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## Seeing Red (Or Not Seeing It): What Is Color Blindness?

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Color blindness (also known as color vision deficiency, color deficiency, or impaired color vision) occurs when a person is not able to see differences between colors. In the most common type of color blindness, a person can have difficulty distinguishing between red and green, but there are other types of color blindness too. Some people with color blindness have difficulty distinguishing between blue and yellow, and others with complete color blindness can't see colors at all.

Most people with color blindness are born with it. Inherited color blindness affects more boys than girls. Approximately one in twelve boys has some form of color blindness, while only one in 200 girls is affected. This is because the genes responsible for color blindness are only found on the X chromosome. Boys have only one X chromosome and girls have two. If one of a girl's X chromosomes is affected by the gene that causes color blindness, the other X chromosome is usually able to compensate for it. Therefore, it is less likely that a girl would be born color blind. There is no treatment for color blindness that is inherited.

However, an ophthalmologist (i.e., a medical doctor who specializes in eye and vision care) can sometimes provide a color blind individual with special contact lenses or glasses that can help the person differentiate between colors.



Color blindness can also sometimes develop later in life. Damage to the color receptors in the eyes, the optic nerve that sends information about color perception from the eye to the brain, or to the parts of the brain that process color information can lead to color blindness. This damage can be caused by accidents (physical trauma), disease, or prescription drugs used to treat some medical conditions. For people who develop color blindness later in life, treatment often involves addressing the condition or drug that is causing the problem.

### Diagnosing Color Blindness

If a child demonstrates difficulty identifying colors or uses the wrong colors for objects in drawings, he/she may be displaying early symptoms of color blindness. Ophthalmologists use a variety of tests to diagnose color blindness. The most common test used to diagnose red/green color blindness is called the Ishihara Color Test. It uses a series of pictures with embedded numbers made from dots of different colors and sizes. For individuals with normal color vision, the numbers are easy to see. However, an individual who has red/green color blindness would have difficulty identifying the numbers in the images.

### Effects of Color Blindness

The effects of color blindness on an individual can range from minor inconveniences to major challenges. Imagine going to the mall and trying to pick out a shirt to match a pair of pants if you cannot see differences between colors. Or, if you are looking at bananas in the grocery store and all of the bananas are the same color, how do you know which ones are ripe? What happens when you are in a business meeting and your boss is using color charts to share important information? Even career choices can be affected by color blindness. For example, it would be very challenging for a police officer to describe a suspect's clothing if the officer couldn't see differences between colors.

## Adaptations and Considerations for Individuals with Color Blindness

There are many situations in which individuals with color blindness are able to adapt. For example, when driving, individuals with color blindness learn that green lights are at the bottom of a traffic signal and red lights are at the top. There are some other things that teachers and parents can consider when working with students who are color blind:

- Instead of relying solely on colors to share information, **pair colors and shapes together** so that a student who is color blind can look for shapes instead of depending on his/her ability to discriminate colors.
- For charts or graphs in which it would be difficult to use shapes or symbols, **add different patterns or textures to colors** to further illustrate the difference between colors.
- **Avoid using color combinations that are more difficult for a person with color blindness to distinguish.** Problematic color combinations include green/red, green/brown, green/gray, green/black, green/blue, blue/purple, and blue/gray.
- **Use a color blindness simulator** to see what images would look like to individuals affected by color blindness. You can find one by searching for "color blindness simulator" on the internet.

There is some debate about whether or not color blindness is technically a disability. What we do know is that it doesn't have to keep someone from pursuing their goals and dreams. With advances in technology and medical research, new treatments and visual aids are being developed to assist individuals diagnosed with color blindness.

### Resources:

"What Is Color Blindness?" accessed May18, 2018, <https://www.aao.org/eye-health/diseases/what-is-color-blindness>

"Facts About Color Blindness," accessed May18, 2018, [https://nei.nih.gov/health/color\\_blindness/facts\\_about](https://nei.nih.gov/health/color_blindness/facts_about)

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