



# RESEARCH METHODS IN PSYCHOLOGY 2e

EVALUATING *a* WORLD *of* INFORMATION

**BETH MORLING**



# RESEARCH METHODS IN PSYCHOLOGY:

Evaluating a World of Information

Second Edition



SECOND EDITION

# RESEARCH METHODS IN PSYCHOLOGY:

Evaluating a World of Information

**Beth Morling**

University of Delaware



W. W. Norton & Company, Inc.  
New York • London

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Printed in Canada.

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Media Assistant: George Phipps

Marketing Manager, Psychology: Lauren Winkler

Composition: CodeMantra

Manufacturing: Transcontinental Interglobe, Inc.

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

Morling, Beth.

Research methods in psychology: evaluating a world of information/Beth Morling, University of Delaware.—Second Edition.

pages cm

Includes bibliographical references and index.

**ISBN: 978-0-393-93693-3 (pbk.: alk. paper)**

1. Psychology—Research—Methodology—Textbooks. 2. Psychology, Experimental—Textbooks. I. Title.

BF76.5.M667 2014

150.72'1—dc23

2014016570

W. W. Norton & Company, Inc., 500 Fifth Avenue, New York, NY 10110-0017

wwnorton.com

W. W. Norton & Company Ltd., Castle House, 75/76 Wells Street, London W1T 3QT

1 2 3 4 5 6 7 8 9 0

**In memory of Larry H. Cohen,  
a great mentor and colleague**



# About the Author

**Beth Morling** is Professor of Psychology at the University of Delaware. She attended Carleton College in Northfield, Minnesota, and received her Ph.D. from the University of Massachusetts at Amherst. Before teaching at Delaware, she held positions at Union College (New York) and Muhlenberg College (Pennsylvania). She has taught research methods at Delaware almost every semester for 10 years. In addition, she teaches undergraduate cultural psychology and a seminar on the self-concept, as well as a graduate course in the teaching of psychology. Her research in the area of cultural psychology explores how cultural practices shape people's motivations. Dr. Morling has been a Fulbright scholar in Kyoto, Japan.





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# Preface

Students in the psychology major plan to pursue a tremendous variety of careers—not only to become psychology researchers. Why do psychology majors need to study research methods when they want to be therapists, social workers, teachers, lawyers, or physicians? Indeed, many students anticipate that research methods will not only be “dry” and “boring,” but also irrelevant to their future goals. This book was written with these very students in mind—students who are taking their first course in research methods (usually sophomores) and who plan to pursue a wide variety of careers. Most of the students who take the course will never become researchers themselves, but they can learn to systematically navigate the research information they will encounter, in the empirical journal articles they will read in their psychology courses, and in online magazines, print magazines, newspapers, blogs, and wikis as well.

I used to tell students that by learning to plan and conduct their own research, they would be able to read and apply research later, in their chosen careers. But then I reviewed the literature on learning transfer, which reminds us that the skills involved in designing one’s own studies won’t easily transfer to understanding and critically assessing others’ studies. If we want students to explain whether a study supports its claims, we also have to teach them how to do so. That is the approach this book attempts to teach.

## Students Can Develop Research Consumer Skills

To be a systematic consumer of research, students need to know what to prioritize when assessing a study. Sometimes large or random samples matter, and sometimes they do not. Sometimes we ask about random assignment and confounds, and sometimes we do not. Students benefit from having a set of systematic steps to help them prioritize their questioning when they interrogate quantitative information. To provide that, this book presents a framework of **three claims and four validities**, introduced in Chapter 3. One axis of the framework is the three kinds of claims that researchers (as well as journalists, bloggers, and commentators) might make: frequency claims (some percentage of people do X), association claims (X is associated with Y), and causal claims (X changes Y). The second axis of the framework is the four validities that are generally agreed upon by methodologists: internal, external, construct, and statistical.

The three claims and four validities framework provides a scaffold that is reinforced throughout the book. Instead of presenting different vocabulary in every chapter, this book fits every term, technique, and piece of information into the basic framework.

The framework also helps students set priorities when evaluating a study. Good quantitative reasoners prioritize different validity questions depending on the claim. For example, for a frequency claim, we should ask about measurement

(construct validity) and sampling techniques (external validity), but not about random assignment or confounds, because the claim is not a causal one. For a causal claim, we prioritize internal validity and construct validity, but external validity is generally less important.

Through engagement with a consumer-focused research methods course, students become systematic interrogators. They start to ask more appropriate and more refined questions about a study. By the end of the course, students can clearly explain why a causal claim needs an experiment to support it. They know how to evaluate whether a variable has been measured well. They know when it's appropriate to call for more participants in a study (and when it is not). And they can explain when a study must have a representative sample, and when it doesn't matter.

## What About Future Researchers?

This book can also be used to teach the flip side of the question: How can producers of research design better studies? The producer angle is presented so that students will be prepared to design studies, collect data, and write papers in courses that prioritize these skills.

Future researchers will find sophisticated content in this book, presented in an accessible, consistent manner. They will learn the difference between mediation (Chapter 9) and moderation (Chapters 8 and 9), an important skill in theory building and theory testing. They will learn how to design and interpret factorial designs, even up to three-way interactions (Chapter 12). And in the all-too-common event that a student-run study fails to work, one chapter helps them explore the possible reasons for a null effect (Chapter 11). This book provides the basic statistical background, ethics coverage, and APA-style notes that are needed to guide students through study design.

## Organization

The fourteen chapters in this book are arranged in six parts. Part I (Chapters 1–3) includes introductory chapters on the scientific method and the three claims, four validities framework. Part II (Chapters 4–5) covers issues that matter for any study: research ethics and good measurement. Parts III–V (Chapters 6–12) correspond to each of the three claims (frequency, association, and causal). Part VI (Chapters 13–14) focuses on balancing research priorities.

Most of the chapters will be familiar to veteran instructors, including chapters on measurement, experimentation, and factorial designs. However, unlike some methods books, this one devotes two full chapters to correlational research (one on bivariate and one on multivariate studies), which help students learn how to interpret, apply, and interrogate different types of association claims, one of the common types of claims they will encounter.

There are three supplementary chapters: Statistics Review: Descriptive Statistics, Statistics Review: Inferential Statistics, and Presenting Results: APA-Style Reports and Conference Posters. These chapters provide a review for students who've already had statistics, and provide the tools students need to create research reports and conference posters.

Two appendices are provided for reference: Random Numbers and How to Use Them, and Statistical Tables. Both of these provide important reference tools for students who are conducting their own research.

## Support for Students and Instructors

The book's pedagogical features emphasize active learning and repetition of the most important points. Each chapter begins with high-level learning objectives—major skills students should expect to remember even “a year from now.” Important terms in a chapter are introduced in boldface. The Check Your Understanding questions at the end of each major section provide basic review questions that allow students to revisit key concepts as they read. Each chapter ends with multiple-choice review questions and a set of Learning Actively exercises that encourage students to apply what they learned. (Answers are provided at the end of the book.) A master table of the three claims and four validities appears inside the book's front cover to remind students of the scaffold for the course.

I believe the book works pedagogically because it continually reinforces the three claims, four validities framework, building in repetition and depth. Although each chapter addresses the usual core content of research methods, students are always reminded of how a particular topic helps them interrogate the key validities. The increasingly detailed iterations of a simple message will help students remember and apply this questioning strategy in the future.

In addition to the book itself, Norton offers a carefully designed support package for instructors and students. The Instructor's Manual contains detailed teaching notes based on my own experience with the course, extra active learning activities and homework assignments, and a full Test Bank. The book comes with a number of other ancillaries to assist both new and experienced research methods instructors; a full list is available on p. xxi.

## Teachable Examples on the Everyday Research Methods Blog



Students and instructors can find additional examples of psychological science in the news on my blog, Everyday Research Methods ([www.everydayresearchmethods.com](http://www.everydayresearchmethods.com); no password or registration required). Instructors can use the blog as a repository of teachable moments with homework style questions; they can find fresh, new examples to use in class. Students can use the entries as extra practice in reading about psychological science in the popular press.

## Changes in the Second Edition

First edition users will be happy to learn that the basic organization, material, and descriptions in the text remain the same. The second edition contains several fresh examples, providing new studies and recent headlines. These new examples free instructors to assign the second edition, but teach with their favorite examples from the first.

We've added short multiple-choice quizzes to the end of each chapter to provide the self-testing opportunities that have been shown to help students

learn (according to research on the testing effect). To train students to interpret tables and graphs in real contexts, certain figures are labeled as “Straight from the Source” when they have been reproduced exactly from their original journal articles. To help students get a sense of the overall structure of the chapter, the end-of-chapter summaries are presented as bulleted lists, organized under the same primary headings from the chapter, to remind students of the organization of the material. Key terms are now listed in the order of their appearance in the chapter, rather than alphabetically.

In response to consistent reviewer requests, I’ve split former Chapter 6 into two chapters, one on surveys and observational methods, and one on sampling techniques. Here is a detailed list of the changes made to each chapter.

Chapter	Major changes in the second edition
1. Psychology Is a Way of Thinking	The language of “cycles” is no longer used here. The same content is presented, under the theory-data cycle, the peer review process, and journal-to-journalism. A new section focuses on how researchers dig deeper—they don’t stop with a single study.
2. Sources of Information: Why Research Is Best and How to Find it	Chapter 2 retains the same recurring example of the catharsis hypothesis as a frame for “sources of information.” In the section on intuitive reasoning, I omitted the subsection on overconfidence, and replaced it with the bias blind spot—the sneaky tendency for us to think only other people are biased, not ourselves.
3. Three Claims, Four Validities: Interrogation Tools for Consumers of Research	The three claims, four validities framework is presented much the same, but with all new examples taken from the popular press during the past year. The long section and figure on using correlation for prediction was moved to Chapter 8 (Bivariate Correlational Research).
4. Ethical Guidelines for Psychology Research	No major changes here, except to include the recent example of social psychologist Diederik Stapel in the section on research fraud.
5. Identifying Good Measurement	While still focusing on measuring happiness, the discussion is amplified to clarify that each variable in a study can be evaluated for construct validity. The chapter now shows what happens when we investigate a claim such as “Religious people are more happy.” In such research, we can evaluate the reliability and validity of two operationalizations: religiosity and happiness. Often we establish the quality of each of our operationalizations in separate data collection, before testing the relationship between them. Students struggle with this idea, and I hope the revision helps them understand it better.  Because my own students tended to get unnecessarily confused by the difference between predictive and concurrent validity, I replaced both terms with the single term, criterion validity, which means that the measure correlates with a behavioral outcome of interest (either now or in the future).

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## Chapter Major changes in the second edition

6. Surveys and Observations: Describing What People Do	<p>New material attempts to convince students that self-report actually can be valid. Many of my students question the validity of any self-report, even of gender.</p> <p>I removed the term nay-saying response bias; according to research on polling, nay-saying is not that common and yea-saying is common. Fence sitting is still in the chapter.</p> <p>I use a new example of observational research, again with families, focusing on dinner conversations and emotional tone. This led to two new “Straight from the Source” figures.</p>
7. Sampling: Estimating the Frequency of Behaviors and Beliefs	<p>This material, on sampling, was previously combined with information on surveys and observations. Now it stands alone as its own chapter, with no other major changes.</p>
8. Bivariate Correlational Research	<p>There are two new examples and one modified example. The first new one is about how people who meet their spouses online are happier (providing a new example of a correlation between a categorical and quantitative variable, as well as a discussion of a study with a very small effect size). The second new example is a negative correlation, in which people who multitask the most are the worst at it. The third example is modified; it used to be “Small talk is associated with lower well-being.” Now I present the complementary positive association in which “Deep talk is associated with higher well-being.”</p> <p>A second major change is removal of the section on subgroups; this confused students and fits better under the sections on moderators and regression.</p> <p>I added a section on restriction of range. This section sets students up for the idea of floor and ceiling effects later on.</p> <p>The material on using correlations for prediction was moved from Chapter 3 to this chapter.</p>
9. Multivariate Correlational Research	<p>The examples for cross-lag panel designs and multiple-regression analyses are the same.</p> <p>The only important change is in the section on mediation, in which I emphasize more strongly that to establish mediation between variable A and B, temporal precedence is very important—the mediator must be measured after variable A, and before variable B.</p> <p>A helpful new figure distinguishes mediation, moderation, and third variables (Figure 9.13).</p>
10. Introduction to Simple Experiments	<p>The red/green ink example is retained, because it provides a nice example of experimental design. However, one author noted to me that he has failed to replicate a similar effect (Steele, 2014). I mention this in Chapter 14 (on replication), but instructors might wish to discuss replicability with students as they teach this chapter.</p> <p>The example on rejection and feeling cold has been replaced with a new example on the effect of serving bowl size on how much people eat.</p>
11. More on Experiments: Confounding and Obscuring Variables	<p>No new examples.</p> <p>I added a new metaphor for obscuring variables: two bowls of salsa that differ in how hot they are. The metaphor is intended to represent the two general causes of a null effect: not enough variance between bowls (between-groups variability) and too much variability within bowls (within-groups variability).</p>

(continued)



## Chapter

## Major changes in the second edition

12. Experiments with More Than One Independent Variable	I kept the cell phone example of a $2 \times 2$ factorial design. A set of new examples on alcohol and aggression replaces the example on serving container size, which is now featured in Chapter 10.
13. Quasi-Experiments and Small- <i>N</i> Designs	The example of burnout and vacation is replaced with an example on how judicial decision making is affected by food breaks for prisoners. I replaced the example of the StayWell program with a study on the effects of cosmetic surgery.
14. Replicability, Generalization, and the Real World	I removed the section stating that statistically significant results are replicable, in response to a reviewer who pointed out the error of this reasoning. (For details, see Sohn, 1998, Replicability and statistical significance.) The example of direct replication from the Bargh et al. walking study is replaced with a study on the name-letter/birthday-number effect. I replaced the psychotherapy meta-analysis example with a meta-analysis on video games. Note that both meta-analysis examples in this chapter use <i>r</i> as the average effect size; instructors might wish to provide an example of meta-analyses in class where <i>d</i> or <i>g</i> are used as the average effect size. I added an example of the file-drawer problem, in which antidepressant trials that showed no effect were less likely to be published.

## Acknowledgments

Working on this textbook has been rewarding and enriching, thanks to the many people who have smoothed the way. To start, I feel fortunate to have worked with an author-focused company and an all-around great editor, Sheri Snavelly. She is both optimistic and realistic, savvy, and smart. She also made sure I got the most rigorous reviews possible and that I was supported with great Norton staff: Sujin Hong, Callinda Taylor, Eric Pier-Hocking, Hope Miller Goodell, and Scott Sugarman. My developmental editor for the second edition, Betsy Dileria, refined each term, figure, and reference, making the book more consistent, tight, and accurate. I also remain grateful to Beth Ammerman, who helped make every aspect of the first edition well-organized and clear.

I am also thankful for the support and continued enthusiasm I have received from the Norton sales management team: Michael Wright, Allen Clawson, Annie Stewart, Dennis Fernandes, Dennis Adams, Katie Incorvia, Jordan Mendez, Lauren Greene, Shane Brisson, and Dan Horton. I also wish to thank my marketing manager Lauren Winkler for her creativity and drive to ensure my book reaches a wide audience.

I deeply appreciate the support of many colleagues. My friend Carrie Smith shares my vision for assessment and helps make this book's Test Bank an authentic measure of quantitative reasoning (as well as sending me great links to blog about). Lauren Usher carefully checked and helped revise the Test Bank for the second edition. Many thanks to Linda Juang for carefully and patiently fact-checking every chapter in this edition. Thanks, as well, to Christine Lofgren, Stefanie LoSavio, and Emily Stanley for writing and revising the questions that appear in the Coursepack created for the course management systems. The book was reviewed by a cadre of talented research method professors, and I am grateful to each of them. Some were asked to review; others cared enough to send me comments by email. Their students are lucky to have them in the classroom, and my readers will benefit from the time they spent in improving this book:

Eileen Josiah Achorn, *University of Texas, San Antonio*  
Kristen Weede Alexander, *California State University, Sacramento*  
Leola Alfonso-Reese, *San Diego State University*  
Jennifer Asmuth, *Susquehanna University*  
Gordon Bear, *Ramapo College*  
Margaret Elizabeth Beier, *Rice University*  
Brett Beston, *McMaster University*  
Julie Boland, *University of Michigan*  
Lisa Cravens-Brown, *The Ohio State University*  
Victoria Cross, *University of California, Davis*  
Matthew Deegan, *University of Delaware*  
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Kenneth M. Steele, *Appalachian State University*  
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Eva Szeli, *Arizona State University*  
Lauren A. Taglialatela, *Kennesaw State University*  
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Charles E. (Ted) Wright, *University of California, Irvine*  
Nancy Yanchus, *Georgia Southern University*  
David Zehr, *Plymouth State University*  
Peggy Mycek Zoccola, *Ohio University*

I have tried to make the best possible improvements from all of these able reviewers.

My life as a teaching professor has been enriched during the last few years because of the friendship and support of many colleagues at the University of Delaware, including, but not limited to, Brian Ackerman, Ryan Beveridge, Chad Forbes, Sam Gaertner, James Jones, Mike Kuhlman, Agnes Ly, Kristen Begosh, Bob Simons, and Hal White. Colleagues old and new, far and near provide me with friendship and support, including, but not limited to, Susan Fiske, Shinobu Kitayama, Keiko Ishii, Yukiko Uchida, Steve Heine, Dana Dunn, Vinai Norassakkunkit, and all the NITOP regulars.

My boys Max, Alek, and Hugo, as usual, ensured that I never had to work on the book for too long at a stretch (thanks, guys . . .). I remain grateful to my mother-in-law, Janet Pochan, for cheerfully helping us with so many tasks on the home front. Finally, I want to thank my husband Darrin for encouraging me and for always having the right wine to celebrate the latest deadline.



# Media and Print Resources for Instructors and Students

## Interactive Instructor's Guide

**Beth Morling, *University of Delaware***

The text's Interactive Instructor's Guide contains teaching guides to the text's key pedagogical features, a discussion of how to design a course that utilizes the textbook, sample syllabus and assignments, and chapter-by-chapter teaching notes and suggested activities.

## Test Bank

**C. Veronica Smith, *University of Mississippi*, and  
Lauren Usher, *University of Miami***

The Test Bank provides over 750 questions using an evidence-centered approach designed in collaboration with Valerie Shute of Florida State University and Diego Zapata-Rivera of the Educational Testing Service. The Test Bank contains multiple-choice and short-answer questions that are classified by section, Bloom's taxonomy, and difficulty, making it easy for instructors to construct tests and quizzes that are meaningful and diagnostic. The Test Bank is available in Word RTF, PDF, and *ExamView*® Assessment Suite format.

## Lecture PowerPoints

This edition of the book features two sets of lecture PowerPoints. One set is straight from Beth Morling's class, offering one approach to using the book. The other set offers starter slides for every section, follows the order of the text, features images and instructor notes, and is designed to be adapted to fit the needs of each individual classroom. In addition, all of the art and tables from the textbook are available in JPG and PPT formats.

## The *Research Methods in Psychology* Blog: *Everyday Research Methods*, *Interrogating the Popular Press*

[www.everydayresearchmethods.com](http://www.everydayresearchmethods.com)

The *Research Methods in Psychology* blog offers an often-updated bank of teachable moments from the web—blogs, newspapers, research studies, online videos, speeches, and more—curated by Beth Morling and occasional guest contributors. Each blog post connects with material students encounter in the textbook and includes critical-thinking/discussion questions that an instructor may discuss in lecture or assign as homework. The blog is easily searchable, and each entry is tagged with a learning objective from the textbook and appropriate keywords.

## Coursepack

**Christine Lofgren, *University of California, Irvine*, Stephanie LoSavio,  
*University of Delaware*, and Emily Stanley, *University of Delaware***

The Coursepack presents students with review opportunities that employ the text's analytical framework. Each chapter includes quizzes based on the Norton Assessment Guidelines, Chapter Outlines created by the textbook author and based on the Learning Objectives in the text, and review flashcards. The APA-style guidelines from the textbook will also be available in the Coursepack for easy access.





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Mozart  
Effect—  
Shmozart  
Effect

(Intelligence, 2010)



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## **Whiff of Rosemary Gives Your Brain a Boost**

(Body Odd,  
nbcnews.com, 2012)

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## Happiness Facts and Fiction

(webmd.com)

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**“Should I buy these boots? They got four and a half stars on Zappos.”**

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*The Three R's? A Fourth is crucial, Too: Recess*

(*New York Times*, 2009)

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### Your Plate Is Bigger Than Your Stomach

(*New York Times*, 2007)

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*The Reason  
Why You're an  
Angry Drunk*

*(Men's Health, 2012)*

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“What is the value of an experiment with just one participant?”

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*“Would we find  
these same results  
in other cultural  
contexts?”*





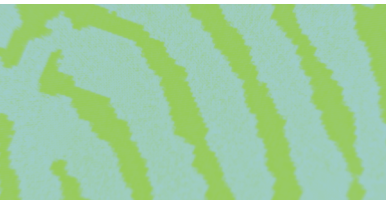
# PART I

## Introduction to Scientific Reasoning



**Mozart  
Effect—  
Shmozart  
Effect**

*(Intelligence, 2010)*



*The Color  
Red Makes  
You Stronger,  
but More  
Distractable*

*(The Wire, 2011)*





# 1

## Psychology Is a Way of Thinking

### LEARNING OBJECTIVES

---

A year from now, you should still be able to:

1. Explain what it means to reason empirically.
  2. Appreciate how an understanding of psychological research methods is crucial not only for producers of information but also for consumers of information.
  3. Describe five processes that shape psychological science.
- 

**Thinking back to your** introductory psychology course, what do you remember learning? You probably remember studies about dogs salivating at the sound of a bell or people failing to call for help when the room they were in filled up with smoke. Or perhaps you recall studies in which people administered increasingly stronger electric shocks to an innocent man although he seemed to be in distress. There were studies about how we learn best, why we sleep, and why we can't always trust our memories. As you continue your exploration of psychology, you can anticipate learning about other landmark studies—research about the brain, cognition, social behavior, child development, and clinical disorders.

Psychological science is based on studies—on research—by psychologists. Like other scientists, psychologists are empiricists. To be an empiricist means to base one's conclusions on systematic observations. Psychologists do not simply think intuitively about behavior, cognition, and emotion; they know what they know because they have conducted studies on people and animals acting in their natural environments or in specially designed situations. If you are to think like a psychologist, then you must think like a researcher, and taking a course in research methods is crucial to your understanding of psychology. This book explains the types of studies

psychologists conduct, as well as some of the potential strengths and limitations of each type of study. You will learn not only how to plan your own studies but also how to find research, read about it, and ask questions of it. While gaining a greater appreciation for the rigorous standards psychologists maintain in their research, you'll find out how to be a systematic and critical consumer of psychological science.

---

## Research Producers, Research Consumers

Some psychology students are fascinated by the research process and intend to become *producers* of research information. Perhaps they hope to get a job studying brain anatomy, observing the behavior of pigeons or monkeys, administering personality questionnaires, observing children in a school setting, or analyzing data. They may want to write up their results and present them at research meetings. These students may dream about working as research scientists or professors.

Other psychology students may not want to work in a lab, but they do enjoy reading about the structure of the brain, the behavior of pigeons or monkeys, the personalities of their fellow students, or the behavior of children in a school setting. They are interested in being *consumers* of research information—in reading about research so they can later apply it to their work, hobbies, relationships, or personal growth. These students might pursue careers as family therapists, teachers, entrepreneurs, guidance counselors, or police officers, and they expect a psychology education to help them in these roles.

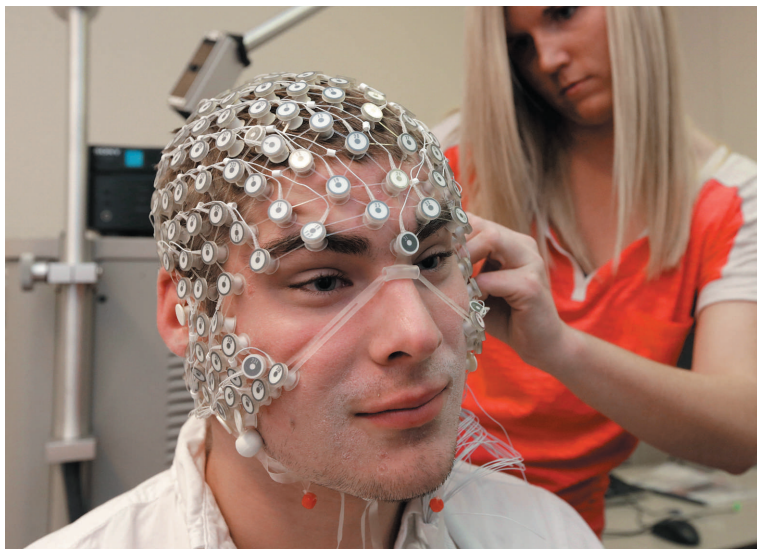
In practice, many psychologists engage in both roles. When they are planning their research and creating new knowledge, they study the work of others who have gone before them. Furthermore, psychologists in both roles require a curiosity about behavior, emotion, and cognition. Research producers and consumers share a desire to ask, answer, and communicate interesting questions. Both of them share a commitment to the practice of empiricism—to answer psychological questions with direct, formal observations, and to communicate with others about what they have learned.

### Why the Producer Role Is Important

For your future coursework in psychology, it is important to know how to be a producer of research. Of course, students who decide to go to graduate school for psychology will need to know all about research methods. But even if you do not plan to do graduate work in psychology, you will probably have to write a paper following the style guidelines of the American Psychological Association (APA) before you graduate, and you may be required to do research as part of a course lab section. To succeed, you will need to know how to randomly assign people

to groups, how to measure attitudes accurately, or how to interpret results from a graph. Perhaps more importantly, the skills you acquire by conducting research can teach you how psychological scientists ask questions and how they think about their discipline.

As part of your psychology studies, you might even work in a research lab as an undergraduate (**Figure 1.1**). Many psychology professors are active researchers, and you might have the opportunity to get involved in their laboratories. Your faculty supervisor may ask you to code behaviors, assign participants to different groups, graph an outcome, or write a report. If such an opportunity arises, take it! Doing so will give you your first taste of being a research producer. Although you will be supervised closely, you will be expected to know the basics of conducting research. This book will help you understand why you have to protect the anonymity of your participants, use a coding book, or flip a coin to decide who goes in which group. By participating as a research producer, you can expect to deepen your understanding of psychological inquiry.



**FIGURE 1.1 Producers of research.** As undergraduates, some psychology majors work alongside faculty members as producers of information.

## Why the Consumer Role Is Important

Although it is important to understand the psychologist's role as a producer of research, most psychology majors do not eventually become researchers. Regardless of the career you choose, however, becoming a savvy consumer of information is essential. In your psychology courses, you will read studies published by psychologists in scientific journals. You will need to develop the ability to read about research with curiosity—to understand it, learn from it, and ask appropriate questions about it.

Think about how often you encounter news stories or look up information on the Internet. Much of the time, the stories you read and the websites you visit will present information based on research. For example, during an election year, Americans may come across polling information in the media almost every day. Many online newspapers have special sections that include stories on the latest research. Entire websites are dedicated to psychology-related topics, such as treatments for autism, subliminal learning tapes, or advice for married couples. Outside the Internet, lifestyle magazines such as *Self*, *Men's Health*, and *Parents* summarize research for their readers. However, only some of the research—whether online or printed—is accurate and useful; some of it is dubious, and

some is just plain wrong. How can you tell the good research information from the bad? Understanding research methods enables you to ask the appropriate questions, so you can assess information correctly. Research methods skills apply not only to research studies but also to much of the other types of information you are likely to encounter in daily life.

Finally, being a smart consumer of research could be crucial to your future career. Even if you do not plan to be a researcher—if your goal is to be a social worker, a teacher, a sales representative, a family therapist, a human resources professional, or an entrepreneur—you will need to know how to interpret published research with a critical eye. Clinical psychologists, social workers, and family therapists must read research to know which therapies are the most effective. In fact, licensure in these helping professions requires knowing the research behind **evidence-based treatments**—that is, therapies that are supported by research. Teachers also use research to find out which teaching methods work best. And the business world runs on quantitative information: Research is used to predict what sales will be like in the future, what consumers will buy, and whether investors will take risks or lie low. Once you learn how to be a consumer of information—psychological or otherwise—you will use these skills constantly, no matter what job you are in.

In this book, you will often see the phrase “interrogating information.” A consumer of research needs to know how to ask the right questions, determine the answers, and evaluate a study on the basis of those answers. This book will teach you systematic rules for interrogating research information.

## The Benefits of Being a Good Consumer

What do you gain by being a critical consumer of information? Imagine, for example, that you are an occupational therapist, a person who helps people with physical and mental disabilities find solutions to daily living challenges, and you’re working in a private practice. You are considering taking an expensive training course in a treatment called facilitated communication (FC), in which therapists help clients communicate by guiding their hands as they type sentences on a computer. This treatment is advertised as a breakthrough for people who have autism, a disorder that appears early in childhood and is characterized, in many cases, by reduced language abilities and impoverished social interactions. The technique is also used for patients with cerebral palsy and other developmental disorders that limit the ability to speak. Before you invest your money in a weekend-long course, you decide it is your professional responsibility to look into the effectiveness of FC. Is this an evidence-based treatment?

The organizers of the training course claim that people with disabilities—even if they cannot or will not speak—are able to type coherent messages on a keyboard if their hands and arms are supported by a sympathetic adult “facilitator” as they use the keyboard. Proponents of FC believe the facilitator develops a relationship of trust and helpfulness with the client. The intent is for the clients to independently create written messages in which they express thoughts that they ordinarily cannot, because of the disability.

If you do further research, however, you would learn that some psychologists suspect that the alleged successes of FC could be cases of “unconscious cuing”: While supporting the client’s hands, the facilitator has many opportunities to influence what the client types (Twachtman-Cullen, 1997). Psychologists have used controlled research to test the claims about the technique. In one study, a patient and a facilitator were both presented with a drawing of a common object, and the client was asked to type its name with the help of the facilitator (Klewe, 1993). Neither the client nor the facilitator could see the other’s drawing, so neither person knew that they had been shown two different objects. (For example, in one trial the client was shown a picture of a key, while the facilitator saw a picture of a sandwich.) Sure enough, the client typed out a name that fit one of the drawings—but always the drawing that the *facilitator* saw (i.e., the sandwich). The facilitators must have been cuing the clients in some way, even if they were not aware they were doing so—and even if they were trying *not* to do so (Figure 1.2). (For a summary of this research and an explanation of why FC may still be practiced today, see Jacobson, Mulick, & Schwartz, 1995; Janzen-Wilde, Duchan, & Higginbotham, 1995; Twachtman-Cullen, 1997). Indeed, the APA resolved that FC has “no scientifically demonstrated support for its efficacy”; it is not an evidence-based treatment (American Psychological Association, 1994).

To return to our scenario, because you are a careful consumer of information, you would probably decide to save your time and money to learn therapies that are backed up by empirical evidence. But without some ability to find, read, and understand the research on this topic, you might not have learned that FC is an unsupported technique. Training in research methods should motivate you to ask questions about this and other therapeutic techniques that you encounter.

Even if you choose a career that is not part of the field of psychology, you can benefit from reading psychological research. Consider a study on the impact of the color red, conducted by Andrew Elliot and his colleagues (2007). These researchers observed that the color red could become associated, over time, with messages of danger, caution, and avoidance. Red is the color of stop signs, stoplights, and warning signs, and teachers often use red ink or pencil to correct homework and tests. Do these associations matter for student achievement? When Elliot and his team gave college students a cognitive skills test, they scored lower if their test booklets had a red paper cover rather than a green or white one. In a second study, the students solved fewer anagrams when their participant ID number was written



**FIGURE 1.2 Facilitated communication.** One behavior that led some researchers to doubt FC was that clients were observed to type with one finger while looking away from the keyboard. (If you try it yourself, you’ll notice it’s virtually impossible to type coherently with one finger without looking.) Such observations meant that the facilitators, not the clients, were probably creating the typed words. Current users of FC claim to ensure that clients are always looking at the keys.



on each page in red ink rather than green or black ink. Elliot and his colleagues thus demonstrated that using red ink or a red cover as part of a cognitive test can inhibit performance. In a third study, students with a red-covered test (compared with students given a green or gray one) decided to work on more of the easy problems instead of the more challenging ones. The color red apparently primes people with an “avoidance” mindset—they avoid challenges and play it safe.

Just think of the real-world applications of this study. If you were a teacher preparing a test or an employer preparing a questionnaire for job candidates, you would now suspect that the color of paper and ink you use could make a difference. (Chapter 10 returns to this example and examines whether the Elliot study stands up to interrogation.)

### CHECK YOUR UNDERSTANDING

1. Explain what the consumer of research and producer of research roles have in common, and describe how they differ.
2. What kinds of jobs would use consumer-of-research skills? What kinds of jobs would use producer-of-research skills?

1. See pp. 4–6. 2. See p. 4.

## How Scientists Approach Their Work

Psychological scientists are identified not by advanced degrees or white lab coats; they are defined by what they *do*. The rest of this chapter will explain the fundamental ways that psychological scientists approach their work. First, scientists act as empiricists in their investigations, meaning that they systematically observe the world. Second, scientists test theories through research and, in turn, adapt their theories based on the resulting data. Third, scientists take an empirical approach to both applied research, which directly targets real-world problems, and basic research, which is intended to contribute to the general body of knowledge. Fourth, scientists go further: Once they have discovered an effect, they plan further research to test why, when, or for whom an effect works. Fifth, psychologists make their work public: They submit their results to journals for review and respond to the opinions of other scientists. Finally, another aspect of making work public involves sharing findings of psychological research with the popular media. Do journalists get the story right?

### Scientists Are Empiricists

Empiricists do not base conclusions on intuition, on casual observations of their own experience, or on what other people say. **Empiricism**, also called the *empirical method* or *empirical research*, involves using evidence from the senses (sight, hearing, touch) or from instruments that assist the senses (such as thermometers, timers, photographs, weight scales, and questionnaires) as the basis for

conclusions. Empiricists aim to be systematic, rigorous, and to make their work independently verifiable by other observers or scientists. In Chapter 2, you will learn more about why empiricism is considered the most reliable basis for conclusions when compared with other forms of reasoning, such as experience or intuition. For now, we'll focus on some of the practices in which empiricists engage.

For more on the contrast between empiricism and intuition, experience, and authority, see Chapter 2, pp. 24–38.

## Scientists Test Theories: The Theory-Data Cycle

In the theory-data cycle, scientists collect data to test, change, or update their theories. Even if you have never been in a formal research situation, you have probably tested ideas and hunches of your own by asking specific questions that are grounded in theory, making predictions, and reflecting on data.

For example, imagine picking up your smart phone to check your e-mail (Figure 1.3). You tap on your inbox, but nothing happens. What could be wrong? Maybe your entire device is on the blink: Do the other applications work? When you test them, you find that your calculator is working, but not your online map application. In fact, it looks as if only the apps that need wireless are not working. You check your wireless indicator, and it looks low. You ask your roommate, sitting nearby, “Are you having wifi problems?” If she says no, you might restart your device, hoping to reset the wireless connection.

Notice the series of steps in this process. First, you asked a particular series of questions, all of which were guided by your theory about how such devices work. The questions you asked (Is it the phone as a whole? Is it only the wifi?) reflected your theory that e-mail applications require a working electronic device as well as a wireless connection. Because you were operating under this theory, you chose not to ask other kinds of questions. (Has a gremlin possessed my phone? Does my device have a bacterial infection?) Your theory set you up for certain questions and not others. Next, your questions led you to specific predictions, which you tested by collecting data. You tested your first idea about the problem (My device can't run any applications) by posing a specific prediction (If I test any application, it won't work). Then you set up a situation to test your prediction (Does the calculator work?). The data (The calculator does work) told you your initial prediction was wrong. You used that outcome to change your idea about the problem (It's only the wireless-based apps that aren't working). And so on. When you take systematic steps to solve a problem, you are participating in something similar to what scientists do in the theory-data cycle.

### The Cupboard Theory vs. the Contact Comfort Theory

A classic example from the psychological study of attachment can illustrate the way researchers similarly use data to test their theories. You have probably observed that animals form strong attachments to their caregivers. If you have a dog, it probably is extremely happy to see you when you come home, wagging its tail and jumping all over you. Human babies, once they are able to crawl, may follow their parents or caregivers



**FIGURE 1.3**  
**Troubleshooting a smart phone.** Troubleshooting an electronic device is a form of engaging in the theory-data cycle.