Heidi Expressions Test Game has been developed to improve early evaluation of vision for communication. Among the visually impaired children there are some who cannot see expressions and/or do not recognize people by their faces. These children may have nearly normal results in routine vision tests (large visual field and normal or near normal visual acuity). Other visually impaired children may have this deficit in visual recognition as a part of more extensive loss of visual functions.

Many children have Cerebral Palsy, which, however, may be so mild that it has not required special treatment.

If the child’s difficulties are not known and understood, his/her behavior may cause misunderstandings and needlessly negative experiences in social interactions. Therefore, testing of a child’s ability to see differences between different facial expressions is an important part of functional visual assessment.

Visually impaired children have two different kinds of problems in learning to recognize faces and to interpret facial expressions:

1. They do not see expressions well enough to interpret them (paralysis problem).
2. They have brain damage in the area of face recognition and therefore do not recognize differences in people’s faces and may also have difficulties in interpreting expressions (cognitive visual expression problem).

It is possible to observe which type of problem the child has during the Heidi Expressions test game. In some cases the child may have poor quality of image and poor facial recognition.

Play situation:

The Heidi Expressions Test Game can be used from the age of 30-36 months when teaching the child how people look when they have the different basic expressions. In the latter case tactile information is used as the main method of teaching the child how a picture represents an object. The expressions can also be created using pipe cleaners for the mouth and buttons for the eyes glued on a small paper plate as an activity in nursery or kindergarten.

The child’s creations can be used to observe which features the child uses in the recognition of his/her pictures.

When the child seems to understand the six different basic expressions, the cards can be matched. First only six cards are chosen, for example the smiling Heidi and the weeping Heidi. If the child does not have cognitive visual functions for facial recognition, he/she may match the faces with the bow equal. This needs to be discussed with the child by showing once more on the tester’s face. Then we can look at the different expressions look. The child may be able to see the expressions in a real life situation although they are too difficult to be recognized in a picture.

When the child has matched the cards printed with full contrast, the 10% contrast pictures and later the 2.5% contrast pictures can be used in the play situation.

If the child can match the high contrast pictures but not the 10% or 2.5% pictures, contrast sensitivity needs to be measured and the central visual field examined if the child is old enough for testing. It is also advisable to discuss with the child the structure of the image: whether there are distortions of lines or quality loss of the image (contrast). When a child can see the expressions only at 100% contrast, all picture materials in testing the child’s abilities should be analyzed. Regular test materials may be too difficult to be seen by the child and therefore the tests may give a wrong impression on the child’s cognitive abilities. Psychological tests and reading test materials may need to be enlarged and/or printed at high contrast. Sometimes a closed circuit TV reading device needs to be used.

By combining the information gathered in the different play situations we learn a lot about the child’s ability to see and interpret facial features and expressions. Then we can support his/her learning in this area which is central in every day social interactions.

If a child is found not to recognize faces and/or facial expressions in these black & white cards, testing is continued using color photographs and therefore materials in testing the child’s abilities should be analyzed. Regular test materials may not be seen by the child and therefore the tests may give a wrong impression on the child’s cognitive abilities. Psychological tests and reading test materials may need to be enlarged and/or printed at high contrast. Sometimes a closed circuit TV reading device needs to be used.

Dependent on the child’s age and communication level the matching game is varied. First the cards can be looked at and the expressions discussed. The tester and the child may make the expressions themselves. With an older child it is possible to reflect upon the causes why Heidi might be glad, sad, serious or weeping.

During this discussion it is possible to observe whether the child has to look very close on the cards and the tester’s face to see the expressions or whether the child seems to have difficulties in understanding the concept of facial expressions. In the latter case tactile information is used as additional information. It may be that the child needs to feel the facial features to perceive the expression and to recognize them.

Drawing pictures of faces can be combined to the Heidi Expressions Test Game. Draw the circle and the eyes and ask the child “Which expression does Heidi have this time?”. The child may draw the mouth or the tears assisted by the tester when needed. This is another effective way to make the child aware of the structure of expressions. At the same time it can be used to create picture perception as such, to teach the child to understand how a picture represents an object. The expressions can also be created using pipe cleaners for the mouth and buttons for the eyes glued on a small paper plate as an activity in nursery or kindergarten.

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Contrast Sensitivity Tests

Which Luminance Level Should Be Used?

An international recommendation does not exist on the luminance level for contrast sensitivity testing, but there is a recommendation for visual acuity testing. It recommends a luminance level equal or higher than 85 cd/㎡ per square meter.

In the United States and in a number of other countries, measurement of visual acuity for research purposes is done by using the back illuminated ETDRS light box with the luminance level adjustable from 2.00 to less than 1 cd/㎡ by using layers of filters. In the small light box the maximum luminance level is 125 cd/㎡.

Measurement of Contrast Sensitivity

Measurement of contrast sensitivity resembles audiometry: a pure tone audiogram depicting the weakest pure tones at different frequencies that the person can hear. Contrast Sensitivity Curve or visuogram shows the faintest contrasts perceived by the person. If the stimulus is a wave going along the curve depicts similar function as does the pure tone audiogram. If the stimuli are optotypes (letters, numbers or pediatric symbols), recognition is required and the test resembles speech audiometry. As in audiometry, the result of the contrast sensitivity measurement is not one single value but a diagram.

Test Procedure When Using Low Contrast Visual Acuity Charts

Testing is identical to the measurement of visual acuity at high contrast level, i.e., we measure the smallest size of the optotypes that the person can recognize. The threshold is defined as the line on which at least 3 out of 5 optotypes are correctly recognized. The 2.5% test is most frequently used as a test in clinical use. The resulting threshold point on the curve is far enough from the high contrast value so that the declination of the slope of the curve can be defined. In severe low vision, the test must be quite close, which may require use of reading lamps.

Move quickly down the chart and ask the person to identify the first or the last symbol on each line. When the person hesitates or makes an error, recite one line and ask the person to read the entire line. To record the result carefully, repeat the number of optotypes read correctly, i.e., if on the 2.5% chart one of the most symbols was read incorrectly on line 20/63 (6/18, 0.3) read 20/63. threshold value at 20/63 (-1) at 2.5%.

Contrast Sensitivity Measured by Using Low Contrast Visual Acuity Charts

Test results are marked on the recording sheet at the level used (see example below) going along that level toward the right until the visual acuity value, measured at that contrast (A at 1.2%, B at 2.5%), is reached. If the person's visual acuity was 20/20 (6/6, 1.0), the line connection between the visual acuity was 202/20 (6/6, 1.0), the line connection between the individual symbols was 20/20 (6/6, 1.0), and X departs the slope of the contrast sensitivity curve of this person. Record the results as 20/50 (6/15, 0.4) at 2.5% and 20/100 (6/30, 0.2) at 1.2%

Test Procedure When Using Low Contrast Visual Acuity Tests with One Symbol-Size

In this test type the 10M size is convenient because at the most common testing distance of 1 meter, it corresponds to visual acuity 0.1 (20/200, 6/60), at 2 meters to 0.2 (20/100, 6/30), at 4 meters 0.4 (20/50, 6/35) and at 0.3 meter distance 0.03 (20/60, Visual communication is the most important way of communicating during the first year of life. Expressions on faces are mediated by faint shadows and changes of the contour of the mouth and eyes. Most facial expressions, or ‘the infant’s reactions to the Heidi/Heidi Low Contrast Cards’ offers useful information. The cards can also be used by wearing lip and eye liners, bright lipstick and eyeglasses with deep dark frames.

If an infant only responds to high contrasts, the people in his or her life should be aware of this problem and make their faces more visible. This will help detect if there are any sort of development delays or vision problems. Expressions are in low contrast, so an infant’s reaction to the ‘Hiding Heidi’ expressions can be used to detect severe low vision, the test must be quite close, which may require use of reading lamps.

In the examination of older children the child may prefer waving to Heidi "bye-bye" instead of simply pointing. Also, the presentation may be varied by letting the parents show the cards. They hold the cards behind their back while moving to the testing distance. There they present the face stimulus and ask "Who has the Heidi picture?"

7. If the infant does not respond to the low contrast cards, bring them closer. Note the distance. If the infant still does not respond to a horizontal presentation of the face cards, slide the cards in a vertical presentation.

8. Initially present the cards in usual illumination level (average room lighting). If the infant does not respond, increase or decrease the luminance level by utilizing a lamp with controllable lighting that allows you to vary the luminance level. Record the optimal luminance level for communication repeatedly during the first year of life.

9. Since infants rely on near and far visual communication, try to obtain at least two separate thresholds. First, measure at the near communication distance, using the method described above; record the distance from the card to the cards, the luminance level, and the threshold contrast level reached.

If the infant responds to low contrast face stimulus at near distance, use one of the cards with higher contrast and the blank card, backing away from the infant to the distance where he or she responds to the face. Record the distance, the luminance level, and the threshold contrast level reached at this distance. This will provide useful information. The cards can also be used by wearing lip and eye liners, bright lipstick and eyeglasses with deep dark frames.

The tester may notice that an infant does not follow the movement of the ‘Hiding Heidi’-picture with eye move-ments or with combined eye-head movements but turns his or her head in the direction of the picture when it stops. Another child may follow the movement but looks puzzled when the movement stops and looks at the tester as if asking “Where did the picture disappear to?” These observations need to be reported to the child’s pediatrician because they may mean that the child has problems in motor perception (+ perception of movement or perception of objects that stand still).

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Contrast Sensitivity Tests

Usually the loss of visual function is roughly equal at high and at low contrast levels. The slope of the curve is steep when there is a change in a description (Type I). When there is a small circumscribed lesion in the center of the macula, visual acuity may decrease several lines, yet in the low contrast vision there is slight or no loss (Type II). Type III change in the transfer of visual information is characterized by moderate to no loss of visual acuity at high contrast and a greater loss of visual function at low contrast. This is often caused by diabetic retinopathy, glaucoma, or optic neuritis, to mention only some of the most common causes.

Clinically, it is well known that there can be three people with different types of contrast sensitivity curves even when they have similar visual fields and visual acuity values. They can have very different functional visions. The three people whose contrast sensitivity curves are in figure all have visual acuity of 20/53 (6/18, 0.3). Person A has high normal function at low contrasts and functions like a normally sighted person. Person B has some decreased low contrast function and the typical behavior of a person with low vision (reading texts closer and moving slightly slower on stairs, etc.). Person C has lost visual function at low contrast and is severely visually impaired. Of these three people with the same visual acuity, one is normally sighted, one has low vision and one is severely visually impaired.

Type of Low Contrast Test Face Test

Contrast sensitivity needs to be assessed in children and adult persons who are unable to respond verbally or by pointing. If the person can follow a moving target or shift gaze to or turn head to peripherally presented visual stimuli, preferential looking test situations can be used when testing with Hiding Heidi pictures.

Present the test within the distance within which the person visually responds using the highest contrast (100%) first. If you expect normal function in a baby, you may shorten the test situation by showing next the 2.5% picture and then the 1.2% picture. If you do not get a response to the 2.5% picture, show the 25% or 10% picture next and then the 5% picture. The picture is presented by moving both the picture and the white card with the same speed, usually horizontally. If the person has horizontal nygmaus, the pictures are best presented vertically.

The visibility of facial features can be tested also in older children by using the Hiding Heidi test. Then it is more fun to ask the child to point to Heidi when she becomes visible. In testing of difficult-to-test children we have sometimes used the following technique: The test is on a table. One of the persons testing takes the picture of Heidi, the other person takes the blank card. Testers move to the testing distance and ask “who has the Heidi card?” Some children like to wave “bye-bye” to Heidi.

When contrast sensitivity has decreased, it is advisable to measure visibility of facial features at different distances. Surprises are common. Since the area of the Heidi picture - and that of a face - is so much larger than the area of a symbol or even a grating stimulus, the low contrast pictures may be discernible at unexpectedly long distances. However, it is important not to force children to function at their threshold. If the function of a healthy child at the same luminance level is demonstrated, the teachers and therapists will better understand the requirements of the visually impaired child’s communication.

The ability to detect objects of low contrast is an important component of the visual system. Determining the levels of contrast that an infant can detect, helps planning information for intervention and provides a baseline to evaluate future changes. Deviations from visual behavior may indicate disorders that leave vision at high contrast levels unaffected.

Hiding Heidi Low Contrast Face Test

6/180 covering the low contrast visual acuity range of most persons with visual problems. The contrast levels of the test lines on the five pages are 25%, 10%, 5%, 2.5% and 1.2%. The same diagram that was used when testing with the low contrast visual acuity charts, can be used also for reporting of the results from testing with tests with one symbolic size. The number of correct answers is read on the left vertical axis and the cross is placed corresponding to the distance used when testing.

Luminance variation affects the threshold values in many disorders and even in normally sighted individuals. It is difficult to arrange high enough luminance on the test in a regular room except by directing a light source toward the test. Then the amount of light falling on the test is dependent on the distance of the test from the light source. For reliable follow-up measurements, the test should be at a fixed distance from the light source. In field studies, the variation in the results caused by variation in illumination needs to be taken into consideration.

The surface of the low contrast charts is easily damaged. Avoid touching the white test surface. If a person needs to point with his/her finger to the 2.5% picture and then the 10% picture next and then the 5% picture. The pictures are presented by moving both the picture and the white card with the same speed, usually horizontally. If the person has horizontal nygmaus, the pictures are best presented vertically.

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Contrast Sensitivity Tests

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Small grating stimuli would often give a misleading picture of visual function at low contrast. Therefore it is wise to make one measurement with a large grating stimulus to learn about the subject's ability to see low contrast information. On the other hand, it is interesting to evaluate the function of the fixation area by using a smaller stimulus. This is possible by covering the grating stimulus with a grey folder that leaves either one fourth or one tenth of the stimulus visible.

Lea Low Contrast Gratings

Grating Acuity Test at Low Contrast Levels

Grating tests have been used to measure contrast sensitivity since the 60's. These computer controlled grating tests have not become widely used in clinical medicine because they are expensive and require an experienced technician to use them. However, studies with them have taught us some important principles in measurement of contrast sensitivity in cases of low vision. The most important finding is that contrast sensitivity values in nearly all cases of low vision are different when measured with gratings of different size. The larger the Stimulus, the higher the contrast sensitivity values. This is particularly common in cases of central scotoma that "eats up" some of the stimulus and thus the effective stimulus is smaller than the physical stimulus.

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Lea Low Contrast Gratings

Contrast sensitivity curves of a person with optic atrophy in both eyes are shown in different outlines. The upper graph shows the contrast sensitivity curves in case of macular degeneration. The lower graph shows the contrast sensitivity curves in case of normal vision. The contrast sensitivity curves are measured with 10 degree gratings and contrast sensitivity is barely measurable.

The Range of Normal Contrast Sensitivity

Among the normally sighted people, both visual acuity and contrast sensitivity have a wide range of variation. In visual acuity, 20/25 (6/7.5) is a low normal value; the highest normal values are three times higher, 20/6 (6/2.5, 2.5). Similarly, the range of normal variation in contrast sensitivity values is great. Therefore, we define a value within the range of normal values as "normal" contrast sensitivity. If his or her contrast sensitivity was previously high, it may decrease to less than one-half or one-third of its original value and still be "normal".

Grating acuity at the lower contrast levels is measured similar to the measurement at high contrast level. It takes some time to get accustomed to locating the correct value on the nomogram. It is best to mark down the result on a diagram immediately. If an error is made in one of the measurements the resulting curve looks strange. Then the strange value should be measured again. If the approximate multiple values of 57.2 cm are used (115, 170, 230, 285 and 340 cm), it is easy to measure the distance.

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Among the normally sighted people, both visual acuity and contrast sensitivity have a wide range of variation. In visual acuity, 20/25 (6/7.5) is a low normal value; the highest normal values are three times higher, 20/6 (6/2.5, 2.5). Similarly, the range of normal variation in contrast sensitivity values is great. Therefore, we define a value within the range of normal values as "normal" contrast sensitivity. If his or her contrast sensitivity was previously high, it may decrease to less than one-half or one-third of its original value and still be "normal".
Contrast sensitivity tests have been used to measure contrast sensitivity since the 1960s. These computer-controlled grating tests have not become widely used in clinical medicine because they are expensive and require an experienced technician to use them. However, studies with them have taught us some important principles in measurement of contrast sensitivity in cases of low vision. The most important finding is that contrast sensitivity values in nearly all cases of low vision are different when measured with gratings of different spatial frequency. The larger the grating, the higher the contrast sensitivity value. This is particularly common in cases of central scotoma that is greater than 30% of the visual field and thus the effective stimulus is smaller than the physical stimulus.

Small grating stimuli would often give a misleading picture of visual function at low contrast. Therefore it is wise to make one measurement with a large grating stimulus to learn about the subject’s ability to see low contrast information. On the other hand, it is interesting to evaluate the function of the foveal area by using a smaller stimulus. This is possible by covering the grating stimulus with a grey folder that leaves either one fourth or one tenth of the stimulus visible.

Contrast sensitivity curves in case of macular degeneration, L, the normal left eye, R, the right eye with dry macular degeneration. Contrast sensitivity measured with 10 degree stimulus is nearly as good as the normal left eye, whereas when measured with 5 degree stimulus it is one fifth of the maximum value of the 10 degree maximum. When measured with 2.5 degree stimulus the maximum value is only one twentieth of the 10 degree maximum.

Start with the high contrast grating. Show the gratings at a distance of 2.5 m starting with the 0.5 cpcm grating. Turn the gratings in different orientations before exposing them from behind the grey cover. Do not move the gratings when presenting it. Ask the person to respond by showing the orientation of the lines with his/her hand or with the ruler that is included in the test. Threshold value is reached when three out of five presentations lead to correct response.

If the broadest lines could not be seen at 2.5m distance, move closer until they are seen. Stop back a little, turn the grating behind the cover and present it again. If a person has uncorrected astigmatism, grating will be seen at different distances when presented in different orientations. Thus you learn about the person’s refractive error while measuring grating acuity.

If the broadest lines were seen at a distance of 2.3m, grating acuity is 2 cpd (0.5 cpcm equals 0.5 cpd at 57cm, 1 cpd at 114cm and 2 cpd at 230m). This is a low value.

When testing normally sighted persons one starts by showing the finest grating at about 1.5 m distance, moves backward until the lines cannot be discerned and then moves toward the person until they become visible again. At this distance make the presentations while slightly changing the distance in order to find the threshold value. Test first with the large stimulus and then with the two smaller ones.

The distance needed to be measured accurately is easy to measure if the person sets with his/her head supported on the head rest of a corneal microscope and a tape measure is fixed on the head rest. When the distance is measured the result can be read on the corresponding nomogram (Diagram A). For example, if a person saw the 0.8 cpcm grating at 1.15 m distance, grating acuity is 16cpm with a 10 degree stimulus (the grating is 2cm in diameter, thus 20 degrees at 57.2cm and 10 degrees at 114cm in diameter, Diagram A). Grating acuity at the lower contrast levels is measured similar to the measurement at high contrast level.

If occupational tasks require good visual function at low contrast levels, visual acuity alone does not select the most suitable persons for that particular task. For example, if the task is to notice airplanes approaching with 90% accuracy, these planes are best seen by a person with good visual acuity in the contrast range of 1.5%-5%. Since the declination of the slope varies even in normal individuals, it is possible that a person with lower visual acuity at high contrast has better function at the lower contrast levels than a person who has higher visual acuity at high contrast. It is important to remember in all such occupational tasks that require exceptionally good visual function at low contrast levels.

The Range of Normal Contrast Sensitivity

Among the normally sighted people, both visual acuity and contrast sensitivity have a wide range of variation. In visual acuity, 20/25 (6/9, 0.8) is a low normal value; the highest normal values are three times higher, 20/8 (6/2.5, 2.5). Similarly, the range of normal variation in contrast sensitivity values is great. Therefore, a value within the range of normal vision for visual acuity may be too high for normal contrast sensitivity. If this is the case, contrast sensitivity values should be recorded and saved as part of the basic information related to each person’s health. A change warrants an examination to find out the cause of the change. Although the most common cause would be a small change in the refractive error of the eye, which is a benign finding, repeating the measurement of contrast sensitivity would be beneficial as a part of routine health examinations to rule out changes in the visual pathways.

Measurement of contrast sensitivity would also help us to better understand the complaints of a person whose visual acuity at high contrast has not changed but whose vision has decreased at low contrast levels. Then we would not annoy him/her by saying that his/her vision is as good as before, a situation which is now experienced by all too many patients/caretakers.

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Lower Visual Acuity May Mean Better Vision

Contrast sensitivity needs to be assessed in children and adult persons who are unable to respond verbally or by pointing. If the person can follow a moving target or shift gaze to or turn head to peripherally presented visual stimuli, preferential looking test situations can be used when testing with Hiding Heidi pictures. Present the test within the distance within which the person visually responds using the highest contrast (100%) first. If you expect normal function in a baby, you may shorten the test situation by showing next the 2.5% picture and then the 1.2% picture. If you do not get a response to the 2.5% picture, show the 25% or 10% picture next and then the 5% picture. The picture is presented by moving both the picture and the white card with the same speed, usually horizontally. If the person has horizontal nystagmus, the pictures are best presented vertically.

The visibility of facial features can be tested also in older children by using the Hiding Heidi test. Then it is more fun to ask the child to point to Heidi when she becomes visible. In testing of difficult-to-test children we have sometimes used the following technique: The test is on a table. One of the two persons testing takes the picture of Heidi, the other person takes the blank card. Then moves to the testing distance and ask “who has the Heidi card?” Some children like to wave “bye-bye” to Heidi.

When contrast sensitivity has decreased, it is advisable to measure visibility of facial features at different distances. Surprises are common. Since the area of the Heidi picture - and that of a face - is so much larger than the area of a symbol or even a grating stimulus, the low contrast pictures may be discernible at unexpectedly long distances. However, it is important not to force children to function at their threshold. If the function of a healthy child at the same luminance level is demonstrated, the teachers and therapists will better understand the requirements of the visually impaired child’s communication.

The ability to detect objects of low contrast is an important component of the visual system. Determining the levels of contrast that an infant can detect, helps planning information for intervention and provides a baseline to evaluate future changes. Deviations from visual behavior may indicate disorders that leave vision at high contrast levels unaffected.

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Contrast Sensitivity Tests

An international recommendation does not exist on the luminance level for contrast sensitivity testing, but there is a recommendation for visual acuity testing. It recommends a luminance level equal or higher than 85 candela per square meter.

In the United States and in a number of other countries, measurement of visual acuity for research purposes is done by using the back illuminated ETDRS light box with the luminance level adjustable from 220 to less than 1 cd/m² by using layers of filters. In the small light box the maximum luminance level is 125 cd/m².

Measurement of Contrast Sensitivity

Measurement of contrast sensitivity resembles audiometry: a pure tone audiogram depicting the weakest pure tones at different frequencies that the person can hear. Contrast Sensitivity Curve or visogram shows the faintest contrasts perceived by the person. If the stimulus is a sine wave grating, then the curve depicts similar function as does the pure tone audiogram. If the stimuli are optotypes (letters, numbers or pictorial symbols), recognition is required and the test resembles speech audiometry. As in audiometry, the result of the contrast sensitivity measurement is not one single value but a diagram.

The threshold values can be measured with two different techniques when using optotype tests:

1. By using low contrast visual acuity charts, or
2. By using tests with one symbol size and several contrast levels.

**Test Procedure When Using Low Contrast Visual Acuity Charts**

Testing is identical to the measurement of visual acuity at high contrast level, i.e., we measure the smallest size of the optotypes that the person can recognize. The threshold is defined as the line on which at least 1 out of 5 optotypes are correctly recognized. The 2.5% test is the most useful test in clinical use. The resulting threshold point on the curve is far enough from the high contrast value so that the decline of the slope of the curve can be defined. In severe low vision, the test must be quite slow, which may require use of reading lamps.

Move quickly down the chart and ask the person to identify the first or the last symbol on each line. When the person hesitates or makes an error, recede one line and ask the person to read the entire line. To record the result carefully, recite the number of optotypes read correctly, e.g., if on the 2.5% chart one or more symbols was read incorrectly on line 20/63 (6/18, 0.3) round the visual acuity to 20/63 (6/18, 0.3).

**Contrast Sensitivity Measured By Using Low Contrast Visual Acuity Charts**

Test results are marked on the recording sheet at the level used (see example below) going along that level toward the right until the visual acuity value, measured at that contrast (A at 1.2%, B at 2.5%), is reached.

**Contrast Sensitivity Test With One Symbol Size**

In this test type the 10M size is convenient because at the most common testing distance of 1 meter, it corresponds to visual acuity 0.1 (20/200, 6/00), at 2 meters to 0.2 (20/100, 6/30), at 4 meters 0.4 (20/50, 6/35) and at 0.3 meter distance 0.03 (20/600, 6/180).

Visual communication is the most important way of communicating during the first year of life. Expressions on faces are mediated by facial shadows and changes of the contour of the mouth and eyes. Most facial expressions are evoked by the infant’s reaction to the Heidi-Heidi Low Contrast Cards offers useful information. The cards can be used with multihandicapped people.

If an infant only responds to high contrasts, the person in his or her life should be seeking other ways of communicating this problem and make their faces more readable. This can be done by wearing lid and eye liners, bright lipstick and eyeglasses with dark frames.

**Instructions**

Even though “infant” is referenced in the following instructions, the instructions also apply for children and multihandicapped people.

1. Stack the Heidi-Heidi Low Contrast Cards sequentially with the 2.5%, 10% and 100% faces downward, in that order. Since the 2.5%, 5% and 1.25% faces are on the opposite side, they will be facing up.

2. Position the infant so he or she faces the examiner and in the optimal position for best visual performance. Support his or her head so involuntary movements least affect the infant’s performance.

The infant can look over the parent’s shoulder while being held, sit on its lap or in the child’s buggy. Consider the infant’s most comfortable position. If possible, select the best time of day when the infant is most alert. Note any differences in performance when not taking the above into consideration.

3. Before observation of the infant’s responses to the Heidi-Heidi faces, familiarize yourself with the infant’s usual response pattern and look for: the head turning toward an interesting visual object, eye widening, breathing, crying, eyebrow arching, smiling, babbling or to or reaching for an object. This will help detect if there are variations of the usual infant responses on the Heidi-Heidi faces. Familiarize and prepare the infant for locating Heidi-Heidi in whatever way is appropriate to his or her level.

4. During your communication with the infant, notice how far you can back away from the infant without losing his or her attention to your face. Move quickly down the chart, present the face card, time them in front of your chest. Present the face cards, one at a time, with the blank card in front of the face card. Encourage the infant to look toward the middle by talking to him or her, pointing above the cards, or play Peek-A-Boo with the blank card in front of your face in an attempt to get the infant’s attention.

5. Use two cards for each presentation. One card is always the blank card, the other, one of the Heidi-Heidi faces. Hide the stimulus card behind the blank card. Then ask the child “Who has the Heidi picture?” while moving the blank card off to one side and the stimulus card off to the other side. Both cards should leave the middle as the same speed. Stimulus cards should be moved to the right and/or left in a random order.

The cards are presented in the following order: 100%, 10%, 2.5% and 1.25%. If the infant does not react to the 100% card, present the 25% card. If the infant then reacts to the 25% card, proceed with the 10% card and then the 2.5% card until a threshold level is reached. If the infant does not react to the 2.5% card, present the 5% and other cards, as above, until a threshold level is reached. If the child responds to the 1.25% face, the contrast threshold at that distance is below 1.25%. Record that as <1.25. The purpose of this threshold is toprecisely to find the infant’s contrast threshold as quickly and as accurately as possible. Avoid repeated presentation of the same stimulus card, as this causes habituation.

The tester may notice that an infant does not follow the movement of the Heidi-picture with eye move-moves or with combined eye-head movements but may make a quick glance. This can be used by wearing lid and eye liners, bright lipstick and eyeglasses with dark frames.

Hiding expressions test game contains six different basic expressions (see under the heading). Each expression is on two exactly identical cards and on a third card which has one additional feature, a bow on Heidi’s hair. In this picture are the set of three cards depicting smiling Heidi and sad Heidi.
demonstrate to the child's parents/therapists/teachers the distance at which the child can see things that correspond to visual/intermediate contrast levels.

**Heidi Expressions Test Game (254500)**

Heidi Expressions Test Game has been developed to improve early evaluation of vision for communication. Among the visually impaired children there are some who cannot see expressions and/or do not recognize people by their faces. These children may have nearly normal results in routine vision tests (large visual field and normal or near normal visual acuity). Other visually impaired children may have this deficit in visual recognition as a part of more extensive loss of visual functions. Many children have Cerebral Palsy, which, however, may be so mild that it has not required special treatment. If the child’s difficulties are not known and understood, his/her behavior may cause misunderstandings and needless negative experiences in social interactions. Therefore, testing of a child’s ability to see differences between different facial expressions is an important part of functional visual assessment.

Visually impaired children have two different kinds of problems in learning to recognize faces and to interpret facial expressions:

1. They do not see expressions well enough to interpret them (paradox problem).
2. They have brain damage in the area of face recognition and therefore do not recognize differences in people’s faces and may also have difficulties in interpreting expressions (cognitive visual assessment).

It is possible to observe which type of problem the child has during the Heidi Expressions test game. In some cases the child may have poor quality of image and poor facial recognition.

**Play situation:**

The Heidi Expressions Test Game can be used from the age of 30-36 months when reaching the child how people look whether they have the six basic expressions depicted on the cards. Matching the cards gives a natural situation to discuss the different expressions.

Depending on the child’s age and communication level the matching game is varied. First the cards can be looked at and the expressions discussed. The tester and the child may make the expressions themselves. The child’s creations can be used to observe which features the child uses in the recognition of his/her picture.

When the child seems to understand the six different basic expressions, the cards can be matched. First only six cards are chosen, for example the smiling Heidi and the weeping Heidi. If the child does not have cognitive visual functions for facial recognition, he/she may match the faces with the bow as equal. This needs to be discussed with the child by showing once more on the tester’s face how the different expressions look. The child may be able to see the expressions in a real life situation although they are too difficult to be recognized in a picture.

When the child has matched the cards printed with full contrast, the 10% contrast pictures and later the 2.5% contrast pictures can be used in the play situation.

If the child can match the high contrast pictures but not the 10% or 2.5% pictures, contrast sensitivity needs to be measured and the central visual field examined if the child is old enough for testing. It is also advisable to discuss with the child the structure of the image: whether there are distortions of lines or spotty loss of the image (scotomas).

When a child can see the expressions only at 100% contrast, all picture materials in testing the child’s abilities should be analyzed. Regular text materials may be too difficult to be seen by the child and therefore the tests may give a wrong impression on the child’s cognitive abilities. Psychological tests and reading test materials may need to be enlarged and/or printed at high contrast. Sometimes a closed circuit TV reading device needs to be used.

By combining the information gathered in the different play situations we learn a lot about the children’s ability to see and interpret facial features and expressions. Then we can support his/her learning in this area which is central in everyday social interactions.

If a child is found not to recognize faces and/or facial expressions in these black & white cards, testing is continued using color photographs and/or printed at high contrast. Sometimes a closed circuit TV reading device needs to be used.

Contrast sensitivity is the reciprocal of the contrast at threshold, i.e., one divided by the lowest contrast at which forms or lines can be recognized.

If a person can see details at very low contrast, his or her contrast sensitivity is high and vice versa. Depending on the structure of the stimulus used in the measurement - either gratings of different size or symbols - contrast sensitivity of a person gets different values.

**What is Contrast?**

Contrast is created by the difference in luminance, the amount of reflected light, reflected from two adjacent surfaces. It can be defined in slightly different ways. In clinical work, we usually use the Michelson formula:

\[
\text{Contrast} = \frac{L_{\text{light}} - L_{\text{dark}}}{L_{\text{light}}} \times 100\%
\]

There is also the Weber definition of contrast:

\[
\text{Contrast} = \frac{L_{\text{light}} - L_{\text{dark}}}{L_{\text{dark}}} \times 100\%
\]

Lum = Luminance on the lighter surface
Lum = Luminance on the darker surface

When the darker surface is black and reflects no light, the ratio is 1. Contrast is usually expressed as percent, then the ratio is multiplied by 100. The maximum contrast is thus 100% contrast. The symbols of the visual acuity charts are close to the maximum contrast. If the lowest contrast perceived is 5%, contrast sensitivity is 100/5 = 20. If the lowest contrast perceived by a person is 0.6%, contrast sensitivity is 100/0.6 = 1670.

There is no international recommendation on how contrast of visual acuity charts should be defined. Therefore there are differences in the contrast of tests of different manufacturers.