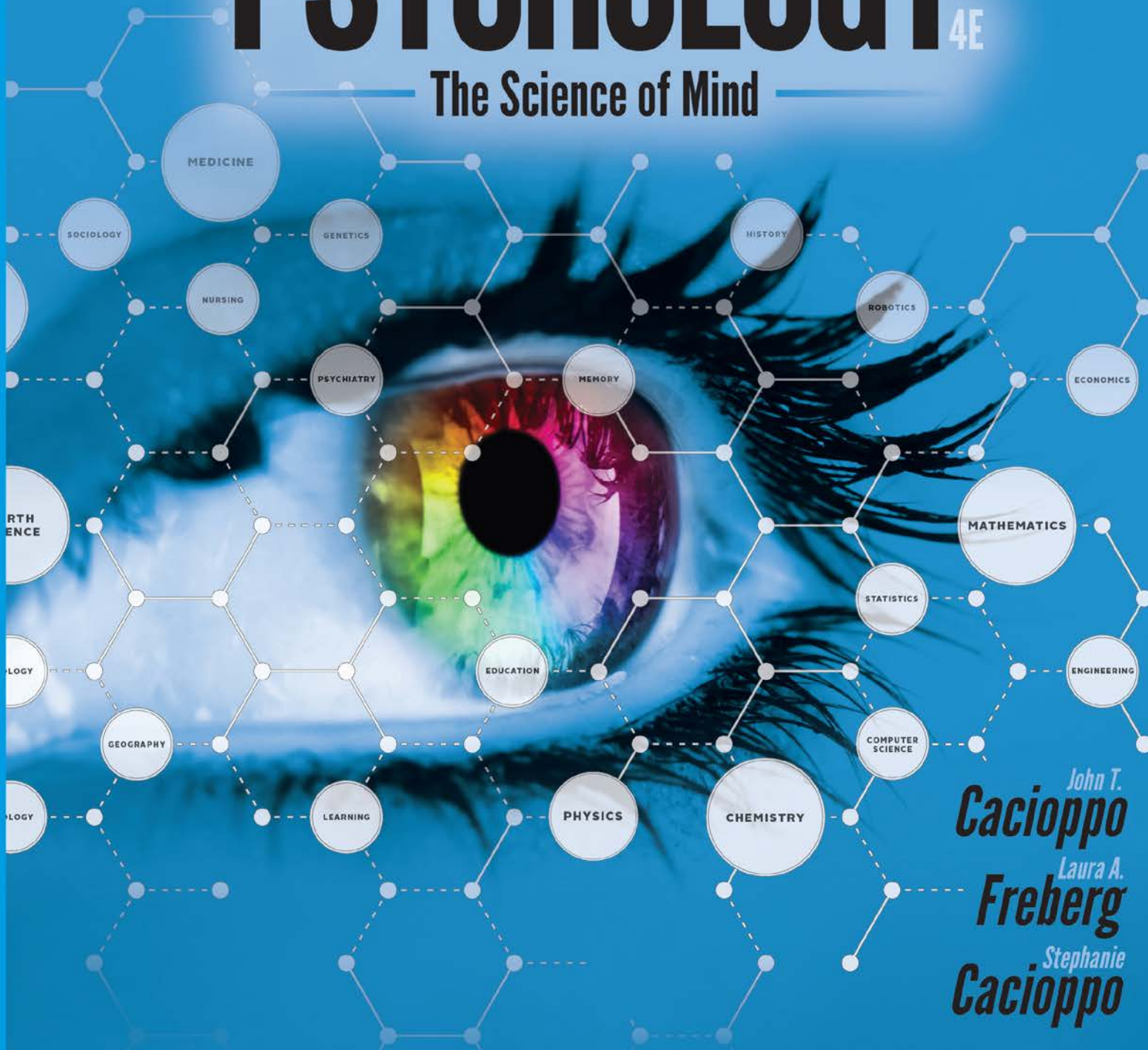


DISCOVERING PSYCHOLOGY ^{4E}

The Science of Mind



John T.
Cacioppo
Laura A.
Freberg
Stephanie
Cacioppo

Discovering Psychology 4e

THE SCIENCE OF MIND

John T.
Cacioppo

University of Chicago

Laura A.
Freberg

California Polytechnic State University, San Luis Obispo

Stephanie J.
Cacioppo

University of Chicago Pritzker School of Medicine



Australia • Brazil • Canada • 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 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, Fourth Edition
**John T. Cacioppo, Laura A. Freberg,
Stephanie J. Cacioppo**

SVP, Higher Education & Skills Product:
Erin Joyner

VP, Higher Education & Skills Product:
Thais Alencar

Product Director: Laura Ross

Product Manager: Colin Grover

Product Assistant: Jessica Witzak

Learning Designer: Natasha Allen

Senior Content Manager: Christy Frame

Digital Delivery Lead: Allison Marion

Director, Marketing: Neena Bali

Marketing Manager: Trisha Salata

IP Analyst: Deanna Ettinger

IP Project Manager: Nick Barrows

Production Service: Anubhav Kaushal,
MPS Limited

Designer: Bethany Bourgeois

Cover Image Source: petekarici/istockphoto

© 2022, 2019, 2016 Cengage Learning, Inc.

WCN: 02-300

Unless otherwise noted, all content is © Cengage.

ALL RIGHTS RESERVED. No part of this work covered by the copyright herein may be reproduced or distributed in any form or by any means, except as permitted by U.S. copyright law, without the prior written permission of the copyright owner.

For product information and technology assistance, contact us at
Cengage Customer & Sales Support, 1-800-354-9706 or
support.cengage.com.

For permission to use material from this text or product,
submit all requests online at **www.cengage.com/permissions.**

Library of Congress Control Number: 2020952162

Student Edition:

ISBN: 978-0-357-36323-2

Loose-leaf Edition:

ISBN: 978-0-357-36330-0

Cengage

200 Pier 4 Boulevard
Boston, MA 02210
USA

Cengage is a leading provider of customized learning solutions with employees residing in nearly 40 different countries and sales in more than 125 countries around the world. Find your local representative at **www.cengage.com.**

To learn more about Cengage platforms and services, register or access your online learning solution, or purchase materials for your course, visit **www.cengage.com.**

To our family and friends for their heartfelt support. In everlasting loving memory of John, Stephanie is also grateful to all of those who have expressed continuing support and love to John and our family. John's legacy will live on through his seminal theories and through all of us whose minds had the privilege of his visionary influence.

J.T.C. AND S. J. C.

To my family—Roger, Kristin, Scott, Marcus, Karen, and Karla—for their unwavering support, encouragement, and belief in my ability.

L. A. F.

About the Authors



John T. Cacioppo

John T. Cacioppo (1951–2018) was the Tiffany and Margaret Blake Distinguished Service Professor and director of the Center for Cognitive and Social Neuroscience at the University of Chicago. He was 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 the American Association for the Advancement of Science. Among the numerous awards that he 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. Dr. John Cacioppo was a member of the President's Committee on the National Medal of Science during the Obama administration; 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.



Roger Freberg

Laura A. Freberg is a professor of psychology at California Polytechnic State University, San Luis Obispo (Cal Poly SLO), where she teaches courses in introductory psychology and biological psychology. She is the author of four editions of *Discovering Behavioral Neuroscience: An Introduction to Biological Psychology* for Cengage Learning. She is the lead author for an online research methods textbook, *Research Methods for Psychological Science* (2017) and serves as Psychology Consultant to the *New York Times* InEducation program. Dr. Freberg's teaching career began more than 40 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 three times (1991, 1994, and 2009) for her work with students with disabilities. She enjoys experimenting with technology and social media in the classroom and 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 served as president of the Western Psychological Association (WPA) in 2018–2019.

Stephanie J. Cacioppo is an Assistant Professor of Psychiatry and Behavioral Neuroscience in the University of Chicago Pritzker School of Medicine and serves as the director of the school's Brain Dynamics Laboratory. Named a "Rising Star" by the Association for Psychological Science (APS) for her innovative and "outstanding contributions to the science of psychology in the areas of research, teaching, and/or application," Dr. Steph Cacioppo is considered a world authority on emotion-driven brain dynamics and well-being. Her work focuses on the dynamics of emotions and social connections and their impact on brain health and human performance. She has a demonstrated history of working in woman's health, motivation, and neuropsychology, and with elite and everyday athletes in emotional fitness, high-performance brain dynamics, and human potential. Dr. Steph Cacioppo is also the first female president of the Society for Social Neuroscience. She has authored more than 120 scientific publications and has been interviewed by prestigious outlets like the *New York Times*, *Scientific American*, *Washington Post*, *Discover Magazine*, and *National Geographic*.



Stephanie Cacioppo

Brief Contents

1	The Science of Mind	THE DISCIPLINE OF PSYCHOLOGY	3
2	The Measure of Mind	THE SCIENTIFIC METHODS OF PSYCHOLOGY	35
3	The Evolving Mind	NATURE AND NURTURE INTERTWINED	71
4	The Biological Mind	THE PHYSICAL BASIS OF BEHAVIOR	105
5	The Perceiving Mind	SENSATION AND PERCEPTION	149
6	The Aware Mind	ELEMENTS OF CONSCIOUSNESS	193
7	The Feeling Mind	EMOTION AND MOTIVATION	231
8	The Adaptive Mind	LEARNING	277
9	The Knowing Mind	MEMORY	317
10	The Thinking Mind	THINKING, LANGUAGE, AND INTELLIGENCE	361
11	The Developing Mind	LIFE SPAN DEVELOPMENT	407
12	The Individual Mind	PERSONALITY AND THE SELF	459
13	The Connected Mind	SOCIAL PSYCHOLOGY	499
14	The Troubled Mind	PSYCHOLOGICAL DISORDERS	549
15	Healing the Troubled Mind	THERAPY	597
16	The Healthy Mind	STRESS AND COPING, HEALTH PSYCHOLOGY, AND POSITIVE PSYCHOLOGY	639

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

Psychology as a Hub Science Why Is Psychology a Hub Science? 5

Why Do We Study Psychology? 6

Where Did Psychology Originate? 7

What Are Psychology's Philosophical Roots? 8

What Are Psychology's Natural Sciences Roots? 8

The Two Disciplines Merge to Create a New Science 9

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

Clinical Roots: Freud and the Humanistic Psychologists 13

Sigmund Freud 13

Humanistic Psychology 14

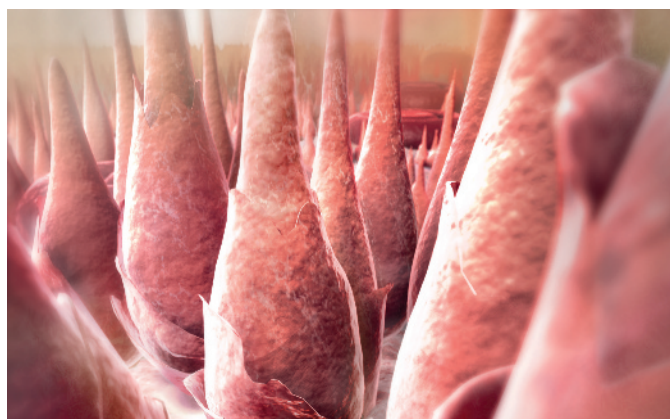
Experiencing Psychology Testing Reaction Time 14

The Behaviorists and the Cognitive Revolution 15

SUMMARY 1.2 20

What Are Psychological Perspectives? 22

What Are the Five Perspectives of Psychology? 22



Argosy Publishing, Inc.

A New Connectivity: Integrating Psychology's Five Perspectives 26

Diverse Voices in Psychology Culture and Diversity as "Cross-cutting Themes" in Psychology 27

Thinking Scientifically Can the Use of a Single Perspective Be Misleading? 28

What Does It Mean to Be a Psychologist? 28

Interpersonal Relationships How Can We Use Relationships to Illustrate Psychological Perspectives? 30

Psychology Takes on Real-World Problems Tackling the Problem of a Pandemic 31

SUMMARY 1.3 32

Key Terms: The Language of Psychological Science 32

2 The Measure of Mind

THE SCIENTIFIC METHODS OF PSYCHOLOGY

What Is Science? 36

How Do We Develop a Scientific Mindset? 36

The Importance of Critical Thinking 37

Experiencing Psychology Using Critical Thinking to Evaluate Popular Press Reports 38

The Scientific Enterprise 40

Scientific Theories 40

Generating Good Hypotheses 41

Communicating Science 42

Thinking Scientifically Does Psychology Have a Replication Problem? 43

SUMMARY 2.1 44

How Do Psychologists Conduct Research? 44

Descriptive Methods 44

The Case Study 44

Naturalistic Observation 46

The Survey 46

Diverse Voices in Psychology How Do We Recruit Diverse Research Participants? 47

Correlational Methods 48

Experimental Methods 51

Meta-analyses 53

The Importance of Multiple Perspectives 54

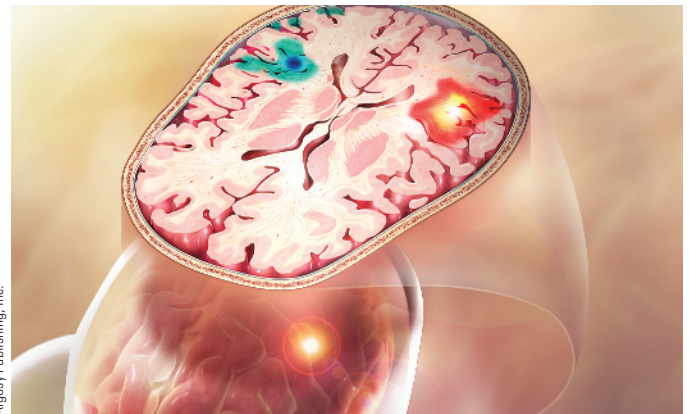
How Do We Study the Effects of Time? 54

SUMMARY 2.2 55

How Do We Draw Conclusions from Data? 56

The Importance of Valid and Reliable Measures 56

Descriptive Statistics 57



Central Tendency 58

Variance 59

The Normal Curve 59

Descriptive Statistics with Two Variables 60

Connecting to Research Do You Believe in ESP? 61

Inferential Statistics 62

Psychology as a Hub Science The Invention of Factor Analysis 64

How Can We Conduct Ethical Research? 64

Human Participants 65

Animal Subjects 66

Interpersonal Relationships The Methodological Perspective 67

Psychology Takes on Real-World Problems Research Methods for Studying a Pandemic 68

SUMMARY 2.3 69

Key Terms: The Language of Psychological Science 69

3 The Evolving Mind

NATURE AND NURTURE INTERTWINED

Why Do We Say That Nature and Nurture Are Intertwined? 72

What Are the Building Blocks of Behavior? 73

Experiencing Psychology The Genetics of Cats 75

Genetic Variation 76

Relatedness 76

Sex Chromosomes 76

Which Fields of Genetics Are Relevant to Psychology? 77

Behavioral Genetics and Heritability 78

Diverse Voices in Psychology Avoiding Social Prejudice in Genetic Research 80

The Search for Candidate Genes 82

Epigenetics 83

Thinking Scientifically The “Warrior Gene” and Criminals 84

Psychology as a Hub Science Understanding the Epigenetic Influences of Nutrition 86

Connecting to Research Can Transgenerational Epigenetic Change Occur? 87

SUMMARY 3.1 88

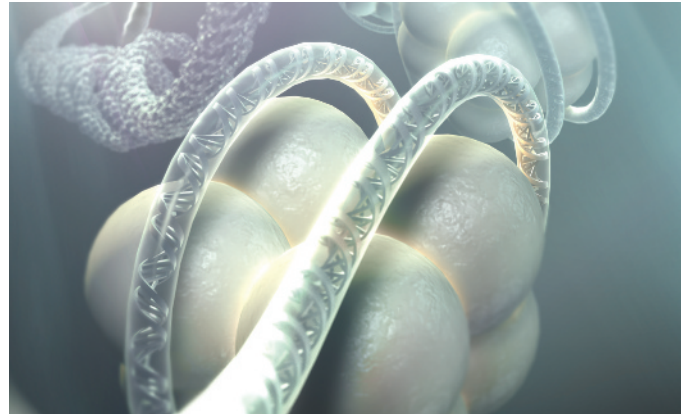
How Does Evolution Occur? 89

Mechanisms of Evolution 89

Adaptation 91

Evolution of the Human Brain 92

The Contemporary Human Brain 93



Argosy Publishing, Inc.

SUMMARY 3.2 94

How Does Evolution Influence Behavior? 95

The Evolutionary Psychology Perspective 95

Origins of Social Behavior 95

Sexual Selection 98

Parental Investment 98

Traits Possibly Influenced by Sexual Selection 99
Culture 99

Interpersonal Relationships The Evolutionary Perspective 101

Psychology Takes On Real World Problem

Can Genetics Explain Differing Responses to COVID-19 Social Distancing? 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

Diverse Voices in Psychology What Is Cultural Neuroscience? 107

Early Attempts to Understand Biological Psychology 108

Contemporary Approaches in Biological Psychology 109

How Is the Nervous System Organized? 110

What Are the Structures and Functions of the Central Nervous System? 111

The Spinal Cord, Brainstem, and Cerebellum 113

Subcortical Structures 116

The Thalamus 116

The Basal Ganglia 116

The Hypothalamus 117

The Hippocampus 117

The Cingulate Cortex 117

The Amygdala 117

The Nucleus Accumbens 118

The Cerebral Cortex 118

Thinking Scientifically Why Does Moving Your Eyes Reduce Negative Emotions? 119

Localization of Functions in the Cerebral Cortex 119

The Frontal Lobe 121

The Occipital Lobe 122

The Temporal Lobe 122

The Parietal Lobe 123

Psychology as a Hub Science Law, Responsibility, and the Brain 123

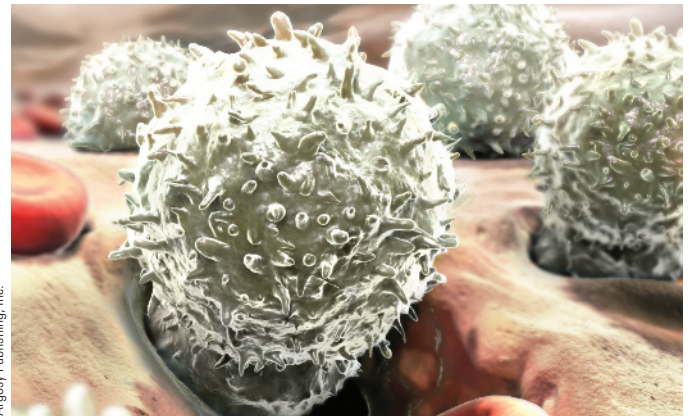
Mirror Neurons 124

Right Brain and Left Brain 124

Connecting to Research Mirror Systems and Predicting Tennis Serves 125

Right–Left Brain Myths 126

The Function of Lateralization 126



Argosy Publishing, Inc.

Experiencing Psychology Handedness 127

SUMMARY 4.1 128

The Peripheral Nervous System (PNS) and the Endocrine System 129

The Somatic Nervous System 129

The Autonomic Nervous System 129

The Endocrine System 132

SUMMARY 4.2 133

How Do Neurons Communicate? 134

Neurons and Glia 134

Neural Signaling 137

Electrical Signaling 137

Chemical Signaling 141

Types of Neurotransmitters 143

Interpersonal Relationships The Biological Perspective 144

Psychology Takes on Real-World Problems Social Distancing, Loneliness, and the Nervous System 145

SUMMARY 4.3 146

Key Terms: The Language of Psychological Science 147

5 The Perceiving Mind

SENSATION AND PERCEPTION

How Does Sensation Lead to Perception? 150

Sensory Information Travels to the Brain 150

The Brain Constructs Perceptions From Sensory Information 151

Measuring Perception 153

Signal Detection 153

SUMMARY 5.1 156

How Do We See? 156

The Visual Stimulus 156

The Biology of Vision 157

Photoreceptors 158

Visual Pathways 159

Visual Perception and Cognition 160

Color Vision 160

Psychology as a Hub Science Color and Accessible Web Design 161

Recognizing Objects 162

Gestalt Psychology 163

Recognizing Depth 164

Developmental and Individual Differences in Vision 166

Connecting to Research Do Children with Autism See the World Differently? 168

Diverse Voices in Psychology Culture Shapes Eye Movements 169

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

SUMMARY 5.2 171

How Do We Hear? 172

The Auditory Stimulus 172

The Biology of Audition 172

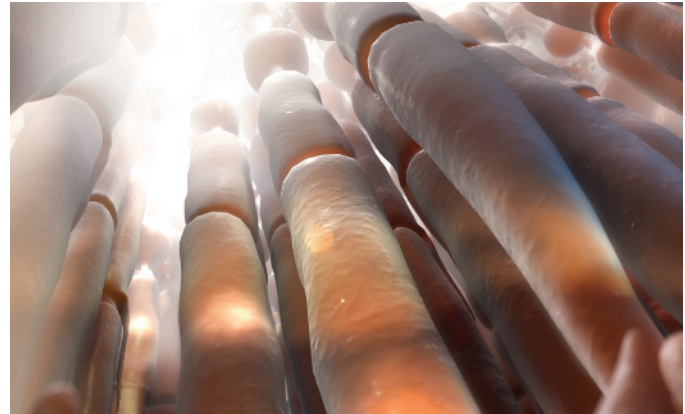
Auditory Perception and Cognition 175

Pitch Perception 175

Perceiving Loudness 175

Localization of Sound 176

Auditory Groupings 176



Argosy Publishing, Inc.

Developmental and Individual Differences in Audition 177

Sociocultural Influences on Auditory Perception 177

How Do We Feel Body Position, Touch, Temperature, and Pain? 178

Body Position 179

Touch 179

Pain 181

How Do We Process Smells and Tastes? 183

Olfaction 183

Gustation 184

Perception and Cognition in the Chemical Senses 185

Developmental and Individual Differences in the Chemical Senses 186

Experiencing Psychology Are You a Supertaster? 186

Sociocultural Influences on the Chemical Senses 187

Interpersonal Relationships Sensation and Perception Perspectives 188

Psychology Takes on Real-World Problems Social Distancing, Loneliness and the Perception of Social Threat 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 206

The Special Benefits of REM Sleep 207

Dreams 208

Sleep Disorders 208

Nightmares and Sleep Terrors 208

Insomnia 209

Narcolepsy and Cataplexy 209

Breathing-Related Sleep Disorders 209

Sudden Infant Death Syndrome (SIDS) 210

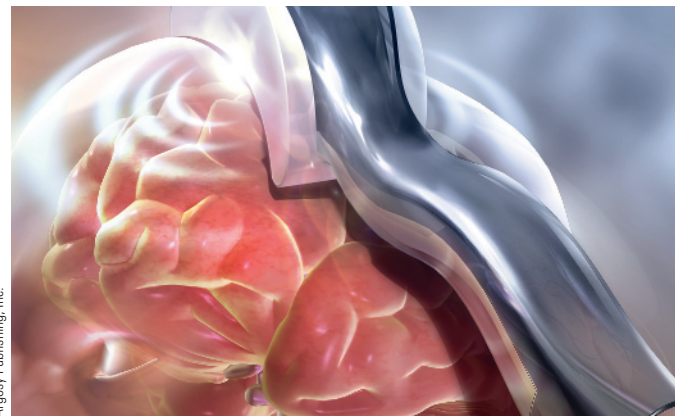
Restless Legs Syndrome (RLS) 210

SUMMARY 6.2 211

How Is Consciousness Affected by Brain Damage? 211

Specific Areas of Brain Damage and Consciousness 211

Coma, Vegetative State, Brain Death, and Near-Death 212



Argosy Publishing, Inc.

Coma 212

Vegetative State (VS) 212

Brain Death 212

Near-Death Experiences 213

Seizures 213

How Do People Intentionally Alter Their States of Consciousness? 214

General Features of Psychoactive Drugs 215

Tolerance and Withdrawal 215

Addiction 215

Commonly Used Psychoactive Drugs 216

Marijuana 216

Thinking Scientifically Do Hallucinogens Have Therapeutic Potential? 217

LSD 218

Caffeine 218

Connecting to Research Psychedelics and Consciousness 218

Diverse Voices in Psychology Entheogens Across Cultures 219

Nicotine 220

Cocaine and Amphetamines 221

Methylphenidate (Ritalin) 222

MDMA (Ecstasy) 222

Alcohol 222

Opioids 223

Nondrug Methods for Altering Consciousness 224

Hypnosis 224

Meditation 225

Other Methods for Altering Consciousness 225

Interpersonal Relationships The Consciousness Perspective *How Does Imitation Influence Liking?* 227

Psychology Takes on Real-World Problems Sleep During a Pandemic 228

SUMMARY 6.3 228

Key Terms: The Language of Psychological Science 229

7 The Feeling Mind

EMOTION AND MOTIVATION

How Are Emotion and Motivation Related? 232

Why Are We Emotional? 233

Theories of Emotion 233

The James–Lange Theory of Emotion 233

The Cannon–Bard Theory of Emotion 235

The Schachter–Singer Two-Factor Theory 236

Connecting to Research Botox and the Ability to Read the Emotions of Others 236

Contemporary Approaches to Emotion 238

The Evolution of Emotion 239

The Biology of Emotion 241

The Autonomic Nervous System 241

The Hypothalamus 242

The Amygdala 242

The Insula 243

The Cingulate Cortex 243

The Basal Ganglia 244

The Cerebral Cortex and Emotion 244

Expressing Emotion 245

Interpreting Emotion 248

Experiencing Psychology Emotional Regulation 248

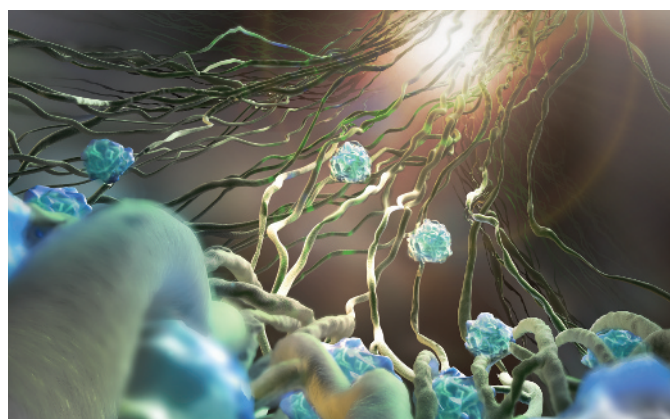
Diverse Voices in Psychology Emotional Expressivity, Smiling, and a History of Immigration 249

Psychology as a Hub Science Lie Detection and the Law 250

SUMMARY 7.1 252

What Does It Mean to Be Motivated? 252

Hunger and Eating 253



The Sensation of Hunger 254

The Sensation of Satiety 256

Obesity 257

Anorexia Nervosa, Bulimia Nervosa, and Binge-Eating Disorder 260

Sexual Motivation 262

Biology and Sexual Motivation 262

Sexual and Emotional Satisfaction 264

Sexual Orientation 264

Cognitive and Social Motives 267

The Motivation to Affiliate 267

Achievement Motivation 268

Thinking Scientifically Do Participation Trophies Affect Entitlement and Competitiveness? 270

Motivational Priorities 271

Approach and Avoidance 271

Motivational Theories 271

Interpersonal Relationships The Emotional Perspective 273

Psychology Takes on Real-World Problems Prioritizing Motives During a Pandemic 274

SUMMARY 7.2 274

Key Terms: The Language of Psychological Science 275

8 The Adaptive Mind

LEARNING

How Do Animals Respond to Their Environment? 278

What Are the Three Main Types of Learning? 280

SUMMARY 8.1 281

What Is Classical Conditioning? 281

Classical Conditioning Terminology 282

Classical Conditioning Phenomena 283

Acquisition 283

Extinction and Spontaneous Recovery 284

Inhibition 285

Generalization and Discrimination 285

Higher-Order Conditioning 286

Latent Inhibition 286

Cognitive and Biological Influences on Classical Conditioning 286

The Element of Surprise 287

Taste Aversion 288

Applying Classical Conditioning 289

Overcoming Fear 289

Addiction 290

Attitudes and Prejudice 290

Creativity and Schizophrenia 291

Connecting to Research Classical Conditioning and Opioid Overdose 292

Psychology as a Hub Science Classical Conditioning Informs Wildlife Conservation 293

SUMMARY 8.2 294

What Is Operant Conditioning? 295

Types of Consequences 296

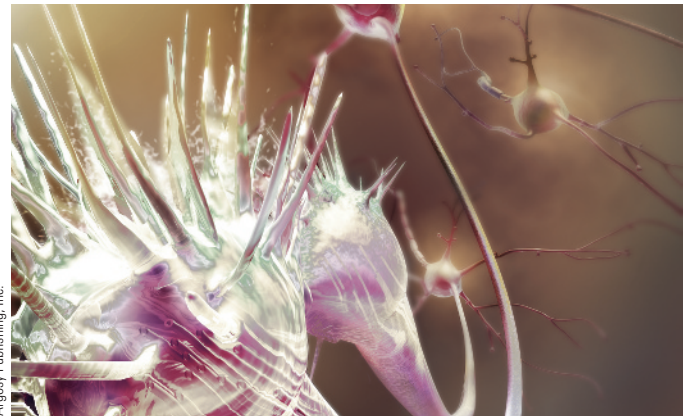
Positive Reinforcement 296

Thinking Scientifically Is Too Much Praise Bad for Children? 297

Negative Reinforcement 298

Punishment 299

Diverse Voices in Psychology Does Physical Punishment Have Different Effects in Different Cultural Contexts? 300



Schedules of Reinforcement 300

Fixed Ratio Schedules 301

Variable Ratio Schedules 302

Fixed Interval Schedules 302

Variable Interval Schedules 302

Partial Reinforcement Effect in Extinction 303

Comparing Schedules 303

The Method of Successive Approximations (Shaping) 304

Cognitive, Biological, and Social Influences on Operant Conditioning 305

Cognitive Influences on Operant Conditioning 305

Biological Influences on Operant Conditioning 306

Social Influences on Operant Conditioning 307

Applying Operant Conditioning 307

Token Economies 308

Behavior Therapies 308

Experiencing Psychology How Do I Break a Bad Habit? 309

SUMMARY 8.3 310

What Is Observational Learning? 310

Albert Bandura and Aggression 311

Cultural Transmission of Learning 312

Interpersonal Relationships The Learning Perspective 313

Psychology Takes on Real-World Problem Can People Learn to be Less Lonely? 314

SUMMARY 8.4 315

Key Terms: The Language of Psychological Science 315

9 The Knowing Mind

MEMORY

What Is Memory? 318

Memory and the Continuum of Information Processing 318

Memory Provides an Adaptive Advantage 319

How Are Memories Processed? 319

Sensory Memory 320

Short-Term Memory 321

Long-Term Memory 325

Moving Information into Long-Term Memory 325

Differences Between Working and Long-Term
Memory 326

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

Declarative Memories 329

Nondeclarative Memories 330

Procedural Memories 330

Priming 331

SUMMARY 9.1 332

How Is Long-Term Memory Organized? 333

Connectionist Theories 333

Inferences: Using Schemas 334

Experiencing Psychology Schemas and False
Memories 334

How Do We Retrieve Memories? 335

Retrieval From Short-Term Memory 335

Retrieval from Long-Term Memory 336

The Role of Cues 336

Diverse Voices in Psychology What Is the “Own-Race
Bias” in Memory for Faces? 336

Tip of the Tongue 337

Reconstruction During Retrieval 338

Retrieval of Emotional Events 340

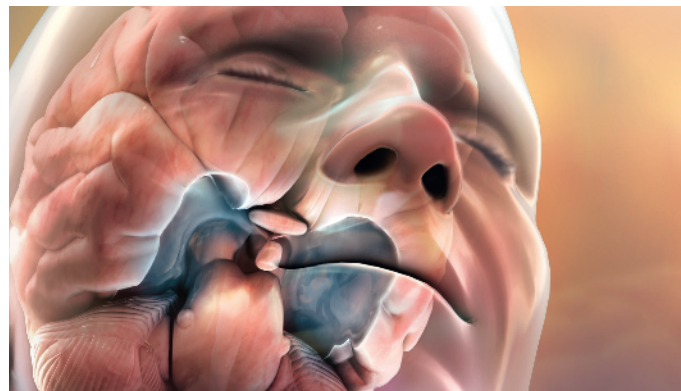
Psychology as a Hub Science How Reliable Are
Eyewitnesses? 341

SUMMARY 9.2 342

Why Do We Forget? 342

Decay 343

xvi CONTENTS



Argosy Publishing, Inc.

Interference 343

Motivated Forgetting 344

What Is the Biology of Memory? 345

Memory at the Level of the Synapse 345

Working Memory and the Brain 347

Long-Term Memories and the Brain 347

Declarative Memories and the Hippocampus 347

Declarative Memories and the Cerebral Cortex 347

Procedural Memories and the Basal Ganglia 348

Biochemistry and Memory 349

How Can We Improve Memory? 350

Distribute Practice over Time 350

Thinking Scientifically Does Using a Laptop or
Longhand to Take Notes Make a Difference? 351

Take Tests 352

Interleaving 352

Connecting to Research How Can We Protect Memory
Retrieval from Stress? 353

Exercise 354

Sleep 354

Recite 354

Use Mnemonics 355

Interpersonal Relationships The Memory
Perspective 356

Psychology Takes on Real-World Problems Compliance
with Social Distancing and Working Memory 357

SUMMARY 9.3 358

Key Terms: The Language of Psychological Science 358

10 The Thinking Mind

THINKING, LANGUAGE, AND INTELLIGENCE

What Do We Think About? 362

- Thoughts as Images 363
- Thoughts as Concepts 363
 - Prototypes and Exemplars 365
 - Concepts as Theories 366
 - Concepts and Schemas 367
 - Concepts and the Brain 367

How Do We Solve Problems? 368

- Understand the Problem 370
- Make a Plan 370
 - Generating Solutions 370
 - Decide on a Solution 374
- Carry Out the Plan 376
- Look Back 377
- Computer Models of Decision Making 377
- The Biological Psychology of Decision Making 377

Experiencing Psychology What Is Your Decision Style? 380

SUMMARY 10.1 382

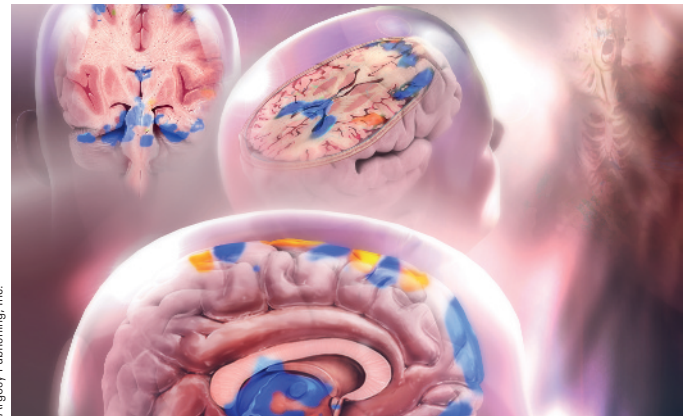
How Does Language Influence Behavior? 382

- The Origins of Human Language 383
- The Basic Building Blocks of Language 384
- The Biological Psychology of Language 384
 - Lessons From Language Disorders 385
 - Are Nonhuman Animals Capable of Real Language? 386
- How Do We Learn Language? 387

Diverse Voices in Psychology Is the “Language Gap” Real? 388

- Variations in Language Processing 389
 - Dyslexia 389
 - Multilingualism 390
 - Signed Languages 391

SUMMARY 10.2 391



Argosy Publishing, Inc.

What Is Intelligence? 392

- Assessing Intelligence 392
- General and Specific Abilities 392
- Emotional and Social Intelligence 394
- Biological Influences on Intelligence 395
 - Brain Structure, Brain Activity, and Intelligence 395

Psychology as a Hub Science How Beliefs About Intelligence Impact Education 396

Genetics and Intelligence 397

Connecting to Research What Is Collective Intelligence? 398

- Extremes of Intelligence 399
 - Intellectual Disability 400
 - Giftedness and Genius 401

Thinking Scientifically Can Children’s IQ Scores Be Increased with Special Baby Videos? 402

Interpersonal Relationships The Cognitive Perspective 403

Psychology Takes on Real-World Problems COVID-19 and the Availability Heuristic 404

SUMMARY 10.3 404

Key Terms: The Language of Psychological Science 405

11 The Developing Mind

LIFE SPAN DEVELOPMENT

What Does It Mean to Develop? 408

Nature and Nurture Intertwined 409

Continuity or Discontinuity 409

Universal or Ecological Development 410

How Do We Change Prenatally? 411

Genetic Risks to Development 412

Environmental Risks to Development 413

What Can Newborns Do? 416

The Newborn's Reflexes 416

The Newborn's Activity 416

The Newborn's Sex and Gender Development 417

The Newborn's Senses 418

SUMMARY 11.1 419

What Physical Changes Occur in Infancy and Childhood? 420

Nervous System Development 421

Motor Development 421

Gender Development in Childhood 423

Diverse Voices in Psychology What Are the Implications of Gender Assignment? 425

How Does Cognition Change During Infancy and Childhood? 425

Jean Piaget's Theory of Cognitive Development 426

The Sensorimotor Stage 427

The Preoperational Stage 427

The Concrete Operational Stage 428

The Formal Operational Stage 428

Criticisms of Jean Piaget's Theory 428

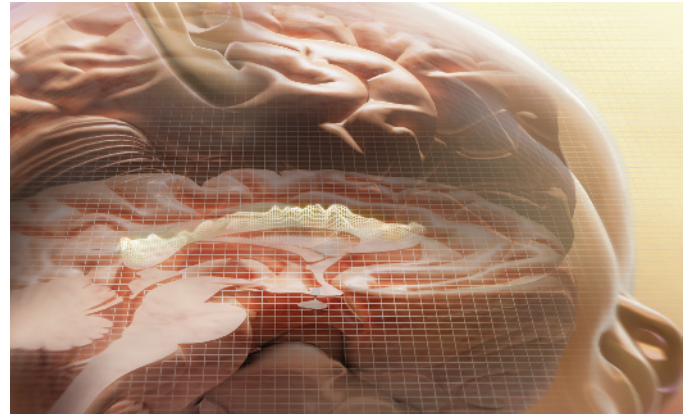
Alternative Approaches to Cognitive Development 429

Lev Vygotsky 429

Information Processing 429

Naïve Theories 430

Theory of Mind 430



How Do Social and Emotional Behaviors Change During Infancy and Childhood? 432

Temperament 432

Attachment 433

Connecting to Research The Evolution of Attachment Behavior 433

Parenting Styles 436

SUMMARY 11.2 438

What Does It Mean to Be an Adolescent? 438

Physical Changes in Adolescence 439

Sex, Gender, and the Adolescent 439

The Adolescent Brain 439

Experiencing Psychology How Risky Are You? 440

Cognitive and Moral Development in Adolescence 442

Adolescent Cognition 442

Moral Reasoning 442

Social and Emotional Development in Adolescence 443

Identity Formation in Adolescence 443

The Benefits of Ethnic Identity 444

Family and Peer Influences 444

What Is It Like to Be an Emerging or Young Adult? 446

Physical Status in Emerging and Young Adulthood 446

Cognition in Emerging and Young Adulthood: Postformal Thought 446

Thinking Scientifically Are Younger Generations More Narcissistic Than Previous Generations? 447

Relationships in Emerging and Young Adulthood 448

What Happens During Midlife? 448

Physical and Cognitive Aspects of Midlife 449

Social Changes in Midlife 449

What Is Late Adulthood Like? 450

Physical Changes in Late Adulthood 450

Cognition in Late Adulthood 450

Social and Emotional Aspects of Late Adulthood 451

Psychology as a Hub Science Psychology and the Well-being of Older Americans 452

Interpersonal Relationships The Developmental Perspective 454

Psychology Takes on Real-World Problems Pandemic Anxiety Across the Lifespan 455

SUMMARY 11.3 456

Key Terms: The Language of Psychological Science 456

12 The Individual Mind

PERSONALITY AND THE SELF

What Is Personality? 461

Historical Approaches to Personality 462

How Do Psychodynamic Theories View Personality? 462

The Id, Ego, and Superego 462

Freudian Defense Mechanisms 463

Psychosexual Stages of Development 463

Contemporary Assessments of Sigmund Freud's Approach 464

The Neo-Freudians 464

Classic Behaviorist Approaches to Personality 465

How Do Humanistic Psychologists Approach Personality? 466

How Do Trait Theories Explain Personality? 467

Early Trait Theories 468

The Big Five Theory 468

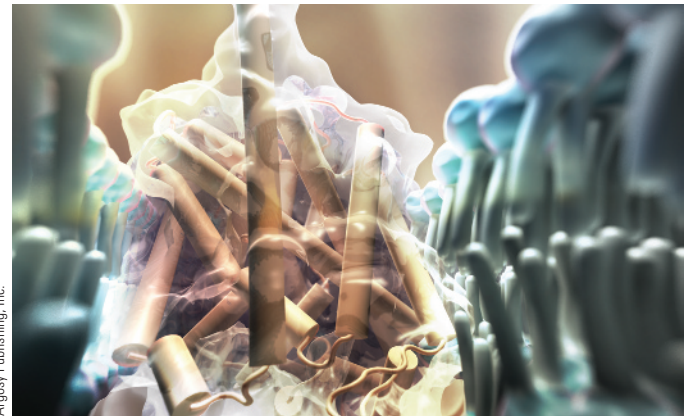
How Do Situations Affect Personality? 470

Experiencing Psychology A Short Version of the Big Five Inventory 470

Locus of Control 472

Reciprocal Determinism and Self-Efficacy 472

If-Then Relationships 473



What Are the Biological Bases of Personality? 473

Temperament and Personality 473

Connecting to Research Temperament Traits Can Be Contagious 474

Genetics and Personality 475

Personality, Brain Structure, and Brain Function 476

The Evolution of Personality 477

How Do We Assess Personality? 478

Personality Inventories 478

Thinking Scientifically Evaluating the Validity and Reliability of Personality Tests 480

Projective Tests 481

The Ethics of Personality Testing 482

Diverse Voices in Psychology Diversity and Personality

Assessments 482

SUMMARY 12.1 483

What Does It Mean to Have a Self? 483

Self-Concept 484

Self-Awareness 485

Self-Esteem 486

Sources of Self-Esteem 486

Gender, Race, and Culture and Self-Esteem 487

Using Self-Enhancement to Protect Self-Esteem 488

The Advantages of Self-Esteem 489

Psychology as a Hub Science Self-Esteem, Academic

Performance, and Aggression 490

Self-Regulation 491

The Brain and the Self 491

The Social Self 493

The Interpersonal Self 493

Cultural Influences on the Self 493

Interpersonal Relationships The Personality

Perspective 494

Psychology Takes on Real-World Problem Personality

and Responses to a Pandemic 496

SUMMARY 12.2 497

Key Terms: The Language of Psychological Science 497

13 The Connected Mind

SOCIAL PSYCHOLOGY

Why Are Humans So Social? 500

How Accurate Are First Impressions? 501

Experiencing Psychology The UCLA Loneliness

Scale 502

Why Did That Just Happen? 505

The Correspondence Bias and the Fundamental Attribution Error 505

Defensive Attributions 506

Connecting to Research Farming, Collectivism, and Individualism 507

Cultural Influences on Attribution 508

How Are Our Attitudes Influenced by Others? 509

Attitude Formation 510

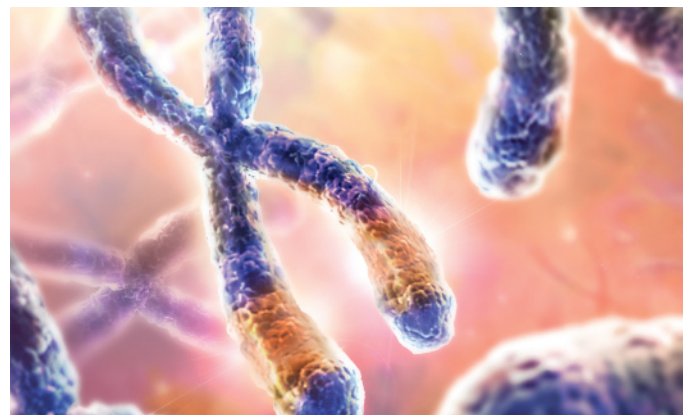
Cognitive Dissonance 510

Why Does Persuasion Happen? 512

The Elaboration Likelihood Model 512

Routes to Persuasion 512

Psychology as a Hub Science Social Media, Persuasion, and Fake News 514



Argosy Publishing, Inc.

The Neuroscience of Persuasion 515

SUMMARY 13.1 516

Why Are We Prejudiced? 516

Sources of Prejudice and Stereotyping 516

Outcomes of Prejudice 518

Reducing Prejudice 519

Diverse Voices in Psychology The Shooter Bias 520

Why Do We Go Along with the Group? 522

Conformity 523

XX CONTENTS

Compliance 524
Obedience 524
The Power of One 527

How Do Groups Work Together? 527

Social Facilitation 527
Social Loafing 528
Deindividuation 528
Group Polarization 528
Groupthink 529

SUMMARY 13.2 530

How Well Do We Get Along with Others? 531

Attraction and Liking 531
Building Relationships 533
Maintaining Relationships 533
Ending Relationships 534

SUMMARY 13.3 534

Why Do We Cooperate in Some Situations and Compete in Others? 535

Competition and Cooperation in Animals 535
Individual Differences in Cooperation and Competition 536
The Influence of Culture on Competition and Cooperation 536
Choosing Between Cooperation and Competition 536
Altruism and Helping 537

Why Are We Aggressive? 539

The Biological Psychology of Aggression 539
Learning and Aggression 541
Preventing Aggression 541

Thinking Scientifically Brain Damage and Criminal Behavior 542

Interpersonal Relationships The Social Perspective 544

Psychology Takes on Real-World Problems Persuasion During a Pandemic 545

SUMMARY 13.4 546

Key Terms: The Language of Psychological Science 546

14 The Troubled Mind

PSYCHOLOGICAL DISORDERS

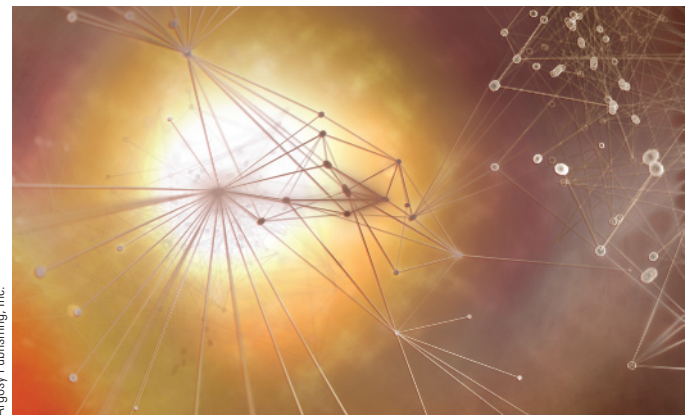
What Does It Mean to Have a Psychological Disorder? 550

How Are Psychological Disorders Diagnosed? 553

What Do the Psychological Perspectives Tell Us About Disorders? 554

Which Disorders Emerge in Childhood? 555

Autism Spectrum Disorder (ASD) 555
 Diagnosing ASD 555
 Causes of ASD 556
Attention Deficit Hyperactivity Disorder (ADHD) 558



Argosy Publishing, Inc.

Diagnosing ADHD 558
Causes of ADHD 560

SUMMARY 14.1 561

What Is Schizophrenia? 561

Symptoms of Schizophrenia 562

Causes of Schizophrenia	562	Social Explanations for GAD	580
Biological Factors in Schizophrenia	562	Integrating the Perspectives	580
Environmental Factors in Schizophrenia	565	OCD and Related Disorders	581
Thinking Scientifically Does Cannabis Use Increase Risk of Schizophrenia?	566	Obsessive-Compulsive Disorder (OCD)	581
What Is Bipolar Disorder?	567	Biological Explanations for OCD	581
What Is Major Depressive Disorder (MDD)?	568	Learning Explanations for OCD	581
Prevalence of MDD	568	Social Explanations for OCD	582
Causes of MDD	569	Body Dysmorphic Disorder	582
Learning Explanations for MDD	569	What Is Posttraumatic Stress Disorder?	582
Cognitive Explanations for MDD	570	Biological Explanations for PTSD	583
Social Explanations for MDD	571	Learning Explanations for PTSD	584
Biological Explanations for MDD	571	Social and Cultural Explanations for PTSD	584
Connecting to Research Recognition of Facial Expression by People with Depression	572	What Are Dissociative Disorders?	584
Stress and MDD	573	What Are Somatic Symptom Disorder and Related Disorders?	585
Diverse Voices in Psychology Race, Ethnicity, Gender, Sexual Orientation, and Prevalence of Suicidality	574	What Are Personality Disorders?	586
SUMMARY 14.2	575	Antisocial Personality Disorder (ASPD)	586
What Is an Anxiety Disorder?	576	Borderline Personality Disorder (BPD)	587
Specific Phobias	576	Narcissistic Personality Disorder (NPD)	587
Social Anxiety Disorder	577	Psychology as a Hub Science The “Dark Side” of Leadership	588
Panic Disorder	578	Experiencing Psychology Assessing Narcissism	590
Biological Explanations for Panic Disorder	578	Interpersonal Relationships The Clinical Perspective	592
Cognitive Explanations for Panic Disorder	578	Psychology Takes on Real-World Problems Is COVID-19 Making Cases of OCD Worse?	593
Social Explanations for Panic Disorder	579	SUMMARY 14.3	594
Integrating the Perspectives	579	Key Terms: The Language of Psychological Science	595
Agoraphobia	579		
Generalized Anxiety Disorder	580		
Biological Explanations for GAD	580		
Cognitive Explanations for GAD	580		

15 Healing the Troubled Mind

THERAPY

How Do Psychologists Provide Therapy? 598

- Approaches to Treatment 599
 - Biological Approaches 599
 - Psychological Approaches 600
 - Evidence-Based Practice 601
 - Clinical Assessment 602
- The Therapists 602
- Delivering Psychotherapy 605
 - Variations in Length of Treatment 605
 - Alternatives to Individual Therapy 605
 - Innovative Delivery Systems 606

Diverse Voices in Psychology Psychotherapy with Native Americans 607

- Contemporary Challenges in Treatment 608

SUMMARY 15.1 608

Historical Approaches to Psychotherapy 609

- Psychoanalysis 609
- Humanistic Therapies 610

Contemporary Approaches to Psychotherapy 612

- Behavioral Therapies 612
- Cognitive Therapies 613
- Biopsychosocial Approaches 614

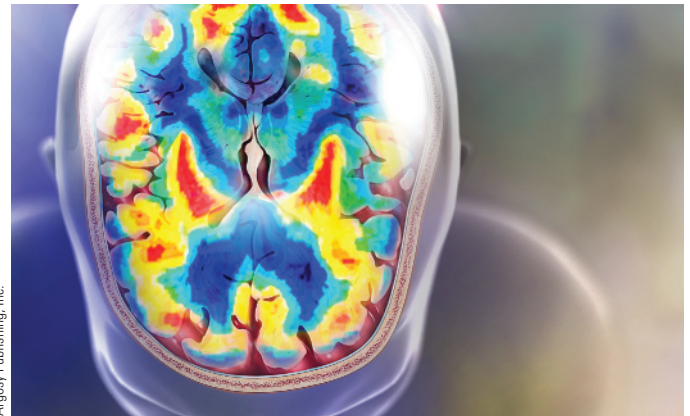
What Are Biological Therapies? 614

- Medication 615
- Electroconvulsive Therapy 615
- Psychosurgery 615
- Brain Stimulation 616
- Neurofeedback 617

SUMMARY 15.2 618

How Are Specific Disorders Treated? 618

- Treating Neurodevelopmental Disorders 618
 - Treating ASD 618



Argosy Publishing, Inc.

Thinking Scientifically Should Autism Spectrum Disorder (ASD) Be Treated? 619

- Treating ADHD 620
- Treating Schizophrenia 623
- Treating Bipolar Disorder 624
- Treating Major Depressive Disorder (MDD) 624

Connecting to Research Mindfulness and the Prevention of Relapse in Major Depressive Disorder (MDD) 627

- Treating Anxiety Disorders 628
- Treating OCD 629

Experiencing Psychology Progressive Relaxation 629

- Treating Body Dysmorphic Disorder 630
- Treating PTSD 630

Psychology as a Hub Science Using Virtual Reality (VR) to Treat Anxiety and PTSD 630

- Treating Dissociative Identity Disorder 631
- Treating Somatic Symptom Disorders 632
- Treating ASPD 632
- Treating Borderline Personality Disorder 632
- Treating NPD 632
- Integration of Specific Treatments 633

Interpersonal Relationships The Treatment Perspective 634

Psychology Takes on Real-World Problems Online Therapy During the COVID-19 Pandemic 635

SUMMARY 15.3 636

- Key Terms: The Language of Psychological Science 637

16 The Healthy Mind

STRESS AND COPING, HEALTH PSYCHOLOGY, AND POSITIVE PSYCHOLOGY

What Is Stress? 640

The Stress Response 640

Experiencing Psychology What Is Your Stress Mindset? 641

Sources of Stress 643

What Are the Biological and Social Correlates of Stress? 645

Stress and the Amygdala 645

Stress, the Sympathetic Adrenal–Medullary System, and the Hypothalamic–Pituitary–Adrenal Axis 647

The Epigenetics of Stress 648

Gender Differences in the Stress Response 649

Socioeconomic Status and Stress 649

How Does Stress Affect Our Health? 650

Stress and the Immune System 650

Stress and Heart Disease 651

Connecting to Research Social Challenges Early in Life Affect the Developing Immune System 652

Stress, Mood, Sleep, and Obesity 652

An Integrated View of Stress and Health 654

Psychology as a Hub Science Belongingness, Stress, Achievement, and Health 655

How Can We Cope Effectively With Stress? 656

Managing Stress 656

Three Types of Coping 658

Resilience: Individual Differences in Response to Stress 659

SUMMARY 16.1 660

What Is the Relationship Between Psychology and Health? 660

Behavior and Health 662

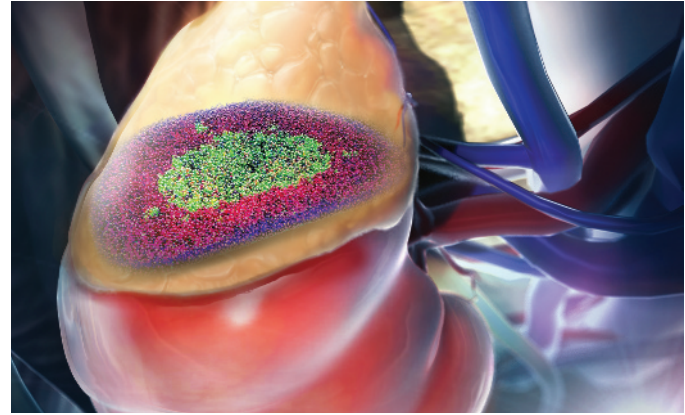
Tobacco Use 663

Nutrition 665

Alcohol 666

Exercise 668

Loneliness and Health 669



Argosy Publishing, Inc.

Culture and Health 670

An Integrated Understanding of Health Behaviors 671

SUMMARY 16.2 672

What Is Positive Psychology? 672

Positive Emotions 673

What Is Happiness? 674

Diverse Voices in Psychology Optimism Across Race and Ethnicity 674

Happiness and Marriage 675

Happiness and Wealth 675

Thinking Scientifically Does Parenting Increase Happiness? 676

Can We Increase Happiness? 678

Positive Traits 680

Positive Institutions 681

Positive Psychology and the Future 682

Interpersonal Relationships The Health Psychology Perspective 682

Psychology Takes on Real-World Problems Resilience in the Face of a Pandemic 683

SUMMARY 16.3 684

Key Terms: The Language of Psychological Science 684

References R-1

Name Index N-1

Subject Index/Glossary S-1

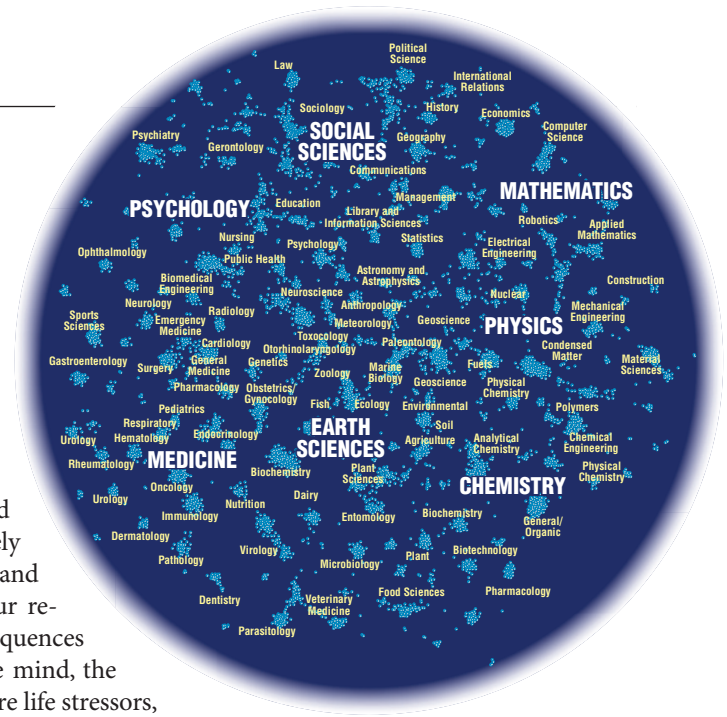
Preface

These unprecedented times call for an even better understanding of the mind than ever before. In 2020, our minds have been challenged, stressed, calmed, and stressed again. There is a need, as a society, to better comprehend the healing and connecting power of the mind to keep transforming adversity into an opportunity to grow stronger and healthier together. Over the past months, we learned that we can be physically distant yet remain emotionally connected with our friends and family—we also realized that the same situation can feel extremely friendly or extremely ostracizing—just with the power of our mind and our inner dialogue. The way we interpret a situation may drive our response to it—and in turn, our response to a situation may have consequences for our mental health and well-being. The more we understand the mind, the more we can adapt and reframe our perspectives on current and future life stressors, develop evidence-based coping mechanisms, and improve our mental well-being. This textbook offers a rare opportunity to further discover the powerful psychological science of the mind.

In line with our first edition, this fourth edition of *Discovering Psychology: The Science of Mind* is a textbook that reflects Dr. John Cacioppo's visionary mission to write a textbook as a bridge to the future. *Discovering Psychology: The Science of Mind* describes the psychological science of mind as a hub science—a discipline whose work provides foundational material for many other scientific fields and a wide range of applications from eating habits to real-world problem solving. Psychological science is also inherently interdisciplinary, and we wanted to write a textbook that presents psychology not as a series of isolated areas of inquiry, but as an integrated, holistic science of mind. Contemporary psychological science is also a global affair, and we sought to produce a textbook that draws on evidence from diverse samples of healthy participants and patients, as well as studies of animals. These goals and our implementation of them resonated with all of us: both instructors and students using our previous editions. In honor of John, we have stayed true to his mission and have attempted to expand its implementation in this, our fourth edition.

The science of psychology developed in the 20th century as a collection of loosely organized, independent subspecialties. Now, in the 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 we marvel at the speed at which new developments are emerging in the theory, methods, and applications of psychological science. This fourth edition is designed to capture some of the most important developments that have emerged in recent years and to reflect the power of psychological science to help us manage the types of challenges that emerged in 2020.

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 students 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



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

in our introductory classes will take only 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 fourth 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 century until today, 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 that busy faculty members must find between their preparation for class and their many other duties, especially while navigating an online delivery system. 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, 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 psychologists think about human behavior.

As citizens of the so-called COVID era, community leaders, influencers, and college graduates will need a firm foundation in the understanding of human behavior and critical thinking to cope with stressors and confront successfully the myriad issues of social isolation, health, privacy, free will, human dignity, public policy, and well-being that might face them again in the future. This fourth 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. 233). 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 and personality, cognitive, biological and evolutionary, developmental, and clinical perspectives are combined can it be thoroughly grasped. James (1890, vol. 1, p. 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.” 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. Viewed through this lens, behavior is neither random nor unexplainable, and it 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 that 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 is 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 five integrative perspectives that weave the standard topics more closely together: social and personality psychology, cognition, biology and evolution, development, and clinical psychology. The need to consider major perspectives in psychology was reinforced in a report titled “Strengthening the Common Core of the Introductory Psychology Course,” published in 2014 by the American Psychological Association (APA Board of Educational Affairs Working Group, 2014) and expanded upon by the APA’s Introductory Psychology Initiative. 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 the chapters. These perspectives are explained in greater detail in the following section.

4. Each chapter includes eight 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, Perspectives on Interpersonal Relationships, Diverse Voices in Psychology, and Psychology Takes on Real-World Problems. These features are designed to promote active learning and to increase student interest. Four of these in particular (Chapter Opener, Perspectives on Interpersonal Relationships, Psychology Takes on Real-World Problems, 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 colors 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. Psychology Takes on Real-World Problems tackles the issue of the COVID-19 pandemic, highlighting research relevant to each chapter that can be applied to understanding behavior during a pandemic and developing thoughtful policy. 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 the following eight 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 accompanying 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 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 the Hypersensitive Narcissism Scale in the chapter on psychological disorders (Chapter 14). 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 review the current controversies about replication in psychology. In the chapter on psychological treatments (Chapter 15), students are asked to evaluate whether autism spectrum disorder (ASD) is simply a difference or something requiring treatment.

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, ethics, 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.

Diverse Voices in Psychology The American Psychological Association (APA) report on best practices for introductory psychology (Gurung et al., 2016) emphasized the inclusion of culture and diversity as a “cross-cutting theme” (p. 112). Although we concur with Trimble, Stevenson, and Worell (2003; see later discussion in this forward) regarding the need to integrate diversity across topics in an organic way, which guided all four editions of this textbook, we thought additional in-depth discussions would be useful. This feature explores timely topics such as the shooter bias (Chapter 13) and culturally competent counseling and psychotherapy with Native Americans (Chapter 15).

Psychology Takes on Real-World Problems Introductory psychology courses provide a unique opportunity to not only prepare students for continued study in psychology, but also to provide tools to majors and nonmajors alike that can be used to tackle significant human problems. Once again taking a cue from the APA's introductory psychology report, we have incorporated aspects of the “Big Problems” activity described in the report's appendix into this feature. For this fourth edition, we selected the topic of the COVID-19 pandemic, which is not only top-of-mind for today's students, but also provides opportunities to apply multiple aspects of psychological science. We provide a template for policy development, emphasizing the utility of psychological science to real-world problems. Each chapter highlights ways in which its material can be used to address the causes of and solutions to problems related to the pandemic, emphasizing the practical significance of psychological science and encouraging students to apply their learning to policy evaluation and change.

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 and Personality 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. 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.

Cognitive The human is above all else a thinking organism, and the way that 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 that 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 either, 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. Not only is love somewhat socially blind, but it 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 (ASD). 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 turned 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.

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 three editions were embraced by faculty working with students representing a wide range of preparation, from community colleges to 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 a textbook “level.” Instead, we believe that all students can master complex content if it is presented in the right way.

As this text goes to press, we are unsure about the direction institutions will take regarding virtual versus face-to-face instruction. As active instructors of introductory psychology, we have shared the journey of many of our colleagues as we navigate the online teaching space. One of our authors (LF) has more than ten years of experience in a completely online environment (Argosy University Online), and we have attempted to keep the needs of online students and instructors top of mind as we revise this latest edition. Many students and faculty are using electronic text resources for the first time, and we are hearing concerns about screen fatigue and other perceived challenges of this medium. Developing an electronic version of a text is not about converting a print book to pdf files. Instead, proactive strategies such as breaking material into reasonable sections and providing sufficient illustrations work for both print and electronic versions alike.

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 students with wide ranges of preparation, 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 that 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 that they read. As this textbook goes to press, issues of diversity and fairness are especially salient in our conversations and news reports. On behalf of the APA, 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. Gurung et al. (2016, p. 112), also writing on behalf of the APA, emphasized the need to present culture and diversity as “cross-cutting themes” throughout the introductory psychology course. We have used these papers as a blueprint for incorporating the dimension of diversity in our textbook.

We adamantly concur with Trimble et al. (2003, p. 2) when they state, “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.” 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. Although Trimble et al. (2003) appear to dislike feature boxes, we have found it useful to augment the discussion of culture and gender in the narrative by highlighting special topics in our *Diverse Voices in Psychology* feature. We believe that this combination represents the antithesis of the biggest concern raised by Trimble et al. (2003)—isolated, disconnected discussion of diversity in boxes alone.

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 to obtain a copy.

In addition, great care has been taken to adhere to APA standards on language. The illustrations feature individuals of diverse races, ethnicities, ages, abilities, and gender. When possible, they 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.

A Complete Course—Teaching and Learning Supplements

A rich array of supplements accompanies Cacioppo/Freberg/Cacioppo's *Discovering Psychology: The Science of Mind*, 4th edition, including several that make use of the latest technologies. These supplements are designed to make teaching and learning more effective. Many are available free to professors or students. Others can be packaged with this textbook at a discount. Contact your local sales representative for more information on any of the listed resources.

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 Rich Site Summary (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.

The Instructor Companion Site

The Instructor Companion Site for this title includes an *Instructor's Resource Manual*, which provides a wealth of teaching tips and classroom resources; *Cengage Learning Testing Powered by Cognero* featuring questions correlated to learning objectives, Bloom's taxonomy level, and difficulty; and *PowerPoint slides* providing concept coverage with dynamic animations, photographs, and video.

Changes in the Fourth Edition

An obvious change in the fourth edition is the addition of Steph Cacioppo to our author team. Steph not only collaborated closely with John (they shared a desk), but she brings her own unique perspectives as a licensed clinician to the textbook.

Progress in psychological science continues to move forward at a blistering pace, and this fourth 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.

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

Chapter 1 The Science of Mind: The Discipline of Psychology

- Expands ties between the textbook and the pillars and cross-cutting themes recommended by the APA Introductory Psychology Initiative.
- Added new section explicitly outlining the advantages of studying psychology for contemporary students.
- Expanded discussion of perspectives to include APA divisions that are not typically covered in intro psychology textbooks.
- Includes a table of common myths in psychology.
- Refreshed the *Psychology Takes on Real-World Problems* feature (cyberbullying in 3e) to a discussion of pandemics. Includes specific information on policy development.

Chapter 2 The Measure of Mind: Methods of Psychology

- Updated discussion of confirmation bias.
- Added section on “truthiness” or how we can be fooled into thinking false information is true.
- Updated section on hypothesis testing and the null hypothesis.
- Expanded discussion of quasi-experiments.
- Expanded discussion of correlations and mistakes in interpretation.
- Updated discussion of descriptive statistics and central tendency with new examples.
- Updated and clarified discussion of statistical significance and effect sizes.
- Refreshed *Experiencing Psychology* feature to the use of critical thinking to evaluate popular press reports of scientific findings. The example used is a report about depression and social media use.
- Updated the *Hub Science* feature to discuss the development of factor analysis.
- The *Psychology Takes on Real-World Problems* feature discusses the application of the research methods covered in the chapter to a specific question with policy implications: Why do people wear masks in some situations and not others?

Chapter 3 The Evolving Mind: Nature and Nurture Intertwined

- Emphasized application of genetics to understanding of causes of psychological disorders and their potential treatments.
- Discussed rates of gene expression as differentiating between species, e.g. humans and other primates.
- Clarified discussion of heritability.
- Uses a study about blood type and risk of COVID-19 severity to illustrate genome-wide association studies (GWAS).
- Updated Flynn effect discussion.
- Refreshed *Experiencing Psychology* feature with an activity for identifying your cat's genome related to length of fur and fur coloring.
- Reformatted Warrior Gene *Thinking Scientifically* feature to include critical thinking questions discussed in Chapter 2.
- Refreshed *Real-World Problems* feature with a discussion of the impact of genetics on responses to social distancing recommendations.

Chapter 4 The Biological Mind: The Physical Basis of Behavior

- Refreshed *Thinking Scientifically* feature to discuss eye movement desensitization and reprocessing therapy (EMDR).
- Updated *Hub Science* feature to discuss the use of neuroscience in courts to assess “dangerousness” at parole hearings.
- Refreshed *Real-World Problems* feature to cover social distancing, loneliness, and the brain.

Chapter 5 The Perceiving Mind: Sensation and Perception

- Inclusion of ganglion cells related to circadian rhythms and sensitivity to brightness.
- Added discussion of perfect pitch and autism spectrum disorder.
- Inclusion of a “hermunculus,” or an attempt to map parts of the body to the sensory cortex in females (instead of the traditional homunculus, or male version).
- Update of *Diverse Voices* feature to include new research on culture and vision.
- Perceptions of taste and culture—including crispy tarantulas!
- Refreshed *Real-World Problems* feature to look at social distancing and the perception of threat.

Chapter 6 The Aware Mind: Elements of Consciousness

- Expanded coverage of the default mode network (DMN) relative to conditions such as autism spectrum disorder.
- Update on “social jet lag.”
- Update on sleep spindles, learning, and Alzheimer's disease.
- Update on screen time and insomnia.
- Update on brain death.
- Update on LSD's mode of action.
- Update on opioid epidemic.
- Refreshed *Connecting to Research* feature with discussion of the effects of psychedelics on consciousness.

- Refreshed *Thinking Scientifically* feature to discuss the potential for using hallucinogens in therapy.
- Refreshed *Real-World Problems* feature with discussion of sleep during a pandemic.

Chapter 7 The Feeling Mind: Emotion and Motivation

- Added discussion of “power posing” and its replication issues to the facial feedback section.
- Added discussion of somatic markers (without using that term, however).
- Updated section on female sexual interest.
- Updated section on genetics and sexual orientation with discussion of the important Ganna et al. (2019) GWAS study.
- Expanded discussion of achievement motivation.
- Added application of Maslow’s hierarchy of needs to understanding behavior during COVID-19.
- Refreshed *Thinking Scientifically* feature with a discussion of participation trophies and motivation.
- Refreshed *Real-World Problems* feature with discussion of COVID-19 and motivational priorities.

Chapter 8 The Adaptive Mind: Learning

- Expanded discussion of operant conditioning applications to spanking practices and behavior in HOV lanes.
- Discussion of classical conditioning and opioid overdose.
- Expanded *Hub Science* feature on taste aversion and endangered species to include the marbled murrelet and the quoll in addition to the Mexican wolf.
- Refreshed *Thinking Scientifically* feature to discuss appropriate ways to praise children.
- Refreshed *Real-World Problems* feature to discuss whether people can learn to be less lonely during social distancing.

Chapter 9 The Knowing Mind: Memory

- Added discussion of reconsolidation following retrieval.
- Added discussion of caffeine and memory.
- Added discussion of interleaving to study skills recommendations.
- Refreshed *Thinking Scientifically* feature with a discussion of taking notes longhand or using a computer.
- Refreshed *Real-World Problems* feature with discussion on compliance with social distancing and working memory.

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

- Updated discussion of neuromarketing.
- Expanded discussion of rumination in problem solving.
- Update and revision of section on heuristics.
- Added explicit best practices for decision making.
- Update and revision of section on dyslexia.
- Update and revision of section on bilingualism and multilingualism.
- Revision of section on emotional and social intelligence.
- Update and revision of section on brain structure and intelligence.

- Updated section on giftedness with discussion of acceleration effects.
- Updated *Thinking Scientifically* section on baby videos, e.g. Baby Einstein.
- Refreshed *Real-World Problems* section with a discussion of the availability heuristic and COVID-19.

Chapter 11 The Developing Mind: Life Span Development

- Update on teratogens, including acetaminophen (Tylenol/Anacin), and ADHD and autism spectrum disorder.
- Addition of research on COVID-19 effects on the fetus.
- Revision of discussion of sex chromosomes and intersex.
- Added discussion of research on infant’s understanding of social power.
- Expanded discussion of attachment to include cross-cultural data and correlations with adult romantic attachments.
- Expanded discussion of indulgent parenting, which has become more common in recent years.
- Addition of other theories of moral reasoning following Kohlberg’s.
- Addition of stage of emerging adulthood, with contrasts to adolescence and young adulthood.
- Update and revision of cognitive changes in later adulthood.
- Refreshed *Relationships* feature with a discussion of a “perfect” time to get married.
- Refreshed *Real-World Problems* feature with a discussion of pandemic anxiety across the lifespan.

Chapter 12 The Individual Mind: Personality and the Self

- Updated discussion of serotonin transporter gene and culture.
- Added discussion of ambiverts.
- Updated discussion of genetics, brain structure, and personality.
- Updated discussion of personality assessment to reflect changes in the most recent version of the MMPI.
- Updated discussion of gender, race/ethnicity, and self-esteem.
- Updated discussion of individualistic versus collectivistic cultures.
- Refreshed *Diverse Voices* feature with discussion of diversity and personality assessment.
- Refreshed *Real-World Problems* feature with discussion of personality and responses to a pandemic.

Chapter 13 The Connected Mind: Social Psychology

- Updated discussion of first impressions.
- Revised section on the neuroscience of cognitive dissonance.
- Added section on the neuroscience of persuasion.
- Expanded discussion of social identities.
- Expanded section on reducing prejudice.
- Updated and expanded *Hub Science* feature on social media and fake news, including explicit hints for avoiding belief in fake news stories.
- Refreshed *Thinking Scientifically* feature with a discussion of brain damage and criminal behavior.
- Refreshed *Real-World Problems* feature to discuss persuasion during a pandemic.

Chapter 14 The Troubled Mind: Psychological Disorders

- Included update on the 11th edition of ICD.
- Update of causal factors related to autism spectrum disorder.
- Expanded discussion of schizophrenia to include saccade differences.
- Added discussion of oxidative stress in bipolar disorder.
- Update of learned helplessness and major depressive disorder section to reflect Maier and Seligman's (2016) rethinking of the original experiments.
- Added discussion of genetics in height phobia.
- Update of discussion of culture in social anxiety.
- Update of biological correlates of OCD.
- Update on causal factors and PTSD.
- Update of biological correlates of antisocial personality disorder.
- Refreshed *Thinking Scientifically* feature with discussion of cannabis and psychosis.
- Refreshed *Diverse Voices* feature with discussion of culture, race, ethnicity, sexual orientation, and suicidality.
- Revised and updated *Hub Science* feature on leadership and psychopathy.
- Refreshed *Real-World Problems* feature with discussion of COVID-19 and OCD.

Chapter 15 Healing the Troubled Mind: Therapy

- Updated discussion of life coaching.
- Added discussion of transcranial direct electrical stimulation for the treatment of auditory hallucination.
- Update on research about the efficacy of antidepressant medications.
- Revised section on treatment of PTSD.
- Refreshed *Diverse Voices* feature with a discussion of psychotherapy with Native Americans.
- Refreshed *Thinking Scientifically* feature with a discussion of neurodiversity versus disorder/disability in autism spectrum disorder. This includes Simon Baron-Cohen's "4 D's": disorder, disability, difference, and disease.
- Refreshed *Real-World Problems* feature with a discussion of online therapy during COVID-19.

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

- Added discussion of stress and COVID-19.
- Added discussion of robotic pets as stress reducers for patients with Alzheimer's disease.
- Expanded discussion of vaping.
- Expanded discussion of loneliness interventions.
- Updated culture and health section with data regarding COVID-19.
- Expanded positive psychology section to include PERMA model.
- Revised happiness discussion with latest world happiness data.
- Expanded discussion of the "meaningful life" and happiness.
- Revised *Thinking Scientifically* feature on parenting and happiness.
- Refreshed *Real-World Problems* feature to discuss resilience during a pandemic.

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. Colin Grover shared our vision for this textbook from the outset and went many extra miles to make it a reality. Christy Frame, Nick Barrows, Deanna Ettinger, and Jessica Witzcak 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

We could not produce this textbook without the meticulous and thoughtful input of our peers. We continue to stand in awe of the care that our colleagues put into their teaching and their desire for their students to succeed. Many thanks to the following reviewers of this book:

Judith Addelston, *Valencia College, East*
Anthony Ahrens, *American University*
John Allen, *University of Arizona*
Roxanna Andersen, *Palm Beach State College, Boca Raton*
Stacy Anderson, *Florida Gulf Coast University*
Ted Barker, *Northwest Florida State College*
Mark Basham, *Regis University*
Kyle Baumbauer, *Texas A&M University*
Kathy Becker-Blease, *Oregon State University*
Kristen T. Begosh, *University of Delaware*
Richard Bernstein, *Broward College, South Campus*
Melissa A. Berry, *University of Dayton*
Kathleen Bey, *Palm Beach State College, Lake Worth*
Rachel Blaser, *University of San Diego*
Sara Broaders, *Northwestern University*
Christina M. Brown, *Saint Louis University*
Eric Bruns, *Campbellsville University*
Kathryn Caldwell, *Ithaca College*
Aimee A. Callender, *Auburn University*
David Campbell, *Humboldt State University*
John Timothy Cannon, *University of Scranton*
Brian D. Carpenter, *Washington University, St. Louis*
Lawrence Cohen, *University of Delaware*
Kyle Evan Conlon, *Boise State University*
John Connor, *Daytona State College*
Brian Cowley, *Park University*
Verne Cox, *University of Texas, Arlington*
David Seth Crystal, *Georgetown University*
Natalie Dautovich, *University of Alabama*
Sarah D'Elia, *George Mason University and Northern Virginia Community College*
Matthew Draper, *Utah Valley University*
Patrick Drumm, *Ohio University, Lancaster*
Robert DuBois, *Waukesha County Technical College*
Kimberly Duff, *Cerritos College*
Megan Dunbar, *California State University San Marcos and Palomar College*
Darlene Earley, *Southern Union State Community College*

Dawn Eaton, *San Jacinto College-South*
Jennifer Engler, *York College of Pennsylvania*
Kathy Erickson, *Pima Community College*
Carlos Escoto, *Eastern Connecticut State University*
Kendall Eskine, *Loyola University New Orleans*
Melanie Evans, *Eastern Connecticut State University*
Bryan D. Fantie, *American 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*
Jeanette Gassaway, *Ohio University*
Bryan Gibson, *Central Michigan University*
Allen Gorman, *Angelo State University*
Ruth Grahn, *Connecticut College*
Ruth M. Grant, *Sacred Heart University*
Alexis S. Green, *Hanover College*
Anthony Greene, *University of Wisconsin, Milwaukee*
Christina Grimes, *Duke University*
Scott Gustafson, *University of Mississippi*
Carrie E. Hall, *Miami University*
Erin E. Hardin, *Texas Tech University*
Gregory Harris, *Polk State College*
Jeffrey Henriques, *University of Wisconsin, Madison*
Robert J. Hines, *University of Arkansas, Little Rock*
Kelly Huffman, *University of California, Riverside*
Linda Jackson, *Michigan State University*
Jennifer Johnson, *Bloomsberg University*
Todd Joseph, *Hillsborough Community College, Dale Mabry*
Irene P. Kan, *Villanova University*
Kevin Keating, *Broward College, North*
Craig Kinsley, *University of Richmond*
Michelle (MiKi) Kitchen, *University of South Carolina*
Cheri Kittrell, *State College of Florida, Manatee-Sarasota*
Megan L. Knowles, *Franklin and Marshall College*
Jordan Labouff, *Baylor University*
Debra Laino, *Philadelphia University*
Carrie Lane, *Florida State University*
Jamison D. Law, *Utah Valley University*
Natalie Lawrence, *James Madison University*
Jennifer Lee, *Cabrillo College*
Angela M. Legg, *Pace University, Pleasantville*
Fabio Leite, *Ohio State University, Lima*
Robin Lightner, *University of Cincinnati*
Carrie A. Lloyd, *Huntington University*
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*
Daniel McConnell, *University of Central Florida*
Anna Medina, *Gonzaga University*
Sean P. Meegan, *University of Utah*
Antoinette Miller, *Clayton State University*

Robin K. Morgan, *Indiana University Southeast*
 Ronald Morrison, *Daytona State College*
 Michelle Niculescu, *Lebanon Valley College*
 Charlotte Nolan-Reyes, *Cabrillo College*
 Kevin O'Neil, *Florida Gulf Coast University*
 Hajime Otani, *Central Michigan University*
 Gwendolyn Parsons-Spurrier, *Hillsborough Community College, Ybor City Campus*
 Lois Pasapane, *Palm Beach State College, Lake Worth*
 Marion Perlmutter, *University of Michigan, Ann Arbor*
 David J. Rademacher, *Carthage College*
 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*
 Marylou Robins, *San Jacinto College-South*
 Dario Rodriguez, *University of Dayton*
 Ronnie Rothschild, *Broward College, Central Campus*
 Sharleen Sakai, *Michigan State 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*
 Alex Sharpe, *Santa Fe College*
 Donald Sharpe, *University of Regina*
 Caroline Shelton-Toney, *Polk State College*
 Cindy Sledge, *San Jacinto College-South*
 Mikle Don South, *Brigham Young University*
 William Suits, *Seminole State College of Florida*
 Cyril Svoboda, *University of Maryland University College*
 Lara Tedrow, *Tidewater Community College*
 Brian Thomas, *Baldwin-Wallace College*
 Lisa Thomassen, *Indiana University, Bloomington*
 Clarissa Thompson, *University of Oklahoma*
 Terry Trepper, *Purdue University Southwest*
 Alexa Tullet, *University of Alabama*
 Lindsey West, *Georgia Regents University*
 Elisha White, *University of Cincinnati, Blue Ash College*
 Katherine Urquhart, *Lake Sumter Community College*
 Anre Venter, *University of Notre Dame*
 Craig Vickio, *Bowling Green State University*
 Mark Walter, *Salisbury University*
 Shannon Welch, *University of Idaho*
 Lona Whitmarsh, *Fairleigh Dickinson University*
 John Wright, *Washington State University*
 Erin Young, *Texas A&M University*

We also thank Suzanne Corkin (1937–2016) for reading and commenting on sections describing the amnesic patient H. M. (Henry Molaison) in our first edition.

Finally, we could not have done this without the patience and support of our families.



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

Argosy Publishing, Inc.

The Science of Mind

THE DISCIPLINE OF PSYCHOLOGY

LEARNING OBJECTIVES

1. Identify the five in-depth perspectives of psychology and explain how integrating these perspectives leads to a more comprehensive and accurate view of behavior and mental processes.
2. Explain why issues of diversity and ethics are important to explore across all topics in psychology.
3. Explain the contributions of philosophy and the natural sciences to our understanding of modern psychology.
4. Describe how early movements in psychology are significant for modern psychology.
5. Discuss the importance of the scientific method as a foundation for psychology.
6. Explain why psychology's role as a hub science supports applications in many academic fields, contributes to the solutions of critical contemporary problems, and informs the development of public policies.

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 commonsense beliefs about the human mind and behavior. We all “know” that 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. Most of us can taste sweetness in a solution made of 1 part sugar and 200 parts water. As remarkable as this sensitivity appears to be, however, people can detect 1 part bitter substance (like quinine or the 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 personal experience of taste does not help us much in answering this question, but psychological science 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



Masterfile

Can you tell whether you're experiencing lust or romantic love? *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 the mind. In this functional magnetic resonance imaging (fMRI) scan, areas of the brain that were more active when participants were feeling lust are shown in blue and areas that were more active when people are experiencing feelings of romantic love are shown in pink. Through technology, researchers can better understand complex behaviors like love and lust.

From <https://news.uchicago.edu/story/researchers-find-brains-sweet-spot-love-neurological-patient>



Source: University of Chicago Office of Communications

bitter is a trait that has served our species well because it helps us avoid eating things that could kill us. Psychology helps us understand why we do the things we do by providing a context for understanding the mind and behavior.

To gain that understanding, psychology addresses questions from the multiple scientific perspectives discussed in this chapter. One can think of this 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 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.

To begin, we can look at the little boy's reaction to his broccoli from a developmental perspective, which tells us that children are more sensitive to taste than adults. Using a biological perspective, we can trace the neural mechanisms responsible for taste sensitivity. 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. Meanwhile, deep-fried tarantulas, a delicacy in Cambodia, might not be a popular item in the United States.

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



iStock.com/NASA/Kutay tahir

We'll start by learning more about psychology's main perspectives, along with a little background about their origins. Our approach to these perspectives is consistent with contemporary recommendations for teaching introductory psychology

made by the American Psychological Association (e.g., Gurung et al., 2016). Once we understand these perspectives, we'll be in a better position to see how they come together to give us the big picture.

What Is Psychology?

Psychology is the scientific study of the **mind**, which includes 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 “mind,” and *logos*, meaning “the objective study of.” Literally translated, therefore, **psychology** means “the objective study of the mind.” Today, we define psychology as the scientific study of behavior, mental processes, and brain functions.

The phrase “behavior, mental processes, and brain functions” has undergone several changes over the history of psychology. *Behavior* refers to any action that we can observe. For many years, our definition stopped at this point. The more recent addition of *mental processes* and *brain functions* to our definition was made possible by the development of improved research methods. 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 in

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

psychology The scientific study of behavior, mental processes, and brain functions.

introspection A personal observation of your own thoughts, feelings, and behavior.

PSYCHOLOGY AS A HUB SCIENCE

Why Is Psychology a Hub Science?

MOST READERS OF THIS BOOK are not pursuing careers in psychology, so how will this material help you in your chosen career? Psychology is all about people, and nearly all occupations require an understanding of people and their behavior. An architect cannot design a functional space without considering how people respond to being crowded. 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. Business leaders and economists cannot predict the movements of markets without understanding the minds making the relevant decisions. 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 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 et al., 2005). The resulting map shows the extent to which each of the sciences are influential and what other sciences they most influence. Boyack and colleagues referred to the most influential sciences as hub sciences. Their 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 the upcoming chapters of this book, we will highlight these connections with examples that are relevant to each particular chapter. ■

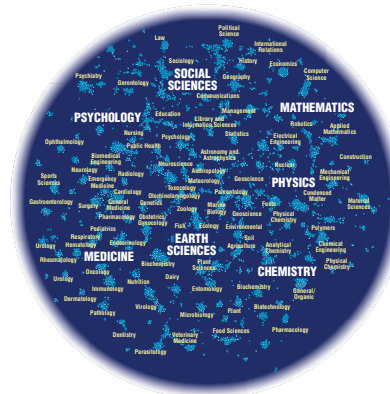


FIGURE 1.1

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 a different font. The other six major areas are social sciences, mathematics, physics, chemistry, earth sciences, and medicine. Source: Adapted from K. W. Boyack, et al. (2005). “Mapping the Backbone of Science,” *Scientometrics*, 64(3), 351–374. With kind permission from Springer Science1Business Media.

love, how can anyone else know whether your observation is accurate? In addition, your mind and behavior are governed by many processes of which you are unaware. Fortunately, innovations in the methods used to investigate brain activity and behavior, such as brain imaging technologies, have allowed psychologists to revisit the question of mental processes and brain functions with greater objectivity and success.

Why Do We Study Psychology?

The empiricist philosophers had a profound influence on the foundations of American political thought—that 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.

You have plenty of company while taking this course. Between 1.2 and 1.8 million undergraduates in the United States enroll in introductory psychology each year, not to mention the 30% of high school graduates who have already completed a psychology course (American Psychological Association [APA], 2019; Gurung et al., 2016). Increasing numbers of students outside the United States share your journey. Today, the United States is home to only 21 to 24% of the world's psychologists, down sharply from 80% in the 1980s (Takooshian et al., 2016).

What do all of these people hope to gain by studying psychological science? We recognize that introductory psychology is often a required course, but we hope that before too long, you will see many benefits more important than the ability to check a box:

- Among the many advantages of studying psychology is a deeper understanding of ourselves as individuals and of the people around us. One of the major themes of this textbook is the social nature of the human species and the importance of social connectivity to our health and well-being. We can all benefit from improved self-knowledge and social skills.
- Psychology provides many opportunities to improve your critical thinking skills, a necessity in an era of “fake news” and a highly prized skill among employers.
- As you will see in our chapter sections on real-world problems, psychology can make contributions to the understanding of and solutions to many pressing contemporary issues, from pandemics and social justice to poverty and climate change.
- Psychology can answer many questions that we ask out of simple curiosity. People behave in interesting ways, and we often find ourselves asking, “Why?” What questions do you have about human behavior?

Many students mistakenly believe that they don't “need” a course in psychology, because they already have a good understanding of human behavior. We are not saying that your understanding of others is poor, but by studying psychological science, all of us can improve our knowledge. See how many of the common myths listed in Table 1.1 you or others you know believe.

Have you ever wondered why people in elevators stand facing the doors and watching the numbers? Psychologists explain this behavior in terms of personal space, or the imaginary bubbles we keep around ourselves that strangers should not invade. When our personal space is violated by necessity, as in a crowded elevator, we cope by pretending nobody else is really there.



TABLE 1.1

Ten Common Myths about Human Behavior	
1.	We only use 10% of our brains.
2.	Some people are left-brained while others are right-brained.
3.	Playing Mozart to infants makes them more intelligent.
4.	Hypnosis improves your memory.
5.	Students learn better when instruction matches their individual learning styles.
6.	Lie detector (polygraph) tests are accurate.
7.	Low self-esteem is a major source of personal and societal problems.
8.	The teen years are typically disruptive.
9.	Memory for traumatic events is usually poor.
10.	In romantic relationships, opposites attract.

Lilienfeld, S. O., Lynn, S. J., Ruscio, J., & Beyerstein, B. L. (2009). *50 great myths of popular psychology*. Hoboken, NJ: Wiley-Blackwell.

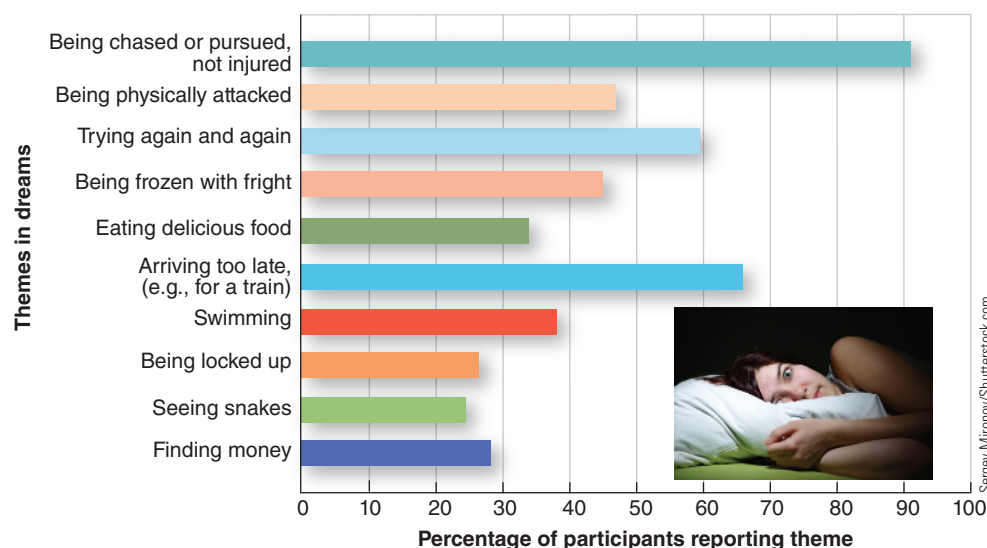
Where Did Psychology Originate?

Psychology is a relatively young discipline, dating only to the 1870s. However, topics that interest modern psychologists go back much 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 that people experience (Nielsen et al., 2003). See ● Figure 1.2 for common dream themes.

The psychology family tree is a hybrid with two major roots: **philosophy** and the **natural sciences**. Psychologists answer questions traditionally posed by philosophers using scientific research methods of the natural sciences, described in more detail in Chapter 2.

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

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

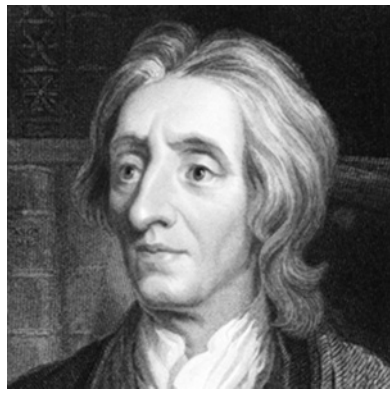
**FIGURE 1.2**

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 T. A. Nielsen, et al. (2003). "The Typical Dreams of Canadian University Students," *Dreaming*, 13, 211–235. doi: 10.1023/B:DREM.0000003144.40929.0b



www.BiblandPictures.com/Alamy Stock Photo

(a)



Georgios Kollias/Shutterstock.com

(b)



Cynthia Johnson/Hulton Archive/Getty Images

One of the most significant questions shared by philosophy and psychology asks whether the mind is inborn or is formed through experience. (a) Philosophers beginning with Aristotle (384–322 BCE) believed that all knowledge is gained through sensory experience. (b) Beginning in the 17th century, this idea flourished in the British philosophical school of *empiricism*. Empiricists, like John Locke, viewed the mind as a “blank slate” at birth, which then was filled with ideas gained by observing the world. (c) Contemporary psychologists believe that experience interacts with inborn characteristics to shape the mind. Intelligence, for example, is influenced by both genetics and experience. During the 1970s, Romanian orphans adopted at young ages recovered from the effects of their seriously deprived social circumstances, but those who endured years of deprivation had more severe cognitive deficits (Ames, 1997).



New York Public Library/Science Source

What Are Psychology’s Philosophical Roots?

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 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.

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. Surprisingly, some people today engage in DIY trepanation, a practice that obviously concerns the medical community (“Doctors warn of the dangers of trepanning,” 2000).

What Are Psychology’s Natural Sciences Roots?

While philosophers tackled these difficult questions, physicians were laying the foundation of our knowledge of the brain and nervous system, discussed in detail in Chapter 4. During this pursuit, physicians helped develop the scientific methods that would become central to psychology and previewed the application of scientific knowledge to the improvement of individual well-being.

Beginning in the 17th and 18th centuries, scientists armed with new technologies, including the light microscope (see ● Figure 1.3), made important discoveries that established the mind as physical rather than magical. 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. Hermann von Helmholtz (1821–1894) asked his participants to push a button as soon as they felt a touch. When a thigh was touched, participants reacted faster than when a toe was touched. Because

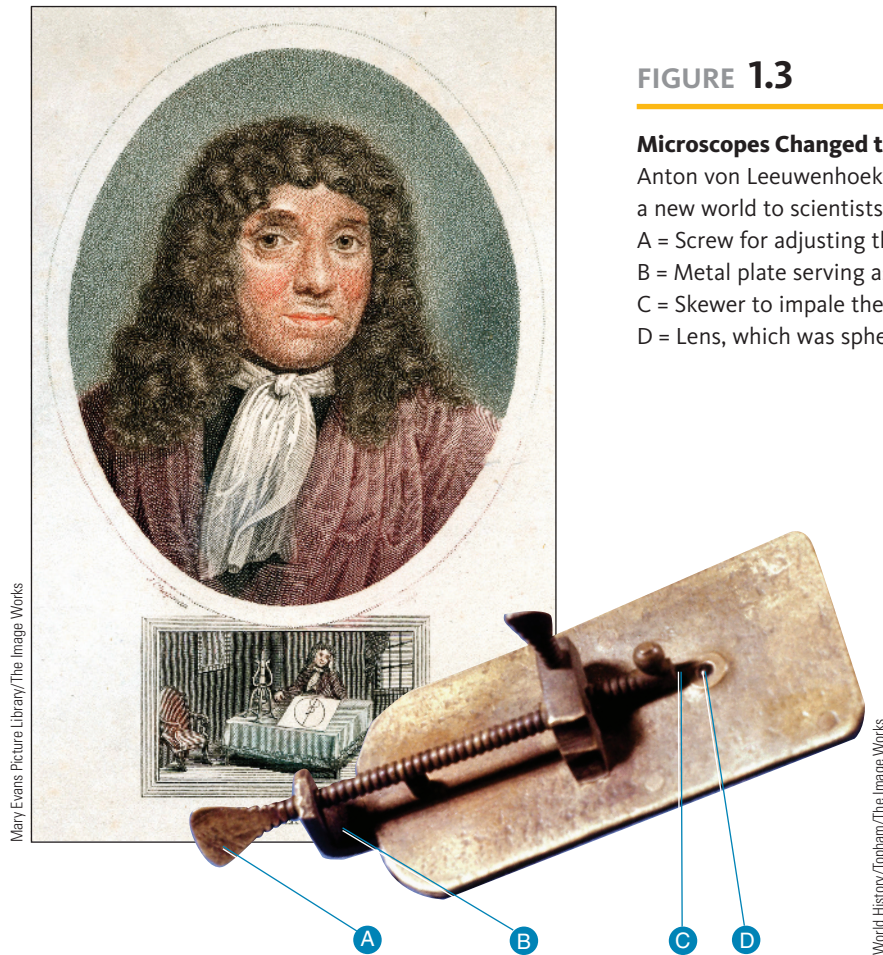


FIGURE 1.3

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

the toe is farther from the brain than the thigh, signals from the toe required more time to reach the brain. These types of discoveries convinced scientists that the mind was not supernatural and could be studied scientifically.

The Two Disciplines Merge to Create a New Science

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. Gustav Fechner (1801–1889) was curious to know how soft a sound a person could hear. He randomly presented sounds of different intensities to which a participant would respond “yes” or “no.” When the “yes” responses passed 50%, or better than chance, Fechner concluded that the sound was within the range that the human ear could detect (see Chapter 5). Although Fechner’s research seems very similar to von Helmholtz’s, note the importance of “mental processes” in Fechner’s work, as opposed to the simple measurement of physiology in von Helmholtz’s experiment. The stage was set for a modern science of psychology.



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