

Preface

I worked as a statistical consultant at the University of California, Los Angeles, ATS statistical consulting group for over 12 years. Before the start of every walk-in consulting session, I would wonder about the questions that would walk into our office. Every session was different, with people bringing questions from all parts of the campus. When a new client walked in the door, one of my first questions was, What department are you from? It might have seemed like a polite question as we got to know each other before diving into the heart of his or her problem. But this was an essential question for me: the answer would guide the way I handled the entire visit.

In working as a consultant who served so many schools and departments, I discovered that there are many regional dialects of statistics. Depending on your school or department, there are certain types of statistical models you emphasize, customs you embrace, and types of terminology you favor. This is why there are statistics books that are written specifically for certain disciplines—to address the statistical customs and traditions within that discipline.

My home discipline is psychology, in which I received my bachelor's, master's, and doctorate. As I was taught statistics, my professors focused on forming specific hypothesis tests for the exact predicted pattern of results. They emphasized taking a laserlike focus on specific contrasts that would directly test the hypothesis of interest. This was especially the case when I was taught about factorial analysis of variance (ANOVA), where a finding of an overall interaction effect was nothing to get excited about because the significant interaction could be consistent with a variety of patterns of results, some of which could be contrary to our hypotheses. We were taught to graph the interactions and probe and dissect the interaction using planned contrasts to test for the exact pattern of results that we hypothesized.

I brought this training to my statistical consulting and my use of statistical packages. However, I frequently found that my training regarding ways of dissecting interactions was not so easily supported by statistical packages—that is, until the most recent versions of Stata. Unlike any other statistical package that I have ever used, Stata provides a suite of tools that allows us to probe, interpret, understand, and graph the results of ANOVA models. These tools are incredibly powerful; they are also very simple and intuitive. In this book, I show how you can use this suite of ANOVA tools to easily form contrasts among groups and dissect interactions with surgical precision. This allows you to present tests of hypotheses regarding the specific pattern of your results, establishing not only that your results are significant but also that they are in the pattern predicted. The suite of tools also integrates graphing tools so that you can use graphics as a means of interpreting your results and for presenting results to others.

The heart and spirit of this book is about showcasing this suite of ANOVA tools that Stata offers, but that does not mean this book is limited to just the presentation of ANOVA. This is because this suite of ANOVA tools can be applied to a wide variety of designs, including analysis of covariance, analysis of covariance with interactions, repeated measures designs, longitudinal designs, and the analysis of survey data to name just a few. This suite of tools can also be used in the context of a wide variety of regression modeling methods, including ordinary regression, robust regression, multilevel models, logistic regression, and Poisson regression.

As I see it, one of the strengths of learning statistics from a behavioral science perspective is seeing how factorial designs can help us understand how the effect of one variable is moderated by another variable through testing of interactions. With most statistical packages, you are handcuffed to using these tools only in the context of a traditional ANOVA. Once you extend your reach outside that realm, these tools are taken away from you. In Stata, you carry this suite of tools with you as you run a multilevel model, a robust regression, a logistic regression, or even a regression based on complex survey sampling. In this book, my aim is to show how you can use these familiar tools and to enable you to apply them across a wide variety of designs and modeling methods.

While this book draws upon my statistical training from the perspective of psychology, it is written for anyone in the behavioral sciences and anyone who would like to learn how to apply ANOVA (and ANOVA-like tools) to a variety of designs and modeling techniques using Stata. Regardless of your home discipline, I hope this book shows how you can use Stata to understand your results so that you can interpret and present them with clarity and confidence.

Valencia, California
July 2015

Michael N. Mitchell