

VISUAL SEARCH TASK ESTIMATION IN LATVIAN SCHOOL – AGE CHILDREN

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Introduction

Visual search is often used to study many topics, such as attention and oculomotor control to memory (Eckstein, 2011). What is more, reading supports different levels of language, visual process and working memory, attention, motor movement and even cognition (Norton & Wolf, 2012). These elements become accurate and rapid while our reading skills develop, and our reading becomes automated. It has also been noted that larger number of false alarms in a visual search task could reveal deficiency of inhibitory processes, and larger number of misses could demonstrate weakness of selective attention (Baranov-Krylov et al., 2009). In order to understand if there are any age differences in visual search task performance and how does reading speed affect the result, we analysed data from 126 school-age children (68 male, 58 female, age 6-13 years) who were enrolled in vision screening in Latvia.

Methods

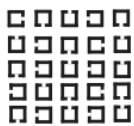


Fig.1. Introduction task with 3 target elements.

- Paper test version for reading assessment and visual search task.
- Head movements were aloud, finger dragging across the text was forbidden. tests were held at a comfortable distance - 30 or 40 cm.
- Errors were recorded on a separate sheet of paper.
- Time was recorded using chronometer.
- Statistical data analysis was made using OriginPro 7.0.

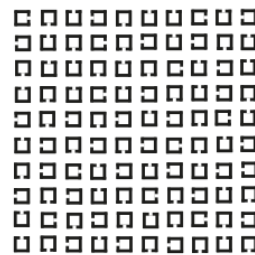


Fig. 2. An example of the main task.

- As for the reading text (16pt), children were instructed to read it out loud and remember what they read. We tested understanding of the text by asking two questions from it.
- Visual search task consisted of 14 pt square letters C in four different directions (see Fig.1., Fig.2.). School - age children memorized the first letter's direction and counted all the letters in the same direction as fast as they could.
- Depending on the test card, there could be 11, 12 or 13 targets.

Results

Age	6	7	8	9	10	11	12	13
Number of children	5	10	13	13	26	27	19	12
Number of boys	3	4	7	7	13	16	9	9
Number of girls	2	6	6	6	13	11	10	3
Median time per element	0.67	0.47	0.43	0.43	0.35	0.31	0.30	0.28
Average time per element	0.68 ± 0.19	0.49 ± 0.06	0.46 ± 0.03	0.45 ± 0.04	0.37 ± 0.02	0.34 ± 0.02	0.31 ± 0.02	0.29 ± 0.02
Median errors	2	5	2	2	2	2	2	2
Average time per target	6.61	5.84	4.93	5.77	3.85	3.35	2.78	3.16
Median time per target	4.31	4.83	4.46	4.45	3.76	3.16	2.74	3.17
Min time per target	2.89	3.67	3.00	2.84	2.08	1.97	1.79	1.86
Max time per target	15.42	13.34	8.96	22.27	6.92	6.19	3.84	5.13

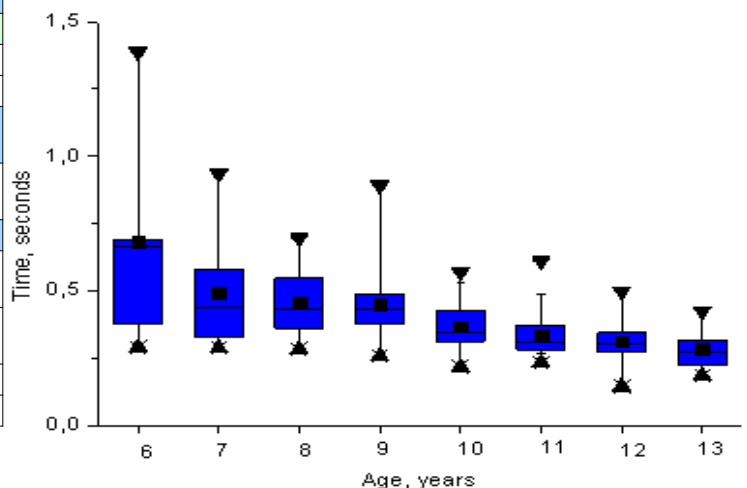


Fig.3. Reaction time for visual search task significantly decreases with age (ANOVA, $p < 0.01$). Accuracy of the visual search task performance does not depend on child's age (ANOVA, $p > 0.05$) but rather on individual differences.

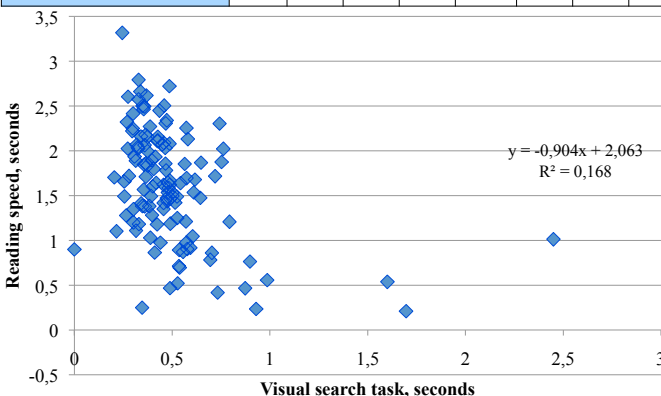


Fig.4. Despite that reading speed significantly increases with age (ANOVA, $p < 0.01$), reading speed has a weak correlation ($r = 0.4$) with reaction time of the visual search task.

Conclusions

1. Visual search task performance and reading skills improve with age.
2. There is a weak correlation between reading speed and reaction time per element for a visual search task.
3. Computerised test version would allow to analyse, which elements or rows were excluded from the counting, and why some elements gave false alarms or misses.

References

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