The Brain: Perception: Teacher’s Guide

Grade Level: 6-8  Curriculum Focus: Human Body  Lesson Duration: One class period

Program Description
How do you see what you see, feel what you tough? Why is a Picasso so beautiful to some and just chaotic to others? Every second our brains tear down the world around us and rebuild it in our heads. Learn how our neurons transform the fractured images bombarding our brains, organizing them into coherent units that we can process and use.

Onscreen Questions and Activities

- Where in the brain is visual information filtered and coded? (Visual information is processed in the visual cortex, located on the back surface of the brain.)
- Why does every person have a unique neural map? (No two neural maps are exactly alike because our individual experiences influence their development.)
- Discuss some of the influences such as experiences or emotions that can affect a person’s perception. How might this explain the existence of certain prejudices?
- Activity: Divide the class into two groups and have each group invent and conduct an experiment that demonstrates how we perceive sound direction. Then describe the experiment and the results to the class.

Lesson Plan

Student Objectives
Students will understand:

- The brain links our sense of taste with our sense of smell.
- The tongue can determine only four basic tastes: salty, sour, bitter, and sweet.
- All the more subtle tastes we experience are largely a function of olfactory senses, or smell.

Materials

- The Brain: Perception video and VCR, or DVD and DVD player

For each group:
• Variety of substances to taste, including raw onion and raw potato, in covered jars or containers so they can't be seen

• Blindfold

• Prepared list of the substances to be tasted

**Procedures**

1. Ask your students if they are certain that they could distinguish a slice of raw potato from a slice of raw onion in a blindfolded taste test. Then ask them if they could distinguish between the two tastes while blindfolded and holding their noses.

2. Tell students they are going to perform a test to find out if their predictions were correct and then discuss the reasons for the results.

3. Divide students into groups of three. In each group, one person will hold his or her nose while blindfolded and taste various substances, including raw potato and raw onion. A second person will taste the same substances while merely blindfolded. The third person will give the taste test to their team members and track the results.

4. Give each group the substances to be tasted and a list of the substances. Before you begin, have one of the tasters in each group to cover his or her ears or sit on the other side of the room. In each group, the first taster should be blindfolded and given the taste test. These first tasters should also hold their noses. Instruct students to try to identify each substance but to say, “I don’t know,” if they have no idea what the substance is. As the first tester takes the test, the third team member should check off on the list which substances are correctly identified, which are incorrectly identified, and which get an “I don’t know.”

5. Repeat the test with second taster. This taster should be blindfolded, but not hold his or her nose.

6. Appoint a small group of students to compile the results of the test. How many correct identifications of each substance were made by students holding their noses compared with the number of correct identifications made by students able to smell?

7. Discuss the results with the class, leading students to infer that smell and taste are linked.

8. Encourage students to do further research on the relationship between smell and taste, or explain to them that the tongue can distinguish only four basic tastes—salty, sour, bitter, and sweet. All the more subtle tastes we experience are largely a function of our sense of smell.

9. Have each student write a paragraph describing the experiment and his or her own personal experience while taking the test.

**Discussion Questions**

1. Compare the brain's coordination of depth perception and location of sound.

2. Describe how olfactory impairment (even holding one's nose) could affect taste perception.

3. Discuss how technology has improved our ability to perceive ourselves.
4. Discuss how experiences, emotions and cultural patterns affect people's perceptions, and how perceptions may affect a culture. How might this explain the existence of certain prejudices?

**Assessment**

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Student’s paragraph clear, complete, well organized, and error-free.
- 2 points: Student’s paragraph clear, incomplete, sufficiently well organized, with some errors.
- 1 point: Student’s paragraph unclear, incomplete, lacking in organization, with numerous errors.

**Vocabulary**

adapt

*Definition:* To adjust to a specified use or situation.

*Context:* But the human brain, even when damaged, has a remarkable ability to adapt. When one sense fails, we can rely on another.

endocrine

*Definition:* The system of organs that secrete hormones into the blood to regulate basic functions of cells and tissues.

*Context:* The endocrine organs are the anterior and posterior pituitary glands, thyroid and parathyroid glands, pancreas, adrenal glands, ovaries (in women) and testicles (in men).

cerebral cortex

*Definition:* The extensive outer layer of gray tissue that covers the cerebrum and is largely responsible for higher nervous functions.

*Context:* The cerebral cortex, the brain's quarter-inch thinking cap, consists of tightly packed columns of nerve cells.

limbic

*Definition:* A system, dispersed throughout the forebrain, composed of the thalamus, hypothalamus, amygdala, hippocampus, and parts of the cortex. It influences emotion and memory.

*Context:* Though they are spread throughout the cortex, olfactory neurons have particular circuits wired to the limbic system.

neurons

*Definition:* Any of the cells of nerve tissue consisting of a main portion containing the nucleus and cytoplasmic extensions, the cell body, the dendrites, and axons.

*Context:* All of these visual bits and pieces are processed and coded by assigned neurons.
olfactory
Definition: Of or pertaining to the sense of smell.
Context: Odor molecules sniffed through the nose or pumped up the tongue and cheeks through the nasal cavity are picked up by cilia or tiny hairlike projections of the olfactory neurons.

perception
Definition: Understanding or insight.
Context: Our perception helps us make sense of the world.

rods and cones
Definition: The portion of the retina ("back wall") that gathers incoming light and converts it to electric impulses for use by the brain.
Context: Incoming light is converted to electricity by these strange devices called rods and cones.

Academic Standards
National Academy of Sciences
The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit http://books.nap.edu.

This lesson plan addresses the following science standards:
- Life Science: Structure and function in living systems

Mid-continent Research for Education and Learning (McREL)
McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit http://www.mcrel.org/compendium/browse.asp.

This lesson plan addresses the following national standards:
- Science — Life Science: Understands the structure and function of cells and organisms.
- Science — Life Science: Understands biological evolution and the diversity of life.
- Science — Nature of Science: Understands the nature of scientific knowledge.
- Science — Nature of Science: Understands the nature of scientific inquiry.
- Science — Physical Science: Understands the sources and properties of energy.
- Technology: Understands the relationships among science, technology, society, and the individual.
Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the DiscoverySchool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- [http://school.discovery.com/teachingtools/teachingtools.html](http://school.discovery.com/teachingtools/teachingtools.html)