

# Studying Our Senses

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We enjoy the flavors of the food we eat, and we identify the things we see easily, without even thinking about how we do it. But scientists have discovered that these sensory processes are amazingly complex and sophisticated.

In this lab, you will explore two types of sensory processes. First, you will investigate how you identify different flavors of jellybeans. Then, you will explore the surprising ways your brain interprets the visual images that reach your eye.

## How Do We Identify Different Flavors of Food?

What part or parts of your body do you use to identify different flavors of jellybean?

Presumably, everyone agrees that you use your mouth to identify different flavors. But, do you use any other senses to identify different flavors of jellybeans?

What experiments could you do to determine if you use any other parts of your body besides your mouth to identify different flavors of jellybean?

### Experiment

#### Precautions

Normally, no eating is allowed in a laboratory in order to avoid the risk that someone might eat something harmful and also to prevent the experiments from being contaminated by food.

The first set of experiments today involves eating jellybeans. To ensure that these experiments are done safely, observe the following precautions.

1. Clean your lab bench thoroughly with a disinfectant cloth.
2. Wash your hands before you begin the experiments.
3. Do not touch any jellybeans which will be eaten by someone else. Use a plastic spoon to place a jellybean in the person's hand.
4. If you are diabetic or have food allergies, please let your instructor know, so we can decide together whether it is safe for you to participate.

Explain why each of these precautions is necessary.

#### Investigation

This investigation will demonstrate the difference between flavor with and without the sense of smell. To discuss the results of this investigation, it is useful to make the following distinctions. We commonly say that we taste the flavor of food in our mouths. However, scientists use the word taste to refer just to the sensations produced by food in contact with the taste buds on the tongue. Smell refers to the sensations produced by food molecules or other odors in contact with the lining of the nose. How important do you think the sense of smell will be for identifying the flavor of a jellybean?

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<sup>1</sup> Teachers are encouraged to copy this student handout for classroom use. A Word file (which can be used to prepare a modified version if desired), Teacher Preparation Notes, comments, and the complete list of our hands-on activities are available at [http://serendip.brynmawr.edu/sci\\_edu/waldron/](http://serendip.brynmawr.edu/sci_edu/waldron/).

1. Close your eyes, hold your nose tightly, and have someone use a plastic spoon to give you a jellybean.
2. Chew this jellybean for 15 seconds and try to identify the flavor.
3. Then let go of your nose and continue chewing the jellybean and try again to identify the flavor.

Describe the flavor sensations while holding your nose and after you let go of your nose. What happens when you let go of your nose?

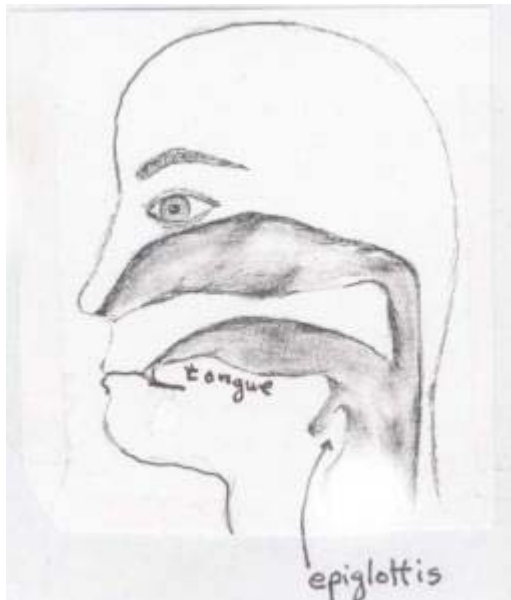
Use the diagram of the mouth and nose to understand how odors from food get up into your nose. How does holding your nose prevent the sense of smell from contributing to your ability to identify the flavor?

### Discussion

1. Why does food often seem tasteless when you have a cold?
2. Scientists have concluded that the taste buds on our tongues can distinguish five basic taste sensations -- sweet, sour, bitter, salty, and savory (sometimes called umami or hearty; responds to substances such as monosodium glutamate).

Would the five basic taste sensations be sufficient to distinguish all the different flavors of food? Could you identify the different flavors of jellybeans just by taste? Or do you need additional characteristics to distinguish the different flavors?

Scientists believe that we can distinguish thousands of different odors. The many different odors combined with the five basic tastes allow us to distinguish the many different flavors of food.



## Seeing Is Believing -- Or Is It?

If you look at a picture, do you see the same thing each time?

1. Look at the first page of pictures. For each picture, describe what you see.

Do you see the same thing each time you look at it?

If you see different images at different times, can you see the two different images at the same time?

Does everyone in your group see the same thing when they look at the picture?

How do you interpret these results?

How can you see different images while you are looking at the same pattern of black and white on the page?

2. Now look at the picture on the top of the second page of pictures. This is a picture of a mammal. What is it?

After you have figured out what mammal is shown in this picture, look at the picture again and try to not see this mammal.

How do you interpret these results?

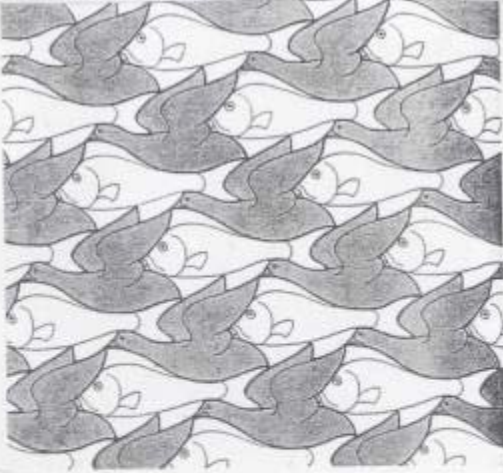
3. Now look at the bottom of the second page of pictures, which has two pictures which show the same two women, but in different positions.

In the picture on the left, do the two women look approximately the same size or different? In the picture on the right, do the two women look approximately the same size or different?

What accounts for the difference in apparent relative sizes in the picture on the left vs. the picture on the right?

These examples illustrate some of the many complex processes your brain uses to interpret visual stimuli. You know that the eyes play a crucial role in vision, but these examples illustrate that the brain is also crucial for vision.

Do you have any questions about how vision works?

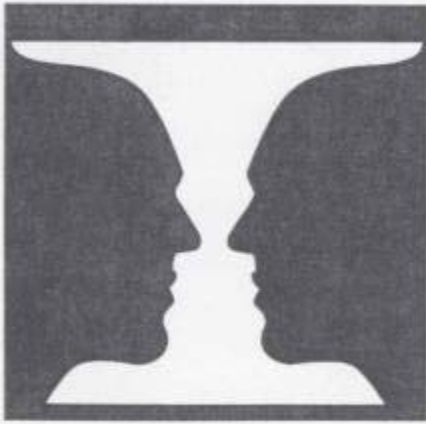


↑ from Kandel et al., 1995,  
↓ Essentials of Neural Science  
and Behavior

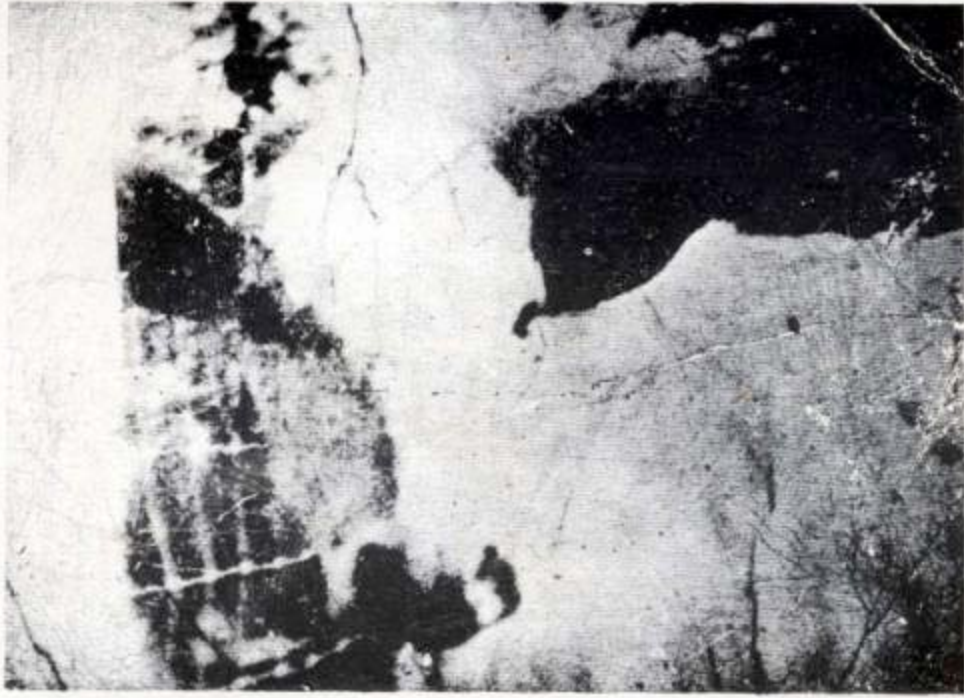


8.5 Images are not pictures The rabbit-duck figure, first used in 1900 by Joseph Jastrow

from Gleitman et al., 1999,  
Psychology



SOURCE: Boring, 1930, p. 42.  
from Westen,  
Psychology



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(From Brown and Herrstein, 1975.)