Visual acuity
Why So Many Acuity Tests?

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www.lea-test.fi
What does visual acuity measure? - Recognition of forms.

Visual Acuity is measured as Recognition Acuity using **standard** VA charts based on **calibrated optotypes**.

Screening – surveys – assessment – follow-up

Landolt C is the **international reference optotype** for calibration.
Visual acuity values

**Recognition acuity** – optotype acuity, 0.1 -2.0 (6/60 – 6/3
60M cards @ 1m, VA value is 0.016 (20/1250, 6/380)

**Detection acuity** – small objects, ”where”function
– grating acuity ” ”

**Discrimination acuity** – resolving orientation of gratings

**Hand movements, light perception/ projection**
(no ”counting fingers”, fingers are not standardized)
CONSULTATION
ON DEVELOPMENT OF STANDARDS
FOR CHARACTERIZATION
OF VISION LOSS
AND VISUAL FUNCTIONING

Geneva, 4-5 September 2003
Standardized, calibrated optotypes
Logarithmic design
Distance & near VA, same optotypes
Distances 6m (4m) and near 40cm; children 3m
adjust the distance and angle to fit the needs of the child

NOT to point at the optotypes.
Second measurement using pointing to reveal a possible difference between the values
Luminance between 80 and 160 cd/m²
Visual acuity of children with special needs for visual functioning

• Measurement of visual acuity using optimal refractive correction that the child can use

• in standard luminance + optimal luminance

• using varying postures when needed

• Always record: name of the test, distance used.
Optotype tests

Line tests
Crowded tests
Single optotype tests

Letters, numbers, paediatric symbols

(Letters are difficult to design so that they would be equally recognizable.)

Different tests for screening, surveys, assessment.
VA - line test
50% & 25% Spacing

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<th>LETTER SIZE</th>
<th>DECIMAL</th>
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<tr>
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<td>.20 M</td>
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DISTANCE EQUIVALENTS
FOOT METER

50% CROWDING

25% CROWDING
Line tests for the 3-4 year old
vision screening tests for threshold measurements
Visual acuity, line tests
standard distance tests for assessment

Standard luminance level
VA charts on the small lightbox
Single, line, crowded
Screening Near Test

larger spaces between lines – easier for the tester, faster
Summary on optotype VA screening, surveys, basic assessment

- Several visual acuities: near, distance
  - line, crowded, single

- Technique: ask which is the first optotype on each line until error or hesitation, next ask the child to read the previous line and then following lines until at least 3 out of 5 optotypes are correctly recognised = threshold. Pointing helps fixation, line test without pointing.

As a second test, try with pointing, report separately.
Young children
and
Children with different abilities
Single LEA Symbols tests
the earliest tests for measurement of VA

LEA Playing Cards

LEA Single Symbols Book

LEA DOMINO Cards
for training of amblyopic eyes

LEA Symbols Flash Cards
Consept “same” in measurement of VA

with colours

with B & W forms

comparing concrete object with picture

Playing Cards

VA = m/M
Learning to match forms

Infants with Down syndrome should have their near correction at the age of a few WEEKS if the error is +6.0 as in this girl or a high minus.
Naming symbols
monocular testing
Single, line, crowded + grating acuity
Discrimination Grating Acuity
VA 0.004 - 0.01, GrA 4 - 6cpd

12 pairs of lines/cm
LEA Grating Acuity Test

Discrimination acuity
Grating acuity values
MUST NOT
be converted
to
optotype acuity values
Grating Acuity Test

Optotype acuity VA = 0.004; 3/750, \textbf{6/1500}
Grating acuity \textbf{4cpd}; if ”converted”, would be 0.12; 6/50; \textbf{30x better than the VA value}
Detection Grating Acuity
Detection Grating Acuity

Teller Acuity Cards

Lea Gratings
Grating Acuity
as detection acuity
Grating acuity

Detection test
Distortion of central image
Difficult-to-test infants and children
Detection acuity, small objects

- The size of the object
- The background/ contrast
- The distance
- Doctor can calculate the size of the object as angular size.
Fixation test

Robert Fantz’ face picture
Small fixation targets for the 4-year screening.
Clinical examination gives the foundation for the assessment of visual functioning

Photo: Miguel G. Alvares, MD  Brazil

Hiding Heidi test
Hiding Heidi
low contrast pictures for assessment of communication distance

Facial expressions are fast moving low contrast shadows. Copying smiling face = must have been seen, then copied.
Figure-in-motion, Pepi-test

Near correction, head support

Pepi-test, copy from www.lea-test.fi

Never mention what you saw moving on the screen!!
You can ask ”Should I play it again?”
Difficult communication situations

Student responds reliably to questions that are recorded.
Oculomotor problems
Slow and inexact accommodation >> Puzzle board as a tactile key card

Cover above and below the line to be read.
Use the LEA Puzzle board as the key card.
Transdisciplinary assessment
Educational Assistant
helping VI teacher to test in an optometrist’s office
Poor visual acuity
Xmas decorations & UV light
Low contrast VA
Translucent low contrast test
at 2.5% contrast on the small lightbox
Contrast sensitivity
50 children with motor problems

Declination of the slope varies, mostly close to normal: ½ of the high contrast VA
The student with the highest visual acuity 1.6, 6/4, had at 2.5% only 0.1(+2), 6/60(+2)
10% of students with severe CP did not see the 2.5% contrast test.
Low Contrast Grating Tests

Cambridge Low Contrast Gratings

LEA Low Contrast Grating Acuity Test
Visual information for perception of round forms and in communication is NOT transferred by fine lines (high GrA & VA) but broad lines (low VA) at low contrast.
Visual Acuity

Detection acuity: objects, gratings
Grating discrimination acuity
Optotype recognition acuities
near & distance
Line, crowded, single
Low contrast tests
Non-calibrated tests
Old non-calibrated tests 1976
Visual acuity tests 1976

Letters cannot be drawn so that they would be equally recognizable. In the best letter test, ETDRS with the Sloan letters there are 3 groups of letters with different recognizability: S, O, C the hardest, Z the easiest.
Visual Acuity Tests
non-calibrated with the reference optotype, Landolt C

Kay Pictures

Keeler LogMAR, HOTV

Grating Acuity Cards do NOT measure recognition acuity, are not a VA but a GrA test
VA tests on projectors and computer screens

Spacing irregular, optotypes vary, luminance level varies. There are very few computer based tests with correct layout and with correct sets of ideal optotypes.
Why So Many Acuity Tests?

- Different calibrated tests measure different functions
  - line, tightly crowded, single optotype tests
  - near and distance vision; high and low contrast
  - different communication techniques
- Grating acuity tests, discrimination tasks, image quality?
- Tests that measure other visual functions
  - Cardiff vanishing pictures, detection + recognition
  - Detection tests, objects and gratings
- Non-calibrated picture tests with varying optotypes exist as long as they are purchased.
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