

## Lab 6/7- Sensory Physiology

### A-1: Two-point discrimination

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

#### Procedure

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.

#### Procedure

1. Place your left fingers in 15°C water and your right fingers in warm water (37° C) 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° C water. Describe the immediate sensation in each hand.

### 6/7-B: Olfactory adaptation

The adaptation of olfactory chemoreceptors will be timed.

#### Procedure

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.

### Procedure

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	<u>10</u>	<u>40</u>
	Total	35	90
	Average =	12	30
		- 26	- 26
		0	4

### Percent impairment:

$$\text{Right ear} = 0 \times 1.5\% = 0.0\%$$

$$\text{Left ear} = 4 \times 1.5\% = 6.0\%$$

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

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

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6. Record the results of these calculations.

### E-1: Demonstration of the blind spot

#### Procedure

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.

#### Procedure

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:

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

### E-3: Astigmatism

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

#### Procedure

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-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.

#### Procedure

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.

#### Results-

##### A-1: Two-point discrimination

Palm of hand	18mm	13mm
Back of hand	14mm	18mm
fingertip	5mm	4mm
Back of neck	36mm	38mm

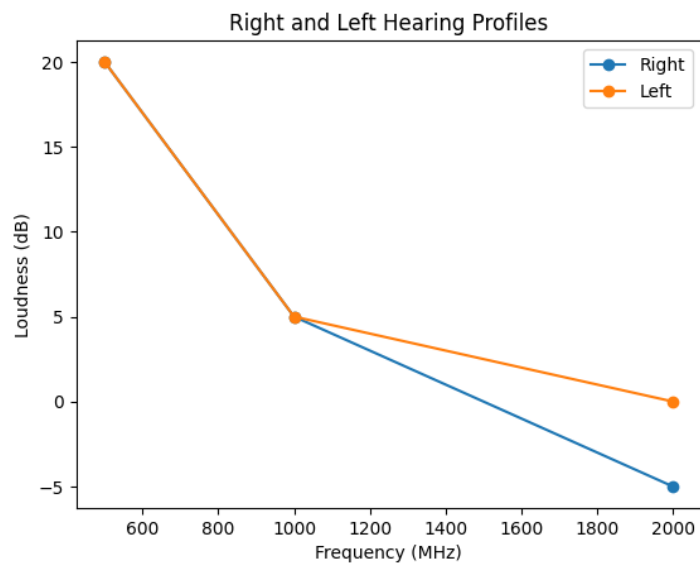
We were opposite every time. Cynthia either felt it first or I did.

##### A-2: Accommodation of thermoreceptors

	Warm water	Cold water
After two min	Calm	Shakey/numb
Both hands in 25 degrees Celsius water afterwards.	Water felt colder	My hands were a little numb but it felt like the water was almost a lot warmer.

B: Olfactory adaptation- When blocking my left nostril, I was no longer able to smell the camphor oil at 46.13 seconds. Then I was able to recognize the bottle of cloves and peppermint oil after removing the camphor oil. I then placed the camphor oil again under my nose, and I was no longer able to smell it at 23 seconds.

## C-2: Audiometry-



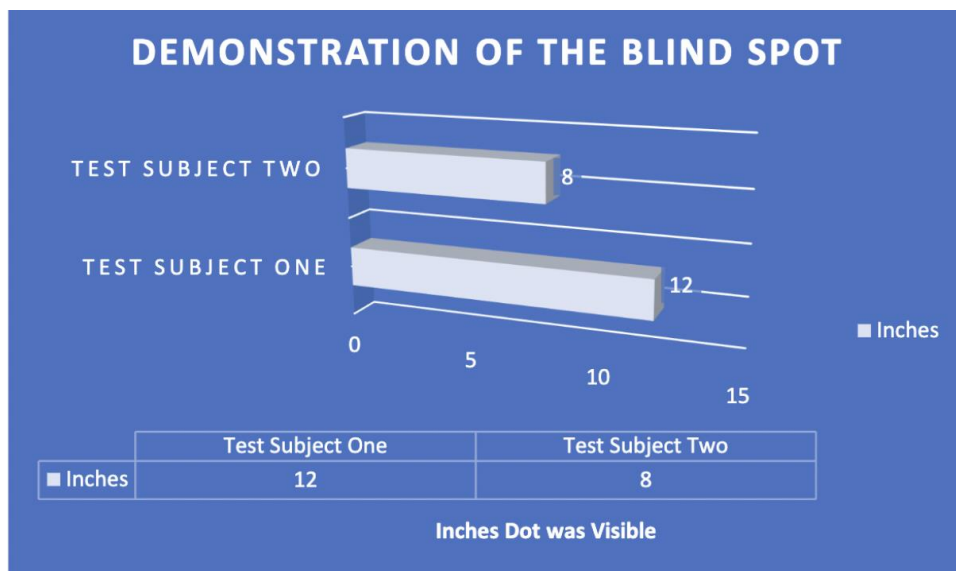
Average Right after subtraction: -19.333333333333332

Percent Impairment Right: Not impaired %

Average Left after subtraction: -17.666666666666664

Percent Impairment Left: Not impaired %

## E-1: Demonstration of the blind spot-



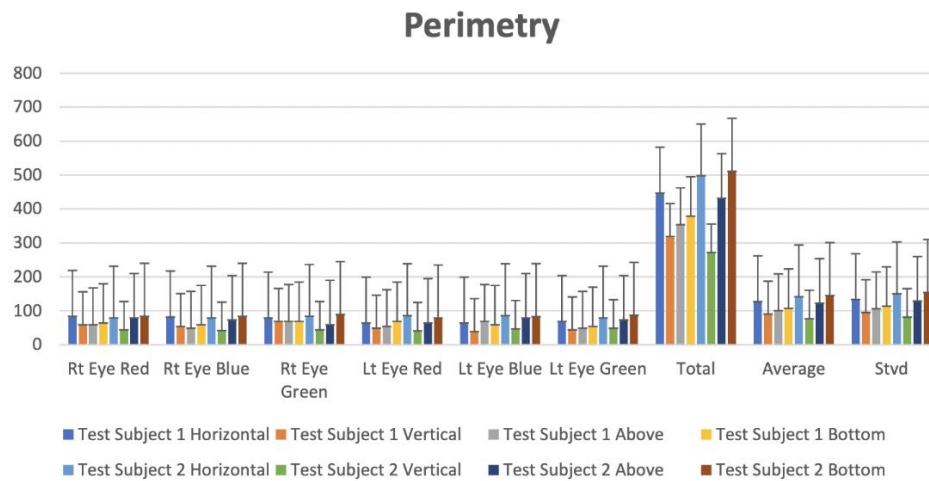
## E-2: The Snellen test-

20/20 vision for both eyes with glasses on.

E-3: Astigmatism-

I had no blurriness in either of my eyes, so I don't have astigmatism.

E-5: Perimetry-



**Discussion:** This lab was fun; my favorite test was the two-point test because it was interesting to see how far the points could get on the back of the neck without me noticing.

**Conclusion:** In this lab we learned about sensory physiology. Through various tests we learned the different aspects of sensory perception. We explored how our senses work and can now understand the mechanisms behind sensory processing.