



# RESEARCH DESIGN AND METHODS

Sixth Edition

A PROCESS APPROACH

KENNETH S. BORDENS    BRUCE B. ABBOTT

# Research and Design Methods

## *A Process Approach*

SIXTH EDITION

Kenneth S. Bordens

Bruce B. Abbott

*Indiana University—Perdue University, Fort Wayne*



Boston Burr Ridge, IL Dubuque, IA Madison, WI New York  
San Francisco St. Louis Bangkok Bogotá Caracas Kuala Lumpur  
Lisbon London Madrid Mexico City Milan Montreal New Delhi  
Santiago Seoul Singapore Sydney Taipei Toronto



## Higher Education

### RESEARCH DESIGN AND METHODS: A PROCESS APPROACH

Published by McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020. Copyright © 2005, 2002, 1999, 1996, 1991, 1988 by The McGraw-Hill Companies, Inc. All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of The McGraw-Hill Companies, Inc., including, but not limited to, in any network or other electronic storage or transmission, or broadcast for distance learning.

Some ancillaries, including electronic and print components, may not be available to customers outside the United States.

This book is printed on acid-free paper.

3 4 5 6 7 8 9 0 FGR/FGR 0 9 8 7 6 5

ISBN 0 07 288764 8

Publisher: *Stephen Rutter*  
Senior sponsoring editor: *John T. Wannemacher*  
Marketing manager: *Melissa S. Caughlin*  
Senior media producer: *Sean Crowley*  
Project manager: *Catherine R. Iammartino*  
Lead production supervisor: *Randy L. Hurst*  
Designer: *Cassandra J. Chu*  
Media project manager: *Kathleen Boylan*  
Senior print supplement producer: *Louis Swaim*  
Art director: *Jeanne Schreiber*  
Cover design: *Bill Stanton*  
Cover art: ©Photodisc  
Interior design: *Glenda King*  
Typeface: *10/12 Goudy*  
Compositor: *Thompson Type*  
Printer: *Quebecor World Fairfield Inc.*

### Library of Congress Cataloging-in-Publication Data

Bordens, Kenneth S.

Research design and methods : a process approach / Kenneth S. Bordens, Bruce B. Abbott.—6th ed.  
p. cm.

Includes bibliographical references and index.

ISBN 0-07-288764-8 (hardcover : alk. paper)

1. Psychology—Research—Textbooks. 2. Psychology—Research—Methodology—Textbooks. I. Abbott, Bruce B. II. Title.

BF76.5.B67 2005

150'.72—dc22

2004045911

# PREFACE

---

It has been 16 years since the publication of the first edition of *Research Design and Methods: A Process Approach* (1988). The sixth edition represents a continuing evolution of the text to better meet the needs of students and instructors. With each new edition, our goal has been to provide students and instructors with a book that accurately reflects the research process.

We have retained the basic theme of taking students through the entire research process, from getting and developing a research idea, to designing and conducting a study, through analyzing and reporting data. Our goal continues to be presenting students with information on the numerous decisions they must make when designing and conducting research and how early decisions affect how data are collected, analyzed and interpreted later in the research process. We also wanted to reinforce the need to treat research subjects ethically and show how requirements of ethical treatments interface with research needs. The text is still organized to follow the sequence of steps involved in actually designing and conducting research. We worked to present the material in a friendly, easy-to-read style, with plenty of examples to clarify crucial concepts.

On the basis of the response to the earlier editions of this text, we think we have achieved many of these goals. We have preserved all of these elements in the sixth edition. We have remained true to our goal to provide students with a realistic view of how research is done, written in an engaging and interesting style. We have retained the basic focus on the research process, from developing ideas, to doing a literature search and evaluating research, to developing a research design and conducting the research, through analyzing and reporting results. However, based on feedback from students and reviewers, we have made some changes, described below, that we hope will further improve the book.

## CHANGES IN THE SIXTH EDITION

---

Several important changes have been made to the sixth edition that distinguish it from earlier editions. Although the basic structure and organization of the book remain the same, changes have been made to each chapter. First, each chapter now begins with an outline of the chapter and includes a set of Review Questions following the Chapter Summary. The outline should help students by giving a preview of the main topics covered in each chapter. The Review Questions will help students focus on the major issues covered

in each chapter. Additionally, many of the research examples throughout the text have been updated.

In addition to the changes common to all chapters, the following changes have been made to individual chapters.

## CHAPTER 1

---

1. A new opening vignette focusing on a case involving the effects of violent video games on aggressive behavior (replacing the old vignette and research example). This example is carried through the chapter where appropriate.
2. A new section has been added on “Why You Should Care About Learning about Research.”

## CHAPTER 2

---

1. The section on getting and developing ideas for research has been updated and refined to provide a clearer presentation of how research ideas are developed.
2. The major section on theory has been rewritten to more clearly focus on the role of theory in science.
3. New examples have been added relating to behavioral science, replacing many of the examples from other sciences that were included in earlier editions.
4. The sections on developing theories have been eliminated.

## CHAPTER 3

---

1. The chapter has been updated to conform with the latest version of *PsycINFO*.
2. A new section on using *PsycARTICLES* has been added.
3. A new section added on Internet-based search engines (e.g. JESTOR, ISI Web of Science).
4. The section on fraud in science has been updated and expanded.
5. A new figure showing the process of how a manuscript is reviewed and published has been added.

## CHAPTER 4

---

1. A new research example of a correlational study (replacing the old one) is tied to the opening vignette and research example in Chapter 1.
2. A new research example of an experiment (replacing the old one) is tied to the opening vignette and research example in Chapter 1.
3. The section discussing threats to internal validity has been expanded to include concrete examples.
4. A table summarizing threats to external validity has been added.

## CHAPTER 5

---

1. New, up-to-date examples replace many older examples.
2. There is a newly organized and expanded section on the reliability of a measure.
3. The section on scales of measurement has been expanded and clarified.
4. A section on Q-sort methodology has been added.
5. The material on experimenter bias has been expanded and includes a new example from the research literature.

## CHAPTER 6

---

1. The section on sampling in Internet research has been expanded to include recent research in the area.
2. The American Psychological Association Ethical guidelines section has been updated reflecting the latest (2002) version of the guidelines.
3. The Department of Health and Human Services Ethical guidelines section has been updated reflecting the latest (2001) version of the guidelines.
4. Information on changing attitudes about using animals in research has been added.
5. An update to the controversy surrounding using animals in research has been added.

## CHAPTER 7

---

1. A new, updated example of observational research has been added.
2. A new section on using Intraclass Correlation to measure inter-rater reliability has been added.
3. A new example of a case history using a classic study from the history of psychology has been added (replacing the old one).
4. An example of archival research has been added.
5. A new example of content analysis has been added (replacing the old one).

## CHAPTER 8

---

1. A new example of a survey replaces the old one. This new example is carried through appropriate sections of the chapter.
2. The chapter has been revised to reflect Dillman's updated approach to survey design and execution (replaces information based on Dillman's earlier work).
3. The section on writing questionnaire items has been extensively revised and simplified. A table of question-writing flaws has been added and largely replaces the previous in-text list of writing flaws.
4. A discussion of the "navigational path" of a questionnaire has been added.
5. The section on "nonresponse bias" in mail surveys has been updated.
6. The section on Internet surveys has been updated and expanded.
7. The section on telephone surveys has been trimmed down

## CHAPTER 9

---

1. The section on making treatment order an independent variable has been rewritten and shortened to improve clarity.
2. In the section on interactions in factorial designs, a paragraph has been added to define the simple effects of each factor.

## CHAPTER 10

---

1. Under nested designs, a paragraph has been added describing the advantages and disadvantages of nested designs, relative to factorial designs. Portions of this section have been rewritten to improve clarity.
2. A paragraph has been added to the section on adding a covariate to an experimental design, in order to clarify the nature of a covariate.
3. The initial description of a quasi-independent variable now includes a brief concrete example to clarify the concept.
4. An example has been added to the discussion of pretest-posttest designs to illustrate a case in which a pretest may be needed to completely answer a research question.

## CHAPTER 11

---

1. To the section on the historical development of single-subject designs has been added a paragraph describing the introduction of the journal *Applied Behavior Analysis*.
2. The chapter now distinguished three categories of single-subject design by adding the category of “dynamic designs,” which resemble baseline designs but employ a continuously varying independent variable and focus on observing a dynamically changing dependent variable rather than steady-state behavior.
3. The discussion of baseline designs has been reorganized and simplified to eliminate redundant discussions of the AB, ABA, and ABAB designs.
4. A new example has been provided illustrating the dynamic design.
5. The signal-detection example of a discrete-trials single-subject design has been rewritten and expanded to improve clarity.

## CHAPTER 12

---

1. The section on entering data on the computer has been updated to reflect the process on modern PC-based machines.
2. A clearer distinction between a histogram and bar graph has been made.
3. A clearer discussion and example of a bimodal distribution has been included.

## CHAPTER 13

---

1. A new, updated example of the *t*-test replaces the old one.



2. A new, updated example of the two-factor ANOVA replaces the old one.
3. A discussion of the Wilcoxon Signed Ranks Test has been added.

## CHAPTER 14

---

1. The section on sample size needed for multiple regression has been updated.
2. A section on exploratory and confirmatory factor analysis has been added.
3. A new example of factor analysis replaces the old one.
4. A new example multiple regression replaces the old one.

## CHAPTER 15

---

1. The entire chapter has been revised to reflect the latest edition of the American Psychological Association's writing style.
2. The section on "typing" a manuscript has been updated to reflect the use of wordprocessors.

## CHANGES TO THE ANCILLARIES

---

The student study guide is now on CD-ROM and will be available at no additional cost to the student. The student study guide that accompanies the sixth edition has been updated to reflect the organizational and content changes made to the text. Each chapter now includes a list of key terms, practice questions (multiple-choice, fill-in, and essay) and hands-on exercises.

The instructor's manual remains largely unchanged, except for the fact that it is now completely on CD-ROM. Instructors may request a printed copy of the instructor's manual from the publisher. The instructor's manual still includes ideas for class exercises, many of which make use of the ever-expanding research methodology resources available on the Internet. The test bank has been updated to reflect changes in the new edition. And, once again we offer the test bank in computerized form for ease of exam preparation.

For this edition we have also developed a PowerPoint presentation for each chapter in the text. The PowerPoint presentations provide an overview of the key concepts and information in each chapter. The presentations are in a "generic format." That is, there is no animation or color scheme. Each instructor can generate his or her own personalized presentations by adding animation and a color scheme.

## ACKNOWLEDGMENTS

---

With each new edition the number of talented people to whom we owe a debt of thanks grows, although we can name only a relative few. The reviewers of the first edition helped to make it a success and pave the way for the second edition: Helen J. Crawford (University of Wyoming), Arthur D. Fiske (University of South Carolina), Daniel Leger (University of Nebraska), Beth A. Shapiro (Emory University), Michael S. Wolgarter (University of Richmond), Barbara Tabachnick (California State University, Northridge), and Elaine



Blakemore (Indiana University Purdue University Fort Wayne). The reviewers of the second edition showed us how we could improve the text in several areas: Carol Lawton (Indiana University Purdue University Fort Wayne), Patricia Phillips (Illinois State University), Daniel Leger (University of Nebraska), and Lori Temple-Colvet (University of Nevada, Las Vegas). The insightful comments and suggestions of the following reviewers helped to guide us through the third edition: Barry H. Cohen (New York University), George Mitchell (University of California, Davis), Charlotte Mandell (University of Massachusetts, Lowell), Beverly A. Goldfield (Rhode Island College), Patricia Phillips (Mercer University), Charles Collyer (University of Rhode Island), Donald Leitner (Saint Joseph's University), Constance Jones (California State University, Fresno), Carol Lawton and Dennis Cannon (Indiana University Purdue University Fort Wayne), and Jonathan Tubman (Florida International University). To these names we add the reviewers of the fourth edition: Frank Haist (Georgia State University), Robert A. Hancock (Lincoln University), Christopher Leone (North Florida University), Scott M. Monroe (University of Oregon), and Blaine Peden (University of Wisconsin). Fifth edition reviewers were Helen J. Crawford (Virginia Polytechnic Institute and State University), Dana L. Gross (Saint Olaf College), Margaret S. Jelinek Lewis (University of Idaho), and Scott Monroe (University of Oregon). For sixth edition, we add Gordon A. Allen (Miami University of Ohio), Martin Bink (University of North Texas), Elliot Bonam (Eastern Michigan University), Kathleen Donovan (University of Central Oklahoma), W. Jake Jacobs (University of Arizona), Matthew D. Johnson (Binghamton University), Jennifer Ann Morrow (Old Dominion University), and John P. Wilson (Cleveland State University). We thank each of them for their thoughtful and detailed comments. Our thanks go also to Franklin Graham, Sponsoring Editor at Mayfield Publishing Company, who nurtured the previous five editions of this text. To John Wannemacher, Sponsoring Editor at McGraw-Hill; and to Cathy Iammartino and the rest of the production staff at McGraw-Hill for their expert crafting of the final product.

We also extend our thanks to those students of ours who used the earlier editions and provided valuable feedback and suggestions on how to make the text better, and to everyone else we neglected to mention by name for their efforts.

Finally, to our success in this project we owe the continued support and encouragement of our wives, Stephanie Abbott and Ricky Bordens, and of our families. To them we owe a special thanks.

# CONTENTS

---

*Preface* xxiii

## **1 Explaining Behavior 1**

Framing a Problem in Scientific Terms 2

Why Should You Care about Learning about Research? 3

Exploring the Causes of Behavior 4

Explaining Behavior 5

Scientific Explanations 5

Scientific Explanations Are Empirical 6

Scientific Explanations Are Rational 6

Scientific Explanations Are Testable 6

Scientific Explanations Are Parsimonious 6

Scientific Explanations Are General 6

Scientific Explanations Are Tentative 6

Scientific Explanations Are Rigorously Evaluated 6

Commonsense versus Scientific Explanations 6

Belief-Based versus Scientific Explanations 8

When Scientific Explanations Fail 10

Failures Due to Faulty Inference 10

Pseudoexplanations 11

Methods of Inquiry 13

The Method of Authority 13

The Rational Method 14

The Scientific Method 15

Observing a Phenomenon 15

Formulating Tentative Explanations 16

Further Observing and Experimenting 16

Refining and Retesting Explanations 16

The Scientific Method at Work: Playing Violent Video Games	17
The Scientific Method as an Attitude	18
Translating the Scientific Method into Practice: The Research Process	18
Method versus Technique	19
Basic and Applied Research	19
Basic Research	19
Applied Research	20
Overlap Between Basic and Applied Research	20
The Steps of the Research Process	20
Developing a Research Idea and Hypothesis	20
Choosing a Research Design	22
Choosing Subjects	22
Deciding on What to Observe and Appropriate Measures	22
Conducting Your Study	22
Analyzing Your Results	22
Reporting Your Results	23
Starting the Whole Process Over Again	23
Summary	23
Review Questions	24
Key Terms	25
<b>2 Developing Ideas for Research and Evaluating Theories of Behavior</b>	<b>26</b>
Sources of Research Ideas	27
Experience	27
Unsystematic Observation	27
Systematic Observation	28
Theory	30
Applied Issues	32
Developing Good Research Questions	34
Asking Answerable Questions	34
Asking the Right Questions	34
Asking Important Questions	35
Scientific Theories	36
Theory versus Hypothesis	37
Theory versus Law	38
Theory versus Model	38
Computer Modeling	39
Mechanistic versus Functional Explanations	41
Types of Theory	42
Quantitative versus Qualitative Theory	42
Quantitative Theory	42
Qualitative Theory	42

Descriptive, Analogical and Fundamental Theories	43
Descriptive Theories	43
Analogical Theories	44
Fundamental Theories	46
Domain of a Theory	46
Roles of Theory in Science	47
Understanding	47
Prediction	47
Organizing and Interpreting Research Results	48
Generating Research	48
Characteristics of a Good Theory	49
Ability to Account for Data	50
Explanatory Relevance	50
Testability	50
Prediction of Novel Events	50
Parsimony	51
Strategies for Testing Theories	51
Following a Disconfirmational Strategy	52
Using Confirmational and Disconfirmational Strategies Together	52
Using Strong Inference	53
Theory-Driven versus Data-Driven Research	54
Summary	57
Review Questions	59
Key Terms	59
<b>3 Reviewing the Scientific Literature</b>	<b>60</b>
Reasons for Reviewing the Literature	60
Sources of Research Information	61
Primary versus Secondary Sources	61
Books	63
Scholarly Journals	64
Conventions and Professional Meetings	65
Other Sources of Research Information	69
Performing Library Research	70
The Basic Strategy	70
Research Tools	70
Using <i>PsycINFO</i>	71
Conducting a <i>PsycINFO</i> Search	71
Narrowing Your Search	71
A Note of Caution About Using <i>PsycINFO</i>	73
Using <i>PsycARTICLES</i>	73

Other Computerized Databases	74
General Internet Resources	74
Computer-Searching for Books and Other Library Materials	75
Computers and Literature Reviews: A Closing Note	75
Using the <i>Psychological Abstracts</i>	75
Citations Index	76
Reading Research Reports	76
Obtaining a Copy	76
Reading the Research Report	77
Reading the Literature Critically	77
Evaluating the Introduction	79
Evaluating the Method Section	79
Evaluating the Results Section	79
Evaluating the Discussion Section	80
References	80
Factors Affecting the Quality of a Source of Research Information	81
Publication Practices	81
Statistical Significance	81
Consistency With Previous Knowledge	83
Significance of the Contribution	84
Editorial Policy	85
Peer Review	85
Problems With Peer Review	85
Fraud and the Role of Values in the Research Process	87
Fraud in Research	87
What Constitutes Fraud in Research?	88
The Prevalence of Research Fraud	89
Explanations for Research Fraud	89
Dealing With Research Fraud	90
The Role of Values in Science	91
How Values Influence What and How Scientists Study	92
Interpreting Behavior	93
Moving From What Is to What Ought to Be	93
Developing Hypotheses	93
Summary	94
Review Questions	95
Key Terms	96
<b>4 Choosing a Research Design</b>	<b>97</b>
Functions of a Research Design	97
Causal versus Correlational Relationships	98
Correlational Research	99

An Example of Correlational Research	100
Assessing the Anderson and Dill Study	100
Causation and the Correlational Approach	100
The Third-Variable Problem	101
The Directionality Problem	101
Why Use Correlational Research?	102
Gathering Data in the Early Stages of Research	102
Inability to Manipulate Variables	103
Relating Naturally Occurring Variables	103
Experimental Research	104
Characteristics of Experimental Research	104
Manipulation of Independent Variables	104
Control Over Extraneous Variables	105
An Example of Experimental Research	106
Assessing the Anderson and Dill Experiment	107
Strengths and Limitations of the Experimental Approach	108
Experiments versus Demonstrations	108
Internal and External Validity	109
Internal Validity	109
Threats to Internal Validity	111
Enhancing Internal Validity	113
External Validity	113
Threats to External Validity	113
Internal versus External Validity	114
Research Settings	114
The Laboratory Setting	115
Simulation: Re-Creating the World in the Laboratory	115
Why Simulate?	116
Designing a Simulation	116
Realism	116
The Field Setting	117
The Field Experiment	118
Advantages and Disadvantages of the Field Experiment	118
A Look Ahead	119
Summary	119
Review Questions	121
Key Terms	121
<b>5 Making Systematic Observations</b>	<b>122</b>
Deciding What to Observe	122
Choosing Specific Variables for Your Study	123
Research Tradition	123
Theory	123
Availability of New Techniques	123

Availability of Equipment	124
Choosing Your Measures	124
Reliability of a Measure	125
Reliability of a Physical Measure	125
Reliability of Population Estimates	125
Reliability of Judgments or Ratings by Multiple Observers	125
Reliability of Psychological Tests or Measures	125
Accuracy of a Measure	127
Validity of a Measure	127
Acceptance as an Established Measure	129
Scale of Measurement of a Measure	130
Nominal Scales	130
Ordinal Scales	131
Interval and Ratio Scales	131
Variables and Scales of Measurement	132
Choosing a Scale of Measurement	132
Information Yielded	132
Statistical Tests	132
Ecological Validity	133
Adequacy of a Dependent Measure	134
Sensitivity of the Dependent Measure	135
Range Effects	136
Tailoring Your Measures to Your Research Participants	137
Types of Dependent Variables and How to Use Them	138
Behavioral Measures	138
Physiological Measures	139
Self-Report Measures	139
Choosing When to Observe	141
The Reactive Nature of Psychological Measurement	142
Reactivity in Research With Human Participants	142
Demand Characteristics	143
Other Influences	144
The Role of the Experimenter	145
Experimenter Bias	145
Reactivity in Research With Animal Subjects	149
Automating Your Experiments	149
Detecting and Correcting Problems	150
Conducting a Pilot Study	150
Adding Manipulation Checks	151
Summary	152
Review Questions	153
Key Terms	154



## **6 Choosing and Using Participants and Subjects: Pragmatic and Ethical Considerations 155**

### **General Considerations 155**

Populations and Samples 156

Sampling and Generalization 156

Is Random Sampling Always Necessary? 160

### **Considerations When Using Human Participants 160**

Ethical Research Practice 160

Nazi War Crimes and the Nuremberg Code 160

APA Ethical Guidelines 161

Government Regulations 164

Ethical Guidelines, Your Research, and the IRB 166

### **Acquiring Human Participants for Research 167**

The Research Setting 167

Laboratory Research 169

Field Research 169

The Needs of Your Research 170

Institutional Policies and Ethical Guidelines 170

### **Voluntary Participation and Validity 170**

Factors That Affect the Decision to Volunteer 170

Participant-Related Characteristics 171

Situational Factors 172

Volunteerism and Internal Validity 172

Volunteerism and External Validity 173

Remedies for Volunteerism 174

### **Research Using Deception 175**

Types of Research Deception 175

Problems Involved in Using Deception 176

Solutions to the Problem of Deception 177

Role Playing 178

Obtaining Prior Consent to Be Deceived 178

Debriefing 179

### **Considerations When Using Animals as Subjects in Research 181**

Contributions of Research Using Animal Subjects 181

Choosing Which Animal to Use 182

Why Use Animals? 182

How to Acquire Animals for Research 183

Ethical Considerations 183

Should the Research Be Done? 186

Generality of Animal Research Data 187

The Animal Rights Movement 189

### **Alternatives to Animals in Research: *In Vitro Methods and Computer Simulation* 191**

Summary 192

Review Questions 193

Key Terms 194

## **7 Using Nonexperimental Research 195**

Conducting Observational Research 195

Is a Dog Really a Human's Best Friend? 195

Developing Behavioral Categories 196

Quantifying Behavior in an Observational Study 198

Frequency Method 198

Duration Method 198

Intervals Method 198

Recording Single Events or Behavior Sequences 198

Coping With Complexity 199

Time Sampling 199

Individual Sampling 200

Event Sampling 200

Recording 200

Establishing the Reliability of Your Observations 200

Percent Agreement 202

Cohen's Kappa 202

Pearson's Product-Moment Correlation 203

Intraclass Correlation (ICC) 204

Dealing With Data From Multiple Observers 205

Sources of Bias in Observational Research 206

Qualitative Approaches 207

Naturalistic Observation 208

Making Unobtrusive Observations 208

Advantages and Disadvantages of Naturalistic Observation 209

Ethnography 209

Observing as a Participant or Nonparticipant 210

Gaining Access to a Field Setting 210

Gaining Entry Into the Group 211

Becoming Invisible 211

Making Observations and Recording Data 212

Analyzing Ethnographic Data 212

Born to Be Wild: An Example of Ethnography 212

Evaluation of the Ethnography of the HDSC 213

Sociometry 214

An Example of Sociometry 214

The Case History 215