Visual acuity and visual performance in children with ophthalmopathology

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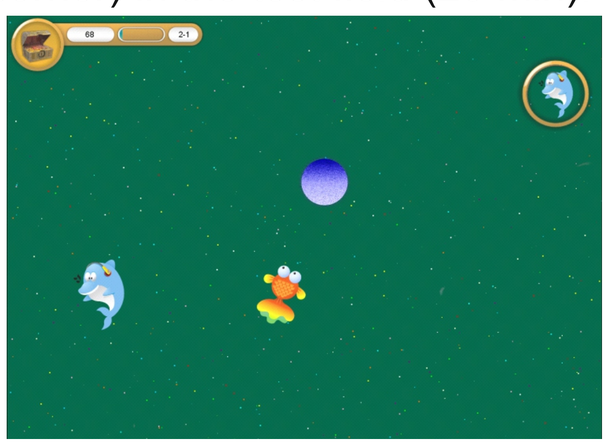
Background and aim

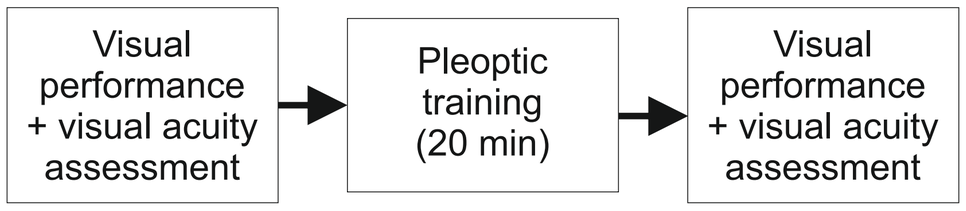
The aim: to assess visual performance before and after pleoptic training.

Subjects were 62 children divided into 2 groups:
(1) with mild ophthalmopathology (N=36, ametropes with and without amblyopia, visual acuity was in the range 0.5-1.25 (0.92±0.16)),
(2) with severe ophtalmopathology (N=26, optic nerve atrophy and retinopathy, visual acuity was in the range 0.08-0.63 (0.2±0.17)).

Pleoptic training (load)
The task: To find a reference image (shown in the right upper corner) in the test field (20 min).

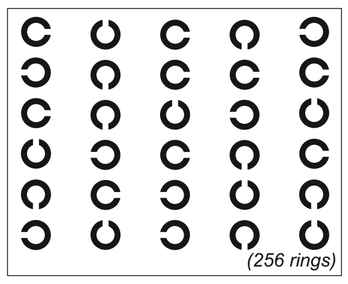


Methods



Visual performance assessment
Two computer programs; viewing distance - 50 cm.

Test 1
Bourdon test with Landolt rings



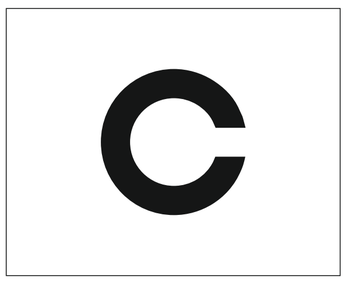
Task description

To find all the rings, identical to the reference ring (presented at the beginning of the test), as fast as possible.

$$Res = \frac{0.5434 \times N - 2.807 \times N_{missed}}{t}$$

where Res - result in points,
N_{missed} - number of missed rings,
N - whole number of presented rings,
t - whole test time, sec.

Test 2
detection of the gap in the non-threshold Landolt ring



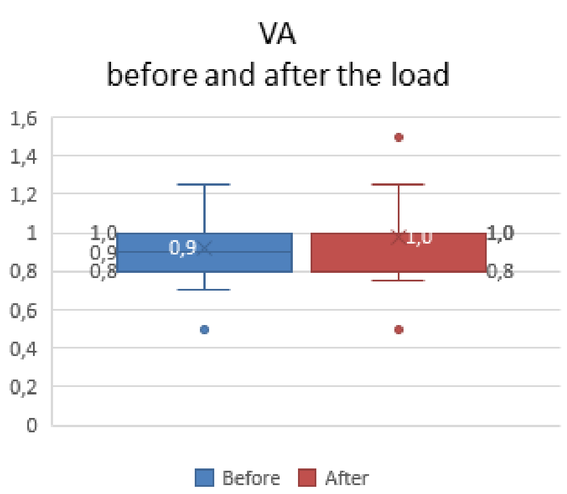
Task description

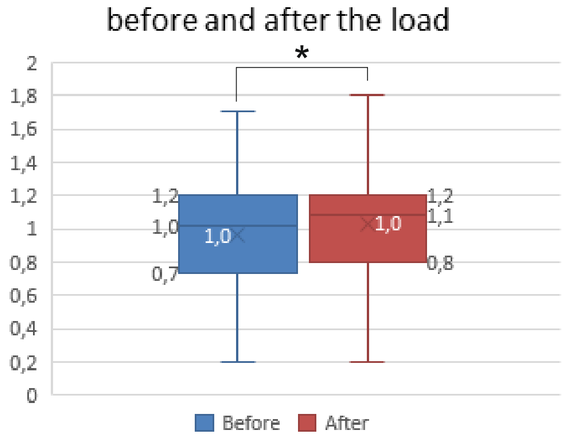
To point position of the gap as fast as possible.

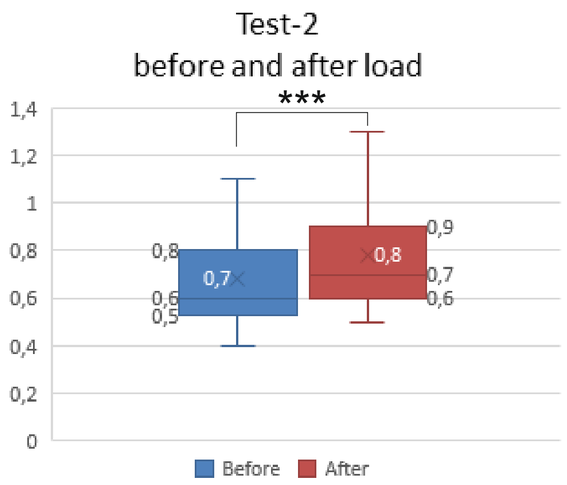
$$Res = \frac{N_{correct}}{N \times t_{average}}$$

where Res - result in points,
$N_{correct}$ - number of correct responses,
N - whole number of presented rings,
$t_{average}$ - average response time, sec.

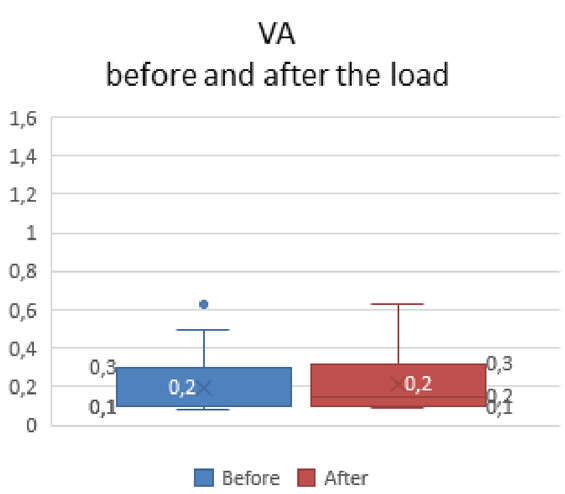
Mild ophthalmopathology

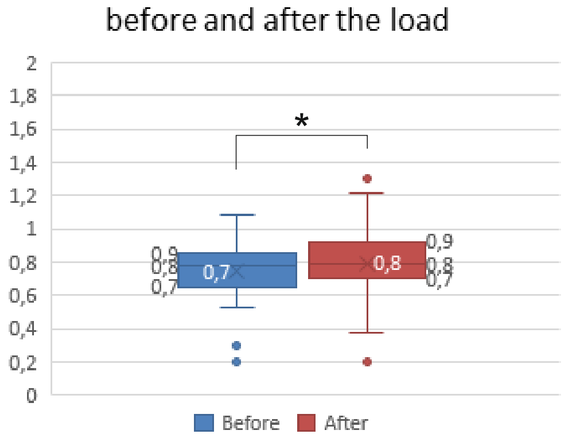


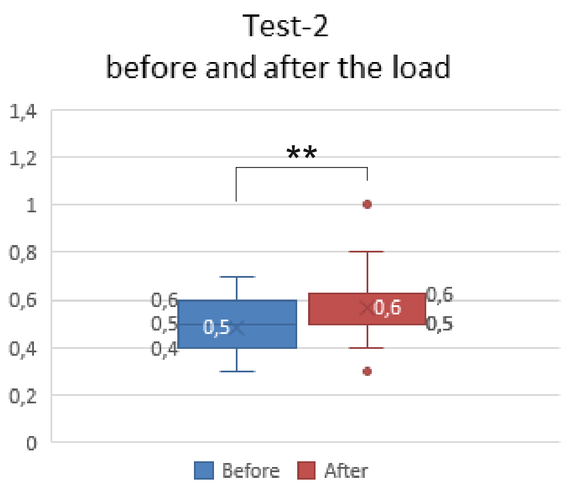




Severe ophthalmopathology







Results

Assessment of visual performance after the treatment showed a small increase in both tests after pleoptic training, though there was no increase in visual acuity.

Effectiveness of trainings should be assessed not only by VA increase, but also by visual performance tests which might be more sensitive.

Partial correlation between visual acuity and visual performance (excluding age factor) appeared to be rs=0.472, p<0.01 by test-1; rs=0.607, p<0.01 by test-2.

The visual performance in group with mild pathology was significantly better than in the other group (Mann–Whitney test, p<0.01).

Conclusions

Visual performance is correlated with visual acuity and is significantly lower in children with severe organic ophthalmopathology even in over threshold tasks.
Visual performance tests seems to be sensitive test for pleoptic training effectiveness.

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