



Depth Perception Challenge

Amount of time Demo takes: 3-5 minutes

Try this at home!

Lesson's Big Ideas

- We see things differently depending on if we are using one eye, or two. Depth perception is one of the things impacted by the use of one eye vs. two.
- When you are only using one eye; this is called monocular vision (mono = one, oculus = eye). Using two eyes is called binocular vision.

Materials

- Short clear glass/plastic cup
- Box of small washers, penny-sized (we try to avoid pennies because students take them)
- Small whiteboard and marker

Safety! Safe Demo!

Background Information

- Depth perception, ability to judge how far away things are, is the result of:
 - The first is based on **memory and your retinae**. Your eye and brain work together to remember a previous time you saw an object; how far away was it? How large was its image on your retina?
 - The second is called **moving parallax**: when you move your head from side to side, things that are close move quickly across your retina, whereas objects that are far away move comparatively little. Your brain uses this info to gauge how far something is from you.
 - Lastly, and most important to this demonstration, is **stereo vision**. Each of your eyes receives a slightly different image of an object (your eyes are not in exactly the same spot). The difference between the two images is especially great when the object is closer to your eyes. Try closing one eye and looking at your

forefinger as you hold it in front of your face. Switch which eye is closed -- did you notice your finger "jumping" to one side? When both eyes are open, your brain combines the two separate images to form a composite, more-correct judgement of where an object is.³

Setup Instructions

1. Set cups and washers on table (ensure that for both trials that the cups stay at the same distance.)

Instructional Procedure

1. Have the student hold a washer in their hand and extend their arm straight out. With one eye covered, the student should try to gauge when the washer they are holding is exactly over the cup.
2. When you say "drop it" the student should drop the washer. Did it fall into the cup? Try 5-8 times and write down how many times the washer landed in the cup when you said to drop it.¹
3. Try with both eyes open and one eye open and compare the results. When were you more accurate? You can also try moving the cup 1-2 feet to each side between drops to see how depth perception may change!²

Assessment Questions

1. When were you more accurate at telling to drop the washer?
 - a. Having both eyes open
2. When have you noticed your depth perception being better or worse?
 - a. Sometimes, people feel that their depth perception is impacted by a lack of sleep, or, of course, by only being able to use one eye.
3. When does depth perception matter?
 - a. Depth perception matters in almost all of our actions. From playing sports, to putting keys into doors, to handing things to another person. All of those actions require depth perception.

Clean Up

- Neatly package all the washers, then place them in the bin with the cups.

References

- Stanford:
<http://stanford.edu/~ajspakow/downloads/outreach/vision-student-9-29->

[09.pdf](#)

- ZOOM: <http://pbskids.org/zoom/activities/sci/pennycupgame.html>
- How Stuff Works:
<http://science.howstuffworks.com/environmental/life/human-biology/eye10.htm>

Related Next Generation Science Standards

- K-5
 - K-2-ETS1 Engineering Design
 - 4-LS1 From Molecules to Organisms: Structures and Processes
- 6-8
 - MS-LS1 From Molecules to Organisms: Structures and Processes
- 9-12
 - HS-LS1 From Molecules to Organisms: Structures and Processes