

MAYER-KRAN™



# DOUBLE-HAPPY™ CONTRAST TEST - FULL SET

## Instructions for Testing



QNET BV  
Kantstraat 19  
NL-5076 NP Haaren  
The Netherlands



**Precision**  
**Vision®**

1725 Kilkenny Court • Woodstock IL 60098 • USA  
[precision-vision.com](http://precision-vision.com)





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### Instructions for Testing

Assessment of contrast sensitivity (CS) is an important component of a comprehensive eye examination. The test should be administered by a vision health professional, or a person trained in administering vision tests. The test results should be interpreted in the context of the individual's overall presentation and the results of the individual's eye examination. If the individual's test shows abnormal results, we recommend retesting, preferably by a different tester who is unaware of the first tester's results. *A CS test does not replace the eye examination.*

This M-K Double-Happy Contrast Test is intended for children and older individuals who are unable to name or match letters, that is, individuals who cannot be tested with standard letter contrast tests. The M-K D-H full test set consists of 16 cards: 15 cards are printed with a schematic smiling face and the 16th card is blank (see list of cards in table at end of this document).

The M-K D-H faces are darker than the white background of the card and each face has a different darkness, ranging from nearly black to a very dim gray. The darkness of the face relative to the white card is calibrated in percent contrast. The higher the percent contrast, the bigger the difference between the darkness of the face and the white card.

The M-K Double-Happy faces in this full set range in percent contrast (Weber formula) from 89% (nearly black) to 0.8% (very dim). The table at the end of this document (p. 4) shows the contrast and logCS values that are included in this full set of M-K D-H contrast test cards. Page 4 also has a table which shows qualitative loss categories corresponding to M-K D-H card numbers and contrast values. These loss categories are based on the experience of clinicians who assess adults with diseases of the retina and optic nerve, such as due to glaucoma or diabetes. The values assigned to the categories were obtained with letter CS tests. This table also indicates performance difficulties associated with the severity of loss. If an adult (or a child age 5-6 years or older) does not detect a face contrast at the "normal" or "near normal" level as indicated in the qualitative loss table on p. 4, this person should be considered to have a loss of CS. Estimated normal values for younger children are noted on p. 5.

This test is designed to measure an individual's contrast sensitivity.<sup>1</sup> Contrast sensitivity is an important aspect of our vision – for example, if print is too low in contrast, we will not be able to read it, or if a step down does not contrast well with the next step, we may miss the step and fall. The lower the contrast of an object a person detects, the higher is their contrast sensitivity.

<sup>1</sup>Contrast sensitivity (CS) is reported differently than percent contrast although it is derived from percent contrast. We use the logarithm of CS when reporting contrast sensitivity, or  $\log_{10}CS$ . You will see that printed on the M-K Double-Happy cards along with % contrast.  $\log_{10}CS$  is a useful scientific number.

One aspect of the test procedure is hinted at by the name of the cards – Double-Happy. Look at the front of the highest contrast card. Now rotate the card by 180 deg; you will see that the face looks exactly the same as it did when you had it in the original position. Thus – Double-Happy! This means that there will be no difference in the image of the face when it is on the person's left or right. Notice also that the face is not in the center of the card but is shifted to one side. This makes it easier for the tester to determine if the person shifts gaze to one or the other side. In the first presentation of a face card, if the person looks to one side, the tester considers that the face may be on that side. Then, when the tester rotates the card 180 deg, the person should look at the opposite side if the person detects the face. Thus, if the person does shift gaze to the opposite side where the face should be, this suggests that the person detects the face on that card. *We emphasize that the tester should not look at the front of the card for the position of the face until s/he can make a judgment whether the person sees that face.*

While presenting a card to the person, you as the tester may observe him/her through the central peephole. Or if the person is not distracted by your face, you can observe him/her over the top of the card. You can determine that the person is 40 cm from the face card, which is the calibrated distance, by holding the card length-wise between your face and the person's face. During testing, you should remeasure test distance particularly if the person moves close to the card. After measuring test distance turn the card face down and away from the person until you are ready to present the face in the correct manner.

It is important that for every contrast card you test, only check the front of the card for the actual location of the face when you are sure the person detects that face. If you are unsure, set that card aside and test it after you retest the just higher contrast card.

Testing continues until the person is **unable** to detect the face on a card, based on the tester's unbiased judgment. The lowest contrast card the tester judges that the person detects is the person's contrast threshold and estimates their contrast sensitivity. (To check the contrast % and contrast sensitivity values for each card, look on the back of the cards or in the table on p. 4.)

The specific rules of the test are as follows:

1. The tester shows the person (child or adult) each card in the set, in series, starting with the highest contrast face and then showing cards with lower contrasts
- 2. Present the card without your knowing on which side the face is located. This is to avoid your being biased about where the face is located.**
3. As you present the card to the person, observe whether s/he looks to the right or left and holds gaze a little on that side
4. Now rotate the card 180 deg and see whether s/he now looks to the other side of the card. In this way, you can make a judgment whether the face is on the right or left of the front of the card. Or, you may try to show the face in the same location, that is, don't rotate the card. Then observe whether the person looks to the same location.

5. If you **are sure** the person detects the face on that card, you can check the front of the card to see whether you were correct in judging the right or left position of the face. This will give you some confidence that the person is actually looking at the face.
6. Next, show the person the next lower contrast face card and conduct the same procedure as in #s 1-5 above. Decide whether you think the person detects this face contrast.
7. Continue testing cards in this way in sequence until you get to a face contrast that you **are unsure** whether the person detects it. Set this card aside.
8. Go back to the next higher contrast face you tested before the one you are not sure about. Test it again and judge whether the person detects the face. If you think, yes, s/he detects this face, then do the following:
9. Retest the card with face contrast that you were unsure about. Be sure to show enough trials to be very sure the person does not see the face contrast. Or that perhaps, the person now appears to detect this face contrast.
10. If you judge the person actually detects the face on the card that your formerly thought they did not, again, be sure by presenting a few more trials.
11. Keep yourself objective, do not check the front of the card until you are very sure the person detects this face.
12. **The lowest contrast face you judge the person detects is the person's threshold for face contrast.** Now you can report his/her contrast sensitivity.

You may find that you need to test several different face contrasts around the person's threshold, especially when you are just learning to do the test. There is no hard and fast rule about judging the threshold for contrast detection; it is up to the tester to use their best, unbiassed judgment. One of the wise women in child vision science made new testers bet their paychecks on their judgment of the person's threshold! You may think about that as you are testing individuals with this test.

Another cue: Showing the blank card (#16) to the person can give the tester an idea about any unusual visual behaviors the person might have, such as always looking to one side, which could impair the tester's judgment of the person's visual responses to the faces.

The full set of M-K D-H CS cards are listed on p. 4. Information to guide interpretation of the results is provided on the right of the table on p. 4. Estimated binocular cutoff values for children, adult norms and adult disability associated with logCS in different activities are on p. 5.

The Mayer-Kran Double-Happy Contrast Test was developed by Dr. D. Luisa Mayer, Associate Professor, and Dr. Barry S. Kran, Professor, of the New England College of Optometry. The test name is trademarked and the test itself has a patent pending (U.S. Patent Application No. 16/943,285 NM:132721-1 BSL).

Publication citation:

Mayer DL, Taylor CP, Kran BS. **A new contrast sensitivity test for pediatric patients.: Feasibility and inter-examiner reliability in ocular disorders and cerebral visual impairment.** Translational Vision Science & Technology 2020:30 (1-9)



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Card Number	Percent (%) Contrast (Weber)	Log <sub>10</sub> Contrast Sensitivity (CS)	M-K DH cards	Range of log <sub>10</sub> CS and % contrast (Weber)	Qualitative loss (Performance levels*)
1	89	0.05	Card 1	0.05 logCS (89%)	Near Total Loss (Vision alone is unreliable for contrast judgments)
2	71	0.15	Card 2, 3	<0.40 logCS (>40%)	Profound Loss (Visual performance is marginal even with assistance)
3	50	0.30	Card 4, 5	0.45 to 0.60 logCS (36% - 25%)	Severe-Profound Loss (Visual Performance is marginal even with assistance)
4	36	0.45	Card 6, 7, 8	0.75 to 1.05 logCS (17.8% - 8.9%)	Severe Loss (Performance is slow, even with assistance)
5	25	0.60	Card 9, 10	1.10 to 1.35 logCS (6.3% - 4.5%)	Mild Moderate Loss (Some assistance is needed)
6	17.8	0.75	Card 11	1.40 to 1.6 logCS (3.2%)	Near Normal (Most difficulties can be overcome)
7	12.6	0.90	Card 12	1.65 logCS (2.2%)	Near Normal (Depending upon age)
8	8.9	1.05	Card 13-15	1.80 to 2.10 (1.6 - 0.8%)	Normal
9	6.3	1.20			
10	4.5	1.35			
11	3.2	1.50			
12	2.2	1.65			
13	1.6	1.80			
14	1.1	1.95			
15	0.8	2.10			
16	BLANK				

\*The qualitative categories of CS loss (last column) are based on those accepted for adults based on letter contrast sensitivity tests.

*\*Performance levels (for adults) are provided by August Colenbrander (Visual Standards. Aspects and Ranges of Vision Loss with Emphasis on Population Surveys. International Council of Ophthalmology, 2002.) Available at: [http://www.icoph.org/downloads/visualstandards\\_report.pdf](http://www.icoph.org/downloads/visualstandards_report.pdf)*

Extrapolating the above adult qualitative CS loss categories to children is speculative and could be questioned. Further, the M-K D-H test requires detection of the stimulus, not identification of a symbol as in adult tests. Detection tasks can overestimate results based on letter identification tasks which means that CS loss could be more severe when the child can be tested with letter CS tests.

To date there are no age-related norms for Mayer-Kran Double-Happy Contrast Test.

^Estimated screening values for typical children of a given age range are provided below to aid in interpreting screening test results for young children. These values are based on limited data in the literature.

1 to 2 years: 1.2 logCS (6.3% Weber contrast)

> 2 to 4 years: 1.5 logCS (3.2% Weber contrast)

5 to 6 years: 1.65 logCS (2.2% Weber contrast)

A child in one of the above age ranges who does not detect the logCS card indicated, should be:

- 1) Retested with the M-K D-H screening set by an independent tester
- 2) Monitored for possible visual problems
- 3) Referred to an ophthalmic professional

### ADULT NORMS

The normative cutoff for adults used in the Berkeley Laboratory (per Dr. Ian Bailey) is  $\geq 1.7$  logCS. Normative cutoff for adults using Pelli-Robson and Mars letter contrast tests is 1.8 logCS.

### Disability for specific activities associated with logCS (adult studies)

Walking  $\leq 0.90$  logCS<sup>a</sup>

Fear of falling when walking  $\leq 1.50$  logCS<sup>b</sup>

Reading  $< 1.4$  log CS (50% disabled)<sup>a</sup>

$< 0.6$  log CS (90% disabled)<sup>a</sup>

Face recognition  $\leq 1.3$  logCS<sup>a</sup>

<sup>a</sup>West SK, Rubin GS, Broman AT, Munoz B, Bandeen-Roch, Turano D for the SEE Project Team. How Does Visual Impairment Affect Performance on Tasks of Everyday Life? Arch Ophthalmol. 2002;120:774-780.

<sup>b</sup>Ramulu PY, van Landingham SW, Massof RW, Chan ES, Ferrucci L, Friedman DS. Fear of falling and visual field loss from glaucoma. Ophthalmology. 2012;119:1352-1358.