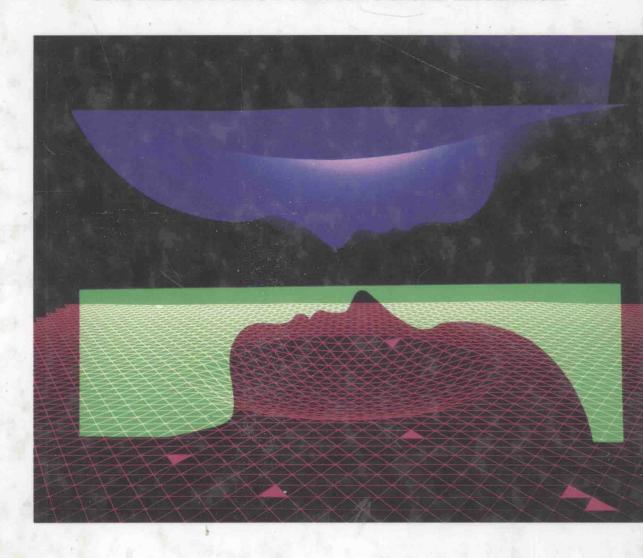
FOURTH EDITION

EXPERIMENTAL PSYCHOLOGY

UNDERSTANDING PSYCHOLOGICAL RESEARCH



Barry H. Kantowitz Henry L. Roediger III David G. Elmes

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UNDERSTANDING PSYCHOLOGICAL RESEARCH

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Demand characteristics								Х		
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Measurement scales	Х									
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Reliability of measures							X	-7.		
Replication						X				
Scale attenuation					Х					
Selection of dependent variable			x							
Small-n design	Х			Х						Х
Verbal report		Х				Х				
Within- and between- subjects designs				х						

Organization of the Book

We have chosen to organize our book topically, for reasons described in the Preface. However, the subjects discussed in a topically organized book are included in our text. The table above lists important methodological topics covered in chapters 6 through 15 and the specific chapters in which they are discussed. (Many of these same concepts are introduced briefly in Part One of the book, the first five chapters.) The table should be useful for those who prefer an alternate organization to the one we have used in writing the text.

PREFACE

THIS TEXTBOOK IS THE fourth edition of a book first published in 1978. Each successive edition has seen both major and minor changes, and this edition is no exception. One chapter is entirely new to this edition, another is essentially new (having been completely revised and given a new title), and a third chapter has been so radically changed that it, too, is essentially new. Most of the remaining chapters have also been improved in response to readers' comments, with many old examples deleted and new ones added. We have tried to blend the best aspects of the previous three editions with new features to make the book even more appealing. (We describe the changes in more detail below.) We are pleased that the continued popularity of this text has permitted us to produce this new edition, because we think we have been able to improve it and we have enjoyed working on it again.

The title Experimental Psychology has appeared on many text-books that have lasted to become classics, beginning with E. B. Titchener's pair in the early 1900s, through Woodworth's (1928) text and its revision (Woodworth & Schlossberg, 1954), and finally to those books by Osgood (1953) and Underwood (1966). All these books provided an introduction to research methodology, but they did so in the context of fundamental research in experimental psychology. The books were primarily about the content of experimental psychology, with an emphasis on the research methods used to acquire the knowledge. We see our textbook as firmly within this tradition, even if much less encyclopedic than the great books mentioned above.

Today this approach is unique; during the 1970s, many "research methods" texts appeared that organize the subject matter quite differently. Instead of providing methodology in the context in which it is used, these books treat methodological topics (e.g., between-subjects designs, small-*n* designs) as chapter titles and introduce content examples to flesh out the discussion of the methods. This is certainly a defensible approach, and we have produced another text that embodies this method (*Research Methods in Psy-*

chology, by Elmes, Kantowitz, and Roediger, also published by West Publishing Co.). However, Experimental Psychology seeks to provide an integrated blend of content and methodology, with methods discussed in the context of actual research. A primary difference between our text and those of our predecessors in this tradition is that our approach is to select particular examples that best illustrate the methodological point under consideration, and that our book is intended mostly for an undergraduate audience with only a first course in psychology as a background.

Text Organization

The philosophy of the text remains unchanged. As with the first three editions, we have striven to achieve an integrated treatment of experimental psychology with a seamless link binding methodology and content. The book includes two main parts. The first five chapters constitute Part One, Fundamentals of Research, and discuss some basic methodological preliminaries that students need. In these chapters we describe some general aspects of science and theory construction; features of and differences among observational, correlational, and experimental methods (with an emphasis on the latter); ethical issues in research; and how to read and write research reports.

In the remaining ten chapters, which make up Part Two, Principles and Practices of Research, we flesh out the bare bones provided in Part One by illustrating experimental topics in the context of actual research problems. The chapters are provided with content titles (for example, Perception) and some content is covered in its own right, but the main purpose of the chapters is to present methodological topics in the context of actual research. This organization reflects our belief that the best way to provide students with an understanding of methodology is to embed it in the context of real problems that occur in conducting research. Methodology does not exist in a vacuum, but is devised to solved concrete research problems. We hope that presenting methods in the context of important content issues will help students to see the importance of considering research methods.

Chapter Format

The chapters in Part Two all share a common format. This parallel structure should help orient students to important features of the text that facilitate learning.

Chapter opening. The chapters begin with an outline and a quotation. Following a brief orientation to the content area explored in the chapter, the student will come across the first of several boxed inserts, which readers of the previous editions have found to be helpful and which have therefore been carried over to the fourth edition.

Introducing the Variables quickly orients the student to those independent, dependent, and control variables commonly used in particular research areas. Our coverage of these variables does not exhaust the possibilities, but it does include some of the most common ones.

Experimental Topics and Research Illustrations represents the main part of the chapter, in which two or three methodology issues are presented in the context of an actual research problem. Thus, for example, in chapter 10 we discuss the difficulty of ceiling and floor effects in the context of a memory experiment in which this problem actually arose. Many of these experimental topics have been introduced in Part One and are covered in more detail in Part Two. Some crucial topics are even covered more than once in Part Two to insure better comprehension. The content topics were chosen to be good vehicles for discussing the particular methodological point under consideration. Thus, the content topics may not represent the most important topics in the subject under discussion; nor do we intend our chapters to represent a complete summary of contemporary work in the area. To reiterate, our intent is to illustrate issues of methods in the context of actual research problems that are of interest. Two other unique features appear toward the end of each chapter in Part Two.

From Problem to Experiment: The Nuts and Bolts presents the rationale behind experimental-design decisions—how many subjects should be used, why variable X is selected instead of variable Y, and so on—when hypotheses are taken from a general form to the specifics of an experiment. These decisions are the "nuts and bolts" of experimental research. They are second nature to practicing experimenters and hence seldom articulated in journal articles, but they may represent puzzles to those new to research.

Psychology in Action suggests safe and simple experimental demonstrations that require little or no equipment and that can be used in or out of class. For example, chapter 7 includes a demonstration of the Stroop effect and chapter 14 presents methods to measure one's personal territory or "space bubble."

End-of-Chapter Features. Finally, each chapter contains a *Summary* in which the main points of the chapter are reviewed, a set of *Key Terms* for review and study, and several *Discussion Questions*.

Chapter Sequence

Although students will be best served by reading Part One in correct serial order, (especially the first three chapters), those professors and students more interested in methodology than in content can ignore the chapter numbers in Part Two. The table that crosslists chapter numbers and experimental topics (to be found at the

end of the Table of Contents) can be used to determine the order in which chapters in Part Two are assigned. Thus, the teacher has the option of following a more or less traditional order, or of creating a unique ordering better suited to his or her educational goals. Two lesser-used chapters which, however, may be quite necessary for some, are located in appendixes. Appendix A provides a brief sketch of the history of experimental psychology, and appendix B contains a review of basic statistics.

Changes in the Fourth Edition

Users of the third edition will note many changes in the fourth edition. We have added an entirely new chapter, chapter 4, on ethics in research. This addition was suggested by several reviewers and adopters. Chapter 15, Human Factors, is also new. It replaces the chapter in the third edition called "Applications of learning and attention theory: Methodology outside the laboratory." Reviewers justifiably complained about the rather cumbersome nature (and title) of this chapter spanning, as it did, rather disparate fields. The new chapter concentrates on human factors psychology while still fulfilling the goal of illustrating research methodology in applied settings. A third major change has been the complete revision of chapter 5, "How to read and write research reports," complete with new examples of articles. Students should find these new examples easier to follow, and they should prove a more useful aid for students when preparing their own papers in the format required by the American Psychological Association.

In addition to these major changes, most of the other chapters have been revised to include better examples of research topics or to provide more up-to-date coverage. For example, in chapter 12 we discuss how psychologists might define intelligence in a computer in terms of specific operations and criteria. In chapter 10, we use research about the levels of processing approach to memory in discussing the issue of generality and generalizability of research. Because the levels of processing approach to memory has engendered such a great amount of research, with investigators asking whether the basic effects hold over a wide array of conditions, this topic serves as a particularly useful focus to ask about generalizability. These two additions are only samples of how we have tried to pick particularly cogent pieces of research to illustrate methodological points. As always, these changes in examples still serve to illustrate some important methodological topic. The items above provide only a selection of the numerous improvements in the fourth edition.

Ancillaries

The fourth edition is accompanied by two outstanding ancillary features. The Study Guide for students was prepared by David G. Payne of the State University of New York at Binghamton. A number of useful study aids are included for each chapter: a summary; a key terms list; a programmed review; an experimental project that requires little equipment; an experimental dilemma for discussion; three types of sample questions for tests. The Study Guide is keyed for the text and permits review and study opportunities that should prove invaluable for students. We hope you will consider adopting it.

Bradford H. Challis of the University of Toronto has prepared an Instructor's Manual that contains many aids for teaching a course on experimental psychology and research methods. Included are a selection of test questions for each chapter (both multiple choice and essay) and suggestions for lectures and demonstrations.

Acknowledgments

It takes many more people than authors to create a text, and we are pleased to acknowledge with gratitude the assistance of numerous others. Our greatest debt is to the users of previous editions. Without their helpful suggestions, this new edition would not exist. We thank our editor, Mary Schiller, for motivating us to do a fourth edition and for her many helpful suggestions along the way. Although many teachers offered useful suggestions, we would be remiss not to thank specifically John B. Best, David del Castillo. John Ceraso, Wendy Domjan, Jerome Friedman, E. Rae Harcum, Richard Haude, John Jahnke, Janet McDonald, Kenneth McIntire, Gary Meunier, Douglas Mook, Renee Neely, Gregg Oden, Charles Peyser, James Pomerantz, Robert Proctor, Albert Silverstein, Lois Tepper, Harriet Wall, and Mary Susan Weldon for cogent reviews and sage advice. Amy Adamson and Heather Turner helped in tracking down references and in numerous other ways, and we appreciate their hard work and good humor. The staff at West Publishing Co. offered expert professional assistance and turned a manuscript into a book with remarkable speed and efficiency. Emily Autumn, our production editor, deserves special praise for her masterful efforts on our behalf. We would like to acknowledge the help of several authors and publishers who permitted us to reprint some of their work, and we are grateful to the Literary Executor of the late Sir Ronald A. Fisher, F.R.S. and to the Longman Group Ltd. of London, for permission to reprint from their book Statistical Tables for Biological, Agricultural, and Medical Research. Finally, our deepest gratitude and affection go to our families, who tolerated our absence during the long period it took to complete this revision.

Barry H. Kantowitz Henry L. Roediger III David G. Elmes

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BARRY H. KANTOWITZ is a Senior Staff Research Scientist at Battelle Memorial Institute, Seattle, in the Center for Human Factors and Organizational Effectiveness. He received the Ph.D. degree in Experimental Psychology from the University of Wisconsin in 1969. From 1969 to 1987 he held positions as Assistant, Associate, and Professor of Psychological Sciences, at Purdue University, West Lafavette, Indiana. Dr. Kantowitz was elected a Fellow of the American Psychological Association in 1974. He has been a National Institute of Mental Health Postdoctoral Fellow at the University of Oregon, a Senior Lecturer in Ergonomics at the Norwegian Institute of Technology, Trondheim, Norway, and a Visiting Professor of Technical Psychology at the University of Lulea, Sweden. He has written and edited more than one dozen books. His research on human attention, mental workload, reaction time, humanmachine interaction, and human factors has been supported by the Office of Education, the National Institute of Mental Health, the National Aeronautics and Space Administration, and the Air Force Office of Scientific Research. He served a five-year term on the editorial board of Organizational Behavior and Human Performance. He has published over seventy scientific articles and book chapters.

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two other textbooks: *Psychology* (coauthored with E. D. Capaldi, S. G. Paris, and J. Polivy) and *Research Methods in Psychology* (with D. G. Elmes and B. H. Kantowitz). He also edited (with F. I. M. Craik) *Varieties of Memory and Consciousness: Essays in Honour of Endel Tulving.* Roediger serves as a Consulting editor for *Contemporary Psychology; Journal of Experimental Psychology: Learning, Memory, and Cognition;* and *Journal of Memory and Language.* He served as Editor of the *Journal of Experimental Psychology: Learning, Memory, and Cognition* from 1985–1989 and as its Associate Editor from 1981 to 1984. He is a member of the Governing Board of the Psychonomics Society (Chair, 1989–1990) and is Secretary-Treasurer of the Midwestern Psychological Association.

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