Visual Perception

Introduction

Except for your brain, the eyes are the most complex organ you possess. Your eyes are composed of over two million working parts. Their coordinated action can instantaneously set in motion hundreds of muscles and organs in the body. Your eyes allow you to track a fly ball into a baseball glove. They can help you pick out the perfect color to paint your room. Your eyes can help you find your best friend at a crowded concert. These amazing organs process light in a way that allows us to perceive color, to judge depth, to sense movement, and to enjoy optical illusions. All these components of a visual scene merge so that we have one combined sensory experience.

In this activity you will explore the physiology of human vision. You will perform a series of tests to explore and assess many characteristics of human visual perception, including visual acuity, depth perception, color vision, peripheral vision, and illusions.

Equipment

* Computer
* Student Response Sheet
* *Carolina* Visual Perception Kit
* Snellen Eye Examination Chart
* Astigmatism Test Chart
* Holmgren-type Color Vision Test
* Depth Perception Tester
* Peripheral Vision Test Cards
* Deck of Illusion Cards
* Red and Green Transparent Vinyl
* Lamp, candle, or flashlight
* Metric ruler
* Colored pencils or markers
* Black marker
* Laminated instruction cards
* Laboratory journal
* Discovery Channel *Human Body: Pushing the Limits* DVD or Internet clip

Procedure

1. Visit the Discovery Channel – Human Body: Pushing the Limits website at <http://dsc.discovery.com/tv-shows/other-shows/videos/human-body-pushing-the-limits-police-chase-for-intera.htm>
2. Watch the video about the remarkable performance of the human eye. Pay attention to the many ways the eye allows us to respond to the world. Your teacher may show this video to the entire class on DVD.
3. Answer conclusion question 1.
4. Read the information and watch the associated videos about how vision works starting at Basic Anatomy and advancing through Errors of Refraction. The link to Basic Anatomy is: <http://science.howstuffworks.com/environmental/life/human-biology/eye1.htm>. Think about the way in which structures in the eye help translate light into images. You may wish to view this video again as you complete station Activity 1.
5. Answer conclusion questions 2-4.
6. Obtain a copy of Student Response Sheet from your teacher.
7. In groups of two or three, visit each eye activity station.
8. Follow your teacher’s instructions to rotate through the stations. All stations should take approximately ten minutes to complete. You may be given time at the end of the activity to revisit particular stations.
9. At each station, follow the directions on the laminated instruction sheet. Read the background information before you proceed to the activity. All materials and instruction cards will stay at the station. You, your partner(s), and your paper move, not the station materials.
10. Record data on the Student Response Sheet. Answer the analysis questions that go with each station. Some of the questions may require you to do a bit of Internet research or may require information from another station. These questions should be completed once you have travelled to each station and have gathered all of your data.
11. Finish all questions on the Student Response Sheet and answer the remaining conclusion questions.

Conclusion

1. Explain how rods and cones in the eye help the police officer in pursuit of a suspect. What other properties of sight help this officer complete the task?
2. What is refraction? What does it mean when we say that light is refracted as it enters the eye?
3. Which parts of the eye are most important when it comes to focusing light so that we can see a perfect image?
4. Lenses are described as convergent or divergent depending on how they refract light. What is the difference between these two types of lenses? Based on what you have learned, do you think the cornea and the eye lens act together as a convergent or divergent lens? Explain.
5. Think about the optical illusions you observed in Activity 10. Explain the relationship between seeing with the eye and perceiving with the brain.