

Colour blindness

Colour blindness, as a form of visual impairment, is often forgotten. For many people it does not cause significant difficulties in their everyday life. If, however, an individual relies on the interpretation of colour as part of their work (e.g. interpretation of maps, charts, diagrams etc.) this can lead to significant problems if the information is not presented in a way that they can interpret.

What is colour blindness and how does it affect people?

Around 10% of the male population is affected by colour blindness, while less than 1% of the female population is affected. Colour blindness is usually transmitted genetically, but can also be caused by brain, eye or nerve damage. There are three commonly occurring types of colour blindness:

- total colour blindness
- red-green colour blindness
- blue-yellow colour blindness.

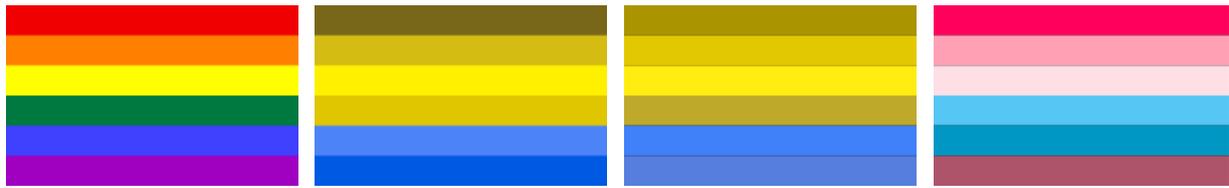
People with normal sight can see colours in daylight through the cone cells in the eye. Different colours of light are signalled to the brain by three different types of cones: absorbing short wavelengths (blue colours), medium wavelengths (green colours) or long wavelengths (red colours).

Red-green colour-blind people are not able, or find it difficult, to distinguish between red and green colours. This is usually caused genetically, by absent cones or a change in wavelength sensitivity of medium or long wavelength sensitive cones. This is the most prevalent type of colour blindness; about 8% of the male population is affected by this type, while about 0.4% of the female population is affected.

Blue-yellow colour blindness is a rare and not gender-specific type of colour blindness. About 0.02% of the population is affected by this type of colour blindness which has the same cause as red-green colour blindness but affects the short wavelength sensitive cones.

Total colour blindness is the rarest type of colour blindness and affects about 0.00001% of the population. People who are totally colour-blind are unable to distinguish between any colours. This is caused by dysfunctional, abnormally-shaped cones or the absence of cones.

The rainbow flag below illustrates how different people view colours depending on their vision.



Normal sight

Defect red cones
(orange and green
appear as the same
colour)

Defect green cones
(red and green
appear as the same
colour)

Defect blue cones

How to make your material accessible

1. Think about how other people might see your information
You can simulate how colour-blind people might see your information on:
 - <http://www.vischeck.com/vischeck/vischeckImage.php>
 - <http://www.etre.com/tools/colourblindsimulator/>
2. Avoid using red and green in the same image to illustrate important information, or check whether the information you want to show is hidden from colour-blind people e.g. using one of the links above.
3. Use high contrast to highlight important features in your image.
4. When it is not possible to improve the visibility of the information in diagrams, tables and other illustrations, aim to include sufficient narrative to describe the points being illustrated.