

Purpose: We will be using a significant amount of material for these experiments.

I will be including every step by step as I go and talk about all these experiments that were done. In this laboratory, I will be performing a series of exercises that measure the capabilities of your sensory systems. Cutaneous, olfactory, auditory, proprioceptive, and visual systems will be examined to observe basic principles of human sensory physiology. Sensation, the monitoring of environmental stimuli, involves the interaction of three basic components of the nervous system. Receptors generate impulses in response to specific environmental stimuli, sensory neurons relay these impulses through afferent pathways to the central nervous system, and interpretation centers of the cerebral cortex translate these impulses into perceived sensations.

Procedures:

A-1) Two-point discrimination

- 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) Accommodations of thermoreceptors

- 1) Place your left fingers in 15-degree Celsius water and your right fingers in warm water and record the sensation of each.
- 2) After two minutes, describe the sensation in each hand.
- 3) Remove hands and promptly place them both at 25 degrees Celsius. Describe the immediate sensation in each hand

6/7-B) Olfactory adaptation

- 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!

- 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 and determine if the camphor is detected.
- 5) Interpret these results.

C-1: Turning fork test

- 1) Plug your left ear with cotton or hold your hand over it and test the right ear
- 2) Hold the handle of a vibrating turning fork to the right of the mastoid process.
- 3) When the sound disappears, move the fork near the external auditory canal.
- 4) Reappearance of the sound indicates no middle ear damage
- 5) Repeat the test with your left ear
- 6) Record the results for each ear.

C-2: Audiometry

- 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 partners 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 equal the percent impairment of each ear.
- 5) To determine the percent of biaural impairment perform the following calculation.
- 6) Record the results of these calculations.

E1: 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 the 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 tests

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

E-3: 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 Vision

Negative after-images

- 1) Stare at different colored objects provided by your lab instructor for 30 seconds each, and then shift your glance to a white sheet of paper. These may include but not be limited to colored squares on white paper, stripes of various colors against white paper, colored flags or scenic views.
- 2) Record the negative after-images seen for each color. Were you able to predict any of these.

Color blindness test

- 1) Obtain the Ichikawa color blindness charts
- 2) Attempt to read the numbers of each pattern on the test panels.
- 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

- 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 oartner will record the degree to 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 regard to cone placement in your retina.

Results

A-1: Two-point discrimination

A is Palm of hand

B is back of hand

C is fingertips

D is back of neck

RUBI	JAY
A: 9MM	A:10MM
B:22MM	B:12MM
C:2 MM	C:4MM
D:15 MM	D:14MM

A-2: Accommodation of thermoreceptors

1: Left finger dipped in a 15-degree Celsius water & Right finger dipped in 37-degree Celsius water.

2: After 2 minutes

Left finger: Ice cold, numbness sensation

Right finger: No feeling at all, No sensation

3: After removing hands and placing in 25-degree Celsius water I honestly noticed that when we switched hands, I noticed my right hand felt ice cold and my left finger was warm.

B-1: Olfactory adaptation

Adaptation time= 17.97 SECONDS

After smelling cloves & peppermint oil=10.46

After unblocking left nostril, we determined that the camphor was detected

C-1: Turning fork test

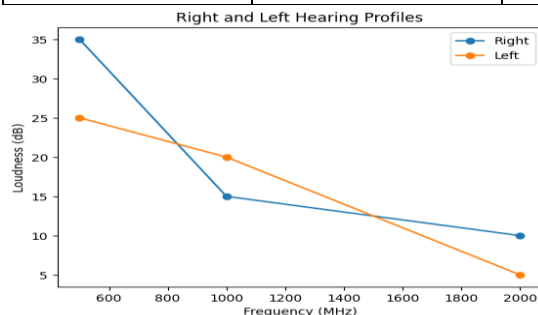
When I covered my left ear and did the test, after the disappearance of the sound I heard the reappearance of the sound, and it gave me a mild headache. Same for when I covered my right ear, I experienced the same symptoms as my left ear with a headache.

C-2: Audiometry

20-26= -6 for L Ear

17-26= -9 for R Ear in which is no percent impairment because negative.

Right Ear	35	15	10	Avrg=20
Left Ear	25	20	5	Avrg=17



E-1: Demonstration of the blind spot

Lack of vision at this point measured for me was 7 inches from my eye to the page

E-2: The Snellen tests

L eye: 20/20 R Eye: 20/15

Sharper than average-----> 20/15

E-3: Astigmatism

Right eye: Showed symptoms of blurriness but horizontal shows clear view of lines

Left eye: I experience the same symptoms as my r eye. Blurriness but horizontally showed clear views of lines

E-4: Color Vision

1: Negative After Images

Yes, I was able to predict them. The colors were popping!!

2: Color blindness test

Everything was normal

E-5: Perimetry

Flag from left

Red:80

Green:80

Blue:80

Flag from Right

Red:90

Green:90

Blue:85

Flag from below

Red:80

Green: 80

Blue:80

Flag from Above

Red:70

Green:70

Blue:70

Discussion

A-1: Two-point discrimination

I was able to distinguish two distinct points on the skin surface and I was able to feel the sensation of it and how different it feels.

A-2: Accommodation of thermoreceptors.

Thermoreceptors are rapidly adapting receptors, which are divided into two types: cold and warm. When you put your finger into cold water, cold receptors depolarize quickly, then adapt to a steady state level which is still more depolarized than the steady state. I experienced that when we switched hands my right hand was ice cold, and my left hand was warm.

B-1: Olfactory adaptation

Olfactory adaptation is a peripheral (at the epithelium level) or a central (at the brain level) mechanism resulting from repeated or prolonged odorous exposure that can induce a perceptual decrease. The aim of this study was to assess whether a peripheral adaptation occurs when an odor is repeated ten times. I love essential oils! Anyways, It took 17.97 seconds until my nose adapted to the smell, after smelling the peppermint and cloves the camphor took only 10.46 seconds to dissipate.

C-1: Tuning fork tests

When I covered my left ear and did the test, after the disappearance of the sound I heard the reappearance of the sound, and it gave me a mild headache. Same for when I covered my right ear, I experienced the same symptoms as my left ear with a headache.

C-2: Audiometry

No percent impairment in any of my ears.

E-1: Demonstration of the blind spot

I was not able to see the dot on the side when performing this experiment

E-2: The Snellen tests

To discuss with you all, my eyesight is horrible. I usually wear glasses for sightseeing. I was 20/15 which means sharper than average. A person can have 20/15 vision, which is sharper than average. If you have 20/15 vision, you can see a line in the eye chart at 20 feet that the average person can only see when they are 15 feet away.

E-3: Astigmatism

My right showed symptoms of blurriness but horizontal shows clear view of lines and experienced the same for my left eye

E-4: Color vision

1: Negative After Images

Yes, I was able to predict them. The colors were popping!!

2: Color blindness test

Everything was normal

E-5: Perimetry

Looks like everything is okay

Conclusion

Sensation can be divided into four types: superficial, deep, visceral, and special. Superficial sensation is concerned with touch, pain, temperature, and two-point discrimination. Deep sensation includes muscle and joint position sense (proprioception), deep muscle pain, and vibration sense. Scientists now believe our sensory receptors may number closer to 18 to 20.

Chemoreceptors respond to chemicals in taste and smell and in internal changes.

Thermoreceptors respond to temperature changes. Mechanoreceptors respond to physical forces in touch, hearing, and pressure. Sensory adaptation refers to the way our senses adjust to different stimuli. Various senses—including hearing, touch, smell, proprioception, and sight—can adapt in response to changes in the environment. Adaptations can allow these senses to continue to function in adverse or overstimulating conditions. Intensity coding is a detection theory analysis of a rate-based intensity code indicates that information from very few fibers. Hearing tests check a person's ability to hear the loudness and pitch of sounds. The results are charted on a graph (audiogram) to help pinpoint the severity and causes of hearing problems. Tests include pure tone audiometry, using an audiometer, and speech discrimination tests. Sensory receptors have specialized functions, and respond to environmental changes in stimuli. Usually,

activation of these receptors by stimuli causes graded potentials triggering nerve impulses along the afferent PNS fibers reaching the CNS. If the information is appropriately combined, account for psychophysical discrimination even at high intensities. There are several types of visual field tests, but they all have one thing in common: you look straight ahead at one point and signal when you see an object or a light somewhere off to the side. Your provider will explain to you exactly where to look so that the test is accurate. Rods are responsible for vision at low light levels (scotopic vision). They do not mediate color vision, and have a low spatial acuity. Cones are active at higher light levels (photopic vision), are capable of color vision and are responsible for high spatial acuity. The central fovea is populated exclusively by cones. Rods are responsible for vision at low light levels (scotopic vision). They do not mediate color vision, and have a low spatial acuity. Cones are active at higher light levels (photopic vision), are capable of color vision and are responsible for high spatial acuity. The central fovea is populated exclusively by cones.