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Lab 6 and 7

Purpose

In this laboratory, 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. Each of these receptors generates a graded potential, which, if strong enough, will depolarize a connecting sensory neuron. Receptors may also excite sensory neurons by delivering many sub-threshold impulses per second. This process is known as summation and may involve the convergence of many impulses from many slow-firing receptors (spatial summation) or the delivery of many impulses by a single fast-firing receptor (temporal summation). Ultimately, the stimulation of a specific interpretation center results in the perception of a specific sensation. The intensity or strength, with which a specific sensation is perceived, depends on the rate that impulses are delivered to an interpretation center. Stronger sensations result from higher frequencies of nerve impulse arrival. This phenomenon is known as intensity coding, and is frequency, not amplitude, dependent.

Procedure

6/7-A: Two-point discrimination

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

A-1:

Results:

Partner 1: Partner 2:

Palm of Hand: 4mm Palm of Hand: 4mm

Back of Hand: 3 mm Back of Hand: 6mm

Finger Tip: 3 mm Finger Tip: 3mm

Outer edge of lip: 3 mm Outer edge of lip: 3mm

Back of neck: 5mm Back of neck: 5mm

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.

Place your left fingers in 15°C water and your right fingers in warm water (37°C) and record the sensation of each.

After keeping one hand in cold water for 2 minutes, the hand started to go numb with the cold while the hand in the hot water started to feel like it was suffocating and was tightening up.

Once the hand in the hot water was put into the warm water it started to feel cold and the hand that was in the cold water and put in the warm water started to heat up a little bit.

6/7-B: Olfactory Adaptation

The adaptation of olfactory chemoreceptors will be tested

Block your left nostril. Uncork and hold the bottle of camphor oil under your nose until you can no longer detect the camphor. Remove the camphor and place the bottles of cloves, then peppermint oil under your nose. Distinguish the smells of cloves and peppermint oil. Uncork and hold the bottle of camphor under your nose again until the smell is no longer recognized. Record this second adaptation time.

Was no longer able to detect the smell of camphor after 30 seconds

The 2nd time I was no longer able to smell the camphor after 42 seconds

6/7-C: Auditory measurements

Sound is measured in terms of amplitude (decibels –dB) and frequency (Hertz –Hz). Tuning fork tests and an audiometer will be used to evaluate auditory function.

C-1: Tuning Fork Tests

These tests utilize the principle of bone conduction to directly vibrate the cochlear hair cells. They should be done in a quiet room for most reliable results.

1. Rinne’s Test

Right Ear has no damage on mastoid process and near external auditory canal.

Left ear also has no damage near mastoid process and near external auditory canal.

C-2: Audiometry

\*On ipynb file from google colab

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

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

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

Results:

Partner 1: Partner 2:

Left eye: 8 inches Left eye: 8 inches

The lack of vision is because your eyes work together and when one is covered its going to only be able to see to a certain extent.

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.

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

Attempt to read the line designated “20”.

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.

Results:

Partner 1: Partner 2:

Left Eye Left eye

20/30 near sighted 20/15 Sharper than average

Right eye Right eye

20/30 near sighted 20/15 Sharper than average

E-3: Astigmatism

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

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

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

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

No blurs appeared with both left and right eye while performing the test.

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.

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.

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.

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

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.

Results:

Flag from left: Flag from above:

Red: 83 degrees Red: 30 degrees

Green: 69 degrees Green: 32 degrees

Blue: 88 degrees Blue: 33 degrees

Flag from right: Flag from below:

Red: 86 degrees Red: 65 degrees

Green: 85 degrees Green: 80 degrees

Blue: 82 degrees Blue: 81 degrees

Discussion: everyone is different and people have different ways of seeing and hearing things, seeing things, and feeling things are different in comparison to other people and results are rarely going to be the same in some areas.

Conclusion: seeing how multiple test are done to find someone’s vision, hearing and sensory was fun to do as it kind of felt like a sneak peak into what someone who does this for a job actually have to do. Obviously not to their extent but still fun none of the less.