

## Vision

### 1. Iris Reflex

The iris, or colored area of the eye, is actually a muscle surrounding a black opening, the pupil. When the iris contracts the pupil opening becomes smaller; when the iris relaxes, the pupil enlarges. Watch it!

Face the windows. Close you eyes and cover them with your hands for ten seconds. Then uncover and open your eyes while your partner closely watches your pupils.

What happens? \_\_\_\_\_

What is the value of this reflex? \_\_\_\_\_

Keep both eyes open. Hold your hands vertically along your nose between your eyes. Have your partner shine a light into your left eye while they observe the iris and pupil of your right eye.

What happens? \_\_\_\_\_

Why? \_\_\_\_\_

### 2. Dominant Eye

Roll a sheet of paper into a tube one inch in diameter. Hold it at arm's length and, with both eyes open, look through it at some small object across the room. Keep focusing on the object and move the tube toward your face.

Which eye does the tube come to? \_\_\_\_\_

Are you right or left handed? \_\_\_\_\_

### 3. Blind Spot

Take one of the three by five index cards with a 5 mm square and 5mm circle on it about 4 cm apart. Close your left eye, hold the card about a foot in front of your right eye with the square on the left, and focus on the square. Although, you are concentrating on the square, the circle will also be within your field of vision. Now move the card toward your right eye and find the spot where the circle disappears. (If it dose not disappear, concentrate harder on the square.)

Explain your results in terms of the anatomy of the retina. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

#### 4. After Image

A sheet of black paper and a sheet of white paper are set out as backgrounds. Place a small red card on the black paper and stare at the red card for thirty seconds. Now look quickly to the white paper. What do you see? Experiment with all the colors and record your results.

|            |       |            |        |        |        |
|------------|-------|------------|--------|--------|--------|
| Color      | Red   | Blue-Green | Orange | Purple | Yellow |
| Afterimage | _____ | _____      | _____  | _____  | _____  |

#### 5. Visual Acuity

The ability to see an object clearly and to distinguish the details in the images projected on the retina is termed visual acuity. The standard Snellen chart is used to test visual acuity. 20/20 vision is normal.

Stand on the piece of masking tape which is twenty feet from the Snellen chart on the wall. Lightly cover your left eye with your hand. Have your partner report to you the label of the smallest letters you can read correctly. This number is the denominator of the fraction. For example, if at 20 feet, you read the line labeled 15, your vision in that eye is 20/15. If on the other hand you read the line labeled 50, your vision in that eye is 20/50, which is below normal.

Test the other eye. If you wear glasses or contacts, test your vision with and without them. (Record results with glasses in parentheses.)

Left Eye \_\_\_\_\_

Right Eye \_\_\_\_\_

#### 6. Depth Perception

Choose a partner and use a test tube and pencil as demonstrated by the instructor. Sit or kneel so that your eyes are on a level with the top of the test tube. Close both eyes and have your partner move the test tube holder around. Now, open one eye and **quickly** place the pencil in the test tube.

What happened? \_\_\_\_\_

Repeat and then try with the left eye.

Result? \_\_\_\_\_

Finally, try using both eyes.

Results? \_\_\_\_\_

Do you see that depth perception is improved when two eyes are used? The brain compares the view received by one eye with that received by the other; the closer the object, the greater the difference in parallax of these views.

## 7. Another aspect of Binocular Vision

Hold your forefinger about eight inches from your nose. Close first one eye, then the other, while watching your finger. Repeat rapidly several times.

What happens? \_\_\_\_\_

Why? \_\_\_\_\_

\_\_\_\_\_

## 8. Optical Illusions

Look at 3 of the optical illusions or ambiguous figures in the folder. Identify which parts of the drawings confuses your perception?

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

## 9. Color blindness

Color blindness may be total or red-green. Total color blindness is rare. Red-green blindness is more common, and the Ishihara series of color plates has been developed to test for it. Conditions in the lab are far from ideal for accurate detection of color blindness, but you may gain a general idea of the method by observing the plates from the Ishihara series book. Check your results against the key in the back of the book to determine if you have any deficits.

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_

9. \_\_\_\_\_ 10. \_\_\_\_\_ 11. \_\_\_\_\_ 12. \_\_\_\_\_

13. \_\_\_\_\_ 14. \_\_\_\_\_ 15. \_\_\_\_\_ 16. \_\_\_\_\_

17. \_\_\_\_\_ 18. \_\_\_\_\_ 19. \_\_\_\_\_

Check your answers against the answer key at the back of the book. Circle any of these which indicate a deficiency?

Which, if any, deficiencies do you have? \_\_\_\_\_

## 10. Peripheral Color vision

The cones, which are receptors for color vision, are concentrated near the center of the retina. The periphery of the retina contains mostly rods, which are sensitive to black and white.

Sit down with a table at your right. Focus your eyes straight ahead on an object at eye level. Place the peripheral color apparatus on your head. Your partner will use six colored pipe cleaners — red, yellow, green, blue, black, and white. They will hang one color at random from the apparatus and rotate the holder from the left and right towards the center. As soon as you can identify the color (still looking straight ahead) your partner note the angle at which this occurs. Repeat until all of the colors have been tested.

For which color do you have the widest vision? \_\_\_\_\_

For which color is your vision narrowest? \_\_\_\_\_

Were you able to detect movement before you could identify color? \_\_\_\_\_

## Senses of the Skin

### 11. Two-Point sensibility

In many areas of the skin, the nerve endings which respond to touch are so far apart that you identify two sensations as one. The distance between two points when they begin to feel like one is called the "two - point threshold". This distance varies from one area of the body to another and can be determined by using two pin points or dividers but choose a trustworthy partner!

Have your partner close his eyes. Place the points four inches apart on the inner surface of the forearm. Move the needles closer and farther apart, and ask your partner whether they detect one or two points. How far apart were the points when they recognized two sensations as one?

Repeat on the back of the neck and on the finger tip. Two-point threshold on:

Forearm \_\_\_\_\_ Back of neck \_\_\_\_\_ Fingertip \_\_\_\_\_

Why does sensitivity vary from one part of the body to another?

\_\_\_\_\_

## 12. Temperature Perception

Three containers are filled with cold, lukewarm, and hot water. Immerse your left hand in the cold water for two minutes and then move it to the lukewarm water.

How does your left hand now feel? \_\_\_\_\_  
Immerse your right hand in hot water for ten seconds and then move it to the lukewarm water.

How does your right hand feel now? \_\_\_\_\_

Which hand felt hottest in the lukewarm water? \_\_\_\_\_  
In this case, your skin seems to respond to the temperature change rather than to the exact temperature of the middle container.

## 13. The Corpse

Place the palm of your right hand against the palm of your partner's left hand. With your free hand, grab and feel the two opposed index fingers.

How does this feel? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

## 14. Tactile Illusion

The subject closes his eyes, crosses his fingers, and places them on the table. Your partner touches the crossed finger tips, sometimes with one pencil and sometimes with two.

Why is it difficult to tell how many pencils are touching you? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

# Hearing

## 15. How keen are your ears?

Close your left ear with a cotton plug. Have your partner move a ticking watch or metronome away from your open right ear until the sound is barely perceptible. Measure the distance from ear to watch. Repeat, closing the right ear and moving the watch away from the left.

How far away could your **left** ear hear the watch? \_\_\_\_\_ **Right** \_\_\_\_\_

Does the sound fade gradually or stop abruptly? \_\_\_\_\_

## 16. Direction of Sound

At some time during the lab, the instructor will call for silence and a volunteer. The subject sits near the center of the room with other students in front of him, behind him, and at various angles to the sides. He closes his eyes and one ear. One at a time, as the instructor directs, class members will click clickers and the subject will point in the direction from which the sound seems to come from. Repeat, closing the other ear. Finally, try it with both ears open.

Why do you have two ears. \_\_\_\_\_

## 17. Bone Transmission of Sound

Plug both ears with cotton and hold a vibrating tuning fork between your teeth. Can you hear it? \_\_\_\_\_ Open one ear. In which ear is the sound more distinct? \_\_\_\_\_ Open both ears, remove the fork from between the teeth, but hold it close to your mouth. Is the sound more or less distinct than when the fork was between the teeth with both ears closed?

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# Chemical Senses

## 18. Taste Areas of the Tongue

In man there are four fundamental sensations of taste—sweet, salty, sour, and bitter—for which there are separate taste buds, with specific receptors, located on different parts of the tongue.

**Find them!**

Wipe your tongue dry with a Kleenex. Have your partner dip a cotton-tipped applicator in the sugar solution and remove any excess liquid by touching the cotton to the inner rim of the container. They will touch the applicator to the tip, middle, sides, and back of your tongue; you should signal to them whenever you can detect the sweet taste. Wherever you are sensitive to sweetness, your partner will note the spot on the outline drawing of the tongue below.

Rinse the mouth, dry the tongue, and use a clean applicator for each of the other test solutions. Use the following code in recording results:

W = sweet (sugar)

S = salty (salt)

B = bitter (quinine)

V = sour (vinegar)

## 19. Interdependence of Taste and Smell

Close your eyes, hold your nose, and stick out your tongue. Your partner will spear five cubes of food on toothpicks—onion, potato, apple, carrot, and celery—and will place them, one at a time on your tongue. Try to guess which food it is while your tongue is still sticking out—i.e., don't roll it around, or change your mind after you pull your tongue in to speak. The food cube should remain on your tongue for one second.

Your partner will try **Each food Five times**, and should *vary the order* in which he presents them. Record the results (for your tongue) on the following table.

### Food Guessed

|                    |        | Onion | Potato | Apple | Carrot | Celery |
|--------------------|--------|-------|--------|-------|--------|--------|
| <b>Food Tested</b> | Onion  |       |        |       |        |        |
|                    | Potato |       |        |       |        |        |
|                    | Apple  |       |        |       |        |        |
|                    | Carrot |       |        |       |        |        |
|                    | Celery |       |        |       |        |        |

As a quick check, try a few samples without holding your nose. Are your guesses more accurate? \_\_\_\_\_

If you pull your tongue in before guessing, you will be using your sense of smell as well as your sense of taste, even if you continue to hold your nose. How does the structure of your mouth and nose make this true?

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### 20. Enjoying Your sense of Smell

Ten familiar substances are presented for you to identify by odor alone. How many can you recognize?

- |          |           |
|----------|-----------|
| 1. _____ | 2. _____  |
| 3. _____ | 4. _____  |
| 5. _____ | 6. _____  |
| 7. _____ | 8. _____  |
| 9. _____ | 10. _____ |

Can odors be classified as easily as tastes can? \_\_\_\_\_ Explain.