Optical instruments

Lecture 1

color deficiency

M.Sc

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Color vision deficiency

represents a group of conditions that affectthe perception of color. Red-green color vision defects are the most common form of color vision deficiency. Affected individuals have trouble distinguishing between some shades of red, yellow, and green. Blue-yellow color vision defects (also called tritan defects), which are rare, cause difficulty distinguishing dark blue from black. These two forms of color vision deficiency disrupt color perception but do not affect the sharpness of vision (visual acuity).

Color vision defect

1) Congenital
2) Acquired

Reasons of acquired type are:

Ocular pathology , intra cranial injury, excessive use of therapeutic drugs

Congenital type

1) Present at birth
2) Both eyes are equally affected
3) Type and severity of the defect are the same throughout life
4) V.A is unaffected and visual field is normal
5) Protan or deutan

Acquired type

1) Onset after birth
2) Monocular differences in the type and severity much occur
3) Type and severity of the defect are fluctuated
4) V.A is often reduced and visual field is defect
5) Tritan

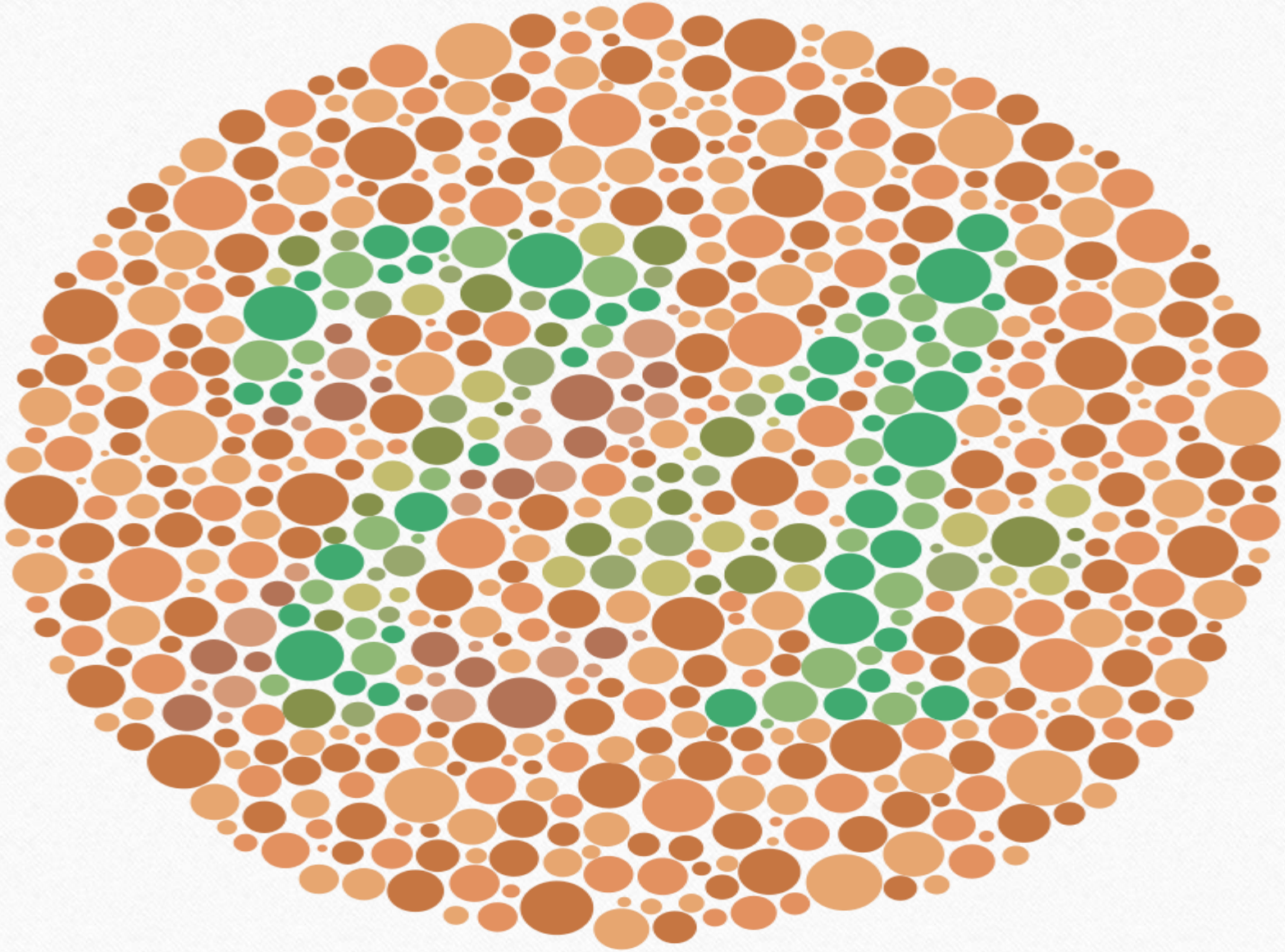
Ishihara test

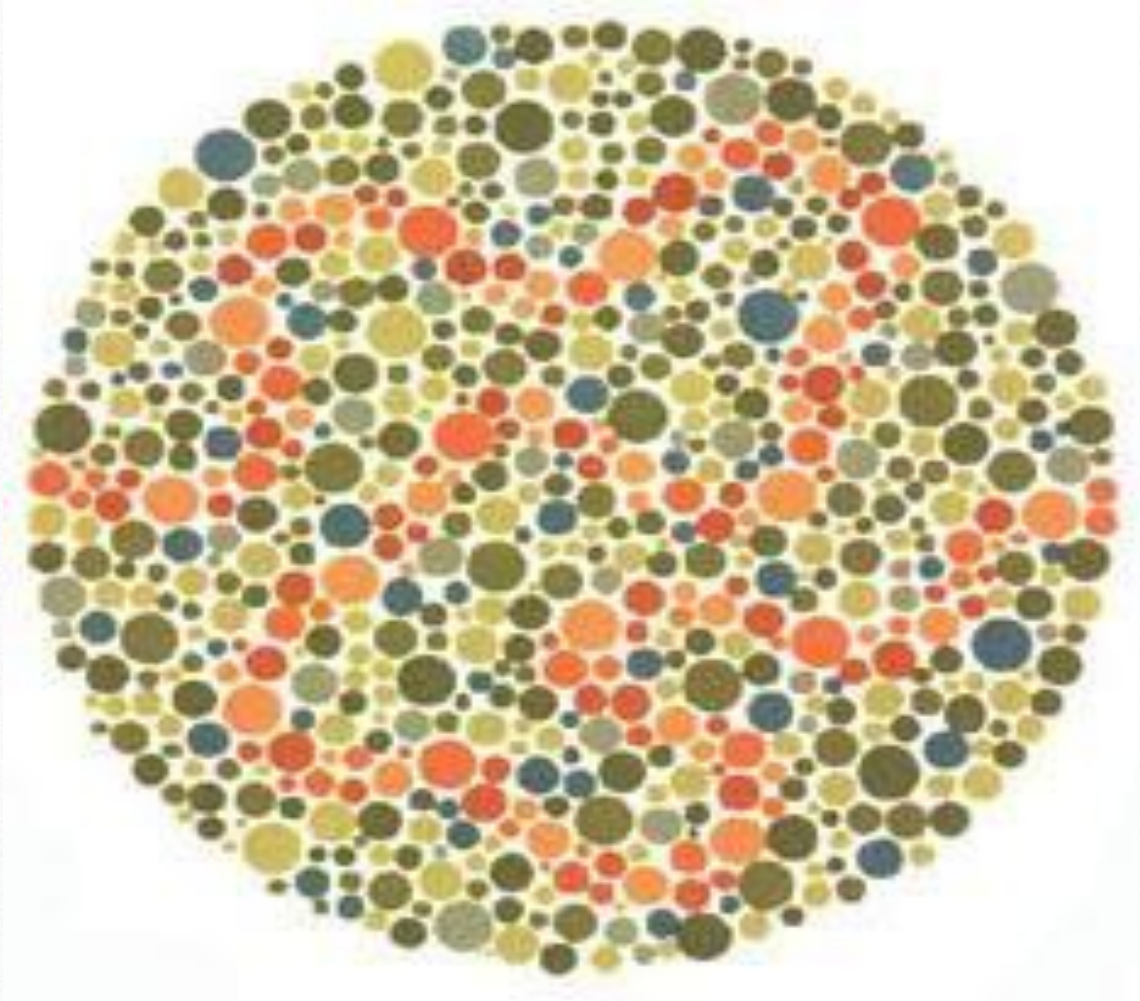
Shinobu Ishihara, a professor at the University of Tokyo, who first published his tests in 1917.

The test consists of a number of Ishihara plates, each of which depicts a solid circle of colored dots appearing randomized in color and size. Within the pattern are dots which form a number or shape clearly visible to those with normal color vision, and invisible, or difficult to see, to those with a red-green color vision defect. Other plates are intentionally designed to reveal numbers only to those with a red-green color vision deficiency, and be invisible to those with normal red-green color vision.

plates

The full test consists of 38 plates, but the existence of a severe deficiency is usually apparent after only a few plates. There are also Ishihara tests consisting of 10, 14 or 24 test plates, and plates in some versions ask the viewer to trace a line rather than read a number.





Types of plates

- Vanishing design: Only people with good color vision can see the sign. If you are colorblind you won’t see anything.
- Transformation design: Color blind people will see a different sign than people with no color vision handicap.
- Hidden digit design: Only colorblind people are able to spot the sign. If you have perfect color vision, you won’t be able to see it.
- Classification design: This is used to differentiate between red- and green-blind persons. The vanishing design is used on either side of the plate, one side for deutan defects an the other for protan.

Hardy-Rand-Ritter

Has three very important features that provide the most advanced color vision test available: congenital and acquired testing, identification of the type of defect and diagnosis of the extent of the defect as well as quick positive classification of normal.

How to test

The patient is asked to name the shape of each symbol they see and indicate its location, which can be in one of four quadrants of each plate. There are four demonstration plates in which the colors of the symbols are such that they can be seen by all observers. One of these plates has no symbol so that patients understand that a symbol might not be seen on some plates.

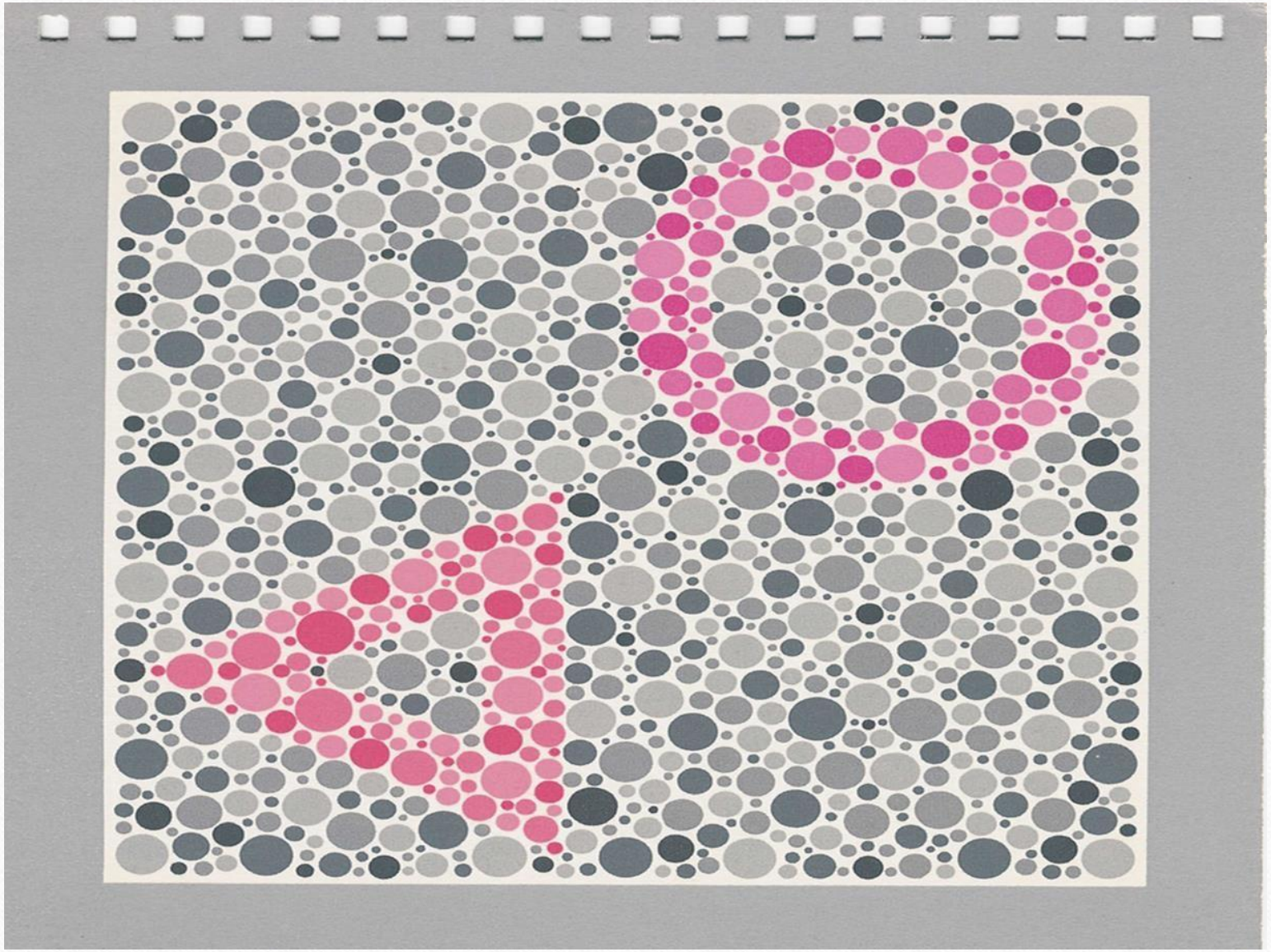
Consist of

There are **6** screening plates:

4 for the protan-deutan deficiencies

2 for the tritan deficiencies.

These are followed by **14** plates designed to grade the severity of the deficiency and to differentiate protans, deutans (**10** plates) and tritans (**4** plates)



Grades of the deficiency

Patients have their color vision deficiency graded as mild, medium or severe, depending on whether they see or do not see the symbols.