Assessing visual acuity in children is not an easy job but can be made interesting and rewarding by gaining the confidence and cooperation of the child. Many a time, we may have to use several tests and these tests may even have to be repeated on subsequent follow up. The test series vary according to the age of the child.

Development of vision

The visual development occurs in 2 phases – rapid phase from birth to 8-9 months – Slow phase from 8-9 months 8-9 years. Other functions which correlate with vision are accommodation, which develops by 4 months of age, fusional convergence which develop by 6 months of age, and stereopsis which is well developed by 4 months of age though adult level is seen by 5-7 years of age.

Infants – A knowledge of visual milestones is helpful in estimating visual potential in the absence of any definite vision test

Reflex response

Blinking reflex: - A positive blink response in response to movement or touching is a good sign.

Pupillary reflex: – Pupil reacts to light after 31 weeks of gestation. Premature babies < 30 weeks dislike bright light.

Fraction reflex: – is a prerequisite for normal visual development and is present at birth even in preterm babies after 33 weeks of gestation. 75% of infants fixate by 2 weeks and 100% by 2 months. Newborns show fixation preference for moving stimuli, coloured stimuli and human face.

In preverbal on nonverbal children, acuity can be evaluated by CSM method. ‘C’ refers to location of corneal light reflex as the patient fixates the examiner’s light under monocular conditions. Normally reflected light from cornea in near the centre of the cornea and it should be positioned symmetrically in both eyes. If fixation target is viewed eccentrically, fixation is termed uncentral. ‘S’ refers to steadiness of fixation on examiners light as it is held motionless and also as it is slowly moved about. ‘M’ refers to the ability of the strabismus patient to maintain alignment first with one eye, then with the other, as the opposite eye in uncovered. Maintenance of fixation is evaluation under binocular conditions. Inability to maintain fixation with either eye, with opposite eye uncovered is presumptive evidence of a difference in acuity between the two eyes. Resentment of closure of one eye indicates poor vision of one eye.

CSM – 6/9 – 6/6
CSNM – 6/36 – 6/60
Unsteady central fixation < 6/60
Gross E7 - < C7.

Following movements

Following horizontally moving targets seen in full term newborns and well developed by first months.

Vertical tracking is developed by two months. Range of following is 45° at birth, 90° by one month and 180° by 3 months. Psychophysical test include preferential looking tests, optokinetic nystagmus and visual evoked response, of which preferential looking tests are the ones commonly used.

Preferential looking tests

These are based on the behavioural pattern of a normal infant to prefer to fixate on a patterned stimulus when two adjacent stimuli
are presented, one homogenous and the other patterned.

The examiner hides behind a screen, on which the stimuli are projected randomly. The baby faces the screen and the observer observes through a hole in the screen and records the direction of head movements in response to stimuli. Preference would be elicited as long as the pattern is visible or resolvable by the child. Fist tests are useful for 6 to 18 months.

Teller acuity cards have patches of square wave gratings, vertical black and white stripes.

Cardiff acuity cards have picture opto types. The picture opto types are of same size but specially drawn with 2 dark lines with a white space in between such that the picture in visible only at a particular distance or closer. These are known as varnishing opto types as they vanish at further distances.

**Vision tests in 1-3 years**

1. **Worth Ivory ball tests**
   
   Ivory balls 0.5 to 2.5" in diameter are rolled on the floor in front of the child and he is asked to retrieve each. Acuity is estimated on the basis of smallest size for the test distance.

2. **Bock’s candy bead test**
   
   Snellen equivalent of 6/60 is estimated by this method. The child is asked to match pick up beads 1mm size at 40 cm.

3. **Marble game test**
   
   The child is asked to place marbles in holes of a card or in a box. It compares the functioning of the child’s eye when one or the other is closed and vision is noted as useful or less useful.

4. **Coin test**
   
   Child is asked to identify two faces of coins of different size held at different distance.

5. **Miniature toy test**
   
   Child is shown a miniature toy from a distance of 10 feet and asked to name / pick the pair from assortment.

**Vision tests in 3-5 years**

Tumbling E test / finger tests

Using different size of E in right, left, upward or downward position, the child is asked to point the direction.

Matching tests – Cambridge crowding charts; Lea symbols

It consists of 5 letters (H, O, T, V, X) or 7 letters (H, O, T, V, X , A, U) printed in Snellen’s size in separate cards. The child is given a corresponding key card and asked to point to the letter he sees. The test is designed for use at 3m.

Lea Symbols:- These are simplified versions of the above test using basic shaping of a square triangle circle, presented singly in sizes ranging from 6/60 to 6/6. The child performs the test by pointing at the key card.

Pictorial charts:- When the child is able to verbalize, visual acuity charts showing pictures rather than symbols may be used.

School going children

Snellen test types

Landolt’s C chart

Lower case letters are found easier by children. Number chart also can be used. Letter charts are easier to use if only one or two lines are presented at a time. In addition to reading ability, speed and fluency, abnormal head posture etc also should be noted. ‘C’ charts allows more of guessing and may be confusing for children.