Understanding Psychology 12th edition Morris Solutions Manual

SKU: 9780134625188-SOLUTIONS

the biological basis of behavior

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The Central Nervous System The Organization of the Nervous System The Brain Hemispheric Specialization Tools for Studying the Brain The Spinal Cord	**Learning Objectives:** 2.6, 2.7, 2.8, 2.9 **Lecture Launchers:** 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17 **Activities & Exercises:** 2.3, 2.4, 2.5, 2.6 **Handout:** 2.1	**Video**: The Spinal Cord Reflex **Interactive**: The Divisions of the Brain **Interactive**: The Four Lobes of the Cerebrum
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▼Lecture Guide

I. NEURONS: THE MESSENGERS

Lecture Launchers and Discussion Topics

- *2.1 - Neurotransmitters: Chemical Communicators of the Nervous System*
- *2.2 - Exceptions to the Rules*
- *2.3 - The Glue of Life: Neuroglial Cells*

Classroom Activities, Demonstrations, and Exercises

- *2.1 - Using Dominoes to Understand the Action Potential*
- *2.2 - Stemming the Tide of Misinformation*

- *REVEL Multimedia*
- *MyPsychLab Multimedia*

Learning Objective 2.1 Define and differentiate between psychobiology *and* neuroscience*. Describe a typical neuron. Distinguish among afferent neurons, efferent neurons, association neurons, mirror neurons, and glial cells.*

A. Structure of the neuron: The nervous system's building block
   1. Neurons: Dendrites, soma, axons
      a. Myelin insulates and protects axons, speeds neural conduction
B. Different types of neurons
   1. Afferent – Collect messages from sense organs
   2. Efferent – Carry messages from the brain and spinal cord to the muscles and glands
   3. Interneurons – Carry messages from one neuron to another
   4. Mirror neurons – Involved in mimicking the behavior of others
C. Glial cells support, separate, and insulate neurons from each other

Learning Objective 2.2 Describe how neurons transmit information, including the concepts of resting potential, polarization, action potential, graded potential, threshold of excitation, and the all-or-none law.

D. The neural impulse
   1. At rest, the neuron is negatively charged inside and positively charged outside
   2. When stimulated, the charge reverses
      a. This is the action potential
   3. Neurons fire in an all-or-nothing manner

Learning Objective 2.3 Describe the parts of the synapse.

E. The synapse
   1. Synaptic vesicles release neurotransmitter into the synapse
   2. Neurotransmitter molecules fit into receptor sites
      a. Neurotransmitters may be either excitatory or inhibitory
   3. Most neurotransmitters are taken back into the synaptic vesicles

Learning Objective 2.4 Explain the role of neurotransmitters in the synapse.

F. Neurotransmitters
   1. Acetylcholine
   2. Glutamate

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3. Serotonin
4. Dopamine
5. Endorphins
6. GABA
7. Glycene

Learning Objective 2.5 Explain neuroplasticity and neurogenesis.

G. Neuroplasticity and neurogenesis
   1. Neuroplasticity allows the brain to reallocate structure and function of cells
      a. Neural networks result from functional groupings of neurons
   2. Neurogenesis portends an exciting future for the birth of new neurons
   3. Stem cells hold the promise of repairing damaged brain tissue

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II. THE CENTRAL NERVOUS SYSTEM

Lecture Launchers and Discussion Topics
- *2.4 - Brain Metaphors*
- *2.5 - The Cranial Nerves*
- *2.6 - The Importance of a Wrinkled Cortex*
- *2.7 - Brain's Bilingual Broca*
- *2.8 - A New Look at Phineas Gage*
- *2.9 - Understanding Hemispheric Function*
- *2.10 - Handedness, Eyedness, Footedness, Facedness*
- *2.11 - Workplace Problems: Left-Handedness*
- *2.12 - The Results of a Hemispherectomy*
- *2.13 - Psychophysiological Measurement*
- *2.14 - Berger's Wave*
- *2.15 - Lie Detectors 2.0*
- *2.16 - Using fMRI and MEG to Study Phantom Limb Pain*
- *2.17 - Freak Accidents and Brain Injuries*

Classroom Activities, Demonstrations, and Exercises
- *2.3 - Mapping the Brain*
- *2.4 - Football and Brain Damage*
- *2.5 - Hemispheric Lateralization*
- *2.6 - Hemispheric Communication and the Split Brain*

- *REVEL Multimedia*
- *MyPsychLab Multimedia*

Learning Objective 2.6 Identify the parts of the brain and the nervous system.

A. The hindbrain
   1. *Medulla*—regulates breathing and heart rate; automatic functions
   2. *Pons*—involved in sleeping, waking, and dreaming
   3. *Cerebellum*—regulates balance and coordination of movement
B. The midbrain
   1. *Thalamus*—directs incoming sensory messages to higher centers
   2. *Hypothalamus*—associated with drives, such as hunger, thirst, emotion, sex
   3. *Reticular formation*—responsible for arousal and alertness
C. The cerebrum
   1. Cerebral cortex is divided into four regions
      a. *Occipital lobes*—contain the visual cortex

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b. *Parietal lobes*—contain somatosensory cortex, that receives information about pressure, pain, touch, and temperature from all over the body
c. *Temporal lobes*—contain auditory cortex
d. *Frontal lobes*—contain the motor cortex; responsible for making plans, taking initiative, and thinking creatively

2. Association areas are found in all the lobes but particularly in the frontal lobes

D. The limbic system
1. Hippocampus – Plays an important role in the formation of new memories
2. Amygdala – Regulates emotions and establishes emotional memories

Learning Objective 2.7 Explain what is meant by "hemispheric specialization" and the functional differences between the two cerebral hemispheres.

E. Hemispheric specialization
1. Hemispheres are connected by a band of fibers called corpus callosum
2. Left side of the brain seems to control language, writing, logical thought, analysis, and mathematical abilities
3. The right side of the brain processes information globally and controls emotional expression, spatial perception, and recognition of faces, patterns, melodies, and emotions
4. Information presented only to the left hemisphere can be verbalized but information only sent to the right cannot

Learning Objective 2.8 Discuss how microelectrode techniques, macroelectrode techniques, structural imaging, and functional imaging provide information about the brain.

F. Tools for studying the brain
1. EEG uses electrodes placed on the scalp that are then amplified and viewed
2. CT scans are computer-aided X-rays that show the skull and brain structure
3. MRI scans use a magnetic field, radio pulses, and a computer to create an image
4. MEG and MSI use magnetic fields to get a clearer picture of the brain at work
5. PET scans use a radioactive sugar injected into the bloodstream
6. fMRI allows researchers to look at the activity of the brain over a time period

Learning Objective 2.9 Explain how the spinal cord works.

G. The spinal cord
1. Made up of long bundles of axons wrapped in myelin
a. Motor neurons descend from the brain
b. Sensory neurons ascend from the extremities and organs
2. Reflexive neural circuits require no input from the brain

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III. THE PERIPHERAL NERVOUS SYSTEM

Classroom Activities, Demonstrations, and Exercises

- *2.7 - Demonstrating Neural Conduction: The Class as a Neural Network*
- *2.8 - The Dollar Bill Drop*
- *2.9 - Reaction Time and Neural Processing*

- *REVEL Multimedia*

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➢ *MyPsychLab Multimedia*

Learning Objective 2.10 Identify the peripheral nervous system, and contrast the functions of the somatic and autonomic nervous systems.

A. The peripheral nervous system
    1. The somatic nervous system
        a. Sensory pathway
        b. Motor pathway

Learning Objective 2.11 Explain the differences between the sympathetic and the parasympathetic nervous systems.

    2. The autonomic nervous system
        a. Sympathetic division
        b. Parasympathetic division

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IV. THE ENDOCRINE SYSTEM

Lecture Launchers and Discussion Topics
➢ *2.18 - Hormone Imbalances*

➢ *REVEL Multimedia*
➢ *MyPsychLab Multimedia*

Learning Objective 2.12 Describe the endocrine glands and the way their hormones affect behavior.

A. Pituitary gland
    1. Just below the hypothalamus
    2. Controls the levels of salt and water in the system
    3. In women, controls the onset of labor and lactation
B. Pineal gland
    1. Secretes melatonin
C. Thyroid gland
    1. Located inside the neck
    2. Controls metabolism by secreting thyroxin
D. Pancreas
    1. Controls the level of sugar in the blood by secreting insulin and glucagons
E. Adrenal glands
    1. One on top of each kidney
    2. Control stress reactions
F. Gonads
    1. Ovaries in women and testes in men
    2. Secrete hormones to regulate sexual growth, activity, and reproduction

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IV. GENES, EVOLUTION, AND BEHAVIOR

Lecture Launchers and Discussion Topics
➢ *2.19 - My Mother, Myself*
➢ *2.20 - Epigenetics*

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➢ *2.21 - The Beak of the Finch*
➢ *2.22 - A Modular Approach to Mental Architecture*
Classroom Activities, Demonstrations, and Exercises
➢ *2.10 - Environmental Influences on the Brain*
➢ *2.11 - Evolution Versus Religion…Can Either Be Proven "False?"*
➢ *2.12 - Gimme 5!*
➢ *2.13 - What Runs in the Family?*
➢ *2.14* - Quit Cloning Around
➢ *2.15 - Wordplay*

➢ *REVEL Multimedia*
➢ *MyPsychLab Multimedia*

Learning Objective 2.13 Distinguish between behavior genetics and evolutionary psychology.

Learning Objective 2.14 Define genetics. Differentiate among genes, chromosomes, and DNA.

A. Genetics
1. Genes – The basic units of inheritance
2. Chromosomes – Cellular bodies that carry genes
3. DNA (deoxyribonucleic acid) – The building blocks of genes

Learning Objective 2.15 Describe what is meant by dominant and recessive genes, polygenic inheritance, and genotype versus phenotype.

4. Dominant genes and recessive genes – Pairings predict outcomes
5. Polygenic inheritance – Multiple genes contribute to a trait
6. Genotype – A unique genetic blueprint
7. Phenotype – The outward expression of a trait

Learning Objective 2.16 Describe the human genome and what can be learned by studying it.

8. Genome – The full complement of an organism's genetic material
   a. The Human Genome Project – Mapping the entire human genome

Learning Objective 2.17 Compare and contrast strain studies, selection studies, family studies, twin studies, and adoption studies as sources of information about the effects of heredity.

B. Behavior genetics
1. Animal behavior genetics
   a. Strain studies
   b. Selection studies
2. Human behavior genetics
   a. Family studies
   b. Twin studies
      i. Identical twins
      ii. Fraternal twins
   c. Adoption studies

Learning Objective 2.18 Identify the key ethical issues that arise as society gains more control over genetics.

C. Social implications

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1. Prenatal screening to identify genetic abnormalities
2. Individuals shape their environments
   a. Genetics and environment interact in a complex fashion

Learning Objective 2.19 Describe how evolutionary psychologists view the influence of natural selection on human social behavior

D. Evolutionary psychology
   1. Natural selection – Survival and reproduction of genetically well-adapted individuals
   2. Evolutionary psychologists study how natural selection might influence the adaptiveness of behaviors and mental processes

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▼LEARNING OBJECTIVES

LO 2.1 Define and differentiate between *psychobiology* and *neuroscience*. Describe a typical neuron. Distinguish among afferent neurons, efferent neurons, association neurons, mirror neurons, and glial cells.

LO 2.2 Describe how neurons transmit information, including the concepts of resting potential, polarization, action potential, graded potential, threshold of excitation, and the all-or-none law.

LO 2.3 Describe the parts of the synapse.

LO 2.4 Explain the role of neurotransmitters in the synapse.

LO 2.5 Explain neuroplasticity and neurogenesis.

LO 2.6 Identify the parts of the brain and the nervous system.

LO 2.7 Explain what is meant by "hemispheric specialization" and the functional differences between the two cerebral hemispheres.

LO 2.8 Discuss how microelectrode techniques, macroelectrode techniques, structural imaging, and functional imaging provide information about the brain.

LO 2.9 Explain how the spinal cord works.

LO 2.10 Identify the peripheral nervous system, and contrast the functions of the somatic and autonomic nervous systems.

LO 2.11 Explain the differences between the sympathetic and the parasympathetic nervous systems.

LO 2.12 Describe the endocrine glands and the way their hormones affect behavior.

LO 2.13 Distinguish between behavior genetics and evolutionary psychology.

LO 2.14 Define *genetics*. Differentiate among genes, chromosomes, and DNA.

LO 2.15 Describe what is meant by dominant and recessive genes, polygenic inheritance, and genotype versus phenotype.

LO 2.16 Describe the human genome and what can be learned by studying it.

LO 2.17 Compare and contrast strain studies, selection studies, family studies, twin studies, and adoption studies as sources of information about the effects of heredity.

LO 2.18 Identify the key ethical issues that arise as society gains more control over genetics.

LO 2.19 Describe how evolutionary psychologists view the influence of natural selection on human social behavior.

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▼RAPID REVIEW

The **nervous system** is composed of a complex network of cells throughout the body. The cells in the nervous system that carry information are called **neurons**. Information enters at the **dendrites**, flows through the cell body (or **soma**) and down the **axon**. Although neurons are the cells that carry the information, most of the nervous system consists of **glial cells**, that provide food, support, and insulation to the neuron cells. The insulation around the neuron is called **myelin** and works in a way similar to the plastic coating on an electrical wire. Bundles of myelin-coated axons are wrapped together in cable-like structures called **nerves**. The movement of an electrical signal across a neuron is called an **action potential**. A neuron fires in an **all-or-none** manner. When the electrical signal travels down the axon and reaches the other end of the neuron called the **axon terminal**, it causes the **neurotransmitters** in the **synaptic vesicles** to be released into the fluid-filled **synapse** between the two cells.

The **central nervous system (CNS)** is made up of the brain and the **spinal cord**. **Afferent (sensory) neurons** send information from the senses to the spinal cord, whereas **efferent (motor) neurons** send commands from the spinal cord to the muscles. **Interneurons** connect sensory and motor neurons and help to coordinate the signals. The brain can be roughly divided into three sections: the cerebrum, the midbrain, and the hindbrain. The many structures within each division are discussed, such as the **brainstem**, **medulla**, **limbic system**, **thalamus**, **hypothalamus**, **hippocampus**, **amygdala**, **cortex**, **cerebral hemispheres**, **corpus callosum**, **occipital lobes**, **parietal lobes**, **temporal lobes**, and **frontal lobes**. The **cerebrum** is made up of the two cerebral hemispheres and the structures connecting them. **Split-brain research** helped scientists understand that the two cerebral hemispheres are not identical. Researchers have developed several methods to observe the structure and activity of a living brain, such as **CT scan**, **MRI**, **EEG**, **PET**, **fMRI**, or **MEG**.

The **peripheral nervous system (PNS)** is made up of all the nerves and neurons that are *not* in the brain or spinal cord, and is divided into two parts: the **somatic nervous system** and the **autonomic nervous system**. The autonomic nervous system is in turn divided into two parts: the **sympathetic division** and the **parasympathetic division**.

The **endocrine glands** represent an additional communication system in the body. The endocrine glands secrete chemicals called **hormones** directly into the bloodstream. The **pituitary gland** is located in the brain and secretes the hormones that control milk production, salt levels, and the activity of other glands. The **pineal gland** is also located in the brain and regulates the sleep cycle through the secretion of melatonin. The **thyroid gland** is located in the neck and releases a hormone that regulates metabolism. The **pancreas** controls the level of blood sugar in the body, whereas the **gonad** sex glands—called the **ovaries** in females and the **testes** in males—regulate sexual behavior and reproduction. The **adrenal glands** play a critical role in regulating the body's response to stress.

Great strides are being made in incorporating **genetics**, **behavioral genetics**, and an **evolutionary perspective** in psychology. Decoding the **human genome**, using sophisticated analyses of **twin** and **adoption studies**, and theorizing how our evolutionary inheritance might shape contemporary behavior all contribute a richer understanding of the biological bases of psychology.

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▼LECTURE LAUNCHERS AND DISCUSSION TOPICS

- 2.1 - Neurotransmitters: Chemical Communicators of the Nervous System
- 2.2 - Exceptions to the Rules
- 2.3 - The Glue of Life: Neuroglial Cells
- 2.4 - Brain Metaphors
- 2.5 - The Cranial Nerves
- 2.6 - The Importance of a Wrinkled Cortex
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Lecture Launcher 2.1 – Neurotransmitters: Chemical Communicators of the Nervous System

In 1921, Otto Loewi put two living hearts in a fluid bath that kept them beating. He stimulated the vagus nerve of one of the hearts. This is a bundle of neurons that serves the parasympathetic nervous system and causes a reduction in the heart's rate of beating. A substance was released by the nerve of the first heart and was transported through the fluid to the second heart. The second heart reduced its rate of beating. The substance released from the vagus nerve of the first heart was later identified as *acetylcholine*, one of the first neurotransmitters to be identified. Although many other neurotransmitters have now been identified, we continue to think of acetylcholine as one of the most important neurotransmitters. For example, curare is a poison that was discovered by South American Indians, who put it on the tips of the darts they shoot from their blowguns. Curare blocks acetylcholine receptors, and paralysis of internal organs results. The victim is unable to breathe and eventually dies. As another example, a substance in the venom of black widow spiders stimulates release of acetylcholine at synapses. More commonly, botulism toxin, found in improperly canned foods, blocks release of acetylcholine at the synapses and has a deadly effect. It takes less than one millionth of a gram of this toxin to kill a person. Finally, a deficit of acetylcholine is associated with Alzheimer's disease, which afflicts a high percentage of older adults.

Many neurotransmitters have been identified in the years since 1921, and there is increasing evidence of their importance in human behavior. Psychoactive drugs affect consciousness because of their effects on synaptic transmission. For example, cocaine and the amphetamines prolong the action of certain

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neurotransmitters and opiates imitate the action of natural neuromodulators called endorphins. It appears that the neurotransmitters dopamine, norepinephrine, and serotonin are associated with some of the most severe forms of mental illness.

Loewi, O. (1921). Über humorale übertragbarkeit der herznervenwirkung. [About humoral transmissibility of the heart nervous system] *Pflüger's Archiv für die gesamte Physiologie des Menschen und der Tiere*, [Pflüger's Archive for the Whole Physiology of Man and Animals], *189*(1), 239-242.
Loewi, O. (1960). An autobiographic sketch. *Perspectives in Biology and Medicine*, *4*(1), 3-25.

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Lecture Launcher 2.2 - Exceptions to the Rules

In an introductory psychology class, students learn the basic rules that generally govern neuronal communication. In many cases, however, the exceptions to these rules may be as important as the rules themselves. Several of these exceptions are described below.

Rule #1: Neuron to neuron signaling is chemical, not electrical.
Exception: Gap junctions

Although it is generally the case that a neuron's electrical signal must first be converted to a chemical signal in order excite or inhibit another neuron, this is not always the case. Some neurons have gap junctions, which connect their intracellular fluids. This means that the electrical signal can flow directly from one neuron to another. Unlike chemical synapses, most electrical synapses formed by gap junctions are bi-directional, meaning that electrical signals can travel in both directions through the gap junctions. Gap junctions also contain gates, which can be closed to prevent the electrical signal from being passed to the neighboring neuron.

Rule #2: Axons always synapse on dendrites.
Exception: Axo-axonic and axosomatic synapses

Axons can form synapses on all parts of a postsynaptic neuron. Synapses located on the soma (i.e., cell body) of a neuron are often inhibitory. In other words, transmitters released at these axosomatic synapses make it harder for the postsynaptic neuron to reach the threshold for generating an action potential. When an axon synapses on the axon of another neuron, it is called an axo-axonic synapse. Because these synapses usually occur near the end of the axon, they have no effect on whether the post synaptic cell generates an axon potential or not. Instead, axo-axonic synapses usually modulate how much neurotransmitter is released from the postsynaptic neuron.

Rule #3: Action potentials only travel in one direction.
Exception: Back-propagating action potentials

Action potentials begin at the axon hillock, where the axon emerges from the soma. From there, the action potential travels down the axon, and away from the soma. At the same time however, a back-propagating action potential can travel from the axon hillock, through the soma, and into the dendrites. Back-propagating action potentials are thought to affect the functioning of receptors located in the soma and dendrites.

Kandel, E., Schwartz, J., & Jessell, T. (2012). *Principles of neural science* (5th ed.). New York, NY: McGraw-Hill.

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Lecture Launcher 2.3 - The Glue of Life: Neuroglial Cells

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Glia is derived from the Greek word for glue and is an appropriate name for the cells that surround all neurons, sealing them together. Glial cells outnumber neurons ten to one, and, although tiny in size, still make up half of the brain's bulk. Unlike neurons, glia do not possess excitable membranes and so cannot transmit information in the way neurons do. Yet so many thousands of cells must be there for some purpose.

Researchers studying the brain have suggested that glia can take up, manufacture, and release chemical transmitters, and so may help to maintain or regulate synaptic transmission. Other researchers suggest that glia can manufacture and possibly transmit other kinds of molecules, such as proteins. The anatomy of some glial cells is striking in this regard, for they seem to form a conduit between blood vessels and neurons, and so may bring nourishment to the neurons. It is thought that these cells may have important functions during prenatal development and recovery from brain injury. One role of the glia is known definitely: certain kinds of glia, called by the tongue-twisting name of *oligodendroglia,* form the myelin sheath that insulates central nervous system axons and speeds conduction of the nerve impulse. A counterpart called a Schwann cell performs the same role for the neurons that make up peripheral nerves.

The study of glia is difficult because these tiny cells are inextricably entwined with neurons. As the most numerous type of cell in the brain, their potential importance is vast, and investigation of their function seems likely to yield exciting results in the near future.

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Lecture Launcher 2.4 - Brain Metaphors

Metaphors are a toolbox of handiness in psychology, because they help us to understand systems that aren't directly observable through reference to things that are more familiar and perhaps better understood (Weiner, 1991). Our understanding of the human brain and its activity has been helped through a reliance on metaphor. The metaphors used, however, have changed over time.

■ *Hydraulic models*. Thinkers such as Galen and Descartes described the brain as a pneumatic/hydraulic system, relying on the "new-fangled" plumbing systems dominant during their lifetimes. Galen, for example, believed that the liver generated "spirits" or gases that flowed to the brain, where they then formed "animal spirits" that flowed throughout the nervous system. Descartes expanded on this view, adding that the pineal gland (the supposed seat of the soul) acted on the animal spirits to direct reasoning and other behaviors. In short, the brain was a septic tank; storing, mixing, and directing the flow of spirit gases throughout the body for the purposes of behavior and action.

■ *Mechanical and telephone models*. With the advent of new technology came new metaphors for the brain. During the Industrial Revolution machine metaphors dominated, and in particular the brain was conceived as a complex mechanical apparatus involving (metaphorical) levers, gears, trip hammers, and pulleys. During the 1920s, the brain developed into a slightly more sophisticated machine resembling a switchboard; the new technology of the telephone provided a new metaphor. Inputs, patch cords, outputs, and busy signals (though no "call waiting") dominated explanations of brain activity. This metaphor, however, faltered by viewing the brain as a system that shut down periodically, as when no one was dialing a number. We now know, of course, that the brain is continually active.

■ *Computer models*. Starting in the late 1950's, metaphors for the brain relied on computer technology. Input, output, memory, storage, information processing, and circuitry were all terms that seemed equally suited to talking about computer chips or neurons. Although perhaps a better metaphor than plumbing or telephones, the computer model eventually showed its shortcomings. As a descriptive device, however, this metaphor can at least suggest limits in our understanding and point the way to

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profitable areas of research.

Weiner, B. (1991). Metaphors in motivation and attribution. *American Psychologist*, *46*, 921-930.

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Lecture Launcher 2.5 - The Cranial Nerves

The textbook discusses various divisions of the nervous system. You may want to add a description of the cranial nerves to your outline of the nervous system. Although the function of the cranial nerves is not different from that of the sensory and motor nerves in the spinal cord, they do not enter and leave the brain through the spinal cord. There are 12 cranial nerves (numbered 1 to 12 and ordered from the front to the back of the brain) that primarily transmit sensory information and control motor movements of the face and head. The 12 cranial nerves are:

1. *Olfactory*. A sensory nerve that transmits odor information from the olfactory receptors to the brain.

2. *Optic*. A sensory nerve that transmits information from the retina to the brain.

3. *Oculomotor*. A motor nerve that controls eye movements, the iris (and therefore pupil size), lens accommodation, and tear production.

4. *Trochlear*. A motor nerve that is also involved in controlling eye movements.

5. *Trigeminal*. A sensory and motor nerve that conveys somatosensory information from receptors in the face and head and controls muscles involved in chewing.

6. *Abducens*. Another motor nerve involved in controlling eye movements.

7. *Facial*. Conveys sensory information and controls motor and parasympathetic functions associated with facial muscles, taste, and the salivary glands.

8. *Auditory-vestibular*. A sensory nerve with two branches, one of which transmits information from the auditory receptors in the cochlea and the other conveys information concerning balance from the vestibular receptors in the inner ear.

9. *Glossopharyngeal*. This nerve conveys sensory information and controls motor and parasympathetic functions associated with the taste receptors, throat muscles, and salivary glands.

10. *Vagus*. Primarily transmits sensory information and controls autonomic functions of the internal organs in the thoracic and abdominal cavities.

11. *Spinal accessory*. A motor nerve that controls head and neck muscles.

12. *Hypoglossal*. A motor nerve that controls tongue and neck muscles.

As is their custom, medical students have developed several mnemonics for memorizing the cranial nerves. Some of the family-friendly ones include:

On Old Olympus' Tiny Tops, A Friendly Viking Grew Vines And Hops
Oh Once One Takes The Anatomy Final Very Good Vacations Are Heavenly
One Of Our Two Timing Adults Found Very Good Values At Home

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On Occasion Our Trusty Truck Acts Funny. Very Good Vehicle Any How
Orlando's Overweight Octopuses Try To Avoid Fuddrucker's And Grabbing Vienna Sausage Hamburgers On Our Overseas Trip To Argentina Found Very Grand Villas And Huts

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Lecture Launcher 2.6 - The Importance of a Wrinkled Cortex

At the beginning of your lecture on the structure and function of the brain, ask students to explain why the cerebral cortex is wrinkled. There are always a few students who correctly answer that the wrinkled appearance of the cerebral cortex allows it to have a greater surface area while fitting in a relatively small space (i.e., the head). To demonstrate this point to your class, hold a plain, white sheet of paper in your hand and then crumple it into a small, wrinkled ball. Note that the paper retains the same surface area, yet is now much smaller and is able to fit into a much smaller space, such as your hand. You can then mention that the brain's actual surface area, if flattened out, would be roughly the size of a newspaper page. Laughs usually erupt when the class imagines what our heads would look like if we had to accommodate an unwrinkled, newspaper-sized cerebral cortex!

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Lecture Launcher 2.7 - Brain's Bilingual Broca

Se potete parlare Italiano, allore potete capire questa sentenza. Of course, if you only speak English, you probably only understand *this* sentence. If you speak both languages, then by this point in the paragraph you should be really bored.

Bilingual speakers who come to their bilingualism in different ways show different patterns of brain activity. Joy Hirsch (now at the Yale School of Medicine) and her colleagues at Memorial Sloan-Kettering Cancer Center in New York monitored the activity in Broca's area in the brains of bilingual speakers who acquired their second language starting in infancy and compared it to the activity of bilingual speakers who adopted a second language in their teens. Participants were asked to silently recite brief descriptions of an event from the previous day, first in one language and then in the other. An fMRI was taken during this task. All of the 12 adult speakers were equally fluent in both languages, used both languages equally often, and represented speakers of English, French, and Turkish, among other tongues.

Hirsch and her colleagues found that among the infancy-trained speakers, the same region of Broca's area was active, regardless of the language they used. Among the teenage-trained speakers, however, a different region of Broca's area was activated when using the acquired language. Similar results were found in Wernicke's area in both groups. Although the full meaning of these results is a matter of some debate (do they reflect sensitivity in Broca's area to language exposure or pronounced differences in adult versus childhood language learning?), they nonetheless reveal an intriguing link between la testa e le parole.

Coderre, E. L., Smith, J. F., Van Heuven, W. J., & Horwitz, B. (2016). The functional overlap of executive control and language processing in bilinguals. *Bilingualism: Language and Cognition*, *19*(03), 471-488.
Fabbro, F. (2013). *The neurolinguistics of bilingualism: An introduction*. Psychology Press.
Kim, K. H., Relkin, N. R., Lee, K. M., & Hirsch, J. (1997). Distinct cortical areas associated with native and second languages. *Nature*, *388*(6638), 171-174.
Marian, V., Spivey, M., & Hirsch, J. (2003). Shared and separate systems in bilingual language processing: Converging evidence from eyetracking and brain imaging. *Brain and language*, *86*(1), 70-82.

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Lecture Launcher 2.8 - A New Look at Phineas Gage

For over 30 years, Jack and Beverly Wilgus had a daguerreotype portrait—a type of early photograph—of a well-dressed young man with one eye closed. Because the photo showed the young man holding what appeared to be part of a harpoon, the Wilguses believed that the man was a 19th-century whaler who had lost his eye, perhaps in a whaling accident. It was only after a copy of the portrait was posted online that the couple was told that the object in the man's hands did not appear to be a harpoon. Then, in 2008, a person viewing the image online posted a comment that the young man may be Phineas Gage, making the "harpoon," the infamous tamping rod that was blasted through his skull and brain. By carefully examining the rod in the daguerreotype, and by comparing the young man's face to the cast made of Gage's head after his death, the Wilguses were able to confirm that the portrait is almost certainly that of Phineas Gage, made sometime after his accident. Importantly, this is the only known photograph of the man who became one of the most famous case studies in psychology.

One of the consequences of the portrait's discovery has been a renewed debate about how Gage's injuries affected his personality and behavior. Many psychology textbooks explain that the accident left Gage a permanently changed man following the accident, with his once well-balanced, gregarious, and hard-working personality replaced with profane, inconsiderate, and impulsive behavior for the rest of his life. This, however, is not necessarily supported by the few original sources researchers have to go on. For example, although the evidence clearly indicates that Gage had major psychological changes for a period after his accident, we also know that Gage later spent many years driving stagecoaches before he died in 1860, 12 years after the accident. Many have questioned whether the postaccident Phineas Gage commonly described in introductory psychology classes could have performed the tasks required to drive a stagecoach, interact with passengers, and be reliable enough to maintain employment for long periods at a time. Does this indicate that many of the psychological changes Gage suffered were temporary? Certainly, the newly discovered daguerreotype of a healthy-looking and well-kept Phineas Gage lends further support to the idea that Phineas was able to largely recover from his accident, both physically and mentally. If true, this may mean that the case of Phineas Gage may be as much a story about the incredible plasticity of the brain and its ability to compensate for the loss of specific brain regions, as it is about the localization of specific functions.

The newly discovered portrait of Phineas Gage can be found at: brightbytes.com/phineasgage or by searching the Internet for "Phineas Gage daguerreotype."

Jarrett, C. & Sutton, J. (2009, July 20). Face to face with Phineas Gage. http://www.thepsychologist.org.uk/blog/11/blogpost.cfm?threadid=1035&catid=48

Macmillan, M. (2008). Phineas Gage–Unravelling the myth. *The Psychologist, 21(9)*, 828-831.

Shetty, S. R., Wadhwa, S., Ganigi, P. M., Hegde, T., & Bopanna, K. M. (2017). Phineas Gage Revisited: An "Indian Crowbar Case". *Journal of Neurological Surgery Part B: Skull Base*, *78*(S 01), P028.

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Lecture Launcher 2.9 - Understanding Hemispheric Function

A variation on the rather dubious statement that "we only use one-tenth of our brain" is that "we only use one-half (hemisphere) of our brain." Research suggests that each cerebral hemisphere is specialized to perform certain tasks (e.g., left hemisphere/language; right hemisphere/visuospatial relationships), with the abilities of one hemisphere complementary being to the other. From this came numerous distortions, oversimplifications, and unwarranted extensions, many of which are discussed in two interesting reviews of this trend toward "dichotomania" (Corballis, 1980; Levy, 1985). For example, the left hemisphere has been described variously as logical, intellectual, deductive, convergent, and "Western," while the right hemisphere has been described as intuitive or creative, sensuous, imaginative, divergent, and "Eastern." Even complex tasks are described as right- or left-hemispheric because of their language component. In

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every individual one hemisphere supposedly dominates, affecting that person's mode of thought, skills, and approach to life. One commonly cited but questionable test for dominance is to note the direction of gaze when a person is asked a question (left gaze signaling right hemisphere activity; right gaze showing left hemisphere activity). Advertisements have claimed that artistic abilities can be improved if the right hemisphere is freed, and the public schools have been blamed for stifling creativity by emphasizing left-hemisphere skills and by neglecting to teach the children's right hemisphere.

Corballis and Levy explode these myths and trace their development. In reality, the two hemispheres are quite similar and can function remarkably well even if separated by split-brain surgery. Each hemisphere does have specialized abilities, but the two hemispheres work together in all complex tasks. For example, writing a story involves left-hemispheric input concerning syntax but right-hemispheric input for developing an integrated structure and for using humor or metaphor. The left hemisphere is not the sole determinant of logic, nor is the right hemisphere essential for creativity. Disturbances of logic are more prevalent with right-hemisphere damage, and creativity is not necessarily affected. Although one hemisphere can be somewhat more active than the other, no individual is purely "right brained" or "left brained." Also, eye movement and hemispheric activity patterns poorly correlate with cognitive style or occupation. Finally, because of the coordinated, interactive manner of functioning of both hemispheres, educating or using only the right or left hemisphere is impossible (without split-brain surgery).

Corballis, M.C. (1980). Laterality and myth. *American Psychologist, 35*, 284–295.
Levy, J. (1985). Right brain, left brain: Fact or fiction? *Psychology Today, 19*, 38–45.
Staub, M. E. (2016). The other side of the brain: The politics of split-brain research in the 1970s–1980s. *History of Psychology*, *19*(4), 259-273.

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Lecture Launcher 2.10 – Handedness, Eyedness, Footedness, Facedness

Although the title sounds like a Dr. Seuss rhyme, it actually denotes something sensible to neuropsychologists. Most people are familiar with the concept of handedness. The human population is distributed across many people who are adept at using their right hands for most tasks, some who have greater skill using the left hand, and a smaller proportion of those who are equally skilled using either hand (or who alternate hands for certain tasks). The concepts of footedness, leggedness, eyedness, and facedness may be less familiar to the layperson, although they stem from the same principle as handedness.

The basis of these distinctions lies in the concept of laterality. Just as the cerebral hemispheres show specialization (e.g., left hemisphere language functions, right hemisphere visual–spatial functions), so too are there preferences or asymmetries in other body regions. The concept of eyedness, then, refers to the preference for using one eye over another, such as when squinting to site down the crosshairs of a rifle or to thread a needle. Footedness and leggedness similarly refer to a preference for one limb over the other; drummers and soccer players will attest to the importance of being equally adept at using either foot and to the difficulty in achieving that. Finally, facedness refers to the strength with which information is conveyed by the right or left side of the face. It has been suggested that verbal information shows a right-face bias, whereas emotional expressions are more strongly shown on the left side of the face, although these conclusions remain somewhat controversial.

Why are these distinctions useful? They play their largest role in the areas of sensation and perception, engineering psychology, and neuropsychology. Studies of reaction time, human–machine interaction, ergonomic design, and so on take into account the preferences and dominance of some body systems over others. In the case of facedness and emotional expression, researchers are working to illuminate the link between facial expressions and cerebral laterality. Given the right hemisphere's greater role in emotional activities, the contralateral control between the right hemisphere and the left hemiface

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becomes an important proving ground for investigating both brain functions and the qualities of expression.

Borod, J. C., Caron, H. S., & Koff, E. (1981). Asymmetry of facial expression related to handedness, footedness, and eyedness: A quantitative study. *Cortex*, *17*, 381-390.
Ekman, P., Hagar, C. J., & Friesen, W. V. (1981). The symmetry of emotional and deliberate facial actions. *Psychophysiology*, *18*, 101-106.
Forrester, G. S. (2017). Hand, limb, and other motor preferences. *Lateralized Brain Functions: Methods in Human and Non-Human Species*, 121-152.
Friedlander, W. J. (1971). Some aspects of eyedness. *Cortex*, *7*, 357-371.
Kozlovskiy, S. A., Marakshina, J. A., Vartanov, A. V., & Kiselnikov, A. A. (2016). ERP study of the influence of handedness and eyedness on the response inhibition in a go/nogo task. *International Journal of Psychophysiology*, (108), 104.
McGuigan, F. J. (1994). *Biological psychology: A cybernetic science.* Englewood Cliffs, NJ: Prentice Hall.
Ross, E. D., Gupta, S. S., Adnan, A. M., Holden, T. L., Havlicek, J., & Radhakrishnan, S. (2016). Neurophysiology of spontaneous facial expressions: I. Motor control of the upper and lower face is behaviorally independent in adults. *Cortex*, *76*, 28-42.
Sackheim, H. A., Gur, R. C., & Saucy, M. C. (1978). Emotions are expressed more intensely on the left side of the face. *Science*, *202*, 434-436.
Wang, Z., & Newell, K. M. (2013). Footedness exploited as a function of postural task asymmetry. *Laterality: Asymmetries of Body, Brain and Cognition*, *18*(3), 303-318.

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Lecture Launcher 2.11 - Workplace Problems: Left-Handedness

Within Canada and the United States, there are approximately 33 million people who are left handed. This presents a severe detriment to the workplace. It has been shown that left-handed individuals are more likely to have accidents at work than are right-handed individuals, in fact 25% more likely (and if they are working with tools and machinery, 51% more likely). Accommodations such as being able to rearrange the work area and having tools available that are either left- or right-hand adapted would make the workplace a safer place to be. Have students suggest ways that the workplace could be made safer or even what could be done in the classroom that would make it easier for students who are left handed to take notes or tests. What about the mouse on computers? The mouse is actually made for people who are right handed. How adaptable must a left-handed person become in order not to be frustrated by using a right-handed mouse?

Gunsch, D. For Your Information: Left-handed workers struggle in a right-handed work world. *Personnel Journal, 93*, 23–24.
http://www.cnn.com/2015/11/03/health/being-left-handed-health-impact/

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Lecture Launcher 2.12 - The Results of a Hemispherectomy

When Matthew was 6 years old, surgeons removed half of his brain.

His first three years of life were completely normal. Just before he turned 4, however, Matthew began to experience seizures, which did not respond to drug treatment. The seizures were both life threatening and frequent (as often as every 3 minutes). The eventual diagnosis was Rasmussen's encephalitis, a rare and incurable condition of unknown origin.

The surgery, a hemispherectomy, was performed at Johns Hopkins Hospital in Baltimore. A few dozen such operations are performed each year in the United States, usually as a treatment for Rasmussen's and for forms of epilepsy that destroy the cortex but do not cross the corpus callosum. After surgeons removed Matthew's left hemisphere, the empty space quickly filled with cerebrospinal fluid.

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The surgery left a scar that runs along one ear and disappears under his hair; however, his face has no lopsidedness. The only other visible effects of the operation are a slight limp and limited use of his right arm and hand. Matthew has no right peripheral vision in either eye. He undergoes weekly speech and language therapy sessions. For example, a therapist displays cards that might say "fast things" and Matt must name as many fast things as he can in 20 seconds. He does not offer as many examples as other children his age. However, he is making progress in the use of language, perhaps as a result of fostering and accelerating the growth of dendrites.

The case of Matthew indicates the brain's remarkable plasticity. Furthermore, it is interesting to note that Matt's personality never changed through the seizures and surgery.

Boyle, M. (1997, August 1). Surgery to remove half of brain reduces seizures. *Austin American-Statesman*, A18.
Handley, S. E., Vargha-Khadem, F., Bowman, R. J., & Liasis, A. (2017). Visual Function 20 Years After Childhood Hemispherectomy for Intractable Epilepsy. *American Journal of Ophthalmology*, *177*, 81-89.
Rasmussen T, Olszewski J, Lloyd-Smith D (1958). Focal seizures due to chronic localized encephalitis. *Neurology, 8* (6), 435–445.
Sachdev, M., Vanags, J., Arehart, E., Grant, G., & Mikati, M. A. (2017). Visual Hallucinations as a Novel Complication Following Hemispherectomy (P6. 224). *Neurology*, *88*(16 Supplement), P6-224.
Schusse, C. M., Smith, K., & Drees, C. (2017). Outcomes after hemispherectomy in adult patients with intractable epilepsy: institutional experience and systematic review of the literature. *Journal of Neurosurgery*, 1-9.
Swerdlow, J. L. (1995, June). Quiet miracles of the brain. *National Geographic, 87*, 2-41.
Vining, E. P., Freeman, J. M., Pillas, D. J., Uematsu, S., Carson, B. S., Brandt, J., Boatman, D., Pulsifer, M. B., & Zuckerberg, A. (1997). Why would you remove half a brain? The outcome of 58 children after hemispherectomy-the Johns Hopkins experience: 1968 to 1996. *Pediatrics*,*100(2 Pt 1)*, 163-171.

Find more hemispherectomy stories and information at: http://hemifoundation.intuitwebsites.com/

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Lecture Launcher 2.13 - Psychophysiological Measurement

There are various strategies for measuring activity in the brain, especially recently developed techniques such as PET, TMS, or MRI. There are, of course, other bodily systems and other techniques for measuring them, many of which rely on the electrophysical activity of the body.

■ *EMG—Electromyography*. An electromyogram records the action potential given off by contracting muscle fibers. A common example is the recording of facial EMG, in which either inserted electrodes or surface electrodes record the activity of muscles as they pose various expressions.

■ *EGG—Electrogastrography*. Electrogastrograms provide a record of smooth muscle activity in the abdomen. The contractions of the stomach or intestines, for example, can be measured by comparing the readings from a surface electrode attached to the abdomen with those of an electrode attached to the forearm. In the special case of measuring contractions in the esophagus, surface electrodes are attached to a balloon, which is "swallowed" by the person being measured. EGG may be used successfully to gain information about fear, anxiety, or other emotional states.

■ *EOG—Electrooculography*. Readings from electrodes placed around the posterior of the eyes are the basis for EOG. Electrical signals result from small saccadic eye movements as well as more gross movements that can be directly observed. EOG can be used for measuring rapid eye movements during sleep.

■ *EKG—Electrocardiography*. EKG records changes in electrical potential associated with the heartbeat. Electrodes are placed at various locations on the body, and their recordings yield five waves that can be analyzed: P-waves, Q-waves, R-waves, S-waves, and T-waves. EKG may be used by psychologists to supplement observations relevant to stress, heart disease, or Type A behavior patterns.

■ *EDA—Electrodermal activity*. Formerly called *galvanic skin response*, *skin resistance*, and *skin*

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conductance, EDA refers to the electrical activity of the skin. As activity in the sympathetic nervous system increases it causes the eccrine glands to produce sweat. This activity of the eccrine glands can be measured by EDA, regardless of whether or not sweat actually rises to the skin surface. The folklore of "sweaty palms" associated with a liar might be measured using this technique.

■ *EEG—Electroencephalography*. As discussed in the text, EEG provides information about the electrical activity of the brain, as recorded by surface electrodes attached to the scalp. EEG has been used in a variety of ways to gather information about brain activity under a wide range of circumstances.

■ *Pneumography*. Pneumographs measure the frequency and amplitude of breathing, and are obtained through a relatively straightforward procedure. A rubber tube placed around the chest expands and contracts in response to the person's inhalations and exhalations. These changes can then be recorded with either an ink pen or electrical signal.

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Lecture Launcher 2.14 - Berger's Wave

Ask if anyone knows what is meant by the term *Berger's wave*. Explain that the study of electrical activity in the brain was once limited to studies in which different kinds of measuring devices were attached to the exposed brains of animals. Studies involving humans were rare; researchers could only measure the electrical activity of the living human brain in individuals who had genetic defects of their skull bones that caused the skin of their scalps to be in direct contact with the surfaces of their brains. Yuck!

All this changed when a German physicist named Hans Berger, after several years of painstaking research, discovered that it was possible to amplify and measure the electrical activity of the brain by attaching special electrodes to the scalp which, in turn, sent impulses to a machine that graphed them. In his research, Berger discovered several types of waves, one of which he called the "alpha" wave for no other reason than being the first one he discovered ("alpha" is the first letter of the Greek alphabet). He kept his research a secret until he published an article about it in 1929. The alpha wave is also sometimes called *Berger's wave* in honor of Berger's discovery.

Obviously, Berger achieved one of the most important discoveries in the history of neuroscience. However, his life was not a happy one. Shortly after his article was published, the Nazis rose to power in Germany, which greatly distressed him. In addition, his work wasn't valued in Germany; he was far better known in the United States. As a result, Berger fell into a deep depression in 1941 and hanged himself.

Gloor, P. (1969). Hans Berger and the discovery of the electroencephalogram. *Electroencephalography and Clinical Neurophysiology*: Supplement 28, 1–36.
Millett, D. (2001). Hans Berger: From psychic energy to the EEG. *Perspectives in Biological Medicine, 44 (4)*, 522–542.
Tudor, M., Tudor, L., & Tudor, K. I. (2005), Hans Berger (1873-1941): The history of electroencephalography. *Acta medica Croatica: Casopis Hravatske akademije medicinskih znanosti*, 59 (4), 307-313.
Wiedemann, H. R. (1994). Hans Berger (1873-1941). *European Journal of Pediatrics, 153(10)*, 705.

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Lecture Launcher 2.15 - Lie Detectors 2.0

A staple of police and lawyer television shows is the "lie detector" scene, in which the suspect is hooked up to polygraph machine and asked a series of questions about a crime. As the questions are asked, the needles on the polygraph record the suspect's heart rate, breathing, skin conductance, and other physiological responses to the questions. Polygraph machines have been used in this way by various law enforcement agencies for many years. The principle behind the test is that the act of lying causes an

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involuntary change in the autonomic nervous system, which can be detected by the polygraph. The accuracy of polygraph machines, however, is controversial, and in many courts they are inadmissible evidence. More recently, some researchers have tried to create a new generation of lie detectors, which can measure activity in the brain directly. These techniques look for patterns in the brain that, at least in theory, correlate with lying.

One technique that might be adapted to lie-detection is electroencephalography, more commonly referred to as EEG. During an EEG recording, electrodes are placed at various locations on the scalp. These electrodes are capable of picking up the electrical activity produced by neurons located in different parts of the brain. While the activity of individual neurons cannot be identified, the patterns of electrical activity produced by thousands of neurons working together can be a sign that the brain is functioning in a particular way. One way EEGs may be useful as lie detectors, is by identifying event-related potentials or (ERPs). An ERP is a brief electrical change that occurs at a reliable time point relative to a specific event. For example, it has been found that 300 to 500 ms after a person has been shown something that is unexpected or novel, there is a brief electrical change in that person's EEG. Theoretically, this ERP could be used to determine if a subject has previous knowledge of a piece of evidence. For instance, an ERP occurring 300 ms after being shown a picture of the murder weapon might indicate that the suspect had not seen the murder weapon before.

More recently, fMRIs have been suggested as potential lie-detectors. fMRI, or functional magnetic resonance imaging, works by detecting the increase in blood flow to more active regions in the brain. This is not to be confused with structural MRIs, which can only create an image of tissues, bones, etc. When a person performs a task in an fMRI, adding two numbers together for example, the brain regions required to perform the task will become active. This activity will cause a change in blood flow, which the fMRI can detect. It is possible that, because different brain regions are involved in recounting an actual event than are involved in making up a story, an fMRI is capable of determining whether someone is lying or telling the truth. Some researchers have found that, even if a lie is well rehearsed, it still appears to activate different brain regions than telling the truth does.

Despite media interest in new forms of lie-detection, many experts agree that the EEG and fMRI approaches currently suffer from the same issues that polygraphs do. For example, although the newer techniques measure brain activity much more directly, there is concern about their reliability. While certain brain activity might suggest that a person is lying, unless the technology can be made almost 100% accurate, innocent people may be accused of crimes they did not commit. Also, it is unclear whether people could find ways to "trick" the machines by performing certain mental tasks during testing. Until these questions can be answered, it is unlikely that the polygraph will be replaced anytime soon.

Farah, M. J., Hutchinson, J. B., Phelps, E. A., & Wagner, A. D. (2014). Functional MRI-based lie detection: Scientific and societal challenges. *Nature Reviews | Neuroscience, 15*, 123-131.

Ganis, G., Kosslyn, S., Stose, S., Thompson, W., & Yurgelun-Todd, D. (2003). Neural correlates of different types of deception: An fMRI investigation. *Cerebral Cortex, 13*(8), 830-836.

Wolpe, P., Foster K., & Langleben D. (2005). Emerging neurotechnologies for lie-detection: Promises and perils. *The American Journal of Bioethics, 5*(2), 39-49.

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Lecture Launcher 2.16 - Using fMRI and MEG to Study Phantom Limb Pain

The concept of *pain sensation* means different things to different people. Many students are aware of phantom pain sensations and are actually very curious as to what it is. Medical professionals have recorded many cases of what has come to be called "phantom limbs." Phantom limb phenomenon occurs when a person who has had an amputation of some body part, such as an arm or leg, reports "feeling" sensations from the now-missing limb. Phantom limb refers to the subjective sensory awareness of an amputated body part, and may include numbness, itchiness, temperature, posture, volume, or movement.

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For example, one man whose left arm was amputated just above the elbow during a horrific car accident claimed that he could still feel the arm as a kind of ghostly presence. He could feel himself wiggling nonexistent fingers and "grabbing" objects that would have been in his reach had his arm still been there (Ramachandran & Blakeslee, 1998). Phantom sensations may take years to fade, and usually do so from the end of the limb up to the body—in other words, one's phantom arm seems to get shorter and shorter until it can no longer be felt. In addition to legs and arms there have been cases of phantom breasts, bladders, rectums, vision, hearing, and internal organs.

Phantom limb pain refers to the specific case of painful sensations that appear to reside in the amputated body part. Patients have variously reported pins-and-needles sensations, burning sensations, shooting pains that seem to travel up and down the limb, or cramps, as though the severed limb was in an uncomfortable and unnatural position. Many amputees often experience several types of pain; others report that the sensations are unlike other pain they've experienced. Unfortunately, some estimates suggest that over 70% of amputees still experience intense pain, even 25 years after amputation. Most treatments for phantom limb pain (there are over 50 types of therapy) help only about 7% of sufferers.

What causes these phantom sensations? A recent study has shed light on the causes of phantom limb sensations. Researchers at Humboldt University in Berlin suggest that the most severe type of this pain occurs in amputees whose brains undergo extensive sensory reorganization. Magnetic responses were measured in the brains of 13 arm amputees in response to light pressure on their intact thumbs, pinkies, lower lips, and chins. These responses were then mapped onto the somatosensory cortex controlling that side of the body. Because of the brain's contralateral control over the body, the researchers were able to estimate the location of the somatosensory sites for the missing limb. They found that those amputees who reported the most phantom limb pain also showed the greatest cortical reorganization. Somatosensory areas for the face encroached into regions previously reserved for the amputated fingers.

Renowned neuroscientist Dr. V. S. Ramachandran has investigated many cases of phantom limb sensations in his career. He believes that examination of people who experience these phenomena, using the noninvasive techniques of magnetoencephalograms and fMRIs, can teach us much about the relationship between sensory experience and consciousness. Researchers have long known that touching certain points on the stump of the amputation (and in some cases on the person's face) can produce phantom sensations in a missing arm or fingers (Ramachandran & Hirstein, 1998). Older explanations of phantom limb sensations have called it an illusion brought on by the irritation of the nerve endings in the stump due to scar tissue. But using anesthesia on the stump does not remove the phantom limb sensations or the pain experienced by some patients in the missing limb, so that explanation is not adequate. Ramachandran and colleagues suggest instead that phantom limb sensations may occur because areas of the face and body near the stump "take over" the nerve functions that were once in the control of the living limb, creating the false impression that the limb is still there, feeling and moving. This "remapping" of the limb functions, together with the sensations from the neurons ending at the stump and the person's mental "body image" work together to produce phantom limb sensations.

Although these findings do not by themselves solve the riddle of phantom limb pain, they do offer avenues for future research. For example, damage to the nervous system may cause a strengthening of connections between somatosensory cells and the formation of new ones. Phantom limb pain may result due to an imbalance of pain messages from other parts of the brain. As another possibility, pain may result from a remapping of somatosensory areas that infringes on pain centers close by.

Boas, R. A., Schug, S. A., & Acland, R. H. (1993). Perineal pain after rectal amputation: A 5-year follow-up. *Pain*, 52, 67–70.
Bower, B. (1995). Brain changes linked to phantom-limb pain. *Science News*, *147*, 357.
Brena, S. F., & Sammons, E. E. (1979). Phantom urinary bladder pain – Case report. *Pain*, *7*, 197–201.
Bressler, B., Cohen, S. I., & Magnussen, F. (1955). Bilateral breast phantom and breast phantom pain. *Journal of Nervous and Mental Disease*, *122*, 315–320.
Dorpat, T. L. (1971). Phantom sensations of internal organs. *Comprehensive Psychiatry*, *12*, 27–35.
Katz, J. (1993). The reality of phantom limbs. *Motivation and Emotion*, *17*, 147–179.
Ramachandran, V. S., & Blakeslee, S. (1998). *Phantoms in the Brain*. William Morrow, N.Y.
Ramachandran, V. S., & Hirstein, W. (1998). The perception of phantom limbs: The D. O. Hebb lecture. *Brain, 121*, 1603–1630.

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Shreeve, J. (1993, June). Touching the phantom. *Discover*, 35–42.

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Lecture Launcher 2.17 - Freak Accidents and Brain Injuries

Students may be interested in the unusual cases of individuals who experience bizarre brain injuries due to freak accidents with nail guns. The most fascinating example involved Isidro Mejias, a construction worker in Southern California, who had six nails driven into his head when he fell from a roof onto his coworker who was using a nail gun. (X-ray images of the embedded nails can be found at several sites on the Internet.) Incredibly, none of the nails caused serious damage to Mejia's brain. One nail lodged near his spinal cord, and another came very close to his brain stem. Immediate surgery and treatment with antibiotics prevented deadly infections that could have been caused by the nails. In a similar accident, a construction worker in Colorado ended up with a nail lodged in his head due to a nail gun mishap. Unlike Mejia, Patrick Lawler didn't realize he had a nail in his head for six days. The nail was discovered when he visited a dentist due to a "toothache." It appears that Lawler fired a nail into the roof of his mouth. The nail barely missed his brain and the back of his eye.

Field, P. (2006). Variations on an historical case study. *NSTA WebNews Digest*, http://www.nsta.org/publications/news/story.aspx?id=52587
Nail Gun Victim Lives. *Current Science*, A Weekly Reader publication, Sept. 10, 2004, v90 (1), Page 14.
http://www.msnbc.msn.com/id/4909827/
http://www.summitdaily.com/article/20050119/NEWS/50119002/0/FRONTPAGE

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Lecture Launcher 2.18 - Hormone Imbalances

Various problems are caused by imbalances within the endocrine system. The following disorders and medical problems are associated with abnormal levels within the pituitary, thyroid, and adrenal glands.

Pituitary malfunctions

Hypopituitary Dwarfism
If the pituitary secretes too little of its growth hormone during childhood, the person will be very small, although normally proportioned.

Giantism
If the pituitary gland over-secretes the growth hormone while a child is still in the growth period, the long bones of the body in the legs and other areas grow very, very long—a height of 9 feet is not unheard of. The organs of the body also increase in size, and the person may have health problems associated with both the extreme height and the organ size.

Acromegaly
If the over-secretion of the growth hormone happens after the major growth period is ended, the person's long bones will not get longer, but the bones in the face, hands, and feet will increase in size, producing abnormally large hands, feet, and facial bone structure. The famous wrestler/actor, Andre the Giant (Andre Rousimoff), had this condition, as did the great actor Rondo Hatton.

Thyroid malfunctions

Hypothyroidism

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In hypothyroidism, the thyroid does not secrete enough thyroxin, resulting in a slower than normal metabolism. The person with this condition will feel sluggish and lethargic, have little energy, and tend to be obese.

Hyperthyroidism
In hyperthyroidism, the thyroid secretes too much thyroxin, resulting in an overly active metabolism. This person will be thin, nervous, tense, and excitable. He or she will also be able to eat large quantities of food without gaining weight (oh, if only we came equipped with thyroid control knobs!).

Adrenal Gland Malfunctions

Among the disorders that can result from malfunctioning of the adrenal glands are Addison's Disease (which is caused by adrenal insufficiency) and Cushing's Syndrome (caused by elevated levels of cortisol). In the former, fatigue, low blood pressure, weight loss, nausea, diarrhea, and muscle weakness are some of the symptoms, whereas for the latter, obesity, high blood pressure, a "moon" face, and poor healing of skin wounds is common. John F. Kennedy, Helen Reddy, and (perhaps) Osama bin Laden were well-known Addisonians.

If there is a problem with over-secretion of the sex hormones in the adrenals, virilism and premature puberty are possible problems. Virilism results in women with beards on their faces and men with exceptionally low, deep voices. Premature puberty, or full sexual development while still a child, is a result of too many sex hormones during childhood. (Puberty is considered premature if it occurs before the age of 8 in girls and 9 in boys.) Treatment is possible using hormones to control the appearance of symptoms, but must begin early in the disorder.

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Lecture Launcher 2.19 - My Mother, Myself

Many people feel that their mothers are "a part of them." Recent findings suggest that there may be considerable truth to that phrase.

Many adults apparently still have cells in their bodies that they picked up from their mothers during the gestation period. Similarly, many mothers still have cells in their bodies that came from their own children during pregnancy. Technically speaking, these "guest cells" are actually the product of stem cells that got planted in the "host's" body and started reproducing decades later. And, technically speaking, there aren't too many of them. Some estimates put the number of foreign cells at less than one in a million, a comforting thought for anyone conjuring up images of parasitic offspring or alien-like entities living happily rent-free.

The meaning of these *microchimeras* is less clear. There is some evidence that these cells might contribute to autoimmune diseases, although there is also speculation that these cells might confer a health benefit. Because this area of study is relatively young, there remain more questions than answers (such as, what about women who have cells from both their mothers and their own offspring?). It's comforting to know, though, that in some small way a parent is always with us.

Boddy, A. M., Fortunato, A., Sayres, M. W., & Aktipis, A. (2015). Fetal microchimerism and maternal health: A review and evolutionary analysis of cooperation and conflict beyond the womb. *Bioessays*, 37(10), 1106-1118.
Gammill, H. S., & Nelson, J. L. (2010). Naturally acquired microchimerism. *International Journal of Developmental Biology, 54,* 531-543.
Ritter, M. (2003, May 9). Moms, you've got a little of your kids inside you. *Austin American-Statesman*, A1, A16.
Shute, N. (2010, Apr. 3). Beyond birth: A child's cells may help or harm a mother long after delivery. *Scientific American*.
http://www.microchimerism.org/

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Lecture Launcher 2.20 - Epigenetics

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Since the time of Watson and Crick's initial discovery of the structure of DNA, geneticists have learned a tremendous amount about how our genetic code determines our observable characteristics (i.e., phenotypes). A great deal of research, however, has focused on changes in phenotype that are not due to changes in the genetic code. Instead, these changes are caused by *epigenetic* mechanisms that change the way genes are expressed, without changing the genetic code directly. A good example of this is cellular differentiation. Following cellular differentiation in a human body, each cell type performs a specialized role. For example, certain neurons may make the neurotransmitter serotonin, whereas some pancreas cells may make insulin. This difference in function, however, is not due to a difference in the cell's genetic code. In fact, both cell types would contain the genes necessary to create serotonin and insulin. This means that there must be epigenetic mechanisms that, for example, turn the insulin gene expression on in a pancreas cell, but off in most neurons.

There are several epigenetic mechanisms that have been identified by researchers. For example, one way to stop the expression of a gene is to wrap that section of DNA around a protein called a histone. If a gene is on the section of DNA that is wrapped around a histone, the protein coded by that gene will not be created by the cell. Another way that gene expression can be regulated is by a process called methylation, which involves the bonding of a methyl group to specific areas of DNA. This methylation does not change the genetic sequence, but does alter the expression of genes.

Although epigenetic changes do not change the DNA sequence directly, they can be inherited by other cells, just as direct changes to DNA are passed on when cells divide. This is why, after a cell has undergone differentiation, all subsequent cells created from that cell-line tend to be the same cell type. Most intriguing, however, is evidence that epigenetic changes can be inherited from one generation to the next. This means that epigenetic changes in a parent may be passed on to a child!

Many psychologists have begun to explore how epigenetic mechanisms might affect the brain and behavior. There is increasing evidence that environmental factors, such as nutrition and early life experiences, may cause long-lasting changes to gene expression by altering epigenetic mechanisms. In addition, some behaviors may be passed on from generation to generation through epigenetic inheritance. For example, the maternal behavior style of certain rats has been shown to be passed on to their female offspring through epigenetic mechanisms.

It is likely that many poorly understood developmental and cognitive disorders are caused by epigenetic mechanisms. If so, there is hope that a better understanding of how gene expression is switched on and off will lead to permanent cures.

Dean, C. (2017). What holds epigenetic memory? *Nature Reviews Molecular Cell Biology*, *18*(3), 140-140.

Goldberg, A. D., Allis, C. D., & Bernstein, E. (2007). Epigenetics: a landscape takes shape. *Cell*, *128*(4), 635-638.

Holt, M. V., Wang, T., & Young, N. L. (2017). Recent advances in understanding histone modification events. *Current Molecular Biology Reports*, *3*(1), 11-17.

Hughes, T. R., & Lambert, S. A. (2017). Transcription factors read epigenetics. *Science*, *356*(6337), 489-490.

Moen, G. H., Sommer, C., Prasad, R. B., Sletner, L., Groop, L., Qvigstad, E., & Birkeland, K. I. (2017). Mechanisms in endocrinology: Epigenetic modifications and gestational diabetes: a systematic review of published literature. *European Journal of Endocrinology*, *176*(5), R247-R267.

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Lecture Launcher 2.21 - The Beak of the Finch

Peter and Rosemary Grant have spent over 20 years studying evolution-in-action in a species of finch that inhabits Daphne Major, an island of the Galapagos archipelago. The Galapagos Islands are notorious for dramatic changes in environmental conditions that in turn shape the types of species that can comfortably inhabit the environment, survive, and pass on their genes to future generations. For example, during years of drought, many small finches died because the plants that produced the seeds that they ate also died. However, those large finches with broad, thick beaks survived because they were able to crack open other seeds that were often left behind by most finches. During years of much rain, the smaller finches thrived, grew, and reproduced faster than the larger finches.

Grant, B.R., & Grant, P.R. (2008). Fission and fusion of Darwin's finch populations. *Philosophical Transactions of the Royal Society B 363*: 2821-2829.

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Grant, P.R., & Grant, B.R. (2008). Pedigrees, assortative mating and speciation in Darwin's finches. *Proceedings of the Royal Society B 275*: 661-668.
Grant, P. R. and Grant, B. R. (2011). Causes of lifetime fitness of Darwin's finches in a fluctuating environment. *Proceedings of the National Academy of Sciences USA* 108: 674-679.
Grant, P. R., and B. R. Grant. (2014). Speciation undone. *Nature, 507*, 178-179.
Grant, P. R., and B. R. Grant. (2014). Insights into speciation from long-term research on Darwin's finches. In G. Trueba (Ed.). *Evolution from the Galápagos*. Springer.
Messer, P. W., Ellner, S. P., & Hairston, N. G. (2016). Can population genetics adapt to rapid evolution? *Trends in Genetics*, *32*(7), 408-418.
Weiner, J. (1994). *The beak of the finch: A story of evolution in our time*. New York: Knopf.

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Lecture Launcher 2.22 - A Modular Approach to Mental Architecture

The view that mental modules have evolved to tackle domain-specific tasks has been controversial. To some extent, critics see this perspective as a return to phrenology. That view held that different regions of the brain were responsible for different traits, behaviors, or other characteristics, and that the size of the various regions could "explain" the greater or lesser enactment of those properties. Someone who behaved in a gregariousness manner, for example, typically was found to have a rather large "gregariousness region" by phrenologists. This tautological explanatory system, much like instinct theory before it, offered little genuine explanation. On this view, "module" simply becomes a replacement for "instinct" or "bump-on-the-noggin."

However, a philosophical basis for mental modules has been advanced; in fact, advanced at a time when the field of evolutionary psychology was still a-borning. In 1983, philosopher/linguist/cognitive scientist Jerry Fodor published *Modularity of Mind*, which argued that mental modules are a good description of the functional architecture of the mind (if not the physical architecture of the brain). Fodor offered several properties that modular systems must fulfill:

1) Specialization – modules operate on only certain kinds of inputs
2) Encapsulation – modules needn't reference other psychological systems in order to operate
3) Obligation – modules must fire and process when appropriately called upon
4) Speed – modules typically operate quickly, due to the properties listed above
5) Generalization – modules produce simple outputs
6) Ontogeny – modules develop in an orderly, regular fashion
7) Fixation – modules have a fixed, neural architecture
8) Accessibility – modules have limited accessibility from non-involved processes

More recent views of modularity may not embrace all of these properties, and certainly some of them describe some proposed modules better than others. In fact, Fodor has often criticized the strong view of modularity adopted by many evolutionary theorists, in distinction to what he has offered as a more moderate approach. Nonetheless, as a possible explanation for why the brain developed as it did, modularity offers some intriguing points of departure.

de Almeida, R. G., & Gleitman, L. R. (Eds.). (2017). *On concepts, modules, and language: Cognitive science at its core*. Oxford University Press.
Fodor, J. A. (1983). *Modularity of mind: An essay on faculty psychology*. Cambridge, MA: MIT Press.
Fodor, J. A. (2000). *The mind doesn't work that way: The scope and limits of computational psychology*. MIT Press.
Harris, L. N., & Lech, I. (2016). Language Modularity. *Encyclopedia of Evolutionary Psychological Science*, 1-3.

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- 2.2 - Stemming the Tide of Misinformation
- 2.3 - Mapping the Brain
- 2.4 - Football and Brain Damage
- 2.5 - Hemispheric Lateralization
- 2.6 - Hemispheric Communication and the Split Brain
- 2.7 - Demonstrating Neural Conduction: The Class as a Neural Network
- 2.8 - The Dollar Bill Drop
- 2.9 - Reaction Time and Neural Processing
- 2.10 - Environmental Influences on the Brain
- 2.11 - Evolution versus Religion…Can Either Be Proven "False?"
- 2.12 - Gimme 5!
- 2.13 - What Runs in the Family?
- 2.14 - Quit Cloning Around
- 2.15 - Wordplay

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Activity 2.1 - Using Dominoes to Understand the Action Potential

Walter Wagor suggests using real dominoes to demonstrate the so-called "domino effect" of the action potential as it travels along the axon. For this demonstration, you'll need a smooth table-top surface (at least 5 feet long) and one or two sets of dominoes. Set up the dominoes beforehand, on their ends and about an inch apart, so that you can push the first one over and cause the rest to fall in sequence. Proceed to knock down the first domino in the row and students should clearly see how the "action potential" is passed along the entire length of the axon. You can then point out the concept of refractory period by showing that, no matter how hard you push on the first domino, you will not be able to repeat the domino effect until you take the time to set the dominoes back up (i.e., the resetting time for the dominoes is analogous to the refractory period for neurons). You can then demonstrate the all-or-none characteristic of the axon by resetting the dominoes and by pushing so lightly on the first domino that it does not fall. Just as the force on the first domino has to be strong enough to knock it down before the rest of the dominoes will fall, the action potential must be there in order to perpetuate itself along the entire axon. Finally, you can demonstrate the advantage of the myelin sheath in axonal transmission. For this demonstration, you'll need to set up two rows of dominoes (approximately 3 or 4 feet long) next to each other. The second row of dominoes should have foot-long sticks (e.g., plastic rulers) placed end-to-end in sequence on top of the dominoes. By placing the all-domino row and the stick-domino row parallel to each other and pushing the first domino in each, you can demonstrate how much faster the action potential can travel if it can jump from node to node rather than having to be passed on sequentially, single domino by single domino. Ask your students to discuss how this effect relates to myelinization.

Wagor, W. F. (1990). Using dominoes to help explain the action potential. In V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), *Activities handbook for the teaching of psychology: Vol. 3* (pp. 72-73). Washington, DC: American Psychological Association.

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Activity 2.2 - Stemming the Tide of Misinformation

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Although there's a lot of promise in stem cell research, it comes with a lot of controversy as well. Consider these statements from various political figures over the years:

"While we must devote enormous energy to conquering disease, it is equally important that we pay attention to the moral concerns raised by the new frontier of human embryo stem cell research. Even the most noble ends do not justify any means."

GEORGE W. BUSH, speech, Aug. 9, 2001

"I think we can do ethically guided embryonic stem cell research. We have 100,000 to 200,000 embryos that are frozen in nitrogen today from fertility clinics. These weren't taken from abortion or something like that. They're from a fertility clinic, and they're either going to be destroyed or left frozen. And I believe if we have the option, which scientists tell us we do, of curing Parkinson's, curing diabetes, curing, you know, some kind of a ... you know, paraplegic or quadriplegic or, you know, a spinal cord injury — anything — that's the nature of the human spirit. I think it is respecting life to reach for that cure."

JOHN KERRY, presidential debate, Oct. 8, 2004

"The best that can be said about embryonic stem cell research is that it is scientific exploration into the potential benefits of killing human beings."

TOM DeLAY, *Washington Post,* May 25, 2005

"I am pro-life. I believe human life begins at conception. I also believe that embryonic stem cell research should be encouraged and supported."

BILL FRIST, speech, Jul. 29, 2005

"I'm very grateful that President Obama has lifted the restrictions on federal funding for embryonic stem cell research."

NANCY REAGAN, commentary, March 8, 2009

"The majority of Americans - from across the political spectrum, and of all backgrounds and beliefs - have come to a consensus that we should pursue this research. That the potential it offers is great, and with proper guidelines and strict oversight, the perils can be avoided."

BARACK OBAMA, executive order, March 9, 2009

Unfortunately, there's also a lot of misinformation about stem cells and stem cell research…in fact, one might question the scientific credentials of Mr. DeLay, whose noteworthy accomplishments (apart from a chequered political career) include running a pest control business and competing on *Dancing With the Stars*.

Encourage your students to examine the evidence and decide for themselves. Ask them to prepare a brief report on some aspect of stem cell research -- it's current legal status in the United States and worldwide; options for gathering stem cells; potential cures indicated by the current scientific evidence, and so on. You might ask different groups of students to tackle different issues, or ask all students to investigate a small set of issues. Similarly, you might structure this as a brief discussion exercise, or you might want to stage it as a more formal debate. There are many possible ways to implement this exercise. The important underlying aspect, however, is to get students to think critically and discuss openly the facts associated with stem cell research.

http://stemcells.nih.gov/research/pages/current.aspxhttp://www.tellmeaboutstemcells.org/
http://www.stemcells.com/view/0/index.html
http://www.physorg.com/news172072614.html
http://www.wilsoncenter.org/index.cfm?event_id=161696&fuseaction=topics.event_summary&topic_id=116811
http://www.biotech.ucdavis.edu/TBCWebsites/TBC07/StemCells&TissueEngineering/Li-MiraLoma/Biotech%20Website%20Design/index.html
http://www.notable-quotes.com/s/stem_cells_quotes.html

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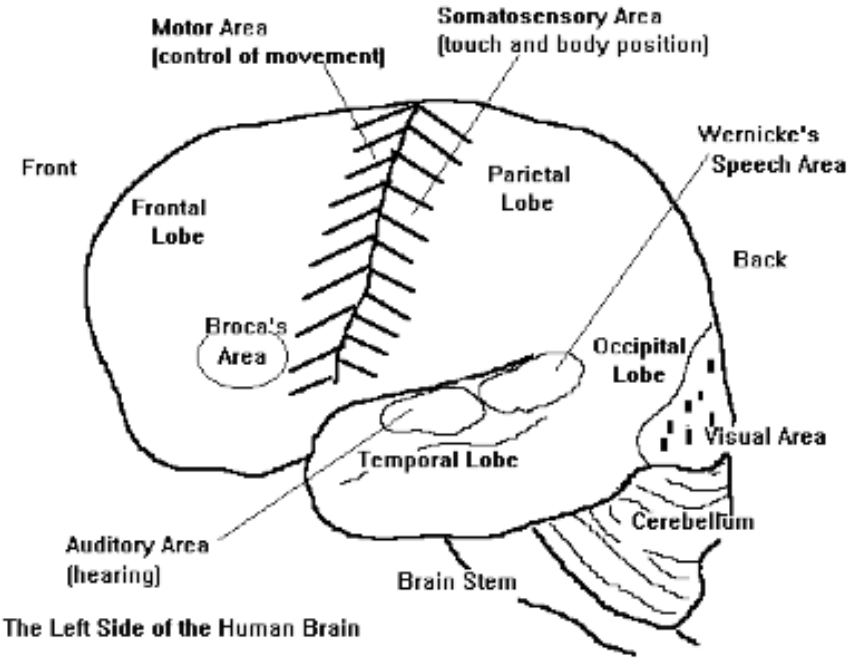
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Activity 2.3 - Mapping the Brain

Many students, especially those with little background in the sciences, will find it a challenge to keep track of the location of all the parts of the brain outlined in the text. One simple way to reinforce their learning of brain structure is to have students locate the various parts on a diagram of the brain. The brain diagram and the student instructions for this exercise are included as **Handout Master 2.1**. The day before you present this activity, ask students to bring colored pencils or markers to the next class meeting. On the day of the activity, divide students into small groups and distribute copies of the diagram of the brain and the accompanying questions in the student handouts. Within their groups students can help each other locate each part of the brain and then color code them using their pencils or markers. They can also indicate the function of each part on the diagram. This exercise is very useful for helping students to memorize brain anatomy, and the color-coded diagram serves as a helpful study guide.

For your convenience, a completed diagram and suggested answers to the questions are furnished here.



1. This is a diagram of the left side of the brain.

   Left side functions: The left hemisphere controls touch and movement of the right side of the body, vision in the right half of the visual field, comprehension and production of speech, reading ability, mathematical reasoning, and a host of other abilities.

   Right side functions: The right hemisphere controls touch and movement of the left side of the body, vision in the left half of the visual field, visual-spatial ability, map-reading, art and music appreciation, analysis of nonverbal sounds, and a host of other abilities.

2. The front of the brain is on the left side of the diagram; the back of the brain is on the right.

3. The cerebrum is the sum of the frontal, parietal, temporal, and occipital lobes. The cerebellum is labeled on the diagram above. The cerebrum is responsible for higher forms of thinking, including a variety of specific abilities described under motor cortex, visual cortex, somatosensory cortex, and auditory cortex. The cerebral cortex also contains vast association areas, whose specific functions

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are poorly defined but may include reasoning and decision making, planning appropriate behavior sequences, and knowing when to stop. The limbic system, which appears to be strongly involved in regulating emotions, is also part of the cerebrum. The cerebellum aids in the sense of balance and motor coordination.

4. The frontal, parietal, temporal, and occipital lobes are labeled on the diagram above.

5. The motor cortex is labeled on the diagram above. The motor cortex in each hemisphere controls movements on the opposite side of the body.

6. The visual cortex is labeled on the diagram above. The visual cortex in each hemisphere receives information from the visual field on the opposite side.

7. The auditory cortex is labeled on the diagram above. The auditory cortex is responsible for processing sounds.

8. The somatosensory cortex is labeled on the diagram above. The somatosensory cortex on each side receives information about touch, joint position, pressure, pain, and temperature from the opposite side of the body.

9. Broca's and Wernicke's areas are labeled on the diagram above. Broca's area is often referred to as the motor speech area. It is responsible for our ability to carry out the movements necessary to produce speech. Wernicke's area is often referred to a sensory speech area. It is mainly involved in comprehension and planning of speech.

10. Neurons would be found all over the drawing. (The brain is made up of billions of neurons.) Each neuron is very tiny compared to the size of the brain, so no single neuron would be visible to the naked eye in a drawing at this scale. The cell bodies of the largest neurons in the brain are about 1/20 of a millimeter in diameter!

11. The brain stem is labeled on the diagram above. Different parts of the brain stem are involved in regulation of sleep and wakefulness, dreaming, breathing, heart rate, and attentional processes.

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Activity 2.4 - Football and Brain Damage

Coaches and medical experts have known for a while that the severe hits that football players take on the field can lead to concussions, blacking out, and even permanent damage. More recently, however, there has been increasing concern that the effects of repeated hits to the head may not manifest themselves until decades later. Early studies suggest that former NFL players suffer high rates of memory and other cognitive problems years after retiring, and that they also may develop these problems earlier than non-football players do. NFL players may also be vulnerable to higher rates of depression and Alzheimer's disease.

To investigate this problem, groups like the Sports Legacy Institute have begun to encourage former NFL players to donate their brains to science when they die. Already, the brains of a handful of players have been examined, with shocking results. Almost all of the brains show high levels of a protein called *tau,* which is suspected of being involved in several neurodegenerative disorders, including Alzheimer's disease. The presence of high levels of tau may explain why football players have a tendency to develop cognitive impairments long after their playing days are over. More disturbing still, high levels of tau have also been found in the brain of an 18-year-old high school football player who died.

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After introducing students to this issue, have the class discuss the possible implications for social and sports policy. Should football playing be stopped? Should the rules of the game be changed to eliminate hard hitting? If necessary, pose the following additional questions to stimulate discussion: Everyone knows football is dangerous, but does the fact that these cognitive impairments may take decades to develop make them somehow different? Is the risk of permanent cognitive disability somehow different than the risk of permanent physical disability? Wrestlers, soccer players, boxers, and other types of athletes are also at risk for long term brain damage. Should these sports be changed of banned?

After discussing the issue in class, have students respond to the following writing prompt.

Writing Prompt: Describe a longitudinal and then a cross-sectional study that could be used to determine if professional football players show higher than normal rates of cognitive impairment. Explain some of the advantages and disadvantages of the two designs.

Sample answer: *A longitudinal study might choose a few football players and then test them every 10 years using the same cognitive tests to see how their abilities change over time. A cross-sectional study, on the other hand, might find a group of 65-year-old retired football players and compare their cognitive functioning to 65-year-olds who did not play football. The longitudinal study would provide a more complete view of how cognitive function might decline, but would take decades to complete, and may suffer from attrition. The cross-sectional study would be a lot easier to perform, but would only offer a "snap-shot" of cognitive function. You could not tell, for example, if football players develop cognitive impairment earlier than non-football players typically do.*

Miller, G. (2009). A late hit for pro football players. *Science, 7*, 670–672.

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Activity 2.5 - Hemispheric Lateralization

Hemispheric lateralization results in eyedness, handedness, footedness, earedness, facedness, and other silly-sounding words with important implications (see the related Lecture Launcher in this chapter). Lateralization results from the specialization of each hemisphere for different tasks, such as reading facial expressions, speaking, solving spatial problems, or performing analytic tasks. Although neuropsychologists use sophisticated measures to determine these lateralization, this simple exercise allows students to gauge their own brain organization.

With both eyes open, have students hold up their right thumbs at arm's length under an object across the room directly in front of them. As they alternately close their left and right eyes, their thumbs should appear to jump to the right or to the left with respect to the distant object. For those who are right-eyed, their thumbs should jump to the right when they close their right eyes, but stay as is when they close their left eyes. The opposite pattern should occur among those who are left-eyed. Students who see little or no jumping are among the 41% of the population who are neither strongly left-eyed nor right-eyed.

As a second test, ask for a volunteer. Present the student with the first paragraph of this exercise (or any suitable short passage) to memorize, a broom, a clock with a second hand, a pencil, and a pad of paper. First, time how long the volunteer can balance the broom on the tip of his or her right index finger while standing on the right foot. Next, measure the time as the volunteer balances the broom on his or her left index finger while standing on the left foot. Finally, repeat these tests while the volunteer recites the memorized passage. Speech will be localized on the side of the brain opposite the hand that is most disrupted by the memorization task.

Another demonstration, suggested by Morton Ann Gernsbacher, requires students to move their right hand and right foot simultaneously in a clockwise direction for a few seconds. Next ask that the right hand and left foot be moved in a clockwise direction. Then, have students make circular movements in

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opposite directions with right the hand and the left foot. Finally, have students attempt to move the right hand and right foot in opposite directions. This generally produces laughter as students discover that this procedure is most difficult to do even though they are sure–before they try–it that it would be no problem to perform. A simple alternative activity is to ask students to pat their heads and to rub their stomachs clockwise and then switch to a counterclockwise motion. The pat will show slight signs of rotation as well.

The brain is lateralized to some extent, and this makes some activities difficult to perform. Challenge your students to explain why activities of these types are difficult to execute. This will generally lead to interesting discussions and the assertion by some students that this type of behavior is no problem. Generally, students who have been trained in martial arts, dance and/or gymnastics have less difficulty completing these activities due to their rigorous physical training.

Haseltine, E. (1999, June). Brain works: Your better half. *Discover,* 112.
Kemble, E. D. (1987). Cerebral lateralization. In V. P. Makosky, L. G. Whittemore, and A. M. Rogers (Eds.). *Activities handbook for the teaching of psychology* (Vol. 2) (pp. 33–36). Washington, D.C.: American Psychological Association.
Kemble, E. D., Filipi, T., & Gravlin, L. (1985). Some simple classroom experiments on cerebral lateralization. *Teaching of Psychology, 12*, 81–83.

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Activity 2.6 - Hemispheric Communication and the Split Brain

Even after reading the textbook and listening to your lecture, many students may have difficulty conceptualizing the effects of a split-brain operation on an individual's behavior. Morris (1991) described five activities designed to simulate the behavior of split-brain patients. All of the activities have the same basic setup. You will need to solicit two right-handed volunteers and seat them next to each other at a table, preferably in the same chair. The volunteer on the left represents the left hemisphere, and the other student is the right hemisphere. The students are instructed to place their outer hand behind their back and their inner hands on the table with their hands crossed, representing the right and left hands of the split-brain patient. Finally, the student representing the right hemisphere is instructed to remain silent for the remainder of the activity. In one of the activities described by Morris, both students are blindfolded and a familiar object (Morris suggested a retractable ball-point pen) is placed in the left hand of the "split-brain patient" (the hand associated with the right hemisphere). Then ask the "right hemisphere" student if he or she can identify the object, reminding him or her that they must do so nonverbally. Next, ask the "right hemisphere" to try to communicate, without using language, what the object is to the "left hemisphere." Your more creative volunteers may engage in behaviors that attempt to communicate what the object is through sound or touch. If your "right hemisphere" has difficulty in figuring out how to communicate, ask the class for suggestions. This demonstration can be used to elicit discussion about why only the "left hemisphere" student can talk, the laterality of the different senses, and how split-brain patients are able to adjust their behavior to accommodate. You should refer to Morris's original article for descriptions of the other activities.

Morris, E. J. (1991). Classroom demonstration of behavioral effects of the split-brain operation. *Teaching of Psychology, 18*, 226-228.

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Activity 2.7 – Demonstrating Neural Conduction: The Class as a Neural Network

In this engaging exercise (suggested by Paul Rozin and John Jonides), students in the class simulate a neural network and get a valuable lesson in the speed of neural transmission. Depending on your class

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size, arrange 15 to 40 students so that each person can place his or her right hand on the right shoulder of the person in front of them. Note that students in every other row will have to face backwards in order to form a snaking chain so that all students (playing the role of individual neurons) are connected to each other. Explain to students that their task as a neural network is to send a neural impulse from one end of the room to the other. The first student in the chain will squeeze the shoulder of the next person, who, upon receiving this "message," will deliver (i.e., "fire") a squeeze to the next person's shoulder and so on, until the last person receives the message. Before starting the neural impulse, ask students (as "neurons") to label their parts; they typically have no trouble stating that their arms are axons, their fingers are axon terminals, and their shoulders are dendrites.

To start the conduction, the instructor should start the timer on a stopwatch while simultaneously squeezing the shoulder of the first student. The instructor should then keep time as the neural impulse travels around the room, stopping the timer when the last student/neuron yells out "stop." This process should be repeated once or twice until the time required to send the message stabilizes (i.e., students will be much slower the first time around as they adjust to the task). Next, explain to students that you want them to again send a neural impulse, but this time you want them to use their ankles as dendrites. That is, each student will "fire" by squeezing the ankle of the person in front of them. While students are busy shifting themselves into position for this exercise, ask them if they expect transmission by ankle-squeezing to be faster or slower than transmission by shoulder-squeezing. Most students will immediately recognize that the ankle-squeezing will take longer because of the greater distance the message (from the ankle as opposed to the shoulder) has to travel to reach the brain. Repeat this transmission once or twice and verify that it indeed takes longer than the shoulder squeeze.

This exercise–a student favorite–is highly recommended because it is a great ice-breaker during the first few weeks of the semester, and it also makes the somewhat dry subject of neural processing come alive.

Rozin, P., & Jonides, J. (1977). Mass reaction time measurement of the speed of the nerve impulse and the duration of mental processes in class. *Teaching of Psychology, 4*, 91-94.

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Activity 2.8 - The Dollar Bill Drop

After engaging in the neural network exercise, follow it up with the "dollar bill drop" (Fisher, 1979), which not only delights students but also clearly illustrates the speed of neural transmission. Ask students to get into pairs and to come up with one crisp, flat, one-dollar bill (or something larger, if they trust their fellow classmates!) between them. First, each member of the pair should take turns trying to catch the dollar bill with their nondominant (for most people, the left) hand as they drop it from their dominant (typically right) hand. To do this, they should hold the bill vertically so that the top, center of the bill is held by the thumb and middle finger of their dominant hand. Next, they should place the thumb and middle finger of their nondominant hand around the dead center of the bill, as close as they can get without touching it. When students drop the note from one hand, they should be able to easily catch it with the other before it falls to the ground.

Now that students are thoroughly unimpressed, ask them to replicate the drop, only this time one person should try to catch the bill (i.e., with the thumb and middle finger of the nondominant hand) while the other person drops it (i.e., from the top center of the bill). Student "droppers" are instructed to release the bill without warning, and "catchers" are warned not to grab before the bill is dropped. (Students should take turns playing dropper and catcher). There will be stunned looks all around as dollar bills whiz to the ground. Ask students to explain why it is so much harder to catch it from someone other than themselves. Most will instantly understand that when catching from ourselves, the brain can simultaneously signal us to release and catch the bill, but when trying to catch it from someone else, the signal to catch the bill can't be sent until the eyes (which see the drop) signal the brain to do so, which is unfortunately a little too late.

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Fisher, J. (1979). *Body Magic*. Briarcliff Manor, NY: Stein and Day.

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Activity 2.9 - Reaction Time and Neural Processing

Yet another exercise that illustrates the speed of neural processing is suggested by E. Rae Harcum. The point made by this simple but effective exercise is that reaction times increase as more response choices become available (i.e., because more difficult choices in responses involve more neuronal paths and more synapses, both of which slow neural transmission). Depending on your class size, recruit two equal groups of students (10 to 20 per group is ideal) and have each group stand together at the front of the room. First, explain that all subjects are to respond as quickly as possible to the name of a U.S. President. Then give written instructions to each group so that neither group knows the instructions given to the other. One group should be instructed to raise their right hands if the president served before Abraham Lincoln and to raise their left hands if the president served after Lincoln. The other group should be instructed simply to raise their left hands when they hear a president's name. Ask participants and audience members to note which group reacts more quickly. When all students are poised and ready to go (i.e., hands level with shoulders and ready to raise), say "Ready" and then "Reagan." The group with the simpler reaction time task should be faster than the group whose task requires a choice.

Harcum, E. R. (1988). Reaction time as a behavioral demonstration of neural mechanisms for a large introductory psychology class. *Teaching of Psychology, 4*, 208-209.

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Activity 2.10 - Environmental Influences on the Brain

You might want to remind students that brain function and structure are subject to environmental influences. Ask students to identify the behaviors that are important for keeping the brain healthy and functioning well. The following are some possibilities:

Good nutrition, especially during childhood Adequate nutrition is vital for proper brain development. Even in adults, diet may influence brain function. Studies are showing that although high levels of cholesterol may be bad for your heart, low levels of cholesterol may be bad for the brain. Low cholesterol may be associated with low levels of the neurotransmitter serotonin, that can result in higher levels of aggression and depression.

Mental stimulation High levels of stimulation help to form neural connections that in turn enhance brain function.

Physical fitness Studies have shown that aerobic fitness has an impact on the density of capillaries in the brain. More capillaries result in greater blood flow to the brain.

Maternal health during pregnancy The uterine environment can have an enormous impact on the brain development of a fetus. Women who do not have adequate nutrition, or drink, smoke, or do drugs, and who are exposed to certain environmental toxins are more likely to have children with lower IQs and learning disabilities.

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Activity 2.11 –
Evolution versus Religion...Can Either Be Proven "False?"

Perhaps as a class exercise, or in small groups, discuss the following issues:

One of the tenets of the scientific method is that a good theory is falsifiable; that is, able to be disproved.

Given this, can the theory of creationism be disproved?
What evidence is necessary to disprove creationism?
What about evolution?
What is the necessary evidence to disprove the mechanisms of evolution?

You might find yourself in a quandary over these issues, as both seemingly polar opposite theories of the origins of humans appear to have one thing in common: Both are quite difficult to "disprove." Does this mean that evolution is not a good theory? This question is a common criticism of evolutionary theory; however, without evolutionary theory, we would never be asking many of the questions about human behavior that we have asked over the last 100-year history of modern psychology. Ask students what kinds of questions those might be.

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Activity 2.12 - Gimmie 5!

Some characteristics of humans that seem to have an innate quality. Broadly, these are:

1) Reflexes
2) An interest in novelty
3) A desire to explore and manipulate objects
4) An impulse to play and fool around
5) Basic cognitive skills

As a brief discussion topic, challenge your students to generate some examples of these characteristics drawn from their daily lives. For example, ask your students how many times a day they use their cell phones to text, search the Internet, use Instagram, or post a tweet to Twitter. That one activity alone would seem to cover "manipulate objects," "play and fool around," and "an interest in novelty!" Perhaps your students can share a story about babysitting, and what they observed an infant doing; chances are good it involved exploring the world, manipulating the environment, and doing some fundamental cognitive processing. Maybe students could list all the different reflexes that come to mind and give a short explanation as to why each might be evolutionarily adaptive. If you asked students to name their 3 favorite toys as a child, it's a near-certainty everyone could do so in a very short time. In short, there are many ways to get students thinking and talking about these innate characteristics, to then set the stage for a larger discussion of the evolutionary perspective in psychology.

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Activity 2.13 - What Runs in the Family?

An interesting exercise for students involves critically examining the role of genetics in psychological traits in their own families. This can be done as a small group exercise, or students could write a short paper exploring the topic. Have each student pick a personality characteristic, talent, or skill that she or he

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believes "runs in the family." You might describe a characteristic of your own family members (their artistic ability, humor, extraversion, etc.) to get the ball rolling. The students can describe the relatives (living or dead) who also possess this characteristic. Next, ask students to suggest different interpretations of these data. What is the likelihood that the trait they are describing is genetically influenced? What might be the relative contributions of genetics versus environment? How might genetics and environment interact to produce this trait? How many family members do not possess the characteristic? Most students like to discuss their family backgrounds, and these questions help students to recognize the more general problems of interpreting behavior genetics research.

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Activity 2.14 - Quit Cloning Around!

The Human Genome Project provides a wealth of material for addressing the genetic basis of a variety of behaviors and traits, such as work currently being conducted on temperament, the origins of mental illness, and behavior genetics in general. The Human Genome Project also raises the possibilities of cloning and genetic manipulation. (In fact, if recent claims by the Raelians [a Canadian prophecy cult] are to be believed, several humans have already been cloned!) A potentially invigorating in-class discussion of human cloning can spark a debate of both the merits and pitfalls of cloning. You may want to briefly discuss students' thoughts on human cloning for purposes such as the elimination of birth defects and cancer, but also "preferences" such as eye color, biological sex, or number of predicted IQ points.

Assign students to review a variety of information online or from other sources. The goal is to allow them to become better informed, and to come to the next class ready to discuss the issue:

http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml
http://www.rael.org/
http://www.clonaid.com/page.php?18
https://www.youtube.com/watch?v=jAhjPd4uNFY

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Activity 2.15 - Wordplay

Here's some stupid, meaningless fun to have when you've got 5 minutes to fill at the end of an otherwise-brilliant classroom presentation. Divide your students into teams (3, 5, or 10 people, depending on your class size) and challenge them to think of as many famous people named "Gene" that they can in 5 minutes. Yes, of course it's fair to think of people named "Jean" as well…homophones are our friends in this little enterprise, as are variants. If you'd like to impress your students, given below is a list – both familiar and esoteric – of some Genes you can share.

Men	Women
Eugene Ionesco	Gene Tierney
Eugene O'Neill	Gina Gershon
Gene Autry	Gina Lollabrigida
Gene Hackman	Gina Schock
Gene Kelley	Gina Torres
Gene Krupa	Jean Harlow
Gene Pitney	Jean Louis "Scout" Finch
Gene Rayburn	Jean Seberg

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Gene Roddenberry
Gene Simmons
Gene Siskel
Gene Vincent
Gene Wilder
Gino Cappelletti
Gino Vanelli
Jean Cocteau
Jean Giradoux
Jean Piaget
Jean Sibelius
Jean Valjean
Jean Simmons
Jean Stapleton
Jeanne Moreau

Loose Associations

Levi's jeans
I Dream of Genie (television show)
The Jean Genie (David Bowie song)
Gene Gene the Dancing Machine (from *The Gong Show*)
Jeannie with the Light Brown Hair
Jeno's Pizza Rolls
Eugene, Oregon
Billy Jean King
Billy Jean (the song)
Jean-Claude van Damme
Genie in a Bottle
Genie, the feral child from Southern California
Wyclef Jean
the Genie from *Aladdin*

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▼HANDOUT MASTERS

- 2.1 Mapping the Brain

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Handout Master 2.1
Mapping the Brain

Label the diagram of the brain to show or answer the following questions.

1. Is this a drawing of the left side or the right side of the brain? What are the particular functions of that side of the brain as compared to the other hemisphere?

   Left side functions: Right side functions:

2. Where is the front of the brain? Where is the back?
3. Label the cerebrum and cerebellum and describe their functions.

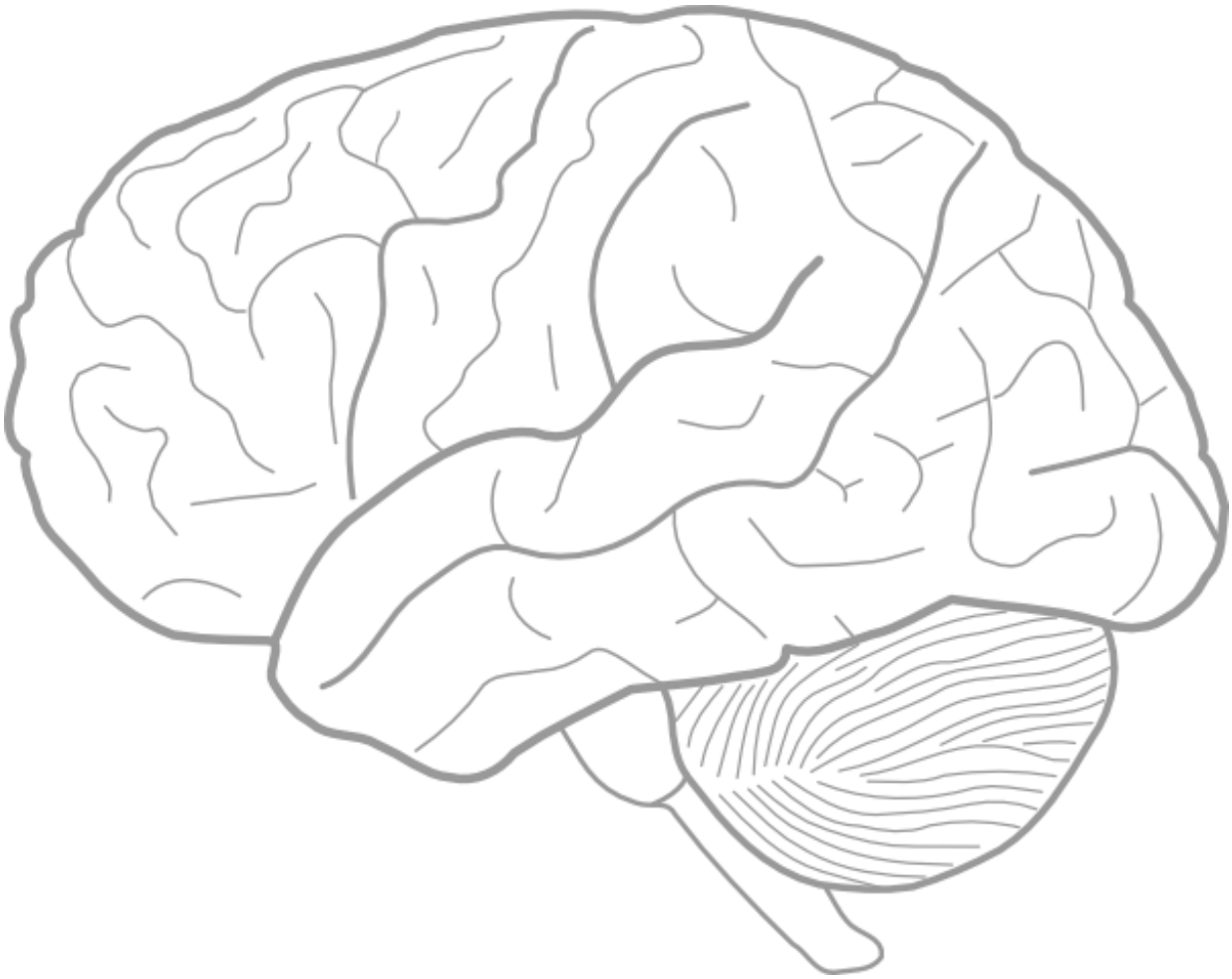
   Cerebral functions: Cerebellar functions:

4. Label the four lobes of the cerebral cortex.
5. Label the motor cortex and describe its function.
6. Label the visual cortex and describe its function.
7. Label the auditory cortex and describe its function.
8. Label the somatosensory cortex and describe its function.
9. Label Broca's and Wernicke's areas and describe their functions.
10. Where would you expect to find neurons in this drawing and how big would they be if they were drawn?
11. Label the brain stem. What is its function?

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Video: Sensory and Motor Neuron
Video: The Neural Impulse
Video: The Synapse
Video: Reuptake of Dopamine
Video: Neural Plasticity
Video: The Spinal Cord Reflex
Video: Chromosomes and DNA
Video: Why We Do the Things We Do

Interactive: The Divisions of the Brain
Interactive: The Four Lobes of the Cerebrum
Interactive: Divisions of the Autonomic Nervous System
Interactive: Do You Fight or Fly?
Interactive: The Glands of the Endocrine System

Additional Revel Videos: Methods for Studying the Brain

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Chapter 2 Videos

Video: The Basics: How the Brain Works, Part 1 (5:04)
Find out about neurons: their parts, how they communicate, and their function in the brain.

Video: The Basics: How the Brain Works, Part 2 (6:11)
Find out about the nervous system: how it's divided and processes information, the significance of each brain structure, and how neuronal transmission works.

Video: The Big Picture: My Brain Made Me Do It. (4:59)
Learn about the function of different parts of the nervous system and how it integrates multiple signals to create experience.

Video: In the Real World: Neurotransmitters (3:10)
Learn about the neurotransmitter dopamine and what happens when there is an imbalance of dopamine as a result of natural causes or drugs.

Video: Special Topics: The Plastic Brain (7:04)
Learn specifics about how the human brain grows and develops throughout the lifespan and how the brain can remarkably repair itself or compensate after being damaged.

Video: Thinking Like a Psychologist: The Pre-Frontal Cortex (3:28)
See how certain areas of the brain contribute to different behaviors, and how both biological and environmental factors can lead a person to become a violent criminal later in life.

Video: What's In It For Me? Your Brain on Drugs (3:51)
Neurotransmitter imbalances can occur from chemicals that we willingly ingest, such as drugs or alcohol.

Chapter 2 Simulations

Simulation: Hemispheric Specialization
Judge whether a string of letters in your peripheral vision is a real word and test whether language functions are lateralized in the brain.

Survey: Do You Fly or Fight?
Participate in a survey to discover if you flee or fight under stressful conditions.

Writing Space

Writing Practice prompts within Writing Space offer immediate automated feedback. Each student submission receives feedback based on the following characteristics: Development of Ideas, Organization, Conventions, Voice, Focus and Coherence. Instructors can provide additional feedback and can adjust the auto-generated grade.

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▼Practice Quizzes and *Test Yourself* Answer Keys

Quiz p. 48

1. a; **2.** d; **3.** c; **4.** b; **5.** c.

Quiz p. 61

1. c; **2.** b; **3.** d; **4.** a; **5.** b.

Quiz p. 63

1. b; **2.** d; **3.** a; **4.** c; **5.** b.

Quiz p. 66

1. d; **2.** c; **3.** b; **4.** a; **5.** d.

Quiz p. 73

1. c; **2.** d; **3.** b; **4.** a; **5.** c.

Chapter Quiz pp. 75-76

1. d; **2.** b; **3.** a; **4.** b; **5.** c; **6.** d; **7.** b; **8.** a; **9.** c; **10.** d; **11.** a; **12.** c; **13.** b; **14.** d; **15.** a.

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