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Eye movement efficiency in normal and reading disabled elementary school children: effects of varying luminance and wavelength.

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Abstract

BACKGROUND: This investigation examines the question of whether decreasing wavelength of light and/or reducing luminance benefits oculomotor efficiency in normal and reading disabled (RD) children.

METHODS: Two groups of children were identified as normal or disabled readers using standardized reading tests. After suitable practice, eye movements were objectively measured with the Visagraph II as each of the subjects silently read a series of three different selections at their independent reading level with clear (control), gray, and blue filters. Four variables were measured for each subject. Data were analyzed using a repeated measure ANOVA and post hoc tests.

RESULTS: The standardized reading tests significantly differentiated average from poor readers using grade scores and percentiles. Initially, with clear filters, eye movement scores of normal readers were superior to disabled readers for fixations regressions, and rate of reading. Among the RDs--but not the normals--the three variables improved with the blue filter when compared with the clear filter, number of fixations and regressions were significantly lower, and rate was significantly higher. Gray filters yielded no significant changes. Improvement with the blue filters normalized the three variables in that there were no significant differences between normal and disabled readers.

CONCLUSION: This investigation confirms a link between wavelength of light and eye movement efficiency in reading. Blue filters resulted in a significant improvement in the number of fixations and regressions and rate of reading in RD children. The outcome broadens the concept of transient system deficit established in previous research to include the effect on oculomotor efficiency. The educational implications of this study are of special interest to optometrists.

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