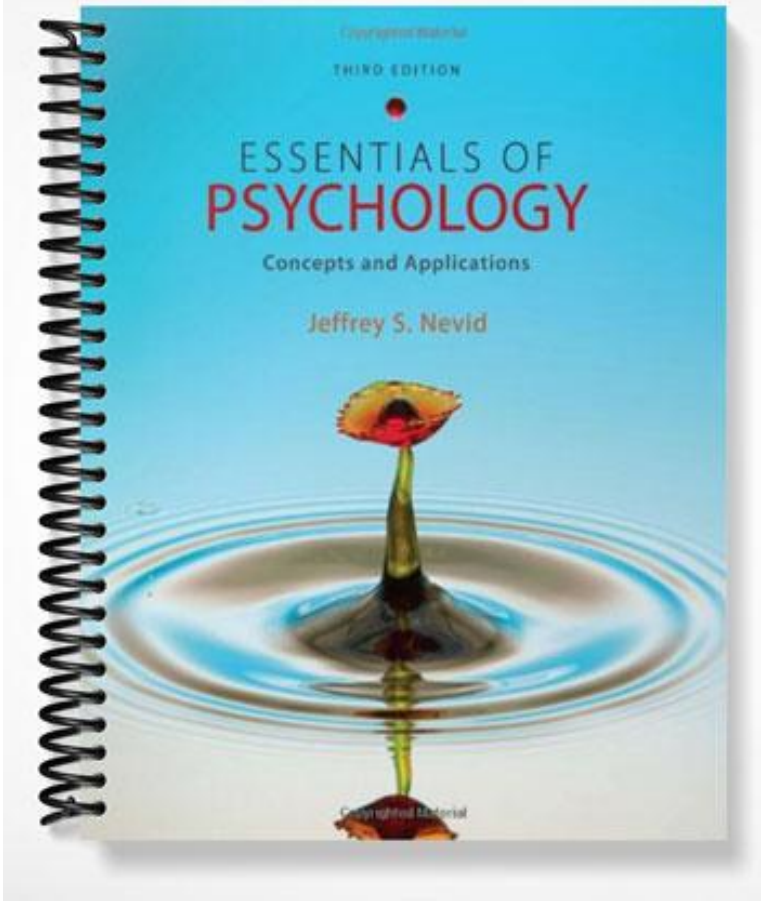
TEST BANK


THIRD EDITION
ESSENTIALS OF
PSYCHOLOGY
Concepts and Applications
Jeffrey S. Nevid

CHAPTER 2

Biological Foundations of Behavior

"Happiness comes only when we push our brains and hearts to the farthest reaches of which we are capable." – *Leo C. Rosten*

CHAPTER PREVIEW

This chapter involves eight modules. Module 2.1 is a detailed presentation of the structure and function of neurons. Module 2.2 provides an overview of the central and peripheral nervous systems. Module 2.3 outlines the major parts of the brain including lobes of the cerebral cortex. Module 2.4 gives information on the methods of studying the brain. Module 2.5 is a short module on lateralization and integration. Module 2.6 summarizes the endocrine system. Module 2.7 presents information on the nature and nurture issue. And Module 2.8 gives a real-life application with biofeedback training.

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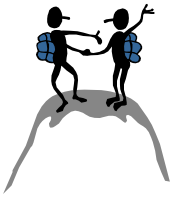

GOALS AND ACTIVITIES PLANNER

	Teacher Skills					
Student Skills	**Challenge Students**	**Variety of Teaching Methods**	**Enthusiasm and Social Skills**	**Connect with Real-Life**	**Psychology Research Skills**	**Other**
Psychology Content						
Comm. Writing Speaking						
Social Skills						
Technology						
Critical & Creative Thinking						
Real-Life Application						
Other						
Other						

*Modified from K.J. Babbage, "High Impact Teaching: Overcoming Student Apathy."

- WHAT ARE THE MODULES YOU WILL EMPHASIZE IN THIS CHAPTER?
- WHAT DO YOU SEE AS THE ESSENTIAL TOPIC IN THIS CHAPTER?
- WHAT ICE-BREAKER, CLIMAX ACTIVITY (LECTURE BREAK(S)), AND WRAP-UP ACTIVITY WILL YOU USE IN THIS CHAPTER?
- IF YOU HAVE TAUGHT THIS CLASS IN THE PAST, WHAT ONE THING ARE YOU GOING TO MAKE SURE TO REVISE, ADD, OR EDIT?

ICE-BREAKERS (IB)

Ice-breakers are useful to introduce topics and to create community in the classroom. These ice-breakers can be used at the beginning of a chapter, the beginning of a module, or the beginning of a class. We have identified the aspects of the student skills grid that are primarily emphasized with each of the ice-breakers; however, you may find it emphasizes others as well. If handouts are used for the ice-breaker, the associated handouts are presented at the end of this chapter.

IB 2.1 What Does the Brain Do?

Activity Type: Ice-Breaker

Class Size: Works well in small classes by breaking class into groups of five or six. In large classes, assign by seat location in class; it could also be done individually.

Class Time Involved: 5–10 minutes for group time and a brief time to share

Materials Needed: Ice-Breaker Handout (see Handout 2.1)

Preparation Time: None

Student Skills: Psychology Content, Social Skills, Creative & Critical Thinking, Real-Life Application

To get students thinking about many of the things that the brain and the nervous system are responsible for, take a few minutes to have students think about what we can do with our brain and nervous system. In small groups have them come up with as many things that they can think of that our brain and nervous system are responsible for controlling. Then have them go back and look at each action and label if they actively control the behavior or action they listed or if the brain and nervous system does this automatically without conscious control. Students usually generate more behaviors that they control, such as talking, walking, thinking, etc. After some prompting, students will start to generate more autonomic nervous system activities such as breathing, heart rate, temperature control, digestion, etc.

IB 2.2 Brain Game

Activity Type: Ice-Breaker

Class Size: Works well in small classes by breaking class into groups of five or six. In large classes, assign by seat location in class; it could also be done individually.

Class Time Involved: 5–10 minutes for group time and a brief time to share

Materials Needed: Ice-Breaker Handout (see Handout 2.2)

Preparation Time: None

Student Skills: Psychology Content, Social Skills, Critical & Creative Thinking

Either as individuals or in small groups, have students try to generate as many parts of the brain as they can list. Do not allow students to use their text, but rather to do this based on previous knowledge. After each part of the brain, have them list the primary function of the brain part. Students are usually surprised how little they actually know about one of the most important organs in their body. In fact, some students will erroneously list glands of the endocrine system as components of the brain. By allowing students to reflect on what they don't know, you will have had them develop a framework for what they will know after the module. This same activity can also be used as a Parting Ways activity and, hopefully, a significant improvement in listing both brain parts and brain functions will occur!

MODULE 2.1 NEURONS: THE BODY'S WIRING

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Understand what a neuron is and how it functions within the body.
2. Know and describe the various parts of the neuron and their functions.
3. Explain the different types of neurons found within the nervous system.
4. Understand how neural impulses are generated and transmitted from one neuron to another.
5. Discuss the roles of neurotransmitters in psychological functioning.

LECTURE OUTLINE

I. Neurons: The Body's Wiring
   - A. *Neurons* – nerve cells
   - B. *Brain* – the mass of nerve tissue encased in the skull that controls virtually everything that we are and everything that we do
   - **C. CONCEPT 2.1** – Neurons are the basic building blocks of the nervous system – the body's wiring through which messages are transmitted within the nervous system

II. The Structure of the Neuron (**Concept Chart 2.1**, Figure 2.1)
   - A. *Soma* – the cell body of a neuron that contains the nucleus of the cell and carries out the cell's metabolic functions
   - B. *Axon* – tube-like part of a neuron that carries messages away from the cell body toward other neurons
   - C. *Terminal buttons* – swellings at the tips of axons from which neurotransmitters are dispatched into the synapse
   - D. *Synapse* – small fluid-filled gap between neurons through which neurotransmitters carry neural impulses
   - E. *Dendrites* – root-like structures at the end of axons that receive neural impulses from neighboring neurons
   - F. **CONCEPT 2.2** – The nervous system has three types of neurons: sensory neurons, motor neurons, and interneurons.
     1. *Sensory neurons* – AKA afferent neurons – transmit information from sensory organs, muscles, and inner organs to the spinal cord and brain
     2. *Motor neurons* – AKA efferent neurons – convey messages from the brain and spinal cord to the muscles and glands
        - a. *Glands* – body organs or structures that produce secretions called hormones
        - b. *Hormones* – secretions from endocrine glands that help regulate bodily processes
     3. *Interneurons* – AKA associative neurons – nerve cells within the central nervous system that process information
     4. *Nerve* – not a neuron – a bundle of axons from different neurons that transmit nerve impulses
   - G. **CONCEPT 2.3** – The nervous system has two types of cells, neurons and glial cells.
     1. *Glial cells* – small but numerous cells in the nervous system that support neurons and that form the myelin sheath found on many axons

2. **CONCEPT 2.4** – Many axons are covered with a protective coating, called a *myelin sheath*, which speeds the transmission of neural impulses.
3. *Nodes of Ranvier* – gaps in the myelin sheath that create noninsulated areas along the axon
4. **LB 2.1**

III. How Neurons Communicate (**LB 2.2**)
- A. **CONCEPT 2.5** – The nervous system is a massive communication network that connects billions of neurons throughout your body.
- B. The neuron is electrically charged with sodium, potassium, and chloride *ions* – electrically charged chemical particles.
- C. *Resting potential* – the electrical potential across the cell membrane of a neuron in its resting state
- D. **CONCEPT 2.6** – A neuron fires when a stimulus triggers electrochemical changes along its cell membrane that lead to a chain reaction within the cell.
  1. *Depolarization* – a positive shift in the electrical charge in the neuron's resting potential, making it less negatively charged
  2. *Action potential* (AKA neural impulse) – an abrupt change from a negative to a positive charge of a nerve cell, also called a neural impulse (Figure 2.2)
- E. **CONCEPT 2.7** – An action potential is generated according to the *all-or-none principle*—neurons will fire only when a change in the level of excitation occurs that is sufficient to produce an action potential. (**LB 2.3**)
- F. *Refractory period* – a temporary state in which a neuron is unable to fire in response to continued stimulation

IV. Neurotransmitters: The Nervous System's Chemical Messengers
- A. Neurons don't actually touch—they are separated by a synapse.
- B. **CONCEPT 2.8** – When the neural impulse reaches the axon's terminal buttons, it triggers the release of chemicals that either increase or decrease the likelihood that neighboring cells will fire. (Figure 2.3)
  1. *Receptor site* – a site on the receiving neuron in which neurotransmitters dock
- C. Neurotransmitters are either excitatory, making an action potential more likely to occur, or they are inhibitory, making an action potential less likely to occur.
- D. Processes preventing excitatory neurotransmitters from continuing to stimulate a receiving cell
  1. *Reuptake* – neurotransmitters are reabsorbed by the transmitting neuron
  2. *Enzymes* – organic substances that produce certain chemical changes in other organic substances through catalytic action
  3. *Neuromodulators* – chemicals released in the nervous system that influence the sensitivity of the receiving neuron to neurotransmitters
- E. **CONCEPT 2.9** – Normal psychological functioning depends on the delicate balance of neurotransmitter activity in the brain. This activity can be affected by such factors as disease and drug abuse.
- F. *Antagonists* – drugs that block the actions of neurotransmitters by occupying their receptor sites. Antagonists influence a number of psychological processes and conditions; for example, schizophrenia and Parkinson's disease.
  1. *Schizophrenia* – a severe and chronic psychological disorder characterized by disturbances in thinking, perception, emotions, and behavior; related to irregularities in dopamine levels
     - a. *Hallucinations* – perceptions experienced in the absence of corresponding external stimuli
     - b. *Delusions* – fixed but patently false beliefs, such as believing that one is being hounded by demons

c. Antipsychotic drugs – antagonists that block receptor sites for dopamine

2. *Parkinson's disease* – a progressive brain disease involving destruction of dopamine-producing brain cells and characterized by muscle tremors, shakiness, rigidity, and difficulty in walking and controlling fine body movements

G. *Agonists* – drugs that either increase the availability or effectiveness of neurotransmitters or mimic their actions. Agonists can be influenced by a variety of drugs, such as amphetamines, alcohol, and anti-anxiety and antidepressant drugs.

1. *Stimulant* – drug that activates the central nervous system, such as amphetamine and cocaine
   a. *Amphetamines* – a class of synthetically derived stimulant drugs, such as methamphetamine or "speed"
2. *Antidepressants* – drugs that combat depression by affecting the levels or activity of neurotransmitters

H. The brain naturally produces neurotransmitters that are chemical cousins to narcotic drugs called *endorphins* – natural chemicals released in the brain that have pain-killing and pleasure-inducing effects.

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.1 Head, Shoulders, Knees, and Toes: Using Music to Learn the Parts of a Neuron

Activity Type: Lecture Break

Class Size: Works best in small class sizes

Class Time Involved: 5–10 minutes

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills, Singing

This is a risky lecture break and is definitely not for all instructors. Some professors will find that this simply does not match their teaching style; however, most of us know that a song makes things very memorable. This explains part of the difficulty in removing a song from your head. We can use this particular quality of music to assist students with the difficult task of visualizing a neuron and remembering the parts of the neuron. For this activity, have students form a large circle and explain that learning a song will help them to remember the parts of the neuron. Due to the fact that neither of us are excellent singers, we usually solicit a few students who admit to being good singers or at least that they enjoy singing. Start by singing a popular children's song. If you don't know the tune, ask your friends, colleagues, students, or children and someone will be able to teach you this simple tune. Start by singing these words and touching the appropriate body parts: head, shoulders, knees, and toes, knees, and toes, head, shoulders, knees, and toes, knees, and toes, and mouth, and ears, and eyes, and a nose,

head, shoulders, knees, and toes, knees, and toes. Then you speed up the song and sing it again. After you have most of the class singing this easy-to-learn song, tell them you are going to change the words to parts of the neuron (see word changes below). Make sure to include similar actions by wiggling your hands in the air for the dendrites, pointing to your head for the cell body, running your hands along your body for the axon, touching your toes for the buttons, going on the outside of your body for myelin sheath, and jumping along the sides of your body as the nodes of Ranvier. Do this a few times until everyone in the class knows the order of the neuron and the parts. At first some students find this silly, but it is not uncommon to have students leaving the room singing the parts of the neuron. On my exams, all of the students that attended the "song day" did very well remembering the parts of the neuron. Students whom I have not seen for years after the class will actually see me and tell me they still remember the "Neuron song." If you are using a portfolio for the class, you could also encourage students to write other helpful mnemonic songs to aid in their learning of other material.

Head, shoulders,
Knees and toes; Knees and toes
Head, shoulders,
Knees and toes; Knees and toes
And mouth, and ears, and eyes, and a nose
Head, shoulders,
Knees and toes; Knees and toes!

Dendrites, cell body,
Axon, buttons; Axon, buttons
Dendrites, cell body,
Axon, buttons; Axon, buttons
And myelin sheath and nodes of Ranvier
Dendrites, cell body,
Axon, buttons; Axon, buttons!

LB 2.2 The World's Largest Neuron

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: Two tennis balls

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

Get your class into two long lines. In smaller classes (e.g., 30 students or less) use the entire class and separate into two equal numbered lines. In larger classes, you may want to have 30 people perform for the rest of the class. If you have an odd number of students, you can have a "helper" stand next to you at the start of one of the lines of the students. You then explain that the first person in the line represents the dendrite, the second person is the soma or cell body, the next 10 or so students are the axon, and finally the last person is the button. You then either hand a tennis ball to both "dendrites" and say, "Go," or you and your helper hand both balls to one dendrite. The students then pass the tennis ball as fast as they can to the button. If a person drops a ball or there is some sort of problem, you can joke that they have been drinking too much alcohol or using drugs and messing up their neuron functioning. Repeat this contest a number of times and ask what happens with practice (if you have a stop watch you can time each of the "firings"). As the students repeat this exercise, they typically get faster and better which is just what happens with real neurons. After they have fired a number of times, take one neuron or one line of students and have every other person in the axon become a node of Ranvier. In that line, the nodes can jump their tennis ball from node to node over the myelinated axon student. Redo the firing process several times and the students will quickly see why nodes of Ranvier increase the speed of transmission.

LB 2.3 Linking the Action Potential to Diet

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Real-Life Application

Students often find the action potential very confusing. You may want to spend just a bit of time explaining that the three most important ions in the action potential are potassium, chloride, and sodium. Start by saying that during the resting potential, inside the neuron there is a great deal of potassium and outside of the neuron there is more chloride and sodium. Ask the students what chloride and sodium make together; most students know it is salt. By talking about the salty nature of the body, they understand where these ions come from. This can also lead into a quick discussion of the importance of a healthy diet for proper neuron functioning. If a person has too much salt in his or her diet, this could result in improper neuron functioning. Finally, ask students if they have ever experienced a nighttime leg muscle cramp where their muscles suddenly tighten, creating pain in their legs. Most students will understand this painful experience. Ask students what they have heard as a common remedy for this pain—most students will respond that people often suggest eating bananas. This actually could be useful to increase potassium. Taking something as abstract as the action potential and then making it more concrete by relating it to diet and food seems to help students remember this information.

MODULE 2.2 THE NERVOUS SYSTEM: YOUR BODY'S INFORMATION SUPERHIGHWAY

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Understand how your body's nervous system is organized.
2. Explain the nature of spinal reflexes.
3. Describe the components and functions of the autonomic nervous system.
4. Explain the relationship between the sympathetic and parasympathetic divisions of the autonomic nervous system.

LECTURE OUTLINE

I. The *Nervous System* – the network of nerve cells and support cells for communicating and processing information from within and outside the body (Concept Chart 2.2)
   A. **CONCEPT 2.10** – The nervous system has two major parts: the central nervous system, which consists of the brain and spinal cord, and the peripheral nervous system, which consists of the nerves that connect the central nervous system to sensory organs, muscles, and glands. (Figure 2.4)

II. Central Nervous System: Your Body's Master Control Unit
   A. *Central Nervous System (CNS)* – consists of the brain and spinal cord
   B. Regulates everything in the body

C. The brain consists of three major parts: the hindbrain, midbrain, and forebrain.
D. **CONCEPT 2.11** – The *spinal cord* is an information highway that conducts information between the brain and the peripheral nervous system.
E. *Spine* – protective bony column that houses the spinal cord
F. *Reflex* – an automatic, unlearned response to a particular stimulus **CONCEPT 2.12** – *Spinal reflexes* are innate, automatic responses controlled at the level of the spinal cord that allow you to respond quickly to particular stimuli. (Figure 2.5)

III. Peripheral Nervous System: Your Body's Link to the Outside World (**Concept Chart 2.2**)
A. *Peripheral Nervous System (PNS)* – the part of the nervous system that connects the spinal cord and brain with the sensory organs, muscles, and glands
B. **CONCEPT 2.13** – The *somatic nervous system* is the part of the PNS that controls voluntary movements of muscles and relays information between the central nervous system and sensory organs.
C. **CONCEPT 2.14** – Like an automatic pilot, *the autonomic nervous system*, a division of the peripheral nervous system, automatically controls such involuntary bodily processes as heartbeat, respiration, and digestion.
D. Refer to IB 2.1 if you did not use this for an ice-breaker activity. You could use this as a lecture break now.
E. **CONCEPT 2.15** – The autonomic nervous system is divided into two branches that have largely opposite effects: the sympathetic nervous system and the parasympathetic nervous system.
1. The *sympathetic nervous system* – accelerates bodily processes and releases stores of energy needed to meet increased physical demands
2. The *parasympathetic nervous system* – regulates bodily processes, such as digestion, that replenish stores of energy
3. **LB 2.4** and **LB 2.5**

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.4 What Part of the Nervous System is Responsible for This?

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: Handout 2.1

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

If you used IB 2.1, you can have students return to their answers. Once again, you can either do this individually or in small groups. Have the students go through their lists and write what part of the

nervous system (central, peripheral, autonomic, somatic, parasympathetic, or sympathetic) is most commonly used for each of the behaviors. In addition or as an alternative, use Handout 2.1 and have students generate a list of behaviors and activities and see if students can come up with specific examples for the different parts of the nervous system. Make sure to tell students that some behaviors involve both types of nervous system responses. For example, breathing can be a somatic controlled behavior, or it can be an autonomic nervous system response.

LB 2.5 Parasympathetic or Sympathetic.

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: Handout 2.3

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

Students frequently have a difficult time distinguishing between the two branches of the autonomic system. Remind them that the sympathetic division is the alarm or the fight-or-flight action that uses energy and the parasympathetic system conserves, reserves, and restores energy. Tell students when they are "stressed" this is a sympathetic function. Having students complete Handout 2.3 may help deal with the difficulty in understanding sympathetic versus parasympathetic behaviors. This assignment could be done as a take-home worksheet to be completed before this lecture. Alternatively, it could be done individually or in small groups during class.

Answers to Handout 2.3: Skin has goose bumps (S); Skin is relaxed (P); Palms are dry (P); Palms are sweaty (S); Lungs are dilated and rapid breathing occurs (S); Lungs are constricted and breathing is relaxed (P); Heart rate decreases (P); Heart rate increases (S); Blood is sent to muscles (S); Blood is sent to internal organs (P); Adrenal gland activity increases (S); Adrenal gland activity decreases (P); Digestion is stimulated (P); Digestion is inhibited (S); Mouth is dry (S); Salivation in the mouth (P).

MODULE 2.3 THE BRAIN: YOUR CROWNING GLORY

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Discuss how the brain is organized and describe the functions of its various parts.
2. Explain the organization of the cerebral cortex.
3. Describe the major functions associated with the four lobes of the cerebral cortex.

LECTURE OUTLINE

I. The Major Parts of the Brain (**Concept Chart 2.3**): **CONCEPT 2.16** – The brain is divided into three major parts: the hindbrain, the midbrain, and the forebrain.
   A. **CONCEPT 2.17** – The *hindbrain*, the lowest part of the brain, contains structures that control basic bodily functions, such as breathing and heart rate.

1. *Medulla* – controls vital bodily processes such as heart rate, breathing, and reflexes like swallowing, coughing, and sneezing (it forms part of the brainstem)
2. *Pons* – helps regulate states of wakefulness and sleep
3. *Brainstem* – the "stalk" in the lower part of the brain that connects the spinal cord to higher regions of the brain (Figure 2.6)
4. *Cerebellum* – controls balance and coordination of basic body movements

B. **CONCEPT 2.18** – The *midbrain* contains nerve pathways for relaying messages between the hindbrain and the forebrain, as well as structures that control some automatic movements.
   1. *Reticular formation* – (AKA reticular activating system) – web-like formation of neurons involved in regulating states of attention, alertness, and arousal

C. **CONCEPT 2.19** – The largest part of the brain, the *forebrain*, controls higher mental functions, such as thinking, problem solving, use of language, planning, and memory.
   1. *Thalamus* – relay station for sensory information and plays a key role in regulating states of wakefulness and sleep near the middle of the brain
   2. *Basal ganglia* – an assemblage of neurons lying in the forebrain that is important in controlling movement and coordination
   3. *Hypothalamus* – regulates hunger, thirst, body temperature, reproductive processes, emotional states, aggressive behavior, and response to stress
   4. **CONCEPT 2.20** – The *limbic system* plays an important role in the regulation of memory and emotions. It consists of the amygdale, hippocampus, thalamus, and hypothalamus.
      a. *Amygdala* – a set of almond-shaped structures believed to play an important part in aggression, rage, and fear
      b. *Hippocampus* – involved in memory formation

II. The Cerebral Cortex: The Brain's Thinking, Calculating, Organizing, and Creative Center

A. **CONCEPT 2.21** – The cerebrum is divided into two hemispheres and is covered by a thin, outer layer, the *cerebral cortex*, which is responsible for higher mental functions. *Cerebral hemispheres* – the right and left masses of the cerebrum, which are joined by the corpus callosum.

B. **CONCEPT 2.22** – The *corpus callosum* is a bundle of nerve fibers that connect the two hemispheres of the brain, allowing them to share information.

C. The cerebral cortex takes up a greater proportion of the brain in humans than in any other animal. (Figure 2.7)

D. **CONCEPT 2.23** – Each cerebral hemisphere has four main parts, or lobes: the occipital, parietal, frontal, and temporal lobes. (Figure 2.8, Table 2.1)
   1. *Occipital lobes* – the parts of the cerebral cortex, located at the back of both cerebral hemispheres, that process visual information
   2. *Parietal lobes* – the parts of the cerebral cortex, located on the side of each cerebral hemisphere, that process touch, pressure, pain, and temperature; contains the *somatosensory cortex* – processes information about touch and pressure on the skin, as well as the position of the parts of our bodies as we move about (Figure 2.9, Figure 2.10)
   3. *Frontal lobes* – the parts of the cerebral cortex, located at the front of the cerebral hemispheres, that are considered the "executive center" of the brain because of their role in higher mental functions; contains the *motor cortex* – involved in regulating body movement
   4. *Temporal lobes* – the parts of the cerebral cortex lying beneath and somewhat behind the frontal lobes that are involved in processing auditory stimuli

E. **CONCEPT 2.24** – Most of the cerebral cortex consists of *association areas* that are responsible for higher mental functions.

F. **LB 2.6** and **LB 2.7**

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.6 What Can the Specific Parts of the Brain Do?

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: Handout 2.1

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

If you used IB 2.1, you can have students return to their answers. Once again, you can either do this individually or in small groups. Have the students go through their lists and write what brain part is most commonly used for each of the behaviors.

In addition or as an alternative, use Handout 2.1 and have students generate a list of behaviors and activities and see if students can correctly identify the correct brain part that is responsible for the behaviors or actions that they listed.

LB 2.7 Build a Magazine Brain

Activity Type: Lecture Break

Class Size: Works best in small class sizes

Class Time Involved: 20–30 minutes

Materials Needed: Textbook to refer to Concept Chart 2.3, magazines, construction paper, markers, scissors, glue, etc.

Preparation Time: Time to gather supplies (see Time-Saver tip at the end of this chapter)

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

This has been one of the most successful lecture breaks that we have used to help students understand and memorize the parts of the brain, the location of the brain parts, and the functions of the brain parts. This assignment could be done individually outside of class, and then the completed projects could be shared with the class. The assignment could also be done individually during class. We have found greatest success, however, by having students complete this in small groups of five to six. In smaller classes, it is probably easy enough to bring enough scissors, markers, construction paper, glue, and magazines for the entire class (you will want at least 3-year-old magazines for each group). We have our own collection of magazines, but also have collected outdated magazines from our campus library

and doctors' offices. However, you may also want to ask for student assistance and ask students to bring their own scissors, markers, glue, and old magazines (magazines that they are willing to cut pictures from). Refer to the Time-Saver tip about collecting a stock pile of materials such as this to help you with these hands-on "craft projects."

Tell students to refer to Concept Chart 2.3. The project involves first drawing a large picture of a brain, and labeling each part of the brain listed in Concept Chart 2.3. Then they should find a picture from the magazine that represents the function of each brain part and paste that to the appropriate location. For example, a student may find a picture of Rodin's "The Thinker" to represent the frontal lobe or a picture of an eye or pair of glasses for the occipital lobe. A variety of interesting pictures can be used to represent the hypothalamus. This allows students the hands-on chance to label the brain and learn the functions. This project has created some excellent posters with some very interesting pictures. Most importantly, it helps students to learn, understand, ask for clarification, and memorize this complex information. Thanks to the popularity of "reality" TV shows, many students find this activity more exciting if you break them into teams and then tell them that you will select the best brain picture and award the winning team 2 bonus points on the upcoming exam. It is amazing how introducing a very small reward can increase the competition and increase the involvement and motivation of all of the students.

MODULE 2.4 METHODS OF STUDYING THE BRAIN

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Discuss the recording and imaging techniques used to study brain functioning.
2. Describe the experimental methods used by scientists to study brain functioning.

LECTURE OUTLINE

I. **CONCEPT 2.25** – Modern technology provides ways of studying the structure and function of the brain without the need for invasive techniques. (**Concept Chart 2.4**)

II. Recording and Imaging Techniques
   - A. *EEG* (electroencephalograph) – an instrument that records electrical activity in the brain (Figure 2.11)
   - B. *CT* scan (computed tomography scan) – an imaging technique in which a computer measures the reflection of a narrow X-ray beam from various angles as it passes through the brain and other bodily structures (Figure 2.12)
   - C. *PET scan* (positron emission tomography) – provides a computerized image of the brain and other organs at work (Figure 2.13)
   - D. *MRI* (magnetic resonance imaging) – provides a detailed image of the soft matter of the brain or other body parts
     1. Functional MRI – new form that allows detailed images of the brain in action (Figure 2.14)
   - E. **LB 2.8** and **LB 2.9**

III. **CONCEPT 2.26** – Experimental methods used to study brain functioning include lesioning, electrical recording, and electrical stimulation.
   - A. *Lesioning* – destroying part of the brain in experimental animals to observe the effects

B. *Electrical recording* – recording the electrical changes that occur in a specific neuron or groups of neurons in the brain in relation to particular activities or behaviors
C. *Electrical stimulation* – a mild electric current is passed through parts of the brain to observe the effects on behavior
D. **LB 2.10**

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.8 Methods of Studying the Brain Field Trip

Activity Type: Lecture Break

Class Size: Works best in small class sizes

Class Time Involved: 2 hours plus travel time

Materials Needed: A willing field trip location and transportation

Preparation Time: Time to find field trip location

Student Skills: Psychology Content, Social Skills, Real-Life Application

Although not a possibility for very large classes, a field trip to a local hospital or clinic is a fantastic experience for students to see firsthand the scans discussed in this chapter. Personally, rather than take the entire class, we offer extra credit and do this field trip as a psychology club event. It tends to work best if you happen to "know someone" at a hospital or clinic to make a contact. Then allow for plenty of time to arrive, park, and get there. Finally, brief your students on appropriate behaviors in a hospital. When you return, make sure to have students sign a thank you card. If all goes well, it may be a bit of work the first year, but the second year it is easier and well worth it.

LB 2.9 It's the Real Thing: Guest Speaker

Activity Type: Lecture Break

Class Size: Works well in all class sizes

Class Time Involved: 50 minutes

Materials Needed: Guest speaker

Preparation Time: Time to find guest speaker

Student Skills: Psychology Content, Real-Life Application

If it is not feasible to take a field trip to see firsthand the actual scans discussed in this chapter, inviting a medical professional who has experience in these scans is the next best thing. By contacting a local clinic or hospital, it may be possible to find someone with experience in at least one of these scans. Once again, it is probably easier if you "know someone" in a hospital or clinic to find a guest speaker.

Ask the guest speaker if she or he can bring copies of the scans either on a computer disk or in printouts. See Chapter 1, LB 1.7 for more information on successful guest speakers in your course.

LB 2.10 Animal Research Debate

Activity Type: Lecture Break

Class Size: Works well in all class sizes

Class Time Involved: 50 minutes

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Communication Verbal Skills

When discussing the section on lesioning, the issue of animal rights will often emerge. This is also an excellent time to teach students some information about appropriate rules in academic discourse, researching a topic, and presenting an argument. In smaller classes, it is possible to have the entire class be involved in the debate. In larger classes, perhaps some students could receive extra credit for being involved in the debate. In our courses, we usually have four debates throughout the semester so each student will only actually participate in one debate. We emphasize that in a well-prepared debate there actually is no "winning" side, but rather full discussion of both sides of the issue. Assign the class into two groups (pro animal research and con animal research). Tell the students that they will need to have the following things presented: a clear thesis statement, an outline of their arguments, research to support each of their arguments, a clear conclusion statement, and rebuttals. We have the teams decide who will be responsible for each of these elements of the debate, or you could assign the debate roles. Obviously, there are a variety of ways to conduct a debate, but we have found the following format very successful:

Pro team presents its argument (10 minutes)

Con team presents its argument (10 minutes)

Pro team rebuttals (5 minutes)

Con team rebuttals (5 minutes)

Questions from the class (10 minutes)

MODULE 2.5 THE DIVIDED BRAIN: SPECIALIZATION OF FUNCTION

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Describe the major differences between the left and right hemispheres.
2. Explain what determines handedness.
3. Discuss brain lateralization and research with "split-brain" patients.

4. Understand major causes of brain damage and how this damage impacts psychological functioning.

LECTURE OUTLINE

I. The Brain at Work: Lateralization and Integration (**Concept Chart 2.5**)
   A. *Lateralization* – the specialization of the right and left cerebral hemispheres for particular functions. **CONCEPT 2.27** – In most people, the left hemisphere is specialized for use of language and logical analysis, while the right hemisphere is specialized for spatial processing and other nonverbal tasks.
   B. Language dominance is associated with handedness.
   C. *Broca's area* – essential in speech production (located in the left frontal lobe) (Figure 2.15)
   D. *Wernicke's area* – essential in ability to understand spoken or written language (located in the left temporal lobe)
   E. *Aphasia* – loss or impairment of the ability to understand or express language

II. Handedness
   A. **CONCEPT 2.28** – Scientists suspect it is strongly influenced by genetics. (Table 2.2)
   B. Not sure of causes; genetic factors important but other factors contribute (social, hormonal)

III. Split-Brain Research: Can the Hemispheres Go It Alone? (Figure 2.16)
   A. *Epilepsy* – neurological disorder characterized by seizures that involve sudden, violent discharges of electrical activity in the brain. Epileptic patients who have their corpus callosum severed to decrease seizures are called *split-brain patients*.
   B. **CONCEPT 2.29** – The results of split-brain operations show that under some conditions, the right hand literally doesn't know what the left hand is doing. (Figure 2.16)
   C. **LB 2.11** and **LB 2.12**

IV. Brain Damage and Psychological Functioning: **CONCEPT 2.30** – Brain damage can result in subtle or profound consequences in physical and psychological functioning.
   A. Phineas Gage, victim of accident in 1848, demonstrated effects of head trauma on personality and behavior. (Figure 2.17)
   B. Phineas Gage sustained damage to the *prefrontal cortex* – area of the frontal lobe that lies in front of the motor cortex and that is involved in higher mental functions, including thinking, planning, impulse control, and weighing the consequences of behavior
   C. *Plasticity* – ability of brain to adapt itself after trauma or surgical alteration. **CONCEPT 2.31** – The brain is capable of reorganizing itself to a certain extent to adapt to new functions, even in some cases in which half of it is surgically removed.

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.11 Can You Pat Your Head and Rub Your Tummy? Left Brain/Right Brain Activity

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5 minutes

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking

After discussing the split-brain research, reiterate that the right hemisphere controls the left hand and that the left hemisphere controls the right hand. Stand in the front of the room and make sure that your feet and hands are free to move. Tell all of the students to put down their pens and pencils and have their hands and feet free to move. Start by telling the students to move their right hand in a circular clockwise direction. As they are moving their right hand, ask them which hemisphere is primarily in control. This should get most of them to say the left hemisphere. Then ask them to get their right foot moving in a clockwise direction. Usually there is a little laughter. Comment that they are making their brains work a little bit harder now. Now stop the right foot and have them continue to move their right hand in a clockwise direction and have them move their left foot in a clockwise direction. This will also result in classroom laughter. Ask them why this is harder for most people—now they are using both sides of their brain. Now ask them to continue to move their right hand in a clockwise direction and their left foot in a counterclockwise direction. Most students think this will be very difficult, but it is surprisingly easy. Finally, have the right hand continue to go in a clockwise direction and the right foot in a counterclockwise direction. For most people this is nearly impossible. Discuss why this is so difficult for the same side of the brain to have two different directions.

LB 2.12 Left Brain/Right Brain Survey

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: Handout 2.4

Preparation Time: None

Student Skills: Psychology Content, Real-Life Application

Most students really enjoy the research on split-brain patients. To help them further explore this interesting issue, have them complete a survey to test for their left-brain, right-brain dominance. There are many surveys available, but we chose a quick easy-to-score survey. This could be done as an outside of class activity or could be done in class. We will also sometimes have students discuss possible careers that they may wish to consider based on their brain hemisphere preference. In scoring, the more choices from the "a" column, the more left-brain dominant; and the more choices from the "b" column, the more right-brain dominant.

MODULE 2.6 THE ENDOCRINE SYSTEM: THE BODY'S OTHER COMMUNICATION SYSTEM

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Name the major endocrine glands, and describe the functions of the pituitary gland and the hypothalamus.
2. Understand the roles that hormones play in behavior.

LECTURE OUTLINE

I. **LB 2.13**

II. Endocrine Glands: The Body's Pumping Stations (**Concept Chart 2.6**)
   A. *Endocrine system* – the body's system of glands. **CONCEPT 2.32** – Endocrine glands distributed throughout the body help coordinate many bodily functions. (Figure 2.18)
   B. **CONCEPT 2.33** – Hormones are released by endocrine glands directly into the bloodstream, and from there they travel to specific receptor sites on target organs and tissues. For example, the *pancreas* – an endocrine gland located near the stomach that produces the hormone insulin, which regulates the concentration of glucose in the blood.
   C. **CONCEPT 2.34** – In concert with the nervous system, the endocrine system helps the body maintain a state of equilibrium, or *homeostasis*.
   D. *Pituitary gland* – an endocrine gland in the brain that produces various hormones involved in growth, regulation of the menstrual cycle, and childbirth. **CONCEPT 2.35** – The pituitary gland is often called the "master gland" because it helps regulate so many other endocrine glands.
   E. *Pineal gland* – small endocrine gland in the brain that releases melatonin, a hormone that helps regulate the sleep-wake cycle
   F. *Adrenal glands* – a pair of endocrine glands located just above the kidneys that produce cortical steroids that promote muscle development and the stress hormones, epinephrine and norepinephrine
   G. *Gonads* – sex glands that produce hormones and *germ cells* – sperm and egg cells
      1. *Ovaries* – in women, they produce female sex hormones, estrogen and progesterone, and produce mature egg cells
      2. *Testes* – in men, they produce sperm and secrete the male sex hormone testosterone
   H. Separate from nervous system but work closely together with brain controlling endocrine system through the autonomic nervous system

III. Hormones and Behavior (**LB 2.14)**
   A. **CONCEPT 2.36** – Hormones are linked to a wide range of behaviors and mood states.
   B. Testosterone and aggression
   C. Oxytocin and bonding, trust
   D. *Thyroid gland* – an endocrine gland in the neck that secretes the hormone thyroxin, whis is involved in regulating metabolic functions and physical growth; related to metabolism, anxiety and irritability
   E. **CONCEPT 2.37** – Hormonal factors may be involved in explaining PMS, a syndrome affecting about three out of four women. *Premenstrual syndrome* – physical and psychological symptoms because of changing hormone levels leading up to menstruation

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We

have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.13 Hormones!

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 5–10 minutes

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Social Skills, Critical & Creative Thinking

Before beginning the section on the endocrine system, you may want to get students thinking about hormones. Many of their initial ideas will be quite stereotypical and this can be a good teaching moment. Ask students to get into small groups and ask them the following:

- What would happen to a woman if you started giving her large doses of testosterone?
- What would happen to a man if you started giving him large doses of estrogen?
- If there were no negative consequences to taking testosterone or estrogen, why would a person want to increase their intake of these hormones?

After getting their initial ideas, and misconceptions, the discussion of the endocrine system should seem more interesting and relevant to the students.

LB 2.14 Biobehavioral Aspects of the Endocrine System

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: Student groups work together on the project outside of class time then present on their findings in class

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Social Skills, Critical & Creative Thinking, Real-Life Applications

Students frequently consider the endocrine system as a completely separate system from the neurological system. This activity will allow students to understand the close relationship between brain centers and the endocrine system. Assign groups of students the task of focusing on one endocrine disorder in detail. Examples include thyroid disorders (hypothyroid, hyperthyroid), adrenal disorders, pancreatic disorders (Type I diabetes). The groups should outline the brain-body connection in the normal functioning of these endocrine systems (What part of the brain directs the release of the endocrine hormones? How does it know when to stop releasing the hormone? etc.), briefly describe what goes wrong in the development of these disorders, and then focus on the psychological repercussions of the disorders. For example, patients with thyroid disorders have an increased risk of depression. In addition, psychological states such as stress can influence most of these disorders. Students will find a lot of resources on the Internet concerning the characteristics and repercussions of these disorders. After students complete their research, have them present their findings to the class.

Through this activity, students will learn the inseparable connection between the brain, psychological states, and the endocrine system.

MODULE 2.7 GENES AND BEHAVIOR: A CASE OF NATURE AND NURTURE

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVES

1. Understand the roles genetic factors play in behavior.
2. Describe the methodologies used in researching genetic influences on behavior.

LECTURE OUTLINE

I. **LB 2.15**

II. Genes and Behavior: A Case of Nature and Nurture
   A. *Genotype* – an organism's genetic code. *Genes* – basic units of heredity that contain the individual's genetic code
   A. Genes are passed along from parent to offspring.
   B. Genes are composed of the complex, double-stranded spiraling molecule called *deoxyribonucleic acid (DNA).*
   C. Genes are linked together on long strands called *chromosomes* – rod-like structures in the cell nucleus that house the individual's genes.

III. Genetic Influences on Behavior
   A. *Nature-nurture problem* – the debate in psychology about the relative influences of genetics (nature) and environment (nurture) in determining behavior
   B. **CONCEPT 2.38** – The view held by most scientists today is that both heredity and environment interact in complex ways in shaping our personalities and intellectual abilities.
   C. *Phenotype* – observable physical and behavioral characteristics of an organism, representing the influences of the genotype and environment
      1. *Polygenic traits* – influenced by multiple genes interacting in complex ways
   D. **CONCEPT 2.39** – Genetic factors create predispositions that increase the likelihood that certain behaviors, abilities, or personality traits will emerge, but whether they do emerge depends largely on environmental influences and individual experiences.

IV. Kinship Studies: Untangling the Roles of Heredity and Environment (**Concept Chart 2.7**)**CONCEPT 2.40** – Scientists use three basic types of kinship studies to examine genetic influences on behavior: familial association studies, twin studies, and adoptee studies.
   A. *Familial association studies* – examine the degree to which disorders or characteristics are shared among family members
      1. They look at how similar closely related people are compared to more distantly related individuals.
      2. If genes help determine a trait or disorder, more closely related people should share the trait or disorder more often..
   B. Twin studies
      1. *Identical twins* – developed from the same *zygote* (fertilized egg cell) and so have identical genes

2. *Fraternal twins* – developed from separate zygotes and so have 50 percent of their genes in common
3. *Twin studies* – examine the degree to which concordance rates between twin pairs for particular disorders or characteristics vary in relation to whether the twins are identical or fraternal
4. *Concordance rates* – the percentage of cases in which both members of twin pairs share the same trait or disorder
5. Problem – identical twins may be treated more similarly than are fraternal twins

C. *Adoptee studies* (AKA adoptions studies) – examine whether adoptees are more similar to their biological or adoptive parents with respect to their psychological traits or to the disorders they develop

D. **LB 2.16**

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.15 Nature Versus Nurture

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 10–15 minutes

Materials Needed: Handout 2.5

Preparation Time: None

Student Skills: Psychology Content, Social Skills, Critical & Creative Thinking

Most students have many intuitive ideas about the nature versus nurture debate. To introduce this section, you can use Handout 2.5 in a variety of ways. You can administer the survey individually and have the individual complete it. You could also get students into small groups and have them discuss these different things before rating whether it is more nature or nurture. Alternatively in a smaller class, (30 or less) you can write the numbers 1 (nature/genetics) 2 3 4 5 (both) 6 7 8 9 10 (nurture/environment) on the board and have students move toward the position they agree with as you read the different behaviors to visually see the class response. This movement activity is especially memorable for the kinesthetic learners. I have started referring to this activity as a "Living Likert Scale" and do it for a variety of topics. In fact, whenever I look out into the classroom and see a particularly high number of sleepy, unengaged faces looking back at me, I may put a 1–10 on the board and come up with some questions to get them moving. In this section, you may want to specifically say, "OK, I think that your thalamus, pons, and medullas are getting too relaxed, let's shake them up a bit by having you move around the room to answer some questions."

LB 2.16 Family Tree

Activity Type: Lecture Break

Class Size: Works best in small to medium class sizes

Class Time Involved: Mostly an outside of class project, perhaps 10 minutes for sharing in class

Materials Needed: Handout 2.6

Preparation Time: None

Student Skills: Psychology Content, Social Skills, Critical & Creative Thinking, Real-Life Application

Have students select one specific personality trait or physical trait that they would like to study in their family. If students are adopted, they can still complete the assignment. They will obviously be looking for the role of environment on their traits but can still look for the role of genetics in the non-adopted parts of their family. Refer students to Handout 2.6. You can either have students simply complete Handout 2.6 or you could have them complete a more extensive research project to find research and information on the physical trait or personality characteristic they are looking into. This has been an assignment that many students get very interested in pursuing. After completing this simple family tree, many students decide to do some more intensive research into their family tree. We also think this assignment is interesting because it encourages students to contact their families and discuss things that they are learning with their families.

MODULE 2.8 APPLICATION: BIOFEEDBACK TRAINING: LEARNING BY LISTENING TO THE BODY

Refer to the Concept Web at the end of this manual for a visual synopsis of all concepts presented in this module.

LEARNING OBJECTIVE

1. Understand the nature and the applications of biofeedback training.

LECTURE OUTLINE

I. Biofeedback Training: Learning by Listening to the Body
   A. *Biofeedback training (BFT)* – method of learning to control certain bodily responses by using information transmitted by physiological monitoring equipment
   B. **CONCEPT 2.41** – By providing information about changes in internal bodily processes, BFT helps people gain some degree of conscious control over their physiological functioning.
   C. With BFT, people have learned to modify their heart rates, blood pressure, muscle tension, body temperature, brain waves, and other physiological processes.
   D. Research supports effectiveness for wide range of conditions (e.g., headaches, mild hypertension, and chronic pain).
      1. Muscle tension in the forehead can be reduced using *electromyographic (EMG) biofeedback* – involves feedback about changes in the level of muscle tension in the forehead or elsewhere in the body
      2. *Migraine headache* – prolonged, intense headache brought on by changes in blood flow in the brain's blood vessels. Can be relieved through *thermal biofeedback* – involves feedback about changes in temperature and blood flow in selected parts of the body

II. **LB 2.17, LB 2.18, LB 2.19**

LECTURE BREAKS (LB)

Lecture breaks will be presented throughout this instructor's manual. These activities will largely be short activities requiring little preparation effort from the instructor but a great return in class activity level. They can be used as discussion starters or topics for journals and writing assignments as well. We have identified the aspects of the student skills grid that are primarily emphasized with each of the lecture breaks; however, you may find it emphasizes others as well. If handouts are used for the lecture break, the associated handouts are presented at the end of this chapter.

LB 2.17 Biofeedback Demonstration

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 10–15 minutes

Materials Needed: Biofeedback equipment

Preparation Time: Obtaining the equipment and learning the equipment

Student Skills: Psychology Content, Real-Life Application

There are many schools that already have biofeedback equipment. Contact other professors and see if there is such equipment available at your campus. If there is such equipment, you may want to consider bringing the equipment into the classroom. In our case, there is equipment in a psychology lab, but it is difficult to move the equipment. In smaller classes, it is possible to have a required assignment where students sign up for times to experience the biofeedback machine. Alternatively, students could receive extra credit for participating in a biofeedback demonstration. If your campus does not have any biofeedback equipment, you may want to consider buying the equipment for your psychology laboratory. This biofeedback machine is useful not just when discussing the nervous system but also for stress management. Other professors teaching classes in counseling, stress management, biopsychology, etc., may also be interested in such equipment.

LB 2.18 The Next Best Thing to Biofeedback

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 10–15 minutes

Materials Needed: A watch or timer to time 1 minute, arousing stimuli such as loud music or violent or exciting video, relaxing stimuli such as soothing music

Preparation Time: Obtaining the stimuli

Student Skills: Psychology Content, Real-Life Application

Not every campus has a biofeedback machine or the ability to purchase such equipment. Or perhaps it is not feasible for your students to use the biofeedback machine. A much simpler (although not quite as impressive) example of the impact of state of mind on the body involves simply having people take each other's pulse rates during different situations. Ask students to find a partner. Have one student find the other student's pulse on the wrist and let them get used to counting the pulse rate. Then for a minute have a heightened sense of arousal. This can be done in a variety of ways—I have screamed very loudly; I have played loud music; I have shown a rather wild car crash movie scene; or I have yelled,

"We are having a pop quiz today!" Try to have the arousing situation last for exactly one minute. Have the student pulse taker write down the pulse rate for that minute. Then have a one-minute relaxation time—tell participants to close their eyes, dim the lights, and have some relaxing music play. Do this for one minute. For most people, a significant change in pulse rate will occur. You can also switch roles from pulse taker to participant (although on the second time you will have to do something different and probably more arousing to get the heightened pulse rate).

LB 2.19 Biofeedback on a Budget

Activity Type: Lecture Break

Class Size: Works in all class sizes

Class Time Involved: 10–15 minutes

Materials Needed: A small, portable blood pressure and pulse wrist cuff

Preparation Time: Obtaining the cuff

Student Skills: Psychology Content, Real-Life Application

Not all campuses will have biofeedback equipment, but in recent years blood pressure/pulse cuffs have became very common and relatively inexpensive. You can typically find one in most drug stores for less than $30. Have one or two volunteers come to the front of the room. Start by getting a base rate of their heart and pulse rate, write that on the board, then for the next minute have the person think about all the stressful things in their lives and have the students yell a few (e.g., exams, papers in this class, quizzes, etc.). For the last time, have the person close their eyes and breathe and relax. The students can whisper nice things (e.g., the sunshine, a puppy, etc.). Write those numbers on the board. Usually you will be able to get people to control their heart and pulse rates. In addition, you will own a piece of equipment to check your own blood pressure and pulse with!

PARTING WAYS (PW)

Parting-way activities provide closure to a topic, act as a review, and can help to create a sense of accomplishment. These activities can be used at the end of a chapter, the end of a module, or the end of a class. We have identified the aspects of the student skills grid that are primarily emphasized with each of the parting ways; however, you may find it emphasizes others as well. If handouts are used for the parting way, the associated handouts are presented at the end of this chapter.

PW 2.1 Concept Chart Parting Ways

Activity Type: Parting Way

Class Size: Works well in all class sizes

Class Time Involved: 10 minutes

Materials Needed: Textbook

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking

To provide closure for this chapter, we would suggest sending students to the following concept charts and asking students if they have any questions or need clarifications:

Concept Chart 2.1: Gives an excellent summary of the parts of the neuron

Concept Chart 2.2: Gives an excellent summary of the central and peripheral nervous systems

Concept Chart 2.3: Gives an excellent summary of major parts of the brain and the lobes

Concept Chart 2.6: Gives an excellent overview of the endocrine system

PW 2.2 Critical & Creative Thinking

Activity Type: Parting Way

Class Size: Works well in all class sizes

Class Time Involved: 10 minutes

Materials Needed: Textbook, page 81: Thinking Critically About Psychology exercise

Preparation Time: None

Student Skills: Psychology Content, Writing Skills, Critical & Creative Thinking, Social Skills

Throughout the textbook, there are a variety of critical thinking activities. This could be done by either having students work individually on the assignment in class or outside of class as a writing assignment. If the instructor is using a journal in the course, this could be assigned as a writing assignment. If a virtual discussion board is being utilized in the course, this could be the discussion starter for the discussion. Finally, this could be done in small groups and then answers shared with the entire class.

PW 2.3 Brain Game (Again)

Activity Type: Parting Way

Class Size: Works well in all class sizes

Class Time Involved: 10–15 minutes

Materials Needed: Handout 2.2

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

If you did IB 2.2, you may want to return to this activity at the end of the brain unit to look for a significant improvement. Or, this could be done for the first time if it was not used as an ice-breaker. Either as individuals or in small groups, have students try to generate as many parts of the brain as they can. Do not allow students to use their text, but rather to do this based on knowledge from this section. After each part of the brain, have them list the primary function of the brain part.

Sometimes we will do activities such as this with some competition, such that the group that lists the most parts and the most correct functions will receive two extra credit points on the upcoming exam. This tends to increase the groups' motivation to generate as many parts and functions as possible.

PW 2.4 Preposterous Question: Build the Best Brain You Can

Activity Type: Parting Way

Class Size: Works well in all class sizes

Class Time Involved: 10–15 minutes

Materials Needed: None

Preparation Time: None

Student Skills: Psychology Content, Critical & Creative Thinking, Social Skills

As a way to end this section, you may want students to spend just a few minutes reviewing the parts and functions of the brain. This activity has the following preposterous hypothesis: Pretend that you will survive but you can only pick five brain structures that will work completely effectively. If you don't select certain parts, they will not function quickly or very effectively. What would be the five areas that you would select? What areas would not be in your top five, and why? Students can complete this assignment individually or in small groups. This creative assignment allows students the chance to review information and also to compare the brain parts.

Please see the discussion board, writing, and/or web evaluation assignment for more possible parting-way activities for this chapter.

ELECTRONIC DISCUSSION BOARD, JOURNAL ASSIGNMENT, OR WRITING ASSIGNMENT TOPIC

If you are using a course management system (e.g., a CMS such as Blackboard or Web CT) or web page software such as FrontPage, you may want to have an electronic discussion board to supplement classroom discussion and post a question for each chapter. If you are not using this technology, you may want to have a journal or writing assignment for the students in each chapter. We believe that it is essential to allow students more time on task to think and reflect about the topics of each chapter outside of the class time.

QUESTION: What information in this chapter did you find most surprising about brain structure and brain functioning? Why did you find this information surprising? Although many functions of the brain were presented along with the associated brain area primarily in control of this function, some functions do not have one clear area of the brain that is responsible for their functioning. What are some of the functions of the brain that do not seem to have one primary area of responsibility? Finally, how do you think the information presented in this section can assist you personally or professionally? Why?

TEACHER TECHNOLOGY ADD-ON—USING WEB LINKS

In each chapter, we will be presenting you a possible technology component to incorporate into your course. Some of these you may already be using, others you may not think fit your particular teaching style, but we hope that you may find some of these ideas will enhance your current teaching and ultimately increase student learning.

In Chapter 2, numerous diagrams or pictures are particularly useful to help students visualize parts of the brain. In other chapters, pictures or diagrams will also be useful. Certainly there are pictures of the brain and brain structures in the textbook, but additional pictures at different angles with different structures labeled is helpful for the students. In addition, as you are lecturing and the students are taking notes, it may be useful to present a variety of web page links in your PowerPoint presentation. Students who are not very comfortable drawing diagrams will also appreciate having more pictures that they can study. We also provide many valuable links to our students in our syllabi. If you are using a course web page built with FrontPage or a course management system such as Blackboard or Web CT, you can post the links to brain structure on your course web page. Some of these web links also are interactive such that the students can select different parts of the brain to explore in more depth. One very

significant problem with web links is that they may be moved or may not exist. Therefore, we suggest selecting more permanent web links from reliable sources. One particularly reliable web page repository is a resource called Project Merlot (http://www.merlot.org/). This project is sponsored by a variety of colleges and has peer reviewed web links. This allows you to go to one web page and surf for a variety of useful links. For example, by searching BRAIN on the Merlot site, we found this very useful brain atlas site with excellent pictures of the brain http://www.med.harvard.edu/AANLIB/home.html.


If you have students find the websites, they could also present and could be a useful virtual tour guide or virtual field trip Lecture Break.

Web Evaluation Assignment

Randomly assign each student a part of the brain, and then have them complete the web evaluation sheet on their brain structure (look back to Handout 1.10). In addition to teaching students technological skills, it is also an excellent way for you to find interesting resources. Alternatively, you could assign students different neurological disorders.

ETHICS IN DAILY LIFE

In this chapter, we discussed the brain and various methods of brain research. Whenever one starts to talk about research, there are many ethical decisions that may enter into the situation. In this section, the most obvious and controversial issue is the stem cell research debate. Have students either individually or in groups find information about the topic and either have them discuss, present, or write about the ethics involved in the stem cell research debate.

TIME-SAVER

In this chapter, one of the lecture breaks involved creating a brain poster by using magazine cutouts of brain functions, markers, glue, scissors, etc. These hands-on activities that create things are very useful to allow students the chance to work in groups, create a project, and to think about the content and material presented in class. These activities generally create excitement in the class and are especially beneficial for more kinesthetic learners. It is amazing how much more willing students are to brainstorm and answer questions when given a piece of poster board and different colored markers. However, for teachers, it takes time to gather magazines, markers, tape, glue, and the associated craft items. Also, for those of us who teach far from our offices (or those that are not even fortunate to have an office on campus), the thought of carrying magazines and the associated craft items makes these hands-on create-a-project lecture break activities seem too effortful. If a lecture break seems as if it is too much work for the payoff, then most instructors will simply ignore the activity. We believe that the benefit of these hands-on creative projects is worth the extra effort, but we have found an amazingly simple time-saver. When we first started teaching, before every one of these projects, we would search our desk for paper, markers, scissors, tape, etc. We would then take the materials to class and then return to unload our supplies. This was simply taking too much time, as well as making a mess in our offices. So we started by collecting the materials needed into a used photocopy paper box and then keeping the materials easily available for when we needed them. This was a big improvement, simply

having a box of supplies (markers, scissors, tape, etc.) that can be transported to class. The box, however, began to be very heavy and difficult to carry so we moved the associated supplies to a large duffle bag. This was an even better step. Then last year, the gift of a new suitcase led to the brainstorm of using an old piece of luggage (which had definitely seen better days after a few too many psychology conferences) for a craft and supply tote on wheels. Suitcases with wheels are easy to find in many stores now, but if you don't want to spend a lot of money up front you may want to look at your area thrift store. Now when the students see us rolling in the old suitcase, they know we will be using supplies. It is easy to transport and we tend to always have everything we need with virtually no preparation time.

ASSESSMENT TIME

With so much material in this section, many students struggle with knowing what they need to focus on. In addition, sometimes they think they are remembering more than they are, and they think they are getting it and maybe are not spending enough time studying. Come in and either hand out a "not a pop quiz" quiz by either handing out a quiz or having a diagram of the neuron and the important structures on the brain and have them quickly label the five parts of the neuron and five parts of the brain. Have them grade their own "not a real pop quiz" quiz. These 2 minutes in class may be enough to remind students that they will have to spend some time studying this material. It is also a good review for the students and helps you to see how well the students learned from the last lecture.

AROUND THE WORLD

Certainly our brain does not change as a function of what culture and environment that we are raised in, but certainly our brain is influenced by poverty and malnutrition. Have students either in small groups or individually do some research on the impact of poverty and malnutrition on the development of a healthy brain. Have them find research on countries that have the largest issues relating to poverty. Find useful websites that describe this issue. Once again, the "around the world" projects can be useful for group projects, individual papers or presentations, and if you use a journal or portfolio in the class could be included in those assignments.

Handout 2.1 What Does The Brain Do? (IB 2.1, LB 2.4, LB 2.6)

In the space below, list as many behaviors or actions that the brain and the nervous system are involved with. Try to generate as many as you can.

Behaviors or Actions	*	**

*, ** Please leave these columns empty for now; you may use these columns for later activities.

Handout 2.2 What Are the Parts of the Brain? (IB 2.2, PW 2.3)

List as many brain parts as you can. After the brain area, list the primary function of that brain part.

Brain Area	Associated Function

Handout 2.3 Sympathetic or Parasympathetic (LB 2.5)

For the following body functions, match which is primarily controlled by the Sympathetic branch and which is primarily a Parasympathetic behavior. Next to each behavior or action, put an "S" for Sympathetic and "P" for Parasympathetic.

Skin has goose bumps

Skin is relaxed

Palms are dry

Palms are sweaty

Lungs are dilated and rapid breathing occurs

Lungs are constricted and breathing is relaxed

Heart rate decreases

Heart rate increases

Blood is sent to muscles

Blood is sent to internal organs

Adrenal gland activity increases

Adrenal gland activity decreases

Digestion is stimulated

Digestion is inhibited (can cause you to feel like you have a knot in your stomach)

Mouth is dry

Salivation in the mouth

Handout 2.4 Left Brain/Right Brain Survey (LB 2.12)

For each pair, please select the item that is most appealing to you:

1.	a) Writing a letter	b) Drawing a picture
2.	a) Being a movie critic	b) Creating a new toy
3.	a) Playing a logical game	b) Playing an instrument
4.	a) Reviewing a book	b) Building something
5.	a) Writing a play	b) Visualizing a play
6.	a) Learning computer programming	b) Puttering in the yard
7.	a) Analyzing a budget	b) Re-arranging an office or room
8.	a) Planning a trip	b) Going on a trip with no plans
9.	a) Learning a dance step by talking	b) Learning a dance step by watching

Modified from Wagner, R.F., and Wells, K.A. (1985). A refined neurobehavioral inventory of hemispheric preference. *Journal of Clinical Psychology, 41,* 672-673.

Handout 2.5 Nature Versus Nurture (LB 2.15)

For each of the following, select the number that most represents your belief about what primarily controls this aspect of an individual. Use the following scale:

1	2	3	4	5	6	7	8	9	10
nature/genetics				both					nurture/environment

1. Height

2. Eye Color

3. Weight

4. Aggression/Anger/Temper

5. Happiness

6. Intelligence

7. Personality

8. Skin Color

9. Extraversion/Social Skills

Handout 2.6 Family Tree (LB 2.16)

What is one specific behavior, trait, personality characteristic, or physical characteristic that you possess that you would like to investigate in your family? _____

Before you complete this exercise, do you believe that this aspect of yourself is primarily nature (genetics), nurture (environment), or a combination? Why?

For this assignment, you will probably need to contact your parents, grandparents, and other family members to gather this information.

If the family member possesses the same aspect that you possess, give that person a "+". If that person does not possess that same aspect, give that person a "–". If you were unable to find information about this person, give that person a "?".

The following is a very simple family tree. Please add spaces as necessary for step-family, additional siblings, aunts, uncles, etc. that you have information about.

You, first name _____ (aspect that you possess _____)

List the first names of all of your siblings and the appropriate +/–/?

_____ _____ _____

_____ _____ _____

List your parents

_____ _____

Father Mother

List any aunts and uncles

List your grandparents

Father's parents Mother's parents

_____ _____ _____ _____

If possible list great grandparents

_____ _____ _____ _____

_____ _____ _____ _____

After completing this exercise, do you believe that this aspect of yourself is primarily nature (genetics), nurture (environment), or a combination? Why?