

COLOUR DEFICIENCY

Normal Colour Vision

We are able to see as a result of light stimulating the retina within the eye. The light sensitive part of the retina is made up of rod and cone receptors. The rods, located in the peripheral retina, give us our night vision, but cannot distinguish colour. Cones, located in the centre of the retina (in an area known as the macula), are more effective in daylight conditions and allow us to perceive colour. The cones contain light sensitive pigments which react to a range of wavelengths. Genes contain the coding instructions for these pigments and if these are defective the wrong pigments will be produced and the cones will be sensitive to different wavelengths of light resulting in colour deficiency.

Types of Colour Deficiency

There are many types and degrees of “colour blindness” which is more correctly called “colour deficiency”. There is a great deal of confusion around the condition and many consider that this means total lack of colour and that an individual affected will only see in black and white. This is not accurate as it is extremely rare to be totally colour blind or monochromatic as it is known. Such individuals will have a complete absence of any colour sensation.

Up to 8% of men and 0.5% of women have some form of colour deficiency. The vast majority of these (99%) will have an abnormality of red perception (known as protan-type) or green perception (known as deutan-type)

Those with normal cones and light sensitive pigments (trichromasy) are able to see all the different colours and subtle mixtures of them by using cones sensitive to one of three wavelengths of light - red, green and blue. A mild colour deficiency is present when one or more of the three light-sensitive pigments is abnormal and the peak sensitivity is shifted (anomalous trichromasy).

Protan-Type Deficiency

An individual with protan-type deficiency is considered to be “red weak”. Red, orange, yellow, yellow-green and green, appear somewhat shifted in tone towards green and all appear paler than they do to the “normal” observer.

Deutan-Type Deficiency

The individual with a deutan-type deficiency is considered “green weak”. He/she is poor at discriminating small differences in tones in the red, orange, yellow, green region of the spectrum.

Colour Deficiency and Fitness for Employment/Studies

There are only a very few types of employment from which people with colour deficiency are barred and this is mostly for reasons of safety. Examples include, airline pilot, ship’s navigator, train driver and some other safety-critical electrical jobs. Careers such as medicine, dentistry and nursing are subject to health assessments (on starting training) which increasingly include a test for colour vision. Colour deficiency may also have implications for a wide range of other professionals, eg histopathologists and laboratory scientific officers. In the vast majority of circumstances a finding of colour

Deficiency will not debar employment in these professions. However, it is important that individuals are aware if they have a problem and how this can impact on some of their activities. They are therefore recommended to discuss this with their tutor or line manager in order that consideration can be given to making any appropriate adjustments/modifications to their course work or tasks (if employed).

For further advice please contact:

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