

4.2: Preparing and Managing Qualitative Data

When you have completed data collection for a qualitative research project, you will likely have voluminous quantities of data—thousands of pages of fieldnotes, hundreds of hours of interview recordings, many gigabytes of images or documents—and these quantities of data can seem overwhelming at first. Therefore, preparing and managing your data is an essential part of the qualitative research process. Researchers must find ways to organize the voluminous quantities of data into a form that is useful and workable. This chapter will explore data management and data preparation as steps in the research process, steps that help facilitate data analysis. It will also review methods for data reduction, a step designed to help researchers get a handle on the volumes of data they have collected and coalesce the data into a more manageable form. Finally, it will discuss the use of computer software in qualitative data analysis.

Data Management

Even before the first piece of data is collected, a data management system is a necessity for researchers. Data management helps to ensure that data remain safe, organized, and accessible throughout the research process and that data will be ready for analysis when that part of the project begins. Miles and Huberman (1994) outline a series of processes and procedures that are important parts of data management.

First, researchers must attend to the formatting and layout of their data. Developing a consistent template for storing fieldnotes, interview transcripts, documents, and other materials, and including consistent metadata (data about your data) such as time, date, pseudonym of interviewee, source of document, person who interacted with the data, and other details will be of much use later in the research process.

Similarly, it is essential to keep detailed records of the research process and all research decisions that are made. Storing these inside one's head is insufficient. Researchers should keep a digital file or a paper notebook in which all details and decisions are recorded. For instance, how was the sample conducted? Which potential respondents never ended up going through with the interview? What software decisions were made? When did the digital voice recorder fail, and for how long? What day did the researcher miss going into the field because they were ill? And, going forward, what decisions were made about each step in the analytical process?

As data begin to be collected, it is necessary to have appropriate, well-developed physical and/or digital filing systems to ensure that data are safely stored, well-organized, and easy to retrieve when needed. For paper storage, it is typical to use a set of file folders organized chronologically, by respondent, or by some other meaningful system. For digital storage, researchers might use a similar set of folders or might keep all data in a single folder but use careful file naming conventions (e.g. RespondentPseudonym_Date_Transcript) to make it easy to find each piece of data. Some researchers will keep duplicate copies of all data and use these copies to begin to sort, mark, and organize data in ways that enable the presence of relationships and themes to emerge. For instance, researchers might sort interview transcripts by the way respondents answered a particular key question. Or they might sort fieldnotes by the central activities that took place in the field that day. Activities such as these can be facilitated by the use of index cards, color-coding systems, sticky notes, marginal annotations, or even just piles. Cross-referencing systems may be useful to ensure that thematic files can be connected to respondent-based files or to other relevant thematic files. Finally, it is essential that researchers develop a system of backups to ensure that data is not lost in the event of a catastrophic hard drive failure, a house fire, lack of access to the office for an extended period, or some other type of disaster.

One more issue to attend to in data management is research ethics. It is essential to ensure that confidential data is protected from disclosure; that identifying information (including signed consent forms) are not kept with or linkable to data; and that all researchers, analysts, interns, and administrative personnel involved in a study sign statements of confidentiality to ensure they understand the importance of nondisclosure (Berg 2009). Note that such documents will not protect researchers and research personnel from subpoena by the courts—if research documents will contain information that could expose participants to criminal or legal liability, there are additional concerns to consider and researchers should do due diligence to protect themselves and their respondents (see, e.g., Khan 2019), though the methods and mechanisms for doing so are beyond the scope of this text. Researchers must attend to data security protocols, many of which were likely agreed to in the IRB submission process. For example, paper research records should be locked securely where they cannot be seen by visitors or by personnel or accessed by accident. Digital records should be securely stored in password protected files that meet current standards for strong passwords. Cloud storage or backups should have similar protections, and researchers should carefully review the terms of service to ensure that they continue to own their data and that the data are protected from disclosure.

Preparing Data

In most cases, data are not entirely ready for analysis at the moment at which they are collected. Additional steps must be taken to prepare data for analysis, and these steps are somewhat different depending on the form in which the data exists and the approach to data collection that was used: fieldnotes from observation or ethnography, interviews and other recorded data, or documentary data like texts and images.

Fieldnotes

When researchers conduct ethnographic or observational research, they typically do not have the ability to maintain verbatim recordings. Instead, they maintain fieldnotes. Maintaining fieldnotes is a tricky and time-consuming process! In most instances, researchers cannot take notes—at least not too many—while present in the research site without making themselves conspicuous. Therefore, they need to limit themselves to a couple of jotted words or sentences to help jog their memories later on, though the quantity of notes that can be taken in the field is higher these days because of the possibility of taking notes via smartphone, a notetaking process largely indistinguishable from the socially-ubiquitous practices of text messaging and social media posts. Immediately after leaving the site, researchers use the skeleton of notes they have taken to write up full notes recording everything that happened. And later, within a day or so, many researchers go back over the fieldnotes to edit and refine the fieldnotes into a useful document for later analysis. As this process suggests, analysis is already beginning even while the research is ongoing, as researchers make notes and annotations about theoretical ideas, connections to explore, potential answers to their research questions, and other things in the process of refining their fieldnotes.

When fleshing out fieldnotes, researchers should be attentive to the distinctions between recollections they believe are accurate, interpretations and reflections they have made, and analytical thoughts that develop later through the process of refining the fieldnotes. It is surprisingly easy for a slight mistake in recording, say, which people did what, or in what sequence a series of events occurred, to entirely change the interpretation of circumstances observed in the field. To demonstrate how such issues can arise, consider the following two hypothetical fieldnote excerpts:

Excerpt A	Excerpt B
Sarah walked into the living room and before she knew what happened, she found Marisol on the floor in tears, surrounded by broken bits of glass. “What did you do?” Sarah said, her voice thick with emotion. Marisol covered her face and cried louder.	Her voice thick with emotion, Sarah said, “What did you do?” Before she knew what happened, she found Marisol on the floor in tears, surrounded by bits of broken glass. Sarah walked into the living room. Marisol covered her face and cried louder.

In Excerpt A, the most reasonable interpretation of events is probably that Sarah walked into the room and found Marisol, the victim of an accident, and was concerned about her. In Excerpt B, in contrast, Sarah probably caused the accident herself. Yet the words are exactly the same in both excerpts—they have just been slightly rearranged. This example highlights how important careful attention to detail is in recording, refining, and analyzing fieldnotes (and other forms of qualitative data, for that matter).

Fieldnotes contain within them a vast array of different types of data: records of verbal interactions between people, observations about social practices and interactions, researchers’ inferences and interpretations of social meanings and understandings, and other thoughts (Berg 2009). Therefore, as researchers work to prepare their fieldnotes for analysis, they may need to work through them again to organize and categorize different types of notes for different uses during analysis. The data collected from ethnographic or observational research can also include documents, maps, images, and recordings, which then need to be prepared and managed alongside the fieldnotes.

Interviews & Other Recordings

First of all, interview researchers need to think carefully about the form in which they will obtain their data. While most researchers audio- or video-record their interviews, it is useful to keep additional information alongside the recordings. Typically, this might include a form for keeping track of themes and data from each interview, including details of the context in which the interview took place, such as the location and who was present; biographical information about the participant; notes about theoretical ideas, questions, or themes that occur to the researcher during the interview; and reminders of particularly notable or valuable points during the interview. These information sheets should also contain the same pseudonym or respondent number that is used during the interview recording, and thus can be helpful in matching biographical details to participant quotes at the time of ultimate writeup. Interviewers may also want to consider taking notes throughout the interview, as notes can highlight elements of body language, facial expression, or more subtle comments that might not be picked up on audio recordings. While video recordings can pick up such details, they tend to make participants more self-conscious than do audio recordings.

Once the interview has concluded, recordings need to be transcribed. While automated transcription has improved in recent years, it still falls far short of what is needed to make an accurate transcript. Transcription quality is typically assessed using a metric called the Word Error Rate—basically, dividing the number of incorrect words by the number of words that should appear in the passage—there are other, more complex assessment metrics that take into consideration individual words’ importance to meaning. As of 2020, automated transcription services still tended to have Word Error Rates of over 10%, which may be sufficient for general understanding (such as in the case of apps that convert voicemails to text) but which is definitely too high of an error rate for use in data analysis. And error rates increase when audio recordings contain background noise, accented speech, or the use of dialects other than Standard American English (SAE). There can also be ethical concerns about data privacy when automated services are used (Khamsi 2019). However, automated services can be cost-effective, with a typical cost of about 25 cents per minute of audio (Brewster 2020). For a typical study involving 40 interviews averaging 90 minutes each, this would come to a total cost of about \$900, far less than the cost of human transcription, which averages about \$1 per minute these days. Human transcription is far more accurate, with extremely low Word Error Rates, especially for words essential to meaning. But human transcribers also suffer from increased error when transcribing audio with noisy backgrounds, where multiple speakers may be interrupting one another (for instance in recordings of focus groups), or in cases where speakers have stronger accents or speak in dialects other than Standard American English. For example, a study examining court reporters—professional transcribers with special experience and training at transcribing speech in legal contexts—working in Philadelphia who were assigned to transcribe African American English had average Word Error Rates of above 15%, and these errors were significant enough to fundamentally alter meaning in over 30% of the speech segments they transcribed (Jones *et al.* 2019).

Researchers can, of course, transcribe their recordings themselves, an option that vastly reduces cost but adds an enormous amount of time to the data preparation process. The use of specialized software or devices like foot-pedal controlled playback can facilitate the ease of transcription, but it can easily take up to four hours to complete the transcription of one hour of recordings. This is because people speak far faster than they type—a typical person speaks at a rate of about 150 words per minute and types at a rate more like 30–60 words per minute. Another possibility is to use a kind of hybrid approach in which the researcher uses automated transcription or voice recognition to get a basic—if error-laden—transcript and then corrects it by hand. Given the time that will be invested in correcting the transcript by listening to the recording while reviewing the transcript, even lower-quality transcription services may be acceptable, such as the automated captioning video services like YouTube offer, though of course these services also present data privacy concerns. Alternatively, researchers might use voice-recognition software. The accuracy of such software can typically be improved by training it on the user’s voice. This approach can be especially helpful when interview respondents speak with accents, as the researcher can re-record the interview in their own voice and feed it into software that is already trained to understand the researcher’s voice.

Table 1 below compares different approaches to transcription in terms of financial cost, time, error rate, and ethical concerns. Costs for transcription by the researcher and hybrid approaches are typically limited to the acquisition of software and hardware to aid the transcription process. For a new researcher, this might entail several hundred dollars of cost for a foot pedal, a good headset with microphone, and software, though these costs are often one-time costs not repeated with each project. In contrast, even automated transcription can cost nearly a thousand dollars per project, with costs far higher for the hired human transcriptionists who have much better accuracy. In terms of time, though, automated and hired services require far less of the researchers’ time. Hired services will require some time for turnaround, more if the volume of data is high, but the researcher can work on other things during that time. For self and hybrid transcription approaches, researchers can expect to put in much more time on transcription than they did conducting interviews. For a typical project involving 40 interviews averaging 90 minutes each, the time required to conduct the interviews and transcribe them—not including time spent preparing for interviews, recruiting participants, traveling, analyzing data, or any other task—can easily exceed 300 hours. If you assume a researcher has 10 hours per week to devote to the project, that would mean it would take over 30 weeks just to collect and transcribe the data before analysis could begin. And after transcription is complete,

most researchers find it useful to listen to the recordings again, transcript in hand, to correct any lingering errors and make notes about avenues for exploration during data analysis.

Table 1. Comparing Transcription Approaches for a Typical Interview-Based Research Project

	Cost	Time	Error Rate	Ethical Concerns
Automated	\$900	A few hours turnaround	High	High
Hired	\$3,600	At least several days turnaround	Low for SAE	Probably Low
Self	Minimal	About 240 hours active	Varies	Low
Hybrid	Minimal	Varies, likely at least 120 hours active	Low for SAE	Varies

Note: this table assumes a project involving 40 interviews, all conducted by the main researcher, averaging 90 minutes in length. Time costs do not include interviewing itself, which would add an additional 60 hours to the time required to complete the project.

Documents and Images

Data preparation is far different when data consists of documents and images, as these already exist in textual form. Here, concerns are more likely to revolve around storage, filing, and organization, which will be discussed later in this chapter. However, it can be important to conduct a preliminary review of the data to better understand what is there. And for visual data, it may be especially useful to take notes on the content in and the researcher's impressions of each visual as a starting point to thinking about how to further work with the materials (Saldaña 2016).

There are special concerns about research involving documents and images that are worth noting here. First all, it is important to remember the importance of sampling issues in relation to the use of documents. Sampling is not always a concern—for instance, research involving newspaper articles may involve a well-conducted random sample, or photographs may have been taken by the researcher themselves according to a clear purposive sampling process—but many projects involving textual data have used sampling procedures where it remains unclear how representative the sample is of the universe of data. Researchers must keep careful notes on where the documents and images included in their data came from and what sorts of limitations may exist in the data and include a discussion of these issues in any reporting on their research.

When writing about interview data, it is typical to include excerpts from the interview transcripts. Similarly, when using documents or visual materials, it is preferable to include some of the original data. However, this can be more complex due to copyright concerns. When using published works, there are real legal limits on the quantity of text that you can include without getting permission from the copyright owner, who may make you pay for the privilege. This is not an issue for works that were created or published more than 95 years ago, as their copyrights have expired. For works more recent than that, the use of more than a small portion of the work typically violates copyright, and the use of an image is almost never permitted unless it has been specifically released from copyright (or created by the researcher themselves). Archival data may be subject to specific usage restrictions imposed by the archive or donor. Copyright can make the goal of providing the data in a form useful to the reader very difficult, so you might need to get the copyright clearance or find other creative ways of providing the data.

Data Reduction

In qualitative data analysis, data collection and data analysis are often not two distinct research phases. Rather, as researchers collect data, they begin to develop themes, ask analytical questions, write theoretical memos, and otherwise begin the work of analysis. And when researchers are analyzing data, they may find they need to go back and collect more to flesh out certain areas that need further elaboration (Taylor, Bogdan, and DeVault 2016). But as researchers move further towards analysis, one of the first steps is reading through all of the data they have collected. Many qualitative researchers recommend taking notes on the data and/or annotating it with simple notations like circles or highlighting to focus your attention on those passages that seem especially fruitful for later focus (Saldaña 2016). This is often called “pre-coding.” Other approaches to pre-coding include noting hypotheses about what might emerge elsewhere in the data, summarizing the main ideas of each piece of data and annotating it with details about the respondent or circumstances of its creation, and taking preliminary notes about concepts or ideas that emerge.

This sort of work is often called “preliminary analysis,” as it enables researchers to start making connections and working with themes and theoretical ideas, but before you get to the point of making actual conclusions. It is also a form of data reduction. In qualitative analysis, the volume of data collected in any given research project is often enormous, far more than can be productively dealt with in any particular project or publication. Thus, data reduction refers to the process of reducing large volumes of data such that the more meaningful or important parts are accessible. As sociologist Kristen Luker points out in her text *Salsa Dancing into the Social Sciences* (2008), what we are really trying to do is recognize patterns, and data reduction is a process of sifting through, digesting, and thinking about our data until we can see the patterns we might not have seen before. Luker argues that one important way to help ourselves see patterns is to talk about our data with others—lots of others, and not just other social scientists—until what we are explaining starts to make sense.

There are a variety of approaches to data reduction. Which of these are useful for a particular project depends on the type and form of data, the priorities of the researcher, and the goals of the research project, and so each researcher must decide for themselves how to proceed. One approach is summarization. Here, researchers write short summaries of the data—summaries of individual interview transcripts, of particular days or weeks of fieldnotes, or of documents. Then, these summaries can be used for preliminary analysis rather than requiring full engagement with the larger body of data. Another approach involves writing memos about the data in which connections, patterns, or theoretical ideas can be laid out with reference to particular segments of the data. A third approach is annotation, in which marginal notes are used to highlight or draw attention to particularly important or noteworthy segments of the data. And Luker's suggestion of conversations about our data with others can be understood as a form of data reduction, especially if we record notes about our conversations.

One of the approaches to data reduction which many analysts find most useful is the creation of typologies, or systems by which objects, events, people, or ideas can be classified into categories. In constructing typologies, researchers develop a set of mutually-exclusive categories—no one can be placed into more than one

category of the typology (Berg 2009)—that are, ideally, also exhaustive, so that no one is left out of the set of categories (an “other” category can always be used for those hard to classify). They then go through all their pieces of data or data elements, be they interview participants, events recorded in fieldnotes, photographs, tweets, or something else, and place each one into a category. Then, they examine the contents of each category to see what common elements and analytical ideas emerge and write notes about these elements and ideas.

One approach to data reduction which qualitative researchers often fall back on but which they should be extremely careful with is quantification. Quantification involves the transformation of non-numerical data into numerical data. For example, if a researcher counts the number of interview respondents who talk about a particular issue, that is a form of quantification. Some limited quantification is common in qualitative analysis, though its use should be particularly rare in ethnographic research given the fact that ethnographic research typically relies on one or a very small number of cases. However, the use of quantification should be constrained to those circumstances where it provides particularly useful or illuminating descriptive information about the data, and not as a core analytical tool. In addition, given that it is exceptionally uncommon for qualitative research projects to produce generalizable findings, any discussion of quantified data should focus on numbers rather than percents. Numbers are descriptive—“35 out of 40 interview respondents said they had argued with housemates over chores in the past week”—while percents suggest broader and more generalizable claims (“87.5% of respondents said they had argued with housemates over chores in the past week”).

Qualitative Data Analysis Software

As part of the process of preparing data for analysis and planning an analysis strategy, many—though not all—qualitative researchers today use software applications to facilitate their work. The use of such technologies has had a profound impact on the way research is carried out, as have many technological changes over history. Take a much older example: the development of technology permitting for the audio recording of interviews. This technology made it possible to develop verbatim transcripts, whereas prior interview-based research had to rely on handwritten notes conveying the interview content—or, if the interviewer had significant financial resources, perhaps a stenographer. Recordings and verbatim transcripts also made it possible for researchers to minutely analyze speech patterns, specific word choices, tones of voice, and other elements that would not previously have been able to be preserved.

Today’s technologies make it easier to store and retrieve data, make it faster to process and analyze data, and provide access to new analytical possibilities. On a basic level, software can allow for more sophisticated possibilities for linking data to memos and other documents. And there are a variety of other benefits (Adler and Clark 2008) to the use of software-aided analysis (often referred to as CAQDAS, or computer-aided qualitative data analysis software). It can allow for more attention to detail, more systematic analysis, and the use of more cases, especially when dealing with large data sets or in circumstances where some quantification is desirable. The use of CAQDAS can enhance the perception of rigor, which can be useful when bringing qualitative data to bear in settings where those using data are more used to quantitative analysis. When coding (to be discussed further in the chapter on qualitative coding), software enhances flexibility and complexity, and may enliven the coding process. And software can provide complex relational analysis tools that go well beyond what would be possible by hand.

However, there are limitations to the use of CAQDAS as well (Adler and Clark 2008). Software can promote ways of thinking about data that are disconnected from qualitative ideals, whether through reductions in the connection between data and context or the increased pressure to quantify. Each individual software application creates a specific model of the architecture of data and knowledge, and analysis may become shaped or constrained by this architecture. Coding schemes, taxonomies, and strategies may reflect the capacities available in and the structures prioritized by the software rather than reflecting what is actually happening in the data itself, and this can further homogenize research, as researchers draw from a few common software applications rather than from a wide variety of personal approaches to analysis. Software can also increase the psychic distance between the researcher or analyst and their data and reduce the likelihood of researchers understanding the limitations of their data. The tools available in CAQDAS applications tend to emphasize typical data rather than unusual data, and so outliers or negative cases may be missed. Finally, CAQDAS does not always reduce the amount of time that a research project takes, especially for newer users and in cases with smaller sets of data. This is because there can be very steep learning curves and prolonged set-up procedures.

The fact that this list of limitations is somewhat longer than the list of positives should not be understood as suggesting that researchers avoid CAQDAS-based approaches. Software truly does make forms of research possible that would not have been without it, speeds data processing tasks, and makes a variety of analytical tasks much easier to do, especially when they require attention to detail. And digital technologies, including both software applications and hardware devices, facilitate so much about how qualitative researchers work today. There are a wide variety of types of technological aids to the qualitative research purpose, each with different functions.

First of all, digital technologies can be used for capturing qualitative data. This may seem obvious, but as the example of audio recording above suggests, the development of technologies like audio and film recording, especially via cellphone or other small personal devices, led to profound changes in the way qualitative research is carried out as well as an expansion in the types of research that are possible. Other technologies that have had similar impacts include the photocopier and scanner, and more recently the possibility to use a cell phone to capture photographs of documents in archives (without the flash on to avoid damaging delicate items). Finally, videoconferencing software makes it possible to interview people who are halfway around the world, and most videoconferencing platforms have a built-in option to save a video record of the conversation, and potentially autocaption it. It’s also worth noting that digital technologies provide access to sources of data that simply did not exist in the past, whether interviewing via videoconferencing, content analysis of social media, or ethnography of massively-multiplayer online games or worlds.

Software applications are very useful for data management tasks. The ability to store, file, and search electronic documents makes the management of huge quantities of data much more feasible. Storing metadata with files can help enormously with the management of visual data and other files. Word processing programs are also relevant here. They help us produce and revise text and reports, compile and edit our fieldnotes and transcriptions, write memos, make tables, count words, and search for and count specific words and phrases. Graphics programs can also facilitate the creation of graphs, charts, infographics, and other data displays. Finally, speech recognition programs aid our transcription process and, for some of us, our writing process.

Coding programs fall somewhere between data reduction and data analysis in their functions. Such software applications typically provide researchers with the ability to apply one or more codes to specific segments of text, search for and retrieve all segments that have had particular codes applied to them, and look at relationships between different codes. Some also provide data management features, allowing researchers to store memos, documents, and other materials alongside the coded text, and allow for interrater reliability testing (to be discussed in another chapter). Finally, there are a variety of data analysis tools. These tools allow researchers to carry out functions like organizing coded data into maps or diagrams, testing hypotheses, merging work carried out by different

researchers, building theory, utilizing formal comparative methods, creating diagrams of networks, and others. Many of these features will be discussed in subsequent chapters.

Choosing the Right Software

There are so many programs out there that carry out each of the functions discussed above, with new ones appearing constantly. Because the state of technology changes all the time, it is outside the scope of this chapter to detail specific options for software applications, though online resources can be helpful in this regard (see, e.g., University of Surrey n.d.). But researchers still need to make decisions about which software to use. So, how do researchers choose the right qualitative software application or applications for their projects? There are four primary sets of questions researchers should ask themselves to help with this decision.

First, what functions does this research need and does this project require? As discussed above, programs have very different functions. In many cases, researchers may need to combine multiple programs to get access to all the functions they need. In other cases, researchers may need only a simple software application already available on their computers.

Second, researchers should consider how they use technology. There are a variety of questions that are relevant here. For example, what kind of device will be used, a desktop computer, laptop, tablet, or phone? What operating system, Windows, Mac/iOS, Chrome, or Android? How much experience and skill do researchers have with computers—do they need software applications that are very easy to use, or can they handle command-line interfaces that require some programming skills? Do they prefer software that is installed on their devices or a cloud-based approach? And will the researcher be working alone or as part of a team where multiple people need to contribute and share access to the same materials?

What type of data will be used? Will it be textual, visual, audio, or video? Will data come from multiple sources and styles or will it all be consistent? Is the data organized or free-form? What is the magnitude of the data that will be analyzed?

Finally, what resources does the researcher already have available? What software can they access, whether already available on their personal computing devices or via licenses provided by their employer or college/university? What degree of technical support can they access, and are technical support personnel familiar with CAQDAS? And how much money do they have available to pay for software on a one-time or ongoing basis? Note that some software can be purchased, while other software is provided as a service with a monthly subscription fee. And even when software is purchased, licenses may only provide access for a limited time period such as a year. Thus, both short-term and long-term financial costs and resource availability should be assessed prior to committing to a software package.

Exercises

1. Transcribe about 10 minutes of an audio interview—one good source might be your local NPR station's website. Be sure that your transcription is an *exact record* of what was said, including any pauses, laughter, vulgarities, or other kinds of things you might not typically write in an academic context, and that you transcribe both questions and responses. What was it like to complete this exercise?
2. Use the course listings at your college or university as a set of data. Develop a typology of different types of courses—*not* based on the department or school offering them or the course number alone—and classify courses within this typology. What does this exercise tell you about the curriculum at your college or university?
3. Review the notes, documents, and other materials you have already collected from this course and develop a new system of file management for them, with digital or physical folders, subfolders, and labels or file names that make items easy to locate.

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