EACH BRAIN MATTERS
THE CENTER FOR NEUROSCIENCES FOUNDATION

UNIT
The 5 Senses
Elementary 5-8

TIMEFRAME
10 - 15 minutes

MATERIALS

Gloves or thongs

Jellybeans/mixed food samples

Opaque containers for jellybeans

Blindfolds (optional)

Taste and Olfaction

Synopsis

This activity has several parts, two of which focus on the sense of taste; the third explores the relationship between taste and smell.

Learning Outcomes

Students will understand the connection between the sense of smell their sense of taste.

Background for Teachers

Our mouths have around 10,000 tiny receptors that send signals to the brain about the taste called taste buds. **Taste buds** are the sensory receptors found on our tongue that enable us to taste the five basic tastes; salty, sweet, bitter, sour, and umami (a savory flavor often found in broths). They do so by producing an electrical singal that travels along a neural pathway to our brains. However, our sense of taste is also highly dependent on our noses.
Our noses hold millions of odor receptors that can smell food by sniffing through the nostrils or by circulating inside of the nose. Once they are in your nose, the odor molecules travel to the nasal cavity where **olfactory nerve** endings send signals to the brain.
As we are eating, our brains are receiving signals from both our mouths and our noses. The signals travel through our brainstems, then to the limbic system and the **gustatory complex** in the cerebral cortex. The gustatory complex is the area responsible for taste located on the sensory cortex. The limbic system is an important area for memory formation and emotion, which explains people often feeling attached or nostalgic over food.

TEACHING TIPS

Use a container that participants cannot see into and be sure their eyes are closed.

ARIZONA LEARNING STANDARDS

3.L2U1.6
5.L4U3.12

Activity Instructions

- Gather foods with similar textures and cut into same sizes pieces, for example apples, pears, pineapples, hard candies. This works best with jelly beans if you have any on hand, but other foods work fine too!
- Have the participants plug their noses and close their eyes. You can also have them work in pairs with one blindfolding the other for the activity.
- Hand a piece of sample food to each student and instruct them to chew it slowly while keeping their nose plugged. Ask them to describe the taste, then ask them to try to guess the flavor.
- After they chew the sample for a while with their nose plugged, ask them to unplug their noses and describe how the taste changes. Ask them to guess the flavor again. Finally, show them the color of the jellybean and ask if they want to revise their guess.
- Explain that often all of our senses work together to help us understand the world.

Extensions & Discussion

Our perception of odors and flavors, including whether we like or dislike particular foods, is based on a combination of our genes and our experiences. Humans can detect around 10,000 odors, and there is a lot of individual variation in how strongly we detect or respond to those odors. The perception of scents such as apple, violets, and blue cheese have a strong genetic basis. Do people in your family share a particular flavor/smell that you all like or dont like?

Key Terms & Concepts

Taste Buds: Nerve endings on the tongue and the lining of the mouth.
Olfactory Nerve: a cranial nerve that sends sensory data to the brain, and it is responsible for the sense of smell.
Gustatory Complex: The area of the brain responsible for the sensation of taste. The gustatory cortex is made up of two smaller substructures, that are found in the insular and the frontal lobes of the brain

Resources

Savory Science, The Scientific American
https://www.scientificamerican.com/article/bring-science-home-jelly-bean-taste-smell/

The Complicated Equation of Smell, Flavor, and Taste, American Journal of Neuroradiology
http://www.ajnr.org/content/ajnr/35/7/1243.full.pdf

The Genetics of Taste, Smithsonian Magazine
https://www.smithsonianmag.com/arts-culture/the-genetics-of-taste-88797110/

