



Experimental Psychology

Seventh Edition

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

S E V E N T H
E D I T I O N

EXPERIMENTAL PSYCHOLOGY

Understanding Psychological Research

B A R R Y H . K A N T O W I T Z
University of Michigan

H E N R Y L . R O E D I G E R I I I
Washington University in St. Louis

D A V I D G . E L M E S
Washington and Lee University

 **Wadsworth**
Thomson Learning[®]

Australia • Canada • Mexico • Singapore • Spain • United Kingdom • United States

Psychology Executive Editor: Vicki Knight
Assistant Editor: Annie Berterretche
Marketing Manager: Jenna Opp
Marketing Assistant: Jessica McFadden
Project Editor: Lisa Weber
Print Buyer: Karen Hunt
Permissions Editor: Bob Kauser

Production Service: Graphic World Publishing Services
Photo Researcher: Sue Howard
Copy Editor: Jennifer Moorehouse
Cover Design and Illustration: Cuttriss and Hambleton
Cover Printer: Phoenix Color Corp.
Compositor: Graphic World, Inc.
Printer: RR Donnelley & Sons, Crawfordsville

COPYRIGHT © 2001 Wadsworth, a division of Thomson Learning, Inc. Thomson Learning™ is a trademark used herein under license.

ALL RIGHTS RESERVED. No part of this work covered by the copyright hereon may be reproduced or used in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, Web distribution, or information storage and retrieval systems—without the written permission of the publisher.

Printed in the United States of America
1 2 3 4 5 6 7 04 03 02 01 00

For permission to use material from this text, contact us by
Web: <http://www.thomsonrights.com> **Fax:** 1-800-730-2215
Phone: 1-800-730-2214

ExamView® and *ExamView Pro®* are trademarks of FSCreations, Inc. Windows is a registered trademark of the Microsoft Corporation used herein under license. Macintosh and Power Macintosh are registered trademarks of Apple Computer, Inc. Used herein under license.

Library of Congress Cataloging-in-Publication Data

Kantowitz, Barry H.

Experimental psychology : understanding psychological research / Barry H. Kantowitz, Henry L. Roediger III, David G. Elmes.—7th ed.

p. cm.

Includes bibliographical references and index.

ISBN 0-534-36426-8

1. Psychology, Experimental. 2. Psychology—Research. I. Roediger, Henry L. II. Elmes, David G. III. Title

BF181 .K35 2000
150'.7'24—dc21

For more information, contact
Wadsworth/Thomson Learning
10 Davis Drive
Belmont, CA 94002-3098
USA
<http://www.wadsworth.com>

International Headquarters

Thomson Learning
International Division
290 Harbor Drive, 2nd Floor
Stamford, CT 06902-7477
USA

UK/Europe/Middle East/South Africa

Thomson Learning
Berkshire House
168-173 High Holborn
London WC1V 7AA
United Kingdom

Asia

Thomson Learning
60 Albert Street, #15-01
Albert Complex
Singapore 189969

Canada

Nelson Thomson Learning
1120 Birchmount Road
Toronto, Ontario M1K 5G4
Canada

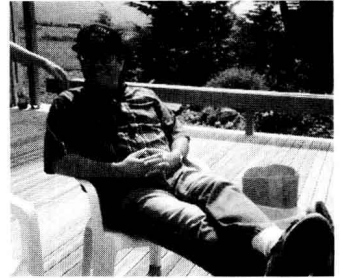


DEDICATION

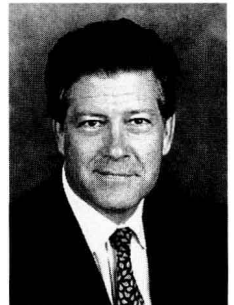
To three outstanding psychologists who shared the fun and excitement of experimental psychology with us, David A. Grant, William M. Hinton, and L. Starling Reid

ABOUT THE AUTHORS

Barry H. Kantowitz is Professor of Psychology, Professor of Industrial and Operational Engineering, and Director of the Transportation Research Institute at the University of Michigan. Prior to that, he was Chief Scientist of the Human Factors Transportation Center of the Battelle Memorial Institute in Seattle. 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 Lafayette, 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, human-machine 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*, and is currently on the board of *Human Factors*, and is editor of the *Transportation Human Factors Journal*.

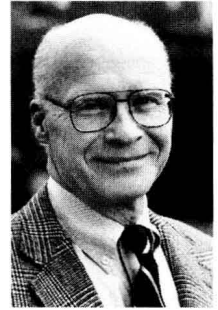


Henry L. Roediger, III, is the James S. McDonnell University Professor of Psychology and Chair of the Psychology department at Washington University, where he has taught since 1996. He received a B.A. degree in psychology from Washington and Lee University in 1969 and a Ph.D. in cognitive psychology from Yale University in 1973. He has taught at Rice University (1988 to 1996) and Purdue University (1973 to 1988) and spent 3 years as a visiting professor at the University of Toronto. His research interests lie in cognitive psychology, particularly in human learning and memory. Dr. Roediger has published over 100 chapters, articles, and reviews as well as two other textbooks: *Psychology* (coauthored with E.D. Capaldi, S.G. Paris, J. Polivy, and P. Herman) 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*. Dr. Roediger has served as editor of *Journal of Experimental Psychology: Learning, Memory and Cognition* (1984–1989) and



Psychonomic Bulletin & Review (1994 – 1997). He is a consulting editor for the *Journal of Memory and Language*, *Memory, and Cognitive Psychology* and the *Journal of Experimental Psychology: Learning, Memory, and Cognition*. He is President of the Experimental Psychology Division of the American Psychological Society. He was a member of the Governing Board of the Psychonomic Society for five years (Chair, 1989–1990) and was President of the Midwestern Psychological Association from 1992 to 1993. In 1994, he received a Guggenheim Fellowship and was elected a member of the Society of Experimental Psychologists. According to a 1996 study by the Institute of Scientific Information, Roediger's papers had the greatest impact (measured by their average number of citations) in the field of psychology for the 5-year period from 1990 to 1994.

David G. Elmes is Professor of Psychology and Head of the Department of Psychology at Washington and Lee University, where he has taught since 1967. He earned his B.A. with high honors from the University of Virginia and completed the M.A. and Ph.D. degrees there. Elmes was a research associate for a year at the Human Performance Center of the University of Michigan, and he was a Visiting Fellow of University College at the University of Oxford. At Washington and Lee, he is director of the Cognitive Science Program. Professor Elmes edited *Readings in Experimental Psychology* and *Directory of Research in Psychology at Primarily Undergraduate Institutions*. He is co-author of the sixth edition of *Research Methods in Psychology* (with B. H. Kantowitz and H. L. Roediger III). Dr. Elmes has published numerous articles concerned with human and animal learning, memory, and the sense of smell. He frequently referees papers submitted to technical journals, and he was a consulting editor for the *Journal of Experimental Psychology: Learning, Memory, and Cognition* for several years. He has been active in the Council on Undergraduate Research for a number of years and is currently its president.



PREFACE

The term *experimental psychology* used to denote only a few selected topics in psychology. In, say, 1930 experiments were conducted to understand sensation, perception, learning, memory and a few other topics. The situation is quite different today: Experimental methods are used to investigate social psychology, developmental psychology, individual differences, and many other topics (such as environmental psychology) that were not considered in psychology's vision seventy years ago. The use of experimental methods has expanded to include most topics in the field. Writing a textbook aimed at this topic has therefore become an increasing challenge.

This textbook is the seventh edition of a book first published in 1978. Each edition has seen both major and minor changes in response to students' and professors' comments, and this edition is no exception. Readers familiar with the previous edition will find changes in every chapter. We have tried to blend the best aspects of the previous six 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 textbooks 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 and the 1980s, 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 also an excellent approach, and we have produced another text that embodies this method (*Research Methods in Psychology*, by Elmes, Kantowitz, and Roediger, also published by Wadsworth). 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.

We should note one point about terms in our book. In 1994, the *Publication Manual of the American Psychological Association* recommended that the traditional term *subjects*, which had been used for over a century to refer to people who were tested in psychological research, be changed to *participants*. This change received a mixed reaction in the research community, and some other organizations that publish psychology journals did not go along. For example, the Psychonomic Society permits use of either term in papers published in their journals. In addition, the copyeditors of the American Psychological Association journals do not insist that *participants* be used as the favored term, but rather encourage its use. Because the situation is unsettled, we have followed the convention of using both *subjects* and *participants* when referring to people in psychological research. We tend to use *subjects* when referring to non-human animals in research, but we use both terms in referring to humans. The usage in our text therefore reflects current practice in the field at large.

▼ TEXT ORGANIZATION

The philosophy of the text remains unchanged. As with the first six 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; the features of (and differences among) observational, correlational, and experimental methods (with an emphasis on the last); 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 methodological 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 solve 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 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 seventh edition.

INTRODUCING THE VARIABLES This feature 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 does include some of the most common ones.

EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS This feature 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 ensure 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. 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 In this section, we present 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 This feature 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 cross-lists 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 instructor 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 Seventh Edition

Users of the sixth edition will note several changes in the seventh edition. The most important change is the addition of Web references in every chapter. These references guide readers online to the Research Methods Workshop at The Wadsworth Psychology Study Center: <http://psychology.wadsworth.com>. In addition, instructors in North America who have specified that *InfoTrac College Edition* be packaged with this text have provided four months of free access to this extensive virtual library for their students.

New coverage has been added for “history effects” as well as a more complete discussion of random selection and random assignment. Student interest is increased by inclusion of recent Gallup Poll research on Y2K beliefs. Many other topics, such as signal detection theory, perceptual defense, social influence, latency measures and statistical reasoning, have been updated. Of course, in order to keep the text from ballooning to more than could be covered in a semester, these additions have been accompanied by selective deletions. For example, discussion of the psychophysiology of attention that covered event-related potentials and electroencephalograms was deleted. While a few instructors (and the authors) regarded this topic with great affection, most reviewers indicated it was too specialized and not of general interest. So, in order to make room for new improvements, this section was omitted in the seventh edition. Since authors hate to make deletions, such changes were made reluctantly. If we have omitted a section that some teachers would like restored, please write to us so that this can be considered for the eighth edition.

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. Although many teachers offered useful suggestions, we would be remiss not to thank specifically L. Joseph Achor, John B. Best, David del Castillo, John Ceraso, Wendy Domjan, Jerome Friedman, Diane Fuller, Harvey Ginsburg, E. Rae Harcum, Richard Haude, John Jahnke, Denny LeCompte, Kathleen McDermott, Janet McDonald, Kenneth McIntire, Gary Meunier, Douglas Mook, George Moutsiakis, Renee Neely, Gregg Oden, Donald Patterson, Charles Peyser, James Pomerantz, Joan F. Pritchard, Robert Proctor, Ronald Salafia, Albert Silverstein, Lois Tepper, Jyotsna Vaid, Harriet Wall, Mary Susan Weldon, and Cynthia E. Willis for cogent reviews

and sage advice. We extend our thanks and appreciation to the reviewers who provided valuable suggestions for improving and strengthening the seventh edition; Jeff Anastasi, Francis Marion University; Veanne N. Anderson, Indiana State University; David Conner, Truman State University; W. Jay Dowling, the University of Texas at Dallas; Robert Rosati, Hofstra University; Theresa Schultz, Dominican University; Brad Thomas, Free Will Baptist Bible College; Evangeline Wheeler, Towson University; and Georgia Wills, Louisiana State University. We thank Michael Cortese for his help in preparing the seventh edition and for preparing the Study Guide and Instructor's Manual for our book. Vicki Knight, Psychology Publisher for Wadsworth, provided invaluable advice and aid for the seventh edition. The staff at Wadsworth Publishing offered expert professional assistance and turned a manuscript into a book with remarkable speed and efficiency. Marcia Craig, our production editor, deserves special praise for her masterful efforts on our behalf. We would also like to thank Mary Schiller, the editor who guided us through five previous editions of this text. Her influence can still be seen on practically every page. 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

CONTENTS IN BRIEF

*P*ART ONE

FUNDAMENTALS OF RESEARCH 1

- CHAPTER 1 Explanation in Scientific Psychology 2
- CHAPTER 2 Research Techniques: Observation and Correlation 24
- CHAPTER 3 Research Techniques: Experiments 52
- CHAPTER 4 Ethics in Psychological Research 88
- CHAPTER 5 How to Read and Write Research Reports 108

*P*ART TWO

PRINCIPLES AND PRACTICES OF EXPERIMENTAL PSYCHOLOGY 161

- CHAPTER 6 Psychophysics 162
- CHAPTER 7 Perception 192
- CHAPTER 8 Attention and Reaction Time 226
- CHAPTER 9 Conditioning and Learning 250
- CHAPTER 10 Remembering and Forgetting 286
- CHAPTER 11 Thinking and Problem Solving 326
- CHAPTER 12 Individual Differences and Development 358
- CHAPTER 13 Social Influence 390
- CHAPTER 14 Environmental Psychology 420
- CHAPTER 15 Human Factors 444

CONTENTS

About the Authors v

Preface xix

PART ONE

FUNDAMENTALS OF RESEARCH 1

CHAPTER 1

EXPLANATION IN SCIENTIFIC PSYCHOLOGY 2

MAKING SENSE OF THE WORLD 3

Social Loafing 3

Curiosity: The Wellspring of Science 4

SOURCES OF KNOWLEDGE 5

Fixation of Belief 5

Scientific Procedures 7

THE NATURE OF THE SCIENTIFIC EXPLANATION 8

What Is a Theory? 9

Induction and Deduction 10

Evaluating Theories 13

Intervening Variables 14

THE SCIENCE OF PSYCHOLOGY 16

Psychology and the Real World 17

SUMMARY 21

KEY TERMS 21

DISCUSSION QUESTIONS 21

WEB CONNECTIONS 22

CHAPTER 2

RESEARCH TECHNIQUES: OBSERVATION AND CORRELATION 24

NATURALISTIC OBSERVATION 26

What Do We Observe? 27

Reactivity 29

The Case Study 31

Survey Research 33

Advantages and Disadvantages of Naturalistic Observations 34

THE RELATIONAL APPROACH 36

Contingency Research 37

Correlational Research 38

The Correlation Coefficient 39

Complex Correlational Procedures	45
Cause: A Note	47
SUMMARY	48
KEY TERMS	50
DISCUSSION QUESTIONS	50
WEB CONNECTIONS	51

C HAPTER 3

RESEARCH TECHNIQUES: EXPERIMENTS 52

WHAT IS AN EXPERIMENT?	53
Advantages of Experiments	54
Why Experiments Are Conducted	55
VARIABLES	56
Independent Variables	56
Dependent Variables	57
Control Variables	58
Name the Variables	59
More Than One Independent Variable	60
More Than One Dependent Variable	66
EXPERIMENTAL DESIGN	66
Between-Subjects Designs	67
Within-Subjects Designs	68
Small- <i>n</i> Designs	69
Mixed Designs	70
Control Conditions	70
Pitfalls	72
Quasi-Experiments	74
FROM PROBLEM TO EXPERIMENT: THE NUTS AND BOLTS	
Conducting an Experiment	80
From Problem to Experiment	80
DATA	81
Obtaining Data	81
Analyzing Data	82
Reporting Data	83
SUMMARY	83
KEY TERMS	85
DISCUSSION QUESTIONS	85
WEB CONNECTIONS	87

C HAPTER 4

ETHICS IN PSYCHOLOGICAL RESEARCH 88

RESEARCH WITH HUMAN PARTICIPANTS	89
Informed Consent and Deception	92
Freedom to Withdraw	93
Protection from Harm and Debriefing	94

Removing Harmful Consequences	95
Confidentiality	95
ETHICS IN RESEARCH WITH ANIMALS	96
Arguments against Research with Animals	97
Arguments for Research with Animals	97
Guidelines for the Use of Animals in Research	99
Guidelines for the Use of Animals in School Science Behavior Projects	100
ETHICS IN DRUG RESEARCH	101
APA Guidelines for Psychologists on the Use of Drugs in Research	101
SCIENTIFIC FRAUD	103
MONITORING ETHICAL PRACTICES	104
SUMMARY	105
KEY TERMS	106
DISCUSSION QUESTIONS	106
WEB CONNECTIONS	106
SUGGESTED READINGS	106

C H A P T E R 5

HOW TO READ AND WRITE RESEARCH REPORTS 108

HOW TO DO A LITERATURE SEARCH	109
THE PARTS OF AN ARTICLE	111
Title and Author(s)	111
Abstract	112
Introduction	112
Method	112
Results	112
Discussion	115
References	115
CHECKLIST FOR THE CRITICAL READER	116
Introduction	116
Method	116
Results	117
Discussion	117
Checklist Summary	118
A SAMPLE JOURNAL ARTICLE	118
WRITING A RESEARCH REPORT	131
Format	131
Sample Manuscript	133
Style	153
Publishing an Article	156
SUMMARY	157
KEY TERMS	158

WEB CONNECTIONS	158
PSYCHOLOGY IN ACTION: A LITERATURE SEARCH	159

PART TWO

CHAPTER 6

PRINCIPLES AND PRACTICES OF EXPERIMENTAL PSYCHOLOGY 161

PSYCHOPHYSICS 162

MEASURING SENSATIONS	163
6.1 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS	
Operational Definition: Thresholds	165
INTRODUCING THE VARIABLES	166
6.2 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS	
Measurement Scales: Fechner's Law and Stevens' Law	178
Importance of Measurement Scales	181
Fechner's Law	182
Stevens' Power Law	183
6.3 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS	
Small- <i>n</i> Design: Psychophysical Methods	184
FROM PROBLEM TO EXPERIMENT: THE NUTS AND BOLTS	
How Can We Measure a Pigeon's Visual Threshold?	187
SUMMARY	188
KEY TERMS	188
DISCUSSION QUESTIONS	189
WEB CONNECTIONS	189
PSYCHOLOGY IN ACTION: WEBER'S LAW	190

CHAPTER 7

PERCEPTION 192

ISSUES IN PERCEPTION	193
Direct and Indirect Perception	193
Awareness and Perception	199
7.1 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS	
Verbal Report: Perception without Awareness	203
INTRODUCING THE VARIABLES	204
7.2 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS	
Converging Operations: Perceptual Defense and Perception without Awareness	213
FROM PROBLEM TO EXPERIMENT: THE NUTS AND BOLTS	
The Color-Distance Illusion	218
SUMMARY	222
KEY TERMS	222
DISCUSSION QUESTIONS	222
WEB CONNECTIONS	223
PSYCHOLOGY IN ACTION: THE STROOP EFFECT	224

CHAPTER 8**ATTENTION AND REACTION TIME 226**

- THE COCKTAIL PARTY PROBLEM 227
 THE ABC OF REACTION TIME 228
 8.1 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS
 Confounding: Dichotic Listening 231
 INTRODUCING THE VARIABLES 232
 8.2 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS
 Selection of the Dependent Variable: Speed–Accuracy
 Trade-off 236
 8.3 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS
 Interaction Effects: Event-Related Potentials and Attention 240
 FROM PROBLEM TO EXPERIMENT: THE NUTS AND BOLTS
 Measuring Attention 243
 SUMMARY 246
 KEY TERMS 246
 DISCUSSION QUESTIONS 247
 WEB CONNECTIONS 247
 PSYCHOLOGY IN ACTION: SPEED-ACCURACY TRADEOFF 248

CHAPTER 9**CONDITIONING AND LEARNING 250**

- TYPES OF CONDITIONING 252
 Classical Conditioning: Does the Name Pavlov Ring a Bell? 252
 Instrumental (Operant) Conditioning 255
 9.1 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS
 Within- and Between-Subjects Designs: Stimulus Intensity 257
 INTRODUCING THE VARIABLES 258
 9.2 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS
 Counterbalancing: Simultaneous Contrast 265
 9.3 EXPERIMENTAL TOPICS AND RESEARCH ILLUSTRATIONS
 Small-*n* Designs: Behavior Problems in Children 270
 FROM PROBLEM TO EXPERIMENT: THE NUTS AND BOLTS
 The Partial Reinforcement Extinction Effect 278
 SUMMARY 281
 KEY TERMS 282
 DISCUSSION QUESTIONS 283
 WEB CONNECTIONS 283
 PSYCHOLOGY IN ACTION: KNOWLEDGE OF RESULTS AS
 REINFORCEMENT 284

CHAPTER 10**REMEMBERING AND FORGETTING 286**

- EBBINGHAUS'S CONTRIBUTION—WHEN MEMORY WAS YOUNG 287
 VARIETIES OF MEMORY 291