

Jedric Callado

Lab 6&7

Physiology

Nov 27, 2023

Purpose: For these investigations, a sizable quantity of material will be used. I will provide step-by-step instructions and discuss all of the tests conducted. I will be conducting a number of tests in this lab to gauge the capacities of your sensory organs. We'll look at the cutaneous, olfactory, auditory, proprioceptive, and visual systems to see how fundamental human sensory physiology works. Three fundamental nervous system components combine to produce sensation, which is the observation of external stimuli. In response to particular environmental stimuli, receptors release impulses. Sensory neurons then transmit these impulses to the central nervous system via afferent pathways. The cerebral cortex's interpretation centers then interpret these impulses into sensations that are felt.

Procedure:

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= Distance you read the letters

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 partner 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

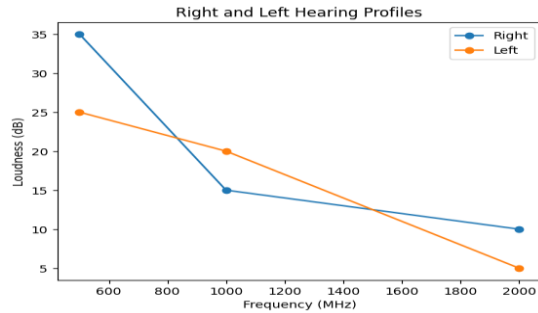
When I covered my left ear and did the test, after the disappearance of the sound I heard the reappearance of the sound, and it gave me a mild headache. Same for when I covered my right ear, I experienced the same symptoms as my left ear with a headache.

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

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:

Four categories of sensation exist: visceral, profound, superficial, and exceptional. Touch, pain, warmth, and two-point discrimination are all considered aspects of superficial sensation.

Proprioception, the sense of joint and muscle position, deep muscular discomfort, and vibration perception are examples of deep sensation. Our sensory receptor count may actually be closer to 18–20, according to scientists. Chemoreceptors react to chemicals by altering internally and by changing taste and smell. Thermoreceptors react to variations in temperature. Mechanoreceptors react to pressure, touch, and other physical stimuli. The term "sensory adaptation" describes how our senses adapt to various stimuli. Hearing, touch, smell, proprioception, sight, and other senses are all able to adjust to changes in their surroundings. These senses can adapt to stay functional in unfavorable or overstimulating environments.