Color blindness

Introduction

- Color blindness is a reduced ability to distinguish between certain colors.
- The condition is often inherited. Other causes include certain eye disease and medication.
- More men than women are affected.

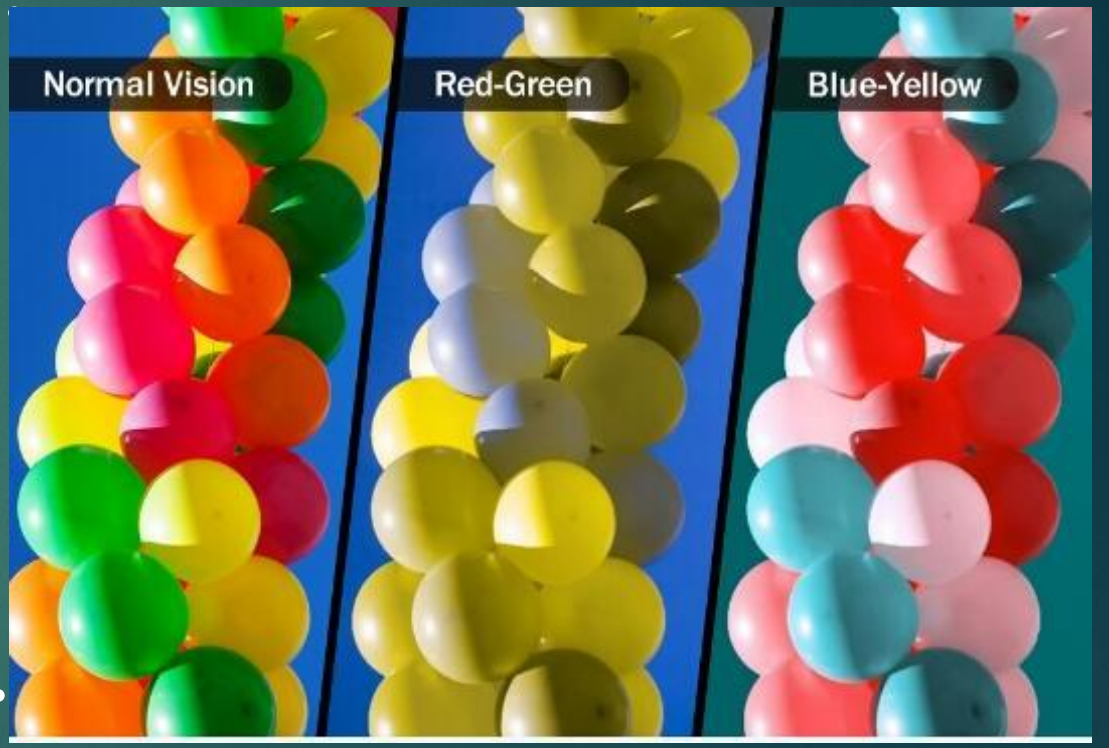
- *Among humans, males are more likely to be color blind than females, because the genes responsible for the most common form of color blindness are on the X-chromosome.*
- *Color blindness can also result from physical or chemical damage to the eye, the optic nerve of brain.*

Mechanism

- The most common cause for color blindness is an inherited problem in the development of one or more of the three sets of the eye's cone cells, which sense color.
- Females have two X-chromosomes, so a defect in one is typically compensated by the other.
- Males have only one X-chromosome and therefore always express the genetic disorder if they have the recessive gene.
- Red-green color blindness is the most common form, followed by blue-yellow color blindness and total color blindness.

Types of color blindness.

- **Red**-**green** color blindness
- **Yellow**-**blue** color blindness.
- Complete color blindness.



Classification of colour blindness:

Trichromats

All 3 types of cones are present.

a) Protanomaly: red weakness
b) Deuteranomaly: green weakness
c) Tritanomaly: blue weakness

Dichromats

2 types of cones are present.

a) Protanopia : red blindness
b) Deuteranaopia : green blindness
c) Tritanopia: blue blindness

Monochromats

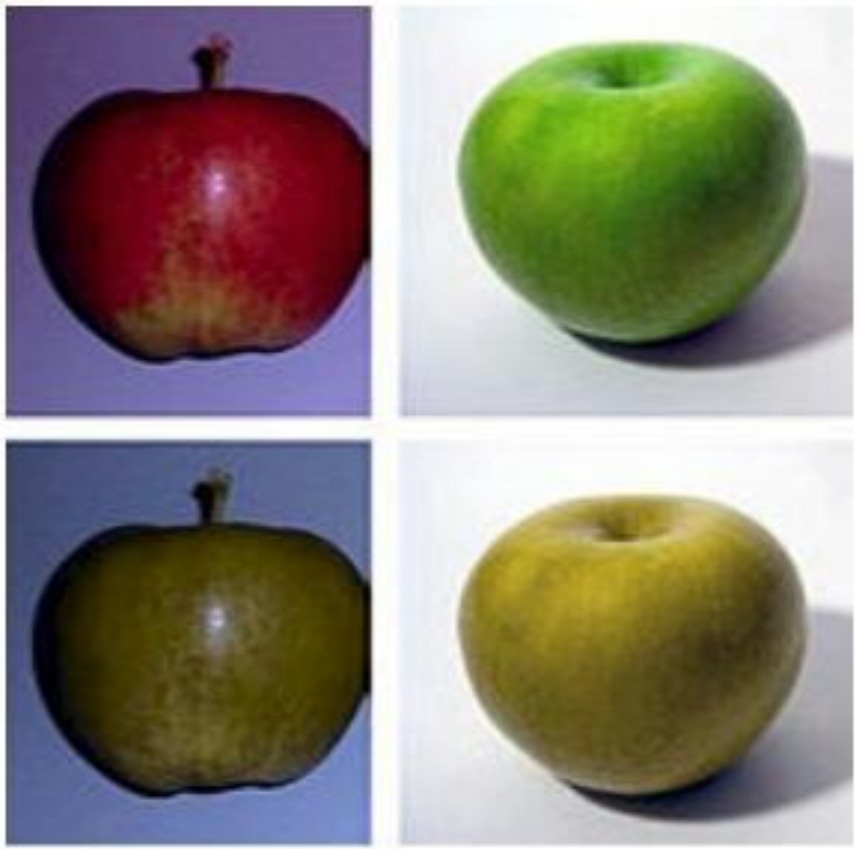
Only one type of cone present and only shades of grey are appreciated.

Genetics.

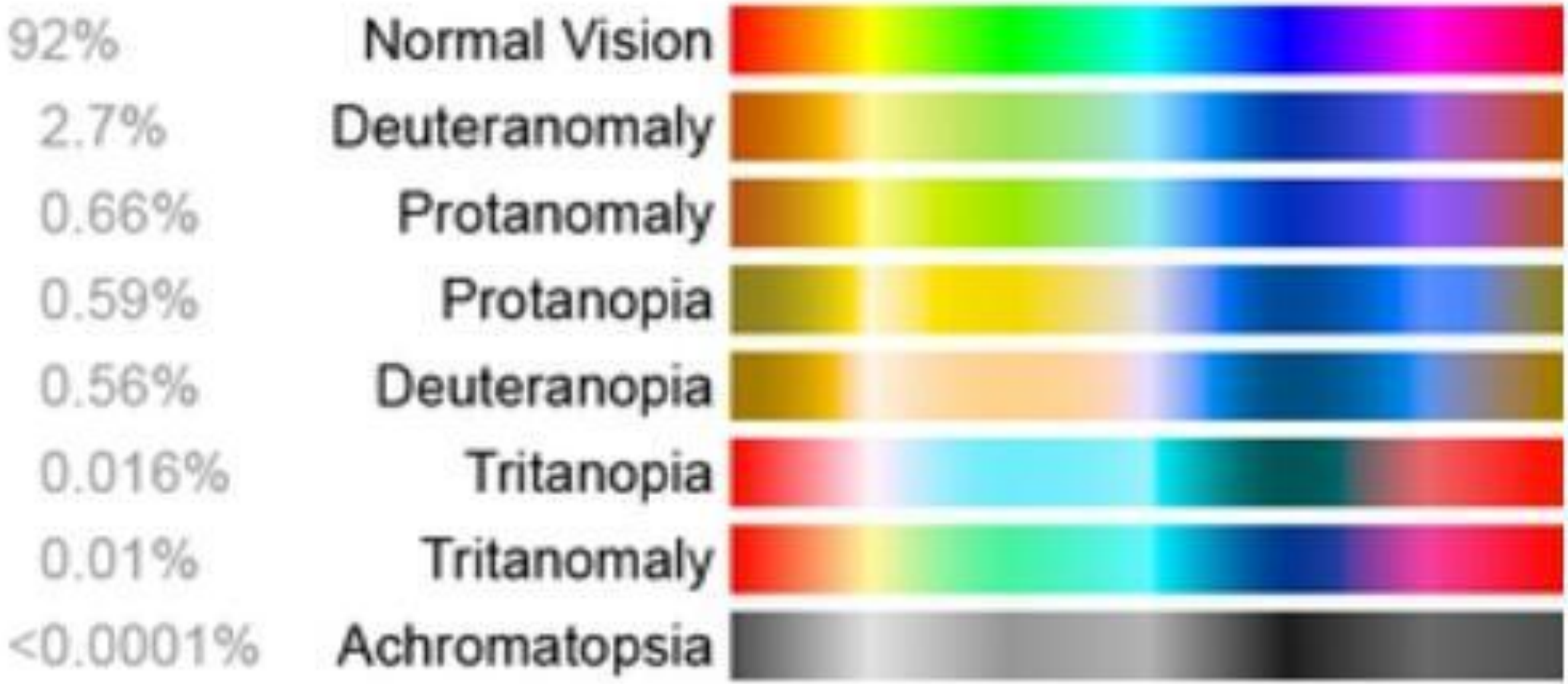
- Color blindness is typically an inherited genetic disorder.
- Two of the most common inherited forms of color blindness are ***protanomaly*** (and more rarely, protanopia – the two together often known as ‘protans’) and ***deutaranopia-*** The two together often referred to as ‘deutans’.)

Some of the inherited diseases known to cause color blindness are:

- - cone dystropy.
- - cone-rod dystropy.
- - achromatopsia.
- - blue cone monochromatism.
- - Leber's congenital amaurosis.
- - retinis pigmentosa.



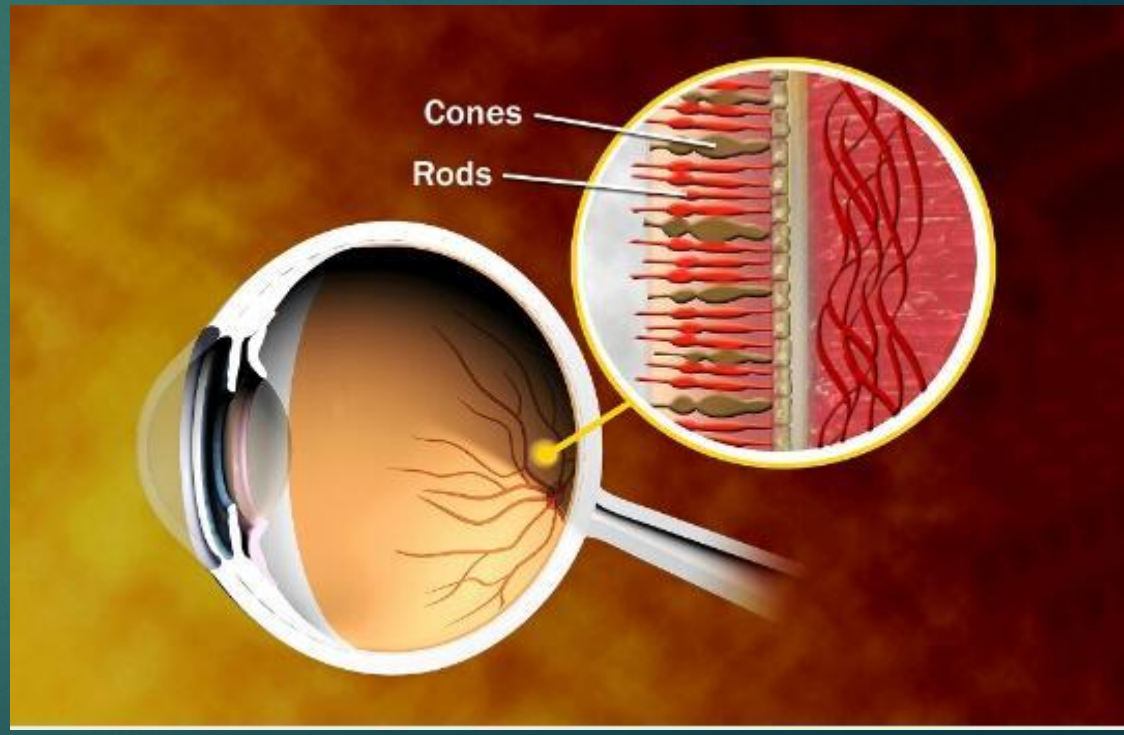
Simulation of the normal (above) and dichromatic (below) perception of red and green apples



These color charts show how different colorblind people see compared to a person with normal color vision.

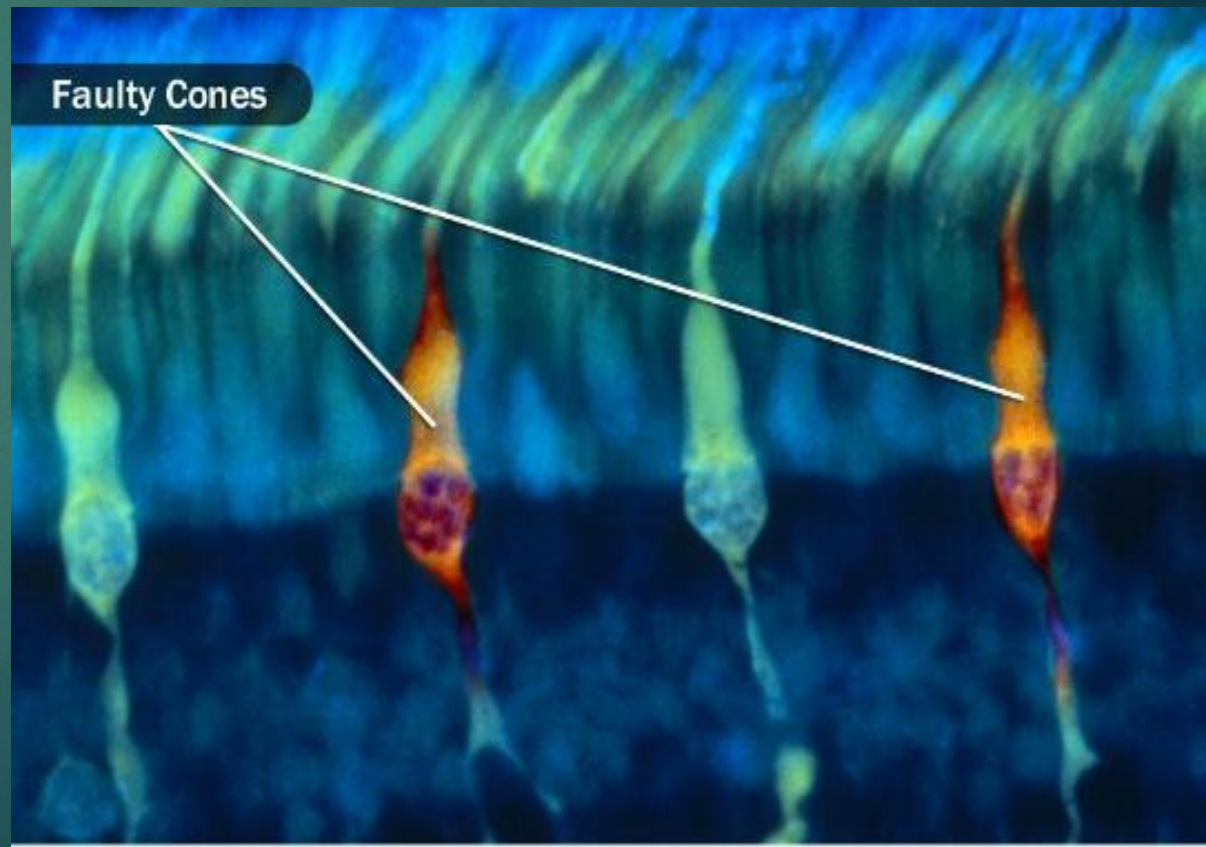
How you see colors :

- *Your **retina** at the back of your eyeball is sensitive to light.*
- *It has two kinds of cells :- **rods and cones**.*
- *The rods work in dim light and the cones react to brighter lights.*
- *They both respond to colors.*



How color blindness happens

- *If someone is color blind, that means there's a problem with at least one kind of cone.*
- *Those cones could be missing, or they might pick up a different color than they should.*



Symptoms

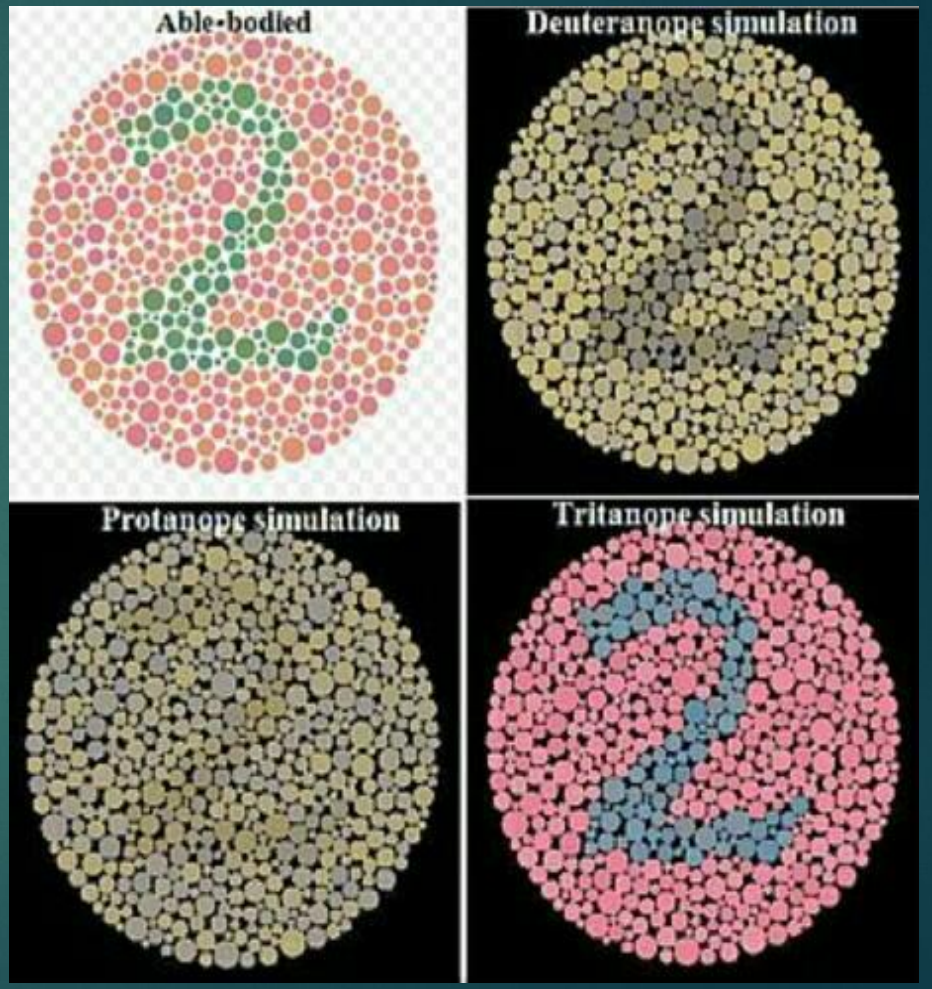
- Color blindness can be figured out when it causes confusion – such as differentiating the colors in traffic lights or interpreting color coded learning material.

People affected by color blindness may not be able to distinguishe :-

- Different shades of red and green.
- Different shades of blue and yellow.
- Any color.

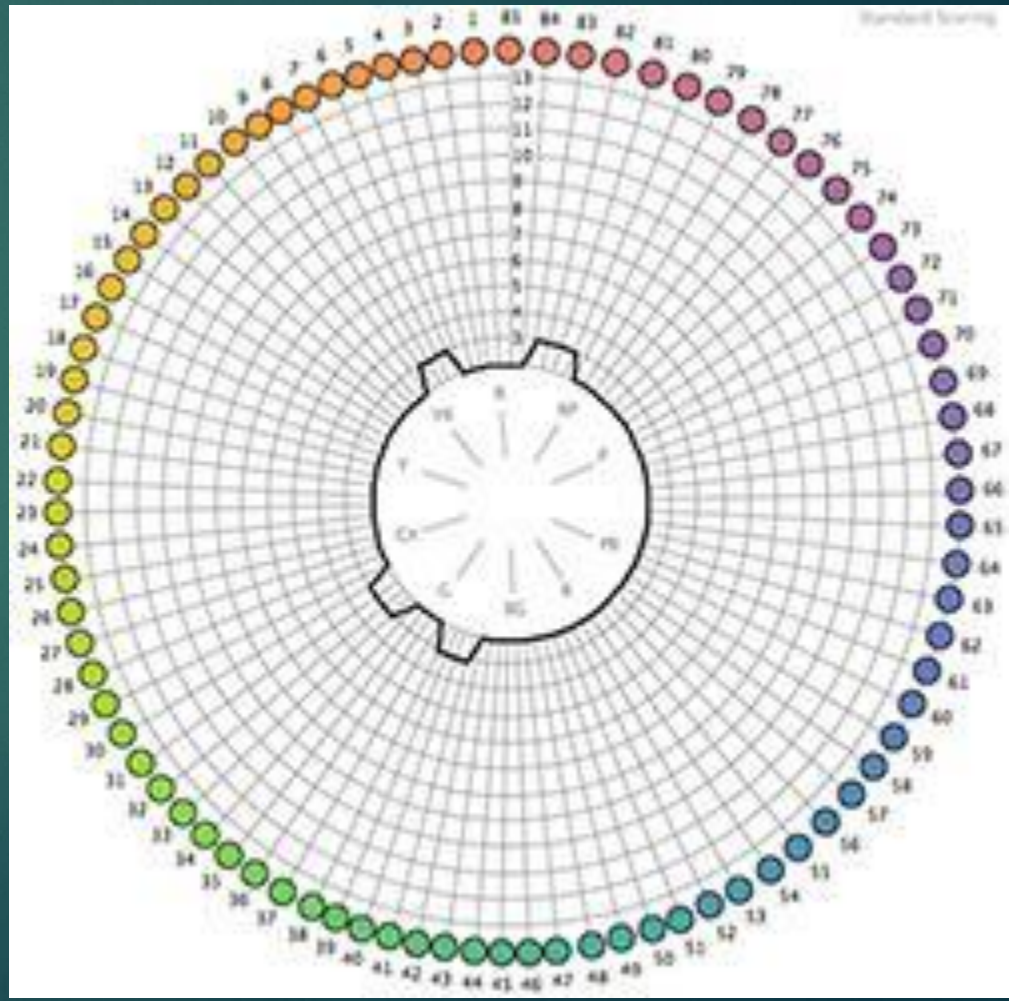
Diagnosis

- *The **Ishchiara color test**, which consist of a series of pictures of colored spots, is the test most often used to diagnose red and green color deficiency.*
- *A figure is embedded in the picture as a number of spots in a slightly different color, and can be seen with normal color vision but not with a particular color defect.*



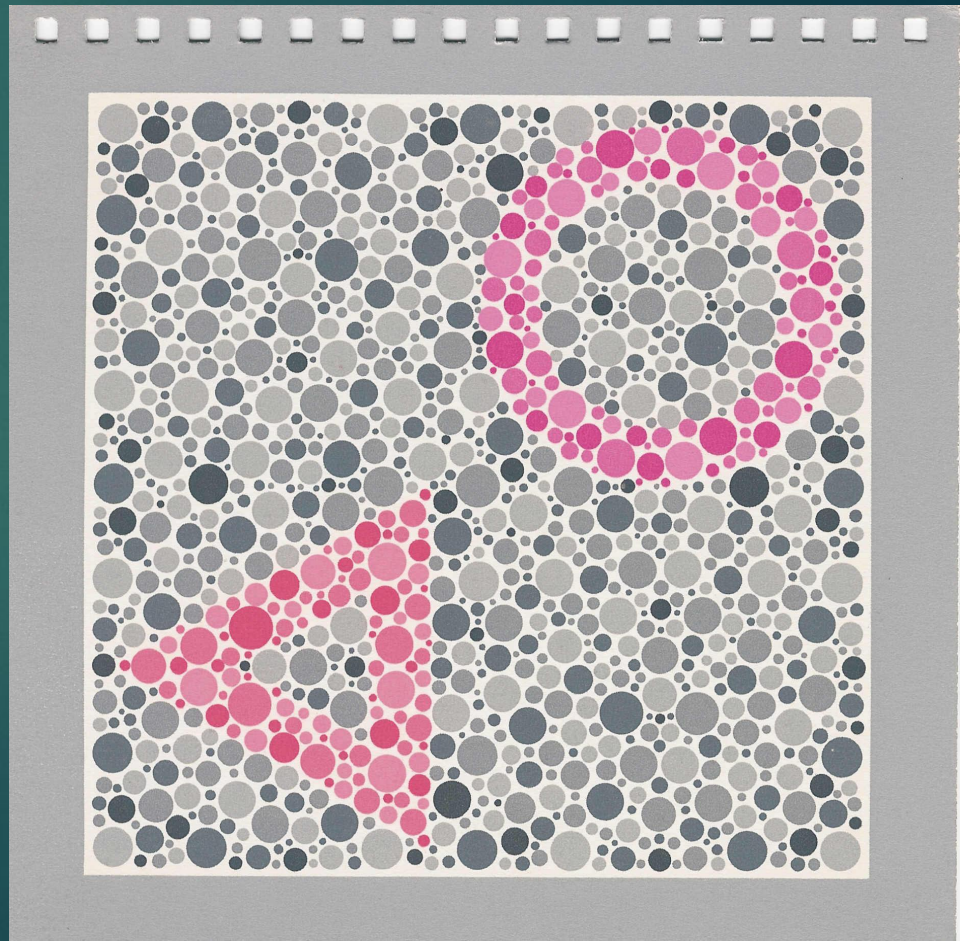
Fransworth Munsel 100 hue test :

- ***Fransworth Munsell 100 hue test*** *:- the patient asked to arrange a set of colored caps or chips to form a gradual transition of color between two anchor caps.*



HRR color test.

- *It is a red-green color test that unlike the Ishchiara, also has plates for the detection of the tritan defects.*
- *It is developed by* ***Hardy, Rand, and Ritter.***
- *Protanomaly and deuteranomaly can be diagnosed using an instrument called an* ***anomaloscope****.*



Occupational safety.

- *Color blindness may make it difficult for a person to engage in certain occupations.*
- *Person with color blindness may be legally or practically barred from occupation in which color perception is an essential part of the job or in which color perception is important for safety.*
- *(eg. Operating vehicles in response to color codes signals.)*

Research

- *Some tentative evidence finds that color blind people are better at penetrating certain color camouflages. Such findings may give an evolutionary reason for the high rate of red–green color blindness. There is also a study suggesting that people with some types of color blindness can distinguish colors that people with normal color vision are not able to distinguish. In World War II, color blind observers were used to*

Questions

- Teena – 1) what is color blindness?
  2)what causes color blindness?
- Vikram- 1) what men are more affected by color blindness than females?
  2) What causes color blindness other than inheritance?
- Haris Chandru- 1) how many sets of cones are present in an eye?
  2) what is the most common form of color blindness?
- Ekta – 1)what are the types of color blindness?
  2) how is color blindness classified?
- Aishwary – 1) how many types of cells are present on the retina?
  2) what are the two most common inherited forms of color blindness?
- Karmshil – 1) what are some inherited diseases known to cause color blindness?
  2) what are monochromats?
- Nidhi – 1) what are dichromats?
  2) what are trichromats?

- Hari shankar – 1) how humans see color?
  2) what it means when someone is color blind?
- Gracy – 1) how does color blindness happen?
  2) what are some symptoms of color blindness?
- Keerthana – 1) which colors cannot be distinguished by people affected by color blindness?
  2) what is an Ishchiara test?
- Amit – 1) what is Franswort Mussel 100 hue test?
  2) what is HRR color test?
- Aswin – 1) what type of occupation are color blind people barred from?
  2) what are some research on color blindness?

Thank you for watching!!!