

Schacter
Gilbert
Wegner
Nock

THIRD EDITION



PSYCHOLOGY

PSYCHOLOGY



RJ Muna

What are these people doing? Dancing? Karate? Levitation? Is the woman in this photo reaching for someone, or pointing to something? And what's up with those guys behind the glass screen? Do they have something to hide? Are they heading in the wrong direction?

Much of what people do can be understood by systematically observing them and testing how they respond in different situations. However, a lot of human thought, emotion, and behavior, and the factors that drive it, occurs in private, outside of the view of others (at least the most interesting parts do). Psychological scientists have developed a wide range of methods that allow them to “peek behind the glass screen,” so to speak, and this photo by RJ Muna grabbed us in part because it so nicely captures this theme. This photo also highlights the beauty and excitement of human behavior, which is what drew each of us to psychology in the first place.

PSYCHOLOGY

THIRD EDITION

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*We dedicate this edition to the
memory of Dan Wegner, our
co-author, colleague, and deeply
missed friend.*

About the Authors



COURTESY OF DANIEL SCHACTER

Daniel Schacter is William R. Kenan, Jr., Professor of Psychology at Harvard University. Dan received his BA degree from the University of North Carolina at Chapel Hill. He subsequently developed a keen interest in amnesic disorders associated with various kinds of brain damage. He continued his research and education at the University of Toronto, where he received his PhD

in 1981. He taught on the faculty at Toronto for the next six years before joining the psychology department at the University of Arizona in 1987. In 1991, he joined the faculty at Harvard University. His research explores the relationship between conscious and unconscious forms of memory, the nature of distortions and errors in remembering, and the ways in which we use memory to imagine future events. Many of Schacter's studies are summarized in his 1996 book, *Searching for Memory: The Brain, The Mind, and The Past*, and his 2001 book, *The Seven Sins of Memory: How the Mind Forgets and Remembers*, both winners of the APA's William James Book Award. Schacter has also received a number of awards for teaching and research, including the Harvard-Radcliffe Phi Beta Kappa Teaching Prize, the Warren Medal from the Society of Experimental Psychologists, and the Award for Distinguished Scientific Contributions from the American Psychological Association. In 2013, he was elected to the National Academy of Sciences.



COURTESY OF DANIEL GILBERT

Daniel Gilbert is Edgar Pierce Professor of Psychology at Harvard University. Dan received his BA from the University of Colorado at Denver and his PhD from Princeton University. From 1985 to 1996 he taught at the University of Texas, Austin, and in 1996 he joined the faculty of Harvard University. He has received the American Psychological Association's

Distinguished Scientific Award for an Early Career Contribution to Psychology, the Diener Award for Outstanding Contributions to Social Psychology, and has won teaching awards that include the Phi Beta Kappa Teaching Prize and the Harvard College Professorship. His research focuses on how and how well people think about their emotional reactions to future events. He is the author of the international best seller *Stumbling on Happiness*, which won the Royal Society's General Prize for best popular science book of the year, and he is the co-writer and host of the PBS television series, *This Emotional Life*.



THE FAMILY OF DANIEL WEGNER

Daniel Wegner was the John Lindsley Professor of Psychology in Memory of William James at Harvard University. He received his BS in 1970 and PhD in 1974, both from Michigan State University. He began his teaching career at Trinity University in San Antonio, TX, before receiving his appointments at the University of Virginia in 1990 and

then Harvard University in 2000. He was a Fellow of the American Academy of Arts and Sciences and also the recipient of the William James Award from the Association for Psychological Science, the Award for Distinguished Scientific Contributions from the American Psychological Association, and the Distinguished Scientist Award from the Society of Experimental Social Psychology. His research focused on thought suppression and mental control, transactive memory in relationships and groups, and the experience of conscious will. His work on thought suppression and consciousness served as the basis of two popular books, *White Bears and Other Unwanted Thoughts* and the *Illusion of Conscious Will*, both of which were named *Choice* Outstanding Academic Books. He died in 2013.



NICOLAS GUEVARA

Matthew Nock is a Professor of Psychology at Harvard University. Matt received his BA from Boston University (1995) and his PhD from Yale University (2003), and he completed his clinical internship at Bellevue Hospital and the New York University Child Study Center (2003). Matt joined the faculty of Harvard University in 2003 and has been

there ever since. While an undergraduate, Matt became very interested in the question of why people do things to intentionally harm themselves, and he has been conducting research aimed at answering this question ever since. His research is multidisciplinary in nature and uses a range of methodological approaches (e.g., epidemiologic surveys, laboratory-based experiments, and clinic-based studies) to better understand how these behaviors develop, how to predict them, and how to prevent their occurrence. He has received multiple teaching awards at Harvard, four early career awards recognizing his research, and in 2011 was named a MacArthur Fellow.

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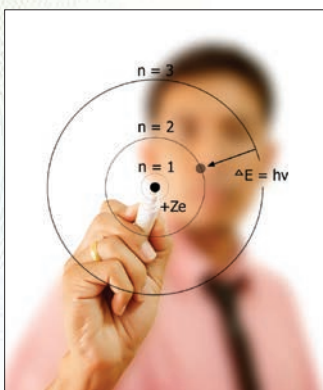
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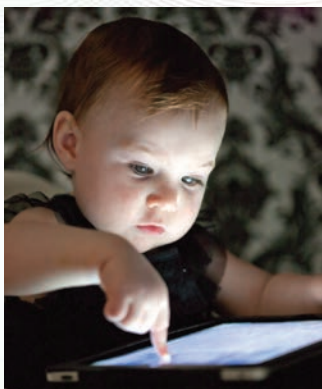
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Preface

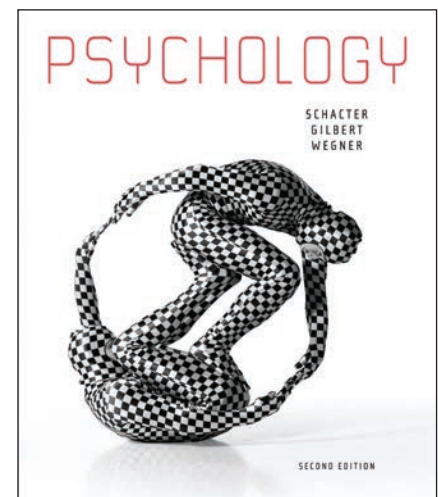
Why are you reading the preface? The book really gets going in about 10 pages, so why are you here instead of there? Are you the kind of person who can't stand the idea of missing something? Are you trying to justify the cost of the book by consuming every word? Did you just open to this page out of habit? Are you starting to think that maybe you made a big mistake?

For as long as we can remember, we've been asking questions like these about ourselves, about our friends, and about anyone else who didn't run away fast enough. Our curiosity about why people think, feel, and act as they do drew each of us into our first psychology course, and though we remember being swept away by the lectures, we don't remember much about our textbooks. That's probably because those textbooks were little more than colorful encyclopedias of facts, names, and dates. Little wonder that we sold them back to the bookstore the moment we finished our final exams.

When we became psychology professors, we did the things that psychology professors often do: We taught classes, we conducted research, and we wore sweater vests long after they stopped being fashionable. We also wrote stuff that people truly enjoyed reading, and that made us wonder why no one had ever written an introductory psychology textbook that students truly enjoyed reading. After all, psychology is the single most interesting subject in the known universe, so why shouldn't a psychology textbook be the single most interesting object in a student's backpack? We couldn't think of a reason, so we sat down and wrote the book that we wished we'd been given as students. *Psychology* was published in 2008, and the reaction to it was nothing short of astounding. We'd never written a textbook before, so we didn't know exactly what to expect, but never in our wildest dreams did we imagine that we would win the Pulitzer Prize!

Which was good, because we didn't. But what did happen was even better: We started getting letters and emails from students all over the country who just wanted to tell us how much they liked reading our book. They liked the content, of course, because as we may have already mentioned, psychology is the single most interesting subject in the known universe. But they also liked the fact that our textbook didn't *sound* like a textbook. It wasn't written in the stodgy voice of the announcer from one of those nature films that we all saw in seventh grade biology ("Behold the sea otter, nature's furry little scavenger"). Rather, it was written in *our* voices—the same voices in which we talk to our students, our spouses, our kids, and our pets (which explains why Chapter 19 is titled "Get Off the Damn Couch!"). We made a conscious effort to tell the *story* of psychology—to integrate topics rather than just list them, to illustrate ideas rather than just describe them. We realized that because science is such a complicated and serious business, some teachers might think that a science textbook should be complicated and serious too. We didn't see it that way. We think writing is the art of making complicated things seem simple and of making serious things seem fun. The students who sent us nice letters seemed to agree (even if the Pulitzer Prize committee didn't).

The last edition of our book was a hit—so why have we replaced it? Two reasons. First, we got tired of being asked about the two guys in checkerboard leotards who were cavorting on the cover. They are gone now, and we're only going to say this one more time: No, they weren't any of us, and yes, they probably did use superglue. The



second and somewhat more important reason for bringing out a new edition is that things change. Science changes (psychologists know all sorts of things about the mind and the brain that they didn't know just a few years ago), the world changes (when we wrote the first edition, no one had heard of an iPad or Barack Obama), and we change (our research and reading gave us new perspectives on psychological issues, and our writing and teaching showed us new ways to help students learn). With all of these changes happening around us and to us, we felt that our book should change as well.

Changes in the Third Edition

New focus on critical thinking

As sciences uncover new evidence and develop new theories, scientists change their minds. Some of the facts that students learn in a science course will still be facts a decade later, and others will require qualification or will turn out to have just been plain wrong. That's why students not only need to learn the facts but also how to *think* about facts—how to examine, question, and weigh the evidence that scientists produce. We emphasize this sort of critical thinking throughout our text, of course, but in this edition, we have included a new section dedicated entirely to helping students think about the mistakes human beings make when they try to consider evidence (see “Thinking Critically about Evidence” in Chapter 2: Methods in Psychology, page 66). We hope this section will help students learn how to use empirical evidence to develop well-grounded beliefs—not only about psychological science but also about the stuff of their everyday lives.

New section “Learning in the Classroom”

Like other psychology textbooks, the first two editions of our text provided in-depth coverage of many different kinds of learning, ranging from classical conditioning to observational learning. This edition still does this. But strangely enough, the Learning chapters in most psychology texts, including the previous two editions of this text, haven't said much about the very kind of learning that is most relevant to our readers: learning in the classroom. We think that it is about time to change this puzzling state of affairs, and so we have. Chapter 7 now includes a new section on learning in the classroom that summarizes some of the exciting recent developments in this area, including evaluation of the most effective study techniques, insights into cognitive illusions that can mislead us into studying ineffectively, research on how to improve attention and learning during lectures, and discussion of the prospects for online learning. The Learning chapter should be relevant to the lives of students, and we've done our best to make it so.

New research

A textbook should give students a complete tour of the classics, of course, but it should also take them out dancing on the cutting edge. We want students to realize that psychology is not a museum piece—it is not just a collection of past events but also of current events—and that this young and evolving science has a place for them if they want it. So we've packed the third edition with information about what's happening in the field today. Not only have we included more than 400 new citations, but we've also featured some of the hottest new findings in the “Hot Science” boxes that you'll find in every chapter.

Chapter Number	Hot Science
1	Psychology as a Hub Science, p. 34
2	Do Violent Movies Make Peaceful Streets?, p. 64
3	Epigenetics and the Persisting Effects of Early Experiences, p. 112
4	Taste: From the Top Down, p. 169
5	The Mind Wanders, p. 185
6	Sleep on It, p. 233
7	Dopamine and Reward Learning in Parkinson's Disease, p. 292
8	The Body of Evidence, p. 325
9	Sudden Insight and the Brain, p. 386
10	Dumb and Dumber?, p. 414
11	A Statistician in the Crib, p. 435
11	The End of History Illusion, p. 460
12	Personality on the Surface, p. 479
13	Mouse Over, p. 516
13	The Wedding Planner, p. 538
14	Can Being the Target of Discrimination Cause Stress and Illness?, p. 552
15	Optimal Outcome in Autism Spectrum Disorder, p. 615
16	"Rebooting" Psychological Treatment, p. 642

Fully updated coverage of *DSM-5*

One area where there has been lots of new research—and lots of big changes—is in the study of psychological disorders. As you will learn, psychologists use a manual called the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* to make decisions about which behaviors should be formally considered “disordered.” For instance, we all get sad from time to time, but when should extreme sadness be classified as a psychological disorder that should be treated? The *DSM* answers questions like this. After nearly 20 years of using the fourth edition of the *DSM (DSM-IV)*, the field of psychology now has an updated fifth edition (*DSM-5*), which was just published in 2013. Psychologists have learned a lot about psychological disorders over the past 20 years, and this third edition of our book contains updated information about how psychologists think about, define, and classify psychological disorders.

New organization

We’ve also rearranged our table of contents to better fit our changing sense of how psychology is best taught. Specifically, we’ve moved the chapter on Stress and Health forward so that it now appears before the chapters on Psychological Disorders and Treatment of Psychological Disorders. We think this change improves the flow of the book in several ways. First, as you will learn, the experience of stress has a lot to do with interpersonal events and how we respond to them, information that you will have just learned about in the chapters on Personality and Social Psychology. Second, current models of psychological disorders view them as resulting from an interaction of some underlying predisposition (e.g., genetic or otherwise) and stressful life events. Such models will be much more intuitive if you first learn about the body’s stress response. Third, this chapter has information about health-promoting behaviors that could come in handy during exam season—and so better to tell you about them before the end of the semester!

New Other Voices feature

Long before psychologists appeared on Earth, the human nature business was dominated by poets, playwrights, pundits, philosophers, and several other groups beginning with P. Those folks are still in that business today, and they continue to have deep and original insights into how and why people behave as they do. In this edition, we decided to invite some of them to share their thoughts with you via a new feature that we call “Other Voices.” In every chapter, you will find a short essay by someone who has three critical qualities: (a) They think deeply, (b) they write beautifully, and (c) they know things we don’t. For example, you will find essays by leading journalists such as David Brooks, Ted Gup, Tina Rosenberg, and David Ewing Duncan; best-selling novelists such as Alice Randall; award-winning educators such as Linda Moore and Robert H. Frank; renowned legal scholars such as Gustin Reichbach and Elyn Saks; and eminent scientists such as biologist Greg Hampikian and computer scientist Daphne Koller. And just to make sure we aren’t the only psychologists whose voices you hear, we’ve included essays by Tim Wilson, Chris Chabris, Daniel Simons, and Charles Fernyhough. Every one of these amazing people has something important to say about human nature, and we are delighted that they’ve

agreed to say it in these pages. Not only do these essays encourage students to think critically about a variety of psychological issues, but they also demonstrate both the relevance of psychology to everyday life and the growing importance of our science in the public forum.

Chapter Number	Other Voices
1	Is Psychology a Science?, p. 17
2	Can We Afford Science?, p. 75
3	Neuromyths, p. 124
4	Hallucinations and the Visual System, p. 173
5	A Judge’s Plea for Pot, p. 217
6	Early Memories, p. 261
7	Online Learning, p. 308
8	Fat and Happy, p. 339
9	Americans’ Future Has to Be Bilingual, p. 364
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11	Men, Who Needs Them?, p. 429
11	You Are Going to Die, p. 467
12	Does the Study of Personality Lack . . . Personality?, p. 503
13	91% of All Students Read This Box and Love It, p. 531
14	Building a Healthier Society?, p. 579
15	Successful and Schizophrenic, p. 613
16	Diagnosis: Human, p. 653

CHANGING MINDS

1. One of the senators from your state is supporting a bill that would impose heavy fines on aggressive drivers who run red lights. One of your classmates thinks this is a good idea. “The textbook taught us a lot about punishment and reward. It’s simple. If we punish aggressive driving, its frequency will decline.” Is your classmate right? Might the new law backfire? Might another policy be more effective in promoting safe driving?

A Changing Minds question from Chapter 13.

gathering scientific information by und



How do people respond when they know they’re being observed?

several opponents at once (Erffmeyer)

A cue question from Chapter 2.

New Changing Minds questions

What can 784 introductory psychology professors agree about? They can agree that students usually come into their first psychology class with a set of beliefs about the field and that most of these beliefs are wrong. With the help of the wonderful people at Worth Publishers (they made us say that), we conducted a survey of 784 introductory psychology teachers and asked them to name their students’ most common misconceptions about psychology. We then created the Changing Minds questions you will see at the end of every chapter. These questions

ask you first to think about an everyday situation in which a common misconception might arise, and then to use the science you have just learned to overcome that misconception. We hope these exercises will prepare you to apply what you learn—and maybe even change some minds about psychology (thereby justifying our corny title).

Additional Student Support

Practice

- *Cue questions* encourage critical thinking and help identify the most important concepts in every major section of the text.
- *Bulleted summaries* follow each major section to reinforce key concepts and make it easier to study for the test.

- A *Key Concept Quiz* at the end of each chapter offers students the opportunity to test what they know.
- *Critical thinking questions* are offered throughout the chapters within a number of the photo captions, offering the opportunity to apply various concepts.

Practical Application

What would the facts and concepts of psychology be without real-world application? Throughout this edition of the text, we provide lots of examples of how the material presented in this book applies to things that you will experience in the real world. For instance, each chapter contains a *Real World* box that applies concepts from inside the book to your life outside the book. (We like this idea so much we even included a box in the Preface! Turn the page to see it.) In addition, because culture influences just about everything we do—from how we perceive lines to how long we’ll stand in them—this edition continues to celebrate the rich diversity of human beings both in Culture & Community boxes and throughout the text, as detailed below.



CLEMENT PHILIPPE/ARTERRA PICTURE LIBRARY/ALAMY

According to the theory of natural selection, inherited characteristics that provide a survival advantage tend to spread throughout the population across generations. Why might sensory adaptation have evolved? What survival benefits might it confer to a small animal trying to avoid predators? To a predator trying to hunt prey?

Critical thinking questions in a photo caption from Chapter 4.

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1	Improving Study Skills, p. 10
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3	Brain Plasticity and Sensations in Phantom Limbs, p. 104
3	Brain Death and the Vegetative State, p. 123
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4	Music Training: Worth the Time, p. 162
5	Drugs and the Regulation of Consciousness, p. 212
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9	From Zippers to Political Extremism: An Illusion of Understanding, p. 390
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14	This is Your Brain on Placebos, p. 571
15	How Are Mental Disorders Defined and Diagnosed?, p. 592
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16	Treating Severe Mental Disorders, p. 647

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5	What Do Dreams Mean to Us around the World?, p. 201
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7	Are There Cultural Differences in Reinforcers?, p. 281
8	Is It What You Say or How You Say It?, p. 329
9	Does Culture Influence Optimism Bias?, p. 378
12	Does Your Personality Change According to the Language You’re Speaking?, p. 492
13	Free Parking, p. 528
14	Land of the Free, Home of the . . . Stressed?, p. 566
15	What Do Mental Disorders Look Like in Different Parts of the World?, p. 589
16	Treatment of Psychological Disorders around the World, p. 632

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THE REAL WORLD

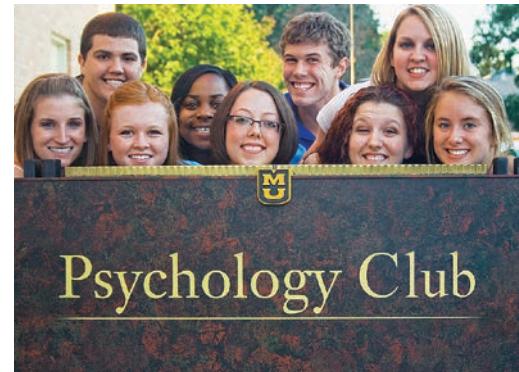
Join the Club!

Once upon a time, Western science was the hobby of wealthy European gentlemen. Fortunately, the face of this field has changed profoundly since its early days and continues to progress even now.

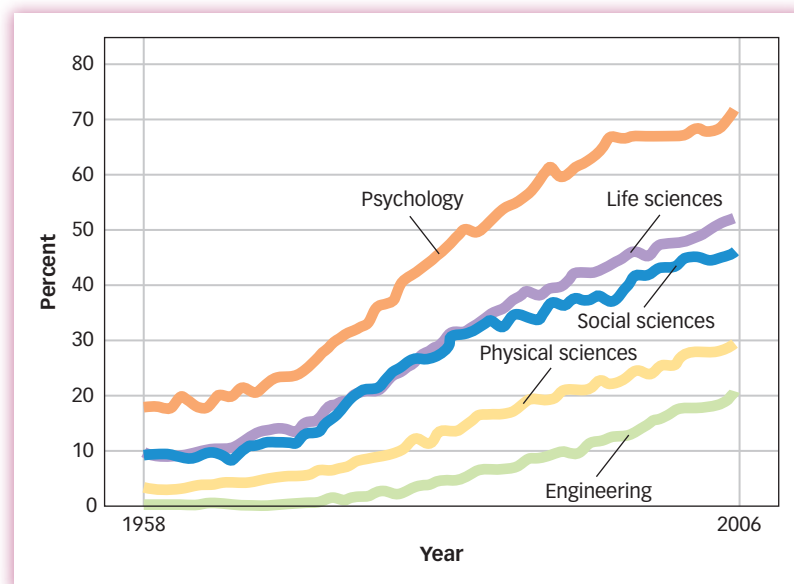
In fact, social changes have led to openness and diversity in psychology more swiftly and completely than in most other fields of study. In 2006, for example, while women were only poorly represented in engineering and the physical sciences, they received more than 71% of all new PhD degrees in psychology (Burrelli, 2008). As you can see in the accompanying figure, although women are earning a

growing proportion of PhDs in all fields, they are now a whopping majority in psychology. Meanwhile, psychology PhDs to Hispanic, African American, and Native American students have more than doubled from 1985 to 2005, and those to Asians and Pacific Islanders have tripled (National Science Board, 2008). It is now the future, and in this future, psychology is the science of everyone.

Signs of the openness of psychology are all around. Just take a look at some of the students in undergraduate



COURTESY UNIVERSITY OF MISSOURI PSI CHI & PSYCHOLOGY CLUB



psychology clubs—or in *Psi Chi* (psychology’s undergraduate and graduate student honorary society) or *Psi Beta* (the honorary society for community and junior college psychology students). Psychology students now are far more often women than men (77%; Planty et al., 2008), and there is substantial representation of minority groups in psychology everywhere you look. Like its clubs and honorary societies, the study of psychology is open and welcoming to people of any age, sex, sexual orientation, race, different ability, color, religion, or national or ethnic origin. Please join us!

◀ The proportion of new PhDs earned by women has grown faster in psychology than in other fields (Burrelli, 2008).

Focus on Learning Outcomes

Teaching with the APA Learning Goals and Outcomes

In an effort to develop greater consensus on goals and learning outcomes for undergraduate education in psychology, the American Psychological Association (APA) created a task force on Undergraduate Psychology Major Competencies to provide a framework for educators. The task force subsequently published comprehensive recommendations in *The APA Guidelines for the Undergraduate Psychology Major*, recently revised for version 2.0 that was released in May 2013. These revised guidelines present a rigorous standard for what students should gain from foundational courses and from the psychology major as a whole. They comprise five goals relating to the following:

Goal 1: Knowledge Base in Psychology

Goal 2: Scientific Inquiry and Critical Thinking

Goal 3: Ethical and Social Responsibility in a Diverse World

Goal 4: Communication

Goal 5: Professional Development

The intent of the APA Task Force is to provide overarching goals without dictating exactly how students and teachers should achieve them. In that spirit, Worth Publishers offers a wide variety of resources to support students and teachers in achieving the APA outcomes. Most important, a concordance of the content in *Psychology*, Third Edition, to the APA goals is available for download from the Resources area of LaunchPad at <http://www.worthpublishers.com/launchpad/schacter3e>. To assist with assessment, Worth has tagged all of the items included in the Test Bank accompanying *Psychology*, Third Edition, to the relevant outcomes, and in addition, the Instructor's Resources and LaunchPad learning system feature a variety of activities and additional content items that contribute to the APA goals. All of these resources in combination offer instructors a powerful set of tools for achieving their course outcomes.

Preparing for the MCAT 2015

From 1977 to 2014, the Medical College Admission Test (MCAT) focused on biology, chemistry, and physics, but starting with the test to be administered in 2015, 25% of its questions will cover “Psychological, Social, and Biological Foundations of Behavior,” with most of those questions concerning the psychological science taught in introductory psychology courses. According to the *Preview Guide for the MCAT 2015 Exam*, Second Edition, the addition of this content “recognizes the importance of socio-cultural and behavioral determinants of health and health outcomes.” The psychology material in the new MCAT covers the breadth of topics in this text, and the table below offers a sample of how the topics in this text's Sensation and Perception chapter correspond precisely to the topics laid out in the MCAT *Preview Guide*. A complete correlation of the MCAT psychology topics with this book's contents is available for download from the Resources area of LaunchPad at <http://www.worthpublishers.com/launchpad/schacter3e>. In addition, since the MCAT represents a global standard for assessing the ability to reason about scientific information, the Test Bank for *Psychology*, Third Edition, features a new set of data-based questions for each chapter, which are designed to test students' quantitative reasoning. These questions are available for preview in LaunchPad.

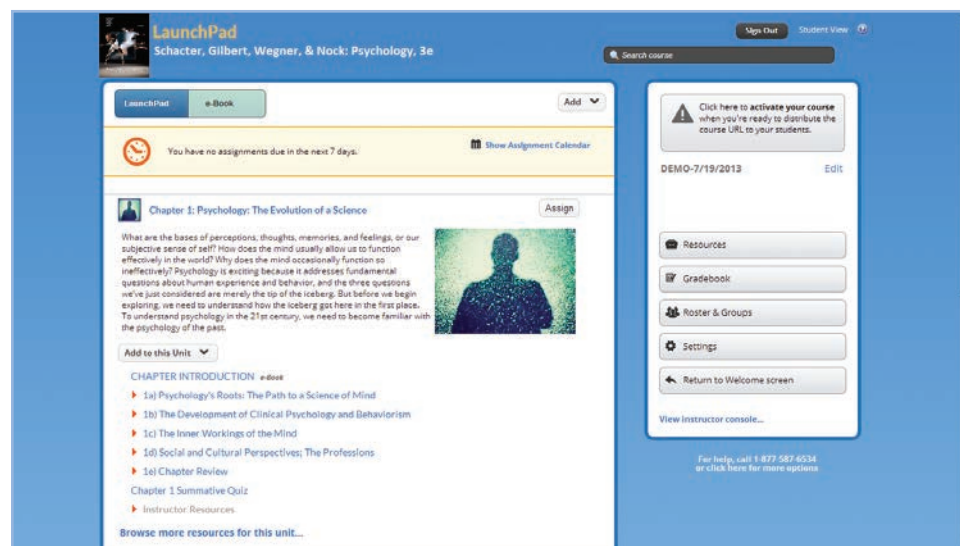
MCAT 2015: Categories in Sensation and Perception	SGWN, <i>Psychology</i> , Third Edition, Correlations	
Content Category 6A: Sensing the environment	Section Title	Page Number(s)
Sensory Processing Sensation <ul style="list-style-type: none"> • Thresholds • Weber's Law • Signal detection theory • Sensory adaptation • Sensory receptors • Sensory pathways <ul style="list-style-type: none"> • Types of sensory receptors 	Sensation and Perception Sensation and Perception Measuring Thresholds Measuring Thresholds Signal Detection Sensory Adaptation Sensation and Perception Are Distinct Activities The Visual Brain Touch and Pain Body Position, Movement, and Balance Smell and Taste Vision I: How the Eyes and the Brain Convert Light Waves to Neural Signals The Human Ear The Body Senses: More Than Skin Deep Smell and Taste	129–173 129–173 132–133 132–133 133–134 135–136 130–132 142–145 163–165 166 167–172 136–145 158–160 163–166 167–172
Vision Structure and function of the eye Visual processing <ul style="list-style-type: none"> • Visual pathways in the brain • Parallel processing • Feature detection 	Vision I and Vision II The Human Eye Vision I From the Eye to the Brain The Visual Brain Studying the Brain's Electrical Activity The Visual Brain	136–156 138 136–145 138–140 142–145 118–119 142–145
Hearing Auditory processing <ul style="list-style-type: none"> • Auditory pathways in the brain Sensory reception by hair cells	Audition: More Than Meets the Ear Perceiving Pitch Perceiving Pitch The Human Ear	157–162 160 160 158–160
Other Senses Somatosensation <ul style="list-style-type: none"> • Pain perception Taste <ul style="list-style-type: none"> • Taste buds/chemoreceptors that detect specific chemicals Smell <ul style="list-style-type: none"> • Olfactory cells/chemoreceptors that detect specific chemicals • Pheromones • Olfactory pathways in the brain Kinesthetic sense Vestibular sense	The Body Senses: More Than Skin Deep The Chemical Senses: Adding Flavor Touch Pain Taste Taste Smell Smell Smell Smell Body Position, Movement, and Balance Body Position, Movement, and Balance	163–166 167–173 163–164 164–165 170–173 170–173 167–170 167–168 170 167–170 166 166
Perception Perception <ul style="list-style-type: none"> • Bottom-up/Top-down processing <ul style="list-style-type: none"> • Perceptual organization (e.g., depth, form, motion, constancy) • Gestalt principles 	Sensation and Perception Sensation and Perception Are Distinct Activities Pain Smell Vision II: Recognizing What We Perceive Principles of Perceptual Organization	129–173 130–136 164–165 167–170 145–157 148–149

Media and Supplements

LaunchPad with LearningCurve Quizzing

A comprehensive web resource for teaching and learning psychology

LaunchPad combines Worth Publishers' award-winning media with an innovative platform for easy navigation. For students, it is the ultimate online study guide, with rich interactive tutorials and videos, as well as an e-Book and the LearningCurve adaptive quizzing system. For instructors, LaunchPad is a full course space where class documents can be posted, quizzes are easily assigned and graded, and students' progress can be assessed and recorded. Whether you are looking for the most effective study tools or a robust platform for an online course, LaunchPad is a powerful way to enhance your class.



LaunchPad to Accompany *Psychology*, Third Edition, can be previewed and purchased at <http://www.worthpublishers.com/launchpad/schacter3e>.

Psychology, Third Edition, and LaunchPad can be ordered together with ISBN-10: 1-4641-8945-5 / ISBN-13: 978-1-4641-8945-6.

LEARNINGCurve 16.5.1 Personality and Health

Which of the following personality characteristics seem to be related to wellness and health?

- conscientiousness and neuroticism
- optimism and hardiness
- agreeableness and hardiness
- optimism and conscientiousness

Great! The correct answer is: **optimism and hardiness**

You can click the "Next Question" button or hit the return key to see another question.

Take a Break Next Question

LaunchPad for *Psychology*, Third Edition, includes all the following resources:

- The design of the **LearningCurve** quizzing system is based on the latest findings from learning and memory research. It combines adaptive question selection, immediate and valuable feedback, and a gamelike interface to engage students in a learning experience that is unique to them. Each LearningCurve quiz is fully integrated with other resources in LaunchPad through the Personalized Study Plan, so students will be able to review using Worth's extensive library of videos and activities. And state-of-the-art question analysis reports allow instructors to track the progress of individual students as well as their class as a whole.

- **New! Data Visualization Exercises** offer students practice in understanding and reasoning about data. In each activity, students interact with a graph or visual display of data and must think like a scientist to answer the accompanying questions. These activities build quantitative reasoning skills and offer a deeper understanding of how science works.
- **An interactive e-Book** allows students to highlight, bookmark, and scribble in their own notes on the e-Book page, just as they would with a printed textbook. Google-style searching and in-text glossary definitions make the text ready for the digital age.
- **Student Video Activities** include more than 100 engaging video modules that instructors can easily assign and customize for student assessment. Videos cover classic experiments, current news footage, and cutting-edge research, all of which are sure to spark discussion and encourage critical thinking.
- **PsychInvestigator: Laboratory Learning in Introductory Psychology** is a series of activities that model a virtual laboratory and are produced in association with Arthur Kohn, Ph.D, of Dark Blue Morning Productions. Students are introduced to core psychological concepts by a video host and then participate in activities that generate real data and lead to some startling conclusions! Like all activities in LaunchPad, PsychInvestigator activities can be assigned and automatically graded.
- The award-winning tutorials in Tom Ludwig's (Hope College) **PsychSim 5.0** and **Concepts in Action** provide an interactive, step-by-step introduction to key psychological concepts.
- **The Scientific American Newsfeed** delivers weekly articles, podcasts, and news briefs on the very latest developments in psychology from the first name in popular science journalism.



Additional Student Supplements

- The **CourseSmart e-Book** offers the complete text of *Psychology*, Third Edition, in an easy-to-use format. Students can choose either to purchase the CourseSmart e-Book as an online subscription or to download it to a personal computer or a portable media player, such as a smart phone or iPad. The CourseSmart e-Book for *Psychology*, Third Edition, can be previewed and purchased at www.coursesmart.com.
- **Pursuing Human Strengths: A Positive Psychology Guide** by Martin Bolt of Calvin College is a perfect way to introduce students to both the amazing field of positive psychology as well as their own personal strengths.
- **The Critical Thinking Companion for Introductory Psychology**, by Jane S. Halonen of the University of West Florida and Cynthia Gray of Beloit College, contains both a guide to critical thinking strategies as well as exercises in pattern recognition, practical problem solving, creative

Take advantage of our most popular supplements!

Worth Publishers is pleased to offer cost-saving packages of *Psychology*, Third Edition, with our most popular supplements. Below is a list of some of the most popular combinations available for order through your local bookstore.

Psychology, 3rd Ed. & LaunchPad Access Card
ISBN-10: 1-4641-8945-5 / ISBN-13: 978-1-4641-8945-6

Psychology, 3rd Ed. & iClicker 2
ISBN-10: 1-4641-8990-0 / ISBN-13: 978-1-4641-8990-6

Psychology, 3rd Ed. & *Scientific American* Reader
ISBN-10: 1-4641-8946-3 / ISBN-13: 978-1-4641-8946-3

Psychology, 3rd Ed. & *Psychology and the Real World*
ISBN-10: 1-4641-8944-7 / ISBN-13: 978-1-4641-8944-9

problem solving, scientific problem solving, psychological reasoning, and perspective-taking.

- Worth Publishers is proud to offer several readers of articles taken from the pages of *Scientific American*. Drawing on award-winning science journalism, the **Scientific American Reader to Accompany Psychology, Third Edition**, by **Daniel L. Schacter, Daniel T. Gilbert, Daniel M. Wegner, and Matthew K. Nock** features pioneering and cutting-edge research across the fields of psychology. Selected by the authors themselves, this collection provides further insight into the fields of psychology through articles written for a popular audience.
- **Psychology and the Real World: Essays Illustrating Fundamental Contributions to Society** is a superb collection of essays by major researchers that describe their landmark studies. Published in association with the not-for-profit FABBS Foundation, this engaging reader includes Elizabeth Loftus's own reflections on her study of false memories, Eliot Aronson on his cooperative classroom study, and Daniel Wegner on his study of thought suppression. A portion of all proceeds is donated to FABBS to support societies of cognitive, psychological, behavioral, and brain sciences.

Course Management

- Worth Publishers supports multiple Course Management Systems with enhanced cartridges for upload into Blackboard, eCollege, Angel, Desire2Learn, Sakai, and Moodle. Cartridges are provided free upon adoption of *Psychology*, Third Edition, and can be downloaded from Worth's online catalog at www.worthpublishers.com.

Assessment

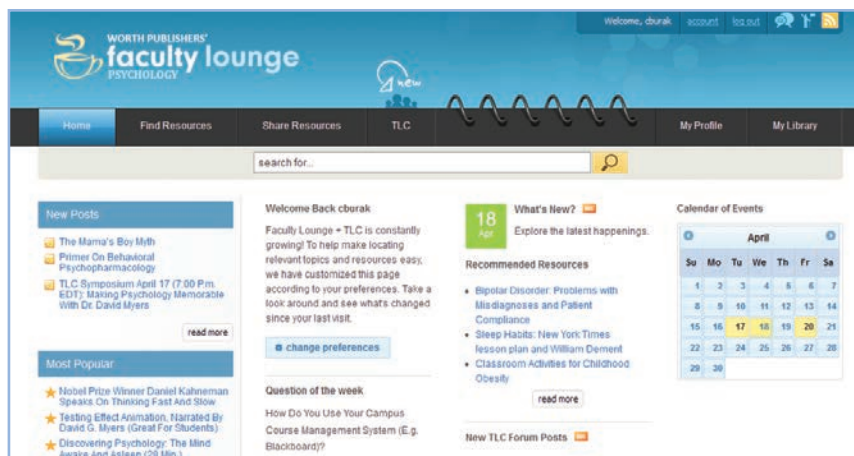
- The **Computerized Test Bank** powered by Diploma includes a full assortment of test items from author Chad Galuska of the College of Charleston. Each chapter features over 200 multiple-choice, true/false, and essay questions to test students at several levels of Bloom's taxonomy. The new edition also features a new set of data-based reasoning questions to test advanced critical thinking skills in a manner similar to the MCAT. All the questions are matched to the outcomes recommended in the 2013 APA Guidelines for the Undergraduate Psychology Major. The accompanying grade book software makes it easy to record students' grades throughout a course, to sort student records, to view detailed analyses of test items, to curve tests, to generate reports, and to add weights to grades.
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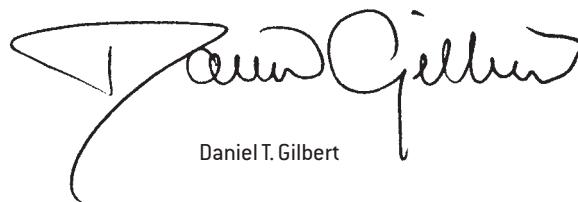
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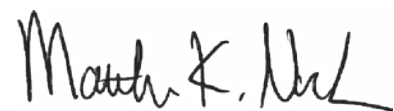
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Daniel T. Gilbert



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▲ Beyond the Individual: Social and Cultural Perspectives

The Development of Social Psychology

The Emergence of Cultural Psychology

CULTURE & COMMUNITY Analytic and Holistic Styles in Western and Eastern Cultures

▲ The Profession of Psychology: Past and Present

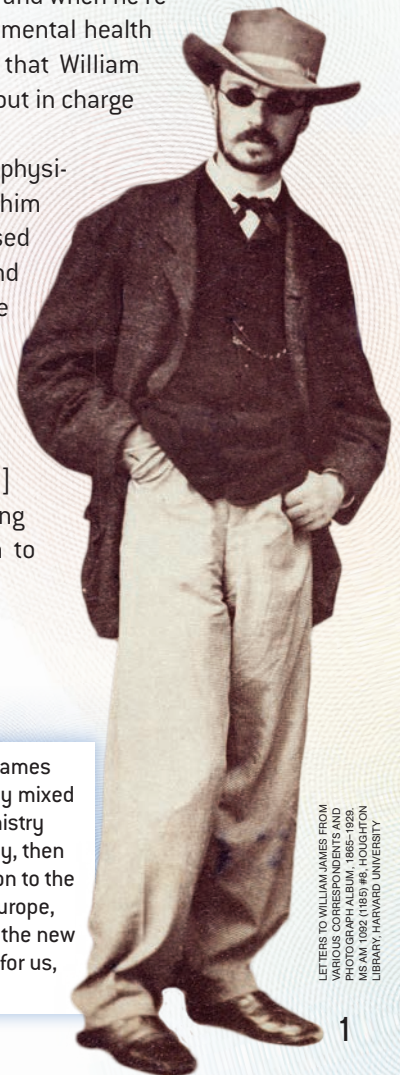
Psychologists Band Together: The American
Psychological Association

What Psychologists Do: Research Careers

HOT SCIENCE Psychology as a Hub Science

A LOT WAS HAPPENING IN 1860. Abraham Lincoln had just been elected president of the United States, the Pony Express had just begun to deliver mail between Missouri and California, and a woman named Anne Kellogg had just given birth to a child who would one day grow up to invent the cornflake. But none of this mattered very much to William James, a bright, taciturn, 18-year-old who had no idea what to do with his life. He loved to paint and draw, but worried that he wasn't talented enough to become a serious artist. He had enjoyed studying biology in school but doubted that a naturalist's salary would ever allow him to get married and have a family of his own. So, like many young people who are faced with difficult decisions about their futures, William abandoned his dreams and chose to do something in which he had little interest but of which his family heartily approved. Alas, within a few months of arriving at Harvard Medical School, his lack of interest in medicine blossomed into a troubling lack of enthusiasm, and so with a bit of encouragement from the faculty, he put his medical studies on hold to join a biological expedition to the Amazon. The adventure failed to focus his wandering mind (although he learned a great deal about leeches), and when he returned to medical school, both his physical and mental health began to deteriorate. It was clear to everyone that William James was not the sort of person who should be put in charge of a scalpel and a bag of drugs.

Had James become an artist, a biologist, or a physician, we would probably remember nothing about him today. Fortunately for us, he was a deeply confused young man who could speak five languages, and when he became so depressed that he was once again forced to leave medical school, he decided to travel around Europe, where at least he knew how to talk to people. As he talked and listened, he learned about a new science called *psychology* [from a combination of the Greek *psyche* [soul] and *logos* [to study]]. He saw that this developing field was taking a modern, scientific approach to



Throughout his youth, William James (1842–1910) seemed seriously mixed up. He began college as a chemistry major, then switched to anatomy, then set sail on a biological expedition to the Amazon, and then traveled to Europe, where he became interested in the new science of psychology. Luckily for us, he stuck with it for a while.

LETTERS TO WILLIAM JAMES FROM
VARIOUS CORRESPONDENTS AND
PHOTOGRAPH ALBUM, 1865–1922.
MS AM 1092 (1165) #6. HOUGHTON
LIBRARY, HARVARD UNIVERSITY

age-old questions about human nature—questions that had become painfully familiar to him during his personal search for meaning, but questions to which only poets and philosophers had ever before offered answers (Bjork, 1983; Simon, 1998). Excited about the new discipline, James returned to America and quickly finished his medical degree. But he never practiced medicine and never intended to do so. Rather, he became a professor at Harvard University and devoted the rest of his life to psychology. His landmark book, *The Principles of Psychology*, is still widely read and remains one of the most influential books ever written on the subject (James, 1890).

A LOT HAS HAPPENED SINCE THEN. Abraham Lincoln has become the face on a penny, the Pony Express has been replaced by e-mail and Twitter, and the Kellogg Company sells about \$9 billion worth of cornflakes every year. If William James (1842–1910) were alive today, he would be amazed by all of these things. But he would probably be even more amazed by the intellectual advances that have taken place in the science that he helped create.

Ppsychology is the scientific study of mind and behavior. The **mind** refers to the private inner experience of perceptions, thoughts, memories, and feelings, an ever-flowing stream of consciousness. **Behavior** refers to observable actions of human beings and nonhuman animals, the things that we do in the world, by ourselves or with others. As you will see in the chapters to come, psychology is an attempt to use scientific methods to address fundamental questions about mind and behavior that have puzzled people for millennia. The answers to these questions would have astonished William James. Let's take a look at three key examples:

1. What are the bases of perceptions, thoughts, memories, and feelings, or our subjective sense of self?

For thousands of years, philosophers tried to understand how the objective, physical world of the body was related to the subjective, psychological world of the mind. Today, psychologists know that all of our subjective experiences arise from the electrical and chemical activities of our brains. As you will see throughout this book, some of the most exciting developments in psychological research focus on how our perceptions, thoughts, memories, and feelings are related to activity in the brain. Psychologists and neuroscientists are using new technologies to explore this relationship in ways that would have seemed like science fiction only 20 years ago.

For example, the technique known as *functional magnetic resonance imaging* (fMRI) allows scientists to scan a brain to determine which parts are active when a person reads a word, sees a face, learns a new skill, or remembers a personal experience. In a recent study, the brains of both professional and novice pianists were scanned as they made complex finger movements, like those involved in piano playing. The results showed that professional pianists have *less* activity than novices in the parts of the brain that guide these finger movements (Krings et al., 2000). This suggests

that extensive practice at the piano changes the brains of professional pianists and that the regions controlling finger movements operate more efficiently for them than they do for novices. You'll learn more about this in the Memory and Learning chapters and see in the coming chapters how studies using fMRI and related techniques are beginning to transform many different areas of psychology.



JACQUES MUNCH/AP/GETTY IMAGES

Keith Jarrett is a virtuoso who has been playing piano for more than 60 years. Compared to a novice, the brain regions that control Jarrett's fingers are relatively less active when he plays.

2. How does the mind usually allow us to function effectively in the world?

Scientists sometimes say that form follows function; that is, if we want to understand *how* something works (e.g., an engine or a thermometer), we need to know what it is working *for* (e.g., powering vehicles or measuring temperature). As William James often noted, “Thinking is for doing,” and the function of the mind is to help us do those things that sophisticated animals have to do in order to prosper, such as acquire food, shelter, and mates. Psychological processes are said to be *adaptive*, which means that they promote the welfare and reproduction of organisms that engage in those processes. Perception allows us to recognize our families, see predators before they see us, and avoid stumbling into oncoming traffic. Language allows us to organize our thoughts and communicate them to others, which enables us to form social groups and cooperate. Memory allows us to avoid solving the same problems over again every time we encounter them and to keep in mind what we are doing and why. Emotions allow us to react quickly to events that have life or death significance, and they enable us to form strong social bonds. The list goes on and on.

Given the adaptiveness of psychological processes, it is not surprising that people with deficiencies in these processes often have a pretty tough time. The neurologist Antonio Damasio (1994) described the case of Elliot, a middle-aged husband and father with a good job, whose life was forever changed when surgeons discovered a tumor in the middle of his brain. The surgeons were able to remove the tumor and save his life, and for a while Elliot seemed just fine. But then odd things began to happen. At first, Elliot seemed more likely than usual to make bad decisions (when he could make decisions at all), and as time went on, his bad decisions became truly dreadful ones. He couldn’t prioritize tasks at work because he couldn’t decide what to do first, and when he did, he got it wrong. Eventually he was fired, so he pursued a series of risky business ventures—all of which failed—and he lost his life’s savings. His wife divorced him, he married again, and his second wife divorced him too.

So what ruined Elliot’s life? The neurologists who tested Elliot were unable to detect any decrease in his cognitive functioning. His intelligence was intact, and his ability to speak, think, and solve logical problems was every bit as sharp as it ever was. But as they probed further, they made a startling discovery: Elliot was no longer able to experience emotions. For example, Elliot didn’t experience any regret or anger when his boss gave him the pink slip and showed him the door, he didn’t experience anxiety when he poured his entire bank account into a foolish business venture, and he didn’t experience any sorrow when his wives packed up and left him. Most of us have wished from time to time that we could be as stoic and unflappable as that; after all, who needs anxiety, sorrow, regret, and anger? The answer is that we all do.

3. Why does the mind occasionally function so ineffectively in the world?

The mind is an amazing machine that can do a great many things quickly. We can drive a car while talking to a passenger while recognizing the street address while remembering the name of the song that just came on the radio. But like all machines, the mind often trades accuracy for speed and versatility. This can produce “bugs” in the system, causing occasional malfunctions in our otherwise efficient mental processing. One of the most fascinating aspects of psychology is that we are *all* prone to a variety of errors and illusions. Indeed, if thoughts, feelings, and actions were error free, then human behavior would be orderly, predictable, and dull, which it clearly is not. Rather, it is endlessly surprising, and its surprises often derive from our ability to do precisely the wrong thing at the wrong time.



Emotions are adaptive. For example, fear leads many animals to freeze so that their enemies can’t see them—as it did these young women who were touring a “haunted house” in Niagara Falls.

psychology

The scientific study of mind and behavior.

mind

The private inner experience of perceptions, thoughts, memories, and feelings.

behavior

Observable actions of human beings and nonhuman animals.

Consider a few examples from diaries of people who took part in a study concerning mental errors in everyday life (Reason & Mycielska, 1982, pp. 70–73):

- I meant to get my car out, but as I passed the back porch on my way to the garage, I stopped to put on my boots and gardening jacket as if to work in the yard.
- I put some money into a machine to get a stamp. When the stamp appeared, I took it and said, “Thank you.”
- On leaving the room to go to the kitchen, I turned the light off, although several people were there.

If these lapses seem amusing, it is because, in fact, they are. But they are also potentially important as clues to human nature. For example, notice that the person who bought a stamp said, “Thank you,” to the machine and not, “How do I find the subway?” In other words, the person did not just do *any* wrong thing; rather, he did something that would have been perfectly correct in a real social interaction. As each of these examples suggests, people often operate on “autopilot,” or behave automatically, relying on well-learned habits that they execute without really thinking. When we are not actively focused on what we are saying or doing, these habits may be triggered inappropriately. William James (1890) thought that the influence of habit could help explain the seemingly bizarre actions of “absentminded” people: “Very absent-minded persons,” he wrote in *The Principles of Psychology*, “on going into their

THE REAL WORLD

The Perils of Procrastination

William James understood that the human mind and behavior are fascinating in part because they are not error free. The mind's mistakes interest us primarily as paths to achieving a better understanding of mental activity and behavior, but they also have practical consequences. Let's consider a malfunction that can have significant consequences in your own life: procrastination.

At one time or another, most of us have avoided carrying out a task or put it off to a later time. The task may be unpleasant, difficult, or just less entertaining than other things we could be doing at the moment. For college students, procrastination can affect a range of academic activities, such as writing a term paper or preparing for a test. Academic procrastination is not uncommon: Over 70% of college students report that they engage in some form of procrastination (Schouwenburg, 1995). Although it's fun to hang out with your friends tonight, it's not so much fun to worry for three days about your impending history exam or try to study at 4:00 a.m. the day of the test. Studying now, or at least a little bit each day, robs procrastination of its power over you.



Some procrastinators defend the practice by claiming that they tend to work best under pressure or by noting that as long as a task gets done, it doesn't matter all that much if it is completed just before the deadline. Is there any merit to such claims, or are they just feeble excuses for counterproductive behavior?

A study of 60 undergraduate psychology college students provided some intriguing answers (Tice & Baumeister, 1997). At the beginning of the semester, the instructor announced a due date for the term paper and told students that if they could not meet the date, they would receive an extension to a later date. About a month later, students completed a scale that mea-

sures tendencies toward procrastination. At that same time, and then again during the last week of class, students recorded health symptoms they had experienced during the past week, the amount of stress they had experienced during that week, and the number of visits they had made to a health care center during the previous month.

Students who scored high on the procrastination scale tended to turn in their papers late. One month into the semester, these procrastinators reported less stress and fewer symptoms of physical illness than did nonprocrastinators. But at the end of the semester, the procrastinators reported more stress and more health symptoms than did the nonprocrastinators, and also reported more visits to the health center. The procrastinators also received lower grades on their papers and on course exams. More recent studies have found that higher levels of procrastination are associated with poorer academic performance (Moon & Illingworth, 2005) and higher levels of psychological distress (Rice, Richardson, & Clark, 2012). Therefore, in addition to making use of the tips provided in the Real World box on increasing study skills (pp. 10–11), it would seem wise to avoid procrastination in this course and others.

bedroom to dress for dinner have been known to take off one garment after another and finally get into bed” (p.115).

James understood that the mind's mistakes are as instructive as they are intriguing, and modern psychology has found it quite useful to study them. Things that are whole and unbroken hum along nicely and do their jobs while leaving no clue about how they do them. Cars gliding down the expressway might as well be magic carpets as long as they are working properly because we have no idea what kind of magic is moving them along. It is only when automobiles break down that we learn about their engines, water pumps, and other fine pieces and processes that normally work together to produce the ride. Breakdowns and errors are not just about destruction and failure, they are pathways to knowledge. (See the Real World box for an example common to us all: procrastination.) In the same way, understanding lapses, errors, mistakes, and the occasionally puzzling nature of human behavior provides a vantage point for understanding the normal operation of mental life and behavior. The story of Elliot, whose behavior broke down after he had brain surgery, is an example that highlights the role that emotions play in guiding normal judgment and behavior.

Psychology is exciting because it addresses fundamental questions about human experience and behavior, and the three questions we've just considered are merely the tip of the iceberg. Think of this book as a guide to exploring the rest of the iceberg. But before we don our parkas and grab our pick axes, we need to understand how the iceberg got here in the first place. To understand psychology in the 21st century, we need to become familiar with the psychology of the past.



AP PHOTO/KALAMAZOO GAZETTE
JILL INCIANE BARGER

Mistakes can teach us a lot about how people think . . . or fail to think, as the case may be.

Psychology's Roots: The Path to a Science of Mind

When the young William James interrupted his medical studies to travel in Europe during the late 1860s, he wanted to learn about human nature. But he confronted a very different situation than a similarly curious student would confront today, largely because psychology did not yet exist as an independent field of study. As James cheekily wrote, “The first lecture in psychology that I ever heard was the first I ever gave” (quoted in Perry, 1996, p. 228). Of course, that doesn't mean no one had ever thought about human nature before. For 2,000 years, thinkers with scraggly beards and poor dental hygiene had pondered such questions, and in fact, modern psychology acknowledges its deep roots in philosophy. We will begin by examining those roots and then describe some of the early attempts to develop a scientific approach to psychology by relating the mind to the brain. Next, we'll see how psychologists divided into different camps (or schools of thought): *Structuralists* tried to analyze the mind by breaking it down into its basic components, and *functionalists* focused on how mental abilities allow people to adapt to their environments.

Psychology's Ancestors: The Great Philosophers

The desire to understand ourselves is not new. Greek thinkers such as Plato (428 BCE–347 BCE) and Aristotle (384 BCE–322 BCE) were among the first to struggle with fundamental questions about how the mind works (Robinson, 1995). Greek philosophers debated many of the questions that psychologists continue to debate today. For example, are cognitive

How do young children learn about the world? Plato believed that certain kinds of knowledge are innate, whereas Aristotle believed that the mind is a blank slate on which experiences are written.



GEO MARTINEZ/FEATURE PICS

nativism

The philosophical view that certain kinds of knowledge are innate or inborn.

philosophical empiricism

The view that all knowledge is acquired through experience.

phrenology

A now defunct theory that specific mental abilities and characteristics, ranging from memory to the capacity for happiness, are localized in specific regions of the brain.

physiology

The study of biological processes, especially in the human body.

abilities and knowledge inborn, or are they acquired only through experience? Plato argued in favor of **nativism**, *the philosophical view that certain kinds of knowledge are innate or inborn*. Children in every culture figure out early on that sounds can have meanings that can be arranged into words, which then can be arranged into sentences. Before a child is old enough to poop in the proper place, he or she has already mastered the fundamentals of language without any formal instruction. Is the propensity to learn language “hardwired” (something that children are born with)? Or does the ability to learn language depend on the child’s experience? Aristotle believed that the child’s mind was a *tabula rasa* (blank slate) on which experiences were written, and he argued for **philosophical empiricism**, *the view that all knowledge is acquired through experience*.

Although few modern psychologists believe that nativism or empiricism is entirely correct, the issue of just how much “nature” and “nurture” explain any given behavior is still a matter of controversy. In some ways, it is quite amazing that ancient philosophers were able to articulate so many of the important questions in psychology and offer many excellent insights into their answers without any access to scientific evidence. Their ideas came from personal observations, intuition, and speculation. Although they were quite good at arguing with one another, they usually found it impossible to settle their disputes because their approach provided no means of testing their theories. As you will see in the Methods chapter, the ability to test a theory is the cornerstone of the scientific approach and the basis for reaching conclusions in modern psychology.

What fundamental question has puzzled philosophers for millennia?

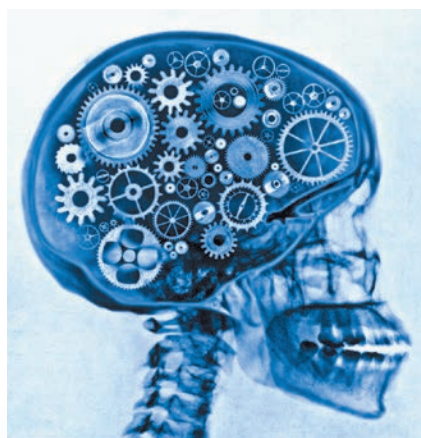
From the Brain to the Mind: The French Connection

We all know that the brain and the body are physical objects that we can see and touch and that the subjective contents of our minds—our perceptions, thoughts, and feelings—are not. Inner experience is perfectly real, but where in the world is it? French philosopher René Descartes (1596–1650) argued that body and mind are fundamentally different things—that the body is made of a material substance, whereas the mind (or soul) is made of an immaterial or spiritual substance. But if the mind and the body are different things made of different substances, then how do they interact? How does the mind tell the body to put its foot forward, and when the body steps on a rusty nail, why does the mind say “ouch”? This is the problem of *dualism*, or how mental activity can be reconciled and coordinated with physical behavior.

Descartes suggested that the mind influences the body through a tiny structure near the bottom of the brain known as the pineal gland. He was largely alone in this view because other philosophers at the time either rejected his explanation or offered alternative ideas. For example, British philosopher Thomas Hobbes (1588–1679) argued that the mind and body aren’t different things at all; rather, the mind *is* what the brain *does*. From Hobbes’s perspective, looking for a place in the brain where the mind meets the body is like looking for the place in a television where the picture meets the flat panel display.

What were early explanations for dualism?

French physician Franz Joseph Gall (1758–1828) also thought that brains and minds were linked, but by size rather than by glands. He examined the brains of animals and of people who had died of disease, or as healthy adults, or as children, and observed that mental ability often increases with larger brain size and decreases with damage to the brain. These aspects of Gall’s findings were generally accepted (and the part about brain damage still is today). But Gall went far beyond his evidence to develop a psychological theory known as **phrenology**, *a now defunct theory that specific*



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René Descartes believed that the physical body was a container for the non-physical thing called the mind. Centuries later, the philosopher Gilbert Ryle (1918–2002) argued that Descartes was wrong, that there is no “ghost in the machine,” and that all mental activity is simply the result of the physical activity of the brain. Most modern scientists reject Descartes’ “dualism” and embrace Ryle’s “scientific materialism.”

mental abilities and characteristics, ranging from memory to the capacity for happiness, are localized in specific regions of the brain (see **FIGURE 1.1**). The idea that different parts of the brain are specialized for specific psychological functions turned out to be right; as you'll learn later in the book, a part of the brain called the *hippocampus* is intimately involved in memory, just as a structure called the *amygdala* is intimately involved in fear. But phrenology took this idea to an absurd extreme. Gall asserted that the size of bumps or indentations on the skull reflected the size of the brain regions beneath them and that by feeling those bumps, one could tell whether a person was friendly, cautious, assertive, idealistic, and so on. What Gall didn't realize was that bumps on the skull do not necessarily reveal anything about the shape of the brain underneath.

Phrenology made for a nice parlor game and gave young people a good excuse for touching each other, but in the end it amounted to a series of strong claims based on weak evidence. Not surprisingly, his critics were galled (so to speak), and they ridiculed many of his proposals. Despite an initially large following, phrenology was quickly discredited (Fancher, 1979).

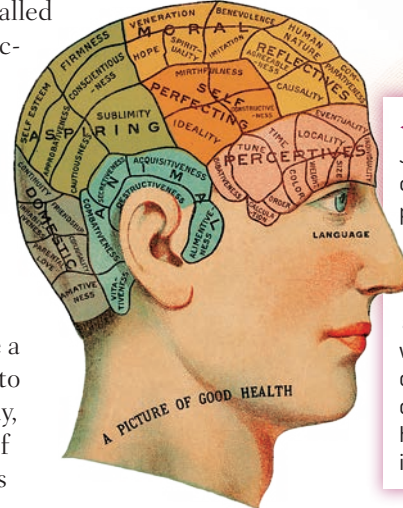
While Gall was busy playing bumpologist, other French scientists were beginning to link the brain and the mind in a more convincing manner. Biologist Marie Jean Pierre Flourens (1794–1867) was appalled by Gall's far-reaching claims and sloppy methods, so he conducted experiments in which he surgically removed specific parts of the brain from dogs, birds, and other animals and found (not surprisingly!) that their actions and movements differed from those of animals with intact brains.

French surgeon Paul Broca (1824–1880) worked with a patient who had suffered damage to a small part of the left side of the brain (now known as *Broca's area*). The patient, Monsieur Leborgne, was virtually unable to speak and could utter only the single syllable “tan.” Yet the patient understood everything that was said to him and was able to communicate using gestures. Broca had the crucial insight that damage to a specific part of the brain impaired a specific mental function, clearly demonstrating that the brain and mind are closely linked. This was important in the 19th century because at that time many people accepted Descartes' idea that the mind is separate from, but interacts with, the brain and the body. Broca and Flourens, then, were the first to demonstrate that the mind is grounded in a material substance, namely, the brain. Their work jump-started the scientific investigation of mental processes.

How did work involving patients with brain damage help demonstrate the mind–brain connection?

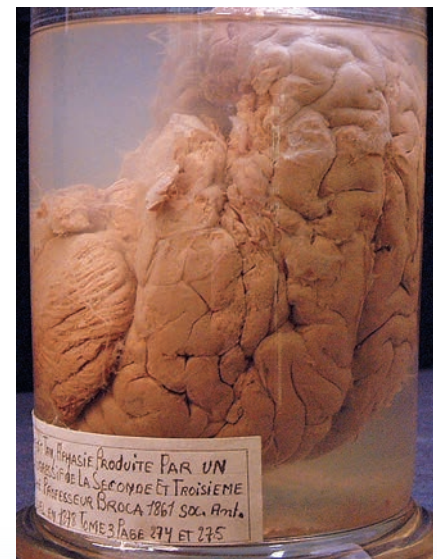
Structuralism: Applying Methods from Physiology to Psychology

In the middle of the 19th century, psychology benefited from the work of German scientists who were trained in the field of **physiology**, *the study of biological processes, especially in the human body*. Physiologists had developed methods that allowed them to measure such things as the speed of nerve impulses, and some of them had begun to use these methods to measure mental abilities. William James was drawn to the work of two such physiologists: Hermann von Helmholtz (1821–1894) and Wilhelm Wundt (1832–1920). “It seems to me that perhaps the time has come for psychology to begin to be a science,” wrote James in a letter written in 1867 during his visit to Berlin. “Helmholtz and a man called Wundt at Heidelberg are working at it.” What attracted James to the work of these two scientists?



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◀ Figure 1.1 Phrenology Franz Joseph Gall (1758–1828) developed a theory called phrenology, which suggested that psychological capacities (such as the capacity for friendship) and traits (such as cautiousness and mirth) were located in particular parts of the brain. The more of these capacities and traits a person had, the larger the corresponding bumps on the skull.

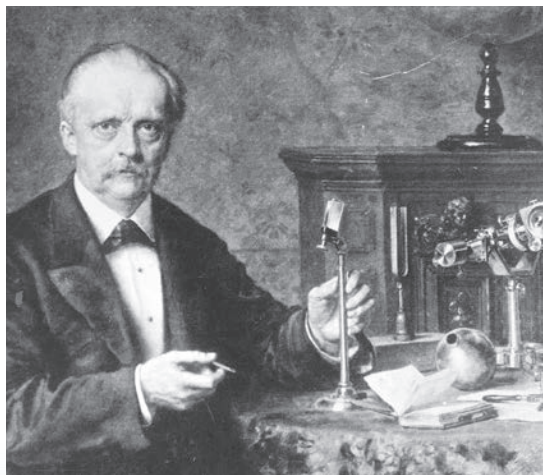


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Mr. Leborgne was nicknamed “Tan” because it was the only word he could say. When he died in 1861, Paul Broca dissected his brain and found a lesion in the left hemisphere which, he concluded, had been responsible for Leborgne's loss of speech. Today, Leborgne's brain lives in a jar at the Musée Dupuytren in Paris, France. And to this day, no one knows his first name.

Helmholtz Measures the Speed of Responses

A brilliant experimenter with a background in both physiology and physics, Helmholtz had developed a method for measuring the speed of nerve impulses in a frog's leg, which he then adapted to the study of human beings. Helmholtz trained participants to respond when he applied a **stimulus**—*sensory input from the environment*—to different parts of the leg. He recorded his participants' **reaction time**, or *the amount of time taken to respond to a specific stimulus*, after applying the stimulus. Helmholtz found that people generally took longer to respond when their toe was stimulated than when their thigh was stimulated, and the difference between these reaction times allowed him to estimate how long it took a nerve impulse to travel to the brain. These results were astonishing to 19th-century scientists because, at that time, just about everyone thought that mental processes occurred instantaneously. When you move your hands in front of your eyes, you don't feel your hands move a fraction of a second before you see them. The real world doesn't appear like one of those late-night movies in which the video and the audio are off by just a fraction of a second. Scientists assumed that the neurological processes underlying mental events *must* be instantaneous for everything to be so nicely synchronized, but Helmholtz showed that this wasn't true. In so doing, he also demonstrated that reaction time could be a useful way to study the mind and the brain.



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By measuring a person's reaction times to different stimuli, Hermann von Helmholtz (1821–1894) estimated the length of time it takes a nerve impulse to travel to the brain.



What was the useful application of Helmholtz's results?

Wundt and the Development of Structuralism

Although Helmholtz's contributions were important, historians generally credit the official emergence of psychology to Helmholtz's research assistant, Wilhelm Wundt (1832–1920; Rieber, 1980). In 1867, at the University of Heidelberg, Wundt taught what was probably the first course in physiological psychology, which led to the publication of his book, *Principles of Physiological Psychology*, in 1874. Wundt called the book “an attempt to mark out [psychology] as a new domain of science” (Fancher, 1979, p. 126). In 1879, at the University of Leipzig, Wundt opened the first laboratory exclusively devoted to psychological studies, and this event marked the official birth of psychology as an independent field of study. The new lab was full of graduate students carrying out research on topics assigned by Wundt, and it soon attracted young scholars from all over the world who were eager to learn about the new science that Wundt had developed.

Wundt believed that scientific psychology should focus on analyzing **consciousness**, *a person's subjective experience of the world and the mind*. Consciousness encompasses a broad range of subjective experiences. We may be conscious of



How did the work of chemists influence early psychology?

sights, sounds, tastes, smells, bodily sensations, thoughts, or feelings. As Wundt tried to figure out a way to study consciousness scientifically, he noted that chemists try to understand the structure of matter by breaking down natural substances into basic elements. So he and his students adopted an approach called

structuralism, *the analysis of the basic elements that constitute the mind*. This approach involved breaking down consciousness into elemental sensations and feelings, and you can do a bit of structuralism right now without leaving your chair.

Consider the contents of your own consciousness. At this very moment you may be aware of the meaning of these words, the visual appearance of the letters on the page, the key ring pressing uncomfortably against your thigh, your feelings of excitement or boredom (probably excitement), the smell of curried chicken salad, or the nagging question of whether the War of 1812 really deserves its own overture. At

stimulus

Sensory input from the environment.

reaction time

The amount of time taken to respond to a specific stimulus.

consciousness

A person's subjective experience of the world and the mind.

structuralism

The analysis of the basic elements that constitute the mind.

introspection

The subjective observation of one's own experience.

