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GARRETT & HOUGH'S

Brain & Behavior

An Introduction to Behavioral Neuroscience

FIFTH EDITION

Prepared by
Meghan C. Kahn

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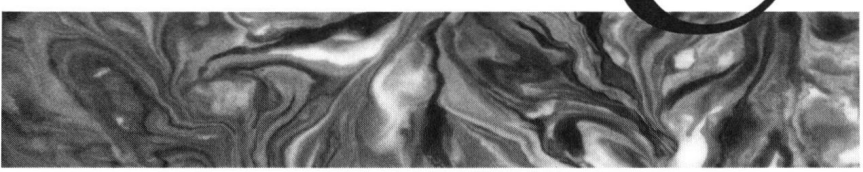

An Introduction to Behavioral Neuroscience

FIFTH EDITION

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—Meghan C. Kahn

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1 What Is Behavioral Neuroscience?

Chapter Outline

The Origins of Behavioral Neuroscience

Prescientific Psychology and the Mind-Brain Problem

Descartes and the Physical Model of Behavior

Helmholtz and the Electrical Brain

The Localization Issue

CONCEPT CHECK

Nature and Nurture

The Genetic Code

The Human Genome Project

APPLICATION | The Promise of DNA Computing

Heredity: Destiny or Predisposition?

RESEARCH SPOTLIGHT | Beyond the Human Genome Project

CONCEPT CHECK

In Perspective

Chapter Summary

Study Resources

Learning Objectives

After reading this chapter, you will be able to

1. Define the mind-brain problem in behavioral neuroscience
2. Describe the contributions of philosophers and scientists to the development of behavioral neuroscience as a field of study
3. Identify the role of physiologists in the establishment of modern-day behavioral neuroscience
4. Compare the relative contributions of genes and environment in the development of behavioral characteristics
5. Critique the fixed nature of heredity in shaping behavior

The Origins of Behavioral Neuroscience

Summary and Guided Review

After studying this section in the text, fill in the blanks of the following summary.

_____ (1) is the multidisciplinary study of the nervous system and its role in behavior. During the 1990s, also known as the Decade of the _____ (2), intensive research into the role of biology in behavioral problems led to new treatments for depression, addiction, and age-related memory impairment. Advances were also made in the area of genetics, including a greater understanding of the genes involved in diseases such as _____ (3) and a(n) _____ (4) of all human genes.

_____ (5) neuroscience is the branch of psychology that studies the relationships between behavior and the body, and it attempts to answer questions about the biological basis of diverse phenomena such as mental illness, emotions, perception, cognition, and consciousness. Psychology emerged as a separate discipline in 1879 when _____ (6) established the first psychology laboratory, and behavioral neuroscience arose as a distinct subfield of psychology some time after this.

Behavioral neuroscience addresses the _____ (7) problem, which concerns the nature of the relationship between the physical brain and the mind. Most modern neuroscientists believe that the _____ (8) is not a real thing but rather is a concept we use to explain our awareness of experience. This position is known as materialistic _____ (9) and assumes that everything is physical. The position that the mind is nonmaterial and separate from the physical brain is called _____ (10). This issue of lack of consensus on the mind-brain problem is not a new one: Among the ancient Greek philosophers, Democritus and _____ (11) were monists, whereas _____ (12) was a dualist.

Scientists often use _____ (13) to help them explain how things work. The hydraulic model of behavior was developed by the 17th-century French philosopher _____ (14) to explain the physical basis of behavior. According to this model, when the mind willed the body to action, the _____ (15) gland pumped animal spirits through the nerves (believed to be hollow tubes) to the muscles, resulting in movement. The pineal gland, therefore, was considered the seat of the _____ (16). This model was ultimately shown to be wrong based on the approach of _____ (17), which involves use of the methods of observation and experimentation.

Important principles of nervous system anatomy and physiology were discovered during the 1700s and 1800s. Work by several physiologists showed that nerves operated via _____ (18), not "animal spirits." However, the German physiologist _____ (19) performed experiments that indicated that nerve conduction was not as fast as electricity conducted through wires, which suggested that something more than just electricity was operating in the nervous system.

In the 1800s, well-documented cases of brain injury suggested that specific parts of the brain have specific functions, a concept known as _____ (20). For example, railroad worker _____ _____ (21) underwent extreme changes in personality following an accident in which an iron rod was driven through his skull and _____ (22) lobes. Another case was reported by the French physician _____ (23); his patient was unable to speak, and

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