

## CHAPTER OVERVIEW

### 12: One-way Analysis of Variance

#### Introduction

We left off with two-group experiments in [Chapter 10](#) where we introduced two-sample tests of the null hypothesis of no difference between the middles for each group (if means, t-tests; if medians, Wilcoxon test).

As review, please revisit what we mean by **independent variables** (statistical jargon for “different treatments, like a placebo vs. aspirin therapy”) and dependent variables (statistical jargon for “**response** or **outcome** of the experiment was recorded as number of living or dead subjects”).

Variables are **independent** in the sense that the values are not related to the experiment’s outcome — we select the levels of the variables. For example, we select to study green vs. red leaves (the variable is “leaf color”, and there are only two levels or states of the variable: green & red). In contrast, we denote the values of the response variable as dependent because the particular values that the variable will take depend on the experiment.

It’s rare that you, as a researcher, would only be interested in comparing two samples or two groups of data for which a treatment has been applied in an experiment or investigation. More often, inferences are drawn on multiple samples (more than two groups) and an experiment involves multiple groups (one or more controls plus one or more experimental treatments).

Previously, we have discussed data sets with only one or two samples or populations (e.g. one- and two-sample t-tests, Mann-Whitney tests). Now we want to extend the discussion of statistics to situations where we may have more than two samples or populations. We introduce the **ANalysis Of VAriance (ANOVA)**.

Importantly, we will see that one- and two-sample tests are just simple cases of ANOVA. Thus, use of ANOVA should be your preference, even if you have just two groups.

[12.1: The need for ANOVA](#)

[12.2: One-way ANOVA](#)

[12.3: Fixed effects, random effects, and ICC](#)

[12.4: ANOVA from "sufficient statistics"](#)

[12.5: Effect size for ANOVA](#)

[12.6: ANOVA post-hoc tests](#)

[12.7: Many tests, one model](#)

[12.8: Chapter 12 References](#)

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