Investigation 21B ◆ Reaction Time

Various sensory organs receive stimuli from the environment and send signals to the brain, where they are interpreted. Messages sent to muscles and glands cause specific reactions to occur. How fast can you react to sound stimuli? How fast can you react to visual stimuli? Are your reactions any faster if you use both sound and visual stimuli? Are your fingers faster than your arms in reacting to stimuli?

This investigation will give you a chance to answer those questions.

Materials (per team of 2)
meterstick
metric ruler

Procedure

PART A Finger Muscles

1. Copy Table 21B.1 in your logbook to help organize your data collection.
2. Work in pairs for this experiment. Determine who will be the experimenter and who will be the subject.
   Subject: Sit down with an arm resting on the desk so that your hand extends past the edge of the desk. Your thumb and forefinger should be parallel to the ground and 4 cm apart. Use the metric ruler to keep the fingers about 4 cm apart. If the distance between the fingers varies too much, the results will be affected.
3. **Experimenter:** Stand and hold a meterstick vertically between the thumb and forefinger of the subject so that the lowest number on the meterstick is between the subject's thumb and forefinger.
4. **Experimenter:** Without warning, drop the stick.
5. **Subject:** Try to catch the meterstick with just your thumb and forefinger.
6. **Experimenter:** Look at the meterstick, and note the number of centimeters the stick dropped before the subject caught it. Record the distance in your logbook, but do not enter it in your table at this time.
7. Repeat the test four times, recording each distance the stick dropped. Determine the average for the five trials. Record the average in the data table under the heading *"Sight only."*
8. Repeat the investigation with the subject's eyes closed. The experimenter will snap his or her fingers or otherwise signal aloud when the stick is released. Calculate the average for five trials, and enter the figure in the data table under *"Sound only."*
9. Repeat the investigation with the subject's eyes open. The experimenter will use the same signal used in step 8 when the stick is released. Calculate the average for five trials, and enter the figure in the data table under *"Sight and sound."*

TABLE 21B.1
Summary of Reaction Times

	Average distance meterstick travels (cm)		
Method	Sight only	Sound only	Sight and sound
Finger muscles			
Arm muscles			
Difference			

PART B Arm Muscles

10. **Subject:** Stand an arm's length away from a classroom or hall wall, and place the palm of your hand, fingers up, flat against the wall. Lean slightly backward or move slightly backward so the palm of your hand is 4 cm away from the wall.
11. **Experimenter:** Stand and hold a meterstick against the wall so that the base of the subject's hand is even with the lowest number on the meterstick.
12. **Experimenter:** Without warning, drop the stick.
13. **Subject:** Try to catch the stick by pinning it to the wall with the flat of your hand.
14. **Experimenter:** Look at the meterstick, and find the number of centimeters the stick dropped before the subject caught it (measure from the base of the hand). Record the distance in your logbook, but do not enter it in your table at this time.
15. Repeat the test four times, recording each distance the stick dropped. Determine the average for the five trials. Record the average in the data table under the heading *"Sight only."*
16. Repeat the investigation with the subject's eyes closed. The experimenter will snap his or her fingers or otherwise signal aloud when the stick is released. Calculate the average for five trials, and enter the figure in the data table under *"Sound only."*
17. Repeat the investigation with the subject's eyes open. The experimenter will use the same signal used in step 16 when the stick is released. Calculate the average for five trials, and enter

the figure in the data table under "*Sight and sound.*"

18. Calculate the differences in the distances dropped by the meterstick for the two methods of catching it. Record the differences.

Analysis

1. In the sight-only test, what parts of your body are involved in catching the meterstick with your fingers? Which parts are involved when you catch the meterstick with your hand? Explain your answer.
2. In the sight-only test, what receptors are involved in both methods of catching the stick?
3. How do the results of the sound-only test compare with the results of the sight-only test?
4. Are there any differences between the reaction times of the finger muscles and those of the arm muscles? Explain this difference.
5. Compare the results of the sight-and-sound test with the sound-only and sight-only tests.
6. What can you conclude about your reactions to different stimuli?
7. What can you conclude about your reactions with different muscle groups?