Warsaw, Op.46 (alternative), [0, 1, 6, 2, 10, 9, 4, 7, 3, 8, 11, 5], P0-I5
391. Schoenberg, Arnold: Accompaniment to a Film Scene, Op.34, [0, 3, 11, 1, 10, 9, 6, 8, 7, 5, 2, 4], P0-I5
392. Schoenberg, Arnold: Fantasy for Piano Four Hands, II (fragment), [0, 3, 6, 1, 7, 8, 2, 5, 11, 4, 10, 9], P0-I5
393. Schoenberg, Arnold: Fantasy for Violin and Piano, Op.47, [0, 11, 3, 1, 7, 9, 5, 6, 2, 4, 10, 8], P0-I5
394. Schoenberg, Arnold: Five Piano Pieces, Op.23, No.5, [0, 8, 10, 6, 7, 5, 9, 1, 3, 2, 11, 4], P0-I9
395. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.1, Op.27, No.1, [0, 11, 8, 2, 1, 7, 9, 10, 4, 3, 5, 6], P0-I5
396. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.2, Op.27, No.2, [0, 11, 4, 10, 2, 8, 3, 7, 6, 5, 9, 1], P0-I5
397. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.4, Op.27, No.4, [0, 2, 9, 5, 7, 3, 10, 11, 1, 8, 4, 6], P0-I1
398. Schoenberg, Arnold: Moses und Aron, [0, 1, 7, 5, 6, 4, 10, 8, 9, 11, 2, 3], P0-I3
399. Schoenberg, Arnold: Piano Concerto, Op.42, [0, 7, 11, 2, 1, 9, 3, 5, 10, 6, 8, 4], P0-I5
400. Schoenberg, Arnold: Prelude To A Suite From “Genesis”, Op.44, [0, 8, 4, 7, 6, 2, 1, 10, 3, 5, 11, 9], P0-I5
401. Schoenberg, Arnold: Serenade, mvt 5, “Tanzscene”, Op.24, [0, 1, 3, 6, 7, 9, 8, 10, 11, 2, 4, 5], P0-I5,11
402. Schoenberg, Arnold: Six Pieces for Male Chorus, No.1, Op.35, [0, 9, 1, 3, 2, 11, 6, 8, 7, 4, 10, 5], P0-I7
403. Schoenberg, Arnold: Six Pieces for Male Chorus, No.2, Op.35, [0, 3, 1, 7, 6, 8, 11, 5, 4, 9, 10, 2], P0-I5
404. Schoenberg, Arnold: Six Pieces for Male Chorus, No.5, Op.35, [0, 6, 9, 1, 2, 10, 7, 3, 11, 5, 4, 8], P0-I5
405. Schoenberg, Arnold: Sonata For Organ, [0, 6, 10, 2, 8, 1, 7, 5, 9, 4, 11, 3], P0-I5
406. Schoenberg, Arnold: String Quartet, No.4, Op.37, [0, 11, 7, 8, 3, 1, 2, 10, 6, 5, 4, 9], P0-I5
407. Schoenberg, Arnold: String Trio, Op.45, [0, 8, 1, 7, 2, 11, 9, 6, 4, 5, 3, 10], P0-I5
408. Schoenberg, Arnold: Suite for Piano, Op.25, [0, 1, 3, 9, 2, 11, 4, 10, 7, 8, 5, 6], P0-I7
409. Schoenberg, Arnold: Three Satires for Mixed Chorus, No.3, Op.28, No.3, [0, 1, 11, 3, 9, 5, 2, 4, 10, 6, 8, 7], P0-I7
410. Schoenberg, Arnold: Three Songs, No.2, “Tot”, Op.48, [0, 1, 7, 11, 8, 2, 6, 5, 10, 9, 3, 4], P0-I5
411. Schoenberg, Arnold: Three Times a Thousand Years, Op.50a, [0, 2, 11, 9, 10, 4, 3, 7, 5, 6, 8, 1], P0-I5
412. Schoenberg, Arnold: Two Piano Pieces, No.1, Op.33a, [0, 7, 2, 1, 11, 8, 3, 5, 9, 10, 4, 6], P0-I5
413. Schoenberg, Arnold: Two Piano Pieces, No.2, Op.33b, [0, 2, 6, 4, 10, 9, 7, 11, 8, 5, 1, 3], P0-I5
414. Schoenberg, Arnold: Variations for Orchestra, Op.31, [0, 6, 8, 5, 7, 11, 4, 3, 9, 10, 1, 2], P0-I9
415. Schoenberg, Arnold: Violin Concerto, Op.36, [0, 1, 6, 2, 7, 9, 3, 4, 10, 11, 5, 8], P0-I5
416. Schoenberg, Arnold: Violin Phantasy, Op.47, [0, 11, 3, 1, 7, 9, 6, 2, 10, 5, 8, 4], P0-I5
417. Schoenberg, Arnold: Von Heute Auf Morgen, Op.32, [0, 1, 7, 11, 9, 3, 6, 5, 2, 10, 8, 4], P0-I5
418. Schoenberg, Arnold: Wind Quintet, Op.26, [0, 4, 6, 8, 10, 9, 7, 11, 1, 3, 5, 2], P0-I11
419. Schuller, Gunther: Transformation, [0, 2, 4, 3, 8, 11, 9, 6, 5, 10, 7, 1], P0-I9
420. Schwantner, Joseph: Modus Caelestis (m. 39), [0, 6, 11, 10, 5, 9, 4, 8, 3, 2, 7, 1], P0-I1
421. Schwantner, Joseph: Wild Angels of the Open Hills, 2, “Angels of the Shadowed Ancient Land,” m. 21, [0, 8, 9, 11, 3, 7, 6, 5, 2, 4, 10, 1], P0-I1

422. Searle, Humphrey: Toccata alla Passacaglia, Op.31, [0, 5, 6, 1, 10, 7, 9, 8, 3, 2, 4, 11], P0-I9
423. Seiber, Mátyás: Concert Piece for Violin and Piano, [0, 1, 7, 6, 11, 10, 4, 5, 9, 8, 2, 3], P0-I3
424. Seiber, Mátyás: Sonata for Violin and Piano, [0, 1, 11, 10, 7, 6, 8, 9, 4, 3, 5, 2], P0-I3
425. Sengstschmid, Johann: Meditation für Orgel, Op.43a, [0, 6, 3, 1, 10, 8, 5, 2, 11, 9, 7, 4], P0-I5
426. Sessions, Roger: Piano Sonata, No.3, mvt 2, [0, 1, 5, 4, 8, 2, 11, 10, 6, 7, 3, 9], P0-I11
427. Sessions, Roger: When Lilacs Last in the Dooryard Bloom'd, [0, 2, 4, 10, 5, 8, 9, 1, 11, 7, 6, 3], P0-I11
428. Shapey, Ralph: String Quartet, No.9, [0, 8, 9, 3, 5, 1, 2, 6, 4, 10, 11, 7], P0-I7
429. Shostakovich, Dmitri: Symphony, No.14, mov. I, [0, 11, 9, 4, 3, 10, 8, 7, 5, 6, 1, 2], P0-I5
430. Slonimsky, Nicholas: No. 1217a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 11, 6, 1, 8, 4, 9, 2, 7], P0-I7
431. Slonimsky, Nicholas: No. 1224a Sixths (Twelve-Tone Patterns), [0, 9, 6, 3, 7, 10, 1, 4, 8, 5, 2, 11], P0-I11
432. Slonimsky, Nicholas: No. 1238a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 9, 7, 5, 3, 2, 4, 6, 8, 1, 10, 11], P0-I1
433. Slonimsky, Nicholas: No. 1241a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 9, 6, 3, 11, 5, 2, 8, 7, 10, 1, 4], P0-I1,7
434. Slonimsky, Nicholas: No. 1252a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 5, 9, 2, 6, 8, 11, 4], P0-I9
435. Slonimsky, Nicholas: No. 1252b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 10, 6, 2, 11, 7, 4, 1, 9], P0-I7
436. Slonimsky, Nicholas: No. 1254a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 1], P0-I1
437. Slonimsky, Nicholas: No. 1254b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 1, 10, 6, 4, 11, 7, 5, 2, 9], P0-I5
438. Slonimsky, Nicholas: No. 1255a [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 2, 5, 8, 11, 3], P0-I3,9
439. Slonimsky, Nicholas: No. 1255b [Slonimsky: Moto Perpetuo] Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 2, 9, 6, 5, 1, 10, 7, 4, 11], P0-I1,7
440. Slonimsky, Nicholas: No. 1258a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 1, 5, 8, 11, 4], P0-I11
441. Slonimsky, Nicholas: No. 1258b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 7, 2, 10, 6, 4, 1, 9], P0-I9
442. Slonimsky, Nicholas: No. 1259a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 2, 6, 9, 1, 5, 7, 10, 3], P0-I9
443. Slonimsky, Nicholas: No. 1259b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 2, 10, 7, 5, 1, 9, 6, 3, 11], P0-I1
444. Slonimsky, Nicholas: No. 1260a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 6, 9, 1, 5, 8, 11, 3], P0-I3
445. Slonimsky, Nicholas: No. 1260b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 2, 10, 6, 5, 1, 9, 7, 4, 11], P0-I7
446. Slonimsky, Nicholas: No. 1263a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 1, 4, 8, 11, 5], P0-I11
447. Slonimsky, Nicholas: No. 1263b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 7, 6, 2, 9, 4, 1, 10], P0-I9
448. Slonimsky, Nicholas: No. 1265 Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11], P0-I11
449. Slonimsky, Nicholas: No. 1265a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8, 11], P0-I11
450. Slonimsky, Nicholas: No. 1265b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 3, 1, 10, 6, 4, 11, 7, 5, 2, 8], P0-I5
451. Slonimsky, Nicholas: No. 1266a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 2, 5, 8, 11, 4, 7, 10, 1], P0-I1
452. Slonimsky, Nicholas: No. 1266b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 3, 2, 11, 6, 5, 1, 8, 7, 4, 10], P0-I7

453. Slonimsky, Nicholas: No. 1267a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 4, 8, 11, 5, 6, 9, 2], P0-I9
454. Slonimsky, Nicholas: No. 1267b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 4, 1, 10, 7, 5, 2, 8, 6, 3, 11], P0-I3
455. Slonimsky, Nicholas: No. 1273a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 5, 9, 6, 2, 11, 8, 4], P0-I9
456. Slonimsky, Nicholas: No. 1273b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 5, 1, 2, 6, 9, 8, 4, 11], P0-I9
457. Slonimsky, Nicholas: No. 1275a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 5, 9, 6, 1, 11, 8, 3], P0-I1
458. Slonimsky, Nicholas: No. 1275b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 5, 2, 1, 6, 9, 8, 3, 11], P0-I1
459. Slonimsky, Nicholas: No. 1276a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 6, 9, 5, 2, 11, 8, 3], P0-I3,9
460. Slonimsky, Nicholas: No. 1276b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 6, 1, 2, 5, 9, 8, 3, 11], P0-I3,9
461. Slonimsky, Nicholas: No. 1279a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 5, 1, 11, 8, 4], P0-I11
462. Slonimsky, Nicholas: No. 1279b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 6, 2, 1, 5, 9, 8, 4, 11], P0-I11
463. Slonimsky, Nicholas: No. 1280a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 2, 6, 9, 5, 1, 10, 7, 3], P0-I9
464. Slonimsky, Nicholas: No. 1280b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 6, 2, 5, 9, 1, 10, 7, 3], P0-I9
465. Slonimsky, Nicholas: No. 1281a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 2, 6, 9, 5, 1, 11, 8, 3], P0-I3
466. Slonimsky, Nicholas: No. 1281b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 6, 2, 1, 5, 9, 8, 3, 11], P0-I3
467. Slonimsky, Nicholas: No. 1284a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 6, 9, 4, 1, 11, 8, 5], P0-I11
468. Slonimsky, Nicholas: No. 1284b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 6, 2, 1, 4, 9, 8, 5, 11], P0-I11
469. Slonimsky, Nicholas: No. 1286a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 4, 7, 2, 10, 8, 5, 11], P0-I11
470. Slonimsky, Nicholas: No. 1286b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 4, 1, 10, 2, 7, 8, 5, 11], P0-I11
471. Slonimsky, Nicholas: No. 1287a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 2, 5, 8, 4, 11, 10, 7, 1], P0-I1
472. Slonimsky, Nicholas: No. 1287b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 5, 2, 11, 4, 8, 7, 1, 10], P0-I1
473. Slonimsky, Nicholas: No. 1288a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 4, 8, 5, 11, 9, 6, 2], P0-I9
474. Slonimsky, Nicholas: No. 1288b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 4, 1, 11, 5, 8, 6, 2, 9], P0-I9
475. Slonimsky, Nicholas: No. 258 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 10, 9, 4, 3, 2, 1, 8, 7, 6, 5], P0-I5
476. Slonimsky, Nicholas: No. 270 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 9, 7, 4, 2, 1, 11, 8, 6, 5, 3], P0-I3
477. Slonimsky, Nicholas: No. 277 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 7, 5, 4, 2, 11, 9, 8, 6, 3, 1], P0-I1
478. Slonimsky, Nicholas: No. 370 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 7, 1, 6, 4, 11, 5, 10, 8, 3, 9, 2], P0-I9

479. Slonimsky, Nicholas: No. 388 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2], P0-I5
480. Slonimsky, Nicholas: No. 389 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2], P0-I11
481. Slonimsky, Nicholas: No. 390 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 3, 9, 6, 4, 7, 1, 10, 8, 11, 5, 2], P0-I5
482. Slonimsky, Nicholas: No. 391 Miscellaneous Patterns [Diminished Seventh Chords] (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 9, 3, 6, 4, 1, 7, 10, 8, 5, 11, 2], P0-I11
483. Slonimsky, Nicholas: No. 638 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 9, 10, 4, 3, 1, 2, 8, 7, 5, 6], P0-I5
484. Slonimsky, Nicholas: No. 641 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 7, 6, 5, 4, 8, 9, 10, 11], P0-I11
485. Slonimsky, Nicholas: No. 643 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 6, 7, 8, 9, 10, 11, 5, 4, 3, 2, 1], P0-I11
486. Slonimsky, Nicholas: No. 644 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 6, 7, 8, 9, 10, 11, 5, 4, 3, 2, 1], P0-I11
487. Slonimsky, Nicholas: No. 692 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 3, 5, 8, 10, 11, 1, 4, 6, 7, 9], P0-I9
488. Slonimsky, Nicholas: No. 698 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 5, 7, 8, 10, 1, 3, 4, 6, 9, 11], P0-I11
489. Slonimsky, Nicholas: No. 736 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 2, 7, 9, 8, 10, 3, 5, 4, 6, 11, 1], P0-I1
490. Slonimsky, Nicholas: No. 813 Interpolation of Three Notes (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 3, 6, 9, 10, 1, 4, 7, 8, 11, 2, 5], P0-I5
491. Slonimsky, Nicholas: No. 909 Infra-Inter-Ultrapolation (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 9, 3, 6, 5, 2, 8, 11, 10, 7, 1, 4], P0-I1
492. Spinner, Leopold: Concert for Piano and Orchestra, Op.4, [0, 2, 1, 9, 11, 3, 4, 7, 5, 6, 10, 8], P0-I7
493. Spinner, Leopold: Ouverture for Orchestra, Op.5, [0, 11, 2, 10, 8, 1, 7, 5, 6, 9, 3, 4], P0-I5
494. Spinner, Leopold: Quintet, Op.14, [0, 6, 4, 2, 8, 5, 1, 9, 10, 11, 7, 3], P0-I3
495. Spinner, Leopold: Ricercata, Op.21, [0, 11, 8, 10, 2, 1, 4, 3, 7, 9, 6, 5], P0-I5
496. Spinner, Leopold: Sonata for Piano, Op.3, [0, 9, 8, 6, 7, 10, 1, 4, 5, 3, 2, 11], P0-I11
497. Spinner, Leopold: Sonata for Violin and Piano, Op.1, [0, 7, 6, 1, 3, 8, 5, 10, 2, 9, 4, 11], P0-I5
498. Spinner, Leopold: String Quartet, Op.2, [0, 1, 7, 6, 11, 10, 4, 5, 8, 9, 3, 2], P0-I3
499. Spinner, Leopold: Trio for Violin, Cello, and Piano, Op.6, [0, 1, 7, 4, 10, 9, 6, 5, 11, 8, 2, 3], P0-I3
500. Spinner, Leopold: Variations for Violin and Piano, Op.19, [0, 8, 9, 1, 2, 4, 3, 5, 6, 10, 11, 7], P0-I7
501. Spinner, Leopold: Zwei Lieder, Op.24, [0, 11, 1, 4, 3, 7, 5, 6, 9, 8, 10, 2], P0-I9
502. Stockhausen, Karlheinz: Choral, [0, 1, 10, 6, 8, 3, 5, 2, 4, 11, 9, 7], P0-I5
503. Stockhausen, Karlheinz: Klavierstück IV row 3, [0, 7, 1, 10, 11, 9, 5, 8, 4, 3, 2, 6], P0-I3
504. Stockhausen, Karlheinz: Licht, Eve formula, [0, 4, 3, 2, 5, 6, 10, 11, 9, 1, 7, 8], P0-I1
505. Stockhausen, Karlheinz: Plus-Minus, [0, 1, 7, 9, 8, 6, 3, 10, 2, 5, 11, 4], P0-I11
506. Stockhausen, Karlheinz: Tierkreis, Aries, [0, 3, 2, 9, 7, 8, 11, 6, 1, 5, 4, 10], P0-I1
507. Stockhausen, Karlheinz: Tierkreis, Sagittarius, [0, 6, 5, 2, 3, 4, 7, 8, 9, 10, 11, 1], P0-I1
508. Stravinsky, Igor: A Sermon, a Narrative and a Prayer, [0, 1, 9, 11, 10, 7, 8, 3, 4, 6, 5, 2], P0-I3
509. Stravinsky, Igor: Canticum Sacrum, II, [0, 11, 9, 6, 10, 8, 7, 5, 2, 4, 3, 1], P0-I1
510. Stravinsky, Igor: Elegy for J.F.K., [0, 6, 4, 2, 8, 9, 3, 1, 11, 10, 7, 5], P0-I7
511. Stravinsky, Igor: Introitus “T. S. Eliot in Memoriam”, [0, 5, 6, 4, 8, 9, 3, 2, 1, 10, 11, 7], P0-I7
512. Stravinsky, Igor: Requiem Canticles, 1st series, [0, 2, 10, 11, 1, 8, 6, 7, 9, 4, 3, 5], P0-I5
513. Stravinsky, Igor: Variations “Aldous Huxley in Memoriam”, [0, 10, 7, 9, 2, 8, 6, 11, 1, 5, 4, 3], P0-I1
514. Talma, Louise: Piano Sonata 2, mvt 4, first row, [0, 4, 8, 2, 5, 10, 1, 11, 6, 9, 7, 3], P0-I11
515. Talma, Louise: Six Etudes, Etude 1, [0, 3, 6, 8, 10, 2, 5, 7, 9, 1, 11, 4], P0-I7
516. Talma, Louise: Six Etudes, Etude 5, [0, 4, 6, 11, 8, 3, 9, 1, 5, 7, 2, 10], P0-I1
517. Talma, Louise: Six Etudes, Etude 6, [0, 8, 6, 9, 4, 5, 2, 1, 3, 10, 7, 11], P0-I7

518. Toufektsis, Orestis: MIKRO-ALLAXI (EpiEnteka II), für 15 Musiker, [0, 8, 3, 7, 2, 4, 10, 11, 1, 6, 9, 5], P0-I1
519. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 1A, [0, 10, 9, 1, 4, 8, 7, 2, 5, 11, 3, 6], P0-I3
520. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 3, [0, 10, 8, 4, 3, 6, 5, 11, 9, 1, 2, 7], P0-I5
521. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 5, [0, 4, 3, 10, 6, 9, 1, 5, 2, 8, 11, 7], P0-I5,11
522. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 7, [0, 2, 11, 8, 5, 3, 10, 9, 1, 7, 6, 4], P0-I9
523. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 8, [0, 4, 3, 11, 6, 8, 2, 9, 10, 7, 1, 5], P0-I1
524. Tranchell, Peter: Septet : [for] 2 violins, oboe, clarinet, horn, bassoon, cello : fifth dodecafonia, [0, 2, 1, 10, 3, 4, 11, 6, 5, 9, 8, 7], P0-I9
525. Tranchell, Peter: Twice a Kiss sketch 1, [0, 9, 1, 2, 4, 8, 5, 7, 10, 6, 3, 11], P0-I7
526. Tranchell, Peter: Twice a Kiss sketch 2, [0, 9, 1, 2, 4, 8, 3, 11, 5, 6, 7, 10], P0-I7
527. Tranchell, Peter: Twice a Kiss sketch 3, [0, 1, 2, 4, 8, 9, 7, 5, 3, 6, 10, 11], P0-I7
528. Urbanner, Erich: Adagio, [0, 3, 1, 11, 10, 9, 8, 7, 6, 4, 2, 5], P0-I5
529. Volkonsky, Andrei: Musica Stricta, mvt 2, row A, [0, 6, 8, 9, 11, 10, 1, 7, 2, 3, 5, 4], P0-I1
530. Volkonsky, Andrei: Musica Stricta, mvt 2, row D, [0, 4, 9, 2, 8, 10, 11, 1, 3, 7, 5, 6], P0-I3
531. Volkonsky, Andrei: Musica Stricta, mvt 4, row G, [0, 6, 5, 4, 3, 2, 1, 11, 9, 10, 8, 7], P0-I1
532. Volkonsky, Andrei: Musica Stricta, mvt 4, row H, [0, 6, 4, 9, 8, 2, 7, 1, 11, 5, 10, 3], P0-I7
533. Wang, Xi-Lin: A Dilapidated Tombstone, [0, 4, 6, 3, 2, 10, 11, 5, 8, 9, 7, 1], P0-I11
534. Weber, Ben: Five Bagatelles for Piano, Op.2, mvt ii, [0, 1, 2, 9, 6, 7, 4, 8, 5, 11, 10, 3], P0-I5
535. Weber, Ben: Humoreske, Op.49, [0, 2, 4, 5, 7, 10, 1, 11, 9, 8, 6, 3], P0-I1
536. Webern, Anton: Op.32 (un-finished), initial sketch, [0, 1, 9, 11, 3, 2, 7, 6, 10, 8, 4, 5], P0-I7
537. Webern, Anton: 3 Volkstexte, “Liebste Jungfrau”, Op.17, No.2, [0, 11, 10, 6, 7, 1, 2, 5, 4, 3, 8, 9], P0-I3
538. Webern, Anton: Cantata I, Op.29, [0, 8, 11, 10, 2, 1, 4, 3, 7, 6, 9, 5], P0-I5
539. Webern, Anton: Klavierstück, [0, 1, 2, 11, 10, 4, 5, 6, 9, 8, 7, 3], P0-I7
540. Webern, Anton: Quartet for Violin, Clarinet, Tenor Sax, And Piano, Op.22, [0, 9, 8, 11, 10, 2, 3, 4, 5, 7, 1, 6], P0-I3
541. Webern, Anton: String Quartet, Op.28, [0, 11, 2, 1, 5, 6, 3, 4, 8, 7, 10, 9], P0-I9
542. Webern, Anton: String Trio, Op.20, [0, 11, 6, 5, 10, 9, 1, 2, 7, 8, 4, 3], P0-I1
543. Webern, Anton: Three Songs on Texts by Hildegard Jone, Op.25, [0, 9, 8, 11, 6, 10, 7, 4, 3, 5, 2, 1], P0-I1
544. Wilson, Olly: Piece for Four’, [0, 8, 9, 4, 2, 6, 7, 11, 10, 3, 5, 1], P0-I7
545. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 10, [0, 10, 1, 11, 4, 2, 5, 3, 8, 6, 9, 7], P0-I7
546. Wuorinen, Charles: Piano Concerto, No.3, [0, 5, 2, 1, 11, 3, 10, 9, 4, 6, 8, 7], P0-I9
547. Wuorinen, Charles: Reliquary for Igor Stravinsky, [0, 11, 7, 5, 6, 8, 2, 4, 9, 3, 1, 10], P0-I9
548. Yun, Isang: Funf Stücke für Klavier, Stück 1, Row 1, [0, 4, 2, 6, 5, 8, 7, 9, 3, 1, 10, 11], P0-I3
549. Yun, Isang: Funf Stücke für Klavier, Stück 1, Row 2, [0, 11, 10, 4, 2, 1, 3, 6, 5, 9, 7, 8], P0-I7
550. Yun, Isang: Funf Stücke für Klavier, Stück 3, Row 1, [0, 11, 1, 9, 10, 7, 5, 6, 8, 2, 3, 4], P0-I3
551. Yun, Isang: Funf Stücke für Klavier, Stück 3, Row 2, [0, 4, 2, 8, 5, 6, 7, 9, 3, 11, 10, 1], P0-I3
552. Yun, Isang: Funf Stücke für Klavier, Stück 4, [0, 1, 7, 8, 11, 3, 4, 9, 5, 2, 6, 10], P0-I5
553. Yun, Isang: Funf Stücke für Klavier, Stück 5, [0, 11, 6, 3, 2, 10, 9, 1, 5, 4, 8, 7], P0-I7
554. Yun, Isang: Gasa, [0, 11, 7, 8, 6, 5, 2, 9, 10, 1, 3, 4], P0-I9
555. Yun, Isang: Riul für Klarinette und Klavier, [0, 5, 6, 9, 8, 4, 3, 7, 1, 2, 11, 10], P0-I7
556. Zappa, Frank: Brown Shoes Don’t Make It, [0, 11, 3, 2, 9, 1, 7, 8, 4, 10, 5, 6], P0-I7
557. Zappa, Frank: Waltz, [0, 11, 3, 2, 9, 1, 7, 8, 4, 10, 5, 6], P0-I7
558. Zenk, Ludwig: An einen Springbrunnnen, Op.6, No.1, [0, 2, 3, 7, 6, 10, 9, 1, 5, 11, 4, 8], P0-I11
559. Zenk, Ludwig: Piano Sonata, Op.1, [0, 1, 8, 4, 6, 5, 2, 10, 9, 3, 11, 7], P0-I3
560. hauer, Josef Matthias: Zwölftonspiel für Oechester. 28. 9. 1954, [0, 5, 7, 4, 6, 1, 9, 3, 8, 11, 10, 2], P0-I3

Retrograde Inversion Combinatorial

These rows are combinatorial by retrograde inversion.

1. Argento, Dominick: Evensong: Of Love and Angels, [0, 11, 9, 8, 5, 3, 4, 1, 2, 7, 10, 6], P0-RI8
2. Bennett, Richard Rodney: Symphony, [0, 2, 9, 8, 3, 5, 6, 1, 7, 11, 10, 4], P0-RI5
3. Berg, Alban: Chamber Concerto, mvts 2, 3, [0, 11, 10, 4, 5, 9, 7, 1, 2, 6, 8, 3], P0-RI9
4. Berg, Alban: Lyric Suite, mvt I, m.7-9, [0, 3, 7, 8, 2, 1, 9, 6, 4, 11, 5, 10], P0-RI3
5. Carter, Elliott: String Quartet, No.3, [0, 11, 2, 9, 5, 3, 4, 8, 10, 7, 1, 6], P0-RI2

6. Copland, Aaron: Connotations, row 1, [0, 1, 3, 6, 2, 9, 8, 5, 10, 4, 11, 7], P0-RI3
7. Copland, Aaron: Connotations, row 2, [0, 7, 9, 6, 2, 3, 8, 11, 10, 4, 5, 1], P0-RI9
8. Copland, Aaron: Piano Fantasy, [0, 7, 2, 10, 8, 3, 6, 4, 11, 9, 1, 5], P0-RI10
9. Cordero, Roque: Concerto for Violin, mvt 2B, [0, 5, 3, 11, 6, 8, 7, 2, 1, 4, 9, 10], P0-RI11
10. Cordero, Roque: Sonata breve, [0, 1, 4, 11, 10, 7, 5, 8, 9, 6, 3, 2], P0-RI11
11. Dallapiccola, Luigi: Due studi, 'Fanfare', [0, 1, 7, 9, 10, 3, 4, 2, 8, 11, 6, 5], P0-RI10
12. Dallapiccola, Luigi: Preghiere, [0, 11, 2, 3, 8, 9, 7, 6, 1, 5, 4, 10], P0-RI11
13. Dallapiccola, Luigi: Quattro liriche di Antonio Machado, ii, [0, 1, 4, 6, 7, 9, 10, 11, 2, 3, 5, 8], P0-RI1
14. Dallapiccola, Luigi: Tre poemi, [0, 8, 9, 6, 3, 1, 2, 11, 7, 5, 4, 10], P0-RI9
15. David, Johann Nepomuk: Symphony, No.8, Op.59, [0, 5, 9, 2, 6, 11, 3, 4, 7, 8, 10, 1], P0-RI11
16. Denisov, Edison: Five Etudes for Solo Bassoon, row G, [0, 11, 5, 10, 4, 3, 9, 8, 2, 1, 6, 7], P0-RI3
17. Dobbins, Bill: Concerto for Jazz Orchestra, [0, 9, 7, 4, 3, 1, 10, 11, 8, 6, 5, 2], P0-RI4
18. Eisler, Hanns: >Spruch< for voice and piano, [0, 3, 11, 9, 5, 8, 4, 1, 2, 10, 7, 6], P0-RI8
19. Eisler, Hanns: An den Schlaf, [0, 8, 2, 10, 11, 5, 6, 1, 9, 3, 7, 4], P0-RI10
20. Eisler, Hanns: Chamber Symphony / Film music for "White Flood", row 1, [0, 1, 2, 3, 11, 7, 6, 5, 9, 8, 10, 4], P0-RI2
21. Eisler, Hanns: Chamber Symphony / Film music for "White Flood", row 2, [0, 8, 2, 10, 11, 5, 6, 1, 4, 9, 7, 3], P0-RI10
22. Eisler, Hanns: Deutsche Symphonie, mvt 4, [0, 10, 5, 6, 11, 7, 1, 4, 2, 8, 9, 3], P0-RI5
23. Eisler, Hanns: Deutsche Symphonie, mvt 7, [0, 11, 8, 5, 2, 1, 4, 3, 10, 7, 6, 9], P0-RI1
24. Eisler, Hanns: Deutsche Symphonie, mvts 2, 6, [0, 3, 11, 9, 5, 8, 4, 7, 6, 2, 1, 10], P0-RI8
25. Eisler, Hanns: Five Pieces for Orchestra, mvt 1, [0, 6, 2, 3, 10, 9, 11, 5, 8, 7, 1, 4], P0-RI12
26. Eisler, Hanns: Five Pieces for Orchestra, mvt 2, [0, 2, 3, 1, 11, 7, 5, 4, 8, 10, 9, 6], P0-RI2
27. Eisler, Hanns: Palmström, Op.5, No.4, [0, 11, 2, 8, 3, 9, 6, 7, 10, 1, 4, 5], P0-RI11
28. Eisler, Hanns: Sonata for Piano, No.2 ("in Form von Variationen"), Op.6, row variant 4, [0, 4, 3, 2, 9, 6, 10, 1, 7, 5, 8, 11], P0-RI6
29. Eröd, Ivan: Die Seidenraupen, [0, 4, 6, 3, 1, 10, 8, 11, 9, 5, 2, 7], P0-RI4
30. Florey, Hans: 'Die Blume der Blumen' für Gesang und Viola, [0, 3, 4, 8, 9, 6, 1, 7, 10, 11, 2, 5], P0-RI12
31. Florey, Hans: 'Fort, fort sind meine Rosen' für Gesang und Instrument, [0, 7, 6, 3, 5, 9, 2, 10, 8, 4, 1, 11], P0-RI12
32. Florey, Hans: Grabgesang, [0, 2, 8, 5, 10, 11, 4, 1, 6, 3, 9, 7], P0-RI10
33. Florey, Hans: Griechisch-lateinisches Quadrat der Ordnung 4 mit Fuge in Klangnotation, [0, 9, 3, 7, 4, 10, 2, 6, 1, 8, 11, 5], P0-RI7
34. Florey, Hans: Kleiner Doppelkanon, [0, 4, 6, 3, 8, 9, 7, 2, 1, 5, 11, 10], P0-RI12
35. Florey, Hans: Magisches Quadrat der Ordnung 3, [0, 4, 6, 3, 8, 9, 7, 2, 1, 5, 11, 10], P0-RI12
36. Frankel, Benjamin: The Curse of the Werewolf, [0, 3, 2, 1, 4, 8, 11, 5, 10, 7, 6, 9], P0-RI4
37. Gerhard, Roberto: Concerto for Harpsichord, String Orchestra, and Percussion, [0, 2, 8, 7, 11, 5, 1, 4, 3, 6, 9, 10], P0-RI7
38. Gerhard, Roberto: Gemini, [0, 11, 3, 1, 5, 4, 8, 6, 7, 2, 9, 10], P0-RI4
39. Gerhard, Roberto: Leo, [0, 2, 1, 6, 5, 7, 3, 8, 9, 10, 4, 11], P0-RI7
40. Gerhard, Roberto: Nonet, [0, 11, 1, 3, 5, 4, 10, 8, 2, 7, 9, 6], P0-RI4
41. Gerhard, Roberto: Symphony, No.2, [0, 8, 1, 7, 5, 6, 10, 11, 2, 3, 9, 4], P0-RI1
42. Ginastera, Alberto: Cantata para América Mágica, Op.27, [0, 7, 6, 5, 10, 11, 8, 1, 2, 9, 4, 3], P0-RI5
43. Ginastera, Alberto: Piano Concerto, No.1, Op.28, [0, 11, 5, 1, 8, 2, 7, 6, 10, 4, 9, 3], P0-RI1
44. Ginastera, Alberto: String Quartet, No.2, Op.26, [0, 5, 11, 2, 8, 1, 9, 10, 7, 4, 3, 6], P0-RI1
45. Goehr, Alexander: Little Symphony, Op.15, [0, 3, 7, 10, 6, 4, 5, 2, 9, 8, 11, 1], P0-RI10
46. Goehr, Alexander: Sonata in One Movement, Op.2, [0, 2, 7, 1, 4, 10, 6, 9, 11, 8, 5, 3], P0-RI2
47. Harrison, Lou: Suite for Piano, [0, 1, 6, 2, 5, 7, 11, 4, 9, 8, 10, 3], P0-RI7
48. Harrison, Lou: Untitled Piano Piece, [0, 10, 4, 3, 9, 7, 2, 8, 6, 1, 11, 5], P0-RI7
49. Hauer, Josef Matthias: 'Kaleidoskop' für Orchester, [0, 9, 6, 7, 3, 8, 2, 4, 11, 1, 5, 10], P0-RI3
50. Hauer, Josef Matthias: 'Musik für Schule und Haus II' 22. September 1956. für Violine, Bratsche und Klavier, [0, 7, 8, 1, 6, 5, 10, 2, 11, 9, 3, 4], P0-RI1
51. Hauer, Josef Matthias: Labyrinthischer Tanz [Zwölftonspiel] für Klavier zu vier Händen. 16. November 1952, [0, 3, 8, 7, 2, 10, 6, 1, 11, 9, 4, 5], P0-RI10
52. Hauer, Josef Matthias: Nomos, [0, 5, 7, 3, 9, 6, 11, 2, 8, 4, 1, 10], P0-RI12
53. Hauer, Josef Matthias: Nomos, Op.19 (bb.1-36), [0, 5, 7, 3, 9, 6, 11, 2, 8, 4, 1, 10], P0-RI12

54. Hauer, Josef Matthias: Nomos, Op.19 (bb.101-102), [0, 7, 4, 2, 1, 10, 9, 11, 8, 6, 3, 5], P0-RI2
55. Hauer, Josef Matthias: Nomos, Op.19 (bb.129-130), [0, 9, 10, 4, 3, 7, 6, 2, 1, 8, 11, 5], P0-RI7
56. Hauer, Josef Matthias: Nomos, Op.19 (bb.131-132), [0, 9, 8, 2, 11, 3, 6, 5, 10, 7, 4, 1], P0-RI11
57. Hauer, Josef Matthias: Nomos, Op.19 (bb.133-134), [0, 8, 5, 11, 2, 7, 4, 6, 3, 1, 10, 9], P0-RI7
58. Hauer, Josef Matthias: Nomos, Op.19 (bb.141-142), [0, 5, 3, 4, 1, 11, 2, 6, 8, 9, 10, 7], P0-RI4
59. Hauer, Josef Matthias: Nomos, Op.19 (bb.194-195), [0, 4, 2, 3, 6, 9, 5, 1, 8, 7, 11, 10], P0-RI6
60. Hauer, Josef Matthias: Nomos, Op.19 (bb.198-201), [0, 8, 9, 11, 3, 5, 6, 1, 2, 7, 10, 4], P0-RI8
61. Hauer, Josef Matthias: Nomos, Op.19 (bb.202-203), [0, 1, 3, 10, 7, 9, 2, 11, 4, 6, 8, 5], P0-RI10
62. Hauer, Josef Matthias: Nomos, Op.19 (bb.208-212), [0, 9, 7, 2, 5, 1, 10, 6, 11, 4, 3, 8], P0-RI2
63. Hauer, Josef Matthias: Nomos, Op.19 (bb.215-219), [0, 3, 8, 2, 6, 5, 4, 1, 10, 11, 9, 7], P0-RI8
64. Hauer, Josef Matthias: Nomos, Op.19 (bb.255-257), [0, 7, 2, 6, 5, 10, 3, 4, 11, 8, 1, 9], P0-RI12
65. Hauer, Josef Matthias: Nomos, Op.19 (bb.301-305), [0, 10, 2, 9, 8, 1, 5, 6, 11, 3, 7, 4], P0-RI10
66. Hauer, Josef Matthias: Nomos, Op.19 (bb.337-338), [0, 1, 11, 5, 4, 3, 8, 9, 2, 10, 6, 7], P0-RI4
67. Hauer, Josef Matthias: Nomos, Op.19 (bb.348-353), [0, 11, 9, 5, 10, 4, 6, 8, 3, 2, 1, 7], P0-RI9
68. Hauer, Josef Matthias: Nomos, Op.19 (bb.395-402), [0, 2, 7, 10, 6, 5, 8, 9, 11, 3, 1, 4], P0-RI12
69. Hauer, Josef Matthias: Nomos, Op.19 (bb.411-414), [0, 2, 8, 3, 5, 6, 7, 4, 9, 10, 1, 11], P0-RI8
70. Hauer, Josef Matthias: Nomos, Op.19 (bb.467-471), [0, 5, 9, 1, 7, 2, 10, 4, 11, 8, 3, 6], P0-RI2
71. Hauer, Josef Matthias: Nomos, Op.19 (bb.471-472), [0, 3, 11, 1, 6, 9, 2, 8, 5, 7, 10, 4], P0-RI12
72. Hauer, Josef Matthias: Nomos, Op.19 (bb.473-474), [0, 6, 9, 1, 3, 11, 8, 4, 5, 7, 10, 2], P0-RI12
73. Hauer, Josef Matthias: Nomos, Op.19 (bb.490-494), [0, 5, 11, 6, 9, 2, 8, 7, 10, 4, 1, 3], P0-RI11
74. Hauer, Josef Matthias: Nomos, Op.19 (bb.496-498), [0, 10, 9, 4, 3, 7, 5, 8, 1, 2, 6, 11], P0-RI7
75. Hauer, Josef Matthias: Nomos, Op.19 (bb.498-501), [0, 3, 1, 10, 7, 6, 2, 11, 8, 5, 4, 9], P0-RI1
76. Hauer, Josef Matthias: Nomos, Op.19 (bb.525-527), [0, 10, 3, 9, 7, 1, 11, 2, 6, 4, 8, 5], P0-RI10
77. Hauer, Josef Matthias: Nomos, Op.19 (bb.64-67), [0, 6, 9, 11, 8, 5, 4, 3, 1, 2, 7, 10], P0-RI5
78. Hauer, Josef Matthias: Nomos, Op.19 (bb.82-83), [0, 2, 11, 8, 5, 10, 9, 1, 7, 3, 4, 6], P0-RI10
79. Hauer, Josef Matthias: Nomos, Op.19 (bb.87-90), [0, 1, 11, 9, 8, 7, 10, 6, 4, 3, 5, 2], P0-RI8
80. Hauer, Josef Matthias: Nomos, Op.19 (bb.91-92), [0, 4, 10, 1, 2, 7, 6, 8, 5, 9, 11, 3], P0-RI2
81. Hauer, Josef Matthias: Tanz [Zwölftonspiel] im langsamen 3/4 Takt für zwei Violinen, zwei Bratschen und Klavier zu zwei Händen, [0, 9, 3, 7, 4, 10, 2, 6, 1, 8, 11, 5], P0-RI7
82. Hauer, Josef Matthias: Tanz für Violine allein, [0, 7, 3, 4, 10, 9, 2, 8, 11, 1, 6, 5], P0-RI7
83. Hauer, Josef Matthias: Zwölftonmusik [Zwölftonspiel] für Klavier zu vier Händen. Februar 1959 (Fragment), [0, 9, 3, 7, 4, 10, 2, 6, 1, 8, 11, 5], P0-RI7
84. Hauer, Josef Matthias: Zwölftonmusik für Orchester, Op.86, [0, 2, 6, 3, 11, 8, 10, 9, 5, 7, 1, 4], P0-RI2
85. Hauer, Josef Matthias: Zwölftonspiel 15. Juni 1957; für Flöte, Oboe, Bassklarinette, Fagott, 2 Violinen, Viola, Violoncello & Klavier vierhändig, [0, 8, 11, 6, 9, 5, 7, 1, 3, 2, 4, 10], P0-RI5
86. Hauer, Josef Matthias: Zwölftonspiel 28. August 1948; für Violine und Klavier, [0, 9, 6, 2, 3, 10, 8, 5, 4, 7, 11, 1], P0-RI12
87. Hauer, Josef Matthias: Zwölftonspiel 31. August 1948; für Violine (Flöte) und Klavier, [0, 9, 6, 2, 3, 10, 8, 5, 4, 7, 11, 1], P0-RI12
88. Hauer, Josef Matthias: Zwölftonspiel 31. August 1948; für Violine und Klavier; 2. Fassung, [0, 9, 6, 2, 3, 10, 8, 5, 4, 7, 11, 1], P0-RI12
89. Hauer, Josef Matthias: Zwölftonspiel März 1958; für Kammerorchester, [0, 5, 10, 4, 1, 7, 2, 11, 8, 3, 6, 9], P0-RI5
90. Hauer, Josef Matthias: Zwölftonspiel November 1957; für zwei Violinen und Klavier, [0, 6, 3, 9, 1, 5, 11, 8, 10, 7, 2, 4], P0-RI6
91. Hauer, Josef Matthias: Zwölftonspiel für Klavier. September 1956, [0, 8, 11, 6, 3, 5, 1, 10, 7, 4, 2, 9], P0-RI11
92. Hauer, Josef Matthias: Zwölftonspiel für Klavier zu zwei Händen. Neujahr 1947 (mit einer Zwölftonreihe von Ernst Hartmann), [0, 10, 6, 3, 7, 4, 9, 2, 8, 11, 1, 5], P0-RI10
93. Hauer, Josef Matthias: Zwölftonspiel für Orchester (August 1957), [0, 9, 4, 6, 11, 3, 2, 8, 5, 1, 7, 10], P0-RI3
94. Hauer, Josef Matthias: Zwölftonspiel für Streichquartett, [0, 3, 7, 2, 9, 6, 4, 10, 1, 8, 11, 5], P0-RI9
95. Hauer, Josef Matthias: Zwölftonspiel für Violine und Cembalo [Klavier]. 27. August 1948, [0, 9, 6, 2, 3, 10, 8, 5, 4, 7, 11, 1], P0-RI12
96. Hauer, Josef Matthias: Zwölftonspiel für Violine und Klavier. 2. September 1956, [0, 6, 8, 1, 10, 5, 9, 3, 11, 4, 7, 2], P0-RI6
97. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche, Cello und Klavier, [0, 6, 9, 11, 4, 3, 7, 5, 2, 8, 10, 1], P0-RI3

98. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, Bratsche und Cello. Jänner 1948, [0, 1, 7, 2, 11, 3, 8, 5, 6, 4, 9, 10], P0-RI2
99. Hauer, Josef Matthias: [Zwölftonspiel] 'Johann Sebastian Bach hat das Wohltemperierte Klavier im Himmel vollendet …', [0, 10, 5, 4, 2, 9, 8, 1, 3, 11, 6, 7], P0-RI2
100. Hendler, Maximilian: Vier Miniaturen für Klarinette, Op.51, [0, 3, 5, 11, 8, 6, 10, 2, 4, 1, 9, 7], P0-RI11
101. Husa, Karel: Hudba pro Prahu 1968, [0, 8, 2, 1, 7, 9, 6, 10, 3, 11, 5, 4], P0-RI9
102. Husa, Karel: Mosaïques, [0, 6, 4, 3, 2, 9, 10, 5, 7, 8, 11, 1], P0-RI6
103. Ives, Charles: String Quartet, No.2, mvt 2, [0, 1, 2, 11, 3, 7, 10, 4, 6, 8, 9, 5], P0-RI2
104. Kokkonen, Joonas: Symphonic Sketches, mov. 3, row "III/A", [0, 2, 1, 3, 8, 7, 5, 6, 4, 11, 9, 10], P0-RI3
105. Kurtág, György: The Sayings of Péter Bornemisza, Op.7, [0, 11, 7, 8, 9, 1, 2, 10, 3, 4, 5, 6], P0-RI8
106. Lackner, Peter: 'Lied des Harfenmädchens' für Frauenstimme und Klavier, [0, 3, 5, 11, 7, 10, 1, 8, 4, 9, 6, 2], P0-RI10
107. Lackner, Peter: 'Lied des Harfenmädchens II' für Flöte, Klarinette, Posaune, Violine, Cello und Klavier, [0, 3, 5, 11, 7, 10, 1, 8, 4, 9, 6, 2], P0-RI10
108. Lackner, Peter: 'So lebe wohl' für Singstimme und Klavier, [0, 2, 3, 8, 10, 7, 6, 5, 1, 11, 9, 4], P0-RI10
109. Lackner, Peter: Kanon 'kgV(3,5,7)', [0, 3, 10, 9, 6, 5, 2, 11, 4, 8, 1, 7], P0-RI3
110. Lackner, Peter: Kanon für Bläsersextett. Mai 1995,1996, [0, 9, 7, 3, 10, 1, 6, 8, 2, 11, 5, 4], P0-RI10
111. Lackner, Peter: Kanon für Schrammel-Quartett. November 2002, [0, 4, 6, 3, 11, 9, 1, 5, 8, 2, 10, 7], P0-RI3
112. Lackner, Peter: Kanon für Streichquartett. 18. Mai 1993, [0, 11, 4, 7, 1, 10, 5, 6, 2, 3, 9, 8], P0-RI11
113. Lackner, Peter: Kanon für Violine, Violoncello und Akkordeon (Harmonium). 25. Oktober 1995, [0, 2, 1, 7, 6, 5, 3, 4, 10, 9, 11, 8], P0-RI7
114. Lang, Bernhard: 'Küstenlinien'; für zwei Klaviere und doppeltes Schlagwerk, [0, 9, 7, 4, 5, 11, 2, 1, 8, 10, 3, 6], P0-RI4
115. Lutyens, Elisabeth: O Saisons, O Châteaux!, [0, 11, 10, 4, 8, 9, 3, 7, 6, 5, 2, 1], P0-RI8
116. Lutyens, Elisabeth: The Valley of Hatsu'se, [0, 6, 11, 10, 8, 7, 9, 1, 3, 2, 4, 5], P0-RI6
117. Lutyens, Elisabeth: Three Improvisations for Piano Solo, [0, 6, 9, 7, 8, 3, 4, 1, 10, 5, 11, 2], P0-RI3
118. Maderna, Bruno: Quartetto, [0, 7, 2, 3, 6, 9, 10, 1, 4, 5, 8, 11], P0-RI9
119. Maderna, Bruno: Streichquartett (Basisreihe 1), [0, 7, 2, 3, 6, 9, 10, 1, 4, 5, 8, 11], P0-RI9
120. Maderna, Bruno: Streichquartett (Basisreihe 2), [0, 7, 10, 1, 6, 3, 11, 4, 9, 2, 5, 8], P0-RI1
121. Mamlok, Ursula: Five Intermezzi for guitar solo, [0, 3, 6, 11, 2, 5, 1, 10, 7, 4, 8, 9], P0-RI5
122. Mamlok, Ursula: Variations for Solo Flute, theme, [0, 2, 1, 11, 7, 3, 5, 6, 4, 10, 8, 9], P0-RI2
123. Martino, Donald: Notturno (Row A), [0, 11, 10, 2, 6, 1, 5, 9, 4, 8, 3, 7], P0-RI12
124. Messiaen, Olivier: Mode de valeurs et d'intensités, Series 3, [0, 11, 6, 4, 3, 9, 5, 2, 8, 1, 7, 10], P0-RI3
125. Morris, Robert: 14 Little Piano Pieces, [0, 5, 1, 9, 10, 11, 2, 7, 3, 4, 6, 8], P0-RI10
126. Morris, Robert: Arabesque, [0, 6, 7, 1, 3, 10, 8, 9, 4, 5, 11, 2], P0-RI1
127. Morris, Robert: Arc, [0, 1, 8, 2, 4, 3, 11, 10, 6, 7, 5, 9], P0-RI4
128. Morris, Robert: Broken Consort in Three Parts, Row 3, [0, 11, 3, 9, 7, 6, 10, 5, 1, 2, 4, 8], P0-RI6
129. Morris, Robert: Brush, [0, 11, 6, 10, 7, 8, 3, 2, 5, 4, 9, 1], P0-RI6
130. Morris, Robert: Concerto for Piano and Winds, [0, 1, 4, 7, 8, 10, 11, 2, 5, 6, 9, 3], P0-RI8
131. Morris, Robert: Four Fold Heart Sutra, [0, 6, 7, 2, 11, 1, 10, 4, 9, 5, 8, 3], P0-RI1
132. Morris, Robert: Four Play Nine, [0, 3, 2, 1, 8, 7, 10, 5, 4, 11, 6, 9], P0-RI3
133. Morris, Robert: Four or Five Mirrors, [0, 11, 2, 3, 7, 1, 6, 5, 9, 8, 10, 4], P0-RI2
134. Morris, Robert: In Variations, [0, 2, 9, 11, 5, 3, 4, 6, 10, 8, 7, 1], P0-RI2
135. Morris, Robert: Inter Alia, [0, 1, 11, 5, 3, 4, 9, 10, 8, 2, 7, 6], P0-RI4
136. Morris, Robert: MA, [0, 1, 5, 6, 4, 11, 8, 7, 9, 2, 10, 3], P0-RI5
137. Morris, Robert: On the Go, [0, 9, 2, 3, 5, 8, 10, 11, 1, 4, 7, 6], P0-RI5
138. Morris, Robert: Out and Out, [0, 11, 6, 3, 7, 9, 5, 8, 1, 2, 10, 4], P0-RI6
139. Morris, Robert: Sung Song, [0, 3, 7, 6, 9, 2, 10, 5, 1, 8, 4, 11], P0-RI9
140. Morris, Robert: Zoe, [0, 8, 6, 3, 1, 9, 7, 10, 4, 2, 5, 11], P0-RI9
141. Musgrave, Thea: Triptych, Song 1, [0, 11, 9, 6, 5, 2, 10, 1, 8, 7, 3, 4], P0-RI11
142. Nierhaus, Gerhard: 'Polg' – für Orchester, [0, 3, 1, 7, 11, 2, 10, 4, 8, 5, 9, 6], P0-RI2
143. Nono, Luigi: Intolleranza, Soprano 2, [0, 1, 2, 7, 6, 11, 10, 5, 4, 9, 8, 3], P0-RI1
144. Nono, Luigi: La terra e la compagna (sketch), Series 4, [0, 2, 9, 5, 6, 8, 3, 11, 1, 10, 4, 7], P0-RI2
145. Papageorgiou, Dimitri: 'Jarra Jarra' for six block flutes, [0, 5, 3, 2, 6, 8, 7, 11, 1, 10, 9, 4], P0-RI8

146. Papaioannou, Yannis: Pygmalion, [0, 2, 7, 5, 8, 11, 9, 6, 10, 3, 1, 4], P0-RI7
147. Papaioannou, Yannis: Songs of the Lake, No.3, [0, 11, 8, 1, 6, 7, 2, 10, 3, 4, 9, 5], P0-RI7
148. Papaioannou, Yannis: Suite, Basic row, [0, 1, 3, 10, 4, 6, 9, 5, 2, 8, 7, 11], P0-RI4
149. Payne, Antony: Miniature Variations on a Theme of E.L., [0, 6, 11, 10, 8, 7, 9, 1, 3, 2, 4, 5], P0-RI6
150. Preßl, Hermann Markus: 'Sonnenuntergänge nach meinem Tode'; Fünf Haikus nach Günther Klinge für Sprechgesang, Alt-Saxophon und Crotales, [0, 4, 7, 9, 8, 2, 6, 10, 5, 11, 1, 3], P0-RI4
151. Preßl, Hermann Markus: 6. Symphonie aus Es, [0, 6, 1, 7, 5, 8, 9, 11, 3, 2, 4, 10], P0-RI1
152. Preßl, Hermann Markus: Ithaka, [0, 9, 7, 10, 6, 4, 2, 5, 8, 3, 1, 11], P0-RI4
153. Ruggles, Carl: Evocations II (Series X), [0, 1, 7, 2, 8, 9, 11, 10, 5, 6, 4, 3], P0-RI9
154. Santoro, Claudio: A Menina Boba, "A Menina Exausta", [0, 5, 10, 7, 3, 11, 1, 8, 2, 9, 6, 4], P0-RI10
155. Schiske, Karl: Symphony, No.4, [0, 8, 11, 3, 2, 6, 1, 9, 4, 5, 7, 10], P0-RI2
156. Schmid, Erich: Bagatellen for Piano, Op.14, [0, 1, 5, 2, 6, 7, 4, 8, 10, 3, 9, 11], P0-RI7
157. Schmid, Erich: Notturno, Op.10, mvt 1, [0, 4, 6, 3, 9, 8, 5, 11, 1, 2, 10, 7], P0-RI12
158. Schnittke, Alfred: Concerto Grosso, No.3, monogram 5, [0, 1, 7, 10, 4, 11, 5, 6, 9, 8, 2, 3], P0-RI11
159. Schnittke, Alfred: Improvisation and Fugue for piano, [0, 8, 11, 3, 9, 2, 5, 7, 6, 10, 1, 4], P0-RI11
160. Schnittke, Alfred: Serenade, [0, 1, 7, 3, 10, 9, 8, 6, 5, 11, 4, 2], P0-RI10
161. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 3, [0, 4, 7, 11, 2, 6, 9, 10, 1, 5, 8, 3], P0-RI6
162. Schnittke, Alfred: Sonata, No.1 for Violin and Piano, mvt 4, [0, 4, 7, 3, 6, 10, 9, 5, 1, 2, 8, 11], P0-RI10
163. Schoenberg, Arnold: Die Jakobsleiter, [0, 1, 4, 3, 7, 6, 11, 2, 10, 9, 5, 8], P0-RI7
164. Schreiner, Thomas: Stück für drei Violinen, [0, 2, 1, 7, 4, 10, 9, 6, 8, 5, 3, 11], P0-RI2
165. Sengstschmid, Johann: Scherzo für Blockflötenquartett, Op.28, [0, 7, 9, 4, 6, 1, 8, 2, 11, 5, 3, 10], P0-RI1
166. Slonimsky, Nicholas: No. 1243a Crossing Sixths (Crossing Intervals), [0, 1, 9, 4, 6, 7, 3, 10, 11, 2, 8, 5], P0-RI1
167. Slonimsky, Nicholas: No. 1249a Crossing Thirds (Crossing Intervals), [0, 11, 3, 8, 6, 5, 9, 2, 1, 10, 4, 7], P0-RI11
168. Slonimsky, Nicholas: No. 1251a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 6, 9, 2, 5, 8, 11, 4], P0-RI1
169. Slonimsky, Nicholas: No. 1251b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 5, 3, 11, 6, 2, 10, 7, 4, 1, 9], P0-RI11
170. Slonimsky, Nicholas: No. 1253a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 5, 8, 11, 3, 6, 9, 2], P0-RI5
171. Slonimsky, Nicholas: No. 1253b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 1, 9, 6, 4, 11, 7, 5, 2, 10], P0-RI9
172. Slonimsky, Nicholas: No. 1261a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 2, 5, 9, 1, 6, 7, 10, 3], P0-RI4
173. Slonimsky, Nicholas: No. 1261b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 1, 10, 7, 5, 2, 9, 6, 3, 11], P0-RI8
174. Slonimsky, Nicholas: No. 1262a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 3, 6, 11, 2, 8, 9, 1, 5], P0-RI10
175. Slonimsky, Nicholas: No. 1262b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 5, 3, 11, 8, 4, 1, 7, 6, 2, 10], P0-RI8
176. Slonimsky, Nicholas: No. 1264a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 5, 8, 11, 4, 7, 10, 2], P0-RI6
177. Slonimsky, Nicholas: No. 1264b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 3, 2, 10, 6, 5, 1, 8, 7, 4, 11], P0-RI12
178. Slonimsky, Nicholas: No. 1268a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 5, 8, 11, 2, 6, 9, 3], P0-RI5
179. Slonimsky, Nicholas: No. 1268b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 3, 1, 9, 6, 4, 10, 7, 5, 2, 11], P0-RI9
180. Slonimsky, Nicholas: No. 1272a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 1, 6, 9, 5, 2, 11, 8, 4], P0-RI1
181. Slonimsky, Nicholas: No. 1272b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 6, 1, 2, 5, 9, 8, 4, 11], P0-RI1

182. Slonimsky, Nicholas: No. 1274a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 5, 9, 6, 2, 11, 8, 3], P0-RI5
183. Slonimsky, Nicholas: No. 1274b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 5, 1, 2, 6, 9, 8, 3, 11], P0-RI5
184. Slonimsky, Nicholas: No. 1282a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 2, 5, 9, 6, 1, 10, 7, 3], P0-RI4
185. Slonimsky, Nicholas: No. 1282b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 5, 2, 6, 9, 1, 10, 7, 3], P0-RI4
186. Slonimsky, Nicholas: No. 1283a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 3, 6, 8, 2, 11, 9, 5, 1], P0-RI10
187. Slonimsky, Nicholas: No. 1283b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 6, 3, 11, 2, 8, 5, 1, 9], P0-RI10
188. Slonimsky, Nicholas: No. 1285a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 1, 5, 8, 4, 11, 10, 7, 2], P0-RI6
189. Slonimsky, Nicholas: No. 1285b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 6, 9, 5, 1, 11, 4, 8, 7, 2, 10], P0-RI6
190. Slonimsky, Nicholas: No. 1289a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 1, 5, 8, 2, 11, 9, 6, 3], P0-RI5
191. Slonimsky, Nicholas: No. 1289b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 7, 10, 5, 1, 11, 2, 8, 9, 6, 3], P0-RI5
192. Slonimsky, Nicholas: No. 262 Infrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 11, 10, 5, 4, 3, 2, 9, 8, 7, 6, 1], P0-RI3
193. Slonimsky, Nicholas: No. 348 Infra-Inter-Ultrapolation (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 10, 1, 7, 4, 2, 5, 11, 8, 6, 9, 3], P0-RI2
194. Slonimsky, Nicholas: No. 647 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 2, 11, 5, 8, 10, 7, 1, 4, 6, 3, 9], P0-RI10
195. Slonimsky, Nicholas: No. 685 Interpolation of Three Notes (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 1, 3, 6, 8, 9, 11, 2, 4, 5, 7, 10], P0-RI9
196. Slonimsky, Nicholas: No. 735 Inter-Infra-Ultrapolation (Quadritone Progression; Equal Division of Two Octaves into Three Parts), [0, 6, 9, 11, 8, 2, 5, 7, 4, 10, 1, 3], P0-RI8
197. Smith, Hale: Evocation, [0, 1, 7, 2, 9, 5, 8, 3, 10, 11, 4, 6], P0-RI2
198. Spinner, Leopold: Die Nacht, Op.29, [0, 4, 1, 2, 5, 6, 7, 10, 8, 9, 11, 3], P0-RI6
199. Spinner, Leopold: Drei Lieder, Op.15, [0, 2, 3, 9, 6, 10, 8, 4, 7, 5, 1, 11], P0-RI12
200. Spinner, Leopold: Lieder for Voice, Clarinet, Violin, and Cello, [0, 7, 6, 3, 11, 9, 2, 1, 4, 8, 10, 5], P0-RI6
201. Spinner, Leopold: Suite for Clarinet and Piano, Op.10, [0, 4, 1, 6, 5, 2, 8, 10, 7, 9, 11, 3], P0-RI6
202. Stockhausen, Karlheinz: 'Mantra', [0, 2, 11, 7, 8, 5, 10, 6, 4, 3, 1, 9], P0-RI7
203. Stockhausen, Karlheinz: Klavierstück IV, row 1, [0, 11, 4, 10, 9, 5, 8, 6, 2, 1, 7, 3], P0-RI9
204. Stockhausen, Karlheinz: Tierkreis, Aquarius, [0, 3, 5, 4, 11, 10, 9, 8, 7, 6, 2, 1], P0-RI3
205. Stockhausen, Karlheinz: Tierkreis, Leo, [0, 5, 11, 6, 3, 2, 8, 7, 9, 10, 4, 1], P0-RI5
206. Stravinsky, Igor: The Owl and the Pussy Cat, [0, 2, 9, 11, 8, 6, 5, 7, 10, 1, 4, 3], P0-RI8
207. Talma, Louise: Seven Episodes for flute, viola and piano, [0, 9, 11, 4, 6, 3, 8, 1, 10, 2, 5, 7], P0-RI3
208. Talma, Louise: Six Etudes, Etude 2, [0, 3, 9, 5, 11, 2, 8, 4, 10, 6, 1, 7], P0-RI2
209. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 4, [0, 7, 6, 1, 3, 4, 2, 11, 9, 5, 10, 8], P0-RI7
210. Tranchell, Peter: Piano piece for Carl Dawson (unfinished), 6, [0, 8, 3, 6, 4, 9, 10, 5, 7, 1, 11, 2], P0-RI12
211. Volkonsky, Andrei: Musica Stricta, mvt 2, row C, [0, 10, 11, 9, 4, 5, 7, 2, 1, 3, 6, 8], P0-RI9
212. Volkonsky, Andrei: Musica Stricta, mvt 3, row F, [0, 1, 9, 3, 5, 6, 7, 11, 10, 8, 4, 2], P0-RI6
213. Walker, George: Spatials, [0, 3, 9, 11, 2, 8, 7, 5, 4, 1, 10, 6], P0-RI11
214. Weber, Ben: Five Bagatelles for Piano, Op.2, mvt v, [0, 9, 1, 8, 2, 7, 3, 5, 6, 4, 11, 10], P0-RI9
215. Webern, Anton: 3 Lieder, "Ave, Regina Coelorum", Op.18, No.3, [0, 11, 3, 2, 1, 7, 6, 10, 9, 8, 5, 4], P0-RI2
216. Webern, Anton: 3 Volkstexte, "Armer Sunder, Du", Op.17, No.1, [0, 11, 6, 7, 4, 5, 8, 9, 10, 1, 2, 3], P0-RI11
217. Yi, Chen: Near Distance, [0, 1, 10, 3, 4, 6, 8, 9, 11, 5, 7, 2], P0-RI4
218. Yi, Chen: Symphony, No.2, [0, 6, 2, 3, 7, 9, 10, 4, 5, 11, 8, 1], P0-RI9

219. Yi, Chen: Woodwind Quintet, [0, 11, 1, 7, 9, 8, 10, 4, 6, 5, 2, 3], P0-RI8
220. Zenk, Ludwig: Abend in Lans, Op.3, No.2, [0, 1, 6, 4, 5, 2, 7, 8, 3, 10, 11, 9], P0-RI6
221. Zenk, Ludwig: Adagio for Orchestra, [0, 3, 11, 8, 6, 2, 7, 5, 9, 4, 1, 10], P0-RI2
222. Zenk, Ludwig: Piano Sonata, No.2, Op.4, [0, 11, 6, 8, 7, 10, 5, 4, 9, 2, 1, 3], P0-RI6

All-Combinatorial

Finally, rows are all-combinatorial when the combinatorial property holds for all transformations in at least one transposition. Notice how the whole-tone hexachord [0,2,4,6,8,10] (in any ordering) stands out for its highly combinatorial properties.

1. Apostel, Hans Erich: Fischerhaus-Serenade, Op.45, [0, 4, 8, 3, 11, 7, 1, 9, 5, 2, 10, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
2. Babbitt, Milton: All Set, [0, 4, 5, 11, 6, 10, 7, 3, 1, 2, 9, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
3. Babbitt, Milton: Arie da Capo, [0, 7, 8, 6, 2, 1, 10, 5, 11, 9, 4, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
4. Babbitt, Milton: Composition for Four Instruments, [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
5. Babbitt, Milton: Composition for Four Instruments, row i, [0, 10, 9, 8, 7, 5, 11, 1, 2, 3, 4, 6], T6; I11; RI5, (0, 2, 3, 4, 5, 7)
6. Babbitt, Milton: Composition for Four Instruments, row ii, [0, 9, 11, 2, 4, 1, 7, 10, 8, 5, 3, 6], T6; I7; RI1, (0, 2, 3, 4, 5, 7)
7. Babbitt, Milton: Composition for Four Instruments, row iii, [0, 4, 3, 8, 7, 11, 5, 1, 2, 9, 10, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
8. Babbitt, Milton: Composition for Four Instruments, row iv, [0, 4, 1, 8, 5, 9, 3, 11, 2, 7, 10, 6], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
9. Babbitt, Milton: Composition for Synthesizer, [0, 9, 1, 8, 4, 5, 7, 2, 3, 6, 10, 11], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
10. Babbitt, Milton: Composition for Tenor and Six Instruments, [0, 11, 7, 5, 6, 1, 4, 3, 10, 8, 2, 9], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
11. Babbitt, Milton: Composition for Twelve Instruments, [0, 1, 4, 9, 5, 8, 3, 10, 2, 11, 6, 7], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
12. Babbitt, Milton: Composition for Viola and Piano, [0, 3, 4, 8, 11, 7, 9, 2, 1, 5, 10, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
13. Babbitt, Milton: Du, row i, [0, 9, 2, 10, 11, 1, 7, 5, 4, 8, 3, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
14. Babbitt, Milton: Du, row ii, [0, 5, 2, 10, 9, 7, 1, 3, 4, 8, 11, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
15. Babbitt, Milton: Groupwise, [0, 5, 4, 6, 10, 11, 2, 9, 3, 1, 8, 7], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
16. Babbitt, Milton: My Complements to Roger, [0, 3, 7, 8, 11, 4, 2, 6, 1, 9, 10, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
17. Babbitt, Milton: My Ends Are My Beginnings, [0, 11, 4, 8, 7, 3, 5, 6, 9, 2, 10, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
18. Babbitt, Milton: Paraphrases, [0, 11, 3, 10, 8, 1, 7, 5, 4, 6, 2, 9], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
19. Babbitt, Milton: Partitions, [0, 7, 9, 10, 2, 11, 5, 8, 4, 3, 1, 6], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
20. Babbitt, Milton: Relata I, [0, 1, 11, 2, 10, 3, 9, 8, 4, 6, 7, 5], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
21. Babbitt, Milton: Relata II, [0, 1, 11, 2, 10, 3, 9, 8, 4, 6, 7, 5], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
22. Babbitt, Milton: Semi-simple variations, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
23. Babbitt, Milton: String Quartet, No.2, [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
24. Babbitt, Milton: String Quartet, No.3, [0, 11, 6, 7, 5, 1, 10, 2, 9, 3, 4, 8], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
25. Babbitt, Milton: String Quartet, No.4, [0, 2, 9, 7, 11, 10, 1, 8, 4, 3, 5, 6], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
26. Babbitt, Milton: Tableaux, [0, 11, 4, 6, 10, 5, 2, 1, 7, 9, 8, 3], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
27. Babbitt, Milton: The Widow's Lament in Springtime, [0, 11, 9, 2, 10, 7, 1, 4, 8, 3, 5, 6], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
28. Babbitt, Milton: Three Compositions for Piano, No.1, [0, 5, 7, 4, 2, 3, 9, 1, 8, 11, 10, 6], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
29. Babbitt, Milton: Two Sonnets of Gerard Manley Hopkins, [0, 2, 3, 4, 7, 5, 11, 6, 10, 9, 8, 1], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
30. Babbitt, Milton: Vision and Prayer, [0, 11, 8, 3, 7, 4, 10, 9, 2, 6, 1, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
31. Babbitt, Milton: Woodwind Quartet, [0, 3, 1, 2, 11, 10, 8, 9, 5, 7, 6, 4], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
32. Baker, David: "Status Symbol" from "The Black Experience", [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
33. Barber, Samuel: Piano Sonata, Op.26, [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
34. Berg, Alban: Altenberg Lieder, [0, 1, 11, 10, 2, 9, 3, 8, 7, 6, 5, 4], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
35. Berg, Alban: Lulu, Primary / Main / Basic Row, [0, 4, 5, 2, 7, 9, 6, 8, 11, 10, 3, 1], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
36. Berg, Alban: Lulu, Schigolch, [0, 2, 3, 1, 4, 5, 6, 7, 8, 9, 11, 10], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
37. Berg, Alban: Lulu, whole-tone row, [0, 2, 4, 6, 10, 8, 11, 7, 9, 1, 3, 5], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
38. Berg, Alban: Lyric Suite, Primary Row / mvt I, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)

39. Berg, Alban: Lyric Suite, mvt I, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
40. Berg, Alban: Lyric Suite, mvt VI, [0, 2, 4, 7, 9, 11, 6, 8, 10, 1, 3, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
41. Berg, Alban: Schliesse mir die Augen Beide, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
42. Berio, Luciano: Cinque Variazioni, [0, 2, 4, 1, 3, 5, 8, 10, 6, 7, 9, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
43. Berio, Luciano: Sequenza I, [0, 11, 10, 9, 8, 7, 4, 6, 5, 3, 1, 2], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
44. Boulez, Pierre: Le Marteau sans Maître, cycle of Bourreaux de solitude, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
45. Boulez, Pierre: Notations, [0, 2, 7, 6, 1, 8, 4, 9, 5, 11, 10, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
46. Britten, Benjamin: The Turn of the Screw, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
47. Carter, Elliott: String Quartet, No.2 (sketch) 1, [0, 4, 8, 3, 7, 11, 6, 10, 2, 9, 1, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
48. Carter, Elliott: String Quartet, No.2 (sketch) 2, [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
49. Carter, Elliott: String Quartet, No.2 (sketch) 3, [0, 2, 4, 6, 8, 10, 1, 3, 5, 7, 9, 11], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
50. Denisov, Edison: Concerto for Guitar and Orchestra, Row 1, [0, 6, 10, 4, 8, 2, 3, 9, 1, 7, 11, 5], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
51. Denisov, Edison: Five Etudes for Solo Bassoon, row B, [0, 11, 6, 5, 4, 10, 9, 3, 2, 7, 1, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
52. Denisov, Edison: Five Etudes for Solo Bassoon, row C, [0, 6, 11, 5, 4, 10, 9, 3, 2, 7, 1, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
53. Denisov, Edison: Five Etudes for Solo Bassoon, row E, [0, 1, 7, 6, 5, 11, 10, 4, 3, 8, 2, 9], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
54. Denisov, Edison: Five Etudes for Solo Bassoon, row I, [0, 6, 1, 7, 2, 8, 3, 10, 5, 11, 9, 4], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
55. Denisov, Edison: Five Etudes for Solo Bassoon, row J, [0, 6, 5, 11, 4, 10, 9, 3, 2, 7, 1, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
56. Denisov, Edison: Octet for Winds, mvt 2, row A, [0, 1, 3, 2, 4, 5, 8, 7, 6, 11, 9, 10], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
57. Denisov, Edison: Octet for Winds, mvt 2, row B, [0, 6, 11, 5, 4, 10, 9, 3, 2, 8, 1, 7], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
58. Eisler, Hanns: Der Zweck der Musik, [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
59. Eisler, Hanns: Deutsche Symphonie, mvt 8, [0, 3, 1, 11, 2, 10, 8, 9, 6, 7, 5, 4], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
60. Eisler, Hanns: Five Pieces for Orchestra, mvt 3, [0, 3, 2, 1, 5, 4, 6, 9, 8, 11, 10, 7], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
61. Eisler, Hanns: Gegen den Krieg, Op.55, [0, 3, 2, 5, 4, 7, 6, 8, 9, 10, 1, 11], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
62. Eisler, Hanns: Man lebt von einem Tage zu dem andern (“Kantate im Exil”), [0, 10, 11, 3, 1, 8, 7, 4, 2, 6, 9, 5], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
63. Eisler, Hanns: Palmström, Op.5, No.5, [0, 10, 11, 9, 8, 1, 7, 6, 5, 3, 4, 2], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
64. Eisler, Hanns: Praeludium und Fuge über B-A-C-H for String Trio, Op.46, [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
65. Eisler, Hanns: Suite for Orchestra, No.1, mvt 4, [0, 4, 2, 3, 1, 11, 7, 10, 9, 8, 6, 5], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
66. Evans, Bill: Twelve Tone Tune, [0, 10, 2, 3, 1, 11, 4, 6, 9, 8, 5, 7], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
67. Fine, Vivian: Chaconne for piano, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
68. Finney, Ross Lee: Fantasy in Two Movements for solo violin, [0, 1, 3, 5, 4, 2, 11, 10, 8, 6, 7, 9], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
69. Finney, Ross Lee: Sonata Quasi una Fantasia, [0, 1, 3, 2, 4, 5, 6, 7, 9, 8, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
70. Gerhard, Roberto: Chaconne for Unaccompanied Violin, [0, 11, 4, 2, 1, 3, 9, 10, 8, 6, 5, 7], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
71. Gerhard, Roberto: Libra, [0, 6, 1, 7, 2, 8, 4, 9, 5, 10, 11, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
72. Gerhard, Roberto: The Plague, [0, 1, 9, 11, 8, 10, 4, 5, 6, 2, 3, 7], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
73. Gielen, Michael: Six Songs, for bass, violin, viola, clarinet, bass clarinet, and piano, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
74. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 1, [0, 1, 6, 7, 8, 2, 10, 11, 5, 4, 9, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
75. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 2, [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
76. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 5, [0, 1, 7, 6, 5, 11, 2, 8, 9, 10, 4, 3], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
77. Ginastera, Alberto: Don Rodrigo, Op.31, Row Class 7, [0, 1, 8, 2, 7, 6, 5, 11, 9, 10, 4, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
78. Ginastera, Alberto: Quintet, Op.29, Row Class V, [0, 5, 4, 7, 3, 2, 6, 9, 8, 1, 10, 11], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
79. Ginastera, Alberto: Quintet, Op.29, Row Class VII S, [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
80. Ginastera, Alberto: Sonata for Cello and Piano, Op.49, [0, 3, 2, 1, 10, 11, 8, 9, 5, 4, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
81. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class III, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
82. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 1, [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)

83. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 4, [0, 2, 1, 5, 3, 4, 7, 8, 6, 10, 9, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
84. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 6, [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
85. Ginastera, Alberto: Sonata for Guitar, Op.47, mvts II and III, Row Class II 7, [0, 9, 10, 11, 8, 7, 6, 3, 4, 5, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
86. Ginastera, Alberto: Turbae ad Passionem Gregorianam, Op.43, mvt II, [0, 5, 1, 7, 6, 11, 8, 2, 3, 4, 9, 10], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
87. Ginastera, Alberto: Violin Concerto, Op.30, [0, 11, 2, 3, 4, 1, 6, 5, 8, 9, 10, 7], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
88. Hartmann, Karl Amadeus: Symphony, No.4, [0, 1, 3, 2, 11, 4, 5, 10, 7, 6, 8, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
89. Hauer, Josef Matthias: Nomos, Op.19 (bb.139-141), [0, 2, 10, 1, 11, 9, 8, 5, 6, 4, 7, 3], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
90. Hauer, Josef Matthias: Nomos, Op.19 (bb.143-145), [0, 9, 10, 2, 1, 11, 4, 6, 7, 5, 8, 3], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
91. Hauer, Josef Matthias: Nomos, Op.19 (bb.331-334), [0, 4, 3, 2, 1, 11, 7, 10, 5, 6, 8, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
92. Hauer, Josef Matthias: Nomos, Op.19 (bb.362-365), [0, 7, 5, 3, 10, 8, 4, 2, 9, 6, 11, 1], T6; I9; RI3, (0, 2, 4, 5, 7, 9)
93. Hauer, Josef Matthias: Nomos, Op.19 (bb.503-507), [0, 10, 1, 2, 3, 5, 7, 11, 4, 8, 9, 6], T6; I9; RI3, (0, 2, 3, 4, 5, 7)
94. Hauer, Josef Matthias: XXIX. Zwölftonspiel für Cembalo; mit der Sokolowski-Reihe zu Bachs Geburtstag, [0, 11, 2, 1, 4, 3, 10, 5, 8, 9, 6, 7], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
95. Hauer, Josef Matthias: Zwölftonspiel für zwei Violinen, [0, 2, 3, 11, 1, 10, 8, 6, 4, 9, 7, 5], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
96. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.13, [0, 3, 5, 7, 8, 10, 9, 6, 4, 2, 1, 11], T6; I9; RI3, (0, 2, 4, 5, 7, 9)
97. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.19, [0, 1, 4, 5, 8, 9, 11, 10, 7, 6, 3, 2], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
98. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.28, [0, 5, 7, 8, 9, 10, 11, 6, 4, 3, 2, 1], T6; I11; RI5, (0, 2, 3, 4, 5, 7)
99. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.30, [0, 1, 2, 6, 7, 8, 11, 10, 9, 5, 4, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
100. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.6, [0, 2, 4, 6, 8, 10, 9, 7, 5, 3, 1, 11], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
101. Hendler, Maximilian: ‘Die vollständige Ordnung der symmetrischen zwölftönigen Modi’, No.1, [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
102. Hendler, Maximilian: aus den fünf Liedern nach Texten von Karl Hans Haysen für Singstimme und Klavier : ‘Erkenntnis’, Op.45-2, [0, 9, 2, 4, 7, 11, 8, 10, 5, 1, 6, 3], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
103. Huber, Klaus: Zwei Sätze, [0, 3, 1, 10, 11, 8, 6, 9, 7, 2, 4, 5], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
104. Ives, Charles: On the Antipodes, [0, 3, 11, 8, 4, 7, 10, 9, 6, 2, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
105. Ives, Charles: Tone Roads, No.3, [0, 11, 1, 3, 2, 10, 5, 8, 4, 7, 6, 9], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
106. Jung, Joachim: , [0, 11, 3, 10, 2, 1, 7, 8, 4, 9, 5, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
107. Klein, Fritz: Die Maschine: Eine extonale Selbstsatire, Op.1, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
108. Klein, Fritz Heinrich: Variationen, Op.14, [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
109. Kokkonen, Joonas: Cello Concerto, mov. 2, row “II/A”, [0, 2, 7, 4, 3, 5, 6, 1, 11, 8, 10, 9], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
110. Kokkonen, Joonas: Cello Concerto, mov. 2, row “II/B”, [0, 2, 3, 1, 4, 5, 7, 8, 6, 9, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
111. Kokkonen, Joonas: Cello Concerto, mov. 2, row “II/C”, [0, 9, 11, 10, 7, 2, 6, 3, 5, 4, 1, 8], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
112. Kokkonen, Joonas: Woodwind Quintet, mov. 1, rows “I/A” and “I/B”, [0, 2, 11, 9, 10, 1, 3, 6, 4, 5, 7, 8], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
113. Krenek, Ernst: Quaestio temporis, Op.170, [0, 3, 11, 4, 2, 1, 7, 8, 10, 5, 9, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
114. Krenek, Ernst: String Quartet, No.6, Op.78, [0, 10, 11, 8, 1, 9, 3, 7, 2, 4, 6, 5], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
115. Krenek, Ernst: Symphonic Elegy for String Orchestra, Op.105, [0, 1, 9, 11, 10, 2, 3, 7, 6, 8, 4, 5], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
116. Krenek, Ernst: Zwölf Variationen in Drei Satzen, [0, 1, 3, 10, 2, 5, 11, 7, 4, 9, 6, 8], T6; I9; RI3, (0, 2, 3, 4, 5, 7)
117. Krenek, Ernst: Zwölf Variationen in Drei Sätzen, Op.79, [0, 1, 3, 10, 2, 5, 11, 7, 4, 9, 8, 6], T6; I9; RI3, (0, 2, 3, 4, 5, 7)
118. Kukuck, Felicitas: ‘Der Gottesknecht’: 6. Kantate, [0, 11, 10, 1, 2, 3, 8, 9, 6, 5, 7, 4], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
119. Lackner, Peter: ‘An alle Außerirdischen’. Kanon für drei Singstimmen, Kontrabaß und Klavier, [0, 4, 9, 7, 11, 2, 5, 1, 8, 10, 6, 3], T6; I5; RI11, (0, 2, 4, 5, 7, 9)

120. Lackner, Peter: ‘Es fiel ein Reif in der Frühlingsnacht’ für Singstimme und ein Melodie-Instrument, [0, 9, 4, 7, 2, 5, 1, 8, 10, 11, 3, 6], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
121. Lackner, Peter: ‘Euphorbia obesa’. Kanon für Oboe, Englischhorn und Fagott., [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
122. Lackner, Peter: ‘Flügelaltar’ für Klavier, [0, 9, 11, 10, 2, 7, 1, 8, 4, 5, 3, 6], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
123. Lackner, Peter: ‘Venus-Quadrat’ für Violine und Klavier, [0, 7, 2, 5, 9, 10, 11, 6, 8, 4, 3, 1], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
124. Lackner, Peter: 2. Kanonzyklus, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
125. Lackner, Peter: Das Buch der Wandlungen I für Frauenstimmen und,oder Klavier, [0, 8, 3, 5, 1, 10, 7, 11, 4, 2, 6, 9], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
126. Lackner, Peter: INITIUM TRIPLEX. 28. Juni 2016; für drei Tasteninstrumente, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
127. Lackner, Peter: KANON für A, O & Gsellmanns Weltmaschine. 8. Oktober 1958,2008, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
128. Lackner, Peter: Kanon T2 à 6, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
129. Lackner, Peter: Kanon T3 à 4, [0, 2, 7, 3, 5, 10, 6, 8, 1, 9, 11, 4], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
130. Lackner, Peter: Kanon T4 á 3, [0, 5, 7, 2, 4, 9, 11, 6, 8, 1, 3, 10], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
131. Lackner, Peter: Kanon T6 á 2, [0, 10, 8, 3, 1, 5, 6, 4, 2, 9, 7, 11], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
132. Lackner, Peter: Kanon für Blockflötenquartett. April 2005, [0, 10, 11, 3, 1, 2, 8, 7, 9, 5, 4, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
133. Lackner, Peter: Kanon für Flöte solo und N. N., [0, 3, 7, 10, 2, 5, 11, 8, 4, 1, 9, 6], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
134. Lackner, Peter: Kanon für Flöte und Elektronik. Februar 1999, [0, 10, 2, 7, 9, 5, 11, 3, 1, 8, 4, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
135. Lackner, Peter: Kanon für Klavier zu vier Händen, [0, 10, 5, 3, 7, 8, 6, 4, 11, 9, 1, 2], T6; I9; RI3, (0, 2, 4, 5, 7, 9)
136. Lackner, Peter: Kanon für Klaviertrio, [0, 2, 4, 9, 5, 7, 3, 1, 11, 6, 10, 8], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
137. Lackner, Peter: Kanon für Orgel, zweimanualiges Cembalo oder Klavier, [0, 7, 2, 11, 4, 9, 6, 8, 1, 5, 3, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
138. Lackner, Peter: Kanon für Orgel. 21. November 1994, 4. Februar 1995, [0, 8, 5, 1, 4, 9, 2, 11, 7, 3, 10, 6], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
139. Lackner, Peter: Kanon für Schwegel, diatonisches Hackbrett und Violine, [0, 8, 4, 10, 6, 2, 5, 1, 9, 3, 11, 7], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
140. Lackner, Peter: Kanon für Schwegel und zwei Geigen, [0, 6, 4, 2, 10, 8, 9, 3, 5, 7, 11, 1], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
141. Lackner, Peter: Kanon für Streichquartett. 22.September 2003, [0, 8, 10, 4, 2, 6, 9, 1, 11, 5, 7, 3], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
142. Lackner, Peter: Kanon für Violine, Viola und Akkordeon. 11. Juni 2007, [0, 11, 1, 2, 3, 10, 4, 9, 8, 7, 5, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
143. Lackner, Peter: Kanon für Violine solo, [0, 11, 2, 7, 10, 9, 3, 4, 1, 8, 5, 6], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
144. Lackner, Peter: Kanon für drei Klaviere. 28. 6. 2016, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
145. Lackner, Peter: Kanon für drei Violinen I, II August 1998, [0, 2, 10, 4, 8, 6, 1, 9, 11, 5, 3, 7], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
146. Lackner, Peter: Kanon für zwei Singstimmen und Ensemble zur Skulpturengruppe LEM von Axel Kirchmayr und einem Text von Hannes Waltl. September 2004, [0, 2, 9, 10, 5, 7, 1, 11, 4, 3, 8, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
147. Lackner, Peter: Kanon für zwei Trompeten, Horn, Posaune und Tuba. 1. Mai 1993, [0, 1, 2, 10, 3, 5, 11, 9, 4, 8, 7, 6], T6; I9; RI3, (0, 2, 3, 4, 5, 7)
148. Lackner, Peter: Kanon für zwei Violinen, [0, 7, 4, 5, 9, 2, 3, 8, 11, 10, 6, 1], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
149. Lackner, Peter: Kanon für zwei Violinen. Frühjahr 1992, [0, 2, 4, 7, 9, 11, 5, 3, 1, 10, 8, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
150. Lackner, Peter: Kanon für zwei Violinen und Klavier. 1. Dezember 2004, [0, 10, 2, 6, 8, 4, 1, 9, 11, 3, 7, 5], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
151. Lackner, Peter: Moebiusband I für zwei Melodieinstrumente, [0, 6, 8, 2, 7, 1, 11, 5, 3, 9, 4, 10], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
152. Lackner, Peter: Trauermusik für Fagott, Kontrafagott und Pauke, [0, 6, 2, 8, 10, 4, 11, 5, 9, 3, 1, 7], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
153. Lackner, Peter: kgV (3,4) [zweistimmiger Kanon für Klavier], [0, 10, 2, 3, 5, 7, 1, 11, 9, 8, 4, 6], T6; I11; RI5, (0, 2, 4, 5, 7, 9)

154. Lang, Bernhard: ‘Der Golem’ nach Gustav Meyrinck, [0, 4, 7, 8, 11, 3, 5, 2, 9, 1, 10, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
155. Lang, Bernhard: Der Reigen, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
156. Lang, Bernhard: Hemma (Music Theatre Hemma Klagenfurt 2015), [0, 5, 10, 2, 3, 1, 7, 9, 8, 4, 11, 6], T6; I9; RI3, (0, 2, 3, 4, 5, 7)
157. Lang, Klaus: ‘Von der Ligurischen Küste zum Trasimenischen See’; Trauermusik für Violine und Klavier, [0, 5, 9, 8, 10, 7, 1, 4, 2, 3, 11, 6], T6; I11; RI5, (0, 2, 3, 4, 5, 7)
158. Leibowitz, René: Trois pièces pour piano, Op.19, [0, 4, 3, 1, 2, 5, 6, 9, 10, 8, 7, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
159. Ligeti, György: Le Grand Macabre, [0, 6, 5, 11, 10, 4, 9, 3, 2, 8, 7, 1], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
160. Liszt, Franz: Eine Faust Symphonie, [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
161. Luo, Zhong-Rong: Chang’e, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
162. Luo, Zhong-Rong: Dusk, row 2, [0, 3, 7, 5, 8, 10, 1, 11, 6, 2, 4, 9], T6; I9; RI3, (0, 2, 4, 5, 7, 9)
163. Luo, Zhong-Rong: Morning Glory, [0, 2, 5, 9, 7, 10, 3, 11, 1, 4, 6, 8], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
164. Luo, Zhong-Rong: Picking lotus flowers at the riverside, [0, 2, 5, 7, 10, 3, 1, 4, 6, 9, 11, 8], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
165. Luo, Zhong-Rong: Three Piano Pieces, “Arabeque”, row 2, [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
166. Lutosławski, Witold: Musique Funébre (Funeral Music), [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
167. Lutyens, Elisabeth: Essence Of Our Happinesses, Op.69, mvt II, Part I, [0, 11, 1, 10, 2, 3, 8, 9, 5, 6, 4, 7], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
168. Lutyens, Elisabeth: Motet (Excerota Tractati Logico-Philosophici), Op.27, [0, 11, 3, 7, 8, 4, 2, 6, 5, 1, 9, 10], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
169. Lutyens, Elisabeth: The Numbered, Altered Primary Row (swap pitches 2 and 3), [0, 11, 10, 1, 2, 9, 3, 4, 8, 5, 7, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
170. Lutyens, Elisabeth: The Numbered, Primary Row, [0, 10, 11, 1, 2, 9, 3, 4, 8, 5, 7, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
171. Mamlok, Ursula: Haiku Settings, No.5, [0, 11, 8, 7, 4, 3, 5, 6, 9, 10, 1, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
172. Mamlok, Ursula: Panta Rhei, [0, 7, 4, 11, 8, 3, 10, 9, 6, 2, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
173. Mamlok, Ursula: Panta Rhei, secondary row (mvt 4, Piano), [0, 11, 8, 3, 4, 7, 2, 1, 6, 9, 10, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
174. Martino, Donald: Notturno (Row B), [0, 7, 11, 10, 9, 8, 2, 1, 6, 3, 4, 5], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
175. Matthias, Hauer Josef: Zwölftonspiel für Holzbläser, Streicher und Klavier. April 1951, [0, 4, 9, 11, 7, 2, 3, 6, 8, 10, 5, 1], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
176. Messiaen, Olivier: Livre d’orgue, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
177. Mittendorfer, Josef: aleatoric row, [0, 2, 7, 1, 8, 6, 10, 5, 4, 11, 3, 9], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
178. Moevs, Robert: Musica da Camera, [0, 1, 11, 3, 4, 2, 9, 10, 8, 7, 5, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
179. Morris, Robert: By Far, [0, 1, 4, 11, 3, 2, 6, 7, 5, 10, 8, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
180. Morris, Robert: Clash, [0, 3, 11, 10, 8, 1, 7, 9, 2, 6, 4, 5], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
181. Morris, Robert: Concerto for Piano and Strings, [0, 1, 6, 11, 7, 5, 10, 8, 4, 3, 2, 9], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
182. Morris, Robert: Roundelay, row 1, [0, 7, 4, 11, 9, 2, 6, 3, 10, 5, 8, 1], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
183. Morris, Robert: Roundelay, row 2, [0, 5, 9, 7, 8, 10, 4, 11, 1, 6, 2, 3], T6; I11; RI5, (0, 2, 3, 4, 5, 7)
184. Morris, Robert: Roundelay, row 5, [0, 3, 11, 4, 1, 2, 8, 10, 5, 9, 7, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
185. Morris, Robert: Roundelay, row 6, [0, 10, 5, 11, 4, 6, 8, 7, 2, 3, 9, 1], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
186. Morris, Robert: Tête-à-Tête, [0, 3, 11, 10, 1, 8, 2, 6, 9, 5, 4, 7], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
187. Nono, Luigi: Canti per tredeci, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
188. Nono, Luigi: Composizione per orchestra, No.1, [0, 1, 7, 6, 2, 8, 4, 3, 5, 10, 11, 9], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
189. Nono, Luigi: Cori di Didone, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
190. Nono, Luigi: Ha venido, [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
191. Nono, Luigi: Il canto sospeso, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
192. Nono, Luigi: Intolleranza, Alto, [0, 6, 7, 1, 2, 8, 9, 3, 4, 10, 11, 5], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
193. Nono, Luigi: Intolleranza, Tenor 1, [0, 6, 11, 5, 10, 4, 9, 3, 8, 2, 7, 1], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
194. Nono, Luigi: Intolleranza, Tenor 2, [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
195. Nono, Luigi: La terra e la compagna (sketch), Series 1, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
196. Nono, Luigi: La terra e la compagna (sketch), Series 2, [0, 6, 1, 7, 11, 5, 2, 8, 10, 4, 3, 9], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)

197. Nono, Luigi: Variazioni canoniche sulla serie dell'Op.41 di Arnold Schönberg, [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
198. Panufnik, Andrzej: Sinfonia di Sfere (Symphony, No.5), Chord 1, [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
199. Preßl, Hermann Markus: N. N. 50; 'Die Zeremonie des Abschieds', [0, 9, 4, 2, 7, 5, 8, 1, 6, 3, 11, 10], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
200. Pärt, Arvo: Diagrams, [0, 11, 2, 1, 3, 4, 9, 10, 7, 8, 6, 5], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
201. Riegebauer, Sigrid: Toccata, [0, 3, 1, 2, 11, 10, 4, 5, 8, 7, 9, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
202. Rochberg, George: Sonata-Fantasia, [0, 11, 10, 4, 5, 6, 9, 8, 7, 1, 2, 3], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
203. Rochberg, George: Symphony, No.2, [0, 8, 1, 4, 9, 5, 6, 2, 3, 10, 11, 7], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
204. Sande, Henrik: 'Volkslied' für zwei Singstimmen und Klavier. 24. 12. 2015, [0, 2, 4, 5, 7, 9, 10, 8, 6, 3, 1, 11], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
205. Sande, Henrik: 4032 Töne für Klavier sechshändig, [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
206. Santoro, Claudio: Sonata, No.1, [0, 10, 3, 8, 11, 1, 2, 9, 7, 4, 5, 6], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
207. Schnittke, Alfred: Concerto, No.2 for Violin and Chamber Orchestra, [0, 11, 1, 2, 10, 3, 4, 9, 5, 6, 8, 7], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
208. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 6, [0, 11, 2, 1, 9, 10, 7, 8, 4, 3, 6, 5], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
209. Schnittke, Alfred: Concerto Grosso, No.3, (mvt 3, 4), row 8, [0, 11, 7, 9, 10, 8, 6, 5, 3, 4, 1, 2], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
210. Schnittke, Alfred: Concerto Grosso, No.3, monogram 3, [0, 11, 2, 1, 3, 4, 10, 9, 7, 8, 5, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
211. Schnittke, Alfred: Piano Sonata, No.1, mvt 2, mm. 72-76, [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
212. Schnittke, Alfred: Sonata, No.2 for Cello and Piano, mvt 2, [0, 2, 3, 1, 4, 5, 11, 10, 7, 9, 8, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
213. Schnittke, Alfred: String Quartet, No.1, [0, 2, 1, 10, 3, 11, 5, 9, 4, 7, 8, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
214. Schnittke, Alfred: String Quartet, No.4, [0, 11, 10, 1, 3, 2, 4, 9, 8, 6, 5, 7], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
215. Schnittke, Alfred: String Quartet, No.4, mvt 2, m.40, [0, 5, 10, 3, 2, 7, 8, 1, 6, 11, 4, 9], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
216. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.122, [0, 1, 11, 2, 10, 3, 4, 9, 8, 7, 6, 5], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
217. Schnittke, Alfred: String Quartet, No.4, mvt 4, m.31, [0, 11, 9, 10, 8, 7, 6, 5, 3, 4, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
218. Schnittke, Alfred: Symphony, No.7, mvt 3, row X, [0, 1, 10, 11, 2, 3, 9, 4, 5, 8, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
219. Schnittke, Alfred: Symphony, No.7, mvt 3, row y, [0, 1, 11, 10, 8, 9, 7, 6, 5, 4, 3, 2], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
220. Schoenberg, Arnold: Fantasy for Piano Four Hands, I, [0, 4, 2, 5, 3, 7, 11, 10, 1, 8, 9, 6], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
221. Schoenberg, Arnold: Four Pieces for Mixed Chorus, No.3, Op.27, No.3, [0, 11, 7, 9, 10, 8, 4, 5, 1, 3, 2, 6], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
222. Schoenberg, Arnold: Modern Psalms, The First Psalm, Op.50c, [0, 11, 8, 4, 7, 3, 1, 5, 2, 6, 9, 10], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
223. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 1), [0, 11, 3, 4, 8, 7, 2, 1, 5, 6, 10, 9], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
224. Schoenberg, Arnold: Ode To Napoleon Buonaparte, Op.41 (view 2), [0, 1, 9, 8, 4, 5, 7, 6, 10, 11, 3, 2], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
225. Schoenberg, Arnold: Psalm 130, De Profundis (unfinished), Op.50B, [0, 6, 5, 1, 11, 7, 4, 8, 9, 3, 2, 10], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
226. Schoenberg, Arnold: Serenade, mvt 4, "Sonett", Op.24, [0, 10, 11, 7, 8, 9, 4, 2, 5, 1, 3, 6], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
227. Schoenberg, Arnold: Suite, Op.29, [0, 4, 3, 7, 11, 8, 9, 6, 5, 1, 2, 10], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
228. Schoenberg, Arnold: Three Songs, No.3, "Madchenlied", Op.48, [0, 6, 8, 10, 2, 4, 9, 5, 3, 11, 7, 1], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
229. Schwantner, Joseph: …and the mountains rising nowhere, [0, 11, 8, 7, 4, 3, 2, 1, 10, 9, 6, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
230. Schwantner, Joseph: Elixir (Consortium VIII), [0, 8, 4, 3, 7, 11, 10, 6, 9, 5, 1, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
231. Schwantner, Joseph: Elixir (Consortium VIII), m.22, [0, 1, 4, 5, 8, 9, 6, 7, 10, 11, 2, 3], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
232. Schwantner, Joseph: In Aeternum (Derived Row), [0, 3, 11, 2, 10, 1, 7, 4, 8, 5, 9, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
233. Schwantner, Joseph: In Aeternum (Principal Row), [0, 4, 11, 6, 10, 5, 1, 9, 2, 7, 3, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
234. Schwantner, Joseph: Modus Caelestis (A), [0, 6, 7, 1, 11, 5, 4, 10, 8, 2, 3, 9], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
235. Seiber, Mátyás: String Quartet, No.2, [0, 2, 3, 1, 4, 11, 5, 10, 7, 9, 8, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)

236. Seiber, Mátyás: Ulysses, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
237. Slonimsky, Nicholas: No. 1214a Thirds (Twelve-Tone Patterns), [0, 4, 8, 11, 3, 7, 6, 10, 2, 5, 9, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
238. Slonimsky, Nicholas: No. 1215a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 7, 2, 9, 4, 11, 6], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
239. Slonimsky, Nicholas: No. 1216a Foutths (Twelve-Tone Patterns), [0, 5, 10, 3, 7, 2, 9, 4, 8, 1, 6, 11], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
240. Slonimsky, Nicholas: No. 1218a Fourths (Twelve-Tone Patterns), [0, 5, 10, 3, 8, 1, 6, 11, 4, 9, 2, 7], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
241. Slonimsky, Nicholas: No. 1219a Fourths (Twelve-Tone Patterns), [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
242. Slonimsky, Nicholas: No. 1220a Fifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
243. Slonimsky, Nicholas: No. 1221a Fifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
244. Slonimsky, Nicholas: No. 1222aFifths (Twelve-Tone Patterns), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
245. Slonimsky, Nicholas: No. 1223a Sixths (Twelve-Tone Patterns), [0, 8, 4, 1, 5, 9, 6, 2, 10, 7, 11, 3], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
246. Slonimsky, Nicholas: No. 1225a Sixths (Twelve-Tone Patterns), [0, 8, 4, 7, 11, 3, 6, 2, 10, 1, 5, 9], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
247. Slonimsky, Nicholas: No. 1226a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 8, 2, 4, 6, 1, 11, 9, 3, 5, 7], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
248. Slonimsky, Nicholas: No. 1227a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 4, 2, 8, 6, 1, 11, 9, 7, 5, 3], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
249. Slonimsky, Nicholas: No. 1228a Minor Sevenths (Twelve-Tone Patterns), [0, 10, 2, 4, 8, 6, 11, 1, 5, 3, 7, 9], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
250. Slonimsky, Nicholas: No. 1229a Major Sevenths (Twelve-Tone Patterns), [0, 11, 10, 9, 8, 7, 1, 2, 3, 4, 5, 6], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
251. Slonimsky, Nicholas: No. 1230a Major Sevenths (Twelve-Tone Patterns), [0, 11, 3, 4, 8, 7, 1, 2, 6, 5, 9, 10], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
252. Slonimsky, Nicholas: No. 1231a Major Sevenths (Twelve-Tone Patterns), [0, 11, 4, 3, 8, 7, 1, 2, 9, 10, 5, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
253. Slonimsky, Nicholas: No. 1232a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
254. Slonimsky, Nicholas: No. 1233a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
255. Slonimsky, Nicholas: No. 1234a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
256. Slonimsky, Nicholas: No. 1235a (Twelve-Tone Spirals), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
257. Slonimsky, Nicholas: No. 1236a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 9, 2, 4, 7, 5, 6, 8, 3, 1, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
258. Slonimsky, Nicholas: No. 1237a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 9, 7, 2, 4, 6, 5, 3, 1, 8, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
259. Slonimsky, Nicholas: No. 1239a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 2, 9, 4, 7, 6, 5, 8, 3, 10, 1], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
260. Slonimsky, Nicholas: No. 1240a Converging and Diverging Whole-Tone Scales (Twelve-Tone Spirals), [0, 11, 9, 2, 4, 7, 5, 3, 6, 8, 1, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
261. Slonimsky, Nicholas: No. 1242a Mutually Exclusive Diminished-Seventh Chords (Twelve-Tone Spirals), [0, 8, 4, 11, 3, 7, 1, 9, 5, 10, 2, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
262. Slonimsky, Nicholas: No. 1244a Crossing Sixths (Crossing Intervals), [0, 3, 8, 7, 4, 11, 1, 2, 10, 5, 6, 9], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
263. Slonimsky, Nicholas: No. 1245a Crossing Fifths (Crossing Intervals), [0, 5, 7, 10, 2, 3, 9, 8, 4, 1, 11, 6], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
264. Slonimsky, Nicholas: No. 1246a Crossing Fourths (Crossing Intervals), [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
265. Slonimsky, Nicholas: No. 1247a Crossing Thirds (Crossing Intervals), [0, 3, 4, 11, 7, 8, 10, 5, 2, 1, 6, 9], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
266. Slonimsky, Nicholas: No. 1248a Crossing Thirds (Crossing Intervals), [0, 5, 4, 1, 8, 9, 11, 6, 3, 2, 7, 10], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)

267. Slonimsky, Nicholas: No. 1250a Crossing Seconds (Crossing Intervals), [0, 11, 2, 9, 4, 7, 6, 5, 8, 3, 10, 1], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
268. Slonimsky, Nicholas: No. 1256a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 5, 8, 11, 4, 6, 9, 1], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
269. Slonimsky, Nicholas: No. 1256b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 9, 4, 2, 11, 7, 5, 1, 8, 6, 3, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
270. Slonimsky, Nicholas: No. 1257a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 1, 6, 9, 2, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
271. Slonimsky, Nicholas: No. 1257b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 3, 11, 7, 5, 2, 10, 6, 1, 9], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
272. Slonimsky, Nicholas: No. 1269a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
273. Slonimsky, Nicholas: No. 1269b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
274. Slonimsky, Nicholas: No. 1270a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 11, 3, 5, 9, 1], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
275. Slonimsky, Nicholas: No. 1270b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 2, 10, 6, 3, 11, 7, 5, 1, 9], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
276. Slonimsky, Nicholas: No. 1271a Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 2, 6, 9, 1, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
277. Slonimsky, Nicholas: No. 1271b Quadritonal Arpeggios (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
278. Slonimsky, Nicholas: No. 1277a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 2, 5, 8, 4, 11, 9, 6, 1], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
279. Slonimsky, Nicholas: No. 1277b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 3, 7, 10, 5, 2, 4, 8, 11, 9, 6, 1], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
280. Slonimsky, Nicholas: No. 1278a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 6, 1, 9, 5, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
281. Slonimsky, Nicholas: No. 1278b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 7, 3, 6, 10, 1, 9, 5, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
282. Slonimsky, Nicholas: No. 1290a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 1, 5, 6, 2, 10, 7, 3, 11], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
283. Slonimsky, Nicholas: No. 1290b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 9, 5, 1, 10, 2, 6, 7, 3, 11], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
284. Slonimsky, Nicholas: No. 1291a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 2, 6, 7, 3, 11, 9, 5, 1], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
285. Slonimsky, Nicholas: No. 1291b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 10, 6, 2, 11, 3, 7, 9, 5, 1], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
286. Slonimsky, Nicholas: No. 1292a Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 3, 7, 10, 6, 2, 1, 9, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
287. Slonimsky, Nicholas: No. 1292b Quadritonal Arpeggios; Inversions (Division of Twelve Tones into Four Mutually Exclusive Triads), [0, 4, 8, 11, 7, 3, 2, 6, 10, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
288. Slonimsky, Nicholas: No. 1293a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 2, 4, 5, 7, 9, 6, 8, 10, 11, 1, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
289. Slonimsky, Nicholas: No. 1293b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 3, 1, 11, 10, 8, 6, 9, 7, 5, 4, 2], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
290. Slonimsky, Nicholas: No. 1294a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 9, 4, 7, 5, 2, 6, 3, 10, 1, 11, 8], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
291. Slonimsky, Nicholas: No. 1294b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 8, 11, 1, 10, 3, 6, 2, 5, 7, 4, 9], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
292. Slonimsky, Nicholas: No. 1295a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 2, 5, 4, 3, 1, 6, 8, 11, 10, 9, 7], T6; I11; RI5, (0, 1, 2, 3, 4, 5)

293. Slonimsky, Nicholas: No. 1295b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 9, 10, 11, 8, 6, 1, 3, 4, 5, 2], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
294. Slonimsky, Nicholas: No. 1296a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 7, 8, 3, 4, 11, 6, 1, 2, 9, 10, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
295. Slonimsky, Nicholas: No. 1297a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 9, 7, 2, 4, 6, 5, 3, 1, 8, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
296. Slonimsky, Nicholas: No. 1297b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 10, 8, 1, 3, 5, 6, 4, 2, 7, 9, 11], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
297. Slonimsky, Nicholas: No. 1298a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 1, 10, 2, 9, 6, 5, 7, 4, 8, 3], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
298. Slonimsky, Nicholas: No. 1299a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 9, 2, 7, 4, 5, 6, 3, 8, 1, 10, 11], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
299. Slonimsky, Nicholas: No. 1299b Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 10, 1, 8, 3, 6, 5, 4, 7, 2, 9], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
300. Slonimsky, Nicholas: No. 1300a Two Major Hexachords (Miscellaneous Dodecaphonic Patterns), [0, 11, 1, 10, 2, 9, 6, 5, 7, 4, 8, 3], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
301. Slonimsky, Nicholas: No. 1303 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 2, 3, 7, 10, 5, 11, 4, 1, 9, 8, 6], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
302. Slonimsky, Nicholas: No. 1304 Invertible Dodecaphonic Progressions – With all Different Intervals. (On a Minor Triad), [0, 3, 7, 8, 10, 5, 11, 4, 2, 1, 9, 6], T6; I9; RI3, (0, 2, 4, 5, 7, 9)
303. Slonimsky, Nicholas: No. 1310 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 5, 1, 4, 2, 3, 9, 8, 10, 7, 11, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
304. Slonimsky, Nicholas: No. 1311 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 9, 10, 2, 5, 11, 8, 4, 3, 1, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
305. Slonimsky, Nicholas: No. 1312 Invertible Dodecaphonic Progressions – With all Different Intervals, [0, 7, 10, 2, 3, 5, 11, 9, 8, 4, 1, 6], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
306. Slonimsky, Nicholas: No. 1314 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 2, 7, 4, 5, 9, 3, 11, 10, 1, 8, 6], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
307. Slonimsky, Nicholas: No. 1315 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 4, 5, 2, 7, 9, 3, 1, 8, 11, 10, 6], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
308. Slonimsky, Nicholas: No. 1316 Invertible Dodecaphonic Progressions – With all Different Intervals. (White-Key Row of Six Notes), [0, 7, 4, 5, 9, 2, 8, 3, 11, 10, 1, 6], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
309. Slonimsky, Nicholas: No. 1317 Invertible Dodecaphonic Progressions – With all Different Intervals. (Mother Chord), [0, 11, 7, 4, 2, 9, 3, 8, 10, 1, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
310. Slonimsky, Nicholas: No. 1318 Invertible Dodecaphonic Progressions – With all Different Intervals. (Grandmother Chord), [0, 11, 1, 10, 2, 9, 3, 8, 4, 7, 5, 6], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
311. Slonimsky, Nicholas: No. 230 Ultrapolation of Three Notes (Ditone Progression; Equal Division of One Octave into Three Parts), [0, 6, 5, 11, 4, 10, 9, 3, 8, 2, 1, 7], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
312. Slonimsky, Nicholas: No. 405 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 7, 5, 3, 10, 8, 6, 1, 11, 9, 4, 2], T6; I9; RI3, (0, 2, 4, 5, 7, 9)
313. Slonimsky, Nicholas: No. 407 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
314. Slonimsky, Nicholas: No. 415 Ultrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 5, 3, 1, 8, 6, 4, 11, 9, 7, 2], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
315. Slonimsky, Nicholas: No. 453 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 10, 3, 2, 1, 6, 5, 4, 9, 8, 7], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
316. Slonimsky, Nicholas: No. 459 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
317. Slonimsky, Nicholas: No. 469 Infrapolation of Two Notes (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
318. Slonimsky, Nicholas: No. 482 Infra-Interpolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 11, 1, 3, 2, 4, 6, 5, 7, 9, 8, 10], T6; I9; RI3, (0, 1, 2, 3, 4, 5)

319. Slonimsky, Nicholas: No. 485 Infra-Interpolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 2, 3, 1, 5, 6, 4, 8, 9, 7, 11], T6; I9; RI3, (0, 2, 3, 4, 5, 7)
320. Slonimsky, Nicholas: No. 496 [Shostakovitch: Prelude No, 2] Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 2, 4, 3, 5, 7, 6, 8, 10, 9, 11, 1], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
321. Slonimsky, Nicholas: No. 499 Inter-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 2, 7, 3, 5, 10, 6, 8, 1, 9, 11, 4], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
322. Slonimsky, Nicholas: No. 505 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 5, 3, 1, 8, 6, 4, 11, 9, 7, 2], T6; I7; RI1, (0, 2, 4, 5, 7, 9)
323. Slonimsky, Nicholas: No. 508 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 10, 8, 3, 1, 11, 6, 4, 2, 9, 7, 5], T6; I5; RI11, (0, 2, 3, 4, 5, 7)
324. Slonimsky, Nicholas: No. 512 Infra-Ultrapolation (Sesquitone Progression; Equal Division of One Octave into Four Parts), [0, 8, 4, 3, 11, 7, 6, 2, 10, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
325. Slonimsky, Nicholas: No. 570 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 3, 2, 5, 4, 7, 6, 9, 8, 11, 10, 1], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
326. Slonimsky, Nicholas: No. 572 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
327. Slonimsky, Nicholas: No. 574 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
328. Slonimsky, Nicholas: No. 576 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 9, 2, 11, 4, 1, 6, 3, 8, 5, 10, 7], T6; I7; RI1, (0, 2, 3, 4, 5, 7)
329. Slonimsky, Nicholas: No. 578 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
330. Slonimsky, Nicholas: No. 579 Ultrapolation of One Note (Whole-Tone Progression; Equal Division of One Octave into Six Parts), [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
331. Slonimsky, Nicholas: No. 637 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 3, 2, 4, 5, 7, 6, 8, 9, 11, 10], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
332. Slonimsky, Nicholas: No. 639 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 5, 4, 3, 6, 7, 8, 11, 10, 9], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
333. Slonimsky, Nicholas: No. 640 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 10, 7, 8, 9, 6, 5, 4, 1, 2, 3], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
334. Slonimsky, Nicholas: No. 642 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 11, 10, 9, 8, 7, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
335. Slonimsky, Nicholas: No. 645 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 11, 10, 8, 9, 7, 6, 4, 5, 3, 2], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
336. Slonimsky, Nicholas: No. 648-654 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
337. Slonimsky, Nicholas: No. 655-657 Permutations (Semitone Progression; Equal Division of One Octave into Twelve Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
338. Slonimsky, Nicholas: No. 749 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 5, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
339. Slonimsky, Nicholas: No. 753 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 4, 8, 9, 1, 5, 6, 10, 2, 3, 7, 11], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
340. Slonimsky, Nicholas: No. 754 Interpolation of Two Notes (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 5, 7, 9, 2, 4, 6, 11, 1, 3, 8, 10], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
341. Slonimsky, Nicholas: No. 793 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
342. Slonimsky, Nicholas: No. 794 Infra-Ultrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 10, 11, 9, 7, 8, 6, 4, 5, 3, 1, 2], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
343. Slonimsky, Nicholas: No. 799 Infra-Infrapolation (Sesquiquadritone Progression; Equal Division of Three Octaves into Four Parts), [0, 2, 7, 9, 11, 4, 6, 8, 1, 3, 5, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
344. Slonimsky, Nicholas: No. 822 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)

345. Slonimsky, Nicholas: No. 823 Ultrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 1, 10, 11, 8, 9, 6, 7, 4, 5, 2, 3], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
346. Slonimsky, Nicholas: No. 824 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
347. Slonimsky, Nicholas: No. 875 Infrapolation of One Note (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 6, 5, 11, 10, 4, 3, 9, 8, 2, 1, 7], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
348. Slonimsky, Nicholas: No. 903 Inter-Ultrapolation (Quinquetone Progression; Equal Division of Five Octaves into Six Parts), [0, 4, 8, 5, 9, 1, 10, 2, 6, 3, 7, 11], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
349. Slonimsky, Nicholas: No. 915 Miscellaneous Patterns (Diatessaron Progression; Equal Division of Five Octaves into Twelve Parts), [0, 10, 2, 8, 4, 6, 5, 3, 7, 1, 9, 11], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
350. Slonimsky, Nicholas: No. 997 Infra-Interpolation (Diapente Progression; Equal Division of Seven Octaves into Twelve Parts), [0, 8, 4, 7, 3, 11, 2, 10, 6, 9, 5, 1], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
351. Smith, Hale: Contours for Orchestra, [0, 5, 6, 4, 10, 11, 7, 2, 1, 3, 9, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
352. Spinner, Leopold: Chamber Symphony, Op.28, [0, 11, 10, 6, 4, 5, 2, 1, 3, 7, 8, 9], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
353. Spinner, Leopold: Fantasy for Piano, Op.9 , [0, 1, 4, 5, 2, 3, 8, 9, 6, 7, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
354. Spinner, Leopold: Ich lieb' eine Blume for Four-part mixed Choir, [0, 11, 2, 4, 9, 7, 1, 3, 10, 8, 5, 6], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
355. Spinner, Leopold: Sonata for Clarinet and Piano, Op.17, [0, 3, 4, 1, 2, 5, 11, 8, 7, 10, 9, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
356. Spinner, Leopold: Sonatina for Cello and Piano, Op.26, [0, 1, 11, 2, 4, 3, 9, 10, 8, 5, 7, 6], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
357. Spinner, Leopold: String Quartet, No.2, Op.7, [0, 3, 4, 7, 8, 11, 1, 10, 9, 6, 5, 2], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
358. Spinner, Leopold: Trio for Clarinet, Cello and Piano, [0, 1, 7, 6, 5, 11, 10, 3, 4, 2, 9, 8], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
359. Steinbauer, Othmar: Violinsonate, No.1, Op.15, [0, 5, 2, 10, 7, 3, 11, 8, 4, 1, 6, 9], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
360. Stockhausen, Karlheinz: Gruppen, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
361. Stockhausen, Karlheinz: Klavierstück IX, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
362. Stockhausen, Karlheinz: Klavierstück VII, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
363. Stockhausen, Karlheinz: Klavierstück X, [0, 8, 1, 10, 9, 11, 5, 3, 4, 7, 2, 6], T6; I3; RI9, (0, 1, 2, 3, 4, 5)
364. Stockhausen, Karlheinz: Kreuzspiel, [0, 10, 9, 11, 7, 2, 8, 1, 4, 6, 5, 3], T6; I3; RI9, (0, 2, 3, 4, 5, 7)
365. Stockhausen, Karlheinz: Tierkreis, Cancer, [0, 7, 11, 10, 9, 8, 3, 6, 4, 1, 5, 2], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
366. Stockhausen, Karlheinz: Tierkreis, Scorpio, [0, 4, 3, 11, 7, 8, 10, 9, 2, 5, 1, 6], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
367. Stravinsky, Igor: Agon, "Pas de deux", "Four trios", [0, 1, 4, 3, 2, 5, 6, 9, 8, 11, 10, 7], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
368. Stravinsky, Igor: Canticum Sacrum, II & IV, [0, 11, 1, 3, 4, 2, 7, 6, 9, 5, 8, 10], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
369. Stravinsky, Igor: Fanfare for a New Theater, [0, 11, 1, 3, 4, 2, 5, 7, 6, 8, 10, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
370. Stravinsky, Igor: Movements, [0, 1, 7, 5, 6, 11, 9, 8, 10, 3, 4, 2], T3,9; I3,9; RI6,12, (0, 1, 2, 6, 7, 8)
371. Talma, Louise: Passacaglia and Fugue, [0, 4, 2, 9, 11, 7, 8, 3, 1, 6, 5, 10], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
372. Talma, Louise: Six Etudes, Etude 4, [0, 1, 5, 9, 4, 8, 7, 6, 11, 2, 10, 3], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
373. Wang, Jian-Zhong: Five Pieces for Piano no. 1, "Pastorale" (variant), [0, 3, 5, 7, 4, 2, 11, 9, 6, 8, 10, 1], T6; I1; RI7, (0, 2, 3, 4, 5, 7)
374. Webern, Anton: Op.32 (un-finished), later sketch, [0, 1, 2, 11, 10, 9, 5, 4, 3, 6, 7, 8], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
375. Webern, Anton: 3 Lieder, "Erlösung", Op.18, No.2, [0, 3, 11, 2, 10, 1, 9, 5, 8, 4, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)
376. Webern, Anton: 3 Volkstexte, "Heiland, Unsere Missetaten…", Op.17, No.3, [0, 9, 8, 7, 11, 10, 4, 5, 6, 3, 2, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
377. Webern, Anton: Concerto for Nine Instruments (Konzert), Op.24, [0, 11, 3, 4, 8, 7, 9, 5, 6, 1, 2, 10], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
378. Webern, Anton: Symphony, Op.21, [0, 3, 2, 1, 5, 4, 10, 11, 7, 8, 9, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
379. Webern, Anton: Variations for Orchestra, Op.30, [0, 1, 4, 3, 2, 5, 6, 9, 8, 7, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
380. Webern, Anton: Variations for Piano, Op.27, [0, 8, 7, 11, 10, 9, 3, 1, 4, 2, 6, 5], T6; I1; RI7, (0, 1, 2, 3, 4, 5)
381. Westergaard, Peter: Mr. and Mrs. Discobbolos, [0, 2, 1, 4, 3, 5, 8, 6, 10, 7, 11, 9], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
382. Wolpe, Stefan: Four Studies on Basic Rows, No.1 – Study on Tritones, [0, 6, 7, 1, 2, 8, 11, 5, 10, 4, 9, 3], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
383. Wolpe, Stefan: Four Studies on Basic Rows, No.2 – Study on Thirds, [0, 11, 9, 8, 10, 7, 6, 5, 3, 2, 4, 1], T6; I1; RI7, (0, 1, 2, 3, 4, 5)

384. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 1, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
385. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 11, [0, 11, 2, 1, 4, 3, 6, 5, 8, 7, 10, 9], T6; I9; RI3, (0, 1, 2, 3, 4, 5)
386. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 2, [0, 2, 4, 6, 8, 10, 11, 1, 3, 5, 7, 9], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
387. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 3, [0, 3, 1, 4, 2, 5, 6, 9, 7, 10, 8, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
388. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 4, [0, 4, 8, 2, 6, 10, 3, 7, 11, 5, 9, 1], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
389. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 5, [0, 5, 2, 7, 4, 9, 6, 11, 8, 1, 10, 3], T6; I3; RI9, (0, 2, 4, 5, 7, 9)
390. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 6, [0, 6, 1, 7, 2, 8, 3, 9, 4, 10, 5, 11], T3,9; I5,11; RI2,8, (0, 1, 2, 6, 7, 8)
391. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 7, [0, 7, 2, 9, 4, 11, 6, 1, 8, 3, 10, 5], T6; I5; RI11, (0, 2, 4, 5, 7, 9)
392. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 8, [0, 8, 4, 1, 9, 5, 2, 10, 6, 3, 11, 7], T2,6,10; I3,7,11; RI1,5,9, (0, 1, 4, 5, 8, 9)
393. Wolpe, Stefan: Four Studies on Basic Rows, No.4, “Basic Row” 9, [0, 9, 1, 10, 2, 11, 6, 3, 7, 4, 8, 5], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
394. Wuorinen, Charles: Flute Variations II, [0, 1, 3, 2, 5, 4, 9, 10, 6, 8, 7, 11], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
395. Wuorinen, Charles: Second Sonata, Source set, [0, 2, 10, 3, 5, 7, 6, 4, 1, 11, 9, 8], T6; I11; RI5, (0, 2, 4, 5, 7, 9)
396. Wuorinen, Charles: Second Sonata, Voice 2, [0, 2, 10, 9, 11, 1, 6, 4, 7, 5, 3, 8], T6; I5; RI11, (0, 1, 2, 3, 4, 5)
397. Wuorinen, Charles: Second Sonata, Voice 3, [0, 2, 4, 3, 5, 1, 9, 7, 11, 10, 8, 6], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
398. Wuorinen, Charles: Sonata for Piano, [0, 3, 2, 4, 5, 1, 11, 8, 9, 7, 6, 10], T6; I11; RI5, (0, 1, 2, 3, 4, 5)
399. Wuorinen, Charles: Third Piano Sonata, [0, 7, 5, 2, 10, 9, 3, 4, 8, 11, 1, 6], T6; I1; RI7, (0, 2, 4, 5, 7, 9)
400. Zhou, Jin-Min: Piano Quintet, Scherzo, [0, 10, 5, 4, 6, 11, 7, 9, 2, 3, 1, 8], T3,9; I1,7; RI4,10, (0, 1, 2, 6, 7, 8)
401. Zillig, Wilfried: Das Opfer, [0, 11, 3, 4, 8, 7, 10, 9, 1, 2, 6, 5], T2,6,10; I1,5,9; RI3,7,11, (0, 1, 4, 5, 8, 9)
402. Zimmerman, Bernd Alois: Perspektiven, [0, 2, 10, 8, 4, 6, 3, 1, 5, 7, 11, 9], T1,3,5,7,9,11; I1,3,5,7,9,11; RI2,4,6,8,10,12, (0, 2, 4, 6, 8, 10)
403. Zimmermann, Bernd Alois: ‘Ich wandte mich um und sah alles Unrecht das geschah unter der Sonne’, [0, 1, 11, 2, 10, 3, 9, 4, 8, 5, 7, 6], T6; I7; RI1, (0, 1, 2, 3, 4, 5)

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1. For more on the preparation of this list, please see the open access research publication linked to this dataset: Gotham and Yust, DLfM 2021. The code and latest version of record for the list are hosted in this repository and the research paper is open access to all when approached from this contents page. In addition to Jason Yust, I would also like to thank the creators of foregoing lists of this kind (notably the Schoenberg-Berg-Webern collection here and a wiki here), the hundreds of analysts whose work is represented here, and the scholars who contributed entries to this new, combined and enlarged collection: Elizabeth West Marvin, David Maw, Rachel Mitchell, Sam Reenan, and Laurel Parsons. To contribute your own corrections or new entry to this list, please email me (Mark Gotham) at < FirstName [dot] LastName [at] tu-dortmund [dot] de > with all the relevant information: Row; Composer (Last Name(s), First Name(s)); Composition including opus number; Year; Source (e.g. URL or PDF). The row can be in any consistent text or numerical format such as ‘A-Gs-G-Cs-F-Fs-C-E-Eb-D-B-Bb’ or [0, 11, 10, 4, 8, 9, 3, 7, 6, 5, 2, 1]. 12.03: Twelve-Tone Anthology#return-footnote-820-1

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CHAPTER OVERVIEW

Chapter 13: Workbook

13.1: Digital Workbook

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13.1: Digital Workbook

At the end of each chapter, you may find Assignments linked for that chapter. Those same assignments are also gathered here in a single table for convenient browsing.

Use arrows in the cells on the header row to sort the table alphabetically. Use the “Search” function to filter by the words in your search.

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[table id=65 /]

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CHAPTER OVERVIEW

Chapter 14: Ear Training Appendix

14.1: The Basics of Sight-Singing and Dictation

14.2: Examples for Sight-counting and Sight-singing- Level 1

14.3: Examples for Sight-counting and Sight-singing- Level 2

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14.1: The Basics of Sight-Singing and Dictation

Key Takeaways

- Sight-singing means to sing at sight, having never before heard or seen what you are singing. Sight-counting is counting a rhythm you have never before heard or seen.
- Always practice sight-singing with the rhythmic and melodic solmization systems your instructor taught you. The more you practice, the easier solmization will be!
- Practice sight-singing and sight-counting while conducting when possible. If you're having trouble, practice at a slower tempo.
- Dictation involves translating rhythms, melodies, chord progressions, or other aural sounds that you've never before seen, played, or sung into staff notation.
- Strategies for rhythmic dictation include dot grids, slash notation, and protonotation. Conducting and/or tapping while taking dictation can also help.
- Strategies for melodic dictation include contour lines, writing down solmization syllables, and protonotation. Conducting and/or tapping while taking dictation can also help.

Regardless of whether you are a vocalist or instrumentalist (or both!), you will likely study sight-singing. Sight-singing means to sing at sight, having never before heard or seen what you are singing. A related skill is sight-counting, which is counting a rhythm you have never before heard or seen. There are many strategies that will help you learn how to sight-sing and sight-count.

Strategies for Sight-Singing and Sight-Counting

If you are learning to sight-sing and sight-count in a classroom, then you are likely going to practice these skills sitting down. When you sight-sing or sight-count, it is important to make sure you have good posture. You will want to sit up straight, at the edge of your chair, with your thighs parallel to the ground. Breathe from your diaphragm (not your chest!) and articulate your singing and counting syllables as clearly as possible.

Example 1 demonstrates proper singing posture while sitting down:

A YouTube element has been excluded from this version of the text. You can view it online here: pb.libretexts.org/music12/?p=852

Example 1. Proper singing posture sitting down.

When sight-counting, it is helpful to use a rhythmic solmization system. *Open Music Theory* prioritizes American standard counting, but there are many other great counting systems available. Here are some other strategies for sight-counting:

- Do not write your counts on your music. This will save you time and will help you to learn to count at sight.
- When you first look at a rhythm to sight-count, note the time signature. How many beats are in each measure, and what note value gets the beat?
- Conduct while you sight-count. This will help you to keep a steady tempo and to remember which beat you are counting.
- If you are not conducting, try tapping a steady beat while sight-counting. This will help you to keep a steady tempo.
- If you are still having trouble keeping a steady tempo, practice with a metronome app.
- If you're having trouble with a rhythm or with solmization syllables, practice at a slower tempo or break the rhythm down into smaller chunks.

When sight-singing, it is extremely helpful to use a melodic solmization system, such as scale degrees or solfège (see both Major Scales, Scale Degrees, and Key Signatures and Minor Scales, Scale Degrees, and Key Signatures.) Both systems are valid; what is important is that you practice consistently, as solmization will become easier the more you practice it. Here are some other strategies for sight-singing:

- Do not write your solfège or scale degrees on your music. This will save you time and will help you to learn to sing at sight.
- When you first look at a melody to sight-sing, note the clef, time signature, and key signature. What is the clef? How many beats are in each measure, and what note value gets the beat? What key is the work in?
- Notice the contour of the melody you are about to sight-sing. Singing the correct direction (up, down, or the same note) is half the battle!
- Conduct while you sight-sing. This will help you to keep a steady tempo and to remember which beat your singing.
- If you are not conducting, try tapping a steady beat while sight-singing. This will help you to keep a steady tempo.
- If you are having trouble sight-singing with a steady tempo, practice with a metronome app.
- If you're having trouble with a melody, practice at a slower tempo or break the melody down into smaller chunks.
- If you're having trouble with rhythm, take the pitches out and just practice the rhythm.
- If you're having trouble with pitches, take the rhythm out and sing the pitches on a singular rhythm.

Learning to sight-sing and to sight-count is rewarding, but it takes many years to master these skills. This is why many undergraduate music curricula have four full classes dedicated to these skills (often called "Aural Skills"). Remember to be patient with yourself and to meet with your instructor for help early on if you are struggling.

Strategies for Dictation

Dictation is another important topic that musicians study. Your instructor will likely play rhythms, melodies, chord progressions, or other aural sounds that you've never before seen, played, or sung. You will then translate those aural sounds into staff notation. There are many strategies that will help you with dictation.

Rhythmic Dictation

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Example 2. A rhythm for dictation.

Listen to Example 2, which is a recording of a rhythm for dictation. One strategy for taking rhythmic dictation is to construct a dot grid. A dot grid is a series of dots that represent beats and measures. Example 3 shows a dot grid for four measures in common time:

Example 3. A dot grid for four measures in common time.

Once a dot grid is constructed, you can place slashes to indicate where you hear articulations, dashes (horizontal lines) to indicate sustained notes, and circles to indicate rests. This is called slash notation. Next, you will want to translate your slash notation to staff notation. Example 4 shows slash notation, followed by staff notation.

A link to an interactive elements can be found at the bottom of this page.

Example 4. Slash notation and staff notation of Example 2.

It is also helpful to conduct or tap while taking rhythmic dictation. Tapping allows you to hear if a note happens on a beat or not—or if there is a rest on a beat. Conducting can help you to identify which beats have articulations, sustains, and rests.

Melodic Dictation

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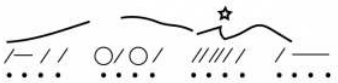
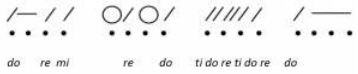
Example 4. A melody with the same rhythm as Example 2.

Listen to Example 4, which adds pitches to the rhythmic dictation from Example 2 above. The first step for taking melodic dictation is to write down the melody's rhythm (see the previous section on rhythmic dictation), then add pitch to your rhythm. There are several strategies for this. The first strategy is to use contour lines, which indicate whether a note moves up, down, or

stays the same (Example 5). You can also use stars (or another symbol) to indicate where you hear a leap. Another strategy is to write down the syllables you hear using your melodic solmization system (Example 6).



Example 5. Contour lines have been added to the slash notation.



Example 6. Solfège has been added to the slash notation.

The next step is to translate your contour lines and solmization syllables into staff notation (Example 7).

A link to an interactive elements can be found at the bottom of this page.

Example 7. Examples 5–6 in staff notation.

It is also helpful to conduct or tap while taking melodic dictation, for the same reasons that it is helpful for rhythmic dictation.

Protonotation

Protonotation is a basic system of musical notation that is drawn from the book *Manual for Ear Training and Sight Singing* by Gary Karpinski (2007, 1–28). This system can also be used to take rhythmic and melodic dictation, and many find it very helpful. Example 8 shows a melody in protonotation and in staff notation:

A link to an interactive elements can be found at the bottom of this page.

Example 8. A melody in protonotation and staff notation.

Protonotation does not contain information about beat duration or key. It only represents basic pitch and rhythmic elements (discussed further below).

Elements of Protonotation

Examples 9–11 shows blank protonotation grids for duple, triple, and quadruple meters:

In duple and triple meter, downbeats are represented by longer vertical lines, and non-accented beats are represented by shorter vertical lines. In quadruple meter, the third beat of each bar is of medium accent, so it is represented by a medium-length line.

In protonotation, notes are notated by using horizontal lines for rhythmic duration and moveable-*do* solfège syllables (although scale degrees can be substituted). Arrows are used to denote the direction of any melodic leaps. Rests are represented by the absence of a horizontal line in a given beat or part of a beat. It can also be helpful to use an **X** instead of a blank, so you can distinguish a rest you are sure about from a part of the protonotation you haven't yet completed.

Converting Protonotation to Staff Notation

If you know 1) the clef, 2) the tonic pitch, and 3) either the beat duration or bottom number of the time signature, you can convert a melody in protonotation to staff notation easily.

1. Write the basic information about the example:
   a. Draw the clef provided (or choose an appropriate one based on your perception of the register of the melody).
   b. Determine the key signature from the tonic provided and the mode (major or minor) that you heard or that was provided.
   c. Determine the time signature from the beat value / bottom number provided and from the meter reflected in your protonotation.
2. Each of the long protonotation lines becomes a bar line in staff notation.
3. Insert the notes into each bar:
   a. The register, solfège syllable, and tonic will determine the pitches.
   b. Use the time signature to determine how to translate the protonotated rhythms into specific note values. For example, a two-beat note in common time (quarter-note beat) is a half note (2 × ♩), while in cut time (half-note beat), it is a whole note (2 ×

𝅗𝅥).

If the clef, tonic pitch, and/or time signature of the melody have not been specified, the same protonotation can be realized into staff notation in several different ways. Example 12 shows a melody in protonotation that is realized in two different clefs, compound meters, and key signatures. The first realization is in bass clef in the key of G major, and the bottom number of its time signature is 8. The second realization is in alto clef in the key of B♭ major, and the bottom number of its time signature is 4.

A link to an interactive elements can be found at the bottom of this page.

Example 12. Two different realizations of a melody in protonotation.

Example 13 shows a melody in protonotation that is realized in three different clefs, compound meters, and key signatures. The first realization is in treble clef in the key of E♭ major, and the bottom number of its time signature is 4. The second realization is in tenor clef in the key of C♯ major, and the bottom number of its time signature is 8. The third realization is in bass clef in the key of F major, and the bottom number of its time signature is 1.

A link to an interactive elements can be found at the bottom of this page.

Example 13. Three different realizations of a melody in protonotation.

Like sight-singing and sight-counting, rhythmic and melodic dictation take many years to master. If you are an undergraduate music major, you will likely practice these skills throughout many classes, over many years. Again, be patient with yourself and meet with your instructor for help early on if you are struggling.

Further Reading

- Karpinsky, Gary. 2007. *Manual for Ear Training and Sight Singing*. New York: Norton.

Online Resources

- Melodies for Sight Singing with Recordings (How to Sing Smarter)
- Melodies for Sight Singing (Chorale Tech)
- Melodies for Sight Singing (Ronnie Sanders)
- Rhythms for Sight Counting (Blue Sky Music)
- Sight Singing by Level (YouTube)
- Melodic and Rhythmic Dictations (James Woodward, Youtube)
- Rhythmic and Melodic Dictations (freemusicdictations.net)
- Rhythmic Dictation (teoria)
- Rhythmic Dictation (Tone Savvy)
- Melodic Dictation (teoria)
- Melodic Dictation (Tone Savvy)

Assignments from the Internet

A. Writing Counts (.pdf)
B. Writing Solfège or Scale Degrees (.pdf)

Assignments

1. Solfège and Scale Degree Identification (.pdf, .docx)
2. Solfège and Scale Degree Identification in a Melodic Context (.pdf, .docx) Worksheet playlist

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14.2: Examples for Sight-counting and Sight-singing- Level 1

Key Takeaways

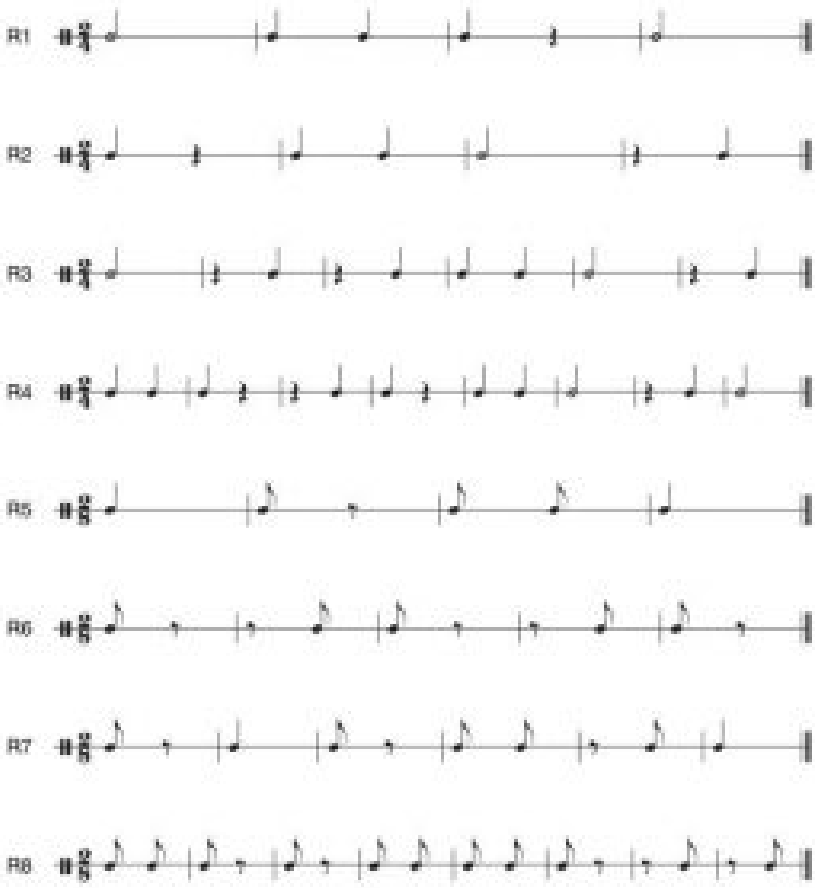
- Simple meters are meters in which the beat divides into two, and then further subdivides into four. (To review this topic see Simple Meter and Time Signatures.)
- Time signatures in simple meters express two things: how many beats are contained in each measure (the top number), and the beat unit (the bottom number), which refers to the note value that is the beat.
- This chapter covers beat units of the quarter note and eighth note.
- This chapter covers singular beat divisions.
- A pickup note, also known as an anacrusis, is a note that happens before the first measure of a musical work. This chapter includes anacruses.
- This chapter covers the major and minor modes.
- Melodies within this chapter include stepwise motion.
- This chapter includes two-part rhythms and two-part melodies.

This chapter includes a series of gradated rhythms and melodies which can be used for practicing sight-counting and sight-singing. Conducting while performing these exercises is highly recommended as it can help the performer keep a steady tempo. Knowledge of simple meters, note and rest values, clefs, and key signatures is assumed from the beginning of this chapter. All examples are author-composed.

Section 1

The following eight exercises are in simple duple meter. The quarter note is the beat unit for the first four exercises and the eighth note is the beat unit for the second four exercises.

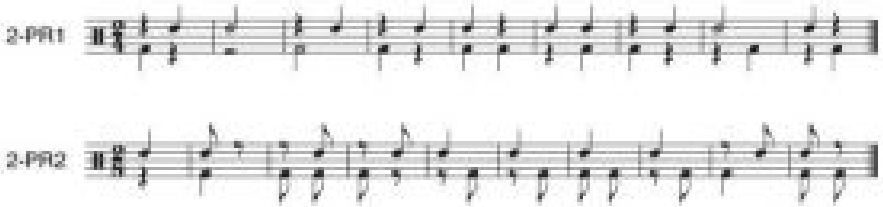
It is recommended that you use a consistent method of rhythmic solmization.



The following two exercises are two-part rhythms that could be performed by counting one line and clapping the other. Which line is counted and which is clapped can and should be interchanged. When clapping a sustained value, try to keep your hands together for the duration of the note and only separate them when clapping again or when performing a rest.

Practice tips:

- Use a metronome
- Slow down the tempo if needed
- Practice counting/clapping one line at a time
- Break the exercise into smaller parts



The following four exercises are in simple duple meter and the major mode. All melodic exercises in this chapter exclusively use stepwise motion in the treble or bass clef, contain no more than four sharps or flats in their key signature, and have an octave or smaller plagal range. For now, exercises will always begin on the first scale degree.

It is recommended that you use a consistent method of solmization.

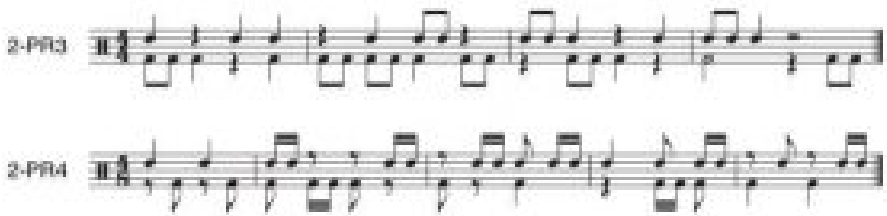
The following four exercises are in simple duple meter and the minor mode. These four exercises are the same melody as M1; however, each uses a different form of the minor scale. Each form of minor contains a unique pattern of accidentals in the upper tetrachord.

The following two exercises are two-part melodies whose lines could be performed in tandem as a duet or by an individual playing one line on a non-wind instrument and singing the other. Which line is played and which is sung can and should be interchanged. Both exercises are in simple duple meter. The first exercise is in the major mode and the second is in the minor mode.

Section 2

The following eight exercises are in simple quadruple meter. Beat divisions are now included.

The following two exercises are two-part rhythms in simple quadruple meter.



The following four exercises are in simple quadruple meter and the major mode. Common time, which is equivalent to $\frac{4}{4}$, is now included.

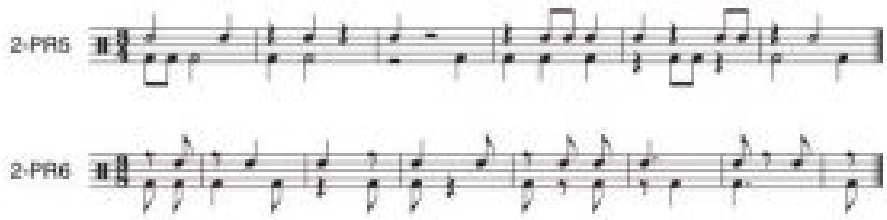
The following four exercises are in simple quadruple meter and the minor mode.

The following two exercises are two-part melodies in simple quadruple meter.

Section 3

The following eight exercises are in simple triple meter. Anacruses and dotted rhythmic values that have the duration of a full measure are now included.

The following two exercises are two-part rhythms in simple triple meter.



The following four exercises are in simple triple meter and the major mode. Melodies can now begin on the third or fifth scale degree of the given key.

The following four exercises are in simple triple meter and the minor mode.

The following two exercises are two-part melodies in simple triple meter.

Online Resources

- Melodies for Sight Singing with Recordings (How to Sing Smarter)

- Melodies for Sight Singing (Chorale Tech)
- Melodies for Sight Singing (Ronnie Sanders)
- Rhythms for Sight Counting (Blue Sky Music)
- Sight Singing by Level (YouTube)

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14.3: Examples for Sight-counting and Sight-singing- Level 2

Key Takeaways

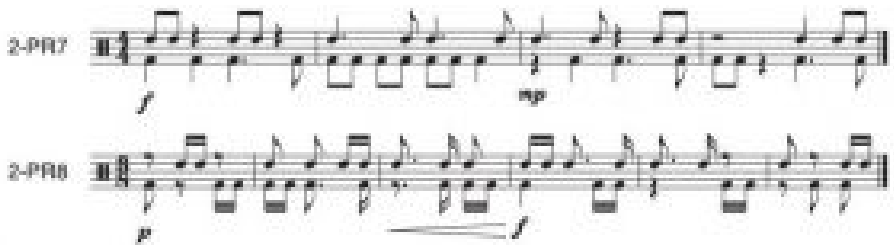
- No new beat units, time signatures, or beat divisions are introduced in this chapter.
- This chapter includes dotted rhythmic values that have a duration smaller than a full measure. (To review this topic see Rhythmic and Rest Values.)
- A tie is a curved line that connects two or more notes with the same pitch. Tied-to notes are not rearticulated.
- Dynamics and articulations are covered in this chapter. (To review this topic see Other Aspects of Notation.)
- Melodies within this chapter include leaps of thirds, fourths, fifths, and octaves within the tonic triad.
- This chapter includes two-part rhythms and two-part melodies.

This chapter builds upon the prior gradated rhythms and melodies. Previously studied meters and key signatures are included. Knowledge of dynamics, articulations, and phrase markings is assumed from the beginning of this chapter. All exercises are author-composed.

Section 4

The following eight exercises contain dotted rhythmic values that do not have the duration of a full measure. Dynamic markings as well as crescendos and decrescendos are now included.

The following two exercises contain dotted rhythmic values that do not have the duration of a full measure.



The following four exercises are melodies in the major mode that contain adjacent leaps of thirds and fourths within the tonic triad.

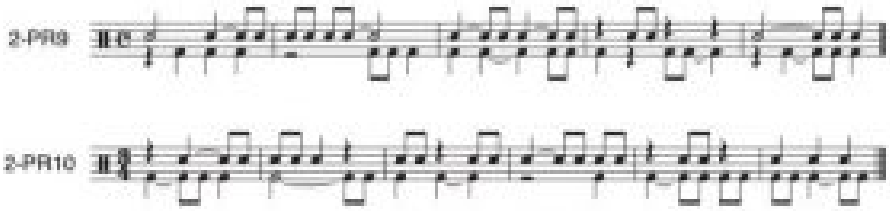
The following four exercises are melodies in the minor mode that contain adjacent leaps of thirds and fourths within the tonic triad.

The following two exercises are two-part melodies that contain adjacent leaps of thirds and fourths within the tonic triad.

Section 5

The following eight exercises are rhythms that contain ties that are within measures. Articulations are now included.

The following two exercises are two-part rhythms that contain ties that are within measures.



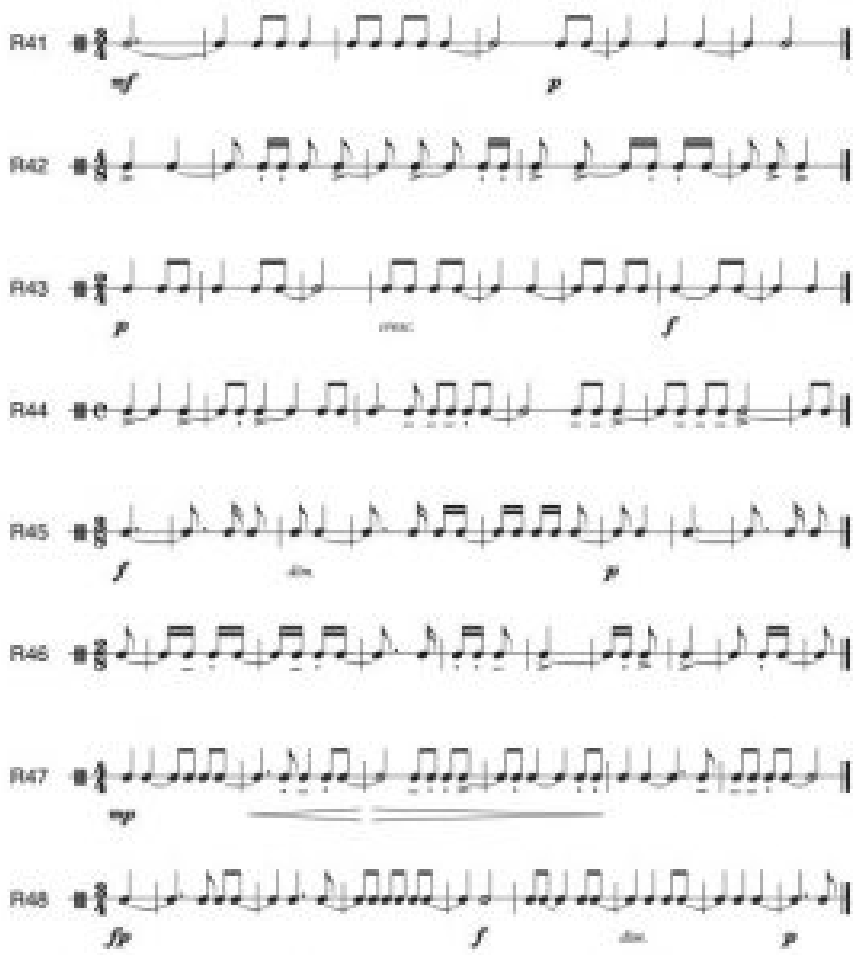
The following four exercises are melodies in the major mode that contain more frequent adjacent leaps of thirds and fourths within the tonic triad.

The following four exercises are melodies in the minor mode that contain more frequent adjacent leaps of thirds and fourths within the tonic triad.

The following two exercises are two-part melodies that contain more frequent adjacent leaps of thirds and fourths within the tonic triad.

Section 6

The following eight exercises are rhythms that contain ties that extend across bar lines.



The following two exercises are two-part rhythms that contain ties that extend across bar lines.

The following four exercises are melodies in the major mode that contain larger leaps of fifths and octaves within the tonic triad.

The following four exercises are melodies in the minor mode that contain larger leaps of fifths and octaves within the tonic triad.

The following two exercises are two-part melodies that contain larger leaps of fifths and octaves within the tonic triad.

Online Resources

- Melodies for Sight Singing with Recordings (How to Sing Smarter)
- Melodies for Sight Singing (Chorale Tech)
- Melodies for Sight Singing (Ronnie Sanders)
- Rhythms for Sight Counting (Blue Sky Music)
- Sight Singing by Level (YouTube)

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Index

A

AABA form
- 7.5: AABA Form and Strophic Form

AABAForm
- Chapter 7: Popular Music

ABA
- 3.7: Ternary Form

ABACA
- 3.9: Rondo

accessibility
- 1.1: Introduction to Western Musical Notation

accessibleeducation
- InfoPage

accidentals
- 1.5: Half Steps, Whole Steps, and Accidentals

adaptivelearning
- InfoPage

African American music
- 6.8: Blues Harmony

altered chords
- 5.13: Altered and Extended Chords

altoclef
- 1.3: Reading Clefs

American Standard Pitch Notation
- 1.6: American Standard Pitch Notation (ASPN)

ametric music
- 8.1: Twentieth-Century Rhythmic Techniques

analysis
- 3.1: Foundational Concepts for Phrase-Level Forms
- 3.2: The Phrase, Archetypes, and Unique Forms
- 4.9: 6/4 Chords as Forms of Prolongation
- 4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
- 8.5: Set Class and Prime Form
- 8.6: Interval-Class Vectors
- 8.10: Analyzing with Modes, Scales, and Collections

analysiseexamples
- Chapter 9: Twelve-Tone Music

analytical unity
- 8.7: Analyzing with Set Theory (or not!)

analyticalwriting
- 9.2: Naming Conventions for Rows

analyzing
- Chapter 8: 20th- and 21st-Century Techniques

answer
- 2.9: High Baroque Fugal Exposition

antecedent
- 3.2: The Phrase, Archetypes, and Unique Forms
- 3.3: Hybrid Phrase-Level Forms

anticipation
- 2.6: Fifth-Species Counterpoint

applied chords
- 4.14: Tonicization

applied leading tone
- 5.5: Harmonic Elision

appoggiatura
- 4.4: Embellishing Tones

Arabic maqam
- 8.8: Diatonic Modes

archetype
- 3.3: Hybrid Phrase-Level Forms

archetypes
- Chapter 3: Form

Arnold Schoenberg
- 8.7: Analyzing with Set Theory (or not!)

arrangement
- 10.1: Core Principles of Orchestration

articulation
- 1.7: Other Aspects of Notation
- 14.3: Examples for Sight-counting and Sight-singing- Level 2

ASPN
- 1.6: American Standard Pitch Notation (ASPN)

assignments
- 1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
- 5.11: Parallel Chromatic Sequences
- 7.10: Classical Schemas (in a Pop Context)

asymmetrical meters
- 8.1: Twentieth-Century Rhythmic Techniques

atonal
- 8.6: Interval-Class Vectors
- 8.10: Analyzing with Modes, Scales, and Collections

atonal music
- 8.3: Intervals in Integer Notation
- 8.7: Analyzing with Set Theory (or not!)
- 9.4: Analysis Examples – Webern Op. 21 and 24

atonality
- 9.5: History and Context of Serialism

augmented
- 1.15: Intervals
- Chapter 5: Chromaticism
- 5.11: Parallel Chromatic Sequences

augmented sixth chords
- 5.3: Augmented Sixth Chords
- 12.1: Harmony Anthology

augmented triad
- 1.16: Triads
- 5.8: Augmented Options
- 5.9: Equal Divisions of the Octave

auralskills
- 14.1: The Basics of Sight-Singing and Dictation

authentic cadence
- 4.7: Performing Harmonic Analysis Using the Phrase Model
- 4.10: Plagal Motion as a Form of Prolongation

auxiliary section
- 7.4: Introduction to Form in Popular Music

B

Bach
- 1.20: Texture

backbeat
- 7.2: Drumbeats

baroque
- 2.9: High Baroque Fugal Exposition
- 2.10: Ground Bass

bass
- 2.12: Galant Schemas – Summary

bass clef
- 1.4: The Keyboard and the Grand Staff

bass line
- 4.3: Strengthening Endings with Strong Predominants

bass lines
- 4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s

bassclef
- 1.3: Reading Clefs

basslines
- 2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
- 4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord

beat
- 1.11: Other Rhythmic Essentials

beats
- 1.10: Compound Meter and Time Signatures

bebop
- 6.5: Embellishing Chords

Beethoven
- 11.5: Hypermeter

Bessie Smith
- 6.9: Blues Melodies and the Blues Scale

binary
- Chapter 3: Form

binary form
- 3.6: Binary Form

blending
- 10.1: Core Principles of Orchestration

blues
- 6.8: Blues Harmony
- 6.9: Blues Melodies and the Blues Scale
- 7.7: Introduction to Harmonic Schemas in Pop Music
- 7.13: Pentatonic Harmony

blues harmony
- Chapter 6: Jazz

blues melodies
- Chapter 6: Jazz

blues scale
- Chapter 6: Jazz
- 6.9: Blues Melodies and the Blues Scale

Brahms
- 10.2: Subtle Color Changes

BrianJarvis
- TitlePage

bridge
- 7.6: Verse-Chorus Form

BrynHughes
- TitlePage

C

cadence
- 3.2: The Phrase, Archetypes, and Unique Forms
- 4.7: Performing Harmonic Analysis Using the Phrase Model
- 5.2: Neapolitan 6th (♭II6)

cadences
- 2.12: Galant Schemas – Summary
- 3.1: Foundational Concepts for Phrase-Level Forms
- Chapter 4: Diatonic Harmony, Tonicization, and Modulation
- 4.1: Introduction to Harmony, Cadences, and Phrase Endings
- 4.15: Extended Tonicization and Modulation to Closely Related Keys
- 6.4: ii–V–I

cadential
- 3.3: Hybrid Phrase-Level Forms
- 4.5: Strengthening Endings with Cadential 6/4
- 4.9: 6/4 Chords as Forms of Prolongation

cadential progression
- 5.3: Augmented Sixth Chords

cantus firmus
- 2.4: Third-Species Counterpoint
- 2.5: Fourth-Species Counterpoint

chaconne
2.10: Ground Bass
changing meter
8.1: Twentieth-Century Rhythmic Techniques
chapter
12.2: Meter Anthology
ChelseyHamm
TitlePage
choral polyphony
2.8: 16th-Century Contrapuntal Style
chord
1.16: Triads
4.5: Strengthening Endings with Cadential 6/4
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
5.2: Neapolitan 6th (♭II6)
5.4: Common-Tone Chords (CT°7 and CT+6)
7.7: Introduction to Harmonic Schemas in Pop Music
chord alterations
6.2: Chord Symbols
chord analysis
1.19: Roman Numerals and SATB Chord Construction
chord extensions
6.3: Jazz Voicings
chord identification
1.17: Seventh Chords
1.18: Inversion and Figured Bass
chord inversion
4.10: Plagal Motion as a Form of Prolongation
chord modulation
5.7: Reinterpreting Diminished Seventh Chords
chord progression
4.1: Introduction to Harmony, Cadences, and Phrase Endings
4.14: Tonicization
4.15: Extended Tonicization and Modulation to Closely Related Keys
5.14: Neo-Riemannian Triadic Progressions
6.5: Embellishing Chords
6.7: Chord-Scale Theory
7.3: Melody and Phrasing
7.10: Classical Schemas (in a Pop Context)
7.11: Puff Schemas
12.1: Harmony Anthology
chord progressions
5.9: Equal Divisions of the Octave
5.10: Chromatic Sequences
5.15: Mediants
6.6: Substitutions
6.8: Blues Harmony
7.12: Modal Schemas
7.13: Pentatonic Harmony
chord qualities
1.17: Seventh Chords
chord quality
1.19: Roman Numerals and SATB Chord Construction
chord substitution
5.5: Harmonic Elision
6.6: Substitutions
chord symbols
1.16: Triads
1.17: Seventh Chords
1.18: Inversion and Figured Bass
5.3: Augmented Sixth Chords
Chapter 6: Jazz
6.2: Chord Symbols
chordal realizations
2.12: Galant Schemas – Summary
chordal seventh
4.13: Predominant Seventh Chords
ChordInversions
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
chordprogressions
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
5.1: Modal Mixture
7.9: Four-Chord Schemas
chordquality
5.1: Modal Mixture
chords
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
4.9: 6/4 Chords as Forms of Prolongation
Chapter 5: Chromaticism
5.6: Chromatic Modulation
5.11: Parallel Chromatic Sequences
6.3: Jazz Voicings
6.4: ii–V–I
chorus
7.6: Verse-Chorus Form
chromatic
5.2: Neapolitan 6th (♭II6)
5.6: Chromatic Modulation
5.10: Chromatic Sequences
5.15: Mediants
chromatic chords
5.3: Augmented Sixth Chords
chromatic harmonies
5.13: Altered and Extended Chords
chromatic harmony
5.8: Augmented Options
chromatic modulation
5.7: Reinterpreting Diminished Seventh Chords
chromatic scale
5.9: Equal Divisions of the Octave
9.1: Basics of Twelve-Tone Theory
chromatic sequence
5.12: The Omnibus Progression
church modes
8.8: Diatonic Modes
circle of fifths
1.12: Major Scales, Scale Degrees, and Key Signatures
Clara Schumann
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
classic music
2.11: Galant Schemas
classical
7.7: Introduction to Harmonic Schemas in Pop Music
classical music
1.20: Texture
3.3: Hybrid Phrase-Level Forms
3.6: Binary Form
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
4.14: Tonicization
7.10: Classical Schemas (in a Pop Context)
10.2: Subtle Color Changes
10.3: Transcription from Piano
classicalmusic
3.8: Sonata Form
clefs
Chapter 1: Fundamentals
1.2: Notation of Notes, Clefs, and Ledger Lines
1.3: Reading Clefs
1.6: American Standard Pitch Notation (ASPN)
closely related keys
4.15: Extended Tonicization and Modulation to Closely Related Keys
closingsection
3.8: Sonata Form
collaboration
InfoPage
common time
14.2: Examples for Sight-counting and Sight-singing- Level 1
common tones
5.12: The Omnibus Progression
5.15: Mediants
composers
4.1: Introduction to Harmony, Cadences, and Phrase Endings
4.7: Performing Harmonic Analysis Using the Phrase Model
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
5.9: Equal Divisions of the Octave
9.3: Row Properties
12.3: Twelve-Tone Anthology
composition
2.1: Introduction to Species Counterpoint
2.2: First-Species Counterpoint
2.3: Second-Species Counterpoint
2.5: Fourth-Species Counterpoint
2.9: High Baroque Fugal Exposition
2.10: Ground Bass
2.11: Galant Schemas
3.2: The Phrase, Archetypes, and Unique Forms
3.4: Expansion and Contraction at the Phrase Level
3.6: Binary Form
4.3: Strengthening Endings with Strong Predominants
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
6.9: Blues Melodies and the Blues Scale
8.4: Pitch-Class Sets, Normal Order, and Transformations
8.5: Set Class and Prime Form
8.6: Interval-Class Vectors
8.10: Analyzing with Modes, Scales, and Collections
9.1: Basics of Twelve-Tone Theory
11.6: Metrical Dissonance
12.2: Meter Anthology
12.3: Twelve-Tone Anthology
composition techniques
4.13: Predominant Seventh Chords
10.2: Subtle Color Changes
compositional styles
8.2: Pitch and Pitch Class
compositional techniques
5.14: Neo-Riemannian Triadic Progressions
compound basic idea
3.3: Hybrid Phrase-Level Forms
compound meters
1.10: Compound Meter and Time Signatures
compound_meter
Chapter 11: Rhythm and Meter
concepts
Chapter 3: Form
concerto
9.4: Analysis Examples – Webern Op. 21 and 24
conducting patterns
1.10: Compound Meter and Time Signatures
consequent
3.2: The Phrase, Archetypes, and Unique Forms
3.3: Hybrid Phrase-Level Forms
consonance
2.1: Introduction to Species Counterpoint
2.3: Second-Species Counterpoint
2.6: Fifth-Species Counterpoint
8.3: Intervals in Integer Notation
consonant
1.15: Intervals

consonant preparation
2.5: Fourth-Species Counterpoint
contemporary composition
8.1: Twentieth-Century Rhythmic Techniques
contemporary music
12.3: Twelve-Tone Anthology
context
Chapter 9: Twelve-Tone Music
continuation
3.3: Hybrid Phrase-Level Forms
contraction
Chapter 3: Form
3.4: Expansion and Contraction at the Phrase Level
contrapuntal
2.9: High Baroque Fugal Exposition
contrapuntal style
Chapter 2: Counterpoint and Galant Schemas
2.8: 16th-Century Contrapuntal Style
contrary motion
4.3: Strengthening Endings with Strong Predominants
5.12: The Omnibus Progression
contrast
3.7: Ternary Form
contrasting sections
3.9: Rondo
contrastingsections
3.5: Formal Sections in General
core section
7.4: Introduction to Form in Popular Music
coresections
3.5: Formal Sections in General
counterpoint
2.1: Introduction to Species Counterpoint
2.2: First-Species Counterpoint
2.3: Second-Species Counterpoint
2.4: Third-Species Counterpoint
2.6: Fifth-Species Counterpoint
4.4: Embellishing Tones
counterpoint exercises
2.8: 16th-Century Contrapuntal Style
countersubject
2.9: High Baroque Fugal Exposition
counting system
1.10: Compound Meter and Time Signatures
counting_rhythms
1.9: Simple Meter and Time Signatures
Creep
7.11: Puff Schemas
crescendo
1.7: Other Aspects of Notation
curriculumdevelopment
InfoPage
CycleOfFifths
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences

D

dance
11.5: Hypermeter
dance music
3.6: Binary Form
deceptive motion
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
decrescendo
1.7: Other Aspects of Notation
derived rows
9.3: Row Properties
development
3.8: Sonata Form
diatonic
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
5.10: Chromatic Sequences
5.15: Mediants
6.7: Chord-Scale Theory
diatonic chords
4.14: Tonicization
6.6: Substitutions
diatonic harmony
7.12: Modal Schemas
diatonic modes
8.8: Diatonic Modes
diatonic system
5.9: Equal Divisions of the Octave
dictation
Chapter 14: Ear Training Appendix
14.1: The Basics of Sight-Singing and Dictation
diminished
1.15: Intervals
Chapter 5: Chromaticism
5.4: Common-Tone Chords (CTº7 and CT+6)
5.8: Augmented Options
diminished seventh
6.5: Embellishing Chords
diminished sevenths
12.1: Harmony Anthology
diminished triad
1.16: Triads
dissonance
2.1: Introduction to Species Counterpoint
2.3: Second-Species Counterpoint
2.4: Third-Species Counterpoint
6.3: Jazz Voicings
8.3: Intervals in Integer Notation
9.5: History and Context of Serialism
dissonant suspension
2.5: Fourth-Species Counterpoint
dodecaphonic
12.3: Twelve-Tone Anthology
dominant
1.12: Major Scales, Scale Degrees, and Key Signatures
4.5: Strengthening Endings with Cadential 6/4
4.9: 6/4 Chords as Forms of Prolongation
5.1: Modal Mixture
5.4: Common-Tone Chords (CTº7 and CT+6)
5.6: Chromatic Modulation
5.11: Parallel Chromatic Sequences
dominant chord
4.3: Strengthening Endings with Strong Predominants
dominant chords
5.13: Altered and Extended Chords
dominant function
5.8: Augmented Options
dominant harmony
5.12: The Omnibus Progression
dominant seventh chord
4.2: Strengthening Endings with V7
5.5: Harmonic Elision
6.8: Blues Harmony
doowop
7.9: Four-Chord Schemas
double neighbor
2.4: Third-Species Counterpoint
drum beat
6.1: Swing Rhythms
drumbeats
7.2: Drumbeats
Chapter 11: Rhythm and Meter
drumming
7.1: Rhythm and Meter in Pop Music
duple_meter
1.9: Simple Meter and Time Signatures
duplet
1.11: Other Rhythmic Essentials
dynamics
1.7: Other Aspects of Notation
10.1: Core Principles of Orchestration
14.3: Examples for Sight-counting and Sight-singing- Level 2

E

eartraining
7.7: Introduction to Harmonic Schemas in Pop Music
14.1: The Basics of Sight-Singing and Dictation
educational assignments
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
educationtechnology
InfoPage
eighth note
1.8: Notating Rhythm
14.2: Examples for Sight-counting and Sight-singing- Level 1
eighth notes
2.6: Fifth-Species Counterpoint
Elton John
7.14: Fragile, Absent, and Emergent Tonics
embellishing chords
Chapter 6: Jazz
embellishing tones
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
4.4: Embellishing Tones
embellishment
2.11: Galant Schemas
4.5: Strengthening Endings with Cadential 6/4
embellishments
2.6: Fifth-Species Counterpoint
emotional themes
7.14: Fragile, Absent, and Emergent Tonics
enharmonic
5.6: Chromatic Modulation
enharmonic equivalence
8.2: Pitch and Pitch Class
enharmonically reinterpreted
5.7: Reinterpreting Diminished Seventh Chords
ensemble
10.1: Core Principles of Orchestration
episodes
3.9: Rondo
escape tone
4.4: Embellishing Tones
exercise
2.5: Fourth-Species Counterpoint
exercises
Chapter 2: Counterpoint and Galant Schemas
2.6: Fifth-Species Counterpoint
2.7: Gradus ad Parnassum Exercises
14.3: Examples for Sight-counting and Sight-singing- Level 2
expansion
Chapter 3: Form
3.4: Expansion and Contraction at the Phrase Level

exposition
2.9: High Baroque Fugal Exposition
3.8: Sonata Form
extended chords
5.13: Altered and Extended Chords
extensions
6.2: Chord Symbols

F

fifth species
Chapter 2: Counterpoint and Galant Schemas
figured bass
1.18: Inversion and Figured Bass
figures
2.12: Galant Schemas – Summary
first inversion
1.18: Inversion and Figured Bass
first species
Chapter 2: Counterpoint and Galant Schemas
folk songs
1.20: Texture
Form
Chapter 7: Popular Music
formal
Chapter 3: Form
formalsections
3.5: Formal Sections in General
forward motion
4.1: Introduction to Harmony, Cadences, and Phrase Endings
foundational
Chapter 3: Form
four voices
2.7: Gradus ad Parnassum Exercises
fourth species
Chapter 2: Counterpoint and Galant Schemas
fourth species counterpoint
2.5: Fourth-Species Counterpoint
French chords
5.3: Augmented Sixth Chords
Frozen
7.14: Fragile, Absent, and Emergent Tonics
fugue
2.9: High Baroque Fugal Exposition
fully diminished seventh chord
5.5: Harmonic Elision
functional harmony
5.14: Neo-Riemannian Triadic Progressions

G

genres
3.5: Formal Sections in General
German chords
5.3: Augmented Sixth Chords
Gradus ad Parnassum
Chapter 2: Counterpoint and Galant Schemas
2.6: Fifth-Species Counterpoint
2.7: Gradus ad Parnassum Exercises
grand staff
1.4: The Keyboard and the Grand Staff
groove
7.2: Drumbeats
ground bass
2.10: Ground Bass
Gulf Coast Blues
6.9: Blues Melodies and the Blues Scale

H

half cadence
4.7: Performing Harmonic Analysis Using the Phrase Model
half note
1.8: Notating Rhythm
half steps
1.5: Half Steps, Whole Steps, and Accidentals
harmonic
1.15: Intervals
Chapter 5: Chromaticism
harmonic ambiguity
5.10: Chromatic Sequences
harmonic analysis
1.17: Seventh Chords
3.2: The Phrase, Archetypes, and Unique Forms
3.6: Binary Form
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
4.7: Performing Harmonic Analysis Using the Phrase Model
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
4.15: Extended Tonicization and Modulation to Closely Related Keys
5.15: Mediants
12.1: Harmony Anthology
harmonic cadences
4.2: Strengthening Endings with V7
harmonic consonance
2.5: Fourth-Species Counterpoint
harmonic elision
5.5: Harmonic Elision
harmonic endings
3.7: Ternary Form
harmonic function
4.1: Introduction to Harmony, Cadences, and Phrase Endings
harmonic functions
4.2: Strengthening Endings with V7
harmonic intervals
8.3: Intervals in Integer Notation
harmonic minor
1.13: Minor Scales, Scale Degrees, and Key Signatures
5.8: Augmented Options
harmonic patterns
2.11: Galant Schemas
harmonic progression
4.10: Plagal Motion as a Form of Prolongation
4.13: Predominant Seventh Chords
4.14: Tonicization
5.5: Harmonic Elision
5.6: Chromatic Modulation
harmonic progressions
4.3: Strengthening Endings with Strong Predominants
5.13: Altered and Extended Chords
6.6: Substitutions
7.12: Modal Schemas
7.13: Pentatonic Harmony
7.14: Fragile, Absent, and Emergent Tonics
harmonic series
8.9: Collections
harmonic structure
9.4: Analysis Examples – Webern Op. 21 and 24
9.5: History and Context of Serialism
harmonic theory
5.14: Neo-Riemannian Triadic Progressions
harmonic writing
2.1: Introduction to Species Counterpoint
HarmonicSchemas
Chapter 7: Popular Music
harmonies
7.9: Four-Chord Schemas
Harmonization
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
harmony
1.16: Triads
2.3: Second-Species Counterpoint
2.4: Third-Species Counterpoint
2.10: Ground Bass
3.4: Expansion and Contraction at the Phrase Level
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
4.1: Introduction to Harmony, Cadences, and Phrase Endings
4.5: Strengthening Endings with Cadential 6/4
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
4.9: 6/4 Chords as Forms of Prolongation
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
5.1: Modal Mixture
5.2: Neapolitan 6th (♭II6)
5.4: Common-Tone Chords (CT°7 and CT+6)
6.3: Jazz Voicings
6.4: ii–V–I
6.5: Embellishing Chords
6.9: Blues Melodies and the Blues Scale
7.7: Introduction to Harmonic Schemas in Pop Music
10.3: Transcription from Piano
hemiola
11.6: Metrical Dissonance
heterophony
1.20: Texture
hexachords
9.3: Row Properties
hexatonic collection
8.9: Collections
hierarchy
3.1: Foundational Concepts for Phrase-Level Forms
high baroque
Chapter 2: Counterpoint and Galant Schemas
hip hop
7.2: Drumbeats
7.5: AABA Form and Strophic Form
history
Chapter 9: Twelve-Tone Music
history of blues
6.8: Blues Harmony
historyofmusicalnotation
1.1: Introduction to Western Musical Notation
homophony
1.20: Texture
hybrid
Chapter 3: Form
hybrid form
3.3: Hybrid Phrase-Level Forms
hypermeter
1.11: Other Rhythmic Essentials
Chapter 11: Rhythm and Meter
11.5: Hypermeter

I

Igor Stravinsky
8.9: Collections
ii V I
6.5: Embellishing Chords

ii7
4.13: Predominant Seventh Chords
iii chord
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
iii7
4.13: Predominant Seventh Chords
imitation
2.8: 16th-Century Contrapuntal Style
2.10: Ground Bass
improvisation
2.11: Galant Schemas
6.1: Swing Rhythms
6.4: ii–V–I
6.5: Embellishing Chords
6.6: Substitutions
6.7: Chord-Scale Theory
Indian raga
8.8: Diatonic Modes
instrumentation
10.1: Core Principles of Orchestration
10.3: Transcription from Piano
integer notation
8.2: Pitch and Pitch Class
integral serialism
9.5: History and Context of Serialism
interval class
8.5: Set Class and Prime Form
intervalclass
8.6: Interval-Class Vectors
intervalclassvector
8.6: Interval-Class Vectors
intervallic invariance
9.3: Row Properties
intervals
Chapter 1: Fundamentals
1.2: Notation of Notes, Clefs, and Ledger Lines
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
1.15: Intervals
1.16: Triads
Chapter 8: 20th- and 21st-Century Techniques
8.3: Intervals in Integer Notation
inversion
8.4: Pitch-Class Sets, Normal Order, and Transformations
8.5: Set Class and Prime Form
inversions
1.18: Inversion and Figured Bass
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
Italian chords
5.3: Augmented Sixth Chords
IV7
4.13: Predominant Seventh Chords

J

jazz
6.1: Swing Rhythms
6.3: Jazz Voicings
6.4: ii–V–I
6.5: Embellishing Chords
6.7: Chord-Scale Theory
6.8: Blues Harmony
8.10: Analyzing with Modes, Scales, and Collections
jazz education
6.7: Chord-Scale Theory
jazz harmonization
6.6: Substitutions
jazz harmony
5.10: Chromatic Sequences
6.2: Chord Symbols
jazz theory
5.13: Altered and Extended Chords
6.6: Substitutions
jazz voicing
6.3: Jazz Voicings
jazz voicings
Chapter 6: Jazz
Johann Joseph Fux
2.7: Gradus ad Parnassum Exercises
JohnPeterson
TitlePage
Joseph Boulogne
4.4: Embellishing Tones
Joseph Straus
8.7: Analyzing with Set Theory (or not!)

K

key
3.7: Ternary Form
key change
4.15: Extended Tonicization and Modulation to Closely Related Keys
key signatures
1.12: Major Scales, Scale Degrees, and Key Signatures
1.13: Minor Scales, Scale Degrees, and Key Signatures
1.19: Roman Numerals and SATB Chord Construction
6.2: Chord Symbols
key takeaways
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
keyboard
1.4: The Keyboard and the Grand Staff
1.5: Half Steps, Whole Steps, and Accidentals
keys
5.6: Chromatic Modulation
keytakeaways
6.4: ii–V–I
kick drum
7.2: Drumbeats
Koji Kondo
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
KyleGullings
TitlePage

L

lead sheet
6.6: Substitutions
lead sheet symbols
6.2: Chord Symbols
leading tone
5.12: The Omnibus Progression
leap
4.4: Embellishing Tones
Let It Go
7.14: Fragile, Absent, and Emergent Tonics
level 1
Chapter 14: Ear Training Appendix
level 2
Chapter 14: Ear Training Appendix
list
12.2: Meter Anthology
listening skills
4.1: Introduction to Harmony, Cadences, and Phrase Endings
lyric invariant
7.4: Introduction to Form in Popular Music
lyric sections
7.6: Verse-Chorus Form
lyric variant
7.4: Introduction to Form in Popular Music
lyrical content
7.5: AABA Form and Strophic Form
lyrics
6.9: Blues Melodies and the Blues Scale
7.3: Melody and Phrasing

M

magic hexachord
9.3: Row Properties
mainsections
3.5: Formal Sections in General
major
1.15: Intervals
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
5.1: Modal Mixture
5.4: Common-Tone Chords (CT°7 and CT+6)
5.8: Augmented Options
5.15: Mediants
major keys
1.17: Seventh Chords
major mode
14.2: Examples for Sight-counting and Sight-singing- Level 1
14.3: Examples for Sight-counting and Sight-singing- Level 2
major scale
1.13: Minor Scales, Scale Degrees, and Key Signatures
8.8: Diatonic Modes
major scales
1.12: Major Scales, Scale Degrees, and Key Signatures
major triad
1.16: Triads
major triads
1.19: Roman Numerals and SATB Chord Construction
5.13: Altered and Extended Chords
MarkGotham
TitlePage
mediant triad
7.11: Puff Schemas
MeganLavengood
TitlePage
melodic
1.15: Intervals
melodic minor
1.13: Minor Scales, Scale Degrees, and Key Signatures
6.7: Chord-Scale Theory
melodic motion
2.4: Third-Species Counterpoint
2.8: 16th-Century Contrapuntal Style
melodic patterns
2.11: Galant Schemas
melodic progression
2.3: Second-Species Counterpoint
melodic shape
2.5: Fourth-Species Counterpoint
melodic tendencies
4.2: Strengthening Endings with V7
melodic variety
2.3: Second-Species Counterpoint

melodic writing
2.1: Introduction to Species Counterpoint
melodicdictation
14.1: The Basics of Sight-Singing and Dictation
melody
2.12: Galant Schemas – Summary
3.1: Foundational Concepts for Phrase-Level Forms
3.4: Expansion and Contraction at the Phrase Level
5.1: Modal Mixture
6.5: Embellishing Chords
6.9: Blues Melodies and the Blues Scale
Chapter 7: Popular Music
10.1: Core Principles of Orchestration
14.3: Examples for Sight-counting and Sight-singing- Level 2
melody organization
3.6: Binary Form
meter
Chapter 1: Fundamentals
1.11: Other Rhythmic Essentials
2.12: Galant Schemas – Summary
Chapter 7: Popular Music
12.2: Meter Anthology
metric modulation
8.1: Twentieth-Century Rhythmic Techniques
metrical patterns
11.5: Hypermeter
metrical_dissonance
Chapter 11: Rhythm and Meter
Middle C
1.6: American Standard Pitch Notation (ASPN)
minor
1.15: Intervals
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
5.1: Modal Mixture
5.8: Augmented Options
5.15: Mediants
minor keys
1.17: Seventh Chords
minor mode
14.2: Examples for Sight-counting and Sight-singing- Level 1
14.3: Examples for Sight-counting and Sight-singing- Level 2
minor scale
1.13: Minor Scales, Scale Degrees, and Key Signatures
minor triad
1.16: Triads
minor triads
1.19: Roman Numerals and SATB Chord Construction
5.13: Altered and Extended Chords
mixture
Chapter 5: Chromaticism
modal
Chapter 5: Chromaticism
8.10: Analyzing with Modes, Scales, and Collections
modal mixture
12.1: Harmony Anthology
modal music
8.8: Diatonic Modes
modalmixture
5.1: Modal Mixture
modern classical music
9.4: Analysis Examples – Webern Op. 21 and 24
modern composers
9.5: History and Context of Serialism
modern music
12.3: Twelve-Tone Anthology
modes
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
7.12: Modal Schemas
7.13: Pentatonic Harmony
modes of limited transposition
8.9: Collections
modulating
5.12: The Omnibus Progression
modulation
3.7: Ternary Form
3.9: Rondo
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
4.15: Extended Tonicization and Modulation to Closely Related Keys
Chapter 5: Chromaticism
5.6: Chromatic Modulation
5.10: Chromatic Sequences
monophony
1.20: Texture
motifs
9.1: Basics of Twelve-Tone Theory
motives
3.1: Foundational Concepts for Phrase-Level Forms
Mozart
10.2: Subtle Color Changes
music
1.1: Introduction to Western Musical Notation
1.2: Notation of Notes, Clefs, and Ledger Lines
1.5: Half Steps, Whole Steps, and Accidentals
1.8: Notating Rhythm
1.9: Simple Meter and Time Signatures
1.10: Compound Meter and Time Signatures
1.12: Major Scales, Scale Degrees, and Key Signatures
1.15: Intervals
2.2: First-Species Counterpoint
2.6: Fifth-Species Counterpoint
2.11: Galant Schemas
3.2: The Phrase, Archetypes, and Unique Forms
5.4: Common-Tone Chords (CT°7 and CT+6)
5.6: Chromatic Modulation
5.9: Equal Divisions of the Octave
6.4: ii–V–I
6.8: Blues Harmony
6.9: Blues Melodies and the Blues Scale
7.3: Melody and Phrasing
7.4: Introduction to Form in Popular Music
7.7: Introduction to Harmonic Schemas in Pop Music
7.10: Classical Schemas (in a Pop Context)
7.12: Modal Schemas
8.6: Interval-Class Vectors
8.8: Diatonic Modes
8.10: Analyzing with Modes, Scales, and Collections
12.1: Harmony Anthology
12.2: Meter Anthology
12.3: Twelve-Tone Anthology
14.3: Examples for Sight-counting and Sight-singing- Level 2
music analysis
3.3: Hybrid Phrase-Level Forms
3.4: Expansion and Contraction at the Phrase Level
3.9: Rondo
4.10: Plagal Motion as a Form of Prolongation
6.2: Chord Symbols
7.12: Modal Schemas
7.13: Pentatonic Harmony
8.3: Intervals in Integer Notation
8.7: Analyzing with Set Theory (or not!)
9.4: Analysis Examples – Webern Op. 21 and 24
10.2: Subtle Color Changes
music composition
4.2: Strengthening Endings with V7
music education
1.4: The Keyboard and the Grand Staff
1.20: Texture
3.1: Foundational Concepts for Phrase-Level Forms
4.7: Performing Harmonic Analysis Using the Phrase Model
4.15: Extended Tonicization and Modulation to Closely Related Keys
5.10: Chromatic Sequences
6.1: Swing Rhythms
6.8: Blues Harmony
7.1: Rhythm and Meter in Pop Music
music history
7.5: AABA Form and Strophic Form
8.8: Diatonic Modes
music invariant
7.4: Introduction to Form in Popular Music
music notation
1.4: The Keyboard and the Grand Staff
2.7: Gradus ad Parnassum Exercises
music production
7.2: Drumbeats
music texture
2.8: 16th-Century Contrapuntal Style

music theory
1.2: Notation of Notes, Clefs, and Ledger Lines
1.4: The Keyboard and the Grand Staff
1.6: American Standard Pitch Notation (ASPN)
1.7: Other Aspects of Notation
1.11: Other Rhythmic Essentials
1.12: Major Scales, Scale Degrees, and Key Signatures
1.13: Minor Scales, Scale Degrees, and Key Signatures
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
1.15: Intervals
1.16: Triads
1.17: Seventh Chords
1.19: Roman Numerals and SATB Chord Construction
1.20: Texture
2.1: Introduction to Species Counterpoint
2.8: 16th-Century Contrapuntal Style
2.11: Galant Schemas
3.4: Expansion and Contraction at the Phrase Level
3.6: Binary Form
4.1: Introduction to Harmony, Cadences, and Phrase Endings
4.2: Strengthening Endings with V7
4.4: Embellishing Tones
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
4.7: Performing Harmonic Analysis Using the Phrase Model
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
4.9: 6/4 Chords as Forms of Prolongation
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
4.13: Predominant Seventh Chords
4.14: Tonicization
4.15: Extended Tonicization and Modulation to Closely Related Keys
5.2: Neapolitan 6th (♭II6)
5.3: Augmented Sixth Chords
5.5: Harmonic Elision
5.7: Reinterpreting Diminished Seventh Chords
5.10: Chromatic Sequences
5.13: Altered and Extended Chords
5.14: Neo-Riemannian Triadic Progressions
5.15: Mediants
6.1: Swing Rhythms
6.2: Chord Symbols
6.3: Jazz Voicings
6.5: Embellishing Chords
6.6: Substitutions
6.8: Blues Harmony
7.1: Rhythm and Meter in Pop Music
7.5: AABA Form and Strophic Form
7.6: Verse-Chorus Form
7.9: Four-Chord Schemas
7.10: Classical Schemas (in a Pop Context)
7.11: Puff Schemas
7.13: Pentatonic Harmony
7.14: Fragile, Absent, and Emergent Tonics
8.1: Twentieth-Century Rhythmic Techniques
8.2: Pitch and Pitch Class
8.3: Intervals in Integer Notation
8.4: Pitch-Class Sets, Normal Order, and Transformations
8.5: Set Class and Prime Form
8.7: Analyzing with Set Theory (or not!)
8.8: Diatonic Modes
8.9: Collections
9.1: Basics of Twelve-Tone Theory
9.2: Naming Conventions for Rows
9.3: Row Properties
9.4: Analysis Examples – Webern Op. 21 and 24
10.1: Core Principles of Orchestration
10.3: Transcription from Piano
12.1: Harmony Anthology
12.3: Twelve-Tone Anthology
music variant
7.4: Introduction to Form in Popular Music
music_theory
1.9: Simple Meter and Time Signatures
musical analysis
3.6: Binary Form
4.1: Introduction to Harmony, Cadences, and Phrase Endings
4.4: Embellishing Tones
5.8: Augmented Options
5.14: Neo-Riemannian Triadic Progressions
7.10: Classical Schemas (in a Pop Context)
8.2: Pitch and Pitch Class
8.4: Pitch-Class Sets, Normal Order, and Transformations
12.1: Harmony Anthology
musical composition
3.7: Ternary Form
6.6: Substitutions
8.1: Twentieth-Century Rhythmic Techniques
musical elements
1.7: Other Aspects of Notation
musical form
3.1: Foundational Concepts for Phrase-Level Forms
3.6: Binary Form
3.9: Rondo
7.4: Introduction to Form in Popular Music
musical frequencies
1.6: American Standard Pitch Notation (ASPN)
musical harmony
1.19: Roman Numerals and SATB Chord Construction
musical ideas
10.3: Transcription from Piano
musical intervals
1.17: Seventh Chords
2.1: Introduction to Species Counterpoint
6.3: Jazz Voicings
8.3: Intervals in Integer Notation
8.4: Pitch-Class Sets, Normal Order, and Transformations
14.3: Examples for Sight-counting and Sight-singing- Level 2
musical modes
7.12: Modal Schemas
musical notation
1.10: Compound Meter and Time Signatures
1.12: Major Scales, Scale Degrees, and Key Signatures
2.11: Galant Schemas
2.12: Galant Schemas – Summary
6.1: Swing Rhythms
6.2: Chord Symbols
musical phrases
4.1: Introduction to Harmony, Cadences, and Phrase Endings
musical progression
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
musical progressions
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
musical relationships
8.7: Analyzing with Set Theory (or not!)
musical structure
3.7: Ternary Form
4.7: Performing Harmonic Analysis Using the Phrase Model
6.1: Swing Rhythms
9.5: History and Context of Serialism
musical technique
9.1: Basics of Twelve-Tone Theory
musical texture
1.20: Texture
8.9: Collections
musical theory
4.3: Strengthening Endings with Strong Predominants
musical_performance
1.9: Simple Meter and Time Signatures
musicalanalysis
3.5: Formal Sections in General
9.2: Naming Conventions for Rows
11.6: Metrical Dissonance
musicalfeatures
1.1: Introduction to Western Musical Notation
musicalform
3.5: Formal Sections in General
musicalnotation
Chapter 1: Fundamentals
1.1: Introduction to Western Musical Notation
1.3: Reading Clefs
14.1: The Basics of Sight-Singing and Dictation
musicalprogression
5.1: Modal Mixture
musicalstructure
11.6: Metrical Dissonance
musicanalysis
7.9: Four-Chord Schemas
musiceducation
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
14.1: The Basics of Sight-Singing and Dictation
musicgenres
7.9: Four-Chord Schemas
musicians
1.4: The Keyboard and the Grand Staff
1.7: Other Aspects of Notation
musicreading
1.3: Reading Clefs
musictheory
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
11.6: Metrical Dissonance

N

namingconventions
Chapter 9: Twelve-Tone Music
natural minor
1.13: Minor Scales, Scale Degrees, and Key Signatures
neapolitan
Chapter 5: Chromaticism
5.2: Neapolitan 6th (♭II6)
neapolitan sixth chords
12.1: Harmony Anthology
neighbor
4.9: 6/4 Chords as Forms of Prolongation
neighbor tone
2.4: Third-Species Counterpoint
4.4: Embellishing Tones
nonprofit
InfoPage
nontonal
9.2: Naming Conventions for Rows
normal order
8.4: Pitch-Class Sets, Normal Order, and Transformations
notable
12.2: Meter Anthology
notated
12.2: Meter Anthology
notatedworks
1.1: Introduction to Western Musical Notation
notating_rhythm
Chapter 11: Rhythm and Meter

notation
1.1: Introduction to Western Musical Notation
1.2: Notation of Notes, Clefs, and Ledger Lines
1.5: Half Steps, Whole Steps, and Accidentals
1.8: Notating Rhythm
note names
1.4: The Keyboard and the Grand Staff
note values
1.8: Notating Rhythm
1.10: Compound Meter and Time Signatures
noteheads
1.2: Notation of Notes, Clefs, and Ledger Lines
notes
Chapter 1: Fundamentals
1.6: American Standard Pitch Notation (ASPN)
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”

O

octave equivalence
8.2: Pitch and Pitch Class
octaveequivalence
1.3: Reading Clefs
octaves
1.6: American Standard Pitch Notation (ASPN)
OER
InfoPage
Olivier Messiaen
8.9: Collections
omnibus progression
5.12: The Omnibus Progression
openeducation
InfoPage
OpenMusicTheory
TitlePage
orchestra
10.2: Subtle Color Changes
orchestral composition
10.3: Transcription from Piano
orchestral music
10.2: Subtle Color Changes
orchestration
10.1: Core Principles of Orchestration
10.3: Transcription from Piano
12.3: Twelve-Tone Anthology
ostinato
2.10: Ground Bass
11.6: Metrical Dissonance

P

Palestrina
2.8: 16th-Century Contrapuntal Style
parallel
5.11: Parallel Chromatic Sequences
parallel relationship
1.13: Minor Scales, Scale Degrees, and Key Signatures
passacaglia
2.10: Ground Bass
passages
12.2: Meter Anthology
passing
4.9: 6/4 Chords as Forms of Prolongation
passing tone
2.3: Second-Species Counterpoint
2.4: Third-Species Counterpoint
4.4: Embellishing Tones
4.5: Strengthening Endings with Cadential 6/4
patterns
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
pedagogical treatise
2.7: Gradus ad Parnassum Exercises
pentatonic
7.13: Pentatonic Harmony
percussion
7.2: Drumbeats
perfect authentic cadence
4.2: Strengthening Endings with V7
performance practice
11.5: Hypermeter
performanceanalysis
9.2: Naming Conventions for Rows
period
3.2: The Phrase, Archetypes, and Unique Forms
Peter Paul and Mary
7.11: Puff Schemas
phrase beginnings
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
phrase endings
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
4.10: Plagal Motion as a Form of Prolongation
phrase middles
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
phrases
3.1: Foundational Concepts for Phrase-Level Forms
3.2: The Phrase, Archetypes, and Unique Forms
3.4: Expansion and Contraction at the Phrase Level
7.3: Melody and Phrasing
Phrasing
Chapter 7: Popular Music
piano
1.4: The Keyboard and the Grand Staff
1.5: Half Steps, Whole Steps, and Accidentals
piano keyboard
1.6: American Standard Pitch Notation (ASPN)
piano music
10.3: Transcription from Piano
pickup note
14.2: Examples for Sight-counting and Sight-singing- Level 1
pitch
1.2: Notation of Notes, Clefs, and Ledger Lines
1.3: Reading Clefs
Chapter 8: 20th- and 21st-Century Techniques
8.2: Pitch and Pitch Class
pitch class
1.6: American Standard Pitch Notation (ASPN)
Chapter 8: 20th- and 21st-Century Techniques
8.2: Pitch and Pitch Class
pitch collections
8.9: Collections
pitchclasses
8.6: Interval-Class Vectors
pitchclassnotation
9.2: Naming Conventions for Rows
pivot
5.6: Chromatic Modulation
placeholder
12.2: Meter Anthology
plagal
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
plagal motion
4.10: Plagal Motion as a Form of Prolongation
polymeter
8.1: Twentieth-Century Rhythmic Techniques
polyphony
1.20: Texture
polyrhythms
11.6: Metrical Dissonance
pop
7.3: Melody and Phrasing
7.7: Introduction to Harmonic Schemas in Pop Music
8.10: Analyzing with Modes, Scales, and Collections
pop music
7.1: Rhythm and Meter in Pop Music
7.2: Drumbeats
7.4: Introduction to Form in Popular Music
7.5: AABA Form and Strophic Form
7.10: Classical Schemas (in a Pop Context)
7.12: Modal Schemas
7.13: Pentatonic Harmony
pop songs
7.12: Modal Schemas
7.14: Fragile, Absent, and Emergent Tonics
popmusic
Chapter 7: Popular Music
7.9: Four-Chord Schemas
popular music
7.6: Verse-Chorus Form
7.11: Puff Schemas
PopularMusic
Chapter 7: Popular Music
postchorus
7.6: Verse-Chorus Form
practice
1.5: Half Steps, Whole Steps, and Accidentals
PracticeTechniques
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
pre_cadential
2.12: Galant Schemas – Summary
prechorus
7.6: Verse-Chorus Form
predominant
4.5: Strengthening Endings with Cadential 6/4
4.7: Performing Harmonic Analysis Using the Phrase Model
4.9: 6/4 Chords as Forms of Prolongation
5.2: Neapolitan 6th (♭II6)
predominant chords
5.3: Augmented Sixth Chords
predominant function
4.10: Plagal Motion as a Form of Prolongation
predominant seventh chords
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
4.13: Predominant Seventh Chords
presentation
3.3: Hybrid Phrase-Level Forms
primarytheme
3.8: Sonata Form
prime form
Chapter 8: 20th- and 21st-Century Techniques
8.5: Set Class and Prime Form
progression
5.2: Neapolitan 6th (♭II6)
6.4: ii–V–I
progressions
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
7.7: Introduction to Harmonic Schemas in Pop Music

prolongation
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
prolonged tonic
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
puff schema
7.11: Puff Schemas
Purcell
2.10: Ground Bass

Q

quadruple_meter
1.9: Simple Meter and Time Signatures
quarter note
1.8: Notating Rhythm
14.2: Examples for Sight-counting and Sight-singing- Level 1

R

Radiohead
7.11: Puff Schemas
recapitulation
3.8: Sonata Form
refrain
3.9: Rondo
reinterpretation
5.6: Chromatic Modulation
relative relationship
1.13: Minor Scales, Scale Degrees, and Key Signatures
repertoire
12.1: Harmony Anthology
repetition
3.4: Expansion and Contraction at the Phrase Level
resolution
4.5: Strengthening Endings with Cadential 6/4
rest values
1.8: Notating Rhythm
rhythm
Chapter 1: Fundamentals
1.2: Notation of Notes, Clefs, and Ledger Lines
1.8: Notating Rhythm
1.9: Simple Meter and Time Signatures
1.11: Other Rhythmic Essentials
6.1: Swing Rhythms
Chapter 7: Popular Music
7.1: Rhythm and Meter in Pop Music
7.2: Drumbeats
10.3: Transcription from Piano
11.5: Hypermeter
14.3: Examples for Sight-counting and Sight-singing- Level 2
rhythm_meter_pop_music
Chapter 11: Rhythm and Meter
rhythmic patterns
2.11: Galant Schemas
7.1: Rhythm and Meter in Pop Music
rhythmic techniques
Chapter 8: 20th- and 21st-Century Techniques
8.1: Twentieth-Century Rhythmic Techniques
rhythmic_essentials
Chapter 11: Rhythm and Meter
rhythmicdictation
14.1: The Basics of Sight-Singing and Dictation
rhythmicpatterns
11.6: Metrical Dissonance
rhythms
1.10: Compound Meter and Time Signatures
rock
7.3: Melody and Phrasing
7.7: Introduction to Harmonic Schemas in Pop Music
rock music
7.1: Rhythm and Meter in Pop Music
7.13: Pentatonic Harmony
Roman numeral analysis
5.5: Harmonic Elision
6.7: Chord-Scale Theory
Roman numerals
2.12: Galant Schemas – Summary
4.14: Tonicization
Romantic music
5.13: Altered and Extended Chords
rondo
3.9: Rondo
rondo form
3.5: Formal Sections in General
root position
1.18: Inversion and Figured Bass
rowproperties
Chapter 9: Twelve-Tone Music
RuleOfTheOctave
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences

S

SATB
2.9: High Baroque Fugal Exposition
scale degrees
1.12: Major Scales, Scale Degrees, and Key Signatures
1.13: Minor Scales, Scale Degrees, and Key Signatures
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
7.13: Pentatonic Harmony
ScaleDegrees
2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences
scales
Chapter 1: Fundamentals
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
Schoenberg
9.5: History and Context of Serialism
second inversion
1.18: Inversion and Figured Bass
second species
Chapter 2: Counterpoint and Galant Schemas
2.3: Second-Species Counterpoint
Second Viennese School
9.1: Basics of Twelve-Tone Theory
secondary dominant
4.14: Tonicization
secondary dominants
5.10: Chromatic Sequences
secondarytheme
3.8: Sonata Form
sections
3.7: Ternary Form
7.3: Melody and Phrasing
7.4: Introduction to Form in Popular Music
semitones
8.3: Intervals in Integer Notation
serialism
8.7: Analyzing with Set Theory (or not!)
Chapter 9: Twelve-Tone Music
9.1: Basics of Twelve-Tone Theory
9.3: Row Properties
9.5: History and Context of Serialism
12.3: Twelve-Tone Anthology
set class
Chapter 8: 20th- and 21st-Century Techniques
8.5: Set Class and Prime Form
set theory
8.2: Pitch and Pitch Class
8.4: Pitch-Class Sets, Normal Order, and Transformations
8.7: Analyzing with Set Theory (or not!)
setclass
8.6: Interval-Class Vectors
seventh
5.4: Common-Tone Chords (CT°7 and CT+6)
seventh chords
1.17: Seventh Chords
1.19: Roman Numerals and SATB Chord Construction
6.2: Chord Symbols
Shostakovich
10.2: Subtle Color Changes
sightsinging
14.1: The Basics of Sight-Singing and Dictation
signatures
Chapter 1: Fundamentals
simple duple meter
14.2: Examples for Sight-counting and Sight-singing- Level 1
simple meter
14.2: Examples for Sight-counting and Sight-singing- Level 1
simple meters
1.10: Compound Meter and Time Signatures
simple triple meter
14.2: Examples for Sight-counting and Sight-singing- Level 1
simple_meter
1.9: Simple Meter and Time Signatures
Chapter 11: Rhythm and Meter
singer/songwriter
7.9: Four-Chord Schemas
sixteenth note
1.8: Notating Rhythm
sixth
5.2: Neapolitan 6th (♭II6)
smooth motion
4.3: Strengthening Endings with Strong Predominants
snare drum
7.2: Drumbeats
solfège
1.12: Major Scales, Scale Degrees, and Key Signatures
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
solmization
14.1: The Basics of Sight-Singing and Dictation
sonata form
3.5: Formal Sections in General
sonata rondo
3.9: Rondo
sonataform
3.8: Sonata Form
song analysis
7.5: AABA Form and Strophic Form

song examples
7.10: Classical Schemas (in a Pop Context)
song form
7.6: Verse-Chorus Form
song structure
7.3: Melody and Phrasing
7.5: AABA Form and Strophic Form
7.6: Verse-Chorus Form
songwriting
7.1: Rhythm and Meter in Pop Music
7.3: Melody and Phrasing
7.7: Introduction to Harmonic Schemas in Pop Music
7.9: Four-Chord Schemas
7.11: Puff Schemas
sonority
8.6: Interval-Class Vectors
sounds
1.1: Introduction to Western Musical Notation
species
2.6: Fifth-Species Counterpoint
species counterpoint
Chapter 2: Counterpoint and Galant Schemas
2.1: Introduction to Species Counterpoint
2.7: Gradus ad Parnassum Exercises
2.8: 16th-Century Contrapuntal Style
stability
3.7: Ternary Form
staff
1.2: Notation of Notes, Clefs, and Ledger Lines
1.3: Reading Clefs
strong beats
2.4: Third-Species Counterpoint
strong predominant
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
strong predominants
4.3: Strengthening Endings with Strong Predominants
strophic form
7.5: AABA Form and Strophic Form
structural features
1.7: Other Aspects of Notation
stylistic periods
1.7: Other Aspects of Notation
subdivision
1.11: Other Rhythmic Essentials
subject
2.9: High Baroque Fugal Exposition
substitutions
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
Chapter 6: Jazz
Sufjan Stevens
7.14: Fragile, Absent, and Emergent Tonics
Super Mario 3
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
suspension
2.5: Fourth-Species Counterpoint
4.5: Strengthening Endings with Cadential 6/4
suspensions
2.6: Fifth-Species Counterpoint
swing
6.1: Swing Rhythms
swing rhythms
Chapter 6: Jazz
swing_rhythms
Chapter 11: Rhythm and Meter
symphony
9.4: Analysis Examples – Webern Op. 21 and 24
syncopation
1.11: Other Rhythmic Essentials
6.1: Swing Rhythms
7.1: Rhythm and Meter in Pop Music
11.6: Metrical Dissonance

T

target chords
5.7: Reinterpreting Diminished Seventh Chords
teaching
1.1: Introduction to Western Musical Notation
teachingstrategies
14.1: The Basics of Sight-Singing and Dictation
techniques
3.4: Expansion and Contraction at the Phrase Level
12.2: Meter Anthology
tempo
1.7: Other Aspects of Notation
tenorclef
1.3: Reading Clefs
ternary
Chapter 3: Form
ternary form
3.7: Ternary Form
text setting
2.8: 16th-Century Contrapuntal Style
textbooks
InfoPage
texture
2.10: Ground Bass
10.1: Core Principles of Orchestration
thematic material
3.6: Binary Form
3.9: Rondo
themes
3.8: Sonata Form
9.1: Basics of Twelve-Tone Theory
theory
1.5: Half Steps, Whole Steps, and Accidentals
1.14: Introduction to Diatonic Modes and the Chromatic “Scale”
3.2: The Phrase, Archetypes, and Unique Forms
6.4: ii–V–I
8.10: Analyzing with Modes, Scales, and Collections
third inversion
1.18: Inversion and Figured Bass
third species
Chapter 2: Counterpoint and Galant Schemas
2.4: Third-Species Counterpoint
three voices
2.7: Gradus ad Parnassum Exercises
timbral cadence
10.2: Subtle Color Changes
timbre
10.1: Core Principles of Orchestration
10.2: Subtle Color Changes
time
Chapter 1: Fundamentals
time signatures
1.10: Compound Meter and Time Signatures
11.5: Hypermeter
14.2: Examples for Sight-counting and Sight-singing- Level 1
time_signatures
1.9: Simple Meter and Time Signatures
Chapter 11: Rhythm and Meter
tonal
8.10: Analyzing with Modes, Scales, and Collections
tonal ambiguity
5.9: Equal Divisions of the Octave
7.14: Fragile, Absent, and Emergent Tonics
tonal context
5.14: Neo-Riemannian Triadic Progressions
tonal harmony
4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings
4.15: Extended Tonicization and Modulation to Closely Related Keys
tonal music
3.5: Formal Sections in General
8.8: Diatonic Modes
tonal stability
6.3: Jazz Voicings
tonalcounterpoint
11.6: Metrical Dissonance
tonalities
7.12: Modal Schemas
tonality
Chapter 4: Diatonic Harmony, Tonicization, and Modulation
5.9: Equal Divisions of the Octave
7.10: Classical Schemas (in a Pop Context)
8.3: Intervals in Integer Notation
tonalmusic
9.2: Naming Conventions for Rows
tonic
1.12: Major Scales, Scale Degrees, and Key Signatures
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord
4.9: 6/4 Chords as Forms of Prolongation
5.1: Modal Mixture
tonic chord
7.14: Fragile, Absent, and Emergent Tonics
tonic prolongation
4.7: Performing Harmonic Analysis Using the Phrase Model
4.10: Plagal Motion as a Form of Prolongation
tonic triad
4.2: Strengthening Endings with V7
14.3: Examples for Sight-counting and Sight-singing- Level 2
tonicization
2.12: Galant Schemas – Summary
4.14: Tonicization
4.15: Extended Tonicization and Modulation to Closely Related Keys
transcription
7.1: Rhythm and Meter in Pop Music
10.3: Transcription from Piano
transformations
3.1: Foundational Concepts for Phrase-Level Forms
5.14: Neo-Riemannian Triadic Progressions
5.15: Mediants
Chapter 8: 20th- and 21st-Century Techniques
9.2: Naming Conventions for Rows
9.3: Row Properties
transition
3.8: Sonata Form
transposition
8.4: Pitch-Class Sets, Normal Order, and Transformations
8.5: Set Class and Prime Form
8.9: Collections
9.1: Basics of Twelve-Tone Theory
treble clef
1.4: The Keyboard and the Grand Staff
trebleclef
1.3: Reading Clefs

triad
1.16: Triads
5.4: Common-Tone Chords (CTº7 and CT+6)
triad types
5.8: Augmented Options
triadic
Chapter 5: Chromaticism
triadic harmonies
1.18: Inversion and Figured Bass
triadic progressions
5.14: Neo-Riemannian Triadic Progressions
triads
Chapter 1: Fundamentals
1.17: Seventh Chords
1.18: Inversion and Figured Bass
1.19: Roman Numerals and SATB Chord Construction
5.11: Parallel Chromatic Sequences
5.15: Mediants
triple_meter
1.9: Simple Meter and Time Signatures
triplet
1.11: Other Rhythmic Essentials
tuplet
1.11: Other Rhythmic Essentials
tutorial
1.5: Half Steps, Whole Steps, and Accidentals
twelvetonemusic
9.2: Naming Conventions for Rows
twelvetonetheory
Chapter 9: Twelve-Tone Music
two voices
2.7: Gradus ad Parnassum Exercises

U

unique
Chapter 3: Form

V

V chord
4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass
V7 resolution
4.2: Strengthening Endings with V7
vectors
8.6: Interval-Class Vectors
VerseChorusForm
Chapter 7: Popular Music
vi7
4.13: Predominant Seventh Chords
video analysis
3.1: Foundational Concepts for Phrase-Level Forms
VirtualLibraryOfVirginia
TitlePage
VIVA
TitlePage
voice
5.4: Common-Tone Chords (CTº7 and CT+6)
voice exchange
5.12: The Omnibus Progression
voice leading
1.19: Roman Numerals and SATB Chord Construction
2.1: Introduction to Species Counterpoint
2.3: Second-Species Counterpoint
4.2: Strengthening Endings with V7
4.3: Strengthening Endings with Strong Predominants
4.5: Strengthening Endings with Cadential 6/4
4.13: Predominant Seventh Chords
4.14: Tonicization
5.2: Neapolitan 6th (♭II6)
5.3: Augmented Sixth Chords
5.5: Harmonic Elision
5.8: Augmented Options
5.10: Chromatic Sequences
5.12: The Omnibus Progression
6.3: Jazz Voicings
6.5: Embellishing Chords
6.7: Chord-Scale Theory
voiceleading
6.4: ii–V–I
voices
2.9: High Baroque Fugal Exposition

W

Webern
Chapter 9: Twelve-Tone Music
9.4: Analysis Examples – Webern Op. 21 and 24
Western classical music
4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s
11.5: Hypermeter
Western music
8.1: Twentieth-Century Rhythmic Techniques
Westernmusicalnotation
1.1: Introduction to Western Musical Notation
whole note
1.8: Notating Rhythm
whole steps
1.5: Half Steps, Whole Steps, and Accidentals

Glossary

Sample Word 1 | Sample Definition 1

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    - 1.7: Other Aspects of Notation - *CC BY-SA 4.0*
    - 1.8: Notating Rhythm - *CC BY-SA 4.0*
    - 1.9: Simple Meter and Time Signatures - *CC BY-SA 4.0*
    - 1.10: Compound Meter and Time Signatures - *CC BY-SA 4.0*
    - 1.11: Other Rhythmic Essentials - *CC BY-SA 4.0*
    - 1.12: Major Scales, Scale Degrees, and Key Signatures - *CC BY-SA 4.0*
    - 1.13: Minor Scales, Scale Degrees, and Key Signatures - *CC BY-SA 4.0*
    - 1.14: Introduction to Diatonic Modes and the Chromatic “Scale” - *CC BY-SA 4.0*
    - 1.15: Intervals - *CC BY-SA 4.0*
    - 1.16: Triads - *CC BY-SA 4.0*
    - 1.17: Seventh Chords - *CC BY-SA 4.0*
    - 1.18: Inversion and Figured Bass - *CC BY-SA 4.0*
    - 1.19: Roman Numerals and SATB Chord Construction - *CC BY-SA 4.0*
    - 1.20: Texture - *CC BY-SA 4.0*
  - Chapter 2: Counterpoint and Galant Schemas - *CC BY-SA 4.0*
    - 2.1: Introduction to Species Counterpoint - *CC BY-SA 4.0*
    - 2.2: First-Species Counterpoint - *CC BY-SA 4.0*
    - 2.3: Second-Species Counterpoint - *CC BY-SA 4.0*
    - 2.4: Third-Species Counterpoint - *CC BY-SA 4.0*
    - 2.5: Fourth-Species Counterpoint - *CC BY-SA 4.0*
    - 2.6: Fifth-Species Counterpoint - *CC BY-SA 4.0*
    - 2.7: Gradus ad Parnassum Exercises - *CC BY-SA 4.0*
    - 2.8: 16th-Century Contrapuntal Style - *CC BY-SA 4.0*
    - 2.9: High Baroque Fugal Exposition - *CC BY-SA 4.0*
    - 2.10: Ground Bass - *CC BY-SA 4.0*
    - 2.11: Galant Schemas - *CC BY-SA 4.0*
    - 2.12: Galant Schemas – Summary - *CC BY-SA 4.0*
    - 2.13: Galant schemas – The Rule of the Octave and Harmonizing the Scale with Sequences - *CC BY-SA 4.0*
  - Chapter 3: Form - *CC BY-SA 4.0*
    - 3.1: Foundational Concepts for Phrase-Level Forms - *CC BY-SA 4.0*
    - 3.2: The Phrase, Archetypes, and Unique Forms - *CC BY-SA 4.0*
    - 3.3: Hybrid Phrase-Level Forms - *CC BY-SA 4.0*
    - 3.4: Expansion and Contraction at the Phrase Level - *CC BY-SA 4.0*
    - 3.5: Formal Sections in General - *CC BY-SA 4.0*
    - 3.6: Binary Form - *CC BY-SA 4.0*
    - 3.7: Ternary Form - *CC BY-SA 4.0*
    - 3.8: Sonata Form - *CC BY-SA 4.0*
    - 3.9: Rondo - *CC BY-SA 4.0*
  - Chapter 4: Diatonic Harmony, Tonicization, and Modulation - *CC BY-SA 4.0*
    - 4.1: Introduction to Harmony, Cadences, and Phrase Endings - *CC BY-SA 4.0*
    - 4.2: Strengthening Endings with V7 - *CC BY-SA 4.0*
    - 4.3: Strengthening Endings with Strong Predominants - *CC BY-SA 4.0*
    - 4.4: Embellishing Tones - *CC BY-SA 4.0*
    - 4.5: Strengthening Endings with Cadential 6/4 - *CC BY-SA 4.0*

- 4.6: Prolonging Tonic at Phrase Beginnings with V6 and Inverted V7s - *CC BY-SA 4.0*
- 4.7: Performing Harmonic Analysis Using the Phrase Model - *CC BY-SA 4.0*
- 4.8: Prolongation at Phrase Beginnings using the Leading-Tone Chord - *CC BY-SA 4.0*
- 4.9: 6/4 Chords as Forms of Prolongation - *CC BY-SA 4.0*
- 4.10: Plagal Motion as a Form of Prolongation - *CC BY-SA 4.0*
- 4.11: La (Scale Degree 6) in the Bass at Beginnings, Middles, and Endings - *CC BY-SA 4.0*
- 4.12: The Mediant Harmonizing Mi (Scale Degree 3) in the Bass - *CC BY-SA 4.0*
- 4.13: Predominant Seventh Chords - *CC BY-SA 4.0*
- 4.14: Tonicization - *CC BY-SA 4.0*
- 4.15: Extended Tonicization and Modulation to Closely Related Keys - *CC BY-SA 4.0*

- Chapter 5: Chromaticism - *CC BY-SA 4.0*
  - 5.1: Modal Mixture - *CC BY-SA 4.0*
  - 5.2: Neapolitan 6th (♭II6) - *CC BY-SA 4.0*
  - 5.3: Augmented Sixth Chords - *CC BY-SA 4.0*
  - 5.4: Common-Tone Chords (CT°7 and CT+6) - *CC BY-SA 4.0*
  - 5.5: Harmonic Elision - *CC BY-SA 4.0*
  - 5.6: Chromatic Modulation - *CC BY-SA 4.0*
  - 5.7: Reinterpreting Diminished Seventh Chords - *CC BY-SA 4.0*
  - 5.8: Augmented Options - *CC BY-SA 4.0*
  - 5.9: Equal Divisions of the Octave - *CC BY-SA 4.0*
  - 5.10: Chromatic Sequences - *CC BY-SA 4.0*
  - 5.11: Parallel Chromatic Sequences - *CC BY-SA 4.0*
  - 5.12: The Omnibus Progression - *CC BY-SA 4.0*
  - 5.13: Altered and Extended Chords - *CC BY-SA 4.0*
  - 5.14: Neo-Riemannian Triadic Progressions - *CC BY-SA 4.0*
  - 5.15: Mediants - *CC BY-SA 4.0*
- Chapter 6: Jazz - *CC BY-SA 4.0*
  - 6.1: Swing Rhythms - *CC BY-SA 4.0*
  - 6.2: Chord Symbols - *CC BY-SA 4.0*
  - 6.3: Jazz Voicings - *CC BY-SA 4.0*
  - 6.4: ii–V–I - *CC BY-SA 4.0*
  - 6.5: Embellishing Chords - *CC BY-SA 4.0*
  - 6.6: Substitutions - *CC BY-SA 4.0*
  - 6.7: Chord-Scale Theory - *CC BY-SA 4.0*
  - 6.8: Blues Harmony - *CC BY-SA 4.0*
  - 6.9: Blues Melodies and the Blues Scale - *CC BY-SA 4.0*
- Chapter 7: Popular Music - *CC BY-SA 4.0*
  - 7.1: Rhythm and Meter in Pop Music - *CC BY-SA 4.0*
  - 7.2: Drumbeats - *CC BY-SA 4.0*
  - 7.3: Melody and Phrasing - *CC BY-SA 4.0*
  - 7.4: Introduction to Form in Popular Music - *CC BY-SA 4.0*
  - 7.5: AABA Form and Strophic Form - *CC BY-SA 4.0*
  - 7.6: Verse-Chorus Form - *CC BY-SA 4.0*
  - 7.7: Introduction to Harmonic Schemas in Pop Music - *CC BY-SA 4.0*
  - 7.8: Blues-Based Schemas - *CC BY-SA 4.0*
  - 7.9: Four-Chord Schemas - *CC BY-SA 4.0*
  - 7.10: Classical Schemas (in a Pop Context) - *CC BY-SA 4.0*
  - 7.11: Puff Schemas - *CC BY-SA 4.0*
  - 7.12: Modal Schemas - *CC BY-SA 4.0*
  - 7.13: Pentatonic Harmony - *CC BY-SA 4.0*
  - 7.14: Fragile, Absent, and Emergent Tonics - *CC BY-SA 4.0*
- Chapter 8: 20th- and 21st-Century Techniques - *CC BY-SA 4.0*
  - 8.1: Twentieth-Century Rhythmic Techniques - *CC BY-SA 4.0*
  - 8.2: Pitch and Pitch Class - *CC BY-SA 4.0*
  - 8.3: Intervals in Integer Notation - *CC BY-SA 4.0*
  - 8.4: Pitch-Class Sets, Normal Order, and Transformations - *CC BY-SA 4.0*
  - 8.5: Set Class and Prime Form - *CC BY-SA 4.0*
  - 8.6: Interval-Class Vectors - *CC BY-SA 4.0*
  - 8.7: Analyzing with Set Theory (or not!) - *CC BY-SA 4.0*
  - 8.8: Diatonic Modes - *CC BY-SA 4.0*
  - 8.9: Collections - *CC BY-SA 4.0*
  - 8.10: Analyzing with Modes, Scales, and Collections - *CC BY-SA 4.0*
- Chapter 9: Twelve-Tone Music - *CC BY-SA 4.0*
  - 9.1: Basics of Twelve-Tone Theory - *CC BY-SA 4.0*
  - 9.2: Naming Conventions for Rows - *CC BY-SA 4.0*
  - 9.3: Row Properties - *CC BY-SA 4.0*
  - 9.4: Analysis Examples – Webern Op. 21 and 24 - *CC BY-SA 4.0*
  - 9.5: History and Context of Serialism - *CC BY-SA 4.0*
- Chapter 10: Orchestration - *CC BY-SA 4.0*
  - 10.1: Core Principles of Orchestration - *CC BY-SA 4.0*
  - 10.2: Subtle Color Changes - *CC BY-SA 4.0*
  - 10.3: Transcription from Piano - *CC BY-SA 4.0*
- Chapter 11: Rhythm and Meter - *CC BY-SA 4.0*
  - 11.1: Notating Rhythm [crosslist] - *CC BY-SA 4.0*
  - 11.2: Simple Meter and Time Signatures [crosslist] - *CC BY-SA 4.0*
  - 11.3: Compound Meter and Time Signatures [crosslist] - *CC BY-SA 4.0*

- 11.4: Other Rhythmic Essentials [crosslist] - *CC BY-SA 4.0*
- 11.5: Hypermeter - *CC BY-SA 4.0*
- 11.6: Metrical Dissonance - *CC BY-SA 4.0*
- 11.7: Swing Rhythms [crosslist] - *CC BY-SA 4.0*
- 11.8: Rhythm and Meter in Pop Music [crosslist] - *CC BY-SA 4.0*
- 11.9: Drumbeats [crosslist] - *CC BY-SA 4.0*
- 11.10: Twentieth-Century Rhythmic Techniques [crosslist] - *CC BY-SA 4.0*

Chapter 12: Anthology - *CC BY-SA 4.0*

- 12.1: Harmony Anthology - *CC BY-SA 4.0*
- 12.2: Meter Anthology - *CC BY-SA 4.0*
- 12.3: Twelve-Tone Anthology - *CC BY-SA 4.0*

Chapter 13: Workbook - *CC BY-SA 4.0*

- 13.1: Digital Workbook - *CC BY-SA 4.0*

Chapter 14: Ear Training Appendix - *CC BY-SA 4.0*

- 14.1: The Basics of Sight-Singing and Dictation - *CC BY-SA 4.0*
- 14.2: Examples for Sight-counting and Sight-singing-Level 1 - *CC BY-SA 4.0*
- 14.3: Examples for Sight-counting and Sight-singing-Level 2 - *CC BY-SA 4.0*

Back Matter - *CC BY-SA 4.0*

- Index - *CC BY-SA 4.0*
- Glossary - *CC BY-SA 4.0*
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