

# DISCOVERING PSYCHOLOGY

The Science of Mind

Mechanical Engineering  
Astrophysics  
Neuroscience  
Geoscience  
Anthropology  
Political Science  
Sociology  
Gerontology  
General Medicine  
Psychiatry  
Communications  
Management  
Education  
Library Science  
Information Science  
Applied Mathematics  
Nursing  
Paleontology  
Physical Sciences  
Statistics  
Ophthalmology  
Public Health  
Astronomy  
Genetics  
Toxicology  
Neurology  
History  
Zoology  
Economics  
Geography  
Obstetrics  
PSYCHOLOGY  
Immunology  
Robotics  
Radiology  
Parasitology  
Dermatology  
Entomology  
Dentistry  
Food Sciences  
Pharmacology  
Microbiology  
Virology  
Plant Sciences  
General Chemistry  
Pathology  
Organic Chemistry  
Biochemistry  
Hematology  
Pediatrics  
Endocrinology  
Polymers  
Gastroenterology  
Agriculture  
Condensed Matter  
Gynecology  
Material Sciences  
Geoscience  
Marine Biology  
Meteorology  
Ecology  
Computer Science  
Nuclear Physics  
Sports Sciences  
Cardiology  
Analytical Chemistry  
Rheumatology  
Emergency Medicine  
Plant Chemistry  
Biotechnology

● SOCIAL SCIENCES

● MATHEMATICS

● EARTH SCIENCES

● CHEMISTRY

● PHYSICS

● MEDICINE

John T.  
**Cacioppo**  
Laura A.  
**Freberg**

**2e**



# MindTap™

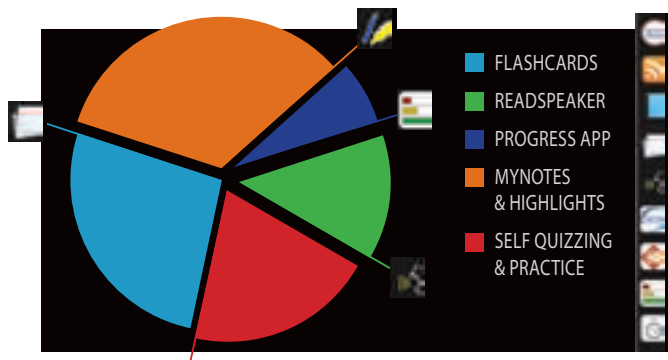
## Tap into **engagement**

MindTap empowers you to produce your best work—consistently.

MindTap is designed to help you master the material. Interactive videos, animations, and activities create a learning path designed by your instructor to guide you through the course and focus on what's important.

### MindTap delivers real-world activities and assignments

that will help you in your academic life as well as your career.



### MindTap helps you stay organized and efficient

by giving you the study tools to master the material.

### MindTap empowers and motivates

with information that shows where you stand at all times—both individually and compared to the highest performers in class.



*“MindTap was very useful – it was easy to follow and everything was right there.”*

— Student, San Jose State University

*“I’m definitely more engaged because of MindTap.”*

— Student, University of Central Florida

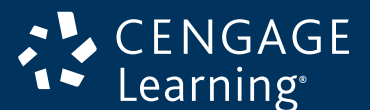
*“MindTap puts practice questions in a format that works well for me.”*

— Student, Franciscan University of Steubenville

Tap into more info at: [www.cengage.com/mindtap](http://www.cengage.com/mindtap)

Source Code: 14M-AA0105

Engaged with you.  
[www.cengage.com](http://www.cengage.com)



Nuclear Physics  
Mechanical Engineering  
Astrophysics  
Neuroscience  
Geoscience  
Anthropology  
Political Science  
Sociology  
Gerontology  
General Medicine  
Psychiatry  
Communications  
Management  
Education  
Library Science

# DISCOVERING PSYCHOLOGY

The Science of Mind

2e

Information Science  
Applied Mathematics  
Nursing  
Paleontology  
Physical Sciences  
Statistics  
Ophthalmology  
Public Health  
Astronomy  
Genetics  
Toxicology  
Neurology  
History  
Zoology  
Economics  
Geography  
Obstetrics  
**PSYCHOLOGY**  
Immunology  
Robotics  
Radiology  
Parasitology  
Dermatology  
Entomology  
Dentistry  
Food Sciences  
Pharmacology  
Microbiology  
Virology  
Plant Sciences  
General Chemistry  
Pathology  
Organic Chemistry  
Biochemistry  
Hematology  
Pediatrics  
Endocrinology  
Polymers  
Gastroenterology  
Agriculture  
Condensed Matter  
Gynecology  
Material Sciences  
Geoscience  
Marine Biology  
Meteorology  
Ecology  
Computer Science  
Nuclear Physics  
Sports Sciences  
Cardiology  
Analytical Chemistry  
Rheumatology  
Emergency Medicine  
Plant Chemistry

SOCIAL SCIENCES

MATHEMATICS

EARTH SCIENCES

CHEMISTRY

PHYSICS

MEDICINE

John T.  
**Cacioppo**  
University of Chicago

Laura A.  
**Freberg**  
California Polytechnic  
State University,  
San Luis Obispo

 **CENGAGE**  
Learning

Australia • Brazil • Mexico • Singapore • United Kingdom • United States

This is an electronic version of the print textbook. Due to electronic rights restrictions, some third party content may be suppressed. Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. The publisher reserves the right to remove content from this title at any time if subsequent rights restrictions require it. For valuable information on pricing, previous editions, changes to current editions, and alternate formats, please visit [www.cengage.com/highered](http://www.cengage.com/highered) to search by ISBN#, author, title, or keyword for materials in your areas of interest.

Important Notice: Media content referenced within the product description or the product text may not be available in the eBook version.

***Discovering Psychology: The Science of Mind,***  
**Second Edition**

**John T. Cacioppo and Laura A. Freberg**

Product Director: Jon-David Hague

Product Manager: Clayton Austin

Content Developer: Michelle Newhart

Product Assistant: Kimiya Hojjat

Media Developer: Jasmin Tokatlian

Marketing Manager: Jennifer Levanduski

Content Project Manager: Michelle Clark

Art Director: Jennifer Wahi

Manufacturing Planner: Karen Hunt

Production and Composition: Graphic World Inc

Text and Photo Researcher: Lumina Datamatics

Text Designer: Diane Beasley

Cover Designer: Irene Morris

Cover Image: Wolfgang Zwanzger/Fotolia

© 2016, 2013 Cengage Learning

WCN: 02-200-203

ALL RIGHTS RESERVED. No part of this work covered by the copyright herein may be reproduced, transmitted, stored or used in any form or by any means graphic, electronic, or mechanical, including but not limited to photocopying, recording, scanning, digitizing, taping, Web distribution, information networks, or information storage and retrieval systems, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the publisher.

For product information and technology assistance, contact us at  
**Cengage Learning Customer & Sales Support, 1-800-354-9706.**

For permission to use material from this text or product,  
submit all requests online at **[www.cengage.com/permissions](http://www.cengage.com/permissions).**

Further permissions questions can be e-mailed to  
**[permissionrequest@cengage.com](mailto:permissionrequest@cengage.com).**

Library of Congress Control Number: 2014948591

ISBN: 978-1-305-08837-5

**Cengage Learning**

20 Channel Center Street  
Boston, MA 02210  
USA

Cengage Learning is a leading provider of customized learning solutions with office locations around the globe, including Singapore, the United Kingdom, Australia, Mexico, Brazil, and Japan. Locate your local office at **[www.cengage.com/global](http://www.cengage.com/global).**

Cengage Learning products are represented in Canada by Nelson Education, Ltd.

To learn more about Cengage Learning Solutions, visit **[www.cengage.com](http://www.cengage.com).**

Purchase any of our products at your local college store or at our preferred online store **[www.cengagebrain.com](http://www.cengagebrain.com).**

# About the Authors

**John T. Cacioppo** is the Tiffany and Margaret Blake Distinguished Service Professor and director of the Center for Cognitive and Social Neuroscience at the University of Chicago. He is a past president of several scientific societies, including the Association for Psychological Science, the Society for Social Neuroscience, the Society for Personality and Social Psychology, and the Society for Psychophysiological Research, and a past chair of the Psychology Section of American Association for the Advancement of Science. Among the awards he has received are the Troland Award from the National Academy of Sciences, the Distinguished Scientific Contribution Award from the American Psychological Association, a Method to Extend Research in Time (MERIT) Award from the National Institutes of Health (NIH), the Scientific Impact Award from the Society of Experimental Social Psychology, the Award for Distinguished Scientific Contributions from the Society for Psychophysiological Research, and the Campbell Award and the Theoretical Innovation Prize from the Society for Personality and Social Psychology. Cacioppo is a member of the President's Committee on the National Medal of Science; the chair of the Board of Behavioral, Cognitive, and Sensory Sciences at the National Research Council; a member of the National Science Foundation Advisory Committee for the Social, Behavioral, and Economic Sciences Directorate; a former member of the Council for the NIH Center for Scientific Review; and a former member of the Council for the National Institute on Aging.



John T. Cacioppo

**Laura A. Freberg** is a professor of psychology at California Polytechnic State University, San Luis Obispo, where she teaches courses in introductory psychology, biological psychology, and sensation and perception. She is the author of three editions of *Discovering Behavioral Neuroscience: An Introduction to Biological Psychology* for Cengage Learning. Recently, to better understand the needs of the online education community, Laura also began teaching social psychology, sensation/perception, cognitive psychology, statistics, research methods, and writing in psychology for Argosy University Online. Laura's teaching career began more than 35 years ago when she taught her first college course at Pasadena City College at the age of 23. She has received Faculty Member of the Year recognition from Cal Poly Disabilities Resource Center 3 times (1991, 1994, and 2009) for her work with students with disabilities. She enjoys using technology and social media in the classroom and is a Google Glass Explorer. Laura serves as the content expert writer for psychology for Answers.com and enjoys collaborating with daughters Kristin Saling (systems engineering, U.S. Military Academy at West Point) and Karen Freberg (communications, University of Louisville) on a variety of research projects in crisis management and public relations, as well as in psychology. She serves as the Bylaws and Archives Committee chair for the Society for Social Neuroscience.



Roger Freberg

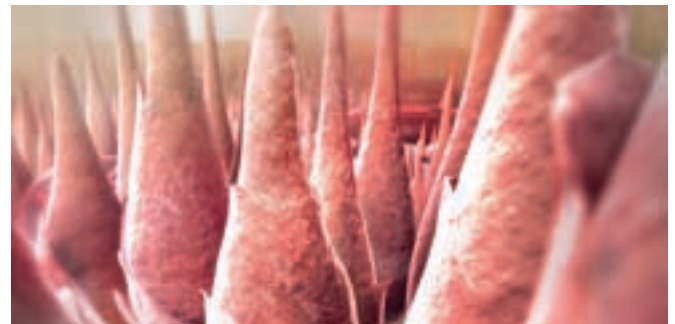
# Brief Contents

<b>1</b>	The Science of Mind	<a href="#">The Discipline of Psychology</a>	2
<b>2</b>	The Measure of Mind	<a href="#">Methods of Psychology</a>	34
<b>3</b>	The Evolving Mind	<a href="#">Nature and Nurture Intertwined</a>	70
<b>4</b>	The Biological Mind	<a href="#">The Physical Basis of Behavior</a>	104
<b>5</b>	The Perceiving Mind	<a href="#">Sensation and Perception</a>	146
<b>6</b>	The Aware Mind	<a href="#">Elements of Consciousness</a>	192
<b>7</b>	The Feeling Mind	<a href="#">Motivation and Emotion</a>	230
<b>8</b>	The Adaptive Mind	<a href="#">Learning</a>	274
<b>9</b>	The Knowing Mind	<a href="#">Memory</a>	316
<b>10</b>	The Thinking Mind	<a href="#">Thinking, Language, and Intelligence</a>	356
<b>11</b>	The Developing Mind	<a href="#">Life Span Development</a>	398
<b>12</b>	The Individual Mind	<a href="#">Personality and the Self</a>	446
<b>13</b>	The Connected Mind	<a href="#">Social Psychology</a>	488
<b>14</b>	The Troubled Mind	<a href="#">Psychological Disorders</a>	534
<b>15</b>	Healing the Troubled Mind	<a href="#">Therapy</a>	578
<b>16</b>	The Healthy Mind	<a href="#">Stress and Coping, Health Psychology, and Positive Psychology</a>	618
	References	R-1	
	Name Index	N-1	
	Subject Index/Glossary	S-1	

# Contents

## 1 The Science of Mind The Discipline of Psychology

What Is Psychology?	5
Why Is Psychology a Hub Science?	5
What Are Psychology's Roots?	6
SUMMARY 1.1	10
How Did the Science of Psychology Begin?	10
Wilhelm Wundt and Structuralism	10
Connecting to Research The First Official Psychology Experiment	11
Gestalt Psychology	12
William James and Functionalism	12
Experiencing Psychology Testing Reaction Time	12
Clinical Roots: Freud and the Humanistic Psychologists	14
<i>Sigmund Freud</i>	14
<i>Humanistic Psychology</i>	15
The Behaviorists and the Cognitive Revolution	16
SUMMARY 1.2	22
What Are Psychological Perspectives?	23
Six Perspectives of Psychology	23
A New Connectivity: Integrating Psychology's Six Perspectives	25
Thinking Scientifically Can the Use of a Single Perspective Be Misleading?	26



Argosy Publishing, Inc.

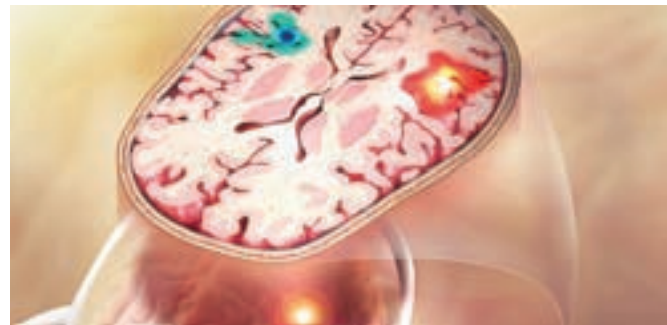
What Does It Mean to Be a Psychologist?	29
Interpersonal Relationships: How Can We Use Relationships to Illustrate Psychological Perspectives?	30
SUMMARY 1.3	31
Key Terms: The Language of Psychological Science	33



# 2 The Measure of Mind

## Methods of Psychology

What Is Science?	36
The Scientific Mindset	36
The Importance of Critical Thinking	38
The Scientific Enterprise	39
<i>Scientific Theories</i>	39
<i>Generating Good Hypotheses</i>	39
<i>Evaluating Hypotheses</i>	39
Thinking Scientifically Using the Five Steps of Critical Thinking to Evaluate Survey Data	40
<b>SUMMARY 2.1</b>	42
How Do Psychologists Conduct Research?	42
Descriptive Methods	42
<i>The Case Study</i>	42
<i>Naturalistic Observation</i>	43
<i>The Survey</i>	44
Correlational Methods	45
Experimental Methods	48
Experiencing Psychology Taking a Video Game and Aggression Survey	50
<i>Meta-analyses</i>	52
<i>The Importance of Multiple Perspectives</i>	53
Psychology as a Hub Science Testing the Effects of Food Additives on Children's Hyperactivity	53
How Do We Study the Effects of Time?	54
<b>SUMMARY 2.2</b>	56



Argosy Publishing, Inc.

How Do We Draw Conclusions From Data?	57
The Importance of Valid and Reliable Measures	57
Descriptive Statistics	58
<i>Central Tendency</i>	58
<i>Variance</i>	60
<i>The Normal Curve</i>	60
<i>Descriptive Statistics With Two Variables</i>	61
Inferential Statistics	61
Connecting to Research Do You Believe in ESP?	62
How Can We Conduct Ethical Research?	64
Human Participants	65
Animal Subjects	66
Interpersonal Relationships: The Methodological Perspective Can We Differentiate "Like" From "Love?"	67
<b>SUMMARY 2.3</b>	68
Key Terms: The Language of Psychological Science	69

# 3 The Evolving Mind

## Nature and Nurture Intertwined

Why Do We Say Nature and Nurture Are Intertwined? 73

What Are the Building Blocks of Behavior? 73

Genetic Variation 74

Relatedness 75

Sex Chromosomes 75

**Connecting to Research** Genes, Bullying, and Emotional Problems 76

Epigenetics 77

**Experiencing Psychology** Reading a DNA Fingerprint 78

What Is the Field of Behavioral Genetics? 81

**Psychology as a Hub Science** The Need to Understand Risk Taking 85

**SUMMARY 3.1** 86

How Does Evolution Occur? 87

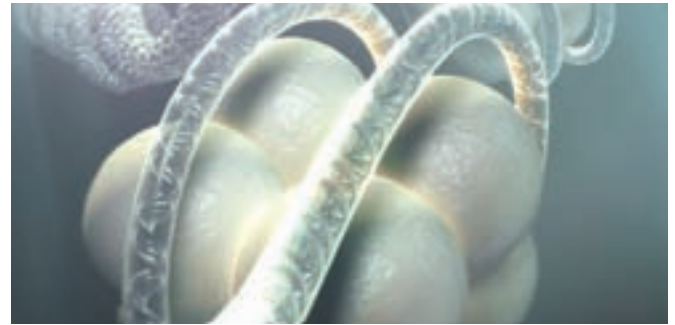
Mechanisms of Evolution 87

Adaptation 89

Evolution of the Human Brain 90

The Contemporary Human Brain 92

**SUMMARY 3.2** 93



Argosy Publishing, Inc.

How Does Evolution Influence Behavior? 94

The Evolutionary Psychology Perspective 94

Origins of Social Behavior 94

*Humans as a Social Species* 95

Sexual Selection 96

*Parental Investment* 96

*Traits Possibly Influenced by Sexual Selection* 97

Culture 98

**Thinking Scientifically** Do Women Prefer Different Male Characteristics at Different Times in Their Menstrual Cycles? 100

**Interpersonal Relationships: The Evolutionary Perspective** Can We Use Odor to Select a Mate, Even Online? 102

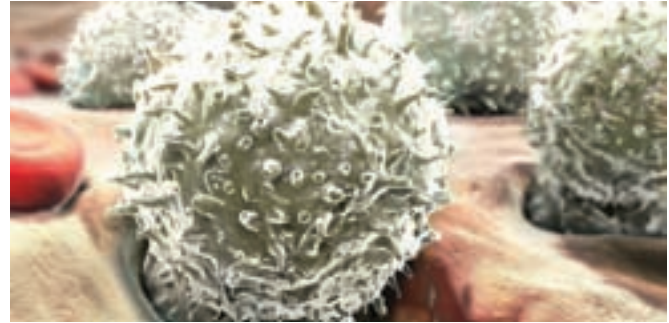
**SUMMARY 3.3** 103

Key Terms: The Language of Psychological Science 103

# 4 The Biological Mind

## The Physical Basis of Behavior

What Is Biological Psychology?	106
Early Attempts to Understand Biological Psychology	107
Contemporary Approaches in Biological Psychology	107
<b>Thinking Scientifically</b> When Does Reductionism Work? When Does It Fail?	108
How Is the Nervous System Organized?	109
What Are the Structures and Functions of the Central Nervous System?	110
The Spinal Cord, Brainstem, and Cerebellum	111
<b>Connecting to Research</b> The Discovery of Mirror Neurons	114
Subcortical Structures	116
<i>The Thalamus</i>	116
<i>The Basal Ganglia</i>	116
<i>The Hypothalamus</i>	116
<i>The Hippocampus</i>	116
<i>The Cingulate Cortex</i>	117
<i>The Amygdala</i>	117
<i>The Nucleus Accumbens</i>	118
The Cerebral Cortex	118
<i>Localization of Functions in the Cerebral Cortex</i>	119
<i>The Frontal Lobe</i>	120
<i>The Occipital Lobe</i>	122
<i>The Temporal Lobe</i>	122
<i>The Parietal Lobe</i>	122
<b>Psychology as a Hub Science</b> Law, Responsibility, and the Brain	123
<i>Right Brain and Left Brain</i>	124
<i>Right–Left Brain Myths</i>	125
<i>The Function of Lateralization</i>	125
<b>Experiencing Psychology</b> Handedness	126
<b>SUMMARY 4.1</b>	128



The Peripheral Nervous System (PNS) and the Endocrine System	129
The Somatic Nervous System	129
The Autonomic Nervous System	130
The Endocrine System	130
<b>SUMMARY 4.2</b>	133
How Do Neurons Communicate?	134
Neurons and Glia	134
Neural Signaling	136
<i>Electrical Signaling</i>	137
<i>Chemical Signaling</i>	140
Types of Neurotransmitters	142
<b>Interpersonal Relationships: The Biological Perspective</b> Is There a Difference Between Love and Lust?	144
<b>SUMMARY 4.3</b>	145
Key Terms: The Language of Psychological Science	145

# 5 The Perceiving Mind

## Sensation and Perception

How Does Sensation Lead to Perception? 148

Sensory Information Travels to the Brain 149

The Brain Constructs Perceptions From Sensory Information 150

*Measuring Perception* 152

*Signal Detection* 153

**SUMMARY 5.1** 154

How Do We See? 155

The Visual Stimulus 155

The Biology of Vision 155

*Rods and Cones* 156

*Visual Pathways* 157

Visual Perception and Cognition 159

*Color Vision* 159

**Psychology as a Hub Science** Color and Accessible Web Design 161

Recognizing Objects 162

**Connecting to Research** Can We Identify a Jennifer Aniston Cell? 162

*Gestalt Psychology* 163

*Recognizing Depth* 164

Developmental and Individual Differences in Vision 168

**Thinking Scientifically** The Roger Shepard Parallelogram Illusion: “Turning the Tables” 170

Sociocultural Influences on Visual Perception 171

**SUMMARY 5.2** 172

How Do We Hear? 173

The Auditory Stimulus 173

The Biology of Audition 174

*Auditory Pathways* 175

Auditory Perception and Cognition 176

*Pitch Perception* 176

*Perceiving Loudness* 176

*Localization of Sound* 176

*Auditory Groupings* 177

Developmental and Individual Differences in Audition 178

Sociocultural Influences on Auditory Perception 179



Argosy Publishing, Inc.

How Do We Feel Body Position, Touch, Temperature, and Pain? 180

Somatosensory Stimuli 180

The Biology of the Somatosenses 180

*Body Position* 180

*Touch* 181

*Pain* 182

Sociocultural Influences on the Somatosenses 183

How Do We Process Smells and Tastes? 184

Chemical Stimuli 184

The Biology of the Chemical Senses 184

*Olfaction* 184

*Taste* 184

**Experiencing Psychology** Are You a Supertaster? 186

Perception and Cognition in the Chemical Senses 188

Developmental and Individual Differences in the Chemical Senses 188

Sociocultural Influences on the Chemical Senses 188

**Interpersonal Relationships: Sensation and Perception Perspectives** Can Relationships Buffer the Experience of Pain? 189

**SUMMARY 5.3** 190

Key Terms: The Language of Psychological Science 191

# 6 The Aware Mind

## Elements of Consciousness

### What Does It Mean to Be Conscious? 194

#### The Evolution of Consciousness 195

*Consciousness as Variations in Alertness* 195

*Consciousness as an Awareness of Ongoing*

*Sensations* 195

*Consciousness as Self-Awareness* 195

#### Psychology as a Hub Science Can Machines Become Conscious? 196

#### Searching for Consciousness in the Brain 197

#### SUMMARY 6.1 199

### What Happens to Consciousness During Waking and Sleep? 199

#### Circadian Rhythms 199

*Modern Living and Circadian Rhythms* 200

*Individual Variations in Circadian Rhythms* 201

#### Waking 202

#### Sleep 203

*Stages of Sleep* 203

#### Experiencing Psychology The Epworth Sleepiness

Scale 204

*The Benefits of Sleep* 205

*The Special Benefits of REM Sleep* 207

#### Connecting to Research Loneliness Affects Sleep 208

#### Dreams 209

#### Sleep Disorders 210

*Nightmares and Sleep Terrors* 210

*Insomnia* 210

*Narcolepsy and Cataplexy* 210

*Breathing-related Sleep Disorders* 211

*Sudden Infant Death Syndrome (SIDS)* 211

*Restless Legs Syndrome (RLS)* 212

#### SUMMARY 6.2 212

### How Is Consciousness Affected by Brain Damage? 213

#### Specific Areas of Brain Damage and Consciousness 213

#### Coma, Vegetative State, Brain Death, and Near-Death 213

*Coma* 213

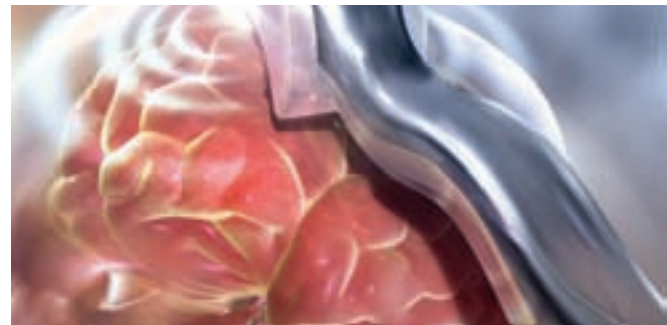
*Vegetative State (VS)* 213

*Brain Death* 214

*Near-Death Experiences* 214

#### Thinking Scientifically Can Patients in Vegetative States (VS) Communicate? 214

#### Seizures 216



Argosy Publishing, Inc.

### How Do People Intentionally Alter Their States of Consciousness? 217

#### General Features of Psychoactive Drugs 217

*Tolerance and Withdrawal* 217

*Addiction* 217

#### Commonly Used Psychoactive Drugs 219

*Marijuana* 219

*LSD* 219

*Caffeine* 219

*Nicotine* 219

*Cocaine and Amphetamines* 221

*Methylphenidate (Ritalin)* 222

*MDMA (Ecstasy)* 222

*Alcohol* 222

*Opioids* 223

#### Nondrug Methods for Altering Consciousness 223

*Meditation* 224

*Other Methods for Altering Consciousness* 226

#### Interpersonal Relationships: The Consciousness Perspective How Does Imitation Influence Liking? 226

#### SUMMARY 6.3 228

#### Key Terms: The Language of Psychological Science 229

# 7 The Feeling Mind

## Motivation and Emotion

How Are Motivation and Emotion Related? 232

What Does It Mean to Be Motivated? 233

Hunger and Eating 235

*The Sensation of Hunger* 235

*The Sensation of Satiety* 237

*Obesity* 238

*Anorexia Nervosa, Bulimia Nervosa, and Binge-Eating Disorder* 241

**Thinking Scientifically** The Impact of Pro-Ana Websites 242

Sexual Motivation 243

*Hormones and Sexual Motivation* 244

*Sexual Orientation* 247

Cognitive and Social Motives 248

*The Motivation to Affiliate* 249

*Achievement Motivation* 250

Motivational Priorities 251

*Approach and Avoidance* 251

**Experiencing Psychology** Excellence Motivation 251

*Motivational Theories* 252

**SUMMARY 7.1** 254

Why Are We Emotional? 255

The Biology of Emotion 257

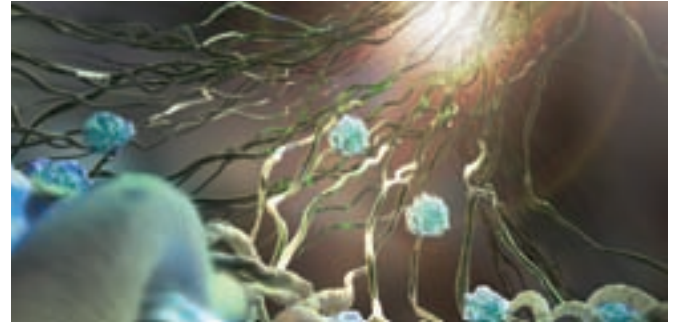
*The Amygdala and the Insula* 257

*The Cingulate Cortex and the Basal Ganglia* 259

*The Cerebral Cortex and Emotion* 260

Expressing Emotion 260

Interpreting Emotion 264



**Psychology as a Hub Science** Lie Detection and the Law 265

Theories of Emotion 266

*The James–Lange Theory of Emotion* 266

*The Cannon–Bard Theory of Emotion* 267

**Connecting to Research** Botox and the Ability to Read the Emotions of Others 268

*The Schachter–Singer Two-Factor Theory* 269

*Contemporary Approaches* 270

**Interpersonal Relationships: The Emotional Perspective** What Is the Impact of Positive and Negative Interactions on Relationships? 272

**SUMMARY 7.2** 273

Key Terms: The Language of Psychological Science 273

# 8 The Adaptive Mind

## Learning

How Do Animals Use Reflexes, Instincts, and Learning to Respond to Their Environments? 276

What Are the Three Main Types of Learning? 279

**SUMMARY 8.1** 280

What Is Classical Conditioning? 281

Classical Conditioning Terminology 281

Classical Conditioning Phenomena 282

*Acquisition* 282

*Extinction and Spontaneous Recovery* 283

*Inhibition* 283

*Generalization and Discrimination* 284

*Higher Order Conditioning* 285

*Latent Inhibition* 285

Cognitive and Biological Influences on Classical Conditioning 286

*The Element of Surprise* 286

*Taste Aversion* 286

Applying Classical Conditioning 288

*Overcoming Fear* 288

*Addiction* 289

*Attitudes and Prejudice* 290

*Creativity and Schizophrenia* 290

**Psychology as a Hub Science** Classical Conditioning

Informs Wildlife Conservation 291

**SUMMARY 8.2** 292

What Is Operant Conditioning? 293

Types of Consequences 293

*Positive Reinforcement* 294

**Thinking Scientifically** Why Do People Deliberately

Injure Themselves? 294

*Negative Reinforcement* 296

*Punishment* 297

Schedules of Reinforcement 298

*Fixed Ratio Schedules* 298

*Variable Ratio Schedules* 298

*Fixed Interval Schedules* 299

*Variable Interval Schedules* 299

*Partial Reinforcement Effect in Extinction* 300

*Comparing Schedules* 301



Argosy Publishing, Inc.

The Method of Successive Approximations (Shaping) 301

Cognitive, Biological, and Social Influences on Operant Conditioning 302

*Cognitive Influences on Operant Conditioning* 302

*Biological Influences on Operant Conditioning* 303

*Social Influences on Operant Conditioning* 304

Applying Operant Conditioning 305

*Token Economies* 305

*Behavior Therapies* 306

**Experiencing Psychology** How Do I Break a Bad Habit? 306

**SUMMARY 8.3** 307

What Is Observational Learning? 308

Albert Bandura and Aggression 309

Imitation 310

**Connecting to Research** Why Do Children Overimitate? 310

Mirror Neurons 311

Cultural Transmission of Learning 312

**Interpersonal Relationships: The Learning**

**Perspective** Can We Influence the Way Others Behave Toward Us? 313

**SUMMARY 8.4** 314

Key Terms: The Language of Psychological Science 315

# 9 The Knowing Mind

## Memory

What Are the Advantages of Memory? 318

Memory and the Continuum of Information Processing 318

Memory Provides an Adaptive Advantage 319

How Are Memories Processed? 320

Sensory Memory 320

Short-Term Memory 321

*Working Memory* 324

Long-Term Memory 325

*Moving Information Into Long-Term Memory* 325

*Differences Between Working and Long-Term Memory* 327

**SUMMARY 9.1** 328

What Are the Different Types of Long-Term Memory? 328

Declarative Memories 329

Nondeclarative Memories 330

*Procedural Memories* 331

*Priming* 331

Long-Term Memories and the Brain 332

*Declarative Memories and the Hippocampus* 332

*Declarative Memories and the Cerebral Cortex* 332

*Procedural Memories and the Basal Ganglia* 334

**SUMMARY 9.2** 334

How Is Long-Term Memory Organized? 335

Connectionist Theories 335

Inferences: Using Schemas 336

**Experiencing Psychology** Schemas and False Memories 336

How Do We Retrieve Memories? 337

Retrieval From Short-Term Memory 337

Retrieval From Long-Term Memory 337

*The Role of Cues* 338

*Tip of the Tongue* 338

*Reconstruction During Retrieval* 339

Retrieval of Emotional Events 341

**Thinking Scientifically** Should We Erase Traumatic Memories? 342

**Psychology as a Hub Science** How Reliable Are Eyewitnesses? 344



Why Do We Forget? 345

Decay 345

Interference 346

Motivated Forgetting 347

What Is the Biology of Memory? 348

Memory at the Level of the Synapse 348

Biochemistry and Memory 349

How Can We Improve Memory? 350

Distribute Practice Over Time 350

**Connecting to Research** Does Caffeine Help You to Remember? 350

Take Tests 351

Sleep 352

Recite 352

Use Mnemonics 353

**Interpersonal Relationships: The Memory Perspective** What Is Transactive Memory? 354

**SUMMARY 9.3** 355

Key Terms: The Language of Psychological Science 355



# 10 The Thinking Mind

## Thinking, Language, and Intelligence

### What Do We Think About? 358

Thought as Images 358

Thought as Concepts 359

*Prototypes and Exemplars* 361

*Concepts as Theories* 362

*Concepts and Schemas* 362

*Concepts and the Brain* 363

### How Do We Solve Problems? 364

Understand the Problem 365

Make a Plan 365

*Generating Solutions* 366

*Decide on a Solution* 369

Carry Out the Plan 371

Look Back 371

The Biological Psychology of Decision Making 372

**Experiencing Psychology** Are You a Maximizer or a Satisficer? 372

#### SUMMARY 10.1 375

### How Does Language Influence Behavior? 375

The Origins of Human Language 376

The Basic Building Blocks of Language 377

The Biological Psychology of Language 377

*Lessons From Language Disorders* 377

*Are Nonhuman Animals Capable of Real Language?* 378

How Do We Learn Language? 380

Variations in Language Processing 381

*Dyslexia* 381

*Multilingualism* 382

*American Sign Language* 383

#### SUMMARY 10.2 384

### What Is Intelligence? 384

Assessing Intelligence 384

General and Specific Abilities 385

Emotional and Social Intelligence 387



Argosy Publishing, Inc.

**Psychology as a Hub Science** How Beliefs About Intelligence Impact Education 388

Biological Influences on Intelligence 389

*Brain Structure, Brain Activity, and Intelligence* 389

*Genetics and Intelligence* 390

**Connecting to Research** What Is Collective Intelligence? 390

Extremes of Intelligence 392

*Intellectual Disability* 392

*Giftedness and Genius* 394

**Thinking Scientifically** Can Children's IQ Scores Be Increased With Special Baby Videos? 394

**Interpersonal Relationships: The Cognitive Perspective** How Does Being a Maximizer or a Satisficer Affect Relationships? 396

Key Terms: The Language of Psychological Science 396

#### SUMMARY 10.3 397

# 11 The Developing Mind

## Life Span Development

### What Does It Mean to Develop? 400

Developmental Themes 400

*Nature and Nurture Intertwined* 400

*Continuity or Discontinuity* 402

*Universal or Ecological Development* 402

### How Do We Change Prenatally? 403

Genetic Risks to Development 405

Environmental Risks to Development 406

### What Can Newborns Do? 408

The Newborn's Reflexes 408

The Newborn's Activity 409

The Newborn's Senses 409

#### SUMMARY 11.1 411

### What Physical Changes Occur in Infancy and Childhood? 411

Nervous System Development 412

Motor Development 412

### How Does Cognition Change During Infancy and Childhood? 415

Jean Piaget's Theory of Cognitive Development 415

*The Sensorimotor Stage* 416

*The Preoperational Stage* 417

*The Concrete Operational Stage* 417

*The Formal Operational Stage* 417

*Criticisms of Jean Piaget's Theory* 418

Alternative Approaches to Cognitive Development 418

*Lev Vygotsky* 418

*Information Processing* 419

*Naïve Theories* 419

*Theory of Mind* 419

### How Do Social and Emotional Behaviors Change During Infancy and Childhood? 421

Temperament 421

Attachment 422

**Connecting to Research** The Evolution of Attachment Behavior 422

Parenting Styles 425

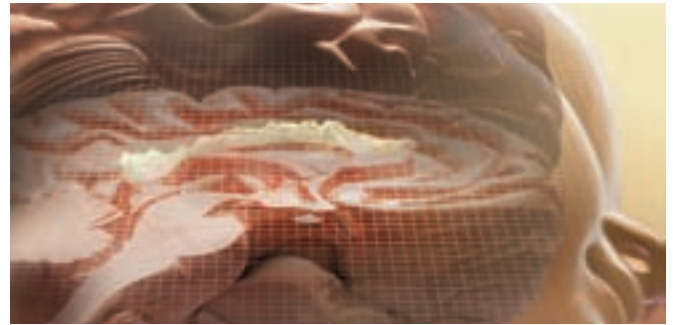
#### SUMMARY 11.2 428

### What Does It Mean to Be an Adolescent? 428

Physical Changes in Adolescence 429

*Sex and the Adolescent* 429

*The Adolescent Brain* 429



Argosy Publishing, Inc.

Cognitive and Moral Development in Adolescence 430

*Adolescent Cognition* 431

*Moral Reasoning* 431

Social and Emotional Development in Adolescence 432

*Identity Formation in Adolescence* 432

*The Benefits of Ethnic Identity* 433

*Family and Peer Influences* 433

### What Is It Like to Be a Young Adult? 435

Physical Status 435

Cognition in Young Adulthood: Postformal Thought 435

Relationships in Young Adulthood 436

**Thinking Scientifically** Are Millennials or Gen Yers More Narcissistic Than Previous Generations? 436

### What Happens During Midlife? 438

**Experiencing Psychology** What Type of Parent Might You Be? 438

Physical and Cognitive Aspects of Midlife 440

Social Changes in Midlife 440

### What Is Late Adulthood Like? 441

Physical Changes in Late Adulthood 441

Cognition in Late Adulthood 442

**Psychology as a Hub Science** Entertainment and the Aging Brain 442

Social and Emotional Aspects of Late Adulthood 443

**Interpersonal Relationships: The Developmental Perspective** How Do Age and Personality Interact to Predict Marital Satisfaction? 444

#### SUMMARY 11.3 445

Key Terms: The Language of Psychological Science 445

# 12 The Individual Mind

## Personality and the Self

What Is Personality?	449
Historical Approaches to Personality	450
How Do Psychodynamic Theories View Personality?	450
<i>The Id, Ego, and Superego</i>	450
<i>Freudian Defense Mechanisms</i>	451
<i>Psychosexual Stages of Development</i>	451
<i>Contemporary Assessments of Sigmund Freud's Approach</i>	451
<i>The Neo-Freudians</i>	452
Classic Behavioral Approaches to Personality	453
How Do Humanistic Psychologists Approach Personality?	454
How Do Trait Theories Explain Personality?	455
Early Trait Theories	456
The Big Five Theory	456
Experiencing Psychology	A Short Version of the Big Five Inventory 458
How Do Situations Affect Personality?	460
Social—Cognitive Learning Theories of Personality	460
<i>Locus of Control</i>	460
<i>Reciprocal Determinism and Self-Efficacy</i>	460
<i>If-Then Relationships</i>	461
What Are the Biological Bases of Personality?	461
Temperament and Personality	461
Genetics and Personality	462
Personality, Brain Structure, and Brain Function	463
The Evolution of Personality	464
How Can We Assess Personality?	465
Personality Inventories	466
Projective Tests	467
Thinking Scientifically	Evaluating the Validity and Reliability of Personality Tests 468
The Ethics of Personality Testing	469
SUMMARY 12.1	470



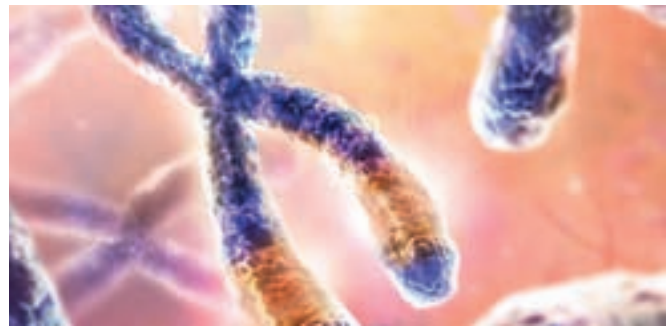
Argosy Publishing, Inc.

What Does It Mean to Have a Self?	471
Defining the Self	471
Self-Concept	471
Self-Awareness	472
<i>Sources of Self-Knowledge</i>	473
Self-Esteem	473
<i>Sources of Self-Esteem</i>	474
<i>Gender, Race, and Culture and Self-Esteem</i>	475
<i>Using Self-Enhancement to Protect Self-Esteem</i>	475
<i>The Advantages of Self-Esteem</i>	476
Psychology as a Hub Science	Self-Esteem, Academic Performance, and Juvenile Delinquency 478
Self-Regulation	479
The Brain and the Self	480
The Social Self	481
<i>The Interpersonal Self</i>	481
Connecting to Research	Effects of Culture on the Self Can Be Modified 482
<i>Cultural Influences on the Self</i>	483
Interpersonal Relationships: The Personality Perspective	How Does Personality Affect Attraction? 484
SUMMARY 12.2	486
Key Terms: The Language of Psychological Science	487

# 13 The Connected Mind

## Social Psychology

Why Are Humans So Social?	490
How Accurate Are First Impressions?	491
Why Did That Just Happen?	493
The Correspondence Bias and the Fundamental Attribution Error	493
Experiencing Psychology What Is Your Attributional Style?	494
Defensive Attributions	495
Connecting to Research Farming, Collectivism, and Individualism	496
Cultural Influences on Attribution	498
How Are Our Attitudes Influenced by Others?	499
Attitude Formation	499
Cognitive Dissonance	500
Why Does Persuasion Happen?	501
The Elaboration Likelihood Model	501
Routes to Persuasion	502
Psychology as a Hub Science Social Media and Persuasion	503
SUMMARY 13.1	505
Why Are We Prejudiced?	505
Sources of Prejudice and Stereotyping	505
Outcomes of Prejudice	507
Thinking Scientifically Does Working in Groups Affect Stereotype Threat?	508
Reducing Prejudice	510
Why Do We Go Along With the Group?	511
Conformity	511
Compliance	512
Obedience	514
The Power of One	516
How Do Groups Work Together?	516
Social Facilitation	516
Social Loafing	517
Deindividuation	517
Group Polarization	517
Groupthink	518
SUMMARY 13.2	519



Argosy Publishing, Inc.

How Well Do We Get Along With Others?	520
Attraction and Liking	520
Building Relationships	522
Maintaining Relationships	522
Ending Relationships	522
SUMMARY 13.3	523
Why Do We Cooperate in Some Situations and Compete in Others?	524
Competition and Cooperation in Animals	524
Individual Differences in Cooperation and Competition	525
The Influence of Culture on Competition and Cooperation	525
Choosing Between Cooperation and Competition	525
Altruism and Helping	526
Why Are We Aggressive?	528
The Biological Psychology of Aggression	528
Learning and Aggression	530
Preventing Aggression	530
Interpersonal Relationships: The Social Perspective What Do We Know About Marriages That Begin Online?	532
SUMMARY 13.4	533
Key Terms: The Language of Psychological Science	533

# 14 The Troubled Mind

## Psychological Disorders

What Does It Mean to Have a Psychological Disorder? 536

How Are Psychological Disorders Diagnosed? 539

What Do the Psychological Perspectives Tell Us About Disorders? 540

Which Disorders Emerge in Childhood? 541

Autism Spectrum Disorder 541

Causes of Autism Spectrum Disorder 542

Attention Deficit Hyperactivity Disorder 544

Causes of Attention Deficit Hyperactivity Disorder 545

**SUMMARY 14.1** 547

What Is Schizophrenia? 547

Symptoms of Schizophrenia 547

Causes of Schizophrenia 548

*Biological Factors in Schizophrenia* 548

**Experiencing Psychology** The Remote Associates

Test 548

*Environmental Factors in Schizophrenia* 550

What Is Bipolar Disorder? 552

What Is Major Depressive Disorder? 553

Prevalence of Major Depressive Disorder 553

Causes of Major Depressive Disorder 554

*Learning Explanations for Depression* 554

*Cognitive Explanations for Depression* 555

*Social Explanations for Depression* 555

**Connecting to Research** Recognition of Facial

Expression by People With Depression 556

*Biological Explanations for Depression* 557

**Thinking Scientifically** What Should We Do When We

Think Somebody Might Commit Suicide? 558

*Stress and Depression* 560

*Integrating the Perspectives* 560

**SUMMARY 14.2** 560

What Is an Anxiety Disorder? 561

Specific Phobias 561

Social Anxiety Disorder 562

Panic Disorder 563

*Biological Explanations for Panic Disorder* 563

*Cognitive Explanations for Panic Disorder* 563

*Social Explanations for Panic Disorder* 563

*Integrating the Perspectives* 564

Agoraphobia 564



Argosy Publishing, Inc.

Generalized Anxiety Disorder 564

*Biological Explanations for Generalized Anxiety Disorder* 564

*Cognitive Explanations for Generalized Anxiety Disorder* 564

*Social Explanations for Generalized Anxiety Disorder* 565

*Integrating the Perspectives* 565

Obsessive-Compulsive and Related Disorders 565

Obsessive-Compulsive Disorder (OCD) 565

*Biological Explanations for Obsessive-Compulsive Disorder* 566

*Learning Explanations for Obsessive-Compulsive Disorder* 566

*Social Explanations for Obsessive-Compulsive Disorder* 566

Body Dysmorphic Disorder 567

What Is Posttraumatic Stress Disorder? 567

Biological Explanations for Posttraumatic Stress Disorder 568

Learning Explanations for Posttraumatic Stress Disorder 569

Social and Cultural Explanations for Posttraumatic Stress Disorder 569

What Are Dissociative Disorders? 569

What Are Somatic Symptom and Related Disorders? 570

What Are Personality Disorders? 570

Antisocial Personality Disorder 571

*Causes of Antisocial Personality Disorder* 571

**Psychology as a Hub Science** The “Dark Side” of Leadership 572

Borderline Personality Disorder 573

*Causes of Borderline Personality Disorder* 573

**Interpersonal Relationships: The Clinical**

**Perspective** How Does PTSD Affect Families? 575

**SUMMARY 14.3** 576

Key Terms: The Language of Psychological Science 577

# 15 Healing the Troubled Mind Therapy

## How Do Psychologists Provide Therapy? 580

Approaches to Treatment 580

*Biological Approaches* 581

*Psychological Approaches* 582

*Evidence-Based Practice* 583

*Clinical Assessment* 583

The Therapists 584

Delivering Psychotherapy 586

*Variations in Length of Treatment* 586

*Alternatives to Individual Therapy* 587

*Innovative Delivery Systems* 588

Contemporary Challenges in Treatment 588

**SUMMARY 15.1** 589

## Historical Approaches to Psychotherapy 590

Psychoanalysis 590

Humanistic Therapies 591

## Contemporary Approaches to Psychotherapy 593

Behavioral Therapies 593

Cognitive Therapies 594

Biopsychosocial Approaches 595

## What Are Biological Therapies? 596

Medication 596

Electroconvulsive Therapy 596

Psychosurgery 596

Brain Stimulation 597

Neurofeedback 599

**SUMMARY 15.2** 599

## How Are Specific Disorders Treated? 600

Treating Neurodevelopmental Disorders 600

*Treating Autism Spectrum Disorder* 600

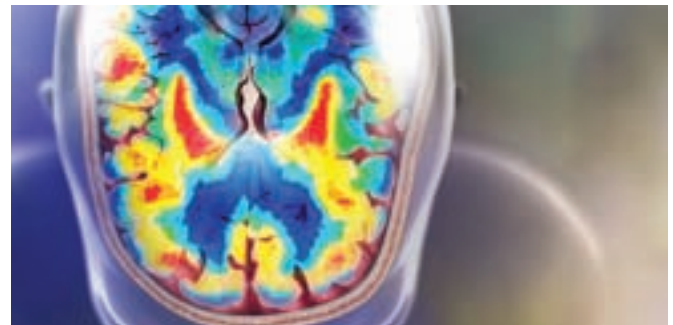
**Thinking Scientifically** Can Mobile Technologies Improve the Behavior of Individuals with Autism Spectrum Disorder? 600

*Treating Attention Deficit Hyperactivity Disorder* 602

Treating Schizophrenia 603

Treating Bipolar Disorder 605

Treating Major Depressive Disorder 607



Argosy Publishing, Inc.

**Connecting to Research** Mindfulness and the Prevention of Relapse in Major Depressive Disorder 609

Treating Anxiety Disorders 610

Treating Obsessive-Compulsive Disorder 611

**Experiencing Psychology** Progressive Relaxation 611

Treating Body Dysmorphic Disorder 612

Treating Posttraumatic Stress Disorder 612

**Psychology as a Hub Science** Using Virtual Reality to Treat Anxiety Disorders and Posttraumatic Stress Disorder 612

Treating Dissociative Identity Disorder 613

Treating Somatic Symptom Disorders 613

Treating Antisocial Personality Disorder 614

Treating Borderline Personality Disorder 614

Integration of Specific Treatments 614

**Interpersonal Relationships: The Treatment Perspective** Can Couples Therapy Help in Cases of Infidelity? 615

Key Terms: The Language of Psychological Science 616

**SUMMARY 15.3** 617

# 16 The Healthy Mind

## Stress and Coping, Health Psychology, and Positive Psychology

What Is Stress? 620

The Stress Response 620

Sources of Stress 622

What Are the Biological Correlates of Stress? 624

Stress and the Amygdala 625

Stress, the Sympathetic Adrenal–Medullary System, and the Hypothalamic–Pituitary–Adrenal Axis 626

Gender Differences in the Stress Response 627

Socioeconomic Status and Stress 628

The Epigenetics of Stress 628

How Does Stress Affect Our Health? 629

Stress and the Immune System 629

Stress and Heart Disease 630

**Connecting to Research** Social Challenges Early in Life Affect the Developing Immune System 630

Stress, Mood, Sleep, and Obesity 631

An Integrated View of Stress and Health 632

**Psychology as a Hub Science** Belongingness, Stress, Achievement, and Health 634

How Can We Cope Effectively With Stress? 635

Managing Stress 635

Three Types of Coping 637

Resilience: Individual Differences in Response to Stress 638

**SUMMARY 16.1** 639

What Is the Relationship Between Psychology and Health? 639

Behavior and Health 641

*Tobacco Use* 641

*Nutrition* 644

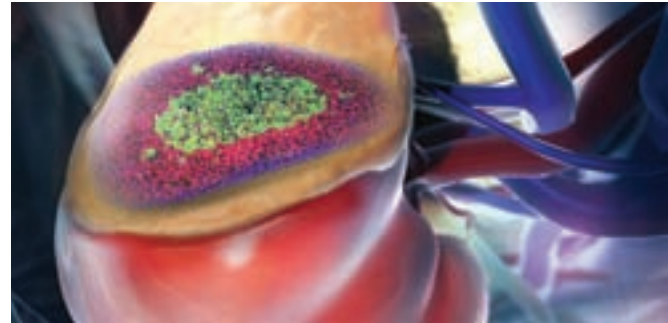
*Alcohol* 645

*Exercise* 647

Culture and Health 648

An Integrated Understanding of Health Behaviors 649

**SUMMARY 16.2** 651



Argosy Publishing, Inc.

What Is Positive Psychology? 651

Positive Emotions 652

*What Is Happiness?* 653

*Happiness and Marriage* 653

**Thinking Scientifically** Does Parenting Increase Happiness? 654

*Happiness and Wealth* 655

*Can We Increase Happiness?* 656

Positive Traits 657

**Experiencing Psychology** The Trait Hope Scale 658

Positive Institutions 660

Positive Psychology and the Future 661

**Interpersonal Relationships: The Health Psychology Perspective** How Do Investment and Experiences of Gratitude Affect Relationships? 661

**SUMMARY 16.3** 662

Key Terms: The Language of Psychological Science 662

---

References R-1

Name Index N-1

Subject Index/Glossary S-1

# Preface



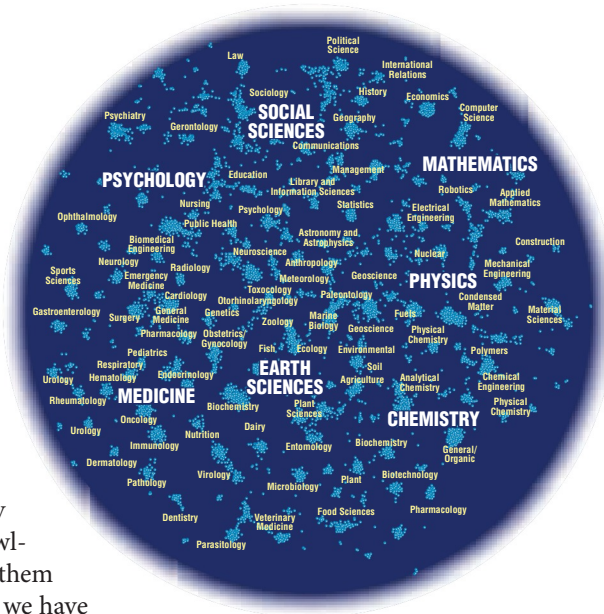
With *Discovering Psychology: The Science of Mind*, we sought to produce a textbook that reflects psychological science in the 21st century and psychology's rightful place as a hub science—a discipline whose work provides foundational material for many other scientific fields. Psychological science is also inherently interdisciplinary. In a scientific community increasingly dominated by interdisciplinary teams, we would like students to see psychology not as an isolated area of study but as one that integrates a range of knowledge into a true science of mind. These goals and our implementation of them resonated with both instructors and students using our first edition, and we have carried this mission forward into our second edition.

The science of psychology developed in the 20th century as a collection of loosely organized, independent subspecialties. Now in our second decade of the 21st century, the discipline is moving rapidly toward maturity as an integrative, multidisciplinary science. Not only are psychologists forming rich collaborations with scholars in other fields, from medicine to business to education to law, but we are returning to original conceptions of psychology put forward by thinkers such as William James, who sought a complete understanding of the human mind and was not content to view psychology from narrow, isolated perspectives. We share a mutual excitement about this evolution of psychological science and a mutual impatience with the slow pace at which existing introductory psychology textbooks—most of which were first written in the 20th century—have adjusted to this sea change.

For many years, the introductory psychology course has served primarily as a jumping-off point for advanced courses in the field, and the textbooks prepared to support the course have reflected this goal. Each chapter in these conventional textbooks provided a capsule of stand-alone information designed to acquaint the student with the terminology and hypotheses of a single psychological perspective. Human behavior is influenced by factors across multiple perspectives, however. We see our introductory textbook as providing a unique opportunity to discuss *all* of psychology in one place and at one time. This approach allows us to reflect on the intersections among various perspectives as they inform the whole of our understanding of the human mind. Given that most students in our introductory classes will only take this one course in the field, we have a responsibility to provide a comprehensive structure that will support their lifelong learning and understanding of human behavior.

Our goal is to engage our students in the fascinating, integrated discipline of psychological science as it exists in the 21st century, and we view the second edition of *Discovering Psychology: The Science of Mind* as another plank in the bridge toward this goal. The structure of the bridge is a traditional chapter organization. The piers on which the bridge rests are the foundational theories of the discipline developed in the late 19th, 20th, and early 21st centuries. The steel beams of which the bridge is composed consist of the theories and research painstakingly developed throughout the 20th and 21st centuries, and the rivets, trusses, and tie rods that hold the bridge together are integrative themes that have been reinvented in the past decade or so. Finally, the smooth roadbed that transports students across the bridge is a clear, inviting, warm, and lively writing style and visual narrative.

As active instructors in the introductory psychology classroom, we recognize the balance busy faculty members must find between their preparation for class and their many other duties. Our intent is to make the transition to a 21st-century textbook as seamless and effortless as possible for faculty and students alike. Our discussions of complex and emerging issues, such as epigenetics,



*We see the introductory course as providing a unique opportunity to discuss all of psychology in one place and at one time.*



include sufficient information and explanation to provide a sense of mastery. Clear writing, frequent examples, visual narratives, and engaging pedagogy energize students and provide the support needed for success. After completing the course, students will be able to appreciate the distinction between how laypeople and how psychologists think about human behavior.

As citizens of the 21st century, community leaders, and influencers, college graduates will need a firm foundation in the understanding of human behavior and critical thinking to confront successfully the myriad issues of privacy, genetic manipulation, free will, human dignity, health, and well-being that will face them in the future. This second edition of *Discovering Psychology: The Science of Mind* is designed to provide that foundation.

## Our Integrative and Functionalist Approach

Early writings about psychology were integrated and inclusive. Diverse elements of behavior were combined into the whole. William James (1890) cautions us about the risks of missing the big picture by breaking the phenomenon of mind into little pieces. Mental life for James was not an entity that can be “chopped up in bits” (p. 239). Despite the long-lived popularity of his dominant psychology textbook, James did not prevail. Psychology soon split into camps of scholars who viewed behavior and mental life through their own single, narrow perspectives, rarely speaking with those who held different views and producing curricula and textbooks that emphasized the parts rather than the whole. There are good reasons for specialization in science, but introductory psychology provides an opportunity to put these pieces back together. Doing so shows students how much our notions have changed regarding how the mind and behavior work and how much this understanding can improve their lives.

As psychological science became increasingly siloed in the 20th century, its origins in the late 19th century as a unified whole were forgotten. In 20th-century introductory psychology textbooks, the writings and experiments of Wilhelm Wundt, Edward Titchener, and James are described as the discipline’s prehensile tail, long ago lost and interesting only from a historical perspective. The organization of the study of mind into separate, disconnected chapters not only transformed the topics of psychology into islands without bridges but actually built barriers to students’ understanding of the connectedness among them. A memory cannot be fully understood from one isolated point of view; only when the social, cognitive, biological and evolutionary, developmental, clinical, and individual differences perspectives are combined can it be thoroughly grasped. James (1890, Vol. 1) warns us that when mental phenomena are “superficially considered, their variety and complexity is such as to leave a chaotic impression on the observer” (p. 1). This confusion, unfortunately, is the legacy for many of our students exposed only to outdated textbooks in psychology.

Breaking from the approach of other textbooks, we reflect throughout our text on the integrative influences of the founders in our functionalist approach to the material. We seek not only to describe behavior but also to answer questions about why a particular behavior occurs. Behavior through this lens is neither random nor unexplainable and shifts into focus when we consider its goals and functions. For example, people do not just experience feelings of loneliness; instead, loneliness acts as a warning signal to remind us of the importance of social connectedness.

Our book is subtitled *The Science of Mind*, and unlike other contemporary texts with their occasional references to *mind*, the word appears in each of the chapter titles, highlighting the scientific study of the nature and behavior of the theoretical construct of the mind. Throughout the book, we emphasize the relationship between rigorous scientific methods and observations, as well as the implications of these observations for competing theories about the structure and operations of the human mind.

*Integration in this textbook extends in two directions, both within psychology and between psychology and other disciplines. We hope to highlight for students the many connections within the discipline of psychology, as well as its connections with other disciplines.*

## Implementing the Goals of Integration

Many introductory psychology textbooks are marketed as “integrated,” but saying you are integrated and actually implementing integration are two different things. We have spent a great amount of time and effort discussing ways to provide a truly integrated presentation of the science of mind.

Integration in this textbook extends in two directions, both within psychology and between psychology and other disciplines. We hope to highlight for students the many connections within the discipline of psychology, as well as its connections with other disciplines. Many introductory psychology textbooks share our goal of providing integration, but we would like to make our methods of achieving this goal explicit.

1. Within the body of each chapter, we make frequent connections to material in other chapters, forming bridges that connect subtopics. In the electronic version of the textbook, these connections will be hyperlinked for the convenience of the reader. For example, in a discussion of the causes of anxiety disorders in our chapter on psychological disorders (Chapter 14), we say:

A reasonable place to start looking for correlates of anxiety in brain structure and function is the fear circuit involving the amygdala, which we discussed in Chapters 4 and 7. The amygdala is particularly rich in receptors for GABA, a neurotransmitter that inhibits brain activity. As discussed in Chapter 6, drugs such as alcohol and the benzodiazepine tranquilizers (e.g., Valium) have their main anxiety-reducing effects at these GABA receptors.
2. We use frequent examples from other parts of the discipline to illustrate principles within a chapter. For example, when we discuss latent inhibition in our chapter on learning (Chapter 8), we illustrate that principle by linking to clinical research about latent inhibition, creativity, and schizophrenia and to social psychology research on prejudice.
3. We specifically identify and explore six integrative perspectives that weave the standard topics more closely together: **social psychology, cognition, biology and evolution, development, individual differences and personality, and clinical psychology**. In keeping with the standard organization of introductory psychology textbooks, the fundamentals of these perspectives are covered in distinct chapters, but the threads of each perspective are woven into all chapters. These perspectives are explained in greater detail in the following section.
4. Each chapter includes six features, which are described in more detail in a later section: **Chapter Opener, Psychology as a Hub Science, Experiencing Psychology, Thinking Scientifically, Connecting to Research, and Perspectives on Interpersonal Relationships**. These features are designed to promote active learning and to increase student interest. Three of these in particular (Chapter Opener, Perspectives on Interpersonal Relationships and Psychology as a Hub Science) also contribute to our integrative approach. In the chapter openers, we show how multiple psychological perspectives address a phenomenon by zooming in to see the biological approach and then zooming out again to gain insight from the developmental, cognitive, individual difference, social, and clinical perspectives. Each Perspectives on Interpersonal Relationships feature shows how a particular perspective views questions about successful relationships, so by the end of the textbook, the student can see how integrating 16 approaches to a single issue enriches our understanding of a psychological phenomenon. The Psychology as a Hub Science features address the larger integration picture of where psychology stands in the context of the scientific community.

## Integrative Features in Detail

Extensive literature supports the idea that an engaged and cognitively active student is more likely to master content. Although students are accustomed to textbooks, their approaches to learning have been affected by technologies that transfer information at an ever-increasing pace, with a strong emphasis on rapidly presented visual images. Consequently, it becomes all

too easy to go through the motions of reading a text without really thinking about what they have read. We have incorporated six features designed to model good textbook-reading practices in students while maintaining a high level of interest and understanding.

**Chapter Opener** To introduce and engage interest in upcoming chapter material, many textbooks use a vignette or case study, accompanied by either a fine art piece or a photo that is not discussed further. We begin each chapter with a combination of two images—one gives the big picture, and the other gives the microview of the same topic. The chapter opener guides the student through the significance of the images. We use the terms *zoom in* and *zoom out* to emphasize the need to understand the underpinnings of a psychological phenomenon without losing the impact of its larger context. For example, in the biological psychology chapter (Chapter 4), the opening images show a woman watching two friends (zoom out) and a beautiful image of a white blood cell exiting bone marrow (zoom in). Does the woman feel like part of a group of friends or does she feel left out? Depending on how she perceives her social situation, biological cascades are set in motion that prepare her immune system for fighting either the viruses found in close social contact or the bacteria that might be more of a risk when a person is solitary. The reader is drawn into the reciprocal relationships that exist between biology and behavior.

*The integrative Hub feature broadens the discussion of a psychological topic to include ways in which it is engaged in cooperative science with other disciplines, from medicine to the social sciences.*

**Psychology as a Hub Science** In our first edition, this Hub feature was located in its own box, but we feel so strongly about its importance and so concerned about students skipping boxes that we have given this material a new home within the narrative of the chapter. This integrative feature broadens the discussion of a psychological topic to include ways in which psychology engages in cooperative science with other disciplines, from medicine to the social sciences. It is accompanied by a graphic adapted from a citation analysis by Boyack, Klavans, and Börner (2005) that shows psychology citations as nodes with connections to other related disciplines. Tailored to each of the 16 features, this graphic highlights the connections between psychology and the relevant disciplines of psychiatry, nursing, public health, emergency medicine, pharmacology, computer science, law, education, management, and the other social sciences. Given these connections, psychology has a central role to play in our efforts to deal with economic collapses, the spread of pandemics, energy conservation, the spread of terrorism, rising health care costs, and our crumbling educational system. For example, cardiovascular disease is surely a medical condition, but contemporary scientists recognize that a full understanding of this killer requires consideration of psychological domains, including stress appraisal, reactivity to stressors, individual resilience, and a person's social context. Seeing the impact of psychology on many disciplines makes the introductory course relevant for students of all majors, as well as rekindling some "psych pride" in those of us in the field.

**Experiencing Psychology** This interactive feature provides ways for students to connect the course material to their own lives and interests. Some hands-on examples are the Epworth Sleepiness Scale in the consciousness chapter (Chapter 6), Coren's handedness scale in the biological psychology chapter (Chapter 4), the BFI-10 personality test in the chapter on personality and the self (Chapter 12), and Anderson and Dill's video game violence and aggression instruments in the research methods chapter (Chapter 2). In other cases, this feature provides longer-term opportunities for students to apply their learning, such as working to reduce the frequency of a bad habit (Chapter 8).

**Thinking Scientifically** This interactive feature models critical thinking skills for students by providing them with opportunities to critique the progress of science. For example, in the chapter on research methods (Chapter 2), students are guided through five steps of critical thinking while evaluating data about the effects of Facebook use on well-being as reported in the popular press. In the chapter on psychological treatments (Chapter 15), students are asked to evaluate the use of mobile technologies to help children with autism spectrum disorder.

**Connecting to Research** To emphasize psychology as a science, this feature explores either a classic or a contemporary study relevant to the chapter's material and comments on its

significance to the field. Sections on the question, methods, results, and conclusions provide a guided introduction for the student to the essentials of the peer-reviewed literature. From Wundt's classic studies of reaction time, to the discovery of mirror neurons, to distinctions between romantic love and lust in the brain, students are given insight into what psychological scientists do.

**Perspectives on Interpersonal Relationships** In keeping with the integrative mission of this textbook, the goal of this feature is to demonstrate how the information in a particular chapter can be applied to a single topic—building and maintaining important relationships. This issue is personally meaningful to college students, especially first-year students, and it applies across the board—regardless of gender, race, age, ethnicity, sociocultural background, sexual orientation, or level of academic preparation. The feature has two main purposes: (1) to engage and maintain student interest throughout the text and (2) to stitch together into an integrative, thematic quilt the patchwork of traditional introductory psychology topic areas.

## Integrative Perspectives in Detail

The separate perspectives taken by psychologists are reviewed for students in the context of the historical discussion in Chapter 1. In each subsequent chapter, we pay especially close attention to the contributions of each of the following perspectives to the topic at hand.

**Social** English writer and poet John Donne was correct in stating that “no man is an island.” The cultural differences that are increasingly apparent as we become a more global world are a testament to how strongly social structures and processes affect the operation of factors from other perspectives. We are a social species, and much of our behavior can be understood in terms of how it maintains our social relatedness with one another. The consequences of failing to maintain connectedness are severe. For example, chronic feelings of social isolation are associated with poor mental and physical health and premature mortality, and longitudinal studies in humans and experimental studies in animals indicate that perceived isolation contributes to these outcomes. In short, feeling left out can be toxic.

**Cognitive** The human is above all else a thinking organism, and the way we process information affects our behavior. Whether we are considering the development of behavior, learned behavior, or the aberrations of behavior that accompany psychological disorders, an understanding of how we think provides considerable insight. For example, we understand that an effective way to improve depressed people's moods is to help them restructure the way they process information. Instead of students' thinking that flunking an exam means they are not good enough to attend college, we can encourage them to think that although flunking an exam isn't fun, it's not the end of the world and they can make some changes that will lead to better performance next time.

**Biological and Evolutionary** We believe that all introductory psychology students, even those who will never take another psychology course, will gain a better understanding of contemporary psychology in the context of the relationships between biological processes and behavior. For example, when we discuss attraction and close relationships, we mention data showing that viewing a photograph of somebody we love, as opposed to somebody we like, activates the brain's reward circuits and decreases activity in areas associated with social judgment. Love not only is somewhat socially blind but really does feel good. Throughout the textbook, we stress the role of evolutionary pressures in shaping both the structures and the functions of the mind. We devote a complete chapter to providing students with a foundation for understanding the interactions between genes and environment, including a basic primer on epigenetics. The importance of gene–environment interactions is woven throughout our discussion of development, but it is also highlighted in other contexts, including discussions of children's responses to being bullied.

**Developmental** The structures and processes of behavior, as well as behavior itself, change over time. Knowing that most children achieve a theory of mind by the age of 4 years not only

is relevant to our understanding of children and their behavior but also informs discussions of the development of language and social skills and the deficits found in individuals with autism spectrum disorder. The importance of the developmental perspective does not end in childhood either. January 1, 2011, marked the date at which the oldest of the baby boomers turn 65. From that date, about 10,000 people will turn 65 every day for the next 19 years. As a result of these demographic changes, the percentage of the U.S. population whose social role is retiree is projected to increase dramatically in the coming decades. Understanding developmental changes across the life span is therefore increasingly important.

**Individual Differences and Personality** Behavioral systems are particularly prone to variation, and we illustrate how such variation can be regarded as a source of important data in its own right. In addition to exploring individual differences within the context of personality, we integrate this facet with other perspectives. For example, we discuss how individual differences in responses to stress are best understood by considering epigenetics, learning, and social factors.

**Clinical** We can understand behavior by observing what works, but it is also highly useful to see what happens when things go wrong. Just as the neuroscientist learns about normal brain function by observing changes following the damage caused by a stroke, we can learn much about behavior by observing how it changes because of a psychological disorder. For example, we consider the effects of schizophrenia on classical conditioning in the chapter on learning (Chapter 8).

## Delivering Complex Content to Contemporary Learners

We were delighted to see that our first edition was embraced by faculty working with students representing a wide range of preparation, from the community colleges to the elite, private universities, as well as by international faculty teaching students with first languages other than English. Our teaching philosophy rejects the common construct of textbook “level.” Instead, we believe that all students can master complex content if it is presented in the right way.

### Student-Friendly Writing and Pedagogy

Our goal in writing this textbook is to provide students with the best science possible, which means that we do not avoid complex topics or dumb down the material. To make psychological science accessible to a wide range of students, we rely on a student-friendly writing style with supportive pedagogy. We break chapters into meaningful chunks, and we use thumbnail images of chapter photos and figures in our summary tables as a mnemonic device students can use to recall where they read about a topic. Margin definitions and carefully selected key terms help the students focus their learning.

One of our reviewers had this to say about the first chapter of our textbook, which can be one of the most difficult to write: “I am impressed with the History of Psychology chapter in Cacioppo/Freberg. The figures, timeline, interesting AND relevant pictures, and examples throughout the text are fantastic and engaging. It is one of the best history/intro chapters I’ve read.” This reviewer also noticed another one of our goals—to use all photos and figures as teachable moments, not just repetitions of the narrative or pretty placeholders.

### Implementation of Guidelines for “Inclusive Psychology”

Today’s college and university students represent a wide range of diverse demographic variables, and these variables should be reflected thoughtfully in the textbooks they read. On

behalf of the American Psychological Association, Trimble, Stevenson, and Worell (2003) provided considerable guidance to textbook authors and publishers regarding opportunities for including diversity content in an introductory psychology textbook. They focus on the following types of diversity: age, culture, race/ethnicity, gender, disability, language, and sexual orientation. We have used their paper as a blueprint for incorporating the dimension of diversity in our textbook.

We adamantly concur with Trimble et al. (2003) when they state that “Culture, race/ethnicity, gender, disability, sexual orientation, language, and age can be integrated into the main text of every textbook chapter. Highlighting these issues only in special sections or boxes fosters the continued marginalization of members of nondominant groups” (p. 2). Instead of separating diversity from the text into “boxes,” we incorporate diversity issues seamlessly throughout the narrative and in illustrations and examples. For example, while we note that Roland Fryer was the youngest African-American professor to obtain tenure at Harvard University, we do so in the context of how his childhood and youth shaped his approaches to educational incentives within a discussion of motivation.

Trimble et al. (2003) provide extensive, detailed suggestions for specific content, such as inclusion of stereotype threat and gender and cultural issues in eating disorders, that we have found useful. For interested faculty and students, we have a comprehensive, separate document with chapter and page references indicating how we have implemented these recommendations. Please feel free to email [lfreberg@calpoly.edu](mailto:lfreberg@calpoly.edu) to obtain a copy.

In addition, great care has been taken to adhere to American Psychological Association standards on language. Illustrations feature individuals of diverse races, ethnicities, ages, abilities, and gender. Illustrations, when possible, show people in a positive light (e.g., no sad older adults feeding pigeons) and avoid traditional depictions (e.g., male therapist helping female client). Large numbers of illustrations feature cross-cultural examples. Cross-cultural research is featured whenever possible, such as global studies of subjective well-being.

## MindTap

MindTap for *Discovering Psychology: The Science of Mind* creates a unique learning path that fosters increased comprehension and efficiency. It engages students and empowers them to produce their best work—consistently. In MindTap, course material is seamlessly integrated with videos, activities, apps, and more.

For students:

- MindTap delivers real-world relevance with activities and assignments designed to help students build critical thinking and analytical skills that can be applied to other courses and to their professional lives.
- MindTap serves as a single destination for all course materials so that students can stay organized and efficient and have the necessary tools to master the content.
- MindTap shows students where they stand at all times—both individually and compared to the highest performers in the class. This information helps to motivate and empower performance.

In MindTap, instructors can do the following:

- **Control the content.** Instructors select what students see and when they see it.
- **Create a unique learning path.** In MindTap, the *Discovering Psychology: The Science of Mind* text is enhanced with multimedia and activities to encourage and motivate learning and retention, moving students up the learning taxonomy. Materials can be used as is or modified to match an instructor’s syllabus.
- **Integrate their own content.** Instructors can modify the MindTap Reader using their own documents or pulling from sources like RSS feeds, YouTube videos, websites, Google Docs, and more.
- **Follow student progress.** Powerful analytics and reports provide a snapshot of class progress, time students spend logging into the course, and completion to help instructors assess level of engagement and identify problem areas.

# Changes in the Second Edition

Progress in psychological science continues to move forward at a blistering pace, and this second edition has been updated to include many new photos and figures and several hundred new references that reflect the advances in the field since the last edition went to press. One of the biggest content changes was the integration of the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*, which we were only able to preview based on online information when our first edition went to press. In this second edition, all terminology changes and the ordering and categorizing of our discussion of psychological disorders have been modified to be consistent with the *DSM-5*.

We have responded to feedback from our adopters and our own experiences using the textbook in our classrooms to make a few structural changes. The Hub and Interpersonal Relationships features are now more tightly woven into the narrative. We did not want the students to skip these important integrative features, and we wished to avoid interruptions in the flow of the chapter's ideas. We simplified the learning objectives for each chapter while maintaining our commitment to Benjamin Bloom's taxonomy. As mentioned previously, the electronic version of the textbook will provide hyperlinks to relevant sections in other chapters to enhance integration. This experience will make the textbook consistent with the way today's students are accustomed to searching for information.

A sample of the content updates and revisions to each chapter include the following:

## Chapter 1 The Science of Mind: The Discipline of Psychology

- Updated information about careers in psychology and related fields
- Included a description of the first official psychology experiment by Wilhelm Wundt
- Added an Experiencing Psychology activity that allows the reader to replicate reaction time experiments in the tradition of Hermann von Helmholtz and Wundt
- Streamlined discussions of psychology's roots in philosophy and the natural sciences

## Chapter 2 The Measure of Mind: Methods of Psychology

- Expanded discussions of populations and sampling, commercial online survey services, operationalization of variables, measurement, generalization, and the importance of using multiple methods
- Updated with brief descriptions of "new" statistics, including estimation and confidence intervals
- Refreshed Thinking Scientifically feature using a study on the effects of Facebook participation on well-being

## Chapter 3 The Evolving Mind: Nature and Nurture Intertwined

- Expanded and updated discussion of epigenetics
- Expanded discussion of origins of social behavior
- Updated with discussions of the use of genetic profiles by online dating services and controversies surrounding the cycle shift hypothesis

## Chapter 4 The Biological Mind: The Physical Basis of Behavior

- Reordered topics to move from the macro level of structures to the micro level of the neuron

- Expanded discussion of the contributions of Santiago Ramón y Cajal
- Updated findings regarding the role of the anterior cingulate cortex in emotional pain
- Updated findings regarding the white matter damage experienced by Phineas Gage
- Added section on the enteric nervous system
- Updated Interpersonal Relationships feature with discussion of new research on lust, love, and the insula

## Chapter 5 The Perceiving Mind: Sensation and Perception

- Clarified the processing of the visual field by each hemisphere
- Added illustration demonstrating the McGurk effect
- Updated with research demonstrating the ability to sense carbohydrates in the mouth

## Chapter 6 The Aware Mind: Elements of Consciousness

- Updated with discussion of the default mode network and its relationship to unfocused and autobiographical thought, daydreaming, and dreaming during sleep
- Updated to include gamma band waves during waking
- Expanded discussion of lucid dreaming
- Adjusted discussion of sleep–wake disorders to reflect changes in the *DSM-5*
- Expanded and updated discussions of addiction, meditation, and mindfulness

## Chapter 7 The Feeling Mind: Motivation and Emotion

- Added discussion of binge-eating disorder category introduced in the *DSM-5*
- Updated and expanded discussion of achievement motivation
- Added discussion of approach and avoidance to section on motivational priorities
- Added discussion of emotions as discrete or continuous
- Updated information about the role of the anterior cingulate cortex in emotion
- Expanded discussion of appraisal theories of emotion
- Refreshed Experiencing Psychology feature with an excellence motivation instrument

## Chapter 8 The Adaptive Mind: Learning

- Refreshed Hub feature with discussion of the use of taste aversion to save the endangered Mexican wolf
- Updated discussion of mirror neuron systems

## Chapter 9 The Knowing Mind: Memory

- Revised discussion of encoding
- Updated sections on brain correlates of stages of memory
- Added discussions of hyperthymesia and reconsolidation
- Updated discussion of the effects of emotion on memory
- Updated sections on biochemistry and memory and sleep and memory
- Refreshed Thinking Scientifically feature with discussion of our ability to erase traumatic memories
- Refreshed Connecting to Research feature with discussion of caffeine's effects on memory

## Chapter 10 The Thinking Mind: Thinking, Language, and Intelligence

- Expanded section on problem solving to include well-defined and ill-defined problems



- Expanded discussion of the importance of understanding probability to problem solving
- Updated discussion of the brain correlates of decision making
- Expanded discussion of the importance of gesture to language
- Updated discussion of the benefits of multilingualism
- Updated discussion of IQ testing and motivational factors leading to success in mathematics
- Refreshed Hub feature with discussion of how beliefs about intelligence influence educational strategies and outcomes
- Updated section on intellectual disability to reflect changes made in the *DSM-5*

## Chapter 11 The Developing Mind: Life Span Development

- Updated debate about the endpoint of adolescence
- Expanded discussion of peer influences in adolescence
- Refreshed Thinking Scientifically feature with discussion of whether millennials are more narcissistic than previous generations
- Refreshed Experiencing Psychology feature with parenting type instrument

## Chapter 12 The Individual Mind: Personality and the Self

- Updated section on brain correlates of personality to include behavioral approach, fight–flight–freeze system, and behavioral inhibition systems
- Expanded discussion of self-report and personality inventories
- Updated discussion of the depletion effect in self-regulation
- Incorporated discussion of the default mode network in thinking about the self
- Refreshed Thinking Scientifically feature by reviewing criticisms of the reliability and validity of the Myers–Briggs Type Indicator

## Chapter 13 The Connected Mind: Social Psychology

- Provided additional clarification about the distinction between the correspondence bias and the fundamental attribution error
- Updated discussion of Milgram experiments with more detail from Jerry Burger’s replications
- Updated discussion of groupthink
- Updated discussion of aggression
- Refreshed Interpersonal Relationships feature with discussion of marriages that begin online
- Refreshed Thinking Scientifically feature with discussion of the effects of stereotype threat on people working in groups

## Chapter 14 The Troubled Mind: Psychological Disorders

- Reordered chapter outline to reflect ordering and groupings of disorders in the *DSM-5*
- Updated all terminology, groupings, and diagnostic criteria to reflect changes made in the *DSM-5*
- Updated information about causal factors and biological correlates, especially for autism spectrum disorder and bipolar disorder
- Updated information about genetic similarities found in schizophrenia, bipolar disorder, and autism spectrum disorder and the implications of these types of results for the organization of the *DSM-5*
- Updated information about the causes of posttraumatic stress disorder

## Chapter 15 Healing the Troubled Mind: Therapy

- Reordered chapter outline to reflect ordering in the *DSM-5*
- Updated information about applied behavior analysis particularly in the treatment of autism spectrum disorder
- Refreshed Experiencing Psychology feature with a progressive relaxation exercise
- Refreshed Connecting to Research feature with discussion of the use of mindfulness to prevent relapse in patients with major depressive disorder
- Refreshed Thinking Scientifically feature with discussion of the use of mobile technologies to aid children with autism spectrum disorder

## Chapter 16 The Healthy Mind: Stress and Coping, Health Psychology, and Positive Psychology

- Added section on socioeconomic status and disparities in stress and health, including the potential impact of the Affordable Care Act
- Expanded managing stress section to include mindfulness and meditation
- Updated statistics related to alcohol use, tobacco use, and diet
- Refreshed Interpersonal Relationships feature with discussion of gratitude for a partner's investment in the relationship
- Refreshed Connecting to Research feature with discussion of the effects of early childhood stress on the immune system
- Refreshed Thinking Scientifically feature with discussion of the effects of being a parent on happiness

# Acknowledgments

We thank William James for bringing so many disparate threads of scholarship together to form the backbone of what continues to be the study of psychology.

## Cengage Learning Team

We are grateful to our Cengage Learning team. Jon-David Hague shared our vision for this textbook from the outset and went many extra miles to make it a reality. Clay Austin, Michelle Newhart, Jennifer Wahi (Art), Jasmin Tokatlian, Kyra Kane, Michelle Clark, Cassie Carey, Carly Bergey, and Brittani Morgan gave us their full support through each step of the process. We also thank Michelle Shiota of Arizona State University and instructional designer Jan Johnson.

## Manuscript Reviewers

The current edition builds on contributions from reviewers from the first edition. We would also like to acknowledge our colleagues who reviewed early drafts of the first edition manuscript. Their suggestions helped to make this a better book.

### *First Edition Full Manuscript Reviewers*

John Allen, *University of Arizona*

Ted Barker, *Northwest Florida State College*

Mark Basham, *Regis University*

Kyle Baumbauer, *Texas A&M University*

Kathy Becker-Blease, *Oregon State University*

Rachel Blaser, *University of San Diego*

Christina M. Brown, *Saint Louis University*

Eric Bruns, *Campbellsville University*

Kathryn Caldwell, *Ithaca College*

Aimee A. Callender, *Auburn University*  
David Campbell, *Humboldt State University*  
Brian D. Carpenter, *Washington University, St. Louis*  
Lawrence Cohen, *University of Delaware*  
Brian Cowley, *Park University*  
Verne Cox, *University of Texas, Arlington*  
Natalie Dautovich, *University of Alabama*  
Robert DuBois, *Waukesha County Technical College*  
Kimberly Duff, *Cerritos College*  
Darlene Earley, *Southern Union State Community College*  
Kathy Erickson, *Pima Community College*  
Carlos Escoto, *Eastern Connecticut State University*  
Kendall Eskine, *Loyola University New Orleans*  
Melanie Evans, *Eastern Connecticut State University*  
Stephen L. Forssell, *George Washington University*  
Debra Lynn Frame, *University of Cincinnati*  
Andrea Friedrich, *University of Kentucky*  
Perry Fuchs, *University of Texas, Arlington*  
Philip Gable, *University of Alabama*  
Bridgett Galvin, *Framingham State College*  
Deborah Garfin, *Georgia State University*  
Bryan Gibson, *Central Michigan University*  
Allen Gorman, *Angelo State University*  
Ruth Grahn, *Connecticut College*  
Ruth M. Grant, *Sacred Heart University*  
Anthony Greene, *University of Wisconsin, Milwaukee*  
Christina Grimes, *Duke University*  
Scott Gustafson, *University of Mississippi*  
Erin E. Hardin, *Texas Tech University*  
Robert J. Hines, *University of Arkansas, Little Rock*  
Linda Jackson, *Michigan State University*  
Irene P. Kan, *Villanova University*  
Craig Kinsley, *University of Richmond*  
Megan L. Knowles, *Franklin and Marshall College*  
Jordan Labouff, *Baylor University*  
Carrie Lane, *Florida State University*  
Jennifer Lee, *Cabrillo College*  
Fabio Leite, *Ohio State University, Lima*  
Robin Lightner, *University of Cincinnati*  
Christine Lofgren, *University of California, Irvine*  
Nicolette Lopez, *University of Texas, Arlington*  
David Malcolm, *Fordham University*  
Michael Mangan, *University of New Hampshire*  
Abigail Marsh, *Georgetown University*  
Anna Medina, *Gonzaga University*  
Sean P. Meegan, *University of Utah*  
Antoinette Miller, *Clayton State University*  
Robin K. Morgan, *Indiana University Southeast*  
Hajime Otani, *Central Michigan University*  
Marion Perlmutter, *University of Michigan, Ann Arbor*  
Gabriel Radvansky, *University of Notre Dame*  
Cynthia Reidi, *Morrisville State College*  
Ann E. Renken, *University of Southern California*  
Heather J. Rice, *Washington University, St. Louis*  
Michael Roberts, *DePauw University*  
Catherine Sanderson, *Amherst College*  
Patrick Saxe, *State University of New York, New Paltz*

Luis Schettino, *Lafayette College*  
David Schroeder, *University of Arkansas*  
Dennis Shaffer, *Ohio State University, Mansfield*  
Donald Sharpe, *University of Regina*  
Mikle Don South, *Brigham Young University*  
Brian Thomas, *Baldwin-Wallace College*  
Lisa Thomassen, *Indiana University, Bloomington*  
Anre Venter, *University of Notre Dame*  
Craig Vickio, *Bowling Green State University*  
Mark Walter, *Salisbury University*  
Shannon Welch, *University of Idaho*  
John Wright, *Washington State University*  
Erin Young, *Texas A&M University*

### **First Edition Focus Group Reviewers**

Judith Addelston, *Valencia College, East*  
Anthony Ahrens, *American University*  
Roxanna Andersen, *Palm Beach State College, Boca Raton*  
Stacy Anderson, *Florida Gulf Coast University*  
Richard Bernstein, *Broward College, South*  
Kathleen Bey, *Palm Beach State College, Lake Worth*  
Sara Broaders, *Northwestern University*  
John Timothy Cannon, *University of Scranton*  
John Connor, *Daytona State College*  
David Seth Crystal, *Georgetown University*  
Jennifer Engler, *York College of Pennsylvania*  
Gregory Harris, *Polk State College*  
Jeffrey Henriques, *University of Wisconsin, Madison*  
Jennifer Johnson, *Bloomsberg University*  
Todd Joseph, *Hillsborough Community College, Dale Mabry*  
Irene Kan, *Villanova University*  
Kevin Keating, *Broward College, North*  
Cheri Kittrell, *State College of Florida, Manatee-Sarasota*  
Debra Laino, *Philadelphia University*  
Natalie Lawrence, *James Madison University*  
Daniel McConnell, *University of Central Florida*  
Ronald Morrison, *Daytona State College*  
Kevin O'Neil, *Florida Gulf Coast University*  
Gwendolyn Parsons-Spurrier, *Hillsborough Community College, Ybor City*  
Lois Pasapane, *Palm Beach State College, Lake Worth*  
Ronnie Rothschild, *Broward College, Central*  
Sharleen Sakai, *Michigan State University*  
Alex Sharpe, *Santa Fe College*  
Caroline Shelton-Toney, *Polk State College*  
William Suits, *Seminole State College of Florida*  
Cyril Svoboda, *University of Maryland University College*  
Clarissa Thompson, *University of Oklahoma*  
Terry Trepper, *Purdue University, Calumet*  
Katherine Urquhart, *Lake Sumter Community College*  
Lona Whitmarsh, *Fairleigh Dickinson University*  
We thank our colleagues for their diligent and thoughtful readings of our textbook.

### **Manuscript Reviewers (First Edition)**

John Allen, *University of Arizona*  
Ted Barker, *Northwest Florida State College*  
Mark Basham, *Regis University*  
Kyle Baumbauer, *Texas A&M University*

Kathy Becker-Blease, *Oregon State University*  
Rachel Blaser, *University of San Diego*  
Christina M. Brown, *Saint Louis University*  
Eric Bruns, *Campbellsville University*  
Kathryn Caldwell, *Ithaca College*  
Aimee A. Callender, *Auburn University*  
David Campbell, *Humboldt State University*  
Brian D. Carpenter, *Washington University, St. Louis*  
Lawrence Cohen, *University of Delaware*  
Brian Cowley, *Park University*  
Verne Cox, *University of Texas, Arlington*  
Natalie Dautovich, *University of Alabama*  
Robert DuBois, *Waukesha County Technical College*  
Kimberly Duff, *Cerritos College*  
Darlene Earley, *Southern Union State Community College*  
Kathy Erickson, *Pima Community College*  
Carlos Escoto, *Eastern Connecticut State University*  
Kendall Eskine, *Loyola University, New Orleans*  
Melanie Evans, *Eastern Connecticut State University*  
Debra Lynn Frame, *University of Cincinnati*  
Andrea Friedrich, *University of Kentucky*  
Stephen L. Forssell, *George Washington University*  
Perry Fuchs, *University of Texas, Arlington*  
Philip Gable, *University of Alabama*  
Bridgett Galvin, *Framingham State College*  
Deborah Garfin, *Georgia State University*  
Bryan Gibson, *Central Michigan University*  
Allen Gorman, *Angelo State University*  
Ruth Grahn, *Connecticut College*  
Ruth M. Grant, *Sacred Heart University*  
Anthony Greene, *University of Wisconsin, Milwaukee*  
Christina Grimes, *Duke University*  
Scott Gustafson, *University of Mississippi*  
Erin E. Hardin, *Texas Tech University*  
Robert J. Hines, *University of Arkansas, Little Rock*  
Linda Jackson, *Michigan State University*  
Irene P. Kan, *Villanova University*  
Craig Kinsley, *University of Richmond*  
Megan L. Knowles, *Franklin and Marshall College*  
Jordan Labouff, *Baylor University*  
Carrie Lane, *Florida State University*  
Jennifer Lee, *Cabrillo College*  
Fabio Leite, *Ohio State University, Lima*  
Robin Lightner, *University of Cincinnati*  
Christine Lofgren, *University of California, Irvine*  
Nicolette Lopez, *University of Texas, Arlington*  
David Malcolm, *Fordham University*  
Michael Mangan, *University of New Hampshire*  
Abigail Marsh, *Georgetown University*  
Anna Medina, *Gonzaga University*  
Sean P. Meegan, *University of Utah*  
Antoinette Miller, *Clayton State University*  
Robin K. Morgan, *Indiana University, Southeast*  
Hajime Otani, *Central Michigan University*  
Marion Perlmutter, *University of Michigan, Ann Arbor*  
Gabriel Radvansky, *University of Notre Dame*  
Cynthia Reidi, *Morrisville State College*

Ann E. Renken, *University of Southern California*  
Heather J. Rice, *Washington University, St. Louis*  
Michael Roberts, *DePauw University*  
Catherine Sanderson, *Amherst College*  
Patrick Saxe, *State University of New York, New Paltz*  
Luis Schettino, *Lafayette College*  
David Schroeder, *University of Arkansas*  
Dennis Shaffer, *Ohio State University, Mansfield*  
Donald Sharpe, *University of Regina*  
Mikle Don South, *Brigham Young University*  
Brian Thomas, *Baldwin-Wallace College*  
Lisa Thomassen, *Indiana University, Bloomington*  
Anre Venter, *University of Notre Dame*  
Craig Vickio, *Bowling Green State University*  
Mark Walter, *Salisbury University*  
Shannon Welch, *University of Idaho*  
John Wright, *Washington State University*  
Erin Young, *Texas A&M University*

### **Manuscript Reviewers (Second Edition)**

Kristen T. Begosh, *University of Delaware*  
Melissa A. Berry, *University of Dayton*  
Kathleen Bey, *University of Delaware*  
Amy Biegel, *Huntington University*  
William O. Boggan, *College of Charleston*  
Lauren Brewer, *College of Idaho*  
Kyle Evan Conlon, *Boise State University*  
Sarah D'Elia, *George Mason University and Northern Virginia Community College*  
Matthew Draper, *Utah Valley University*  
Patrick Drumm, *Ohio University, Lancaster*  
Megan Dunbar, *California State University San Marcos and Palomar College*  
Dawn Eaton, *San Jacinto College-South*  
Bryan D. Fantie, *American University*  
Philip Gable, *University of Alabama*  
Jeanette Gassaway, *Ohio University*  
Alexis S. Green, *Hanover College*  
Carrie E. Hall, *Miami University*  
Kelly Huffman, *University of California, Riverside*  
Michelle (MiKi) Kitchen, *University of South Carolina*  
Jamison D. Law, *Utah Valley University*  
Angela M. Legg, *Pace University, Pleasantville*  
Carrie A. Lloyd, *Huntington University*  
Robin K. Morgan, *Indiana University, Southeast*  
Michelle Niculescu, *Lebanon Valley College*  
David J. Rademacher, *Carthage College*  
Charlotte Nolan-Reyes, *Cabrillo College*  
Marylou Robins, *San Jacinto College-South*  
Dario Rodriguez, *University of Dayton*  
Cindy Sledge, *San Jacinto College-South*  
Lara Tedrow, *Tidewater Community College*  
Alexa Tullet, *University of Alabama*  
Lindsey West, *Georgia Regents University*  
Elijah White, *University of Cincinnati, Blue Ash College*

### **Focus Group Reviewers**

Judith Addelston, *Valencia College, East*  
Anthony Ahrens, *American University*

Roxanna Andersen, *Palm Beach State College, Boca Raton*  
Stacy Anderson, *Florida Gulf Coast University*  
Richard Bernstein, *Broward College, South*  
Kathleen Bey, *Palm Beach State College, Lake Worth*  
Sara Broaders, *Northwestern University*  
John Timothy Cannon, *University of Scranton*  
John Connor, *Daytona State College*  
David Seth Crystal, *Georgetown University*  
Jennifer Engler, *York College of Pennsylvania*  
Gregory Harris, *Polk State College*  
Jeffrey Henriques, *University of Wisconsin, Madison*  
Jennifer Johnson, *Bloomsburg University*  
Todd Joseph, *Hillsborough Community College, Dale Mabry*  
Irene Kan, *Villanova University*  
Kevin Keating, *Broward College, North*  
Cheri Kittrell, *State College of Florida, Manatee-Sarasota*  
Debra Laino, *Philadelphia University*  
Natalie Lawrence, *James Madison University*  
Daniel McConnell, *University of Central Florida*  
Ronald Morrison, *Daytona State College*  
Kevin O'Neil, *Florida Gulf Coast University*  
Gwendolyn Parsons-Spurrier, *Hillsborough Community College, Ybor City*  
Lois Pasapane, *Palm Beach State College, Lake Worth*  
Ronnie Rothschild, *Broward College, Central*  
Sharleen Sakai, *Michigan State University*  
Alex Sharpe, *Santa Fe College*  
Caroline Shelton-Toney, *Polk State College*  
William Suits, *Seminole State College of Florida*  
Cyril Svoboda, *University of Maryland University College*  
Clarissa Thompson, *University of Oklahoma*  
Terry Trepper, *Purdue University, Calumet*  
Katherine Urquhart, *Lake Sumter Community College*  
Lona Whitmarsh, *Fairleigh Dickinson University*

We also thank Suzanne Corkin for reading and commenting on sections describing the amnesic patient H.M. (Henry Molaison).

Finally, we could not have done this without the patience and support of our families: Stephanie, Christina, and Anthony (JTC) and Roger, Kristin, Karen, and Karla (LF).

Nuclear Physics  
Mechanical Engineering  
Astrophysics  
Neuroscience  
Geoscience  
Anthropology  
Political Science  
Sociology  
Gerontology  
General Medicine  
Psychiatry  
Communications  
Management  
Education  
Library Science

# DISCOVERING PSYCHOLOGY

Information Science  
Applied Mathematics  
Nursing  
Paleontology  
Physical Sciences  
Statistics  
Ophthalmology  
Public Health  
Astronomy  
Genetics  
Toxicology  
Neurology  
History  
Zoology  
Economics  
Geography  
Obstetrics  
**PSYCHOLOGY**  
Immunology  
Robotics  
Radiology  
Parasitology  
Dermatology  
Entomology  
Dentistry  
Food Sciences  
Pharmacology  
Microbiology  
Virology  
Plant Sciences  
General Chemistry  
Pathology  
Organic Chemistry  
Biochemistry  
Hematology  
Pediatrics  
Endocrinology  
Polymers  
Gastroenterology  
Agriculture  
Condensed Matter  
Gynecology  
Material Sciences  
Geoscience  
Marine Biology  
Meteorology  
Ecology  
Computer Science  
Nuclear Physics  
Sports Sciences  
Cardiology  
Analytical Chemistry  
Rheumatology  
Emergency Medicine  
Plant Chemistry

● SOCIAL SCIENCES

● MATHEMATICS

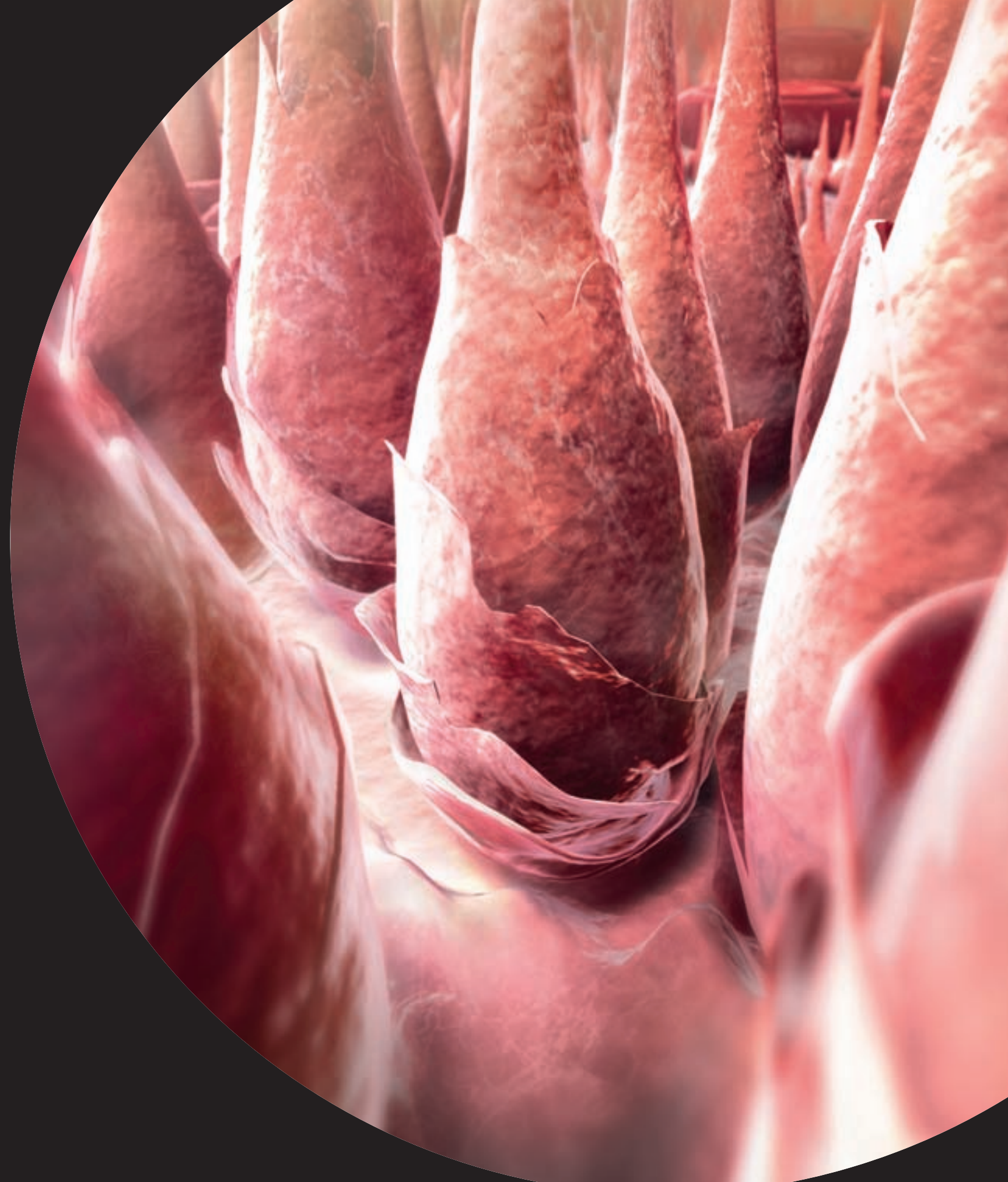
● EARTH SCIENCES

● CHEMISTRY

● PHYSICS

● MEDICINE





# 1 The Science of Mind

## The Discipline of Psychology

**STUDYING THE SCIENCE OF PSYCHOLOGY CAN** lead you to see yourself and other people in completely new ways. Hundreds of years ago, people believed that the world was flat and the sun and stars circled the earth. Careful scientific research slowly dispelled these inaccurate notions. Nonetheless, we hold tightly to many equally false common-sense beliefs about the human mind and behavior. We all “know” that



Radius Images/Masterfile

opposites attract, but we also “know” that birds of a feather flock together, so why do we need psychology to tell us what we already know? The problem is that both statements cannot be true at the same time, so the real state of affairs is neither obvious nor simple. Just as careful science was required to understand our planet’s place in the universe, the same scientific techniques are providing us with a more accurate, complete view of the human mind.

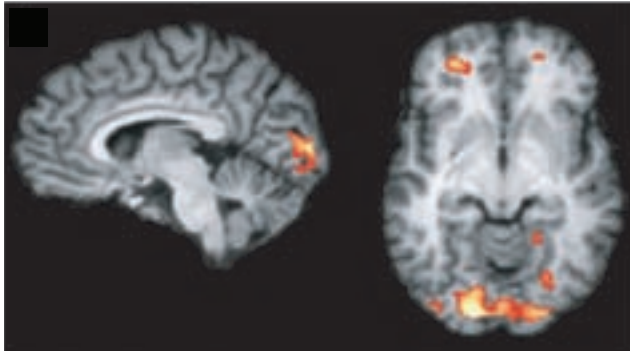
Let’s begin with a seemingly simple and familiar example: our ability to taste. We know a lot about taste—what we like or dislike, the different qualities of taste, and so on. You might even be aware that some types of taste seem stronger than

others. Most of us can taste sweetness in a solution made of 1 part sugar and 200 parts water; this ability shows an impressive sensitivity to taste. As remarkable as this sensitivity appears to be, however, people can detect 1 part bitter substance (like quinine or chemicals in broccoli) in 2 million parts water. This contrast in taste sensitivity between sweet and bitter does not reflect the actual difference between sweet and bitter substances—that is, bitter tastes are not 10,000 times stronger than sweet tastes—but rather how we experience them. Why would we have such a vast difference in sensitivity between these types of tastes?

Our observations of taste do not help us out much in answering this question, but psychology can. As it turns out, our greater sensitivity to bitter tastes is highly adaptive: Most poisons or toxins taste bitter, and if you want to stay alive, it is more important to avoid swallowing poison than to enjoy something sweet. Being far more sensitive to tastes that are bitter is a trait that has served our species well, because it helps us avoid eating things that could potentially kill us. Psychology helps us understand why we do the things we do by providing a context for understanding behavior.

To gain that understanding, psychology has to act like the zoom feature in Google Earth. In some parts of this textbook, we will zoom in on human behaviors, like looking at the highly magnified image of the papillae on the tongue (pictured on page 2), which allow us to taste, and trace the messages about taste sent from the tongue to the brain. At

◀ Taste buds contained in the papillae of the tongue are far more responsive to bitter tastes than to sweet tastes.



other times, we'll zoom out to take in the larger picture and better understand why the boy on the previous page is giving his bitter-tasting broccoli a skeptical look.

Psychologists approach the study of mind using in-depth perspectives, which we will describe in this chapter. For example, we can look at the little boy's reaction to his broccoli from a developmental perspective, which tells us that taste sensitivity decreases over the life span. Or, using the social perspective, we can think about social influences like culture on food preferences. Cottage cheese, enjoyed by many Americans, is viewed with disgust in some other parts of the

world. Fruit bat pie, a delicacy in Palau, might not be a popular item for a campus dining facility in the United States.

Although single perspectives can tell us a lot about a phenomenon like our sensitivity to bitter tastes, no one perspective can give us a complete answer. The best view comes from putting multiple perspectives together. You can learn a lot about your house from Google Earth by zooming in, but when you see how your home fits into the larger scene of city, state, country, and planet, that viewpoint adds something special to your understanding.

We'll start by learning more about psychology's main perspectives, along with a little background about their origins. At that point, we'll be in a better position to understand how these perspectives come together to give us the big picture.



istockphoto.com/NASA/kutay tanir

Introspection is the personal observation of our own thoughts, feelings, and behaviors. Because we are not perfect observers of the operations of our own minds, psychologists developed other methods that provide scientific insight into mind. In this functional magnetic resonance imaging (fMRI) scan, areas of the brain that were more active when participants were hungry than when they were full are highlighted. Through technology, researchers can better understand how the brain regulates hunger.

From D. Fuhrer, S. Zysset, & M. Stumvoll, "Brain Activity in Hunger and Satiety: An Exploratory Visually Stimulated fMRI Study," in *Obesity* (2008) 16: 945–950. © Nature Publishing Group.

## Learning Objectives

1. Explain the subject matter that psychologists study.
2. Analyze the contributions of philosophy and the natural sciences to modern psychology.
3. Describe how early movements in psychology are significant for modern psychology.
4. Compare and contrast the major perspectives of modern psychology.
5. Demonstrate how the major perspectives can be integrated to address a single psychological problem.
6. Explain why psychology's role as a "hub science" allows psychologists to pursue a range of career paths.

# What Is Psychology?

The study of the **mind** is as fascinating as it is complex. Psychological scientists view the mind as a way of talking about the activities of the brain, including thought, emotion, and behavior. A quick look at this textbook's table of contents will show you the variety of approaches to *mind* that you will encounter, such as the thinking mind (cognitive psychology) and the troubled mind (abnormal psychology).

The word **psychology** is a combination of two Greek words: *psyche* (or *psuche*), or “soul,” and *logos*, meaning “the study of.” For the ancient Greeks, a soul was close to our modern view of a spirit or mind. *Logos* is the source of all our “ologies,” such as biology and anthropology. Literally translated, therefore, *psychology* means “the study of mind.” Contemporary definitions of psychology refine this basic meaning. Most psychologists today define their field as “the scientific study of behavior and mental processes”—that is, the scientific study of mind.

The phrase “behavior and mental processes” has undergone several changes over the history of psychology. *Behavior* refers to any action that we can observe. As we will see in our chapter on research methods, observation has been an important tool for psychologists from the early days of the discipline. Our definition does not specify whose behavior is to be examined. Although the bulk of psychology focuses on human behavior, animal behavior has been an essential part of the discipline, both for understanding animals better and for comparing and contrasting animal and human behavior.

The study of *mental processes* has been highly dependent on the methods available to psychologists. Early efforts to study mental processes were generally unsatisfactory, because they relied on the use of **introspection**, or the personal observation of your own thoughts, feelings, and behaviors. Because it is difficult for others to confirm your introspections, this subjective approach does not lend itself well to the scientific method. If you say that you are

**mind** The brain and its activities, including thought, emotion, and behavior.

**psychology** The scientific study of behavior and mental processes.

**introspection** Personal observation of your own thoughts, feelings, and behavior.

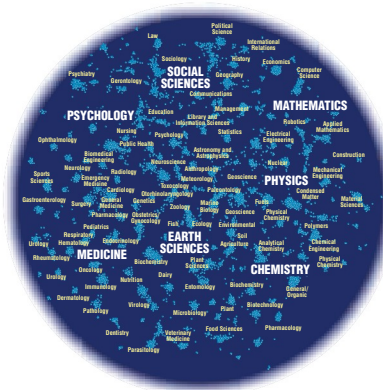


## Psychology as a Hub Science

### Why Is Psychology a Hub Science?

Psychology is all about people, and few occupations do not require an understanding of people and their behavior. An architect cannot design a functional space without considering how people respond to crowding. An attorney cannot cross-examine a witness without an understanding of memory, motivation, emotion, and stress. A teacher cannot encourage students to reach their potential without an understanding of child development and learning. The study of psychology, then, provides you with better insight into and understanding of many occupations and fields of study.

You probably have seen applications that allow you to map your friendship networks on social media, with shorter links indicating greater connectivity and with larger bubbles indicating more overlapping friendships with another person. Kevin Boyack and his colleagues generated a similar map of the sciences (see ● Figure 1.1) but used reference lists in journal articles instead of friendship networks (Boyack, Klavans, & Börner, 2005). The resulting analysis shows that psychology is one of the seven major hub sciences, with strong connections to the medical sciences, the social sciences, and education. In our upcoming chapters, we will highlight these connections with examples that are relevant to each particular chapter. ●



**FIGURE 1.1**

**Psychology as a Hub Science.** This map of science was generated by comparing citations from more than 1 million papers published in more than 7,000 journals since 2000. Psychology appears among the seven major areas of science, indicated in the map by large font. The other six major areas are social sciences, mathematics, physics, chemistry, earth sciences, and medicine. *Source:* Adapted from “Mapping the Backbone of Science,” by K. W. Boyack et al., 2005, *Scientometrics*, 64(3), 351–374. With kind permission from Springer Science+Business Media.

feeling hungry, how can anyone else know whether your observation is accurate? In addition, your mind and behavior are governed by a host of structures, factors and processes, most of which are not available through introspection. Innovations in the methods and mathematics used to investigate brain activity and behavior have allowed psychologists to revisit the question of mental processes with greater objectivity and success.

## What Are Psychology's Roots?

*The empiricists had a profound influence on the foundations of American political thought—all of us are created equal. For generations, Europe had been ruled by people who were born into positions of power instead of earning the privilege of leading through hard work and education. If knowledge is not innate or inborn, any of us can learn enough to grow up to be President.*

**philosophy** The discipline that systematically examines basic concepts, including the source of knowledge.

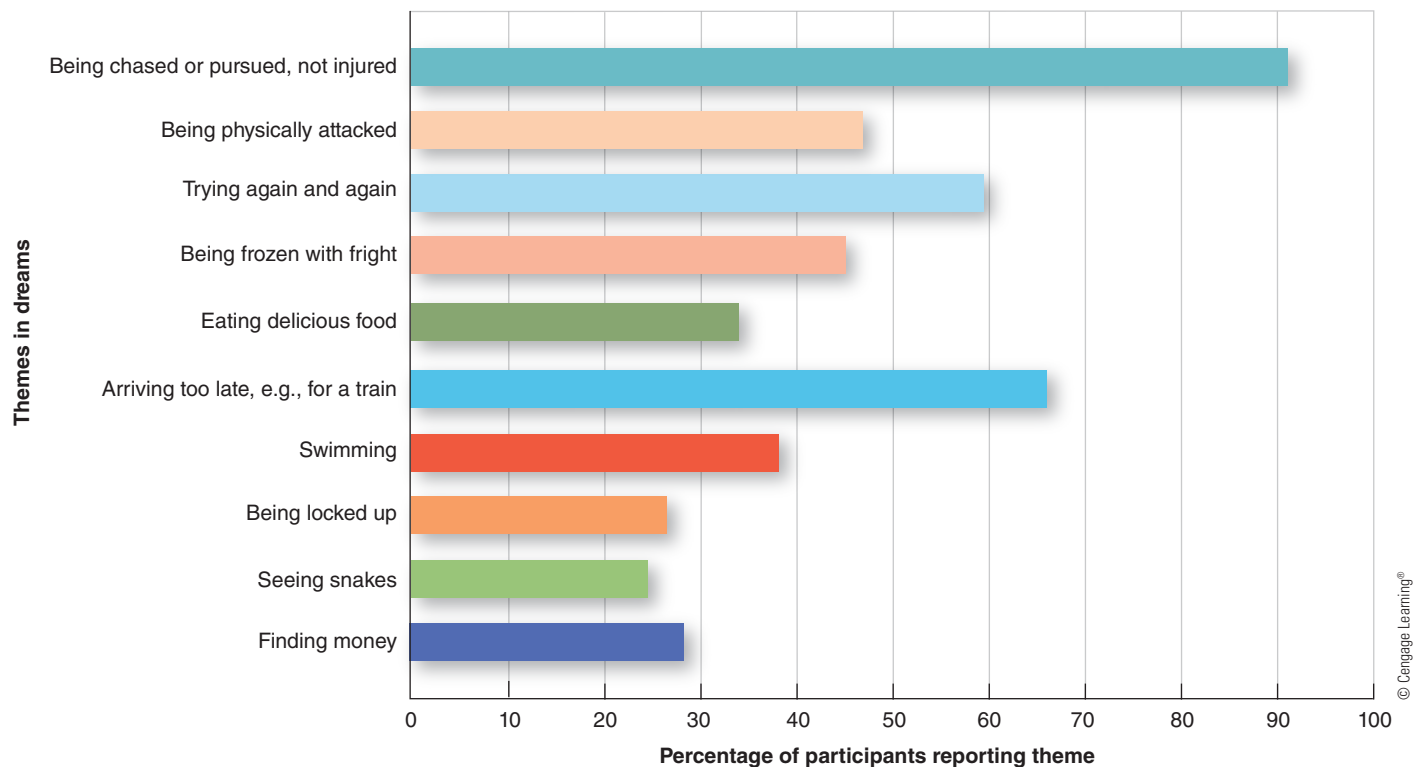
**natural science** Sciences that study the physical and biological events that occur in nature.

Psychology is a relatively young discipline, dating back only to the 1870s. However, topics that interest modern psychologists go back farther in the history of human thought. People living as long ago as 6000 to 5000 BCE in Assyria described their dreams (Restak, 1988). Among these accounts are descriptions of being chased, which are still among the most common dreams experienced by people (Nielsen et al., 2003). See ● Figure 1.2 for common dream themes that many people experience.

The psychology family tree includes two major roots: **philosophy** and the **natural sciences**. Psychologists answer questions traditionally posed by philosophers by borrowing the methods of the natural sciences.

We examine scientific methods in detail in Chapter 2.

Philosophers and psychologists share an interest in questions regarding the nature of the self, the effects of early experience, the existence of free will, and the origin of knowledge. Both disciplines consider the relative balance of biological factors (nature) and environmental factors (nurture) in the resulting human behavior. Both attempt to determine the relationships



**FIGURE 1.2**

**Many People Report Dreams With the Same Themes.** Although we don't understand why we dream about certain things, many people report similar themes in their dreams.

Source: Adapted from "Typical Dreams of Canadian University Students," by T. A. Nielsen et al., 2003, *Dreaming*, 13, 211–235.



Cynthia Johnson/Getty Images

Desperate conditions in Romanian orphanages in the 1970s left many children without the experiences they needed for optimum cognitive or social development.



© Mary Evans Picture Library/The Image Works

### FIGURE 1.3

**Microscopes Changed the World of Science.** This light microscope was used by Anton van Leeuwenhoek to discover red blood cells in 1676. Microscopes opened a new world to scientists interested in living things.

A = Screw for adjusting the height of the object being examined

B = Metal plate serving as the body

C = Skewer to impale the object and rotate it

D = Lens, which was spherical

© World History/Topham/The Image Works



Zev Radovan/BibleLandPictures.com/Alamy

Aristotle (384–322 BCE) believed that we gain knowledge through our senses.

John Locke (1632–1704) and other empiricist philosophers believed that the mind was a “blank slate” at birth and that knowledge was gained through experience.



Georgios Kollidas/Shutterstock

between self-interest and community welfare, between body and mind, and between humans and other species with which we share the planet. Although we typically consider questions of the unconscious mind and abnormal behavior to be the realm of the psychologist, philosophers investigated these issues thousands of years before the first psychologist was born.

One of the most significant questions shared by philosophy and psychology asks whether the mind is inborn or is formed through experience. Some philosophers, including René Descartes (1596–1650), argued that ideas and emotions were innate or inborn. More commonly, philosophers beginning with Aristotle (384–322 BCE) believed that all knowledge is gained through sensory experience. Beginning in the 17th century, this idea flourished in the British philosophical school of *empiricism*. The empiricists viewed the mind as a “blank slate” at birth that was filled with ideas gained by observing the world.

This philosophical debate about the source of knowledge is echoed in psychology when researchers consider the relative contributions of inborn or innate factors (nature) and of experience (nurture) to particular behaviors. Contemporary psychologists no longer view the question of nature and nurture as needing an either–or response. Instead, we see the mind as a result of complex interactions between inborn characteristics and everyday experiences. For example, we might have a genetic predisposition for intelligent behavior, but intelligence depends on experience too. During the 1970s, children in Romanian orphanages experienced extremely deprived social conditions because of a lack of funding for their care. The children had few opportunities to interact with other people or with the environment. The children who were adopted from these orphanages at young ages were able to recover, but the children who endured years of deprivation experienced permanent cognitive deficits (Ames, 1997). In Chapters 3 (Nature and Nurture) and Chapter 11 (Development), we will revisit these debates in depth.

Running along a parallel track to the early philosophers, ancient physicians were laying the foundation of our biological knowledge of the brain and nervous system, discussed in greater detail in Chapter 4. During this pursuit, physicians helped develop the scientific methods that would become central to contemporary psychology and previewed the application of the knowledge they gained to the improvement of individual well-being.



Prisma Archivo/Alamy

Ancient people might have attempted to cure headaches, seizures, or psychological disorders by drilling holes in the skull. Bone growth around the hole indicates that some patients survived the procedure.



bilwissedition Ltd. & Co. KG/Alamy

The work of Hermann von Helmholtz (1821–1894) on reaction time helped establish the mind as something that could be studied scientifically.

Although some confusion occurred along the way, such as Aristotle’s belief that the mind was located in the heart, ancient people had a rudimentary understanding that the head and later the brain were important for mental life. As many as 7,000 years ago, healers using a technique known as trepanation drilled holes in a person’s skull to cure some unspecified conditions, possibly headache or hallucination. Subsequent growth of the skull bones indicates that some patients survived this procedure. The early Egyptians correctly understood that paralysis of a part of the body resulted from brain damage and that such damage was permanent (Breasted, 1930).

For centuries, the whole of medicine remained a primitive business. Beginning in the 17th and 18th centuries, scientists armed with new technologies, including the light microscope (see ● Figure 1.3), began to make a series of important discoveries about the human body and mind. For example, they demonstrated that a single sensory nerve carried one type of information instead of multiple types. You might have already duplicated this research yourself while rubbing your sleepy eyes—you see a flash of light. The nerves serving the retina of the eye do not know how to process information about touch or pressure. When stimulated, they are capable of only one type of message—light. These types of discoveries about the physical aspects of mind convinced scientists that the mind could be studied scientifically.

The work of Hermann von Helmholtz (1821–1894) on the speed of nerve signaling provided further evidence that the mind had a physical basis. Von Helmholtz asked his participants to push a button when they felt a touch. When a thigh was touched, participants reacted faster than when a toe was touched. Because the toe is farther from the brain than the thigh, signals from the toe required more time to reach the brain. Von Helmholtz used these differences in reaction time to show that voluntary behavior did not occur instantaneously as previously thought. Helmholtz’s demonstration that behavior is not instantaneous—rather, it requires time for the system to process physical signals—contributed to a more scientific, less mystical view of the nervous system.

Philosophers began to incorporate physiological and psychological concepts into their work, and natural scientists began to explore the questions asked by philosophers. The gradual merger of these approaches resulted in a series of experiments that looked increasingly like contemporary psychology. Scientists began to ask questions about the relationships between physical stimulation and its resulting sensations. For example, Gustav Fechner (1801–1889) was able to identify the softest sound a person could hear by randomly presenting sounds of different intensities to which a participant would respond “yes” or “no.” When the “yes” responses reached 50%, Fechner concluded that the sound was within the range that the human ear could detect (see Chapter 5). The stage was set for a modern science of psychology.