

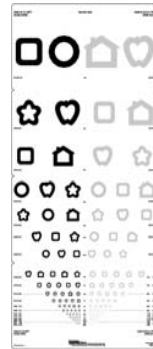
The MIXED CONTRAST™ test format – Contrast testing made EASY, FAST, CONVINCING

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DISTANCE TESTS

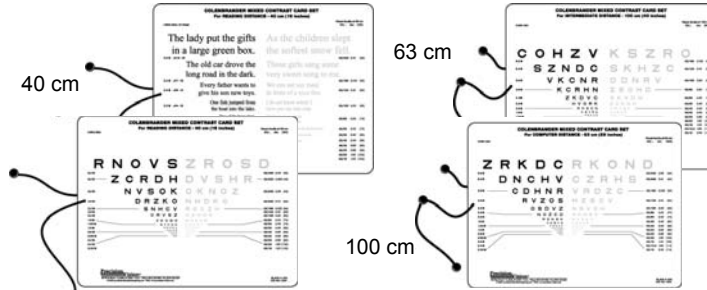


Chart for the ETDRS cabinet



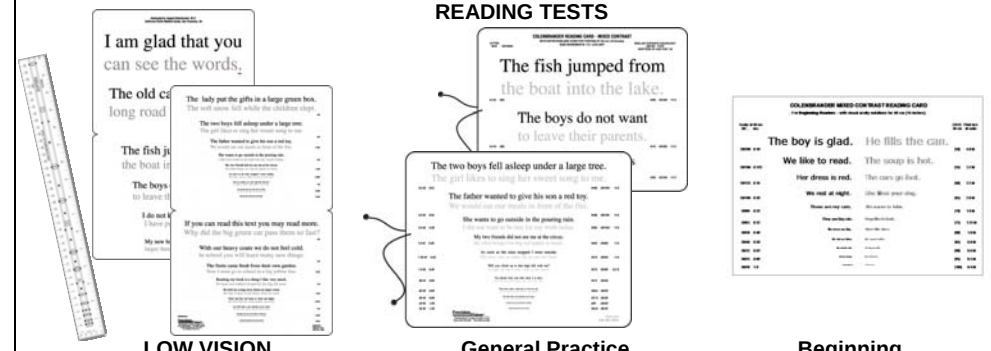
Folding chart for multiple distances

INTERMEDIATE TESTS – for multi-focal corrections



Cards for 40 cm (16"), 63 cm (25") and 100 cm (40") provide a standard test to compare various multi-focal corrections

READING TESTS



LOW VISION
larger print, any distance

General Practice
smaller print, fixed distance

Beginning
Readers

BACKGROUND

Contrast Sensitivity is important.

- It may be an **EARLY SIGN** of AMD and other disorders.
- It can explain **PATIENT COMPLAINTS** in the presence of normal acuity.
- Deficits can interfere with **ACTIVITIES OF DAILY LIVING**.

Yet, it is rarely tested in routine practice, since an extra test takes extra time.

The **MIXED CONTRAST** format provides a solution that is:

- **Easy** – High and low contrast are side-by-side. No additional card required.
- **Fast** – The difference between high and low contrast is immediately obvious.
- **Convincing** – No need for lengthy explanations.

NORMAL VALUES

A normal difference between high contrast (HC) and low contrast (LC) acuity is 1 or 2 lines.

In AMD patients we have found differences of up to 10 lines, independent of visual acuity.
E.g.: acuity ↑, contrast ↓ or: acuity ↓, contrast ↑

SIGNIFICANCE

Even if the causes of contrast deficits are not always clear, the consequences make detection worthwhile. Many studies have shown that ADL complaints correlate better with contrast deficits than with visual acuity deficits.

This is not surprising since most ADLs (except reading) involve medium size objects with variable contrast, rather than small objects with high contrast, as on letter charts.

Low vision experience has shown that patients with contrast deficits need more magnification than those with only a visual acuity deficit.

Patients who are made aware of their contrast deficit can take preventive measures.

Caution with steps and curbs may prevent falls.

Better contrast and better lighting at home.

Avoiding low-contrast situations, such as night driving.

LETTERS vs. READING

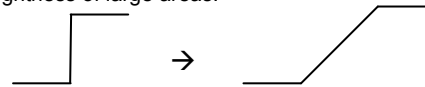
For optical problems, where foveal defocus predicts peripheral defocus, letter tests are acceptable.

For retinal problems, which may be outside the fixation area, reading tests are preferred, since they involve a larger retinal area.

MECHANISMS

OPTICAL IMAGING

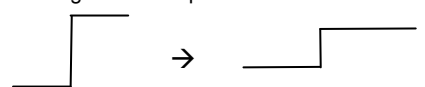
Optical defects blur edges, but do not change the brightness of large areas.



SENSORY RETINA

Cone density affects visual acuity.

Cone sensitivity reduces the brightness signal, even if edges are sharp.



NEURAL PROCESSING

Neural processing is needed to compare adjacent areas to detect a difference between them.

EDGE DETECTION

Contrast detection requires the detection of an edge between adjacent areas.

The eye integrates brightness over a number of cones. For detection of a line, the integration area cannot be wider than the line.

Small integration areas (narrow lines, small letters, good acuity) require more contrast.

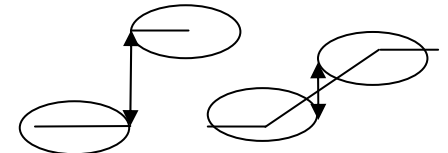
This explains the slope of the right hand side of the contrast sensitivity curve.

- The MIXED CONTRAST format measures this **slope of the CS curve**, which is **independent of HC visual acuity**.

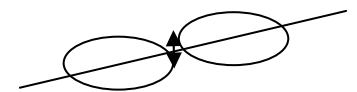
Changes in the slope may be an early sign of AMD. These changes often occur locally and do not need to start in the fovea.

- **READING**, which involves a larger retinal area than letter recognition, therefore is the preferred test.

When edges are blurred, the effective average brightness of areas along the edge is reduced.



When the transition from bright to dim becomes too shallow, an edge is no longer perceived.



This occurs in many real life situations.

It explains why the left side of the CS curve drops off for low-frequency sine waves, but not for coarse square waves or for large letters.

WEBER contrast vs. MICHELSON contrast

Michelson's formula was designed for repetitive stimuli, such as gratings.

Weber's formula was designed for objects seen against a background. It is used for the Pelli-Robson and Mars cards.

On both scales 0% = 0% and 100% = 100%. For values in between the notations vary. In the clinically important range Weber = 2x Michelson. The LC part of the MIXED CONTRAST cards is printed at 20% Weber (= 11% Michelson).

AVAILABILITY – Charts are available from:

On Sight Vision
Tlf. 57611190
Mail: osv@onsightvision.dk

www.onsightvision.dk