

P20. COMPARISON OF FOUR CHARTS FOR VISUAL ACUITY IN VIEW OF REPEATABILITY

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Background and aim: Visual acuity (VA) assessment is one of the most common procedure in optometry. The most fruitful period for VA charts development was in 70-80ies of XX century in Europe and in USA. However, in spite of all the recommendation proposed, the most common chart in Russia is still Sivtsev-Golovin chart, published in 1920th.

The aim of this work was to compare four VA charts: widely used (1) Lea and (2) ETDRS, (3) Sivtsev-Golovin chart (the most common chart in Russia) and (4) chart with the optotypes recently developed in IITP (Patent RF 2447826).

Materials and methods: Subjects were tested with four charts in random order. Each subject was tested in monocular conditions for both eyes, then in binocular conditions. After a break time (at least 1 day), subjects were tested again (retest).

Viewing distance was 4 m. If needed, the subjects used optical correction, providing BCVA. Ambient lighting corresponded to 250 lx, illumination of charts – to 160 Cd/m².

The subjects were 27 young adults, 6 females, 21 males. Mean age – 26.37 years (min – 19, max – 33, median – 27, std – 3.39). 12 subjects were emmetropic; 9 – with light myopia; 4 – with mild myopia; 1 with light hypermetropia.

Results: In decimal units the difference between mean VA for retest and test was 0.07 for ETDRS, 0.06 for Lea, 0.07 for Sivtsev-Golovin, 0.02 for IITP chart. We compared the test and the retest data for each chart by Wilcoxon signed-rank test. The only chart with no significant difference between test and retest values is IITP chart, that means best repeatability in our sample.

Conclusions: In our sample, the best repeatability was obtained for the IITP chart with modified 3-bar optotypes.

Charts for visual acuity: repeatability comparison

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Results

Monocular and binocular data was analyzed together.

We compared the test and the retest data for each chart by Wilcoxon signed-rank test.

The only chart with no significant difference between test and retest values is IITP chart, that means best repeatability in our sample.

Decimal units

Chart	Visual acuity, test	Visual acuity, retest	Mean difference
Sivtsev chart	1.43±0.34	1.50±0.34	0.08±0.23
LEA chart	1.40±0.31	1.46±0.29	0.06±0.20
ETDRS chart	1.29±0.27	1.37±0.26	0.08±0.15
IITP chart	1.37±0.27	1.39±0.24	0.01±0.17

LogMAR units

Chart	Visual acuity, test	Visual acuity, retest	Mean difference
Sivtsev chart	-0.14±0.11	-0.16±0.11	-0.02±0.07
LEA chart	-0.14±0.10	-0.15±0.09	-0.02±0.06
ETDRS chart	-0.10±0.10	-0.13±0.09	-0.03±0.05
IITP chart	-0.13±0.08	-0.14±0.07	-0.01±0.05

Sivtsev chart



Figure from <https://commons.wikimedia.org/w/index.php?curid=13464488>

LEA chart

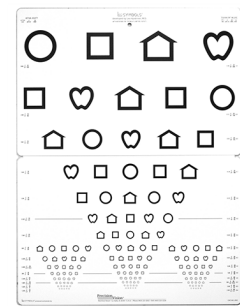


Figure from <http://visionintegral.com/gt>

ETDRS chart

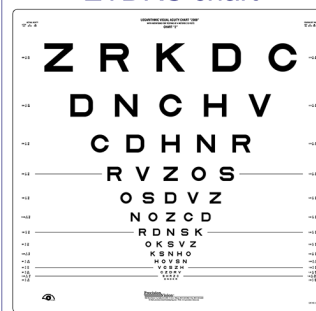
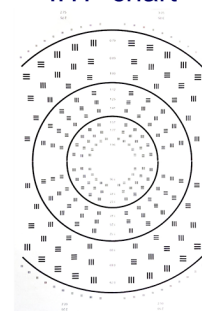
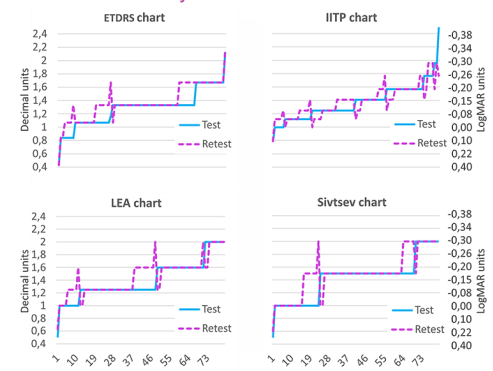


Figure from <https://www.precision-vision.com>

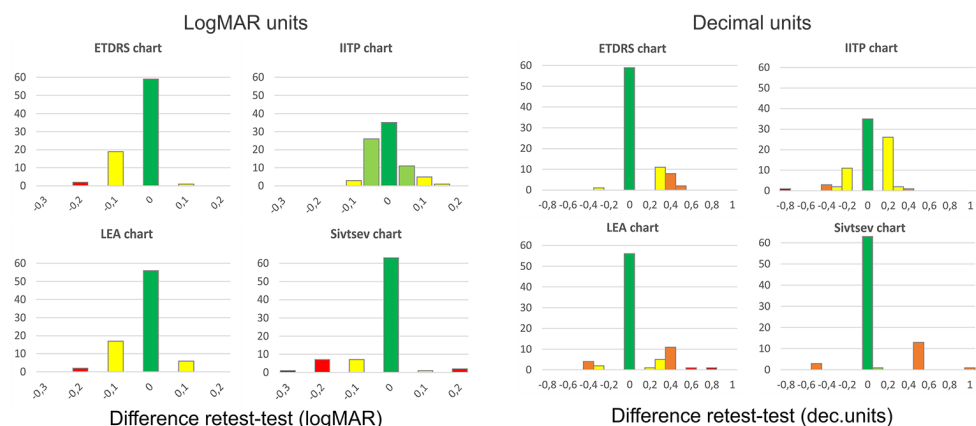
IITP chart



Visual acuity scores in test and retest



Differences of retest and test scores



Conclusions

In our sample, the best repeatability was obtained for the IITP chart with modified 3-bar optotypes. The design of IITP chart is too complicated for subjects and uncomfortable for testing.

Further work

1. To compare LEA, ETDRS, Sivtsev chart with another IITP chart with more usual design (linear).
2. To compare linear and proportional chart designs.