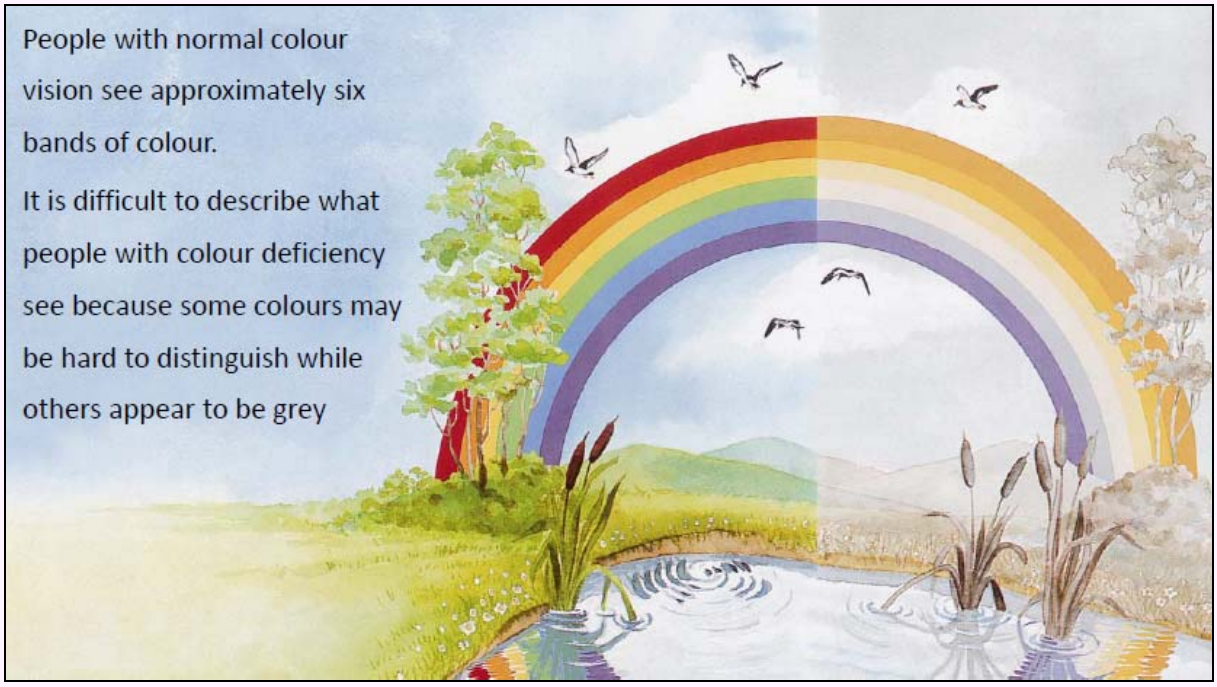


Colour Vision

Reduced recognition of Colours

Most people, when looking at a rainbow can recognise six distinct bands of colour (red, orange, yellow, green, blue and violet).

People with colour blindness or colour deficiency (a more accurate description) do not distinguish the same differences in colour that a person with normal colour vision does. They may only see four colour bands (yellow-orange, grey, blue and violet) and may find distinguishing pastel colours very difficult. Some people with colour deficiency confuse blue-green shades with grey, and others may not be able to tell the difference between yellow, brown and green. Usually a person with a colour deficiency has inherited it - they have been born with it - but colour vision deficiency can also be acquired through retinal eye disease, optic nerve disease or brain damage, or, from exposure to certain medicines or chemicals.

Inherited colour deficiency occurs more commonly in males (8% of males and 0.4% of females inherit colour deficiency). For both groups it is important to know if you have problems with colour perception because certain professions or occupations may have limitations for people with colour deficiencies.

Commercial pilots, some seafarers, commissioned officers in the armed forces, and police staff rely heavily on accurate colour vision and colour vision standards apply. Colour deficiency can reduce accuracy in other jobs where colour judgements are important – electricians, car painters, decorators, fruit graders, fashion designers, meat inspectors for example. And obviously it is important to know when you are at school so that teacher and colour deficient student can communicate effectively.

Despite this, it is worth noting that, apart from the restrictions outlined above, people with colour deficiency live normal lives.

Your optometrist is well equipped to do colour vision assessments and give you sound advice if you are found to be colour deficient. The assessment will normally start with the ‘Ishihara’ coloured dots number recognition test which takes only a short time to complete. More detailed colour vision tests can be undertaken as some occupations where colour vision is important will accept entrants

or recruits who have the very mildest forms of colour deficiency if these tests are passed successfully. It may also be helpful for parents, teachers or tutors to know which particular colours a colour deficient child or student will have trouble with.

Types of colour deficiency

At the back of the eye the retina contains two types of light receptor cells, rods and cones. Cones are responsible for our perception of colour. Rods are active at night while cones are active in daylight. Cones contain pigment that is receptive to certain wavelengths of light i.e. to certain colours. Absence of any one of these pigments within the cones results in colour deficiency.

Rarely there can be a total absence of cones in the retina where no colour is perceived at all, just a variation in brightness.

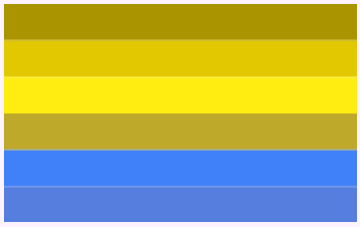
The most common forms of colour deficiency are caused by the partial absence of red wavelength pigment (protanomaly) or green wavelength pigment (deuteranomaly). These are known as red green colour deficiency. Of the 8% of males with an inherited deficiency a quarter will be protanomalous.

An absence of blue wavelength light receptor pigment causes blue yellow colour deficiency (tritanomaly). This affects males and females equally with an incidence of around 1 : 13000, and is due to a gene mutation.

Because the absence of pigment is rarely complete there are varying degrees of severity in colour deficiency. A person can have a mild, moderate or severe colour vision deficiency, depending on the amount of pigment loss.

The colors of the rainbow as viewed by a person with no colour vision deficiencies.

The colours of the rainbow as viewed by a person with protanopia.



The colours of the rainbow as viewed by a person with deuteranopia.

The colours of the rainbow as viewed by a person with tritanopia.

Causes of colour deficiency

Colour deficiency is either inherited or acquired as a result of gene mutation or through eye or brain disease or exposure to medicines or chemicals.

The most common form of colour deficiency i.e. red green colour deficiency is mainly inherited but can also arise as a result of eye or brain disease or exposure to medicines or chemicals. The blue yellow colour deficiency is a result of a mutation at chromosome 7

How does a person with colour deficiency see?

Because of the absence of pigment in the cones an affected person will see fewer colours and will be prone to confusing certain colours. Common confusions for a red green colour deficiency are blue and purple, red and green, and all of the autumnal colours can be confused with each other. All colours can be confused with grey. Common confusions with a blue yellow defect are green and purple.

Can a colour deficiency be cured?

An inherited colour deficiency cannot be cured nor can one caused by genetic mutation. Some acquired colour deficiencies can be reversed by eliminating the causative agent (such as certain medicines or chemicals).

If a colour vision deficiency has been acquired (rather than inherited) a diagnosis is important to find the cause in case there is an underlying disease.

Special colour filter lenses are available which cannot cure colour deficiency but they serve to expand the range of distinguishable colours and make them more vivid.

Conversely, some fashion sunglass lens colours can make matters worse, especially with regard to correctly noticing signal colours (i.e. traffic lights) which is potentially dangerous.

Your Optometrist can offer career advice and can arrange for a detailed colour vision assessment and tailored advice if you have any concerns.

To find your nearest NZAO member optometrist, check the Yellow Pages ® of your phone book or contact:

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