

K-1: The Senses

OUR SENSE OF TASTE

Written by

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Activities from the *K-1: The Senses Teacher's Guide* may be used alone or with integrated unit components. The Learning Brain: Senses unit is comprised of the guide, a PowerPoint® slide set, "What Sound Is It?" for use with the activity, "Our Sense of Hearing," and a student storybook, *Making Sense!* (available as a PowerPoint® file and in PDF format). All files are available free-of-charge at BioEd Online (www.bioedonline.org).

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First edition. Printed in the United States of America.

ISBN: 978-1-888997-87-3

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TEACHER RESOURCES FROM THE CENTER FOR EDUCATIONAL OUTREACH AT BAYLOR COLLEGE OF MEDICINE

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Development of The Learning Brain educational materials was supported by grant number 5R25DAO33006 from the National Institutes of Health, NIH Blueprint for Neuroscience Research Science Education Award, National Institute on Drug Abuse (NIDA), administered through the Office of the Director, Science Education Partnership Award program (Principal Investigator, Nancy Moreno, Ph.D.). The activities described in this book are intended for school-age children under direct supervision of adults. The authors, BCM, NIDA and NIH cannot be responsible for any accidents or injuries that may result from conduct of the activities, from not specifically following directions, or from ignoring cautions contained in the text. The opinions, findings and conclusions expressed in this publication are solely those of the authors and do not necessarily reflect the views of BCM, image contributors or the sponsoring agencies.

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ACKNOWLEDGMENTS

The authors gratefully acknowledge the support and guidance of William A. Thomson, Ph.D., BCM Center for Educational Outreach; and C. Michael Fordis, Jr., M.D., BCM Center for Collaborative and Interactive Technologies. The authors also sincerely thank J. Kyle Roberts, Ph.D., and Alana D. Newell, M.Ed., who guided field test activities and conducted data analyses. We also are grateful to the Houston-area teachers and students who piloted the activities in this guide.

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Funding provided by:

NIH Blueprint for Neuroscience Research

SEPA SCIENCE EDUCATION
PARTNERSHIP AWARD
Supported by the National Institutes of Health

NIDA NATIONAL INSTITUTE
ON DRUG ABUSE
National Institutes of Health
U.S. Department of Health and Human Services



OUR SENSE OF TASTE

Guiding Questions

What are the basic tastes? Where is information about taste detected in the body?

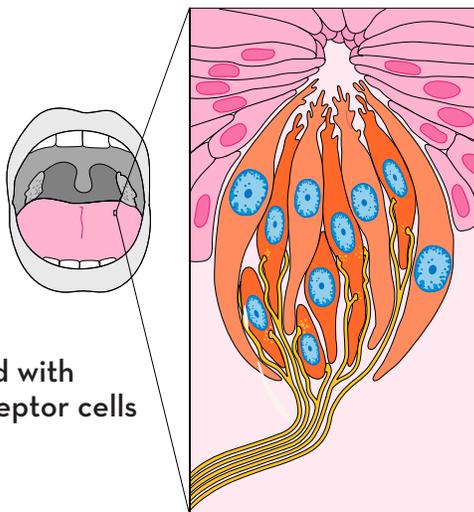
Concepts

- All of the senses are connected to the brain.
- Our senses let us know what is going on inside and outside our bodies.
- One of our senses is taste.
- The tongue is covered with taste buds, which contains taste receptors.
- Taste receptors communicate with the brain, which determines the flavors we experience.
- Taste buds detect sweet, sour, salty, bitter and umami (savory) tastes.

Time

Setup: 10 minutes

Class: 30 minutes each for Part 1 and Part 2



Taste bud with taste receptor cells

Why does chocolate ice cream taste delicious and sour milk taste awful? Scientists believe that taste evolved to help identify potentially nutritious foods and avoid eating things that are harmful.



Taste begins in our mouths, with the chemical receptors that dot our tongues. The tongue's surface is coated with thousands of small bumps, called papillae. Each papilla holds approximately 10,000 taste buds, which renew themselves about every 10 days, unless they are damaged by infection or smoking. Each taste bud contains 50-150 taste receptor cells.

When you eat, saliva dissolves certain chemicals from the food. The chemicals enter openings in your taste buds and interact with taste receptor cells. The receptor cells send signals to the brain, where they are combined with information from the sense of smell to create what you experience as flavor.

We generally recognize four tastes: sweet, sour, salty and bitter. A fifth taste, umami (savory) occurs when we eat foods with glutamate (like MSG). Bacon,



mushrooms and fermented foods, such as cheese and soy sauce, are rich in umami. Beyond allowing us to taste, the tongue can sense pressure, temperature and pain. That's why we are able to experience certain foods as spicy or minty, and distinguish among different food textures. The sense of smell also contributes to the flavors we experience. Odor qualities, such as floral, fruit, burnt or putrid, shape our food-related sensory experiences.

Some people, called “supertasters,” have more taste buds than average and are highly sensitive to certain tastes. One's genes can make him or her more sensitive to certain tastes, as well. And over time, many people experience a change in taste sensitivities. That's why adults sometimes become more tolerant of—and even enjoy—foods, such as broccoli or Brussels spouts, that they avoided as children.

Many older textbooks feature a “map” of the tongue with different regions specialized for particular tastes, such as sweet or sour. This interpretation of the distribution of taste receptors is inaccurate. In fact, receptors for all tastes are distributed throughout the tongue, and even are present in other areas of the mouth.

MATERIALS

PART 1

Teacher (See Setup)

- 16-oz bottle of lemon juice
- 1/4 cup of sugar
- 1/4 cup of salt
- Classroom human body diagram (see Activity 2, “The Brain: Protection”)
- Marker
- Water

Per Student

- 4 crayons or markers
- Set of labeled portion cups containing 1/8 tsp of the following substances: salt in cup 1, sugar in cup 2, water in cup 3, and lemon juice in cup 4.
- 2 cotton swabs (Q-tips® style)



- Plastic spoon
- Plain paper or foam plate
- Small hand mirror
- Science notebook

PART 2

Teacher (See Setup)

- 16-oz bottle of lemon juice

Per Student

- 6 plastic spoons
- 4 plastic cups half-filled with water
- 1/2 cup of sugar
- 1/4 cup of lemon juice
- Tray

SETUP

Part 1

Prepare a set of four portion cups, labeled 1, 2, 3 and 4. Place 1/8 teaspoon of each of the following substances into the cups: salt in cup 1, sugar in cup 2, water in cup 3, and lemon juice in cup 4. Place each set of cups, along with two cotton swabs, on a plate for each student.



Part 2

Prepare a half-full cup of water for each student. Place the cups of water, 1/2 cup of sugar, 1/4 cup of lemon juice and six spoons on a tray for each group.

Have students work in groups of four, with their own sets of materials for Part 1, and with shared materials for Part 2.

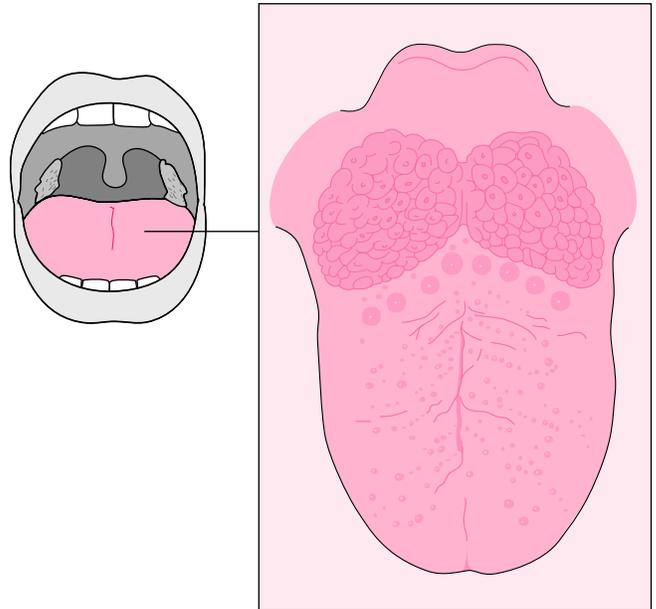
SAFETY

Have students wash their hands before and after the activity. Instruct students not to share cotton swabs.

PROCEDURE

Part 1

1. Ask students to think about their favorite flavors. Conduct a short class discussion about the foods they mention. Students will probably share foods that are sweet, salty, and sour; but they may describe complex combinations of flavors. Explain that you will create a class “taste” chart. Draw a table on the board and list “Sweet,” “Sour” and “Salty” across the top. Note that the tongue can detect two additional tastes: bitter and umami (savory). Bitter is more common, and can be detected easily, so add a “bitter” column to the table. Then, have students assign the favorite foods they mentioned, or other examples, by adding words or drawings to each category of the class chart.
2. Ask, *Where is your flavor detector?* Hopefully students will point to the tongue. Ask, *Did you know your tongue is connected to the brain?* Discuss how the brain receives and manages “taste” information (receptors in the tongue detect different chemicals and communicate with the brain; the brain interprets the messages as flavors).
3. Ask, *Have you ever really looked at your tongue?* Give each student a mirror with which to exam his/her tongue. Ask, *Do you notice little bumps on your tongue?* Explain that these bumps contain taste buds, which detect the flavors of anything we place



- in our mouths. Write the number 10,000 on the board, and tell students that there are at least 10,000 taste buds on a typical person's tongue!
4. Have each student draw and color his/her life-sized tongue in his/her notebook.
 5. Tell students that they will be conducting an investigation using their sense of taste. Emphasize that scientists normally do not taste materials, but that, in this case, tasting is necessary and completely safe.
 6. Give each student a disposable plate (paper or foam) and a set of small portion cups that are pre-numbered (1 through 4) that contain the mystery substances. Tell students that they should test only the substances on their own plates and should not share with any other student.
 7. Give every student one cotton swab. Demonstrate how to dip the tip of a swab into a container and touch your tongue with the sample. Instruct students to test container 1. Ask, *How did the substance taste?*
 8. Instruct students to use the other end of the swab to test container 2. Ask, *How did this substance taste?* Encourage students to pair-share their observations.



9. Give each student a second swab and have them test containers 3 and 4, using one end for each sample. Again have them share the taste with their partners.
10. Ask students, *How were you able to identify the contents of each container? What was the taste of the sample in container one? How about number two, etc.? Which part of the body allowed you to recognize the different tastes?* [The brain]
11. Remind students that taste buds in the bumps on our tongues collect information about the flavors of food, and then send that information to the brain. Add a piece of yarn to connect the tongue to the brain on the classroom human body diagram.

What Is Flavor?

Flavor is the sensory impression of a food or other substance, and is mainly determined by the senses of taste and smell working together.



Part 2

1. Give each student a plastic spoon and a clean, clear plastic cup half full of water. Tell the class that they will experiment with their senses of taste.
2. Ask, *What does lemon juice taste like without sugar?* [Sour] *Why do people add sugar to lemon juice?* [To make it taste sweet] *Do you like things very sweet or only slightly sweet?* Give students time to respond. Then, direct each student to put one spoonful of lemon juice and one spoonful of sugar into his or her cup and stir gently. Be sure students understand that they should use only one spoon for each container.
3. Prompt students to take a small sip. Ask, *Was your lemonade sweet enough? Does the lemonade still taste sour? What other things have you tasted that were sweet and sour?*
4. Instruct students to add another spoonful of sugar to their cups, stir gently and taste again. Ask, *Did you like the lemonade more or less after adding the second spoonful of sugar?* Explain that preferences (likes and dislikes) are shaped by information in the brain, and differ from one person to the next. Also mention that preferences can change over time.
5. Have students write a sentence in their notebooks about what they have learned.

EXTENSIONS

- If students have questions about the taste, “bitter,” allow them to sample small pieces of unsweetened (bitter) dark chocolate.
- Have students identify foods or drinks that have a combination of tastes. [For example, sweet and sour sauce, sweet and salty candy, or bittersweet chocolate.] Conduct a tasting session with some of these items.
- Take a class survey of favorite foods and record the answers on a chart. Determine which tastes are most and least popular. Make a class graph of the numbers of students who select each taste.
- Explore the connection between taste and smell by having students conduct a taste test of lemonade while pinching their noses.

RECOMMENDED RESOURCES

- Cole, Joann. *The Magic School Bus Explores the Senses*. (2001) Scholastic, Inc. ISBN: 978-0590446983
- Cuda-Kroen, Gretchen. “Baby’s Palette And Food Memories Shaped Before Birth.” NPR. Web. 02 Feb 2015. <http://www.npr.org/2011/08/08/139033757/babys-palate-and-food-memories-shaped-before-birth>
- Rissman, Rebecca. *Tasting (The Five Senses)*. (2010) Heinemann Educational Books. ISBN: 978-1432936891



My Science Journal

Name _____

Drawing

Key Words to Use

I Observed...
