



EACH BRAIN MATTERS
THE CENTER FOR NEUROSCIENCES FOUNDATION

UNIT

The 5 Senses
Elementary 3-5

TIMEFRAME

10 - 15 minutes

MATERIALS

Index cards or
toilet paper rolls

Seeing the Picture

Synopsis

In this activity students will create an illusion to explore how our brains put together the information from our eyes.

Learning Outcomes

Students will understand that our eyes each see a slightly different view, and our brains put that information together to form one image.

Background for Teachers

We see the world with both our eyes and our brain. When information about what we are seeing reaches the **retina** it then travels along the **optic nerves**. At the **optic chiasm**, a group of axons from each eye crosses over to join the other (see image A). This cross over allows both sides of the brain to receive information from each eye. After this, the information travels to the midbrain and the thalamus. The information that is sent to the midbrain is not processed consciously, but rather produces the pupil reflexes. The information that is sent to the thalamus however, continues on to the **primary visual cortex** in the **occipital lobe**. Typically our brains are able to take information from both of our eyes to create one image easily because our eyes are looking at the same thing.

TEACHING TIPS

Be sure they have both eyes open and looking straight ahead when doing the hole in the hand activity

ARIZONA LEARNING STANDARDS

3.P2U1.1

3.P4U1.3

3.L1U1.5

5.L4U3.12

Activity Instructions

Shifting Images

- Review how information travels from our eyes to our brain, including the optic chiasm.
- Have students choose a background to look at (door, wall, ect. try to avoid plain white) and raise their right hand so that the palm is facing them. Have them take notice of their hands placement in front of them.
- Instruct them to use their left hand to cover their left eye, and then their right eye while continuing to look at their hand with the eye that is not covered. What did they notice?

Hole in Hand

- Have the students roll an index card length wise into a tube and tape it together. (May also use toilet paper rolls)
- Hold the tube up against the left eye with your left hand so you are able to see through it. Hold your right hand up against the tube so that your palm is facing you and your pinky is touching the side of the tube near the end away from your face. Look straight ahead with both eyes, you should be able to see a hole through your right hand! If you do not see a hole, be sure you are looking forward with both eyes, then you may need to slide your right hand back on the tube..
- Repeat the activity with the opposite eye.

Extensions & Discussion

In this activity, your eyes will each have different views. When your brain tries to put the views together, it will create the illusion of a hole in the hand.

Some people have dominant eyes, which means the information that is received from that eye will take precedent and the illusion will work better when the dominant eye is looking through the tube.

Did you notice a difference between what you saw with each eye?

Did it work with both eyes?

Key Terms & Concepts

Retina: The nerve layer that lines the back of the eye, senses light, and creates impulses that travel through the optic nerve to the brain.

Optic Nerve: A pair of cranial nerves that carry impulses to the brain from the retina at the back of the eye.

Optic Chiasm: An X-shaped structure formed by the crossing of the optic nerves in the brain

Occipital Lobe: The lobe located in the back of the brain, primarily responsible for visual processing

Primary Visual Cortex: Located in the occipital lobe, the visual cortex receives information from the retina.

Resources

Neuroscience for Kids

<https://faculty.washington.edu/chudler/chvision.html>

Brain Facts.org

<https://www.brainfacts.org/Thinking-Sensing-and-Behaving/Vision/2012/Vision-Processing-Information>

Structure & Function of the Human Eye

<https://www.thoughtco.com/how-the-human-eye-works-4155646>

Image from:

Case Western School of Medicine

<http://casemed.case.edu/clerkships/neurology/NeurLrngObjectives/Vision.htm>

Image A:

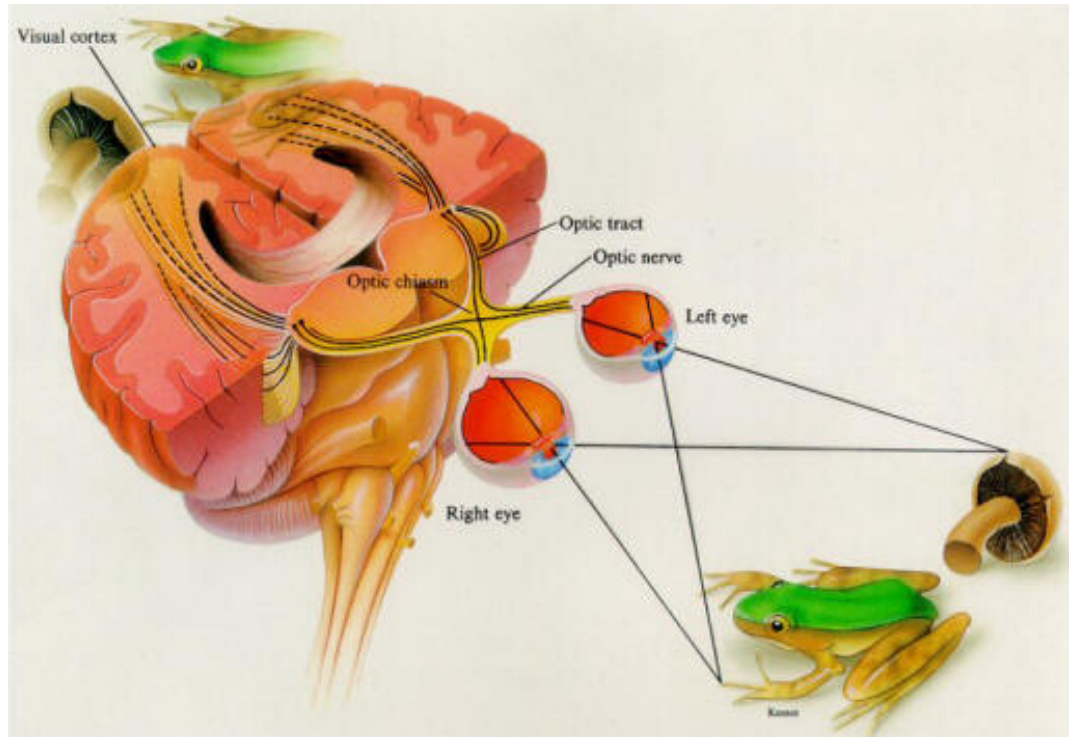


Image B:

Human Eye Anatomy

