**Sensory Overload**

**A. Vision**

1. **Adaptation to low light** 
   1. To determine how the different photoreceptors in your eyes adjust to changing light conditions, you will be asked the following activity with the help of your instructor.
   2. Under regular light, sort the foam pieces in the plastic bag into separate piles of matching color as quickly as you can. This is your ***control experiment***.

*How long does it take you to sort the colors? Check with a partner to make sure the colors were sorted correctly.*

* 1. Shuffle the colored shapes to mix up the colors.
  2. When the instructor turns off the classroom lights, immediately sort the pieces by color again, working as quickly as you can.
  3. Review the results of your experiment when the lights are turned back on.

*How long does it take you to sort the colors? Are any of the colors sorted incorrectly? If so, which ones?*

* 1. Reset the experiment, and wait for the instructor to turn off the lights again. This time, wait 1 minute before quickly sorting the colors.

*How do your results compare with the previous test under low light?*

*How does it compare with the control experiment?*

*Under what circumstances would natural selection favor the ability of the eyes to quickly adjust to changing light conditions?*

1. **Peripheral Color Blindness**

There are areas in your eye in which color cannot be detected. This is called peripheral color blindness.

1. Hold one of the colored pens in front of your right eye approximately one foot in front of your face.
2. Slowly move it to your right in a circular arc (towards your ear) until you can no longer determine the color of the pen's cap. We are all colorblind to some extent!

*Which kind of photoreceptor in our eyes can detect color? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Which photoreceptor is very sensitive to light? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Why do you think that there are fewer color-sensitive photoreceptors along the periphery of our eyes? What kind of visual information are we likely to encounter at that angle?*

**B. Touch**

**1. Concentration of Touch Receptors**

You have different concentrations of touch receptors on you body depending on the need to detect touch stimuli in each area. Places on you body that come in contact with tactile stimuli frequently tend to have many touch receptors. Also, places on your body where touch is necessary for a particular physiological function may also have many touch receptors.

*Where on your body would you expect to have a high concentration of touch receptors (of the five locations listed in the table below)?*

1. Choose 1cm2 areas on the face, neck, shoulder, back of arm and fingertip of your partner.
2. Gently tap this area with monofilament 20-30 times
3. Do NOT tell your partner how many times you plan on tapping). Do not tap at a constant rate but vary the rate of hits.
4. The person being tapped should not watch the monofilament, but should look away and count the number of times they feel a tap.
5. Both partners should take turns with this activity and record the data.

*Was your hypothesis supported by your experiment results?*

**2. Two-Point Discrimination**

Touch receptors can also differ from each other by the total area over which each receptor detects touch stimuli. These areas are called ***receptive fields***. Large receptive fields allow the cell to detect changes over a wider area, but lead to a less precise perception. Thus, the fingers have many, densely packed mechanoreceptors with small receptive fields while the back, for example, has fewer receptors with large receptive fields.

*Where on your body would you expect to have touch receptors with the smallest receptive fields (of the five locations listed in the table below)? Why?*

1. Choose the same 1cm2 areas on the face, neck, shoulder, back of arm and fingertip of your partner as you did in the previous test.
2. Using the two-point discriminator, tap the chosen location, starting with the smallest distance.
3. Do NOT tell your partner what distance you are testing.
4. The person being tapped should not watch the experiment, but should look away and say for each tap, whether they feel one point or two separate points.
5. Both partners should take turns with this activity and record the minimum distance at which they felt two points at each location.

*Was your hypothesis supported by your experiment results?*

1. **Hearing** 
   1. Place a meter-stick next to your partner’s ear and have them hold it in place.
   2. Strike one of the tuning forks on a book to make it vibrate.
   3. Put the fork close to your partner's ear and move it away from his or her ear along the meter-stick. Move the tuning fork at a rate of 10cm/sec.
   4. Stop moving the tuning fork when your partner tells you when they can no longer hear the sound.
   5. Your partner should record the pitch of the tuning fork and the max distance at which they could hear it.
   6. Repeat the experiment with two other pitches.
   7. Switch roles and have your partner conduct the same experiment on you.

*How did the pitch affect how far you could hear the sound? Which pitch is more easily detectable over longer distances?*

*Discuss the ways in which this experimental design could be improved to achieve more accurate results.*

1. **Taste**

1. **Identifying Tastes** 
   1. Using a clean Q-tip, add a few drops of solution A to the end of your Q-tip.
   2. Gently roll the Q-tip on the surface of your tongue and identify the taste (sweet, salty, bitter or sour).
   3. Repeat this procedure with a clean end of the Q-tip for each of the taste solutions.
   4. Record your results in the data table below, then check your answers with the key provided.

|  |  |
| --- | --- |
| Taste Solution | Taste |
| A. |  |
| B. |  |
| C. |  |
| D. |  |

*How accurate were you in your analysis? Were some tastes easier or harder to identify than others?*

1. **Taste Paper - PTC**

PTC (Phenylthiocarbamide) has the unusual property in that it either tastes very bitter or is virtually tasteless, depending on the genetic makeup of the taster. The ability to taste PTC is a dominant genetic trait. Ability to taste PTC may be correlated with a dislike of plants in the *Brassica* genus (cabbage, cauliflower, broccoli, Brussels sprouts, and some types of seeds,) presumably due to chemical similarities.

• Place one piece of the PTC paper on your tongue.

*Are you able to taste PTC?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Do you have an aversion to plants in the Brassica genus?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Under what conditions would evolution favor a genetically determined taste perception?*

1. **Taste vs. Flavor**

*Describe the difference between taste and flavor. Which sense(s) does each one rely on?*

* 1. Take one jellybean out of the container carefully, using the spatula or spoon provided.
  2. ***Hold your nose closed tightly*** and bite off ***half*** the jellybean and chew it. *Can you determine the flavor of the jellybean?*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. Eat the rest of the jellybean but do NOT hold your nose closed this time.

*Are you able to determine the flavor this time?*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*What does this result suggest about how we perceive the flavor of jellybeans and other artificial and complex flavors?*