

Hands-on Neuroscience Activity 4

Topic and Learning Objective

- The Brain!
- Students will learn how reflexes work! We'll learn why they can happen so quickly and how reflexes can get better with practice.

Alignment with NGSS Grades 3-5

Disciplinary Core Ideas

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified. (4-PS4-2)

Systems and System Models

- A system can be described in terms of its components and their interactions. (4-LS1-1),(4-LS1-2)

Materials:

- Knee reflex mallets
- Flashlights
- Rulers
- Paper
- Pencils

Detailed Description

Introduction to how reflexes work!

- Reflexes are things your body does on its own without you having to think about it! They're usually very fast because of how they're 'wired' in your body.

The Knee Jerk Reflex

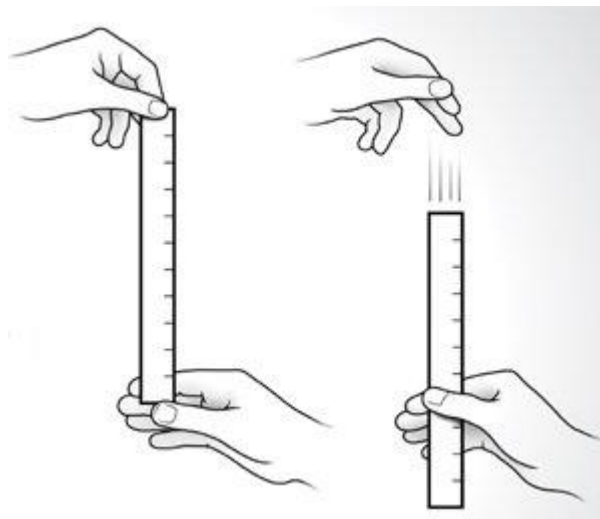
- How to achieve it: use the knee reflex mallets to hit the area on your knee just below the kneecap. The leg needs to be freely hanging as the student is seated. (Might be better to use stools from the lab classrooms). Be careful not to hit too hard, it just takes a good tap.

Every student will probably want to experience it so give everyone only one turn, then have them return to their seats after you've gone through everyone.

- After they've returned to their seats, remind them that we learned about neurons and about how their job is to send messages in your body. Explain that with this reflex, the message only goes from your knee, up your leg, to your spine, then back to your leg to tell it to kick! The message doesn't go all the way to your brain! That's why you don't have to think about doing it and why it's so fast!

The Pupillary Reflex

- When too much light hits your eye, your pupil contracts (the black area gets smaller). Use the flashlights and demonstrate this on one student. If the students seem well behaved and trustworthy, hand out the flashlights and have the students partner up, testing this reflex on each other. Instruct them to start with shining the light at the ear, then slowly move the flashlight to the side until it hits the eye and you can see the pupil close. Have them do this a few times to see it clearly and make sure they switch roles so everyone sees it.
Make sure that they understand that this reflex is also very fast and that you don't need to think about it to make it happen, it's automatic! It exists so that your eyes can protect themselves from harsh light.
- Give each pair of students a ruler, a piece of paper, and a pencil. One student will hold the ruler and the other one will try and catch it. They will then record the number of inches the ruler was caught at. (see image for setup)



- Each student will have five recorded tries of catching the ruler, then they will switch! See if they got faster as time passed!
- As students are doing this activity, go around helping them read the ruler and record the responses. Explain to them that this reflex is slower than others because it requires hand eye coordination! Your eyes and your hand must work together, and your brain is the one coordinating both of them together!

- Cleanup! Make sure all materials are put back away on the desk in the front of the room (pencils!) Make sure trash is thrown away where needed. Line up quietly to leave the class :)

Learning Skills!

- The scientific method! (Observation, recording data, interpreting data)

Safety Precautions

- Make sure students don't misuse flashlights, knee reflex mallets, or rulers. Respect the materials and students around you!