# CHAPTER 2
Biopsychology, Neuroscience, and Human Nature

## Before You Read...Term Identification

Make flashcards using the following terms or, even better, develop mnemonics (memory strategies) to help you remember the different concepts and terms. Use the definitions in the margins of this chapter for help. Numbers refer to page numbers in the textbook.

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<td>Natural Selection</td>
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<td>Nervous system</td>
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<td>Parasympathetic division</td>
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<td>Parietal lobes</td>
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<td>Peripheral nervous system</td>
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<td>PET scanning</td>
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<td>Phenotype</td>
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<td>Pituitary gland</td>
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<td>Plasticity</td>
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<td>Pons</td>
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<td>Reflex</td>
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<td>Resting potential</td>
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<td>Reticular formation</td>
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<td>Sensory neuron</td>
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<td>Sex chromosomes</td>
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<td>Soma</td>
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<td>Somatic nervous system</td>
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<td>Somatosensory cortex</td>
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<td>Sympathetic division</td>
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<td>Synapse</td>
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<td>Synaptic transmission</td>
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<td>Temporal lobes</td>
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<td>Thalamus</td>
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</tr>
<tr>
<td>Visual cortex</td>
<td>77</td>
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</tbody>
</table>

Lecture Assistant for Chapter 2

Tear this outline out and bring it with you to class in order to facilitate your note taking.
Spend more time listening to the lecture and less time writing!

- Cerebral Hemispheres =
- Corpus Callosum =

Chapter Opening Problem: Why does it make a difference which hand a split-brain patient uses to identify an object by touch?

2.1 HOW ARE GENES AND BEHAVIOR LINKED?

- Evolution =

- Genetics =

Core Concept 2.1 =

A) Evolution and Natural Selection

1) The Evidence That Convinced Darwin =

- Natural Selection =

2) Application to Psychology:

- Phobias =

- Nature-Nurture Issue =

B) Genetics and Inheritance

- Genotype =

- Phenotype =

1) Chromosomes, Genes, and DNA:

- DNA =

- Genes =

Chromosomes =

2) Genetic Explanations for Psychological Processes =

3) “Race” and Human Variation =

C) Psychology Matters: Choosing Your Children’s Genes:

2.2 HOW DOES THE BODY COMMUNICATE INTERNALLY?

Core Concept 2.2 =

A) The Neuron: Building Block of the Nervous System

1) Types of Neurons:
   • Sensory Neurons (Afferent Neurons) =
   • Motor Neurons (Efferent Neurons) =
   • Interneurons =

2) How Neurons Work:
   • Dendrites =
   • Soma =
     o Excitatory =
       o Inhibitory =
   • Axon =

3) The Action Potential:
   • Resting Potential =
   • Action Potential =
• **All-or-None Principle** =

4) **Synaptic Transmission** =

• **Synapse** =
  - **Synaptic Gap (Synaptic Cleft)** =

• **Terminal Buttons** =

• **Synaptic Transmission** =

5) **Neurotransmitters** =

• **Vesicles** =

• **Receptors** =

• **Reuptake** =

6) **Synchronous Firing** =

7) **Plasticity** =

8) **Brain Implants** =

9) **Glial Cells: A Support Group for Neurons** =

• **Glial Cells** =
  - **Myelin Sheath** =

B) **The Nervous System**

1) **The Central Nervous System** =

• **Reflexes** =

• **Contralateral Pathways** =

2) **The Peripheral Nervous System (PNS)** =

• **Nerves** =

• **Somatic Division of the PNS (Somatic Nervous System)** =

• **Autonomic Division of the PNS (Autonomic Nervous System)** =
  - **Sympathetic Division** =

Parasympathetic Division =

3) Male and Female Brains =

C) The Endocrine System:
   
   • *Hormones* =

1) How Does the Endocrine System Respond in a Crisis?
   
   • *Epinephrine (Adrenalin)* =

2) What Controls the Endocrine System?
   
   • *Pituitary Gland* =
      
   o *Hypothalamus* =

D) Psychology Matters: How Psychoactive Drugs Affect the Nervous System

1) *Agonists and Antagonists* =
   
   • *Agonists* =

   • *Antagonists* =

2) Why Side Effects?
   
   • *Neural Pathways* =

2.3 **HOW DOES THE BRAIN PRODUCE BEHAVIOR AND MENTAL PROCESSES?**

   • *Phineas Gage* =

   **Core Concept 2.3** =

A) Windows on the Brain

1) Sensing Brain Waves with the EEG =
   
   • *Electroencephalograph (EEG)* =

   • *Brain Waves* =

2) Mapping the Brain with Electric Probes =
3) **Computerized Brain Scans**

- **CT Scanning (Computerized Tomography)**

- **PET Scanning (Positron Emission Tomography)**

- **MRI (Magnetic Resonance Imaging)**

- **fMRI (Functional Magnetic Resonance Imaging)**

4) **Which Scanning Method Is Best?**

B) **Three Layers of the Brain**

1) **The Brain Stem and Its Neighbors**

   **The Brain Stem in Split-Brain Patients: A Piece of the Puzzle**

2) **Brain Stem Components and Connections**

   - **Medulla**

   - **Pons**

   - **Reticular Formation**

   - **Thalamus**

   - **Cerebellum**

3) **The Limbic System: Emotions, Memories, and More**

   - **Hippocampus**

      - H. M.: The Man Who Lost His Hippocampus

   - **Amygdala**

Pleasure and the Limbic System
• Hypothalamus =

4) The Cerebral Cortex: The Brain’s Thinking Cap =

• Cerebral Cortex =
  
  o Cerebral Hemispheres =

C) Lobes of the Cerebral Cortex =
  
  o Phrenology =

1) The Frontal Lobes =
  
  o Prefrontal Cortex =

• Motor Cortex =
  
  o Homunculus =

• Mirror Neurons =

  The Frontal Lobes’ Role in Speech…and the Split Brain =

2) The Parietal Lobes =

• Somatosensory Cortex =

3) The Occipital Lobes =

• Visual Cortex =

  Visual Pathways in Split-Brain Patients =

3) The Temporal Lobes =

• Auditory Cortex =
D) The Cooperative Brain =
   • Association Cortex =

E) Cerebral Dominance =
   o Aphasia =
   o Broca’s Area =
   o Spatial Orientation =

1) Some People Are Different—But That’s Normal =
   o Transcranial Magnetic Stimulation (TMS) =

2) Different Processing Styles =

F) The Split Brain Revisited: “I’ve Half a Mind to…” =

1) The Clueless Hemisphere =

2) Two Consciousnesses =
   o Duality of Consciousness =
   o Confederation of Minds =

3) What’s It To You? =

G) Psychology Matters: Using Psychology To Learn Psychology =

H) Critical Thinking Applied: Left Brain vs. Right Brain =
As You Read…Practice Activities

How Are Genes and Behavior Linked?

1. Indicate whether each statement is True (T) or False (F) by circling the appropriate letter after the statement.

   A. At birth we have all the nerve cells in our brain that we’ll ever have.         T     F
   B. The corpus callosum allows the two hemispheres of the brain to communicate with each other. T     F
   C. In “split-brain” patients the cerebral hemispheres are cut in order to prevent continuous epileptic seizures. T     F
   D. The human brain weighs about five pounds.                     T     F
   E. A human brain contains about 100 million brain cells.             T     F
   F. During one’s adult years, about 200,000 nerve cells die each day.  T     F
   G. According to the concept of biopsychology, succeeding generations of organisms change as they adapt to changing environments. T     F

Evolution and Natural Selection

2. Fill in the blanks with the correct information.

   Charles Darwin ultimately decided on a career in biology, although he had previously trained for careers in both _______________ and _______________. He served aboard a British research ship named _______________, which was commissioned to survey the coastline of _______________. After extensive study of plants and animals, Darwin concluded that all creatures, including human, share a _____________________________. The evidence that convinced him of this conclusion included that fact that there is _______________ among individuals within the same species, and this, then, could give some individuals a reproductive and survival advantage over others. Thus, the process of ____________________________ would favor those individuals best adapted to the environment, allowing them to survive and reproduce. Darwin wrote a book in 1859 about his studies and conclusions and titled the book, ___________________________.

Genetics and Inheritance

4. Fill in the blanks with the correct information.

   A. ________________ are structures made up of long, coiled strands of DNA.

   B. The specific genetic code that makes you different from anyone else is called your ________________.

   C. Although people are all very different, _________ percent of our genetic material is the same.

   D. One’s physical characteristics, influenced by but not totally due to one’s genes, are referred to as one’s ________________.

   E. A segment of the DNA strand is a ____________________.

   F. In almost every cell of the human body, there are ________ chromosomes.

   G. A person receives _________ chromosomes from his or her biological father.

   H. DNA stands for the term ________________________________.

   I. Genes are composed of tiny molecules called ____________________.

   J. The normal pair of sex chromosomes for a female is __________ and for a male is __________.

   K. The genetic code uses _________ nucleotides, which fit together in __________.

   L. The complete package of human DNA contains about _________ genes.

   M. Down syndrome is caused by an extra chromosome __________.

   N. Biological research shows that “race” is a __________-defined term.
Psychology Matters: Choosing Your Children’s Genes

5. What are “stem cells?”

6. The ethical, legal, and social issues related to genetic science are being discussed and studied intensely. To find out about research on these topics, as well as the social policy and legal issues being discussed, investigated, and acted upon, visit the following website:

How does the Body Communicate Internally?

7. What are the body’s two main communication systems?
   A. _________________________  B. _________________________

8. What coordinates the body’s two communication systems?

9. Fill in the blanks with the correct terms.
   The body’s first internal communication system to respond to external stimuli is the _________________. The “building block” of this fast-acting system is the _________________. The slower-acting system is called the _________________. The chemicals used by this slower-acting system are known as _________________.

The Neuron: Building Block of the Nervous System

10. In the table below, name the three types of neurons and explain what each kind does.

<table>
<thead>
<tr>
<th>Type of Neuron</th>
<th>What It Does</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td></td>
</tr>
</tbody>
</table>
11. Label the four main parts of the neuron in the spaces provided.

12. Match each term with its description by placing the letter corresponding to the term in the space next to its description.

TERMS
A. Efferent neurons  E. Soma  I. Resting potential
B. Afferent neurons  F. Axon  J. All-or-none principle
C. Action potential  G. Dendrites  K. Neurotransmitters
D. Terminal buttons  H. Synaptic gap  L. Glial cells

DESCRIPTIONS
— They contain vesicles of chemicals
— A temporarily reversed charge in the ions
— They carry information from the brain & spinal cord to the muscles, organs, & glands
— The part of the neuron that receives messages from other neurons
— When the ions in the axon give it a negative electrical charge
— The part of the neuron that contains its chromosomes
— They form the myelin sheath
— They carry information from the senses to the brain and spinal cord
— The nerve cell either fires or it doesn’t
— The transmitter fiber of the neuron
— The chemical messengers contained in the end of the axon
— The chemical messengers flow across it
13. What are five different functions of the glial cells?

A. ______________________________________________________________

B. ______________________________________________________________

C. ______________________________________________________________

D. ______________________________________________________________

E. ______________________________________________________________

14. Underline the word(s) in parentheses that will make each statement correct. (Both options within parentheses may be correct!)

A. Messages received by a neuron can be (excitatory/inhibitory).

B. Dendrites pass their messages directly on to the (soma/axon).

C. The (axon/cell body) assesses all the messages received by the neuron.

D. The axon gets the electrical energy it needs to fire from (charged chemicals/ions).

E. The electrical message changing into a chemical message that then flows across the gap between neurons is called the (synaptic transmission/action potential).

F. The typical negative electrical charge within the axon is its (resting/action) potential.

G. Each ruptured vesicle releases about (5000/500,000) neurotransmitter molecules.

H. During the action potential (positive/negative) ions rapidly enter the (axon/soma).

15. Indicate whether each statement is True (T) or False (F) by circling the appropriate letter after the statement.

A. All neurons communicate using chemical messages called neurotransmitters. T F

B. The idea of computerized “brain implants” is fiction, not fact. T F

C. Forming new synapses and experiencing changes in dendrites are both forms of plasticity. T F

D. Glial cells “glue” the neurons together. T F
16. Explain the process of “reuptake.”

17. The following website has a quick quiz on basic neural functioning. You can test your own knowledge of the neuron (and then explore other, related sites).

http://psych.hanover.edu/Krantz/neural/struct3.html

18. Fill in the blank boxes of this concept map.
### The Nervous System

19. In the spaces provided describe a description of each nervous system and explain its functions.

<table>
<thead>
<tr>
<th>Nervous System</th>
<th>Description</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Central Nervous System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Peripheral Nervous System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Somatic Nervous System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Autonomic Nervous System</td>
<td></td>
<td></td>
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<tr>
<td>E. Sympathetic Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Parasympathetic Division</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20. Explain what “contralateral pathways” are and how these relate to split-brain patients.

21. Visit this wonderful, interactive site! Eric H. Chudler, Ph.D. created this site for children, but it has a wealth of information and is extremely helpful to college students, too, due to its demonstrations, interactions, quizzes, and superb explanations of difficult concepts.  
   [http://faculty.washington.edu/chudler/introb.html](http://faculty.washington.edu/chudler/introb.html)
22. Fill in the blanks in this concept map.

The Endocrine System

23. Match each endocrine gland with the function of its hormones by placing the letter corresponding to the endocrine gland in the space next to its hormones’ functions. (Some options are used more than once.)

ENDOCRINE GLANDS
A. Pituitary               C. Ovaries and Testes  E. Thyroid
B. Adrenals                D. Parathyroids            F. Pancreas

FUNCTIONS OF THE HORMONES
_____ Regulate calcium levels in the body
_____ Regulate metabolism and physical growth
_____ Stimulate body growth and regulate the conservation of water in the body
_____ Regulate the fight-or-flight response and sexual desire
_____ Influence development of sexual characteristics
_____ Regulate glucose levels
_____ Oversee the rest of the endocrine system
_____ Regulate breast milk production and secretion
24. Fill in the blanks with the correct information.

In the endocrine system, the chemicals used for communication are called __________________. In the nervous system, the chemicals are called __________________. The master gland, or the __________________, keeps the functions of the endocrine system under control. It is controlled by the _____________________.

**Psychology Matters:**

*How Psychoactive Drugs Affect the Nervous System*

25. In terms of psychoactive drugs, what are “agonists” and “antagonists?”

Agonists _____________________________________________________________

Antagonists __________________________________________________________

**How Does the Brain Produce Behavior and Mental Processes?**

26. Who was Phineas Gage and why is he important to the study of the brain?

**Windows on the Brain**

27. Describe the six different methods listed in your textbook that scientists use to study the brain. Include the strengths and weaknesses of each method.

<table>
<thead>
<tr>
<th>Method and Description</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td></td>
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<tr>
<td>B.</td>
<td></td>
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<td>C.</td>
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<tr>
<td>D.</td>
<td></td>
<td></td>
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<tr>
<td>E.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.</td>
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<td></td>
</tr>
</tbody>
</table>
28. **NEED A BREAK?**
To get a better understanding of biopsychology, neuroscience, and the brain, visit MyPsychLab.

**Three Layers of the Brain**

29. The three layers of the brain are the:

   A. __________________ B. __________________ C. __________________

30. What important function does the brain stem play in terms of sensory and motor pathways?

31. What is the limbic system? What are three brain structures in this system?

32. *Match each term with its description by placing the letter corresponding to the term in the space next to its description. Terms can be used more than once!*

   **TERMS**
   
   A. Medulla  
   B. Pons  
   C. Thalamus  
   D. Reticular Formation  
   E. Cerebellum  
   F. Hippocampus  
   G. Amygdala  
   H. Hypothalamus

   **DESCRIPTIONS**
   
   _____ Surgically removed in the man named H. M.  
   _____ Regulates breathing, heart rate, and blood pressure  
   _____ Helps keep a series of events in order  
   _____ Receives information from the senses and sends it to the appropriate processing areas of the brain  
   _____ Regulates sleep and dreaming cycles  
   _____ A pair of football-shaped structures on top of the brain stem  
   _____ Is the link between the nervous system and the endocrine system  
   _____ Involved in keeping the brain awake, alert, and paying attention  
   _____ Involved in storing information in long-term memory  
   _____ Involved in the brain’s reward circuits, such as the hunger, thirst and sex drives  
   _____ A bridge connecting the brain stem to the cerebellum  
   _____ Located under the back of the cerebral hemispheres  
   _____ Involved in making coordinated movements  
   _____ Involved in fear and aggression  
   _____ A bundle of nerve cells that forms the core of the brain stem  
   _____ Involved in monitoring the blood
33. Label each structure of the brain in this image next to its specific letter.

34. Complete the following paragraph with information about the lobes in the brain.

There are _____ lobes in each hemisphere of the brain. The ______________ lobes are responsible for higher mental functions such as planning and decision-making, and they also contain the ______________ cortex, which is responsible for moving muscles. The ______________ lobes run along the top of the brain. The __________________ cortex is part of this lobe and it specializes in the sense of ______________. The ______________ lobes are where our vision functions mainly reside. The ______________ lobes contain the ______________ cortex, which is involved in our ability to hear.

35. What is “phrenology” and what aspect of this theory was correct?
36. Explain what “mirror neurons” are, where they are located, what functions they serve, and how they may relate to certain psychological disorders?

37. Based on the descriptions provided below, decide the probable lobe of the brain in which damage occurred. If you can be more specific in terms of which hemisphere or what area within the lobes, add that information.

<table>
<thead>
<tr>
<th>DESCRIPTIONS</th>
<th>DAMAGED LOBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ted cannot talk since his serious car accident.</td>
<td>_______________</td>
</tr>
<tr>
<td>B. Because of a tumor, Miguel has significant problems understanding language.</td>
<td>_______________</td>
</tr>
<tr>
<td>C. Ali has had trouble understanding people’s emotions since crashing his motorcycle.</td>
<td>_______________</td>
</tr>
<tr>
<td>D. Danella doesn’t recognize any face, including her own, since her stroke.</td>
<td>_______________</td>
</tr>
<tr>
<td>E. A gunshot wound has changed Mimi’s personality.</td>
<td>_______________</td>
</tr>
<tr>
<td>F. Jeff’s left arm is paralyzed after his stroke.</td>
<td>_______________</td>
</tr>
<tr>
<td>G. Tatiana’s brain tumor has negatively affected her spatial ability.</td>
<td>_______________</td>
</tr>
<tr>
<td>H. Ingrid’s brain infection has caused her to lose all feeling in her right leg.</td>
<td>_______________</td>
</tr>
<tr>
<td>I. After a fall from a building, Tomo is unable to see.</td>
<td>_______________</td>
</tr>
</tbody>
</table>

The Cooperative Brain

38. Explain what the “association cortex” is.

Cerebral Dominance

39. **Identify the hemisphere where the functions are primarily controlled (in most people) by writing R (right) or L (left) in the blank next to the function.**

A. _____ Language understanding
B. _____ Speech production
C. _____ Spatial orientation
D. _____ Interpreting the emotional responses of other people
E. _____ Musical ability
F. _____ Regulating one’s own positive emotions
G. _____ Regulating one’s own negative emotions
H. _____ Processing in an analytical, sequential fashion
I. _____ Processing in a more holistic and emotional style
40. What is “cerebral dominance” and in what way is the term often misunderstood?

The Split Brain Revisited: “I’ve Half a Mind to…”

41. Indicate whether each statement about split-brain individuals is True (T) or False (F) by circling the appropriate letter after the statement.

A. In split-brain patients, the corpus callosum is cut.  
B. Because of the split-brain surgery, the person’s left and right eyes get different information.  
C. In split-brain patients each hemisphere of the brain communicates with the same side of the body.  
D. Only in split-brain patients does information from the left visual field go to the right visual cortex.  
E. If split-brain patients see an object flashed in their right visual field, they will most likely be able to say what it was.  
F. When split-brain people see an object in their left visual field, they will likely be able to draw it with their right hand.  
G. Split-brain patients sometimes demonstrate a duality of consciousness.  
H. “Confederation of minds” is generally used to describe split-brain patients, but not other people.

Psychology Matters: Using Psychology to Learn Psychology

42. Based on what you learned in this chapter, what might help you better learn and remember this material?

Critical Thinking Applied: Left Brain vs. Right Brain

43. Why is it inaccurate to classify people as “left-brained” or “right-brained?”

PRACTICE TEST #1

1. Every day of one’s adult life, _____ nerve cells in the brain die.
   A. 2000       B. 200,000       C. 20,000       D. 2,000,000

2. Genotype is to _____ as phenotype is to _____.
   A. genetic make-up; habitat conditions
   B. genetic make-up; recognizable features
   C. natural selection; environmental pressures
   D. selective breeding; evolution

3. Humans have _____ pairs of chromosomes.
   A. 23       B. 25       C. 26       D. 21

4. The chemical messengers in the endocrine system are called

5. Organisms gradually adapt over time to their environments through the process of

6. A picture of a spoon is flashed in the left visual field of a split-brain patient and a picture of a
   fork in the right visual field. The split-brain person should be able to
   A. point to the spoon with his or her left hand.
   B. point to the fork with either hand.
   C. say that a spoon was seen.
   D. point to the spoon with either hand.

7. Humans have approximately _____ genes.
   A. 300,000       B. 50,000       C. 100,000       D. 30,000

8. You don’t like cold showers and so you stick your hand under the water before jumping into
   the shower. The message about temperature is carried to your brain by

9. The part of the neuron that receives incoming messages is the

10. The ability of neurons to change, that is, to make new connections and strengthen old ones is
    called
PRACTICE TEST #2

1. The order in which neurons conduct a signal is from
   A. axon to soma to synapse to dendrite.  C. dendrite to soma to axon to synapse.
   B. axon to dendrite to soma to synapse.  D. dendrite to synapse to axon to soma

2. Which of the following is primarily under voluntary control?
   A. Autonomic nervous system  C. Sympathetic nervous system
   B. Somatic nervous system  D. Parasympathetic nervous system

3. The cerebellum is used primarily for _____ while the medulla is primarily used for _____.
   A. thinking; hearing.  C. motor coordination; breathing.
   B. posture; cognition.  D. emotion; motor coordination.

4. If you can see the turkey at Thanksgiving, it is because of the _____ division of the nervous system.
   A. autonomic   B. somatic   C. parasympathetic   D. sympathetic

5. If you go through a Haunted House on Halloween and get goose bumps, you can thank your
   __________ nervous system.
   A. autonomic   B. somatic   C. parasympathetic   D. sympathetic

6. Structures of the limbic system include the
   A. hippocampus, amygdala and hypothalamus.
   B. thalamus, hypothalamus and medulla.
   C. amygdala, pons and RAS.
   D. cerebellum, medulla and hippocampus.

7. The hormone that is responsible for sustaining the “fight-or-flight” response is

8. The left hemisphere in most people’s brains
   A. processes information in a holistic manner.
   B. is better at pattern recognition.
   C. is where most language and speech processing takes place.
   D. is better at understanding simple commands.

9. Which of the following is primarily associated with maintaining basic life functions?
   A. Brain stem  B. Limbic system  C. Cerebrum  D. Occipital lobes

10. Drugs such as nicotine that mimic neurotransmitters are called
    A. anatagonists.  C. impersonators.
PRACTICE TEST #3

1. The part of the brain that was affected in Phineas Gage’s accident that changed his personality was the

2. Scientists study the brain by measuring brain waves using a(n)
   A. EEG.   B. MRI machine.   C. CT scan.   D. fMRI machine.

3. If you stimulated Mike’s amygdala, you should get ready to
   A. give him something to eat.   C. block a punch.
   B. teach him about neurons.   D. help him get ready for a date.

4. Structures of the brainstem include the
   A. amygdala, pons and pituitary.
   B. medulla, pons, and reticular formation.
   C. thalamus, hypothalamus and medulla.
   D. cerebellum, medulla and hippocampus.

5. If sending a current through the electrode you implanted in a rat’s brain causes the rat to press a bar in its cage to get food pellets, you placed the electrode in the rat’s

6. Sleep and the dreaming cycles are regulated by the

7. When you become wide awake while reading an exciting story, your _____ is at work.
   A. medulla   C. reticular formation
   B. pons   D. thalamus

8. If you are trying to keep the list of all of the brain parts in order, your _____ is implicated in this activity.
   A. cerebellum   B. medulla   C. pons   D. thalamus

9. The _____ is most associated with emotions.
   A. medulla   C. limbic system
   B. reticular formation   D. thalamus

10. Your grandmother has trouble remembering new information. What part of her brain is no longer working as well as it should?
COMPREHENSIVE REVIEW TEST

1. The peripheral nervous system is comprised of which two subdivisions?
   A. The autonomic nervous system and the sympathetic division
   B. The autonomic nervous system and the central nervous system
   C. The somatic nervous system and the autonomic nervous system
   D. The somatic nervous system and the sympathetic division

2. Richard had a stroke, now he can no longer remember any new information. The stroke most likely damaged his
   A. occipital lobes.    C. hippocampus.
   B. reticular formation.    D. thalamus.

3. Shondra was in a car accident and injured her head. Now she has a great deal of trouble organizing and prioritizing and she is often quite impulsive. She most likely injured the ______ lobes of her cerebral cortex.
   A. occipital    B. frontal    C. parietal    D. temporal

4. For most people, the brain’s right hemisphere
   A. processes information in a holistic manner.
   B. is where face recognition occurs.
   C. is where most logical processing occurs.
   D. is where most language is processed.

5. The word “apple” is flashed on the left side of a screen, and the word “strawberry” is flashed on the right side of the screen. Andrea, whose corpus callosum has been cut, would most likely be able to
   A. say that she saw the apple.    C. draw the strawberry using her left hand.
   B. draw the apple using either hand.    D. draw the apple using her left hand.

6. "Fight-or-flight" behavior is associated with what part of the nervous system?
   A. The parasympathetic division    C. The sympathetic division
   B. Motor neurons    D. The somatic nervous system

7. Which is an example of a parasympathetic response?
   A. Getting ready to take an exam    C. Breathing slowly to get to sleep
   B. Running on a treadmill    D. Watching a horror movie

8. The _____ sends messages from your senses to the appropriate processing areas in the brain.
   A. thalamus    B. hypothalamus    C. limbic system    D. medulla

9. Phrenology was correct about
   A. voluntary movement.    C. specialization of hemispheres.
   B. localization of function.    D. neuronal firing.
10 All of the following are parts of the endocrine system EXCEPT the

11. Sarah had an automobile accident in which she hit her head. The doctors said that she injured her cerebellum. She is now most likely to have difficulty
   A. feeling really happy.  B. reading her history book.  C. understanding what others are saying.  D. sitting up straight.

12 The area of the brain responsible for producing speech is called _____, after the doctor who first discovered the particular area.
   A. Brady’s area  B. Gage’s area  C. Tan’s area  D. Broca’s area

13. The left hemisphere is generally considered more _____ than the right hemisphere.
   A. specialized  B. developed  C. creative  D. analytical

14. Manuel has a tumor in his brain that has caused him to have outbursts of aggression. What brain structure is most likely involved?
   A. Amygdala  B. Hippocampus  C. Pons  D. Medulla

15. Dendrites relay their messages directly to the

CRITICAL THINKING ESSAYS

1. You are involved in a strenuous game of soccer and have been playing for 25 minutes. Before that, you and some teammates were on the sidelines yelling feedback back and forth. At one point two players on the other team purposefully and spitefully foul one of your teammates, so you angrily yell at them to stop.
   Discuss what structures in your brain and nervous systems are particularly active and what functions they are serving.

2. Why, in a psychology class, are you learning about how neurons function? Why is this relevant?

3. Your friends tell you that they just found out that psychologists have created “split-brain people” and that such split-brain individuals have two separate brains that cannot communicate with each other. Your friends want to know what’s going on!
   What accurate information can you give your friends about split-brain patients?