

# The PSYCHOLOGIST as DETECTIVE

An Introduction to Conducting Research in Psychology



RANDOLPH A. SMITH  
STEPHEN F. DAVIS



# The Psychologist as Detective

An Introduction to Conducting  
Research in Psychology

**RANDOLPH A. SMITH**

*Ouachita Baptist University*

**STEPHEN F. DAVIS**

*Emporia State University*



PRENTICE HALL  
Upper Saddle River, NJ 07458

## Library of Congress Cataloging-in-Publication Data

Smith, Randolph A.,

The psychologist as detective : an introduction to conducting  
research in psychology / Randolph A. Smith, Stephen F. Davis.  
p. cm.

Includes bibliographical references and index.

ISBN 0-02-412581-4

1. Psychology—Research. 2. Psychology—Research—Methodology.  
3. Psychology, Experimental. I. Davis, Stephen F. II. Title.  
BF76.5.S54 1996

96-20148

150'.72—dc20

CIP

Editor-in-Chief: *Pete Janzow*

Acquisition Editor: *Nicole Signoretti*

Director of Production and Manufacturing: *Barbara Kittle*

Managing Editor: *Bonnie Biller*

Project Manager: *Shelly Kupperman*

Manufacturing Manager: *Nick Sklitsis*

Prepress and Manufacturing Buyer: *Tricia Kenny*

Creative Design Director: *Leslie Osber*

Interior/Cover Design: *Amy Rosen*

Cover Art: *Cathie Bleck Illustrations*

Photo Research: *Sherry Cohen*

Electronic Art Creation: *PH Formatting*

Marketing Manager: *Gina Sluss*

The figures shown on pp. 442-445 were taken from the following sources:

p. 442 Title heading from "Causal Models and the Acquisition of Category Structure," M. R. Waldmann, K. J. Holyoak, and A. Fratianne, 1995, in *Journal of Experimental Psychology General*, 124, pp. 181-206. Copyright ©1995 by the American Psychological Association. Reprinted with permission.

p. 443 Women's Minds, Women's Bodies, Joan H. Rolling, ©1996 by Prentice Hall, Inc.

pp. 444, 445 *Classic and Contemporary Readings in Social Psychology*, Erik J. Coats and Robert S. Feldman, ©1996 by Prentice Hall, Inc.



©1997 by Prentice-Hall, Inc.

Simon & Schuster/A Viacom Company

Upper Saddle River, NJ 07458

All rights reserved. No part of this book may be reproduced, in any form  
or by any means, without permission in writing from the publisher

Printed in the United States of America

10 9 8 7 6 5 4 3

**ISBN 0-02-412581-4**

PRENTICE-HALL INTERNATIONAL (UK) Limited, *London*

PRENTICE-HALL of Australia Pty. Limited, *Sydney*

PRENTICE-HALL Canada, Inc., *Toronto*

PRENTICE-HALL of India Private Limited, *New Delhi*

PRENTICE-HALL of Japan, Inc., *Tokyo*

SIMON & SCHUSTER Asia Pte. Ltd., *Singapore*

EDITORIA PRENTICE-HALL do Brasil, Ltda., *Rio de Janeiro*



# Preface

## NOTE TO THE INSTRUCTOR

---

Margery Franklin (1990) quotes former Clark University professor and chair Heinz Werner's views on psychological research. Werner indicated:

I got rather apprehensive at finding that students were frequently taught that there was only one acceptable way of conduct in the laboratory there has to be an hypothesis set up, or a set of hypotheses, and the main job of the experimenter is to prove or disprove the hypothesis. What is missed here is the function of the scientist as a discoverer and explorer of unknown lands. . . . Hypotheses . . . are essential elements of inquiry, but they are so, not as rigid propositions but as flexible parts of the process of searching; by the same token, conclusions drawn from the results are as much an end as a beginning. . . . Now . . . academic psychologists [are beginning] to see research not as a rigid exercise of rules of a game but as a problem solving procedure, a probing into unknown lands with plans which are not fixed but modifiable, with progress and retreat, with branching out into various directions or concentration on one.

Clearly Werner's views are as applicable in the 1990s as they were during the heyday of behaviorism; they reflect perfectly the intent of this text.

From our vantage point, research in psychology is like a detective case; hence, the title we have chosen, *The Psychologist as Detective*. A problem presents itself, clues are discovered, bits of evidence that compete for our attention must be evaluated and accepted or discarded, and, finally, a report or summary of the case (research) is prepared for consideration by our peers.

When presented in this light, the research process in psychology will, we believe, be an interesting and stimulating endeavor for students. In short, our goal is to attract students to psychological research because of its inherent interest.

To accomplish this goal several pedagogical features have been employed in this text:

1. To provide a sense of relevance and continuity, the theme of "psychologist as detective" runs throughout the text.

2. **Interactive Style of Writing.** Based on the belief that the experimental psychology-research methods text should be lively and engaging, we employ an interactive, conversational style of writing that we hope will help draw students into the material being presented.
3. **The Psychological Detective Feature.** The questions or situations posed by these sections that appear throughout each chapter will encourage students to engage in critical thinking exercises. These sections also serve as excellent stimulants for productive class discussions.
4. **Marginal Definitions.** Key definitions appear in the margin, close to the introduction of the term in the text.
5. **Review Summaries.** To help students master smaller chunks of material, each chapter contains several review summaries.
6. **Study Breaks.** Each Review Summary is followed by a Study Break that students can use to test their mastery of the material they have just completed. These study breaks should be especially helpful to your students when they prepare for quizzes and examinations.
7. **Hands-On Activities.** Each chapter concludes with a Hands-on Activities section that students are encouraged to become engaged in. It's like having a laboratory manual built into the text!

We hope that these special features will provide your students with a positive experience as they learn the fundamentals of research methodology in psychology.

## NOTE TO THE STUDENT

---

Welcome to the world of psychological research! Because the two of us have taught this course for over forty-five years (combined!), we have seen the excitement that research can generate in student after student. As you will learn, conducting psychological research is very much like being a detective on a case.

Throughout this text we have tried to make it perfectly clear that research is something that *you* can (and should) become involved in. We hope you will enjoy reading about the student projects that we use as research examples throughout this text. Student research projects are making valuable contributions to our field. We hope to see *your* name among those making such contributions!

At this point we encourage you to stop *immediately* to review the list of pedagogical features highlighted in the "Note to the Instructor". . . Did you humor us by actually looking at that list? If not, please do so now. To make full use of this text, you need to become *actively* involved; these pedagogical features will help you. Active involvement means that you need to stop to think about **The Psychological Detective** sections immediately when you encounter them, refer to figures and tables when directed to do so, complete the **Study Breaks** when they appear, and attempt some of the **Hands-On Activities**, even if they are not assigned. Becoming actively involved in this course helps the material come alive; your grade and your future involvement in psychology will thank you.

A C K N O W L E D G M E N T S

---

We would like to express our appreciation to the consultants who reviewed earlier versions of this text: Diane Mello-Goldner, Pine Manor College; Trey Buchanan, Wheaton College; David Johnson, John Brown University. Their comments were especially helpful as we prepared the final draft.

In many ways the final preparation of a text is only as good as the publisher. We could have asked for none better than Prentice Hall! Chief Psychology Editor Pete Janzow was always there to listen to our suggestions and concerns. His instincts concerning what will make a good book are impeccable. Assistant Psychology Editor Nicole Signoretti was always supportive of those features that we felt would result in a more lively and appealing text. Thanks, folks—It would not have worked without your concern and support!

We also thank our families (Corliss, Tyler, and Ben—RAS; Kathleen and Jennifer—SFD) for putting up with us during the preparation of this text. True friends and real supporters are few and far between!

*R. A. S.*

*S. F. D.*

# Contents

## PREFACE xiv

### CHAPTER 1

## The Science of Psychology 1

### WAYS TO ACQUIRE KNOWLEDGE 1

- Tenacity 3
- Authority 4
- Experience 5
- Reason and Logic 5
- Science 5

### COMPONENTS OF THE SCIENTIFIC METHOD 6

- Objectivity 6
- Confirmation of Findings 7
- Self-Correction 7
- Control 7

### THE PSYCHOLOGICAL EXPERIMENT 8

- Independent Variable 8
- Dependent Variable 9
- Extraneous Variables 9

### ESTABLISHING CAUSE-AND-EFFECT RELATIONS 9

### REVIEW SUMMARY 11

### STUDY BREAK 12

### THE RESEARCH PROCESS 12

- Finding a Problem 12
- Reviewing the Literature 13
- Theoretical Considerations 13
- Hypothesis 14
- Experimental Design 15
- Conducting the Experiment 15
- Data Analysis and Statistical Decisions 15

Decisions in Terms of Past Research and Theory	15
Preparing the Research Report	16
Sharing Your Results: Presentation and Publication	16
Finding a New Problem	19
<b>WHY IS THE RESEARCH METHODS COURSE IMPORTANT?</b>	<b>19</b>
<b>REVIEW SUMMARY</b>	<b>21</b>
<b>STUDY BREAK</b>	<b>21</b>
<b>LOOKING AHEAD</b>	<b>22</b>
<b>HANDS-ON ACTIVITIES</b>	<b>22</b>

**CHAPTER 2**

## **Research Ideas, Hypotheses, and Ethics 23**

<b>THE RESEARCH IDEA</b>	<b>24</b>
Characteristics of Good Research Ideas	24
Sources of Research Ideas	25
<b>SURVEYING THE PSYCHOLOGICAL LITERATURE</b>	<b>29</b>
<b>FORMULATING THE RESEARCH HYPOTHESIS</b>	<b>35</b>
Characteristics of the Research Hypothesis	37
<b>REVIEW SUMMARY</b>	<b>42</b>
<b>STUDY BREAK</b>	<b>43</b>
<b>ETHICS IN PSYCHOLOGICAL RESEARCH</b>	<b>44</b>
APA Principles in the Conduct of Research with Humans	46
The Ethical Use of Animals in Psychological Research	52
The Institutional Review Board	58
The Experimenter's Responsibility	58
Ethical Obligations Once the Research Is Completed	59
<b>REVIEW SUMMARY</b>	<b>60</b>
<b>STUDY BREAK</b>	<b>61</b>
<b>LOOKING AHEAD</b>	<b>62</b>
<b>HANDS-ON ACTIVITIES</b>	<b>62</b>

**CHAPTER 3****Nonexperimental Methods for Acquiring Data 63****DESCRIPTIVE METHODS 64**

Archival and Previously Recorded Sources  
of Data 64

Observational Techniques 66

Choosing Behaviors and Recording  
Techniques 70

Using More than One Observer:  
Interobserver Reliability 72

**CORRELATIONAL STUDIES 73****EX POST FACTO STUDIES 78****REVIEW SUMMARY 79****STUDY BREAK 80****SURVEYS, QUESTIONNAIRES, TESTS,  
AND INVENTORIES 81**

Sampling 81

Surveys and Questionnaires 83

Tests and Inventories 90

Research Strategies Using Surveys,  
Questionnaires, Tests, and Inventories 93

**REVIEW SUMMARY 95****STUDY BREAK 95****LOOKING AHEAD 95****HANDS-ON ACTIVITIES 97****CHAPTER 4****The Basics of Experimentation I:  
Variables and Control 99****THE NATURE OF VARIABLES 100****OPERATIONALLY DEFINING VARIABLES 101****INDEPENDENT VARIABLES 101**

Types of IVs 102

**DEPENDENT VARIABLES 103**

Selecting the DV 104

Recording or Measuring the DV 104

Should More than One DV Be Recorded? 106

Characteristics of a Good DV 107

EXTRANEOUS VARIABLES	107
Nuisance Variables	108
Confounders	110
REVIEW SUMMARY	113
STUDY BREAK	113
CONTROLLING EXTRANEOUS VARIABLES	114
Basic Control Techniques	114
REVIEW SUMMARY	126
STUDY BREAK	127
THE EXPERIMENTER AS AN EXTRANEOUS VARIABLE	127
Experimenter Characteristics	127
Experimenter Expectancies	128
Controlling Experimenter Effects	129
PARTICIPANT PERCEPTIONS AS EXTRANEOUS VARIABLES	130
Demand Characteristics and Good	
Participants	131
Response Bias	132
Controlling Participant Effects	133
REVIEW SUMMARY	135
STUDY BREAK	136
LOOKING AHEAD	136
HANDS-ON ACTIVITIES	137

## CHAPTER 5

### **The Basics of Experimentation II: Participants and Apparatus, Cross-Cultural Considerations, and Beginning the Research Report 139**

PARTICIPANTS	140
Types of Participants	140
Number of Participants	142
APPARATUS	143
IV Presentation	143
DV Recording	145
Other Considerations	146
REVIEW SUMMARY	146
STUDY BREAK	146

## CHAPTER 6

**THE INTERFACE BETWEEN RESEARCH  
AND CULTURE 147**

Culture, Knowledge, and Truth 148

The Effect of Culture on Research 148

Methodology and Analysis Issues 149

**REVIEW SUMMARY 152****STUDY BREAK 152****THE APA FORMAT PAPER 152**

What Is APA Format? 153

Sections of the APA Format Paper 153

**REVIEW SUMMARY 164****STUDY BREAK 166****LOOKING AHEAD 166****HANDS-ON ACTIVITIES 167****Statistics Review 168****DESCRIPTIVE STATISTICS 170**

Scales of Measurement 170

Measures of Central Tendency 172

Graphing Your Results 174

Statistics 180

Measures of Variability 181

**REVIEW SUMMARY 185****STUDY BREAK 186****CORRELATION 187**The Pearson Product-Moment Correlation  
Coefficient 188**INFERENTIAL STATISTICS 189**

What Is Significant? 190

The *t* Test 191One-Tail versus Two-Tail Tests  
of Significance 193

The Logic of Significance Testing 195

When Statistics Go Astray: Type I and Type II  
Errors 195**EFFECT SIZE 197****REVIEW SUMMARY 198****STUDY BREAK 199****LOOKING AHEAD 199****HANDS-ON ACTIVITIES 199**

CHAPTER 7

**Designing, Conducting, Analyzing,  
and Interpreting Experiments  
with Two Groups 201**

**EXPERIMENTAL DESIGN: THE BASIC BUILDING  
BLOCK 202**

The Two-Group Design 203

**REVIEW SUMMARY 212**

**STUDY BREAK 212**

Comparing Two-Group Designs 213

Variations on the Two-Group Design 216

**REVIEW SUMMARY 218**

**STUDY BREAK 219**

**STATISTICAL ANALYSIS: WHAT DO YOUR DATA  
SHOW? 219**

The Relationship Between Experimental Design  
and Statistics 219

Analyzing Two-Group Designs 220

Calculating Your Statistics 220

**INTERPRETATION: MAKING SENSE OF YOUR  
STATISTICS 221**

Interpreting Computer Statistical Output 221

**THE CONTINUING RESEARCH PROBLEM 230**

**REVIEW SUMMARY 231**

**STUDY BREAK 232**

**LOOKING AHEAD 232**

**HANDS-ON ACTIVITIES 232**

CHAPTER 8

**Designing, Conducting, Analyzing,  
and Interpreting Experiments  
with More than Two Groups 237**

**EXPERIMENTAL DESIGN: ADDING TO THE BASIC  
BUILDING BLOCK 238**

The Multiple-Group Design 238

Comparing the Multiple-Group Design to the  
Two-Group Design 245

Comparing Multiple-Group Designs 247

Variations on the Multiple-Group Design 249

**REVIEW SUMMARY 250**

**STUDY BREAK 250**

**STATISTICAL ANALYSIS: WHAT DO YOUR DATA  
SHOW? 251**

Analyzing Multiple-Group Designs	251
Calculating Your Statistics	252
Rationale of ANOVA	252
<b>INTERPRETATION: MAKING SENSE OF YOUR STATISTICS</b>	<b>254</b>
Interpreting Computer Statistical Output	255
<b>THE CONTINUING RESEARCH PROBLEM</b>	<b>268</b>
<b>REVIEW SUMMARY</b>	<b>269</b>
<b>STUDY BREAK</b>	<b>270</b>
<b>LOOKING AHEAD</b>	<b>271</b>
<b>HANDS-ON ACTIVITIES</b>	<b>271</b>

## CHAPTER 9

### **Designing, Conducting, Analyzing, and Interpreting Experiments with Multiple Independent Variables 275**

<b>EXPERIMENTAL DESIGN: DOUBLING THE BASIC BUILDING BLOCK</b>	<b>276</b>
The Factorial Design	277
<b>REVIEW SUMMARY</b>	<b>288</b>
<b>STUDY BREAK</b>	<b>289</b>
Comparing the Factorial Design to Two-Group and Multiple-Group Designs	289
Choosing a Factorial Design	291
Variations on Factorial Designs	293
<b>REVIEW SUMMARY</b>	<b>297</b>
<b>STUDY BREAK</b>	<b>297</b>
<b>STATISTICAL ANALYSIS: WHAT DO YOUR DATA SHOW?</b>	<b>298</b>
Analyzing Factorial Designs	298
Analyzing the Statistical Example	299
Rationale of ANOVA	300
Understanding Interactions	302
<b>INTERPRETATION: MAKING SENSE OF YOUR STATISTICS</b>	<b>303</b>
Interpreting Computer Statistical Output	303
A Final Note	324
<b>THE CONTINUING RESEARCH PROBLEM</b>	<b>324</b>
<b>REVIEW SUMMARY</b>	<b>326</b>
<b>STUDY BREAK</b>	<b>327</b>
<b>LOOKING AHEAD</b>	<b>328</b>
<b>HANDS-ON ACTIVITIES</b>	<b>328</b>

**CHAPTER 10**

# **How Good Is Your Experiment? Internal and External Validity 331**

**AN INTRODUCTION TO EXPERIMENT  
EVALUATION 332**

**INTERNAL VALIDITY: EVALUATING YOUR  
EXPERIMENT FROM THE INSIDE 335**  
Threats to Internal Validity 337

**REVIEW SUMMARY 346**

**STUDY BREAK 347**  
Protecting Internal Validity 347  
The Bottom Line 352

**REVIEW SUMMARY 353**

**STUDY BREAK 354**

**EXTERNAL VALIDITY: GENERALIZING YOUR  
EXPERIMENT TO THE OUTSIDE 354**

Threats to External Validity (Based  
on Methods) 356

Threats to External Validity (Based on Our  
Participants) 359

The Devil's Advocate: Is External Validity Always  
Necessary? 364

The Bottom Line 365

**REVIEW SUMMARY 367**

**STUDY BREAK 367**

**LOOKING AHEAD 368**

**HANDS-ON ACTIVITIES 368**

**CHAPTER 11**

# **Alternative Research Approaches 371**

**SINGLE-CASE EXPERIMENTAL DESIGNS 372**

History of Single-Case Designs 373

Uses of Single-Case Designs 374

General Procedures of Single-Case Designs 375

Statistics and Single-Case Designs 377

Representative Single-Case Designs 378

**REVIEW SUMMARY 384**

**STUDY BREAK 384**

**QUASI-EXPERIMENTAL DESIGNS 385**

History of Quasi-experimental Designs 386

Uses of Quasi-experimental Designs 386

Representative Quasi-experimental Designs 387

REVIEW SUMMARY	394
STUDY BREAK	395
QUALITATIVE RESEARCH	396
Ethnography	398
Clinical Perspective	399
Grounded Theory	400
ALTERNATIVE RESEARCH APPROACHES:	
THE BOTTOM LINE	402
REVIEW SUMMARY	403
STUDY BREAK	403
LOOKING AHEAD	403
HANDS-ON ACTIVITIES	404
<b>Assembling the Research Report</b>	<b>407</b>
APA FORMAT REVISITED AND EXTENDED	408
Title Page	409
Abstract	410
Introduction	411
Method	414
Results	416
Discussion	422
References	423
Author Note	430
REVIEW SUMMARY	432
STUDY BREAK	433
WRITING IN APA STYLE	433
General Guidelines	434
Grammatical Guidelines	436
APA EDITORIAL STYLE	438
PREPARING YOUR MANUSCRIPT	439
REVIEW SUMMARY	440
STUDY BREAK	440
LOOKING AHEAD	441
HANDS-ON ACTIVITIES	441
<b>Appendix A: Statistical Tables</b>	<b>447</b>
<b>Appendix B: Answers to Study Breaks</b>	<b>452</b>
<b>References</b>	<b>472</b>
<b>Index</b>	<b>480</b>

# CHAPTER 1



## The Science of Psychology

### **WAYS TO ACQUIRE KNOWLEDGE**

- Tenacity
- Authority
- Experience
- Reason and Logic
- Science

### **COMPONENTS OF THE SCIENTIFIC METHOD**

- Objectivity
- Confirmation of Findings
- Self-Correction
- Control

### **THE PSYCHOLOGICAL EXPERIMENT**

- Independent Variable
- Dependent Variable
- Extraneous Variables

### **ESTABLISHING CAUSE-AND-EFFECT RELATIONS**

#### **THE RESEARCH PROCESS**

- Finding a Problem
- Reviewing the Literature
- Theoretical Considerations
- Hypothesis
- Experimental Design
- Conducting the Experiment
- Data Analysis and Statistical Decisions
- Decisions in Terms of Past Research and Theory
- Preparing the Research Report
- Sharing Your Results: Presentation  
and Publication
- Finding a New Problem

### **WHY IS THE RESEARCH METHODS COURSE IMPORTANT?**

We purposely titled our text “The Psychologist as Detective” to convey the excitement and thrill that researchers have when they investigate questions that are at the core of what it means to be a psychological being. The parallels between conducting psychological research and working on a detective case are striking. First, you have to know the boundaries of your case (a research question is developed). Suspects are eliminated (the researcher exercises control over unwanted factors). Evidence is gathered (the researcher conducts the experiment and makes observations). A solution is proposed (the results of the research are analyzed and an interpretation is offered). The proposed solution is presented to the jury (researchers share their results and/or interpretations with their peers).

To help you become a good psychological detective, we have included several “Psychological Detective” sections in each chapter. Each of these sections asks you to stop, then think about and answer a question concerning psychological research. Please take full advantage of these sections; they were designed to help you think critically about psychological research. Critical thinking is vital to good detectives. We want you to become the best psychological detective possible. We begin our examination of psychological research by considering a research project that would intrigue even the best psychological detective.

You are sitting on the witness stand at a trial and the defense attorney begins questioning you. “How fast were the cars going when they smashed into each other?” You give your answer. Next the attorney asks, “Was there any broken glass?” You frantically search your memory for an answer. “If the cars involved *smashed* into each other, then surely there was broken glass?” You respond affirmatively. Elizabeth Loftus’s (1979) provocative research on eyewitness testimony has shown that the types of questions asked of witnesses may influence their answers and that their testimony may not be valid.

In a research study investigating the questions above concerning the automobile accident, Loftus (1979) found that the estimated speeds reported by research participants who were asked about cars that “smashed into” each other were higher than speeds estimated by participants who were asked about cars that merely “hit” each other. Moreover, participants who were told that the cars smashed into each other reported the presence of more broken glass.

Such results prompted other researchers to ask questions about the credibility of witnesses. For example, Pamela Feist (1993), a student at Southwest State University (Marshall, MN) wondered whether the way witnesses are dressed influences the perception of their credibility. As you can see from Figure 1-1, she found that female witnesses were seen as more credible when dressed conservatively than when they were dressed fashionably. On the other hand, fashionably dressed men were seen as being slightly more credible witnesses than were conservatively dressed men.

For the time being we will not concern ourselves with *how* Feist gathered this information relating style of dress and witness credibility. Our concern at present is *why* she gathered this information. The answer really is quite straightforward—an interesting question in need of an answer had presented itself. Asking and then attempting to answer questions are at the heart of what psychologists do. In short, psychologists are in the business of acquiring new information.