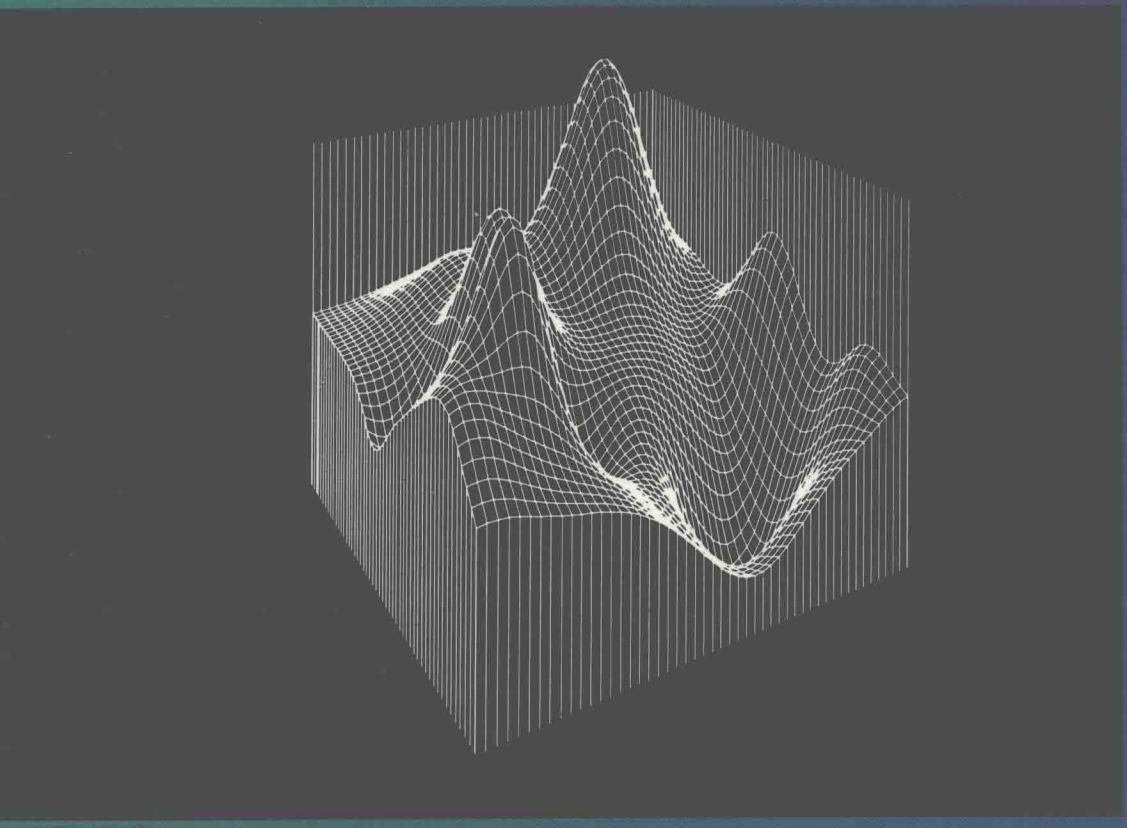
STATISTICS for the SOCIAL SCIENCES



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Preface

To the students and the instructors using this text, welcome! This book is designed to teach introductory statistics primarily to undergraduates majoring in the social sciences. I have tried to use a wide variety of examples that are both relevant to the social and behavioral sciences and of interest to today's undergraduate students. This book may be used as a text in a statistics course geared to any of the social sciences, or it may be used as part of a course or sequence of courses in research methodology.

Why another statistics text? After years of teaching students, many of whom claim to be victims of math anxiety, I wanted to provide a teaching device that could be used by the nonmathematically inclined, but at the same time would cover all relevant topics thoroughly enough to meet the needs of all students. To do this, (a) I am assuming that the only recent math courses that readers have had did not go much beyond introductory algebra and (b) many of the more onerous calculations encountered can be done on a computer. So, while all relevant calculations are presented here, emphasis—particularly in the later chapters—is also placed on the analysis of computer printouts.

Another thing that I have done is to begin with as little computational work as possible and move slowly into the math. This approach should enable students to gradually overcome their fear of numbers, build confidence in their ability to handle quantitative work, and (who knows?) even come to enjoy what they are doing. Note that many of the earlier topics, such as those on the scientific method, levels of measurement, and interpretation of tables, are given far less attention in many other statistics texts than is given here. By including them, it is my hope that students will see statistics as linked to the more comprehensive field of research methodology, rather than just as an entity unto itself. My

emphasis is on the analysis and interpretation of data, rather than on how those data are collected. However, I do want the reader to have a feel for the way interpretation of data is related to the methods whereby the data were obtained. This approach also guards the student from immediate inundation in calculation.

Examples and exercises are designed to mirror the subject matter explored in all the social science disciplines. Easily spotted throughout the text are examples that can be identified with sociology, political science, communications, psychology, social work, management, education, and other disciplines. In selecting examples, I have chosen topics that should be of general interest to undergraduates in each field or to all undergraduates in the social sciences. I have also sought to include examples that reflect applied research as well as basic research. Such examples and exercises should help students retain interest in the course material. This has been my experience with my own students after having "test marketed" drafts of these chapters.

Each chapter begins with an introduction and a list of key concepts that are introduced for the first time in that particular chapter. In the body of each chapter, key concepts are presented in boldface type with their accompanying definitions in italics. Boxes are used to provide supplemental information reinforcing certain topics presented in the chapter. The exercises at the end of the chapter are presented in the same order in which the material is presented within the chapters, so that they may be undertaken prior to the completion of all topics presented in the chapter. There are ample exercises so that instructors may assign at their discretion a subset of the problems and still cover all the appropriate statistical procedures presented in the chapter. Thus more homework problems are included than one may need to assign.

A word about the ordering of the chapters: Chapters 1 through 6 are designed to introduce students to concepts of empirical research and the basic working vocabulary of statistics. These chapters cover the scientific method, levels of measurement and formats for manipulating and presenting data, operational definitions and index construction, central tendency and dispersion measures, and contingency tables. Although all statistics introductions cover central tendency and dispersion, few give as much emphasis to the other topics I have done here. This additional coverage will be of particular value if you are using this text in a combined methods/statistics course or if students have not already taken a separate methods course.

Chapters 7 through 10, together with Chapter 12, cover inferential statistics. Chapter 7 is an overview of the entire area and should be read

first, followed by Chapter 11. From that point, it is possible to cover the remaining inferential statistics chapters in any order. Although generally one presents the two-sample *t* test prior to covering analysis of variance, it is possible, for instance, to cover chi-square without having first covered ANOVA.

Chapters 11 (association measures) and 13 (linear regression) cover additional topics in descriptive statistics and could be presented prior to the chapters on statistical inference. Chapter 14, however, can only be fully utilized if students have already had several of the inferential statistics topics in addition to linear regression. If you have a two-course sequence, it is possible to group the descriptive statistics chapters in the first course (Chapters 1-6, 11, and 13) and the inferential chapters in the second course (Chapters 7-10 and 12), culminating with Chapter 14, which interweaves the two threads. In short, I have designed the chapters with the knowledge that there are many possible sequences of topics and that we all march to different drummers.

For the instructor, I will save more of my comments for the instructor's manual that accompanies the book. In that manual, I will give suggestions gleaned from years of teaching this material. In turn, I hope that you will share your observations—both positive and negative—with me. You may contact me in care of Sage Publications. Best wishes for a positive teaching and learning experience.

Note to Students

Unlike many other courses, the material presented here is often cumulative in nature. This means that to understand today's assignment, you need to understand the material previously presented. If you do not understand today's topic, you may not be able to understand tomorrow's. Accordingly, do not try to "cram" this material. Learn it at a regular pace. If something confuses you, stop and reread it. If you still do not understand the topic, ask your instructor. Don't feel self-conscious about raising your hand in class and asking. You need to understand the material! Moreover, if you are confused, the odds are that others are likewise having trouble. Never assume that you are the only one "snowed." One other suggestion: attend class! You will learn better with the reinforcement provided by your instructor in class and you will have your instructor at hand to help explain any material that is causing you difficulty. Statistics calls for attendance.

It is my hope that this book will help contribute to a worthwhile educational experience for you. Best wishes with it!

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There are many people who contributed directly or indirectly to this book. Indirectly, all those professors and colleagues who helped me develop my interest in statistics and methodology deserve my thanks. Likewise, my family deserves my gratitude for their patience and support during a period when the demands of the book interfered with my family activities and responsibilities. Finally, I owe a debt to all of my colleagues in the Wright State University Department of Political Science and the College of Liberal Arts for their encouragement and support.

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Thanks to the SAS Institute, Inc., whose software is used to generate printouts incorporated into this text and the accompanying Instructor's Manual. Also, in the Instructor's Manual, several printouts are reproduced using SPSS Release 3.0. SPSS is a registered trademark of SPSS, Inc.

I wish to thank CQ Press for permission to reprint material from H. Stanley and R. Niemi (1992), *Vital Statistics on American Politics* (3rd ed.) and to Americans for Democratic Action for allowing me to use their ratings of members of Congress.

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Others too numerous to mention have contributed to this textbook. To all of them, thanks! Any errors to be found are, of course, not theirs but mine.

KEY CONCEPTS

empirical
normative
scientists
hypothesis/hypotheses
social sciences
scientific method
table/cross-tabulation/contingency table
marginal totals
grand total
cell (of a table)
association
concept
variable
induction
deduction
experiment
scientific law
data (pl.)/datum or piece of data (sing.)
necessary condition
sufficient condition
theory
main diagonal
positively related/a positive relationship
off diagonal
inversely related/an inverse relationship
causation
temporal sequence
dependent variable
independent variable
criterion variable
predictor variable
unit of analysis
statistics

Brief Contents

Detailed Contents