

3. Psychology and the Brain

Objectives

- Understand how the nervous and endocrine systems work
- Compare the differences between the peripheral nervous system and the central nervous system
- Explore the different structures and functions of the brain

Vocabulary

autonomic nervous system

central nervous system

endocrine system

hormones

nervous system

somatic nervous system

Background

In this chapter, students become acquainted with the command centers of their bodies—the amazing brain, one of the most complex structures in the universe. Students understand themselves better as they learn that their brains plan, coordinate, and control all thoughts, movements, and feelings that they experience.

Through the brain's central role within the nervous system and endocrine system, information within and outside the body can be picked up, retrieved, and responded to in moments. The elaborate message exchange in the brain and these key systems coordinate all behavior and make possible such important human functions as thinking, language, creativity, and perception. Though researchers have uncovered deep insights into the complex workings of the brain, it continues to remain a mystery.

Students learn about the basic workings of the nervous system, including the communicative functions that nerve cells and neurotransmitters play. They also take an in-depth look at the nervous system's two key branches: the information-carrying peripheral nervous system, and the coordinating and "thinking" central nervous system. Students will understand their own behavior better by learning how information is relayed and processed in these intricate areas. Scientists use

this knowledge to provide better drug treatments when functioning becomes abnormal.

Students next familiarize themselves with the different areas, parts, and functions of the brain, learning to associate specific behaviors—such as sneezing or crying—with these parts. They learn more about their own thinking processes as they read about the "left" and "right" hemispheres of the brain, and how they control and influence personal qualities and different areas of the body.

High school students have great interest in their own growth processes, metabolism, and sexual functions, so they will find value in the chapter's information about the endocrine system and how hormones carry messages through the bloodstream. Students also learn about the specific functions of various hormone-producing glands of the endocrine system.

Further Resources

- Asimov, Isaac. *The Human Brain: Its Capacities and Functions*. New York: New American Library, 1964.
- Franklin, Jon. *Molecules of the Mind: The Brave New Science of Molecular Psychology*. New York: Macmillan, 1987.

For Discussion

Review

1. How is the nervous system different from the endocrine system?
2. What are the two types of cells that make up the nervous system?
3. What is the difference between the autonomic nervous system and the somatic nervous system?
4. What are the functions of the “left” and “right” hemispheres of the brain?

Critical Thinking

1. Why are psychologists greatly interested in the study of neurotransmitters?
2. If a psychologist discovers that his client suffers from Parkinson’s disease, what does that indicate neurologically?
3. What do you think would happen if the corpus callosum shut down?
4. In terms of the two hemispheres of the brain, what can you deduce about a left-handed artist? a right-handed linguist?
5. On a practical level, why is it worthwhile for you to know how your brain functions?

Activities

1. Brain Activities

Divide students into pairs and have each pair create a list of three simple, random activities (i.e., eating, laughing, and jogging). Have them report to the class how they think the brain is specifically functioning during each of these activities.

2. Represent a System

Divide students into groups of three. Assign one person in each group to research the peripheral, endocrine, and central nervous systems and report to the group on the different ways their system works and reacts to specific activities or situations.

3. Internet: Mental Disorder Research

Assign individuals or teams to use the Internet to find sites that deal with research into mental disorders. Challenge them to locate studies that present specific findings, graphs, and information relating disorders to brain activity. Students should print out pages of sites that they find interesting.

4. Special Sources: Right and Left Hemispheres

Ask students to use library sources to research the right brain and the left brain. Then conduct a classroom discussion of their conclusions.

Name _____

3. Psychology and the Brain

As you read Chapter 3, write an answer to each question below.

1. Explain briefly how the nervous system works.

2. How do nerve cells communicate information?

3. How does the peripheral nervous system work?

4. What are the different parts of the brain?

5. What are the primary glands of the endocrine system and what are their key functions?

Name _____

3. Psychology and the Brain

Find the best answer for each item. Then circle that answer.

1. What are the components of the nervous system?
 - a. the brain, hormones, and glands
 - b. the brain, spinal cord, and network of nerves throughout the body
 - c. the brain, spinal cord, and hormones
 - d. the brain, glands, and network of nerves throughout the body
2. Which of the following is part of the peripheral nervous system that controls stomach muscles, intestines, and other organs?
 - a. autonomic nervous system
 - b. central nervous system
 - c. somatic nervous system
 - d. none of the above
3. Which system consists of the brain and the spinal column?
 - a. autonomic nervous system
 - b. central nervous system
 - c. somatic nervous system
 - d. none of the above
4. What is the system of glands that regulates the body's growth, metabolism, and sexual development and function?
 - a. nervous system
 - b. sensory system
 - c. hormonal system
 - d. endocrine system
5. What are hormones?
 - a. chemicals that control growth, emotional responses, and physical changes
 - b. glands that control eye sight, hearing, and language ability
 - c. nerves that control reflexes
 - d. neurotransmitters that send information about behavior

Name _____

3. Psychology and the Brain

Read each description, and write the letter of the correct term on the line.

1. The most important part of the nervous system is the _____.
 - a. brain
 - b. spinal cord
 - c. right hemisphere
 - d. frontal lobe
2. All actions of the body are controlled by the _____.
 - a. brain and nervous system
 - b. brain and endocrine system
 - c. nervous and endocrine systems
 - d. nervous system and spinal cord
3. Neurons _____.
 - a. are the same as glia
 - b. control body temperature and the pituitary
 - c. serve one function
 - d. outnumber glia cells in the brain
4. Psychiatric disorders are thought to be the result of _____.
 - a. a shortage of neurotransmitters
 - b. abnormal chemical transmissions in the brain
 - c. abnormal neurons without nuclei
 - d. neurotransmitters with multiple receptors
5. _____ is the neurotransmitter that involves involuntary body movement common with Alzheimer's disease.
 - a. Serotonin
 - b. Glutamate
 - c. Endorphin
 - d. Acetylcholine
6. All of the following are body functions controlled by the autonomic nervous system EXCEPT _____.
 - a. reflexes
 - b. heart rate
 - c. breathing
 - d. crying
7. The most accurate depiction of the relationship between the central and peripheral nervous systems is that _____.
 - a. both work independently
 - b. both perform the same function
 - c. information is processed in the peripheral and sent to the central with a response
 - d. information is processed in the central and sent to the peripheral with a response
8. The parts of the brain in which people think are the _____.
 - a. cerebral cortex and cerebrum
 - b. cerebrum and medulla
 - c. medulla and spinal cord
 - d. thalamus and hypothalamus
9. The _____ is the place where body temperature is controlled.
 - a. cerebrum
 - b. medulla
 - c. thalamus
 - d. hypothalamus
10. The endocrine system uses _____ to help the nervous system control and coordinate body functions.
 - a. neurotransmitters
 - b. neurons
 - c. hormones
 - d. the pons

Essay Question

Why is it important for psychologists to know how the brain functions?