Cynthia Ramirez
September 25, 2023

Purpose:

The purpose of Sensory Physiological experiments is to monitor sensations involving the environment through our three essential nervous system components, which are receptors, sensory neurons, and interpretation centers that work together to allow us to collect data from our senses.

Procedure:

6/7-A: Tests of cutaneous sensation

The ability to distinguish two distinct points on the skin surface will be recorded

1. With your partner's eyes closed, apply two caliper pinpoints as closely together as possible on your partner's skin on the palm of his/her hand.

2. Remove the pins and move them 1 millimeter apart. Reapply the caliper points to your partner's skin. Repeat this procedure until your partner can discriminate two distinct points.

3. Record this distance between pins at which your partner can discriminate two separate caliper points.

4. Compare results obtained from the following areas:

a. palm of hand
b. back of hand
c. fingertip
d. outer edge of the lips
e. back of neck

5. Have your partner repeat this experiment on your skin.

6. Interpret the results you have obtained.

A-2: Accommodation of thermoreceptors.

Accommodation, or sensory adaptation, occurs when receptors generate fewer impulses during constant stimulation. Accommodation of cutaneous thermoreceptors will be recorded.

1. Place your left fingers in 15 Celsius water and your right fingers in warm water (37 Celsius) and record the sensation of each. Keep hands immersed for 2 minutes.

2. After two minutes, describe the sensation in each hand.

3. Remove hands and promptly place them both in 25 Celcius water. Describe the immediate sensation in each hand.

6/7-B: Olfactory adaptation

The adaptation of olfactory chemoreceptors will be timed.

1. Block your left nostril. Uncork and hold the bottle of camphor oil under your nose until you can no longer detect the camphor. Do not consciously sniff the contents of the vial!

Record the adaptation time.

2. Remove the camphor and place the bottles of cloves, then peppermint oil under your nose. Distinguish the smells of cloves and peppermint oil.

3. Uncork and hold the bottle of camphor under your nose again until the smell is no longer recognized. Record this second adaptation time

4. Unblock your left nostril determine if the camphor is detected.

5. Interpret these results.

C-2: Audiometry

An audiometer measures hearing acuity by presenting pure tones to the subject's ear through a set of color-coded earphones (red = right ear, blue = left ear). The intensity required to first perceive the signal is recorded for each ear at a number of frequencies. The presentation of signals should be randomized. The results are plotted on an audiogram to determine individual hearing acuity compared to normal values.

1. In a quiet room, the instructor will demonstrate the proper method of operating the audiometer.

2. Audiometry tests will be conducted in pairs. Each student will take his/her partner's audiogram.

3. Record your results on the worksheet on page 44.

4. Analyze the audiograms in the following way:

   a. Average the values obtained for each ear for the frequencies of 500 Hz, 1000 Hz, and 2000 Hz.

   b. Subtract 26 dB from each average.

   c. If the difference is greater than 26, multiply this number by 1.5%. This equals the percent impairment of each ear.

Example:	Hz	Right ear	Left ear
	500	10	20
	1000	15	30
	2000	10	40
Total		35	90
Average =		12	30
		- 26	- 26
		0	4

Percent impairment:
Right ear = 0 x 1.5% = 0.0% Left ear = 4 x 1.5% = 6.0%

5. To determine the percent of biaural impairment perform the following calculation:

$$\text{Biaural impairment} = \frac{(\%\ \text{impairment of good} \times 5) + (\%\ \text{impairment of bad ear})}{6}$$

6. Record the results of these calculations.

6/7-E: Visual measurements

The sense of sight is the most important of the senses. As such, a number of standardized tests have been developed to evaluate visual functions.

E-1: Demonstration of the blind spot

1. Cover your left eye and focus the right eye on the center of the cross below.

2. Slowly bring the page closer to your eye until the spot disappears.

3. Have your partner measure this distance from your eye to the page.

4. The image of the spot is now superimposed on the optic nerve. Explain the lack of vision at this point.

E-2: The Snellen test

The ability to discriminate fine detail is known as visual acuity. The Snellen test uses a standardized eye chart to evaluate visual acuity. You will be using one of several versions of this eye chart in the form of the wall chart in the laboratory.

1. Stand 20 feet away from the Snellen chart. Cover your left eye.

2. Attempt to read the line designated “20”.

3. If you cannot read line 20, attempt line 30, 40, 50, 70, 100 or 200 until a line is legible. Perform these attempts with your left eye, covering your right eye.

4. The Snellen chart is analyzed in the following way:

$$\text{Visual acuity} = \frac{\text{Distance you read the letters}}{\text{Lowest line read clearly at 20 feet}}$$

Examples:

Nearsightedness (myopia) = 20/30

Normal = 20/20

Farsightedness (hyperopia) = 30/20

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E-3: Astigmatism

An abnormal curvature of the cornea may produce a blurred image on the retina known as an astigmatism.

1. Stand approximately 8 – 10 inches away from the radial astigmatism eye chart so that it fills your field of vision. Cover your left eye.

2. Focus on the lines in the vertical plane with your right eye.

3. If a blur appears in the lateral lines or the lines converge into one, you have an astigmatism in this plane of your eye.

4. Record the results of this test and repeat with the left eye.

E-4 Color-blindness test

Color blindness is a genetic abnormality that is carried by the X chromosome. (See page 45.) The most common form is red-green color blindness, wherein one or the other pigment or sometimes both from the respective cone is in small amounts or lacking altogether. Several versions of the test for color blindness are available. In this laboratory, you will be using the Ichikawa color blindness charts.

1. Obtain the Ichikawa color blindness charts.

2. Attempt to read the numbers of each pattern on the test panels. (There are some "practice" panels before the actual test panels begin.)

3. After the first 10 test panels, if your score indicates color blindness, continue with the next five test panels to determine which color deficiency exists.

4. Record your results on the worksheet on page 46.

E-5: Perimetry

The arrangement of rods and cones in the retina is not at random. Using objects of different colors, you will map the locations of the cones in your retina for one eye.

1. Seat yourself before the perimeter board with your right eye at the edge of the semicircle. Cover your left eye. Stare at the center line.

2. Your lab partner will introduce several different colored blocks into your field of vision. Identify these blocks by color. Do not take your eye from the center of the chart or uncover your left eye.

3. Your partner will record the degree at which the colors were discriminated on the perimetry score sheet on page 47.

4. Repeat these procedures for each block for both the horizontal and vertical perimetry charts. Record the data and connect the same colored dots to form an outline of cone placement of your right eye on your data sheet.

5. Explain these results in regards to cone placement in your retina.

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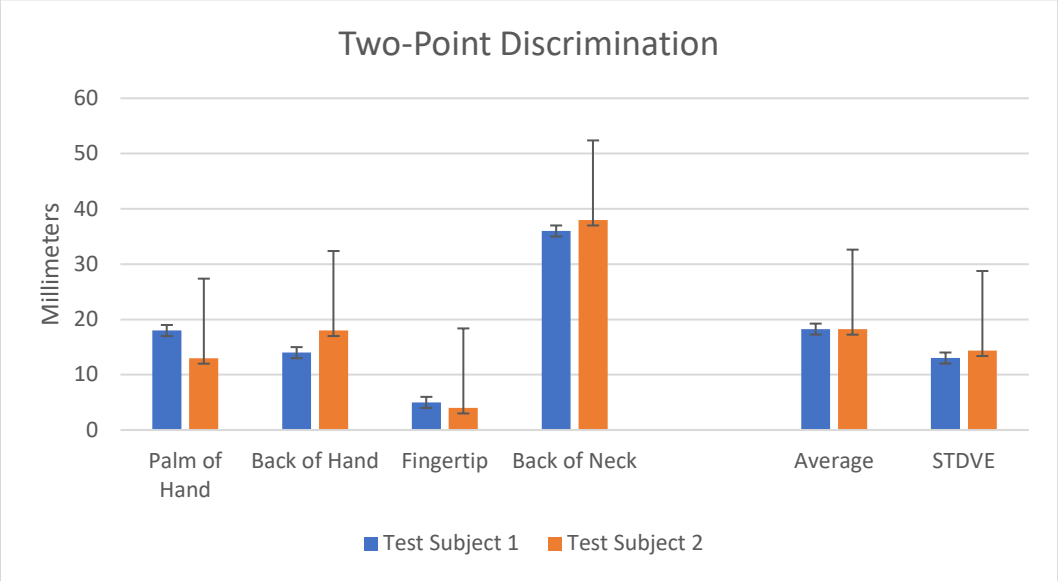
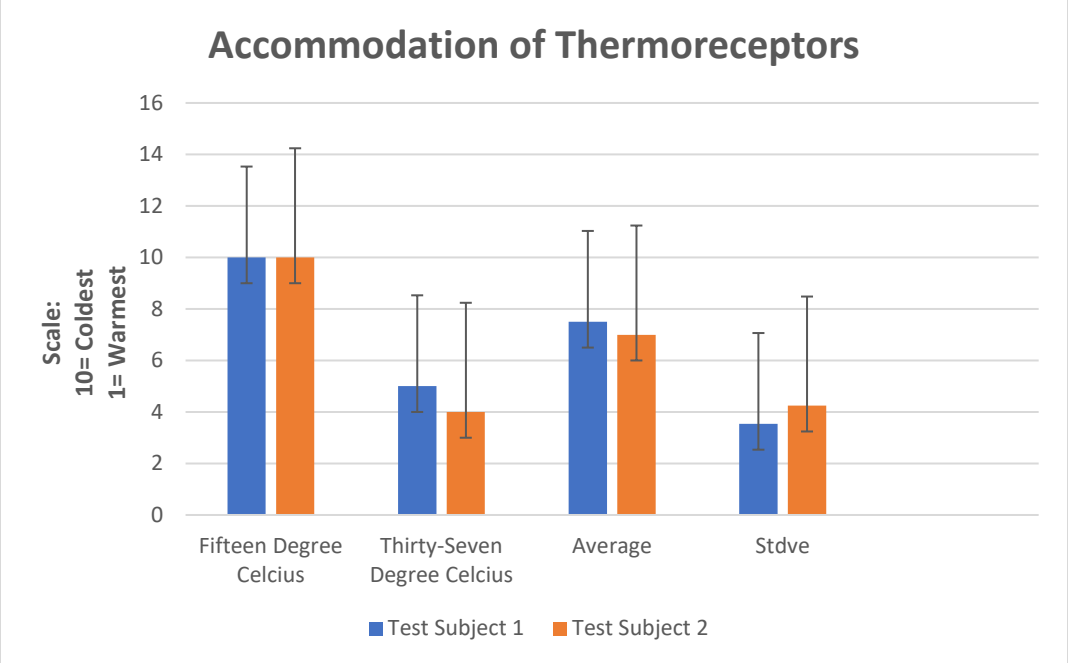
Results:

A-1



A-2



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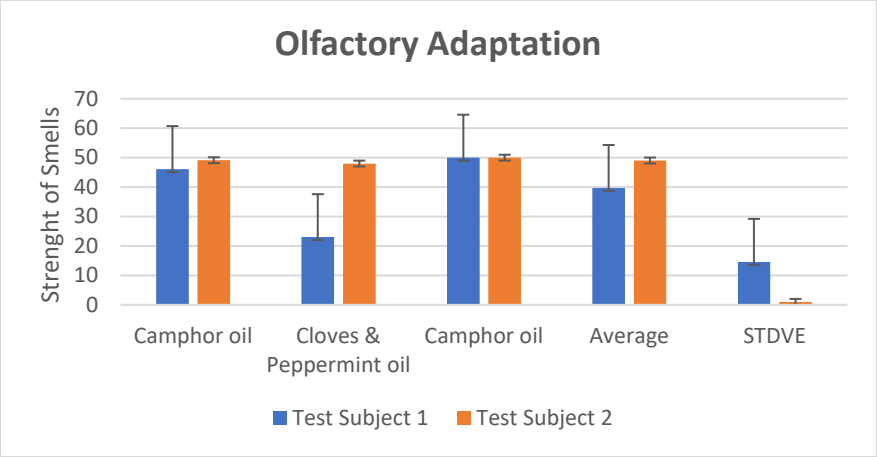
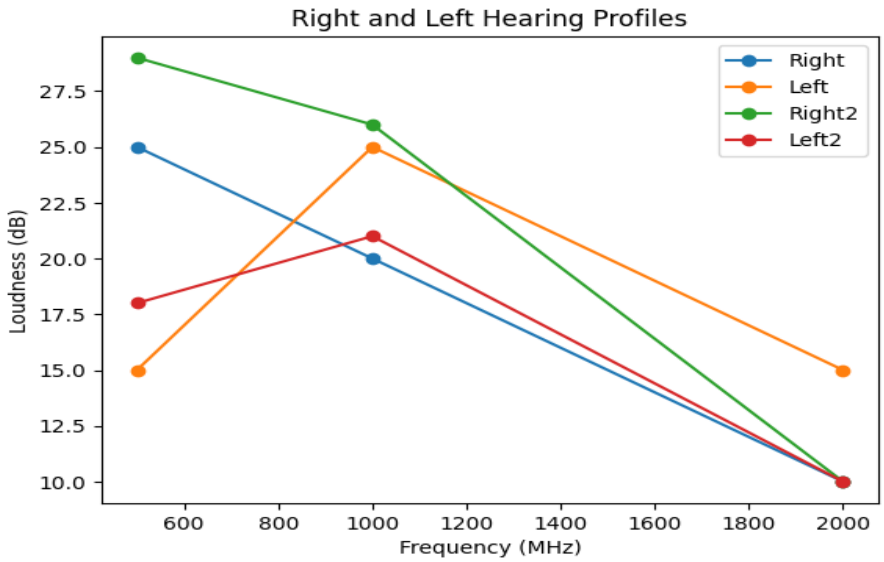
6/7 B



C-2



Test Subject 1

```
Average Right after subtraction: -7.666666666666668
Percent Impairment Right: Not impaired %
Average Left after subtraction: -7.666666666666668
Percent Impairment Left: Not impaired %
```

Test Subject 2

```
Average Right2 after subtraction: -4.333333333333332
Percent Impairment Right: Not impaired %
Average Left2 after subtraction: -9.666666666666668
Percent Impairment Left: Not impaired %
```

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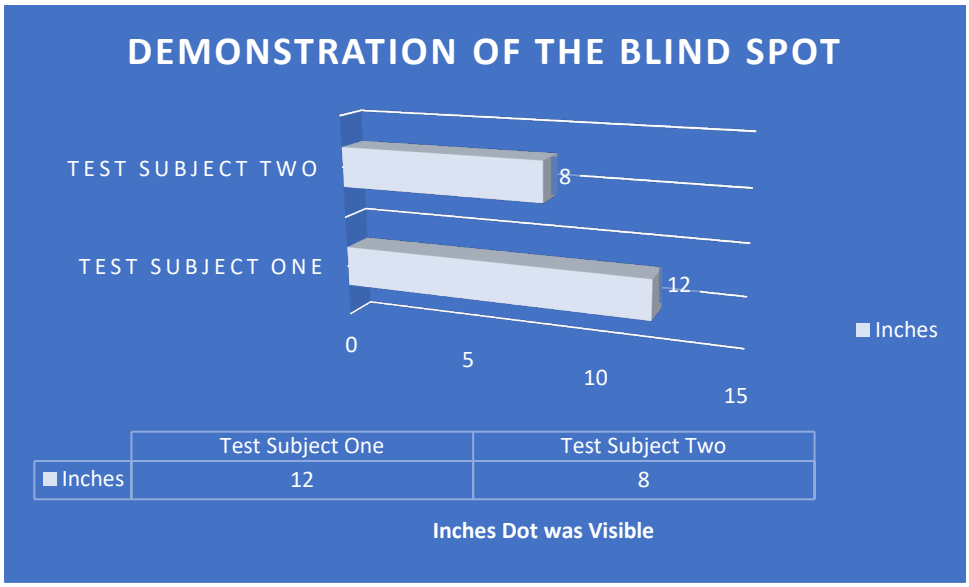
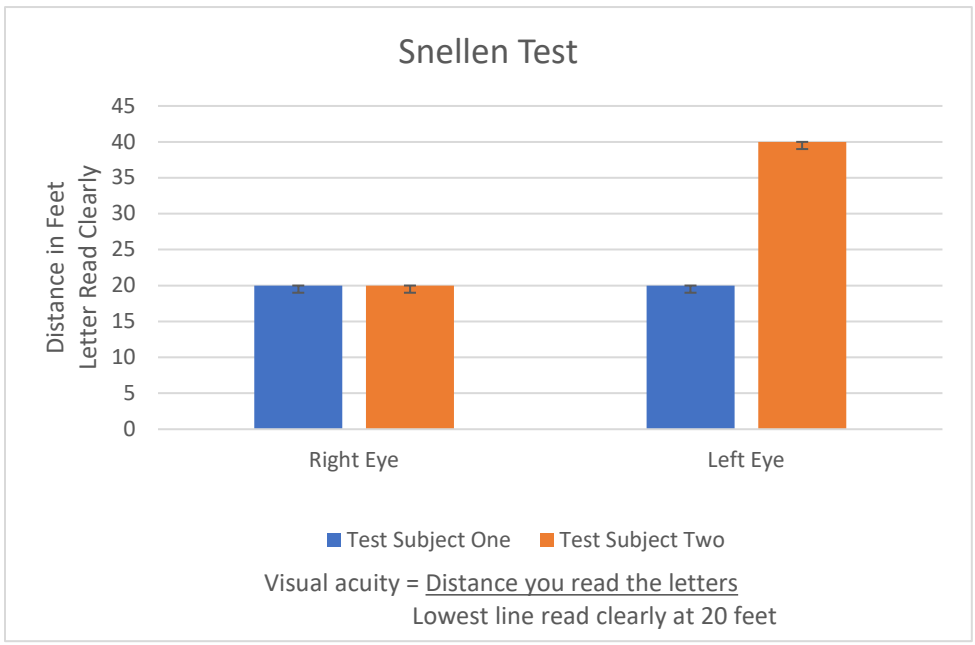
E1



E-2



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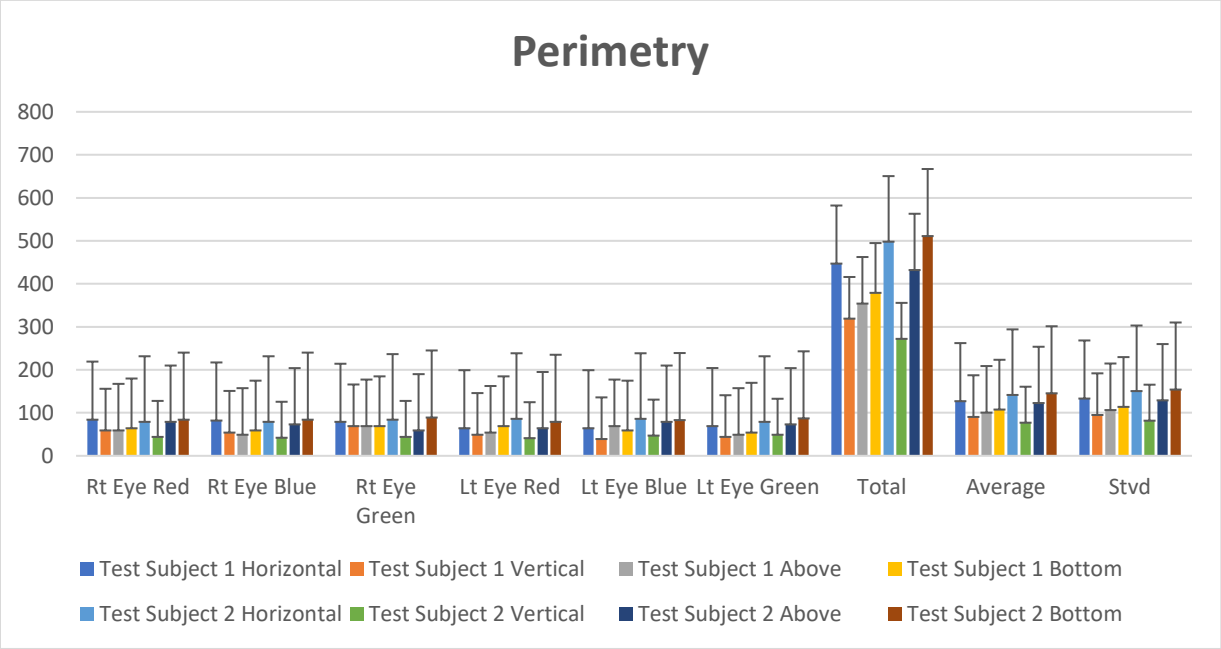
E-5



Discussion:

I enjoyed this potential reaction lab; it felt like a game racing to hit the mark. It was difficult because of the double-clicking to respond to the red button clicker, but other than that, it was interesting.

Conclusion:

Ultimately, some students' reaction times were faster than others in the class. It was nice to the input of other students' scores because it allowed me to compare reaction times. I would enjoy doing this lab exercise again.