Purpose

Labs 6 and 7 were designed to show us how our sensory physiology works. It involved many small experiments using odor containing bottles, water at different temperatures, calipers, eye/ color charts and an audio measuring device.

Procedure

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 15C 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-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 (checks for middle ear damage)

Procedure
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 tuning fork to the right 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.
2. Weber's test (checks for nerve or conduction deafness)
NOTE: This test does not need to be performed if no middle ear damage was detected by the Rinne's test.
Procedure
1. Hold the handle of a vibrating tuning fork (512 Hz) to the bridge of your nose.
2. Lateralization of sound to one ear indicates deafness.
a. Lateralization to poor ear indicates conduction deafness. b. Lateralization to better ear indicates nerve deafness.

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 of impairment of each ear.
Percent impairment:
Right ear = 0 x 1.5% = 0.0% Leftear =4x1.5%=6.0%
5. To determine the percent of biaural impairment perform the following calculation:
Biaural impairment = (% impairment of good x 5) + (% impairment of bad ear) 6
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 = Distance you read the letters 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-4: Color vision

Cones contain visual pigments that respond to specific wavelengths of light to produce nervous impulses pertaining to color. The next two tests will explore different aspects of color vision.

1. Negative After-images

Staring at an image of specific color for too long will "bleach out" visual pigments of that color. Glancing at a white surface will reveal an image of complementary color to the original.

NOTE: This test will be done first as a class, then may be repeated on an individual basis.

Procedure

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?

2. 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.

Procedure

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.

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

Lab E1

The spot disappeared 7 inches from my face.

Lab E2

20/20 vision

Lab E3

The astigmatism chart looked blurry to me, some of the lines also started to converge indicating probable astigmatism.

Lab E4

Colors flipped to opposite of each other, blue turned to red.

Color blindness test indicating no color blindness

Lab A1

Palm of hand 9mm

Back of Hand 9mm

Fingertip 2mm

Back of neck 4mm

Lab A2

No extreme change noticed, hand held in cold water felt really warm when put into intermediate temperature water, hand held in warm water felt really cold when put into intermediate temperature water.

Lab B Olfactory Adaptation

Adaptation time 1 22 seconds

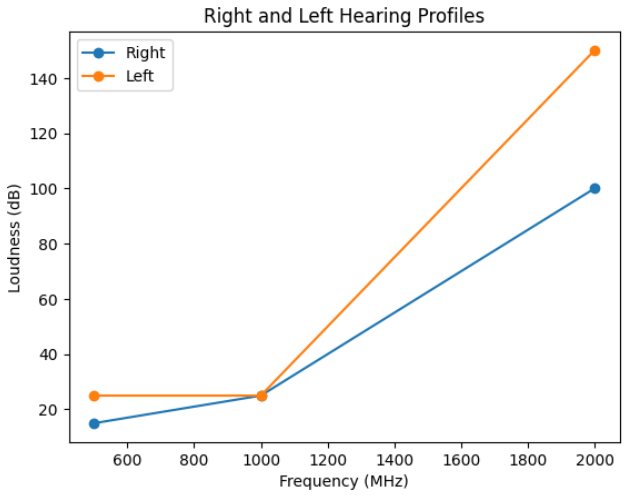
Adaptation time 2 15 seconds

This test shows that olfactory senses will adapt to a constant stimulus over time

Lab C1 Tuning fork tests

No damage observed in either ear.

Lab C2



Lab E5

Flag from right	**Flag from left**	**Flag from above**	**Flag from below**
Green 66°	Green 73°	Green 27°	Green 75°
Blue 78°	Blue 85°	Blue 28°	Blue 86°
Red 89°	Red 68°	Red 23°	Red 92°

Discussion

This lab was straightforward and easy to complete. There were no unexpected complications and all experiments were easy to understand and complete

Conclusion

All in all, this lab was easy to understand and complete. The experiments provided us data on many senses and how sensitive they are to various stimuli. I think it was a valuable and fun lab session that allowed us to measure how our own body reacted to stimuli. All of the data collected appears to be within range and not erroneous in nature.