STATISTICS *for* SOCIAL UNDERSTANDING

With Stata and SPSS

NANCY WHITTIER
Smith College

TINA WILDHAGEN
Smith College

HOWARD J. GOLD
Smith College

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Preface

The idea for *Statistics for Social Understanding: With Stata and SPSS* began with our desire to offer a different kind of book to our statistics students. We wanted a book that would introduce students to the way statistics are actually used in the social sciences: as a tool for advancing understanding of the social world. We wanted thorough coverage of statistical topics, with a balanced approach to calculation and the use of statistical software, and we wanted the textbook to cover the use of software as a way to explore data and answer exciting questions. We also wanted a textbook that incorporated Stata, which is widely used in graduate programs and is increasingly used in undergraduate classes, as well as SPSS, which remains widespread. We wanted a book designed for introductory students in the social sciences, including those with little quantitative background, but one that did not talk down to students and that covered the conceptual aspects of statistics in detail even when the mathematical details were minimized. We wanted a clearly written, engaging book, with plenty of practice problems of every type and easily available data sets for classroom use.

We are excited to introduce this book to students and instructors. We are three experienced instructors of statistics, two sociologists and a political scientist, with more than sixty combined years of teaching experience in this area. We drew on our teaching experience and research on the teaching and learning of statistics to write what we think will be a more effective textbook for fostering student learning.

In addition, we are excited to share our experiences teaching statistics to social science students by authoring the book's ancillary materials, which include not only practice problems, test banks, and data sets but also suggested class exercises, PowerPoint slides, assignments, lecture notes, and class exercises.

Statistics for Social Understanding is distinguished by several features: (1) It is the only major introductory statistics book to integrate Stata and SPSS, giving instructors a choice of which software package to use. (2) It teaches statistics the way they are used in the social sciences. This includes beginning every chapter with examples from real research and taking students through research questions as we cover statistical techniques or software applications. It also includes extensive discussion of relationships between variables, through the earlier placement of the chapter on cross-tabulation, the addition of a dedicated chapter on causality, and comparative examples throughout every chapter of the book. (3) It is informed by

research on the teaching and learning of quantitative material and uses principles of universal design to optimize its contents for a variety of learning styles.

Distinguishing Features

1) Integrates Stata and SPSS

While most existing textbooks use only SPSS or assume that students will purchase an additional, costly, supplemental text for Stata, this book can be used with either Stata or SPSS. We include parallel sections for both SPSS and Stata at the end of every chapter. These sections are written to ensure that students understand that software is a tool to be used to improve their own statistical reasoning, not a replacement for it.[1] The book walks students through how to use Stata and SPSS to analyze interesting and relevant research questions. We not only provide students with the syntax or menu selections that they will use to carry out these commands but also carefully explain the statistical procedures that the commands are telling Stata or SPSS to perform. In this way, we encourage students to engage in statistical reasoning as they use software, not to think of Stata or SPSS as doing the statistical reasoning for them. For Stata, we teach students the basic underlying structure of Stata syntax. This approach facilitates a more intuitive understanding of how the program works, promoting greater confidence and competence among students. For SPSS, we teach students to navigate the menus fluently.

2) Draws on teaching and learning research

Our approach is informed by research on teaching and learning in math and statistics and takes a universal design approach to accommodate multiple learning styles. We take the following research-based approaches:

- Research on teaching math shows that students learn better when teachers use multiple examples and explanations of topics.[2] The book explains topics in multiple ways, using both alternative verbal explanations and visual representations. As experienced instructors, we know the topics that students frequently stumble over and give special attention to explaining these areas in multiple ways. This approach also accommodates differences in learning styles across students.
- Some chapter examples and practice problems lead students through the process of addressing a problem by acknowledging commonly held misconceptions before presenting the proper solution. This approach is based on research that shows that simply presenting students with information that corrects their statistical misconceptions is not enough to change these "strong and resilient" misconceptions.[3] Students need to be able to examine the differences in the reasoning underlying incorrect and correct strategies of statistical work.
- Each chapter provides numerous, carefully proofread, practice problems, with additional practice problems on the text's website. Students learn best by

doing, and the book provides numerous opportunities for problem-solving.

- The book avoids the "busy" layout used by some textbooks, which can distract students' attention from the content, particularly those with learning differences. Drawing on the principles of universal design, our book utilizes a clean, streamlined layout that will allow all students to focus on the content without unnecessary distractions.[4] Boxes are clearly labeled as either "In Depth," which provide more detailed discussion or coverage of more complex topics, or "Application," which provide additional examples. We avoid sidebars; terms defined in the glossary are bolded and defined in the text, not in a sidebar.
- In keeping with principles of universal design, we use both text and images to explain material (with more figures and illustrations than in many books).

3) Incorporates real-world research and a real-world approach to the use of statistics

Each chapter begins with an engaging real-world social science question and examples from research. Chapters integrate examples and applications throughout. Chapters raise real-world questions that can be addressed using a given technique, explain the technique, provide an example using the same question, and show how related questions can also be addressed using Stata or SPSS. We use data sets that are widely used in the social sciences, including the General Social Survey, American National Election Study, World Values Survey, and School Survey on Crime and Safety. Applied questions draw from sociology, political science, criminology, and related fields. Several data sets, including all of those used in the software sections, are available to students and instructors (in both Stata and SPSS formats) through the textbook's website. By using and making available major social science data sets, we engage students in a problem-focused effort to make sense of real and engaging data and enable them to ask and answer their own questions. Robust ancillary materials, such as sample class exercises and assignments, make it easy for instructors to structure students' engagement with these data. The SPSS and Stata sections at the end of each chapter allow students to follow along.

Throughout the book, we discuss issues and questions that working social scientists routinely confront, such as how to use missing data, recode variables (including conceptual and statistical considerations), combine variables into new measures, think about outliers or atypical cases, choose appropriate measures, weigh considerations of causation, and interpret results.

The focus in every chapter on relationships between variables or comparisons across groups also reflects our commitment to showing students the power of statistics to answer important real-world questions.

4) Uses accessible, non-condescending approach and tone

We have written a text that is student-friendly but not condescending. We have found that,

in an effort to assuage students' anxiety about statistics, some texts strike a tone that communicates the *expectation* that students lack confidence in their abilities. We are conscious of the possibility that addressing students with the assumption that they hate or are intimidated by statistics could activate stereotype threat—the well-established fact that, when students feel that they are expected to perform poorly, their anxiety over disproving that stereotype makes their performance worse than it otherwise would be. In selecting examples, we have remained alert to the risk of stereotype threat, choosing examples that do not activate (or even challenge) gender or racial stereotypes about academic performance.

5) Balances calculation and concepts

This book is aimed at courses that teach statistics from the perspective of social science. Thus, the book frames the point of learning statistics as the analysis of important social science questions. While we include some formulas and hand calculation, we do so in order to help students understand where the numbers come from. We believe students need to be able to reason statistically, not simply use software to produce results, but we recognize that most working researchers rely on statistical software, and we strike a balance among these skills. At the same time, we spend more time on conceptual understanding, including more in-depth consideration of topics relating to causality, and we include topics often omitted from other texts such as the use of confidence intervals as a follow-up to a hypothesis test. A lighter focus on hand calculation opens up time in the semester for topics that are most important to understanding statistical social sciences. Our aim is to give students the tools they might use as working researchers in a variety of professions (from jobs in small organizations where they might be reading and writing up external data or doing program evaluation, to research or data analysis jobs) and prepare them for higher-level statistics classes if they choose to take them.

For Instructors

Organization of the Text

The textbook begins with descriptive statistics in chapters 2 through 5. One key difference from many introductory statistics texts is that we introduce cross-tabulations early, after frequency distributions and before central tendency and variability. In our experience as instructors, we have noticed that students often begin thinking about relationships between variables at the very beginning of the class, asking questions about how groups differ in their frequency distributions of some variable, for example. Cross-tabulations follow naturally at this point in the class and allow students to engage in real-world data analysis and investigate questions of causality relatively early in the course. Chapters 6 and 7 lay the foundation for inferential statistics, covering probability, the normal distribution, and sampling distributions. We cover elementary probability in the context of the normal distribution, with a focus on the logic of probability and probabilistic reasoning in order to lay the groundwork for an understanding of inferential statistics. Chapters 8 through

12 cover the basics of inferential statistics, including confidence intervals, hypothesis testing, z- and t-tests, analysis of variance, and chi-square. Chapter 13, unusual among introductory statistics texts, focuses on the logic of causality and control variables. Most existing texts address this topic more briefly (or not at all), but, in our experience, it is an important topic that we all supplement in lecture. Finally, chapter 14 covers correlation and regression. While that chapter is pitched to an introductory level, we pay more attention to multiple regression than do many texts, because it is so widely used, and we have a box on logistic regression to introduce students to the range of models that working social scientists employ.

Instructors who wish to cover chapters in a different order—for example, delaying cross-tabulations until later in the semester—can readily do so. Some courses may not cover probability or analysis of variance, and those chapters can be omitted. For instructors who want to follow the order of this book in their class, the ancillary materials make it easy to do so.

For Students

In a course evaluation, one of our students offered advice to future students:

> Use the textbook! it is incredibly specific and helpful.

We agree, and not just because we wrote it! We suggest reading the assigned section of the chapter before class and working the example problems, pencil in hand, as you read. Make a note of anything you don't understand and ask questions or attend especially to that material in class. After class, look back at the "Chapter Summary" and work the practice problems to consolidate your understanding. If you found a chapter especially difficult on your first pass through, try to reread it after you have covered the material in class. This may seem time-consuming, but you not only will improve your understanding (and your grade) but will save time when it comes to studying for midterm and final exams or completing class projects. As another student explained:

> The textbook format let me go through the material from class at a slower pace and I could turn to it for step-by-step help in doing the assignments.

Similarly, you should look through the software sections before you conduct these exercises in class or lab. You do not need to try to memorize the SPSS or Stata commands, but familiarize yourself with the procedures and the reasons for them. As with the rest of the chapter, hands-on practice is key here, too.

Remember, you are taking this class because you want to understand the social world. As another of our students wrote:

> If you are not too familiar with working with numbers, that is just fine! This course is designed as an analytical course which means that you will be focusing more so on the meaning behind numbers and statistics rather than just focusing on finding "correct" answers.

The companion website contains more study materials and gives you access to

the data sets used for the software sections in the textbook. You can use these data sets and your newfound skill in SPSS or Stata to investigate questions you are interested in, beyond those we cover.

Chapter 1 contains more tips on studying and learning as well as overcoming math anxiety.

Ancillaries

This book is accompanied by a learning package, written by the authors, that is designed to enhance the experience of both instructors and students.

For Instructors

Instructor's Manual with Solutions. This valuable resource includes a sample course syllabus and links to the publicly available data sets used in the Stata and SPSS sections of the text. For each chapter, it includes lecture notes, suggested classroom activities, discussion questions, and the solutions to the practice problems. The Instructor's Manual with Solutions is available to adopters for download on the text's catalog page at https://rowman.com/ISBN/9781538109830.

Test Bank. The Test Bank includes both short answer and multiple choice items and is available in either Word or Respondus format. In either format, the Test Bank can be fully edited and customized to best meet your needs. The Test Bank is available to adopters for download on the text's catalog page at https://rowman.com/ISBN/9781538109830.

PowerPoint® Slides. The PowerPoint presentation provides lecture slides for every chapter. In addition, multiple choice review slides for classroom use are available for each chapter. The presentation is available to adopters for download on the text's catalog page at https://rowman.com/ISBN/9781538109830.

For Students

Companion Website. Accompanying the text is an open-access Companion Website designed to reinforce key topics and concepts. For each chapter, students will have access to:

- Publicly available data sets used in the Stata and SPSS sections
- Flashcards of key concepts
- Discussion questions

Students can access the Companion Website from their computers or mobile devices at https://textbooks.rowman.com/whittier.

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Notes

[1] S. Friel. 2007. "The Research Frontier: Where Technology Interacts with the Teaching and Learning of Data Analysis." In M. K. Heid and G. W. Blume (eds.), *Research on Technology and the Teaching and Learning of Mathematics: Syntheses and Perspectives*, Volume 2 (pp. 279–331). Greenwich: Information Age Publishing, Inc.

[2] J. R. Star. 2016. "Small Steps Forward: Improving Mathematics Instruction Incrementally." *Phi Delta Kappan* 97: 58–62.

[3] J. Garfield and D. Ben-Zvi. 2007. "How Students Learn Statistics Revisited: A Current Review of Research on Teaching and Learning Statistics." *International Statistical Review* 75: 372–396.

[4] S. E. Burgstahler. 2015. *Universal Design in Higher Education: From Principles to Practice*. Cambridge, MA: Harvard Education Press.

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About the Authors

Nancy Whittier is Sophia Smith Professor of Sociology at Smith College. She has taught statistics and research methods for twenty-five years and also teaches classes on gender, sexuality, and social movements. She is the author of *Frenemies: Feminists, Conservatives, and Sexual Violence*; *The Politics of Child Sexual Abuse: Emotions, Social Movements, and the State*; *Feminist Generations* and numerous articles on social movements, gender, and sexual violence. She is co-editor (with David S. Meyer and Belinda Robnett) of *Social Movements: Identities, Culture, and the State* and (with Verta Taylor and Leila Rupp) *Feminist Frontiers*.

Tina Wildhagen is Associate Professor of Sociology and Dean of the Sophomore Class at Smith College. She has taught statistics and quantitative research methods for more than a decade and also teaches courses on privilege and power in American education and inequality in higher education. Her research and teaching interests focus on social inequality in the American education system and on first-generation college students. Her work appears in various scholarly journals, including *The Sociological Quarterly, Sociological Perspectives, The Teachers College Record, The Journal of Negro Education* and *Sociology Compass*.

Howard J. Gold is Professor of Government at Smith College. He has taught statistics for thirty years and also teaches courses on American elections, public opinion and the media, and political behavior. His research focuses on public opinion, partisanship, and voting behavior. He is the co-author (with Donald Baumer) of *Parties, Polarization and Democracy in the United States* and author of *Hollow Mandates: American Public Opinion and the Conservative Shift*. His work has also appeared in *American Politics Quarterly*, *Political Research Quarterly*, *Polity, Public Opinion Quarterly*, and the *Social Science Journal*.