DUANE P. SCHULTZ ▪ SYDNEY ELLEN SCHULTZ

A HISTORY OF MODERN PSYCHOLOGY

ELEVENTH EDITION

A History of **Modern Psychology**

ELEVENTH EDITION

DUANE P. SCHULTZ

SYDNEY ELLEN SCHULTZ

CENGAGE Learning®

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

CENGAGE Learning®

A History of Modern Psychology,
Eleventh Edition
Duane P. Schultz, Sydney Ellen Schultz

Product Director: Jon-David Hague

Product Assistant: Kimiya Hojjat

Content Project Manager: Tanya Nigh

Manufacturing Planner: Karen Hunt

Production Service and Compositor: Lumina Datamatics Ltd.

IP Project Manager: Brittani Morgan

IP Analyst: Deanna Ettinger

Photo and Text Researcher: Lumina Datamatics Ltd.

Cover Designer: Lumina Datamatics Ltd.

Cover Image: microchip background, ©mistery/Shutterstock; old vintage clock face, ©pjmorley/Shutterstock; gothic medieval stone church arches detail, ©Andrea Izzotti/Shutterstock

Library of Congress Control Number: 2015942359

ISBN-13: 978-1-305-63004-8

Cengage Learning
20 Channel Center Street
Boston, MA 02210
USA

Cengage Learning 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.**

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

To learn more about Cengage Learning Solutions, visit **www.cengage.com.**

Purchase any of our products at your local college store or at our preferred online store **www.cengagebrain.com.**

Printed in the United States of America
Print Number: 01 Print Year: 2015

Brief Contents

Contents

CHAPTER 10

CHAPTER 11

In Their Own Words

Preface

The focus of this book is the history of modern psychology, the period beginning in the late nineteenth century, when psychology became a separate and independent discipline. Although we briefly review earlier philosophical thought, we concentrate on issues directly related to the establishment of psychology as a new and distinct field of study. Our purpose is to present a history of *modern* psychology, not the centuries of philosophical work that preceded it.

We recount the history of psychology in terms of people, ideas, and schools of thought, as well as the spirit of the times that influenced their development. Since the formal beginning of the field in 1879, psychology's methods and subject matter have changed as each new idea captured the loyalty of adherents and dominated the field for a time. Our interest, then, is in the developing sequence of approaches that have defined psychology over the years.

Each school of thought is discussed as a movement arising within a historical and social context. Contextual forces include the intellectual spirit of the times (the *Zeitgeist*), as well as social, political, and economic factors such as the effects of war, prejudice, and discrimination.

Although the chapters are organized in terms of the schools of thought, we also recognize that these systems resulted from the work of individual scholars, researchers, organizers, and promoters. It is people, not abstract forces, who write articles, conduct research, present papers, popularize ideas, and teach the next generation of psychologists. We discuss the contributions of the pivotal men and women, noting that their work was often affected not only by the times in which they flourished but also by their own personal life experiences.

We describe each school of thought in terms of its connection to the scientific ideas and discoveries that preceded and followed it. Each school evolved from or revolted against the existing order and in its turn inspired viewpoints that challenged, opposed, and eventually replaced it. With the hindsight of history, then, we can trace the pattern and the continuity of the development of modern psychology. Here are a few examples of material new to this edition.

New to the Eleventh Edition

- *Winging it—how birds evolve to avoid cars*
- *Is it all in our heads?—the increasing role of brain science in psychology*
- *Why did the FBI raid the home of James McKeen Cattell?*
- *The latest in positive psychology—Seligman's flourish movement*
- *Multimedia classroom presentations in psychology—100 years ago*
- *The return of Freud's anal personality*
- *They only came out at night—psychology's role in training bat bombers in World War II*
- *The use of Coca-Cola as a popular "nerve tonic" for neurotics*

- *Alexander Volta's "shocking" research*
- *Ada Lovelace: Virgin "Bride of Science"*
- *Little Albert found at last?—the search for psychology's most famous baby*
- *More on Freud's promotion of cocaine, his personal life, and his escape from the Nazis*
- *Computers are interpreting dreams—really?*
- *Why was John B. Watson haunted by depression and suicidal thoughts?*
- *Can what you think affect someone else's brain?*
- *Does it matter where you live?—happiness across cultures*
- *Why was Alan Turing arrested for gross indecency in England in 1952 and pardoned by the Queen in 2013?*
- *Freud's 1,500 love letters—published at last*
- *Knee jerks and goldfish—what did they mean for psychology?*
- *How the media covered the new psychology in America 100 years ago*
- *Ethnic differences in how students perceive their psychology courses*
- *Asylum tourism—the so-called insane asylums built in the nineteenth century now attract tourists*
- *The enthusiastic embrace of psychology by the American public in the 1920s*
- *Is contemporary neuroscience a new form of phrenology?*
- *The relationship between seventeenth-century mechanical figures and today's robots*
- *The roles of meaning and purpose in happiness*
- *The huge impact of World War II on the growth of American psychology*

As we prepared the eleventh edition of this book many years after writing the first one, we were reminded anew of the dynamic nature of the history of psychology. It is not fixed or finished but is in a continual state of growth. An enormous amount of scholarly work is being produced, translated, and reevaluated. Information from nearly 180 sources has been added, some published as recently as 2014, and revisions have been made to material from the previous edition.

We have included information on Web sites that provide additional material on the people, theories, movements, and research discussed in this book. We explored hundreds of sites and chose the most informative, reliable, and current, as of the time of publication. The **In Their Own Words** sections provide original writings by key figures in the history of psychology, presenting in each theorist's distinctive personal style—and the style of the times—a unique perspective on psychology's methods, problems, and goals. These sections have been reevaluated and edited for clarity and comprehension.

At the beginning of each chapter we offer a teaser, a brief narrative built around a person or event designed to introduce a major theme. These sections immediately define the subject matter and tell the student that history is about real people and situations. These topics include, among others:

- *The mechanical duck that ate, digested, and defecated on a silver platter. All the rage in Paris in 1739, it was to become a metaphor for a new conception of the functioning of the human body as a machine.*
- *The campus clown and perception.*
- *Charles Darwin's fascination with Jenny the Orangutan, who wore a frilly dress and drank tea from a cup.*
- *Why Wilhelm Wundt couldn't multitask, and what that meant for the new psychology.*
- *The most famous horse in the history of psychology.*
- *The 1909 Tennessee drug bust against the deadly substance caffeine, and the psychologist who proved the government wrong.*
- *Why John B. Watson held the hammer while his pretty young graduate assistant held the baby.*

- *The IQ Zoo, Priscilla the Fastidious Pig, and Bird Brain, who beat B. F. Skinner at a game of tic-tac-toe.*
- *What Wolfgang Köhler was really doing on the most famous island in the history of psychology.*
- *Sigmund Freud's boyhood dream about his mother and what it really meant.*

New photographs, tables, and figures have been chosen for this edition. Chapters contain outlines, discussion questions, and annotated reading lists. Important terms are boldfaced in the text and defined in the margin glossary and at the back of the book. The following supplements are available for instructors:

Online PowerPoint Lecture Slides (978-1-305-67185-0)
Instructor Manual with Test Bank (978-1-305-67184-3)
Cognero (978-1-305-87617-0)
Website

Acknowledgments

We are grateful to the many instructors and students who have contacted us over the years with valuable suggestions. We are also pleased to acknowledge the assistance of David Baker, director of the Archives of the History of American Psychology at the University of Akron, and his staff, for providing gracious and valuable assistance with research material.

D.P.S., S.E.S.

CHAPTER 1

The Study of the History of Psychology

Did You See the Clown? What about the Gorilla?

He looked just like a clown. He wore a bright purple and yellow outfit, red shoes, wild eye makeup, a white wig, a large red nose, and floppy blue shoes and he was riding a unicycle. We don't know about your campus, but we don't see too many clowns around ours. If we did, we probably would notice them. How could you miss seeing something as obvious and odd as a clown?

That was what Ira Hyman, a psychologist at Western Washington University in Bellingham, Washington, wanted to find out. He asked a student to dress up like a clown and ride around the main campus square where hundreds of people were walking to and from classes (Hyman, Boss, Wise, McKenzie, & Caggiano, 2009; Parker-Pope, 2009).

When students were asked if they noticed anything unusual, like a clown, only half of those who were walking by themselves said they did. More than 70 percent of those walking with another person saw the clown, but only 25 percent of those who were on their smartphones were aware of the clown. Now you might be thinking that this would be a huge disappointment to a clown who is trying to attract attention, but what does it have to do with the history of psychology? It's a good question. But before we get to the answer, let's take a look at a gorilla—or at least someone dressed like one.

It has come to be one of the most popular psychology studies of the twenty-first century. A group of students watched a short video of two teams of three people each, moving quickly round while passing a basketball to one another. One team was dressed in black shirts and the other wore white shirts. The job of the students was to count the number of times the team dressed in white shirts passed the ball to one another. (See the video at www.theinvisiblegorilla.com/videos.html.) A simple matter of counting right? All they had to do was to pay close attention.

About halfway through the less-than-one-minute video, a woman dressed from head to toe in a gorilla suit walked into the middle of the group, thumped her chest, and then walked away. Meanwhile, the players kept passing the ball around as if nothing had happened.

When the video ended, the subjects were asked if they saw anything unusual while they were counting. Half of them said no. They had not seen the gorilla! This phenomenon has been called "inattentional blindness," and it has been demonstrated countless times in a number of countries all around the world and with diverse groups of subjects.

For example, 83 percent of a group of radiologists did not see an image of a gorilla that had been inserted on the CT image they were examining (Drew, Vo, & Wolfe,

2013). Older subjects were less likely to see the gorilla than younger ones, and white subjects were less likely to see an African American walk into the basketball-passing scene than a white person (Graham & Burke, 2011; Brown-Iannuzzi, Hoffman, Payne, & Trawalter, 2013).

So, what does the clown and gorilla research have to do with the history of psychology? Studies clearly show that we have a hard time mentally focusing on more than one thing at a time, but it turns out that this is not a new finding. The same thing was first demonstrated over 150 years ago, in 1861, by a German psychologist who is usually credited with starting psychology as we know it today.

That experiment (see Chapter 4) also shows us that the study of the past is relevant for the present, but first we must become aware of what was done in the past. History has much to tell us about the world today, and early developments in psychology help us understand the nature of the field in the twenty-first century. That is one answer to the question you may be asking yourself: namely, "Why am I taking this course?"

Why Study the History of Psychology?

We just noted one reason for studying the history of psychology. Another has to do with the fact that this course is being offered at your school. It indicates that the faculty believes it is important for you to learn about the history of your field. Courses in the history of psychology have been taught since 1911, and many colleges require them for psychology majors.

A survey of 374 colleges found that 83 percent provided coursework in the history of psychology (Stoloff et al., 2010). Another survey of 311 psychology departments reported that 93 percent offered such courses (Chamberlin, 2010). Of all the sciences, psychology is unique in this regard. The majority of science departments do not offer studies in the history of their fields, nor does the faculty of those departments consider the history of their disciplines to be vital to their students' development.

In determining how this academic interest in the history of the field helps you understand psychology today, consider what you already know from taking other psychology courses: namely, that there is no single form, approach, or definition of psychology on which all psychologists agree. You have learned that there is an enormous diversity, even divisiveness and fragmentation, in professional and scientific specialization and in subject matter.

Some psychologists focus on cognitive functions, others deal with unconscious forces, and still others work only with overt behavior or with physiological and biochemical processes. Modern psychology includes many subject areas that seem to have little in common beyond a broad interest in human nature and behavior and an approach that attempts in some general way to be scientific.

The only framework that binds these diverse areas and approaches and gives them a coherent context is their history, the evolution over time of psychology as an independent discipline. Only by exploring psychology's origins and development can we understand the nature of psychology today. Knowledge of history brings order to disorder and imposes meaning on what may appear to be chaos, putting the past into perspective to explain the present. Exploring people, events, and experiences of the past help make clear the forces that have made psychology what it is today.

This book shows you that studying the history of psychology is the most systematic way to integrate the areas and issues of modern psychology. This course will enable you to recognize relationships among ideas, theories, and research efforts and to understand how pieces of the psychology puzzle come together to form a coherent picture.

We should add that the history of psychology is a fascinating story on its own, offering drama, tragedy, heroism, and revolution—and its share of sex, drugs, and some really weird

people. Despite false starts, mistakes, and misconceptions, you will see that overall there is a clear and continuing evolution that has shaped contemporary psychology and provides us with an explanation for its richness.

The Beginning of Modern Psychology

Here is another question. For our study of the history of psychology, where do we start? The answer depends on how we define *psychology*. Its origins can be traced to two different time periods, some 2,000 years apart. Thus, psychology is both one of the oldest of all scholarly disciplines and one of the newest.

First, we can trace ideas and speculations about human nature and behavior back to the fifth century BC, when Plato, Aristotle, and other Greek philosophers grappled with many of the same issues that concern psychologists today. These ideas include some of the basic topics you covered in your introductory psychology classes: memory, learning, motivation, thought, perception, and abnormal behavior. There seems to be little disagreement among historians of psychology that the "views of our forebears over the past 2,500 years set the framework within which practically all subsequent work has been done" (Mandler, 2007, p. 17). Thus, one possible starting point for a study of the history of psychology would take us all the way back to ancient philosophical writings about problems that later came to be included in the formal discipline we know as psychology.

Conversely, we could choose to view psychology as one of the newer fields of study and begin our coverage approximately 200 years ago, when modern psychology emerged from philosophy and other early scientific approaches to claim its own unique identity as a formal field of study.

How should we distinguish between modern psychology, which we cover in this book, and its roots, that is, the prior centuries of its intellectual forerunners? That distinction has less to do with the kinds of questions asked about human nature than with the methods used to try to answer those questions. It is the approach taken and the techniques employed that distinguish the older discipline of philosophy from modern psychology and that mark the emergence of psychology as a separate, primarily scientific, field of study.

Until the last quarter of the nineteenth century, philosophers studied human nature by speculating, intuiting, and generalizing based on their own experience. However, a major transformation occurred when philosophers began to apply the tools and methods already successful in the biological and physical sciences to explore questions about human nature. Only when researchers came to rely on carefully controlled observation and experimentation to study the human mind did psychology begin to attain an identity separate from its philosophical roots.

The new discipline of psychology needed precise and objective ways of dealing with its subject matter. Much of the history of psychology, after its separation from its roots in philosophy, is the story of the continuing development of tools, techniques, and methods to achieve this increased precision and objectivity, refining not only the questions psychologists asked but also the answers they obtained.

If we seek to understand the complex issues that define and divide psychology today, then a more appropriate starting point for the history of the field is the nineteenth century, the time when psychology became an independent discipline with distinctive methods of inquiry and theoretical rationales. Although it is true, as we noted, that philosophers such as Plato and Aristotle concerned themselves with problems that are still of general interest, they approached these problems in ways vastly different from those of today's psychologists. Those scholars were not *psychologists* in the contemporary usage of the term.

A noted scholar of the history of psychology, Kurt Danziger, refers to the early philosophical approaches to questions of human nature as the "prehistory" of modern

psychology. He believes that the "history of psychology is limited to the period when psychology recognizably emerges as a disciplinary subject matter and that it is extremely problematical to talk about psychology as having a history before that" (Danziger, quoted in Brock, 2006, p. 12).

The idea that the methods of the physical and biological sciences could be applied to the study of mental phenomena was inherited from both philosophical thought and physiological investigations of the seventeenth to nineteenth centuries. That exciting era forms the immediate background out of which modern psychology emerged, and that is where we will begin. We shall see that while the nineteenth-century philosophers were clearing the way for an experimental attack on the functioning of the mind, physiologists were independently approaching some of the same problems from a different direction.

The nineteenth-century physiologists were making great strides toward understanding the bodily mechanisms underlying mental processes. Their methods of study differed from those of the philosophers, but the eventual union of these disparate disciplines—philosophy and physiology—produced a new field of study that quickly earned its own identity and stature.

Although the majority of psychologists agree that psychology is a science, surveys of the general population indicate that up to 70 percent of the general public remains skeptical of psychology's scientific status (Lilienfeld, 2012). We hope that by the end of this course, you will see that much of the field of psychology today continues to advance through the use of increasingly rigorous scientific methodology.

The Data of History: Reconstructing Psychology's Past: How Do We Know What Really Happened?

In this book, *A History of Modern Psychology,* we are dealing with two disciplines, history and psychology, using the methods of history to understand the development of psychology. Because our coverage of the evolution of psychology depends on the methods of history, let us introduce briefly the notion of **historiography,** which refers to the techniques and principles employed in historical research.

Historiography: The principles, methods, and philosophical issues of historical research.

Historians face several problems that psychologists do not share. The data of history—that is, the materials historians use to reconstruct lives, events, and eras—differ markedly from the data of science. The most distinctive feature of scientific data is the way they are gathered. For example, if psychologists want to investigate the circumstances under which people act to help those in distress, or whether children imitate aggressive behavior they see on television or in video games, then they will construct situations or establish conditions from which data can be generated.

The psychologists may conduct a laboratory experiment, observe behavior under controlled real-world conditions, take a survey, or calculate the statistical correlation between two variables. In using these methods, scientists have a measure of control over the situations or events they choose to study. In turn, those events can be reconstructed or replicated by other scientists at other times and places. Thus, the data can be verified later by establishing conditions similar to those of the original study and repeating the observations.

In contrast, the data of history cannot be reconstructed or replicated. Each situation occurred at some time in the past, perhaps centuries ago, and historians might not have bothered to record the particulars of the event at the time or even to record the details accurately.

Today's historians cannot control or reconstruct past events to examine them in light of present knowledge. If the historical incident itself has been lost to view, then how can

historians deal with it? What data can they use to describe it, and how can we possibly know for sure what happened?

Although historians cannot repeat a situation to generate pertinent data, they still have significant information to consider. The data of past events are available to us as fragments: descriptions written by participants or witnesses, letters and diaries, photographs and pieces of old laboratory equipment, interviews, and other official accounts. It is from these sources, that is, these data fragments, that historians try to recreate the events and experiences of the past.

This approach is similar to that of archaeologists who work with fragments of past civilizations—such as arrowheads, shards of clay pots, or human bones—and try to describe the characteristics of those civilizations. Some archaeological excavations yield more detailed data fragments than others, allowing for more accurate reconstructions. Similarly, with excavations in history, the data fragments may be so great as to leave little doubt about the accuracy of the account. In other instances, however, the data fragments may be lost, distorted, or otherwise compromised.

HISTORY ONLINE

www.CengageBrain.com

Check the publisher's Web site, www.CengageBrain.com, and enter SCHULTZ HISTORY to find companion materials for this text.

www3.uakron.edu/ahap/

The Archives of the History of American Psychology holds an outstanding collection of documents and artifacts, including the professional papers of prominent psychologists, laboratory equipment, posters, slides, and films.

www.apa.org/about/archives/index.aspx

This link to the historical archives of the APA will help you locate APA-relevant historical material held by the Library of Congress in Washington, DC, as well as oral histories, photos, biographies, and obituaries.

psychclassics.yorku.ca/[companion site: psychclassics.asu.edu/]

This amazing site is maintained by psychologist Christopher Green at York University in Toronto, Canada. It includes the complete text of books, book chapters, and articles of importance in the history of psychology. Google *York University History and Theory of Psychology Question & Answer Forum* to post questions about the history of psychology, answer questions that other people have submitted, or browse the site to find out what people are saying. Green offers a blog and a weekly podcast, *This Week in the History of Psychology,* at **yorku.ca/christo/podcasts.**

historyofpsychology.org/

The Web site for the Society for the History of Psychology (Division 26 of the American Psychological Association) offers student resources, online books and journals, and a retail shop selling posters, T-shirts, coffee mugs, baseball caps, and more featuring great men and women from psychology's past. See also their Facebook page: **www.facebook.com/pages/Society-for-the-History-of-Psychology/86715677509?ref=mf**.

The APA YouTube site offers a variety of short videos geared to students and the general population, including quick summaries of research programs, tips on mental health topics such as how to choose a psychologist and recognizing the symptoms of depression, and humorous animated videos on psychotherapy **(www.youtube.com/theapavideo)**.

History Lost and Found

In some cases, the historical record is incomplete because data have been lost, sometimes deliberately. Consider the case of John B. Watson (Chapter 10), the founder of the behaviorism school of thought. Before he died in 1958 at age 80, he systematically burned his letters, manuscripts, and research notes, destroying the entire unpublished record of his life and career. Those data are lost forever.

Sometimes data have been misplaced. In 2006, more than 500 handwritten pages were discovered in a household cupboard in England. They were determined to be the official minutes of Royal Society meetings for the years 1661 to 1682, recorded by Robert Hooke, one of the most brilliant scientists of his time. The papers revealed early work done with a new scientific tool, the microscope, and detailed the discovery of bacteria and spermatozoa. Also included was Hooke's correspondence with Isaac Newton about the subject of gravity and the movement of the planets (Gelder, 2006; Sample, 2006).

In 1984, the papers of Hermann Ebbinghaus (Chapter 4), who was prominent in the study of learning and memory, were found some 75 years after his death. In 1983, 10 large boxes were uncovered that contained the handwritten diaries of Gustav Fechner (Chapter 3), who developed psychophysics. These diaries covered the period from 1828 to 1879, a significant time in the early history of psychology, yet for more than 100 years psychologists were unaware of their existence. Many authors had written books about the work of Ebbinghaus and Fechner without having access to these important collections of personal papers.

Charles Darwin (Chapter 6) has been the subject of more than 200 biographies. Surely we can assume that the written record of Darwin's life and work would be accurate and complete by now. Yet in 1990, well over 100 years after Darwin's death, large amounts of new material became available, including notebooks and personal letters that were not available for consideration by earlier biographers. Uncovering these new fragments of history means that more pieces of the puzzle can be set in place.

In rare and bizarre instances, the data of history may be stolen and not recovered, if at all, for many years. In 1641, an Italian mathematician stole more than 70 letters written by the French philosopher Rene Descartes (Chapter 2). One of the letters was discovered in 2010 in a collection housed at a college in the United States. It was subsequently returned to France (Smith, 2010).

Altered and Hidden History

Other data may be hidden deliberately or altered to protect the reputation of the people involved. Sigmund Freud's first biographer, Ernest Jones, intentionally minimized Freud's use of cocaine, commenting in a letter, "I'm afraid that Freud took more cocaine than he should, though I'm not mentioning that [in my biography]" (Isbister, 1985, p. 35). We will see when we discuss Freud (Chapter 13) that recently uncovered data confirm Freud's cocaine use for a longer period than Jones was willing to admit in print.

When the correspondence of the psychoanalyst Carl Jung was published, the letters were selected and edited in such a way as to present a favorable impression of Jung and his work. In addition, it was revealed that Jung's so-called autobiography was written not by him but by a loyal assistant. Jung's words were "altered or deleted to conform to the image preferred by his family and disciples. . . . Unflattering material was, of course, left out" (Noll, 1997, p. xiii).

In a similar instance, a scholar who catalogued the papers of Wolfgang Köhler (Chapter 12), a founder of the school of thought known as Gestalt psychology, was perhaps too devoted an admirer. When he oversaw the selection of materials for publication, he restricted selected information to enhance Köhler's image. The papers had been "carefully

selected to present a favorable profile of Köhler." A later historian reviewing the papers confirmed the basic problem with the data of history, "namely, the difficulty of determining the extent to which a set of papers is a true representation of a person or a slanted one, either favorable or unfavorable, biased by the person who selected the papers to be made public" (Ley, 1990, p. 197).

The data of history may also be affected by the actions of the participants themselves in recounting pivotal events. People may, consciously or unconsciously, produce biased accounts to protect themselves or enhance their public image. For example, Freud liked to depict himself as a martyr to his psychoanalytic cause, a visionary who was scorned, rejected, and vilified by the medical and psychiatric establishment of the day. Freud's first biographer, Ernest Jones, reinforced those claims in his books (Jones, 1953, 1955, 1957).

Date uncovered later revealed a totally different situation. Freud's work had not been ignored during his lifetime. By the time Freud was middle-aged, his ideas were exerting an immense influence on the younger generation of intellectuals. His clinical practice was thriving, and he could be described as a celebrity. Freud himself had clouded the record. The false impression he fostered was perpetuated by several biographers, and for decades our understanding of Freud's influence during his lifetime was inaccurate.

These instances illustrate the difficulties faced by scholars in assessing the worth of historical materials. Are the documents or other data fragments accurate representations of the person's life and work, or have they been chosen to foster a certain impression, whether positive, negative, or something in between? Another biographer stated the problem in this way: "The more I study human character, the more convinced I become that all records, all reminiscences, are to a greater or lesser degree based on illusions. Whether the distorting lens is that of bias, vanity, sentimentality, or simple inaccuracy, there is no Absolute Truth" (Morris, quoted in Adelman, 1996, p. 28).

Freud put the matter even more bluntly: "Anyone who writes a biography is committed to lies, concealments, hypocrisy, flattering and even to hiding his own lack of understanding, for biographical truth does not exist" (quoted in Cohen, 2012, p. 7).

In another example of hidden or suppressed data fragments, in the more than 70 years since Freud's death in 1939, many of his papers and letters have been published or released to scholars. In 2011, the first volume of Freud's 1,500 letters to the woman he would marry was finally published. They had been kept secret for all those years (Bollack, 2011). A huge collection consisting of 153 boxes of Freud's papers is held by the Library of Congress in Washington, DC. Some of these documents will not be made available for many more years at the request of the Freud estate. The formal reason for this restriction is to protect the privacy of Freud's patients and their families, and perhaps also the reputation of Freud and his family.

One letter to Freud from his eldest son is sealed until 2032. Correspondence with his nephew is being held until 2050. A letter from one of Freud's mentors will not be released until 2102, some 177 years after the man's death, leaving us to wonder what could be so remarkable about that letter as to require such secrecy for such a long period of time. Some collections, including letters to his daughter, Anna, and his sister-in-law, are held in perpetuity, meaning there is no release date for them at all. Psychologists do not know how these archival documents and manuscripts will affect our understanding of Freud and his work. Until these data fragments are available for study, however, our knowledge of one of psychology's pivotal figures remains incomplete and perhaps inaccurate.

Changing the Words of History: Distortion in Translation

Another problem with the data of history relates to information that comes to the historian through faulty translation from one language to another. We refer to Freud again for

examples of the misleading impact of translations. Not many psychologists are sufficiently fluent in the German language to read Freud's original work. Most people rely on a translator's choice of the most appropriate words and phrases, but the translation does not always convey the original author's intent.

Three fundamental concepts in Freud's theory of personality are *id, ego,* and *superego,* terms with which you are already familiar. However, these words do not represent Freud's ideas precisely. These words are the Latin equivalents of Freud's German words: id for *Es* (which literally translates as "it"), ego for *Ich* ("I"), and superego for *Uber-Ich* ("above-I").

Freud wanted to describe something intimate and personal with his use of *Ich* (I) and to distinguish it from *Es* (it), the latter being something distinct from or foreign to "I." The translator's use of the words *ego* and *id* instead of *I* and *it* turned these personal concepts into "cold technical terms, which arouse no personal associations" (Bettelheim, 1982, p. 53). Thus, the distinction between I and it (ego and id) is not as forceful for us as Freud intended.

Consider Freud's term *free association*. Here the word *association* implies a connection between one idea or thought and another, as though each one acts as a stimulus to elicit the next one in a chain. This is not what Freud proposed. His term in German was *Einfall,* which does not mean association. Literally, it means an intrusion or an invasion. Freud's idea was not to describe a simple linking of ideas but rather to denote something from the unconscious mind that is uncontrollably intruding into or invading conscious thought. Thus, our historical data, Freud's own words, were misinterpreted in the act of translation. An Italian proverb, *Traditore—Tradutore* (to translate is to betray), makes this point clearly.

What do these problems with the data of history tell us about our study of the history of psychology? They show primarily that our understanding of history is dynamic. The story is constantly changing and growing and is refined, enhanced, and corrected whenever new data are revealed or reinterpreted. Therefore, history cannot be considered finished or complete. It is always in progress, a story without an ending. The historian's narrative may only approximate or approach the truth, but it does so more fully with each new finding or new analysis of the data fragments of history.

In Context: Forces That Shaped Psychology

A science such as psychology does not develop in a vacuum, subject only to internal influences. Because it is part of the larger culture, psychology is affected by external or contextual forces that shape its nature and direction. The study of psychology's history must consider the context in which the discipline evolved, the prevailing ideas in the science and culture of the day—the **Zeitgeist** or intellectual climate or spirit of the times—as well as current social, economic, and political forces.

Zeitgeist: The intellectual and cultural climate or spirit of the times.

We see instances throughout this book of how these contextual forces influenced psychology's past and continue to shape its present and future. They even influence how we define and treat mental disorders (Clegg, 2012). Let us consider a few examples of contextual forces, including jobs, wars, and prejudice and discrimination.

Jobs

The early years of the twentieth century saw dramatic changes in the nature of psychology in the United States and in the type of work that psychologists were doing, as we shall see later. Largely because of economic forces, increasing opportunities emerged for psychologists to apply their knowledge and techniques to solve real-world problems. The primary explanation for this situation was practical. As one psychologist said, "I became an applied psychologist in order to earn a living" (H. Hollingworth, quoted in O'Donnell, 1985, p. 225).

Toward the end of the nineteenth century, the number of psychology laboratories in the United States was rising steadily, but so was the number of psychologists competing for jobs. By 1900, there were three times as many psychologists with doctoral degrees as there were labs to employ them. Fortunately, the number of teaching jobs was increasing as states throughout the Midwest and the West established universities. At most of them, however, psychology, as the newest science, received the smallest amount of financial support. Compared to more established departments such as physics and chemistry, psychology consistently ranked low in annual appropriations. There was little money for research projects, laboratory equipment, and faculty salaries.

Psychologists quickly realized that if their academic departments, budgets, and incomes were ever to improve, they would have to demonstrate to college administrators and state legislators that psychology could be useful in solving social, educational, and industrial problems in the real world. So, in time, psychology departments came to be judged on the basis of their practical worth.

At the same time, because of social changes in the U.S. population, psychologists were presented with an exciting opportunity to apply their skills. The influx of immigrants, along with their high birth rate, made public education a growth industry. Public school enrollments increased 700 percent between 1890 and 1918, and high schools were being built at the rate of one a day. More money was being spent on education than on defense and welfare programs combined.

Many psychologists took advantage of this situation and pursued ways to apply their knowledge and research methods to education. This marked a fundamental shift of emphasis in American psychology, from experimentation in the academic laboratory to the application of psychology to the issues of teaching and learning.

Wars

War is another contextual force that helped shape modern psychology by providing job opportunities for psychologists. We will see in Chapter 8 that the experiences of American psychologists in aiding the war effort in World Wars I and II accelerated the growth of applied psychology by extending its influence into such areas as personnel selection, psychological testing, clinical psychology, and engineering psychology. This work demonstrated to the psychological community at large, and to the public, how useful psychology could be.

World War II also altered the face and fate of European psychology, particularly in Germany (where experimental psychology began) and in Austria (the birthplace of psychoanalysis). Many prominent researchers and theorists fled the Nazi menace in the 1930s, and most of them settled in the United States. Their forced exile marked the final phase of psychology's relocation from Europe to the United States in the twentieth century.

War also had a personal impact on the ideas of several major theorists. It was after witnessing the carnage of World War I, for example, that Sigmund Freud proposed aggression as a significant motivating force for the human personality. Erich Fromm, a personality theorist and antiwar activist, attributed his interest in abnormal behavior to his exposure to the fanaticism that swept his native Germany during the war.

Prejudice and Discrimination

Another contextual factor is discrimination by race, religion, and gender. For many years, such prejudice influenced basic issues such as who could become a psychologist and where he or she could find employment.

Discrimination against women Widespread prejudice against women existed in the early years of psychology's history. We will see many examples of women who were denied admission to graduate school or excluded from faculty positions. Even when women were able to obtain such appointments, they were paid lower salaries than men and encountered barriers to promotion and tenure. For many years, the only academic jobs typically open to women were at women's colleges, although these schools often practiced their own form of prejudice by refusing to hire married women. The reasoning was that a woman was incapable of managing both a husband and a teaching career.

Eleanor Gibson received awards from the APA as well as several honorary doctorates and the National Medal of Science for her work on perceptual development and learning. When Gibson applied to graduate school at Yale University in the 1930s, she was told that the director of the primate laboratory would not permit women in his facility. She was also barred from attending seminars on Freudian psychology and was not allowed to use the graduate students' library or cafeteria, which were reserved for men only.

Thirty years later, the situation had not changed very much. Sandra Scarr, a developmental psychologist, recalled her 1960 admission interview for graduate school at Harvard University. Gordon Allport, the eminent personality psychologist, told her that Harvard loathed accepting women. He said, "Seventy-five percent of you get married, have kids and never finish your degrees, and the rest of you never amount to anything anyway!" Scarr added:

> *Then, I did get married, and I had a baby in my third year of graduate school, and I was immediately written off. No one would take me seriously as a scientist; no one would do anything for me—write letters, help me find a job. No one believed that a woman with young kids would do anything. So I went and beat on doors and said, "Okay, here I am" until I got hired. Finally, after about 10 years and after I published a lot of articles, my colleagues began to treat me seriously as a psychologist.* (1987, p. 26)

Despite such examples of obvious discrimination, by the beginning of the twentieth century, 20 women had earned doctoral degrees in psychology. In the 1906 edition of the reference work *American Men of Science* (note the title), 12 percent of the listed psychologists were women, a high figure considering the barriers to their graduate education. These women were actively encouraged to join the APA.

James McKeen Cattell, a pioneer in the mental testing movement (Chapter 8), took the lead in urging the acceptance of women in psychology, reminding male colleagues that they ought not "draw a sex line" (unpublished letter quoted in Sokal, 1992, p. 115). Largely because of his efforts, the APA was the first scientific society to admit women.

Between 1893 and 1921, the APA elected 79 women to membership, 15 percent of the total of new members during that period. By 1938, 20 percent of all psychologists listed in *American Men of Science* were women, and women accounted for almost one-third of the membership of the APA. By 1941, more than 1,000 women had earned graduate degrees in psychology, and one-fourth of all psychologists who held PhDs were women (Capshaw, 1999). Currently, more than 75 percent of all new PhDs in psychology are women.

Division 35 of the APA is the Society for the Psychology of Women, which publishes a journal, the *Psychology of Women Quarterly,* and a newsletter, *The Feminist Psychologist*. In addition, the multimedia digital archive, Psychology's Feminist Voices (www.feministvoiceses.com), offers a Twitter account (@feministvoices) and a YouTube channel (psychsfeministvoices) (Pickens, 2013).

Discrimination based on ethnic origin Well into the 1960s, Jews faced admissions quotas in colleges and graduate schools. A study of discrimination against Jews during that

time at three elite universities (Harvard, Yale, and Princeton) found exclusionary practices to be widespread. Admissions officers and college presidents routinely spoke of keeping the "Jewish invasion" under control. In 1922, the director of admissions at Yale wrote a report titled "The Jewish Problem," in which he described Jews as an "alien and unwashed element" (Friend, 2009, p. 272). In 1938, in reaction to an attempt to help Jews immigrate from Nazi Germany, a large group of Yale students stated, "We don't like Jews. There are too many at Yale already" (Olson, 2013, p. 381).

In the 1920s, the policy at Harvard was to accept no more than 10 to 15 percent of the Jews who applied for admission to each entering class. Jews who were admitted to these elite schools were often segregated, not allowed to join fraternities or prestigious dining and social clubs. Too high a percentage of Jewish students were seen as a threat; "If Jews get in," one researcher was told, "they would ruin Princeton" (Karabel, 2005, p. 75).

Those Jewish students who did gain admission and eventually earned a doctoral degree in psychology still experienced anti-Semitism. Many colleges and universities refused to hire Jews for faculty positions. Julian Rotter (see Chapter 11), who received his doctoral degree in 1941, recalled that he "had been warned that Jews simply could not get academic jobs, regardless of their credentials" (1982, p. 346). He began his professional career working at a state mental hospital instead of a university.

Abraham Maslow (Chapter 14) was urged by his professors at the University of Wisconsin to change his first name to "something less obviously Jewish" so that he would have a better chance of obtaining an academic job (Hoffman, 1996, p. 5). Maslow refused to do so.

Writing about one of his graduate students, Harvard psychologist E. G. Boring noted, "He is a Jew, and on this account we have not found it so far easy to place him in a college teaching position in psychology, because of the personal prejudice that exists against Jews in many academic circles and possibly especially in psychology" (quoted in Winston, 1998, pp. 27–28). These and similar incidents drove many Jewish psychologists into clinical psychology, which offered greater job opportunities, rather than the more futile pursuit of an academic career.

In 1945, the editor of the *Journal of Clinical Psychology* proposed that a limit be placed on Jewish applicants to graduate training in that specialty area. He argued that it would be unwise to allow any one group to "take over" the field and that if too many Jews were allowed to become clinical psychologists, it could jeopardize public acceptance of clinical work. To their credit, a majority of the psychology community voiced strong opposition to the proposal (Harris, 2009).

African Americans faced considerable prejudice from mainstream psychology for many years. In 1940, only four black colleges in the United States offered undergraduate degree programs in psychology. In those instances, when blacks were permitted to enroll at predominantly white universities, they confronted a variety of barriers. In the 1930s and 1940s, many colleges did not even allow black students to live on campus. Francis Sumner, the first black student to earn a doctoral degree in psychology, received what was considered in 1917 to be a highly positive letter of recommendation to graduate school. His advisor described him as "a colored man … relatively free from those qualities of body and mind which many persons of different race find so objectionable" (Sawyer, 2000, p. 128). When Sumner enrolled at Clark University as a graduate student, the administration arranged a separate table in the dining hall for him and those few students willing to eat with him.

The major university providing psychology instruction for black students was Howard University in Washington, DC. In the 1930s, the school was known as the "Black Harvard" (Phillips, 2000, p. 150). Between 1930 and 1938, only 36 black students were enrolled in graduate psychology programs in universities outside the American South; the majority of these students were at Howard. Between 1920 and 1950, 32 blacks earned

doctoral degrees in psychology. From 1920 to 1966, the 10 most prestigious psychology departments in the United States awarded eight doctorates to blacks, out of a total of more than 3,700 doctoral degrees granted (Guthrie, 1976; Russo & Denmark, 1987). In 1933, Inez Beverly Prosser became the first black woman to earn a PhD in psychology. However, her career was restricted to teaching at small southern, historically black colleges (Benjamin, 2008).

Kenneth Clark, later famous for his research on the effects of racial segregation on children, graduated from Howard University in 1935 with a Bachelor of Science degree in psychology. He was often refused service at restaurants in the Washington, DC, area because of his race. He organized a student protest demonstration against segregation in 1934 and was arrested and charged with disorderly conduct. He noted that this was the beginning of his career as an activist on behalf of integration (Phillips, 2000). Clark's application for admission to graduate school at Cornell University was rejected on the basis of race because, he was told, PhD candidates "developed a close interpersonal, social relationship. They worked very closely with the professors and they were sure that I would be uncomfortable, that I would feel awkward in the situation" (Clark, quoted in Nyman, 2010, p. 84). In 1940, Clark became the first African American to earn a doctoral degree from Columbia University and the first to receive a permanent professorship at the City College of New York (Philogene, 2004).

Mamie Phipps Clark also earned a doctoral degree at Columbia but faced both race and sex discrimination. She wrote that "following my graduation it soon became apparent to me that a black female with a Ph.D. in psychology was an unwanted anomaly in New York City in the early 1940s" (M. P. Clark, quoted in Cherry, 2004, p. 22). Although her husband Kenneth Clark was on the faculty at City College, Mamie Phipps Clark was effectively barred from academic jobs. She found work analyzing research data, a minor position she described as "humiliating" for a PhD psychologist (M. P. Clark, quoted in Guthrie, 1990, p. 69).

Working with Kenneth Clark, Mamie Clark opened a storefront center to provide psychological services, including testing, to children. Their efforts prospered and became the noted Northside Center for Child Development. In 1939 and 1940, the Clarks conducted an important research program on racial identity and self-concept in black children. The results of their work were cited in the 1954 U.S. Supreme Court's landmark decision to end racial segregation in public schools. In 1971, Kenneth Clark served as president of the APA, the first African American to be elected to that post.

Despite his considerable accomplishments, Clark considered his life to be a series of "magnificent failures." At the age of 78, he said that he was "more pessimistic now than I was two decades ago" (K. Clark, quoted in Severo, 2005, p. 23).

Earning a PhD was only the first hurdle for blacks and next was finding a suitable job. Few universities hired blacks as faculty members, and most companies that employed applied psychologists (a major source of jobs for female psychologists) were effectively closed to African Americans. The historically black colleges were the primary sources of employment, but working conditions rarely afforded opportunities for the kind of scholarly research that led to professional visibility and recognition. In 1936, a professor at a black college described the situation as follows:

> *Lack of money, overwork, and other unpleasant factors make it practically impossible for him to do anything outstanding in the field of pure scholarship. He cannot buy books on a large scale himself, and he cannot get them at his school libraries, because there are no really adequate libraries in the Negro schools. Probably the worst handicap of all is the lack of a scholarly atmosphere about him. There is no incentive, and, of course, no money for research in most schools.* (A. P. Davis, quoted in Guthrie, 1976, p. 123)

Since the 1960s, the APA has made determined efforts to bring greater diversity to the field by expanding opportunities for ethnic minorities to attend graduate schools and to increase their presence among college faculty. Despite these initiatives, minority representation of PhD faculty on campus has not kept pace with the proportion of African Americans or Hispanic Americans in the general population.

A study of minority students majoring in psychology found that they were significantly less satisfied than white students with their faculty, courses, and textbooks for not paying more attention to diversity issues. As one minority student put it, "make an effort to include us in the field" (Lott & Rogers, 2011, p. 209).

The APA has established a division called the Society for the Psychological Study of Culture, Ethnicity, and Race, which publishes the *Cultural Diversity and Ethnic Minority Psychology* journal. The Association of Black Psychologists publishes the *Journal of Black Psychology*. The Asian American Psychological Association publishes the *Asian American Journal of Psychology*. The National Latina/o Psychological Association publishes the *Journal of Latina/o Psychology*.

A Final Note

When we consider the effects of prejudice as a contextual factor restricting the access of women and minorities to education and employment opportunities in psychology, it is important to note the following: Yes, the history of psychology as described in this and other textbooks includes the contributions of very few female and minority scholars because of the discrimination they faced. However, it is also true that few white men are singled out for attention, relative to their numbers in the field. This is not the result of deliberate discrimination. Rather, it is a function of the way history in any field is written.

> *The history of a discipline such as psychology involves describing major discoveries, illuminating questions of priority, and identifying "great individuals" in the context of a national or international Zeitgeist. Those who carry out the day-to-day work of a discipline are unlikely to find themselves in this spotlight. Psychologists who bring considerable talent to bear behind the scenes—teaching courses, seeing clients, performing experiments, sharing data with colleagues seldom are publicly recognized beyond a small group of peers.* (Pate & Wertheimer, 1993, p. xv)

Thus, history ignores the everyday work of the majority of psychologists, regardless of their race, gender, or ethnic origin.

Conceptions of Scientific History

Two ways to view the historical development of scientific psychology are the personalistic approach and the naturalistic approach. In essence, we are asking which is the more important in accepting a new idea: the person who developed it or the times in which the idea is put forth.

The Personalistic Theory

Personalistic theory: The view that progress and change in scientific history are attributable to the ideas of unique individuals.

The **personalistic theory** of scientific history focuses on the achievements and contributions of specific individuals. According to this viewpoint, progress and change are attributable directly to the will and charisma of unique persons who alone redirected the course of history. A Napoleon, a Hitler, or a Darwin was, so this theory goes, the prime mover and

shaper of great events. The personalistic conception implies that the events never would have occurred without the appearance of these monumental figures. The theory says, in effect, that the person makes the times.

At first glance, it seems obvious that science is the work of the intelligent, creative, and energetic men and women who alone determine its direction. We often define an era by the name of the person whose discoveries, theories, or other contributions mark the period. We talk of physics "after Einstein" or of sculpture "after Michelangelo." It is apparent in science, in the arts, and in popular culture that individuals have produced dramatic, sometimes traumatic, changes that have altered the course of history.

Therefore, the personalistic theory has merit, but is it sufficient to explain the development of a science or a society? No. Often, the contributions of scientists, artists, and scholars were ignored or suppressed during their lifetimes, only to be recognized long afterward. These instances imply that the intellectual, cultural, or spiritual climate of the times can determine whether an idea will be accepted or rejected, praised, or scorned. The history of science is also the story of discoveries and insights that were initially rejected. Even the greatest thinkers and inventors have been constrained by the Zeitgeist, the spirit or climate of the times.

Thus, the acceptance and application of a great person's discovery or idea may be limited by prevailing thought, but an idea too unorthodox for one time and place may be readily received and supported a generation or a century later. Slow change is often the rule for scientific progress.

The Naturalistic Theory

Naturalistic theory: The view that progress and change in scientific history are attributable to the Zeitgeist, which makes a culture receptive to some ideas but not to others.

We can see, then, that the notion that the person makes the times is not entirely correct. Perhaps, as the **naturalistic theory** of history proposes, the times make the person or at least make possible the recognition and acceptance of what that person has to say. Unless the Zeitgeist and other contextual forces are receptive to the new work, its proponent may not be heard, or they may be shunned or put to death. Society's response, too, depends on the Zeitgeist.

Consider the example of Charles Darwin. The naturalistic theory suggests that if Darwin had died young, someone else would have developed a theory of evolution in the mid-nineteenth century because the intellectual climate was ready to accept such a way of explaining the origin of the human species. Indeed, someone else did develop the same theory at the same time (Chapter 6).

The inhibiting or delaying effect of the Zeitgeist operates not only at the broad cultural level but also within science itself, where its effects may be more pronounced. The concept of the conditioned response was suggested by the Scottish scientist Robert Whytt in 1763, but no one was interested then. Well over a century later, when researchers were adopting more objective research methods, the Russian physiologist Ivan Pavlov (Chapter 9) elaborated on Whytt's observations and expanded them into the basis of a new system of psychology. Thus, a discovery often must await its time. One psychologist wisely noted, "There is not much new in this world. What passes for discovery these days tends to be an individual scientist's rediscovery of some well-established phenomenon" (Gazzaniga, 1988, p. 231).

Instances of simultaneous discovery also support the naturalistic conception of scientific history. Similar discoveries have been made by individuals working far apart geographically, often in ignorance of one another's work. In 1900, three investigators unknown to one another coincidentally rediscovered the work of Austrian botanist Gregor Mendel, whose writings on genetics had been largely ignored for 35 years.

Other examples of simultaneous discovery in science and technology include calculus, oxygen, logarithms, sunspots, and the conversion of energy, as well as the invention of color photography and the typewriter, all discovered or promoted at approximately the same time by at least two researchers (Gladwell, 2008; Ogburn & Thomas, 1922).

Nevertheless, it can be very difficult for a new idea or discovery to be accepted because the dominant theoretical position in a scientific field may obstruct or prohibit consideration of new viewpoints. A theory may be believed so strongly by the majority of scientists that any investigation of new issues or methods is stifled.

An established theory can determine the ways in which data are organized and analyzed as well as the research results permitted to be published in mainstream scientific journals. Findings that contradict or oppose current thinking may be rejected by journal editors, who function as gatekeepers or censors, enforcing conformity of thought by dismissing or trivializing revolutionary ideas or unusual interpretations.

An analysis of articles that appeared in two psychology journals (one published in the United States and the other in Germany) over a 30-year period from the 1890s to 1920 examined the question of how important each article was considered to be at the time of publication and again at a later date. Level of importance was measured by the number of citations to the articles in subsequent publications. The results showed clearly that by this measure, the level of scientific importance of the articles depended on whether the "research topics [were] in the focus of scientific attention at the time" (Lange, 2005, p. 209). Issues not in keeping with currently accepted ideas were judged to be less important.

In the 1970s, psychologist John Garcia attempted to publish the results of research that challenged the then dominant stimulus-response (S-R) learning theory. Major journals refused to accept his articles, even though the work was judged to be well done and had received professional recognition. Garcia, a Hispanic American, was elected to the Society of Experimental Psychologists and received the APA's Distinguished Scientific Contribution Award for his research. Eventually his work was published, but only in lesser-known, smaller-circulation journals, which further delayed widespread dissemination of his ideas.

The Zeitgeist, or climate of thought within science, can have an inhibiting effect on methods of investigation, theoretical formulations, and the definition of the discipline's subject matter. For example, we will describe the tendency in early scientific psychology to focus on consciousness and subjective aspects of human nature. Not until the 1920s could it be said, as some joked, that psychology finally "lost its mind" and then lost consciousness altogether. But a half century later under the impact of a different Zeitgeist, psychology regained consciousness as an acceptable subject for investigation, responding to the changing intellectual climate of the times.

We can make an analogy with the evolution of a living species. Both science and species change or adapt in response to the demands of their environment. What happens to a species over time? Very little, as long as its environment remains largely constant. When conditions change, however, the species must respond appropriately or face extinction.

Similarly, a science exists in the context of an environment, its Zeitgeist, to which it must be responsive. The Zeitgeist is not so much physical as it is intellectual, but like the physical environment, it is subject to change. We see evidence of this evolutionary process throughout the history of psychology. When the Zeitgeist favored speculation, meditation, and intuition as paths to truth, psychology also favored those methods. Later, when the intellectual spirit of the times dictated an observational, experimental, and scientific approach to truth, the methods of psychology moved in that direction. At the

beginning of the twentieth century, when one form of psychology was transplanted to a different intellectual soil, it became a totally different species of psychology. This move occurred when psychologists brought the original German psychology to the United States, where it was modified by the new environment to become a uniquely American psychology.

Our emphasis on the Zeitgeist does not negate the importance of the personalistic conception of scientific history—the significant contributions of great men and women—but it does require us to consider their ideas in context. A Charles Darwin or a Sigmund Freud does not single-handedly alter the course of history through sheer force of genius. He or she does so only because the path has already been cleared. One recent historian of psychology noted, "If we lose the importance of the individual in our historical writings, we fail to truly capture the interaction between the personal and the social" (Ball, 2012, p. 80).

Therefore, in this book we approach the historical development of psychology in terms of both personalistic and naturalistic viewpoints, although the Zeitgeist plays the major role. When scientists propose ideas that are too far out of phase with accepted intellectual and cultural thought, their insights are likely to die in obscurity. Individual creative work is more like a prism that diffuses, elaborates, and magnifies current thought, rather than an independent beacon. Remember, however, that both viewpoints will shed light on the path ahead.

Schools of Thought in the Evolution of Modern Psychology

During the last quarter of the nineteenth century, the initial years of psychology's evolution as a distinct scientific discipline, the direction of the new field was influenced by Wilhelm Wundt. A German physiologist, Wundt had definite ideas about the form this new science (*his* new science) should take. He determined its goals, subject matter, research methods, and topics to be investigated. In this pursuit, he was influenced by the spirit of his times, the current thinking in philosophy and physiology. Nevertheless, it was Wundt in his role as agent of the Zeitgeist who drew together threads of philosophical and scientific thought. Because he was such a compelling promoter of the inevitable, psychology was shaped by his vision.

Before long, however, controversy arose among the growing numbers of psychologists. New social and scientific ideas were being advanced. Some psychologists, reflecting more modern currents of thought, disagreed with Wundt's version of psychology and proposed their own. By around 1900, several different systematic positions and schools of thought coexisted uneasily. We may think of them as differing definitions of the nature of psychology.

The term *school of thought* refers to a group of psychologists who become associated ideologically, and sometimes geographically, with the leader of a movement. Typically, the members of a school of thought share a theoretical or systematic orientation and investigate similar problems. The emergence of the various schools of thought and their subsequent decline and replacement by others is a striking characteristic of the history of psychology.

This stage in the development of a science, when it is still divided into schools of thought, has been referred to as "preparadigmatic." A paradigm (a model or pattern) is an accepted way of thinking within a scientific discipline that provides essential questions and answers. The notion of paradigms in scientific evolution was advanced by Thomas Kuhn,

a historian of science, whose 1970 book, *The Structure of Scientific Revolutions,* has sold more than a million copies.

The more mature or advanced stage in the development of a science is reached when it is no longer characterized by competing schools of thought, that is, when the majority of the scientists agree on theoretical and methodological issues. At that stage, a common paradigm or model defines the entire field.

We can see paradigms at work in the history of physics. The Galilean-Newtonian concept of mechanism was accepted by physicists for 300 years, during which time virtually all physics research was conducted within that framework. Then, when a majority of physicists came to accept Einstein's model, which was a new way of viewing the subject matter, the approach of Galileo and Newton was replaced. This replacement of one paradigm by another is what Kuhn meant by a scientific revolution.

Psychology has not yet reached the paradigmatic stage. Throughout psychology's history, scientists and practitioners have been seeking, embracing, and rejecting various definitions of the field. No single school or viewpoint has succeeded in unifying these assorted positions for very long. Cognitive psychologist George Miller (Chapter 15) said that "no standard method or technique integrates the field. Nor does there seem to be any fundamental scientific principle comparable to Newton's laws of motion or Darwin's theory of evolution" (1985, p. 42).

For many years the state of psychology changed little. Scholars referred to the history of the field as a "sequence of failed paradigms" (Sternberg & Grigorenko, 2001, p. 1075). Historian Ludy Benjamin wrote, "A common lament among psychologists today … is that the field of psychology is far along a path of fragmentation or disintegration [with] a multitude of independent psychologies that soon will be or already are incapable of communicating with one another" (2001, p. 735).

Another contemporary psychologist described the field "not as a unified discipline but as a collection of psychological sciences" (Dewsbury, 2009b, p. 284). And yet another wrote in 2013 that "Psychology still hasn't settled on whether its subject matter is mind or behavior. It is ever more appropriate that the components of the American Psychological Association are called Divisions, because psychology becomes more fractionated with each passing decade" (Catania, 2013, p. 133). There are almost 60 divisions in the APA, including one on the history of psychology.

Thus, psychology may be more fragmented today than at any time in its history, with each faction clinging to its own theoretical and methodological orientation, approaching the study of human nature with different techniques and promoting itself with specialized jargon, journals, and the trappings of a school of thought.

Each of the early schools of thought within psychology was a protest movement, a revolt against the prevailing systematic position. Each school passionately criticized what it saw as the weaknesses of the older system and offered new definitions, concepts, and research strategies to correct the perceived failures. When a new school of thought captured the attention of a segment of the scientific community, those scholars rejected the previous viewpoint.

Sometimes leaders of the older school of thought never became convinced of the worth of the new system. Usually more advanced in age, these psychologists remained too deeply committed to their position, intellectually and emotionally, ever to change. Younger, less committed adherents of the old school were more easily attracted to fresh ideas and became supporters of the new position, leaving the others to cling to their traditions in increasing isolation.

The German physicist Max Planck wrote, "A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents

Structuralism: E. B. Titchener's system of psychology, which dealt with conscious experience as dependent on experiencing persons.

Functionalism: A system of psychology concerned with the mind as it is used in an organism's adaptation to its environment.

Behaviorism: Watson's science of behavior, which dealt solely with observable behavioral acts that could be described in objective terms.

Gestalt psychology: A system of psychology that focuses largely on learning and perception, suggesting that combining sensory elements produces new patterns with properties that did not exist in the individual elements.

Psychoanalysis: Sigmund Freud's theory of personality and system of psychotherapy.

Humanistic psychology: A system of psychology that emphasizes the study of conscious experience and the wholeness of human nature.

Cognitive psychology: A system of psychology that focuses on the process of knowing, on how the mind actively organizes experiences.

eventually die, and a new generation grows up that is familiar with it" (1949, p. 33). Charles Darwin wrote, "What a good thing it would be if every scientific man was to die when 60 years old, as afterwards he would be sure to oppose all new doctrines" (quoted in Boorstin, 1983, p. 468).

Different schools of thought have developed during the course of the history of psychology, each one an effective protest against what had gone before. Each new school used its older opponent as a base against which to push and gain momentum. Each position proclaimed what it was not and how it differed from the established theoretical system. As the new system developed and attracted supporters and influence, it inspired opposition, and the whole combative cyclical process began anew. What was once a pioneering, aggressive revolution became, with its own success, the established tradition, and inevitably it then succumbed to the vigorous force of the next youthful protest movement. Success destroys vigor. A movement feeds on opposition. When the opposition has been defeated, the passion and ardor of the once-new movement die.

It is in terms of the historical development of the schools of thought that we describe the advance of psychology. Great men and women have made important contributions, but the significance of their work is most easily understood when examined within the context of the ideas that preceded theirs, the ideas on which they built, and the work their contributions eventually inspired.

Plan of the Book

We describe the philosophical and physiological precursors of experimental psychology in Chapters 2 and 3. The psychology of Wilhelm Wundt (Chapter 4) and the school of thought called **structuralism** (Chapter 5) developed from these philosophical and physiological traditions.

Structuralism was followed by **functionalism** (Chapters 6, 7, and 8), **behaviorism** (Chapters 9, 10, and 11), and **Gestalt psychology** (Chapter 12), all of which evolved from or revolted against structuralism. On a roughly parallel course in time, though not in subject matter or methodology, **psychoanalysis** (Chapters 13 and 14) grew out of ideas about the nature of the unconscious and the medical interventions to treat the mentally ill.

Psychoanalysis and behaviorism instigated a number of sub-schools. In the 1950s, **humanistic psychology,** incorporating principles of Gestalt psychology, developed in reaction to behaviorism and psychoanalysis (Chapter 14). Around 1960, **cognitive psychology** challenged behaviorism to revise psychology's definition once again. The major focus of the cognitive system is a return to the study of conscious processes. That idea, along with contemporary and continuing developments, including evolutionary psychology, cognitive neuroscience, and positive psychology, is the subject of Chapter 15.

Review Questions

1. Describe how the studies of the clown and the gorilla support the notion of inattentional blindness. Relate this to your own experiences when you did not see something that other people said was really there.
2. What can we learn from studying the history of psychology?
3. Why can psychologists claim that psychology is one of the oldest scholarly disciplines as well as one of the newest?

4. Explain how modern psychology is a product of both nineteenth-century and twentieth-century thought.
5. In what ways do the data of history differ from the data of science? Give examples of how historical data can be distorted.
6. In what ways have contextual forces influenced the development of modern psychology?
7. Describe the obstacles faced by women, Jews, and African Americans in pursuing careers in psychology, especially during the first half of the twentieth century.
8. How does the process of writing history in any field necessarily restrict the number of people whose work can be singled out for attention?
9. Discuss the differences between personalistic and naturalistic conceptions of scientific history. Explain which approach is supported by cases of simultaneous discovery.
10. What is the Zeitgeist? How does the Zeitgeist affect the evolution of a science? Compare the growth of a science with the evolution of a living species.
11. What is meant by the term *school of thought*? Has the science of psychology reached the paradigmatic stage of development? Why or why not?
12. Describe the cyclical process by which schools of thought begin, prosper, and then fail.

Recommended Resources

Cadwallader, T. C. (1975). Unique values of archival research. *Journal of the History of the Behavioral Sciences,* 11, 27–33. Discusses the use of archival materials (unpublished documents, diaries, correspondence, and notebooks) to trace a theory's evolution in reverse, from its published form back through earlier versions, to uncover the impact of a theorist's personal context on his or her ideas.

Chabris, C., & Simons, D. (2010). *The invisible gorilla and other ways our intuitions deceive us*. New York: Crown. Discusses the illusions and limitations of our attention and memory processes with both historical and contemporary examples.

Cheng, E. (2012). *Historiography: An introductory guide*. London: Bloomsbury Continuum. A student-oriented guide to the methods of gathering historical data from the time of the Renaissance to the present.

Dewsbury, D. (2009b). Is psychology losing its foundations? *Review of General Psychology,* 13, 281–289. Examines the growing anti-intellectualism in society, in universities, and within the discipline of psychology and suggests some remedies.

Hilgard, E. R. (Ed.). (1978). *American psychology in historical perspective: Addresses of the presidents of the American Psychological Association, 1892–1977.* Washington, DC: American Psychological Association. Biographical notes and selections from presidential addresses reflecting the growth of American psychology as a science and profession.

Hyman, I., Boss, S., Wise, B., McKenzie, K., & Caggiano, J. (2009). Did you see the unicycling clown: Blindness while walking and talking on a cell phone. *Applied Cognitive Psychology,* 24, 597–607. Research on multitasking and divided attention.

Karabel, J. (2005). *The chosen: The hidden history of admission and exclusion at Harvard, Yale, and Princeton*. Boston: Houghton Mifflin. A former college admissions counselor describes cultural factors in discrimination against African-American, Jewish, and female college applicants and explores the concept of ethnic diversity.

Mack, A., & Rock, I. (2000). *Inattentional blindness*. Boston: MIT Press. Explains the authors' research demonstrating that there is often no conscious perception of our visual world unless we pay close attention to only one stimulus at a time.

Philogene, G. (Ed.). (2004). *Racial identity in context: The legacy of Kenneth B. Clark*. Washington, DC: American Psychological Association. Describes the life and work of Clark; explores the creation of racial identity and the effects of negative racial images.

Pickens, W. (2013). APA on your screen. *Monitor on Psychology,* 44(8), 9. An overview of YouTube online sources of information provided by APA.

Popplestone, J. A., & McPherson, M. W. (1998). *An illustrated history of American psychology*. Akron, OH: University of Akron Press. Photographs and other illustrations providing a visual history of psychology from its origins in nineteenth-century Europe to the late twentieth century in the United States.

CHAPTER 2

Philosophical Influences on Psychology

The Defecating Duck

It looked like a duck. It quacked like a duck. It rose up on its legs when the keeper held out his hand to offer it kernels of grain. It stretched its neck forward, grabbed the grain in its beak, and swallowed it just like a duck. And then it defecated onto a silver platter—just like a duck? Only it was not a duck, at least not a real one. It was a mechanical duck, a robot, a machine full of levers, cogs, and springs that caused it to move and to imitate a duck's behavior. One wing alone contained more than 400 moving parts. It was considered one of the great wonders of its time.

The duck's inventor, Jacques de Vaucanson, charged an admission fee equivalent to the average of one week's wages to view this marvel of the age. He quickly became rich, and his mechanical model became "the talk of all the salons, as the nation's leaders debated how it worked and just what it signified for politics, philosophy, and life itself" (Singer, 2009, p. 43). That is a lot to ask of a defecating duck.

The year was 1739; the place was Paris. The defecating duck drew enormous crowds from many European countries. People marveled that inventors could fashion such a lifelike creation. They watched it move, eat, swallow, and poop in awe that such a glorious, miraculous machine had been made possible. Even the great philosopher Voltaire beheld the duck in wonder and wrote, "Without the shitting duck, there would be nothing to remind us of the glory of France" (quoted in Wood, 2002, p. 27). More than 100 years later, the great scientist Hermann von Helmholtz (see Chapter 3) wrote that the duck was "the marvel of the last century" (quoted in Riskin, 2004, p. 633).

Well, you might ask, what is the big deal? Why was this mechanical toy considered such a wonder? Today we can see far more complicated and realistic figures at any theme park. But remember, this was the eighteenth century, and such a contraption had rarely been seen. The great public interest in the amazing French duck was part of a newfound fascination with all sorts of machines that were being invented and perfected for use in science, industry, and entertainment. They were about to change the world.

The Spirit of Mechanism

Throughout England and Western Europe, a vast number of newly developed machines were being put to daily use to extend, or replace, human muscle power. Pumps, levers, pulleys, cranes, wheels, and gears powered water mills and windmills to grind grain, saw

wood, weave textiles, and accomplish other forms of labor-intensive work, thus freeing European society from its dependence on human brawn. Machines became familiar to people at all levels of society, from peasant to aristocrat, and soon they were accepted as a natural part of everyday life.

In the royal gardens of the day, mechanical devices were being built to provide whimsical forms of amusement. Water running through underground pipes operated mechanical figures that performed an astonishing variety of movements, played musical instruments, and produced sounds approximating human speech. As people strolled through the gardens, they would unwittingly step on hidden pressure plates, activating the mechanisms and sending water coursing through the pipes to set the figures in motion. Of all the new devices, however, it was the mechanical clock that would have the greatest impact on scientific thought.

You may wonder what this massive growth of technology has to do with the history of modern psychology. We are talking about a time 200 years before the formal founding of psychology as a science, and about physics and mechanics, disciplines far removed from the study of human nature. Nevertheless, the relationship is compelling and direct because the principles embodied by those machines, mechanical figures, and clocks that first appeared in the seventeenth century influenced the direction of the new psychology.

The prevailing climate of thought in the seventeenth to nineteenth centuries was the intellectual soil that nourished the new psychology. The underlying philosophy—the basic contextual force—of the seventeenth century was the spirit of **mechanism,** the image of the universe as a great machine. This doctrine held that all natural processes are mechanically determined and are capable of being explained by the laws of physics and chemistry.

Mechanism: The doctrine that natural processes are mechanically determined and capable of explanation by the laws of physics and chemistry.

The idea of mechanism originated in physics, then called natural philosophy, as a result of the work of the Italian physicist Galileo Galilei (1564–1642) and the English physicist and mathematician Isaac Newton (1642–1727), who had been trained as a clockmaker. Everything that existed in the universe was assumed to be composed of particles of matter in motion. According to Galileo, matter was made up of discrete corpuscles or atoms that affected one another by direct contact. Newton revised Galileo's version of mechanism by suggesting that movement was communicated not by actual physical contact but by forces that acted to attract and repel the atoms. Newton's idea, although important in physics, did not radically change the basic concept of mechanism and the way it was applied to problems of a psychological nature.

If the universe consists of atoms in motion, then every physical effect (the movement of each atom) follows from a direct cause (the movement of the atom that strikes it). Because the effect is subject to the laws of measurement, it should be predictable. The operation of the physical universe was thus considered to be orderly, like a smoothly running clock or any other good machine. It was thought that once scientists grasped the laws by which the world functioned, they could determine how it would run in the future.

The methods and findings of science were growing apace with technology during this period, and the two meshed effectively. Observation and experimentation became the distinguishing features of science, followed closely by measurement. Scholars attempted to define and describe every phenomenon by assigning it a numerical value, a process that was vital to the study of the machinelike universe. Thermometers, barometers, slide rules, micrometers, pendulum clocks, and other measuring devices were perfected, and they reinforced the notion that it was possible to measure every aspect of the natural universe. Even time, previously deemed incapable of being reduced to smaller units could now be measured with precision.

The precise measurement of time had both scientific and practical consequences. "Without accurate time-keeping instruments, there could be no measurement of small increments of time elapsed between observations and thus no consolidation of the advances

in scientific understanding begun with the help of the telescope and microscope" (Jardine, 1999, pp. 133–134). In addition, astronomers and navigators needed exact time-measuring devices to accurately record the movements of celestial bodies. These data were vital to determining the location of ships and for navigation on the open seas.

The Clockwork Universe

The mechanical clock was the ideal metaphor for the seventeenth-century spirit of mechanism. Historian Daniel Boorstin referred to the clock as the "mother of machines" (1983, p. 71). Clocks in the seventeenth century were a technological sensation, as astonishing and influential as computers would become in the twentieth century. No other mechanical device had such an impact on human thought and behavior at all levels of society. In Europe, clocks were being produced in great quantity and variety.

Note that the Chinese had devised huge mechanical clocks as early as the tenth century. It is possible that news of their invention stimulated the development of clocks in Western Europe. However, the Europeans' refinement of clockwork mechanisms and their enthusiasm for elaborate, even fanciful, clocks was unmatched (Crosby, 1997).

Some were small enough to fit on a tabletop or even to be carried on one's person. With advancing technology, portable clocks were developed that were small enough to be carried around. At first they were worn on a chain around the neck as a symbol of the person's wealth. They became such a status symbol that members of the Calvinist and Puritan religious sects, "objecting to such ostentatious display, began carrying them in their pockets. Thus was born the pocket watch, popular until well into the twentieth century" (Newton, 2004, p. 62).

Larger clocks, housed in church towers and government buildings, could be seen and heard by residents for miles around. In this way, clocks became available to everyone, regardless of social class or economic circumstances. Also, however, people came to depend on clocks and to be governed by them. For the first time, punctuality became part of daily life. Activities came to be measured in units of time. Life was "regularized and became more orderly" and, as a result, more predictable (Shorto, 2008, p. 208).

Because of the regularity, predictability, and precision of clocks, scientists and philosophers began to think of them as models for the physical universe. Perhaps the world itself was a vast clock made and set in motion by the Creator. Scientists such as the British physicist Robert Boyle, the German astronomer Johannes Kepler, and the French philosopher Rene Descartes agreed with this idea, expressing the belief that the harmony and order of the universe could be explained in terms of the clock's regularity—which is built into the machine by the clockmaker just as the regularity of the universe was thought to be built into it by God. The French scientist Bernard de Fontenelle summed it up when he wrote in 1686 that "The universe is but a watch on a larger scale" (quoted in Dolnick, 2011, epigraph).

This idea also became a model in the founding of the United States and the development of American politics. A commentator observed 200 years later that the Founding Fathers "who were influenced by Newtonian physics and the deist idea of God as cosmic clockmaker, devised a constitutional system of separated powers, checking and balancing one another, mimicking what they considered our solar system's clockwork mechanics" (Will, 2009). Thus, the idea of a clockwork universe transformed nearly every aspect of human experience.

Determinism and Reductionism

Determinism: The doctrine that acts are determined by past events.

When seen as a clocklike machine, the universe—once it was created by God and set in motion—would continue to function efficiently without any outside interference. Thus, the clock metaphor for the universe encompasses the idea of **determinism,** the belief

that every act is determined or caused by past events. In other words, we can predict the changes that will occur in the operation of the clock—as well as in the universe—because we understand the order and regularity with which its parts function.

It was not difficult to gain insight into the structure and workings of a clock. A person could disassemble a clock and see exactly how its springs and gears operated. This led scientists to popularize the notion of **reductionism**. The workings of machines such as clocks could be understood by reducing them to their basic components.

Reductionism: The doctrine that explains phenomena on one level (such as complex ideas) in terms of phenomena on another level (such as simple ideas).

Similarly, it was thought that we could understand the physical universe (which, after all, was just another machine) by analyzing or reducing it to its simplest parts, to its molecules and atoms. Eventually, reductionism would come to characterize every science, including the new psychology.

Some obvious questions followed: If the clock metaphor and the methods of science could be used to explain the workings of the physical universe, would they also be appropriate for the study of human nature? If the universe was a machine—orderly, predictable, observable, and measurable—could human beings be considered in the same way? Were people, and even animals, also some type of machine?

Automata

The intellectual and social aristocrats of the seventeenth century already had the models for this idea in their water-powered garden figures, and the proliferation of clocks provided similar models for everyone else. As the technology was refined, more sophisticated mechanical contraptions, built to imitate human movement and action, were offered for popular entertainment. These devices were called automata, and they were capable of performing marvelous and amusing feats with precision and regularity.

Automata had been developed much earlier than the seventeenth century. Ancient Greek and Arabic manuscripts contain descriptions of mechanized figures. China also excelled in constructing automata; Chinese literature tells of mechanical animals and fish and of human figures devised to pour wine, carry cups of tea, sing, dance, and play musical instruments.

In the sixth century, a large clock had been built in what was then called Palestine. When it struck the hours, an elaborate set of mechanical figures was set in motion. As a result, the art of creating automata spread through much of the Islamic world (Rossum, 1996). But more than a thousand years later, when seventeenth-century Western European scientists, intellectuals, and artisans devised automata, they were thought to be new. The fundamental work of those earlier civilizations had been lost.

Two of the most complex and spectacular European automata, both made by Jacques de Vaucanson, were the defecating duck and an animated flute player, which contained "an infinity of wires and steel chains [that] form the movement of the fingers, in the same way as in living man, by the dilation and contraction of the muscles. It is doubtless the knowledge of the anatomy of man that guided the author in his mechanics" (Riskin, 2003, pp. 601–602). The flute player not only produced sounds, which popular musical toys could do, but it actually played the instrument. Standing five-and-a-half feet tall, the height of the average man of the day, this automaton contained a mechanical part that duplicated every muscle or other body part needed to play the flute.

Nine bellows pumped differing amounts of air into the figure's chest, depending on which of the 12 tunes it was programmed to perform. The air was forced through a single pipe (corresponding to a human trachea) and into the mouth, where it was controlled by the metal tongue and lips before entering the flute, thus giving the impression that the figure was actually breathing. Fingers opened and closed over the instrument's holes to produce precise sounds. Both these automata "blurred the line between man and machine, between the animate and the inanimate" (Wood, 2002, p. xvii).

Another musical automaton, the so-called Lady Musician, played five different melodies on a harpsichord. Her mechanical eyes followed mechanical fingers as they moved over the keys, and she appeared to be breathing in time with the music. Another marvel was the figure of a small boy seated at a desk, programmed to move its hand as if writing letters or drawing figures. It was exhibited all across Europe two centuries ago and can now be seen at the Franklin Institute in Philadelphia (Fountain, 2011).

Automata can also be found in the central squares of many European cities, where mechanical figures in the town hall's clock tower march in circles, bang drums, and strike bells with hammers on the quarter hour. In France's Strasbourg Cathedral, representations of biblical figures bow hourly to a statue of the Virgin Mary, while a rooster opens its beak, sticks out its tongue, flaps its wings, and crows. At England's Wells Cathedral, pairs of knights in armor circle each other in mock combat. As the clock strikes the hour, one knight knocks the other off his horse. The Bavarian National Museum in Munich, Germany, houses a parrot 16 inches tall. As the clock strikes the hour, the parrot whistles, flaps its mechanical wings, rolls its eyes, and drops a small steel ball from its tail.

The following photo shows the inner workings of a Japanese puppet that serves tea. Made of wood, strings and cogs, it appears to be walking but it is really rolling on wheels. The arms move the serving tray up and down and the head nods. When the cup is lifted off the tray, the automaton will stop. This model is now on exhibit at the National Science Museum in Tokyo.

The philosophers and scientists of the time believed that this kind of clockwork technology might fulfill their dream of creating an artificial being. Clearly, many of the early automata give that appearance. We could think of them as the Disney figures of their day, and it is easy to understand why people reached the conclusion that living beings were simply another kind of machine.

EVERETT KENNEDY BROWN/EPA/Newscom

Automaton figure of a doll.

People as Machines

Look again at the inner workings of the doll in the photo. A person examining it could clearly see the functioning of the gears, levers, and ratchets that accounted for the figure's movements. The English philosopher Thomas Hobbes (1588–1679) wrote, "for what is the heart but a spring, and the nerves but so many strings; and the joints but so many wheels, giving motion to the whole body" (quoted in Zimmer, 2004, p. 97).

Descartes and other philosophers also adopted automata as models for human beings. Not only was the universe a clockwork machine, so too were its people. Descartes wrote that this idea would not "appear at all strange to those who are acquainted with the different automata, or moving machines, fabricated by human industry … such persons will look upon this body as a machine made by the hands of God, which is incomparably better arranged and adequate to movements more admirable than in any machine of human invention" (1637/1912, p. 44). People might be better and more efficient machines than the ones the clockmakers built, but they were machines nonetheless.

Thus, clocks and automata paved the way for the ideas that human functioning and behavior were governed by mechanical laws and that the experimental and quantitative methods so successful in uncovering the secrets of the physical universe could be applied to human nature. In 1748, the French physician Julien de La Mettrie (who died of an overdose of pheasant and truffles) reported a hallucination he had experienced during a high fever. The dream persuaded him that people were machines, albeit enlightened ones, like a watch that wound its own springs (Mazlish, 1993).

This notion became a driving force in science and philosophy and, for a considerable time, altered the prevailing image of human nature, even among the general population. For example, during the American Civil War (1861–1865), a Union officer, commenting on the death of a friend, wrote that nothing was left of him "but the broken machine that the soul once put in motion" (Lyman, quoted in Agassiz, 1922, p. 332).

The mechanical image of human beings permeated the literature of the nineteenth and early twentieth centuries in novels and children's tales. People were fascinated by the idea that lifelike figures could be recreated by machines. Hans Christian Andersen, the Danish storyteller, wrote *The Nightingale* about a mechanical bird. The English novelist Mary Wollstonecraft Shelley's perennially popular book, *Frankenstein,* features a machine monster powered by the newly discovered electrical impulses in nerves that destroys its creator. The famous Oz books for children by the American writer L. Frank Baum (the basis for the classic movie *The Wizard of Oz*) are full of mechanical men.

And so the legacy of the seventeenth to nineteenth centuries includes the conception of humans operating as machines, along with the scientific method by which human functioning could be investigated. Bodies were likened to machines, the scientific outlook was dominant, and life was subject to mechanical laws. In a rudimentary way, mechanism was also applied to human mental functioning. The result was a machine that supposedly could think.

The Calculating Engine

Charles Babbage (1791–1871) developed a fascination with clocks and automata as a boy. He was attracted particularly to the mechanical figure of a dancing lady, an object he managed to purchase later in life. Babbage was unusually intelligent and gifted in mathematics, which he studied on his own as an adolescent. When he enrolled at Cambridge University, he was disappointed to discover that he understood more about math than the faculty did. He later became a mathematics professor at Cambridge as well as a Fellow of the Royal Society and one of the best-known intellectuals of the age. His lifelong quest was to develop a calculating machine that could perform mathematical operations faster than

humans and then print the results. In pursuing this goal, Babbage formulated the basic principles that drive modern computers.

Babbage may not have been the first to develop a mechanical computing machine. The so-called Antikythera computer was discovered in 1900 in the wreckage of a ship sunk around 100 BC off the Greek island of Antikythera. The gadget was about the size of a modern laptop and contained a series of 37 gears, which, when a date was entered, could crank out information about the position of the sun, moon, and other planets (Seabrook, 2007).

Whereas the automata we have discussed so far imitated human physical actions, Babbage's calculator imitated human mental actions. In addition to tabulating the values of mathematical functions, the machine could play chess, checkers, and other games. It even had a memory that held intermediate results until they were needed to complete a given calculation. Babbage called his calculator "the difference engine" (see accompanying photo), and he referred to himself as "the programmer." The difference engine consisted of some 8,000 precisely engineered brass and steel parts—shafts, gears, and disks—all of which were powered or set in motion by a hand crank. This machine marks the beginning of the development of today's sophisticated computers. It is considered to represent a major breakthrough in the attempt to simulate human thought. "Here was a machine that actually *performed* mental functions. The age of artificial intelligence could be said to have begun with the Difference Engine" (Snyder, 2011, p. 88).

One of Babbage's biographers noted, "The significance of the machine being automatic cannot be overstated. By cranking the handle, that is, by exerting a physical force, you could for the first time achieve results that up to that point in history could only have been arrived at by mental effort—thinking. It was the first successful attempt to externalize a faculty of thought in an inanimate machine" (Swade, 2000, p. 83).

Babbage promoted his new machine to the most influential people of the day to garner their support, so he could construct an even more advanced device. He held grand parties at his London house, inviting up to 300 of the social, intellectual, and political elite at a time. Charles Darwin was a guest; the writer Charles Dickens attended. Important people were eager to be seen at the home of the brilliant raconteur, inventor, and celebrity to be in the presence of Babbage and his marvelous machine. The complete engine was too big to exhibit at home, however, so Babbage had a working model of a portion of it built to entertain his visitors. The model was two-and-a-half feet tall, two feet wide, and two feet deep.

After 10 years, Babbage was forced to abandon his work on the difference engine because of high cost overruns, to the point where the government withdrew all its support. A British government official said that if the machine ever were completed, it should "first be set to calculating how much money went into its construction!" (quoted in Green, 2001, p. 136).

Babbage then turned his attention to designing an even larger device, containing a staggering 25,000 parts, which he called "the analytical engine." This machine could be programmed, through the use of punch cards, and had a separate memory and information processing capability. It also had an output capability for printing the results of its tabulations. The analytical engine has been likened to a "general purpose digital computing machine" (Swade, 2000, p. 115). Unfortunately, the machine was never built due to lack of funds. The government declined to get involved with Babbage's projects again.

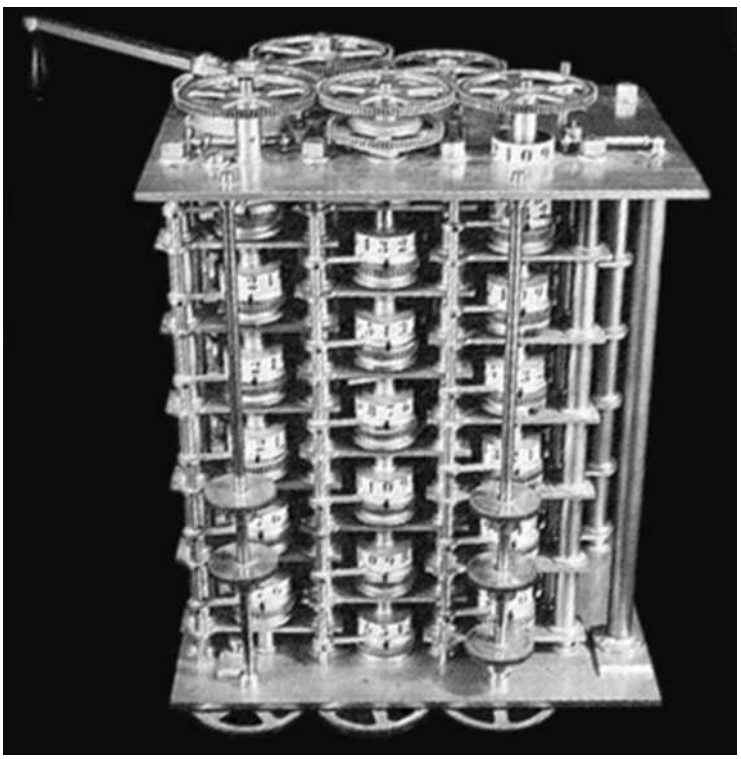
When he could no longer obtain funding for his work, he became despondent, bitter, and resentful. He reportedly said that he had never known one happy day in his entire life. He "hated mankind in general, Englishmen in particular, and the English government and organ-grinders most of all" (Morrison & Morrison, 1961, p. xiii). His battle against organ grinders and other street musicians brought him considerable notoriety among Londoners,

many of whom derided him as a "crackpot." He frequently wrote letters of protest to the newspapers, complaining that the grating noise from the street dampened his mental powers and interfered with his work. It should be noted that Charles Dickens and others made the same complaints.

Overall, Babbage came to believe that his efforts to develop a calculating machine had been wasted and that the importance of his contributions would never be recognized. Nevertheless, Babbage did eventually receive ample credit posthumously for his work. In 1946, when the first fully automatic computing machine was developed at Harvard, one computer pioneer referred to that accomplishment as the realization of Babbage's dream.

In 1991, to commemorate the bicentennial of Babbage's birth, a team of British scientists constructed a duplicate of his difference engine, based on his original drawings. The device weighs three tons and performs calculations flawlessly (Dyson, 1997). Twenty years after that, in 2011, the British government began a multimillion-dollar project to finally build Babbage's analytical engine from his original plans. The project will use the same kinds of gears, levels, and springs that Babbage designed, and its purpose is to honor the man now called "the father of computing" (Markoff, 2011, p. D1). It is expected to take 10 years to build.

Charles Babbage, who typified the nineteenth-century notion of humans operating as machines, was clearly far ahead of his time. His calculating machine, a forerunner of the modern computer, marked the first successful attempt to duplicate human cognitive processes and develop a form of artificial intelligence. Scientists and inventors of Babbage's day predicted that there would be no limit to what machines might be designed to do or to the humanlike functions they might perform. They would be astounded at the developments that continue to define and shape our daily lives.



Science Museum, UK

Babbage's calculating machine, which survives intact at the Science Museum in London, England.

The Bride of Science

One of Babbage's loyal supporters, and one of the few people who understood how his machines operated, was the 17-year-old math prodigy Ada, countess of Lovelace (1815–1852). Babbage called her his "Enchantress of Numbers." She referred to herself as the "Bride of Science" (Babbage, quoted in Johnson, 2008, p. 76). Her father was the notorious, licentious celebrity poet, Lord Byron, whom her mother divorced one month after she was born, presumably because of the affair (one of many) he was having with his half-sister.

Her mother devoted the rest of her life to making sure she did not become like her father, whom Ada never met. Ada was a willful child, and her mother tried to discipline her wild tendencies by forcing her to study mathematics from morning to night. When the child did not behave as the mother demanded, she was locked in a closet or tied to a wooden board.

Her independent and willful tendencies were not dampened, however, and she turned out to be a mathematical genius. She also became interested in many new ideas such as materialism and mechanism and "experimented with social and sexual conventions too. She was flirtatious, outspoken and often shocking; she consorted with people at the margins of society as well as those at the heart of it" (Woolley, 1999, p. 2). At the age of 13, in 1828, she drew plans for a flying machine and became obsessed with the notion of flying like a bird.

Later in life, married and with three children, she developed extreme mood swings and "nervous disorders" and became addicted to opium and morphine, both of which had been prescribed for her by her physicians. She died at the age of 36 "in terrible agony, of uterine cancer, denied morphine at the end by her mother, who felt that Lovelace could better expiate her mortal sins through intense suffering" (Snyder, 2011, p. 298).

Ada became fascinated by Babbage's analytical engine and published in 1843 what would be the first and only definitive explanation of how it functioned and its potential uses and philosophical implications. She was the first to recognize the fundamental limitation of a "thinking" machine, which is that it cannot, on its own, originate or create anything new. The machine can do only what it is instructed, or programmed, to do. In 1980, the U.S. Department of Defense named the programming language for its military computer control system "Ada" in honor of her contributions to the development computers.

The Beginnings of Modern Science

We noted that the seventeenth century saw far-ranging developments in science. Until that time, philosophers had looked to the past for answers, to the works of Aristotle and other ancient scholars, and to the Bible. The ruling forces of philosophical inquiry were dogma (the doctrine proclaimed by the established church) and authority figures. In the seventeenth century, a new force became important: **empiricism,** the pursuit of knowledge through observation and experimentation. Knowledge handed down from the past became suspect. In its place, the golden age of the seventeenth century became illuminated by discoveries and insights that reflected the changing nature of scientific inquiry.

Empiricism: The pursuit of knowledge through the observation of nature and the attribution of all knowledge to experience.

Among the many scholars whose creativity marked that period, the French mathematician and philosopher Rene Descartes contributed directly to the history of modern psychology. His work helped to free scientific inquiry from the control of rigid, centuries-old theological and intellectual beliefs. Descartes symbolized the transition to the modern era of science, and he applied the idea of the clockwork mechanism to the human body. For these reasons, we can say that he inaugurated the era of modern psychology.

Rene Descartes (1596–1650)

Descartes was born in France on March 31, 1596. He inherited enough money from his father to finance a life of intellectual pursuits and travel. From 1604 to 1612, he was a pupil at a Jesuit school, where he studied mathematics and the humanities. He also displayed considerable talent in philosophy, physics, and physiology. Because Descartes's health was poor, the school's director excused him from morning religious services and permitted him to lie in bed until noon, a habit Descartes retained all his life. During these quiet mornings, he did his most creative thinking.

After completing his formal education, Descartes chose to sample the worldly pleasures of life in Paris. Eventually, he found this tiresome and chose a quieter life devoted to the study of mathematics. At the age of 21, he served as a gentleman-volunteer in the armies of Holland, Bavaria, and Hungary and was known as a fine swordsman and adventurer. He loved to dance and gamble; he proved a successful gambler because of his mathematical skills.

Halls, Franc/Images from the History of Medicine

RENE DESCARTES

Descartes was attracted to women who squinted, and on that basis he offered the following explanation to people who fall in love. He wrote, "When I was a boy I fell in love with a girl who had a bit of a squint, and for a long time afterwards, whenever I saw someone with a squint I felt the passion of love. . . . So if we love someone without knowing why, we can assume that that person is somehow similar to someone else whom we loved before, even if we don't know precisely how" (quoted in Buckley, 2004, pp. 107–108).

His only lasting romantic attachment was a three-year affair with a Dutch woman, Helene Jans, who gave birth to their daughter Francine. Descartes adored the child and was heartbroken when she died in his arms at the age of five. A biographer wrote that Descartes was inconsolable, experiencing "the deepest regret he had ever felt in his life" (quoted in Rodis-Lewis, 1998, p. 141). Descartes remained celibate for the rest of his life.

Descartes was keenly interested in applying scientific knowledge to practical concerns. He investigated ways to keep his hair from turning gray and conducted experiments on the maneuverability of wheelchairs. He also anticipated the notion of conditioning in dogs some 200 years before Pavlov refined the concept (see Chapter 9). According to one biographer, Descartes, in 1630, told a friend that "after you whip a dog six or eight times to the sound of a violin, the sound of the violin alone will make the dog whimper and tremble with fear" (quoted in Watson, 2002, p. 168).

While on duty with the army, Descartes had several dreams that changed his life. As he recalled, he spent the day of November 10 alone in a stove-heated room, deep in thought about his mathematical and scientific ideas. He fell asleep, and in his dreams, as he later interpreted them, he was rebuked for his idleness. The "Spirit of Truth" took possession of his mind and persuaded him to devote his life's work to the proposition that mathematical principles can be applied to all the sciences and thus produce certainty of knowledge. He resolved to doubt everything, particularly dogma from the past, and accept as true only that of which he could be absolutely certain, that determined by the empirical methods.

Descartes wrote that he "was struck by the large number of falsehoods that I had accepted as true in my childhood, and by the highly doubtful nature of the whole edifice that I had subsequently based up on them. I realized that it was necessary . . . to demolish everything completely and start again right from the foundations if I wanted to establish anything at all in the sciences that was stable and likely to last" (quoted in Grayling, 2005, pp. 56–57).

Returning to Paris, he again found life too distracting. By selling the estates he had inherited from his father, Descartes was able to afford to move to a country house in Holland. His need for solitude was so great that he lived in 13 towns and two dozen houses over 20 years, keeping his address secret from all but close friends, with whom he corresponded frequently. His only apparent requirements were proximity to a Roman Catholic Church and a university. According to one biographer, Descartes's motto was, "He lives well who is well hidden" (Gaukroger, 1995, p. 16).

Another biographer described Descartes at this stage of his life as being:

> *[A] man of immense self-regard and of immeasurable ambition … a proud, excitable, egotistical little man. Dogmatic about his own views, he accused everyone who disagreed with him of misunderstanding or of being stupid. He was suspicious, quick to take offense and to anger, slow to cool. He insisted that he was unaffected by personal attacks but he never forgot an insult, slight, or an injury.* (Watson, 2002, pp. 165, 187–188)

Descartes wrote extensively on mathematics and philosophy, and his growing fame from these writings caught the attention of 20-year-old Queen Christina of Sweden, the so-called Queen of Winter, who requested that he instruct her in philosophy (Grayling, 2005, p. 221). Although exceedingly reluctant to abandon his freedom and privacy, and fearing that he would die in Sweden from the cold, he nevertheless had great respect for royal demands.

On September 7, 1649, Descartes boarded a ship, "dressed up in his new green silk suit, white collar, lace-spangled gloves, curly wig, and boots with turned up toes," prepared for the month-long voyage to Stockholm (Watson, 2002, p. 290). His appearance at the royal court was not a success, however, despite the queen being cross-eyed and thus having a squint, which had always been appealing to Descartes. The queen insisted on having her lessons at 5 o'clock in the morning in an unheated library during an unusually bitter winter. "I am not in my element here," Descartes wrote to a friend, "and I want only peace and quiet" (quoted in Rodis-Lewis, 1998, p. 196). To another friend he wrote, "I think that in winter men's thoughts here freeze like the water" (quoted in Watson, 2002, p. 304). The increasingly frail Descartes withstood the early hour and extreme cold for nearly four months before contracting pneumonia. He died on February 11, 1650.

An interesting postscript to the death of a man who, as we will see, devoted considerable thought to the interaction between the mind and the body is the disposition of his own body. Sixteen years after Descartes's death, his friends decided that the body should be returned to France. They sent a coffin to Sweden, but it was too short to contain the remains, so the solution reached by Swedish authorities was to cut off the head and bury it until other arrangements could be made.

While the rest of the corpse was being prepared for the journey home, France's ambassador to Sweden decided he wanted a souvenir, and he severed the right forefinger. The body, now minus its head and one finger, was buried in Paris amid much pomp and ceremony. Sometime later, an army officer in Sweden dug up Descartes's skull as a memento. For 150 years, it passed from one Swedish collector to another until it was finally interred in Paris.

Descartes's notebooks and manuscripts were shipped to Paris after his death, but the boat sank just before docking. The papers lay submerged for three days. It took 17 years of restoration work before they could be published. Almost 200 years after Descartes's death, an Italian mathematician stole 72 of his letters and took them to England, providing another example of data lost to history. Only 45 of these letters have been recovered, the latest in 2010 (Cohen, 2010). Fortunately, Descartes's ideas have fared better than the remains of his corpse and writings.

The Contributions of Descartes: Mechanism and the Mind-Body Problem

Mind-body problem: The question of the distinction between mental and physical qualities.

Descartes's most important contribution to the development of modern psychology was his attempt to resolve the centuries-old controversy about the **mind-body problem**. Throughout the ages, scholars had argued about how the mind (the soul or spirit) could be

distinguished from the body and all other physical qualities. The basic, deceptively simple, question was this: Are mind and body—the mental world and the material world—distinct from each other? For thousands of years, scholars had taken a dualistic position, arguing that the mind and the body had different natures. However, accepting the dualistic position raises other questions. If the mind and body are of different natures, what is their relationship to one another? How do they interact? Are they independent, or does one influence the other?

Before Descartes, the accepted theory was that the interaction between mind and body flowed primarily in one direction. The mind could exert an enormous influence on the body, but the body had little effect on the mind. It was thought that the body and mind were related in the same way that a puppet and its puppeteer were joined. The mind is like the puppeteer, pulling the strings of the body.

In Descartes's quite different theory of mind-body interaction, the mind influences the body, but the body exerts a greater influence on the mind than previously supposed. The relationship is not in one direction only but rather is a mutual interaction. This idea, considered radical in the seventeenth century, has important implications for psychology.

After Descartes published his doctrine, many of his contemporaries decided they could no longer support the conventional idea that the mind was the master of the two entities—the puppeteer pulling the strings—functioning almost independently of the body. As a result, scientists and philosophers came to assign a greater importance to the physical or material body. Functions previously attributed to the mind were now considered functions of the body.

For example, the mind was believed to be responsible not only for thought and reason but also for reproduction, perception, and movement. Descartes disputed this belief, arguing that the mind had only a single function, that of thought. To Descartes, all other processes were functions of the body.

Thus, he introduced an approach to the long-standing mind-body problem that focused attention on a physical-psychological duality. In so doing, he redirected the attention of scholars from the abstract theological concept of soul to the scientific study of the mind and mental processes. As a result, methods of inquiry shifted from subjective metaphysical analysis to objective observation and experimentation. Whereas people could only speculate about the nature and existence of the soul, they could actually observe the operations and processes of the mind.

So, scientists accepted mind and body as two separate entities. Matter, the body's material substance, can be said to have extension (in that it takes up space) and to operate according to mechanical principles. The mind, however, is free; it is unextended and lacks physical substance. Descartes's revolutionary idea is that mind and body, although distinct, are capable of interacting within the human organism. The mind can influence the body, and the body can influence the mind.

The Nature of the Body

Descartes argued that because the body is composed of physical matter, it must therefore possess those characteristics common to all matter, that is, extension in space (it takes up space) and the capacity for movement. If the body is matter, then the laws of physics and mechanics that account for movement and action in the physical world must apply to the body as well. Therefore, the body is like a machine whose operation can be explained by the mechanical laws that govern the movement of all objects in space.

He was clearly influenced by the mechanistic spirit of the age, as reflected in the development of automata and mechanical clocks. When he lived in Paris, he had been fascinated by the mechanical marvels installed in the royal gardens. He spent many hours treading

on the pressure plates that caused water jets to activate the figures, making them move and utter sounds.

When Descartes described the operation of the human body, he referred directly to the mechanical figures he had seen. He compared the body's nerves to the pipes through which the water passed and the body's muscles and tendons to engines and springs. The movements of the automata were not caused by voluntary action on their part but by external forces such as the water pressure. The involuntary nature of this movement was reflected in Descartes's observation that bodily movements frequently occur without a person's conscious intention.

From this line of reasoning, he arrived at the idea of the *undulatio reflexa,* a movement not supervised or determined by a conscious will to move. For this conception, Descartes is often called the author of the **reflex action theory**. This theory is a precursor of the twentieth-century behavioral stimulus-response (S-R) psychology, in which an external object (a stimulus) brings about an involuntary response, such as the jerk of your leg when the doctor taps your knee with a hammer. Reflexive behavior involves no thought or cognitive process; it appears to be completely mechanical and automatic.

Reflex action theory: The idea that an external object (a stimulus) can bring about an involuntary response.

Descartes's work also supported the growing trend in science toward the notion that human behavior is predictable. The mechanical body operates in ways that can be anticipated, as long as the inputs are known. In one example, Descartes compared the control of human muscular movement to the mechanical functioning of the choir organs he had seen in church:

> *If you have ever had the curiosity to examine the organs in our churches, you know how the bellows push air into receptacles called (presumably for this reason) wind-chests. And you know how the air passes from these into one or other of the pipes, depending on how the organist moves his fingers on the keyboard. You can think of our machine's heart and arteries, which push the animal spirits into the cavities of its brain, as being like the bellows, which push air into the wind-chests; and of external objects, which stimulate certain nerves and cause spirits contained in the cavities to pass into particular pores, as being like the fingers of the organist, which press certain keys and cause the air to pass from the wind-chests to particular pipes.* (quoted in Gaukroger, 1995, p. 279)

Descartes found confirmation in contemporary physiology for his mechanical interpretation of the workings of the human body. In 1628, the English physician William Harvey uncovered the basic facts about blood circulation within the body. Other physiologists were studying the digestive processes. Scientists had determined that the muscles of the body worked in opposing pairs and that sensation and movement depended somehow on the nerves.

Although researchers were making great strides in describing the functions and processes of the human body, their findings were often inaccurate and incomplete. For example, the nerves were believed to be hollow tubes through which liquid animal spirits flowed, just like water flowing in the pipes that powered mechanical figures. However, our concern here is not with the accuracy or completeness of seventeenth-century physiology but rather with its support for a mechanical interpretation of the body.

Established church dogma held that animals did not possess souls. Therefore, they were assumed to be automata. This idea preserved the difference between humans and animals so essential to Christian thought. If animals were automata and did not have souls, then they did not have feelings either. So the researchers of Descartes's time could conduct their research on live animals, before anesthesia was available. One writer described their amusement "at [the animals'] cries and yelps since these were nothing but the hydraulic hisses and vibrations of machines" (Jaynes, 1970, p. 224). Thus, animals belonged entirely

to the category of physical phenomena. They had no immortality, no thought processes, and no free will. Their behavior could be explained wholly in mechanistic terms.

The Mind-Body Interaction

According to Descartes, the mind is nonmaterial in that it lacks physical substance, but it is capable of thought and other cognitive processes. Because the mind thinks, perceives, and wills, it must somehow influence and be influenced by the body. For example, when the mind decides to move from one place to another, this decision is carried out by the body's muscles, tendons, and nerves. Similarly, when the body is stimulated—for example, by light or heat—it is the mind that recognizes and interprets these sensory data and determines the appropriate response.

Before Descartes could complete his theory about the interaction of mind and body, he needed to locate the actual physical part of the body where the mind and the body mutually interacted. He conceived of the mind as unitary, which meant that it must interact with the body only at a single point. He also believed that the interaction occurred somewhere within the brain because research had shown that sensations travel to the brain and movement originates within the brain. It was obvious to Descartes that the brain had to be the focal point for the mind's functions. The only structure of the brain that is single and unitary (that is, not divided and duplicated in each hemisphere) is the pineal body or *conarium,* and Descartes chose this as the logical site of the interaction.

Descartes used mechanistic terms to describe how the mind-body interaction occurs. He suggested that the movement of animal spirits in the nerve tubes makes an impression on the conarium, and from this impression the mind produces a sensation. In other words, a quantity of physical motion (the flow of animal spirits) produces a mental quality (a sensation). The reverse can also occur: The mind can make an impression on the conarium (in some way, Descartes never made clear), and by inclining or tilting to one direction or another, the impression can influence the flow of animal spirits to the muscles, resulting in a physical or bodily movement.

The Doctrine of Ideas

Derived ideas: Derived ideas are produced by the direct application of an external stimulus.

Innate ideas: Innate ideas arise from the mind or consciousness, independent of sensory experiences or external stimuli.

Descartes's doctrine of ideas also had a profound influence on the development of modern psychology. He suggested that the mind produces two kinds of ideas: derived and innate. **Derived ideas** arise from the direct application of an external stimulus, such as the sound of a bell or the sight of a tree. Thus, derived ideas (the idea of the bell or the tree) are products of the experiences of the senses. **Innate ideas** are not produced by objects in the external world impinging on the senses but develop instead out of the mind or consciousness. Although the potential existence of innate ideas is independent of sensory experiences, they may be realized in the presence of appropriate experiences. Among the innate ideas Descartes identified are God, the self, perfection, and infinity.

In later chapters, we will see how the concept of innate ideas led to the nativistic theory of perception (the idea that our ability to perceive is innate rather than learned) and also influenced the Gestalt school of psychology, which, in turn, influenced the more contemporary cognitive movement in psychology.

Descartes's work served as a catalyst for many trends that would converge to form the new psychology. His most important systematic contributions include:

- *The mechanistic conception of the body*
- *The theory of reflex action*
- *The mind-body interaction*