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Purpose

Astigmatism is a quite common form of refractive error; its prevalence in primary school children is reported to be up to 20%^{1,2}, influenced by age³. The study of the functional effects of uncorrected astigmatism on reading performance can provide useful indication about the clinical guidelines for its correction.

A previous study investigated the functional effects of uncorrected astigmatism of 1.00D and 2.00D, induced by lenses on trial frame, on measures of reading fluency⁴. The aim of this study was to evaluate the effect of an astigmatism of 1.25D, artificially induced by contact lenses, on reading performance.

Material and Methods

27 young adults, 15 men and 12 women of mean age 25 y (sd ± 2), normally sighted, were recruited from the students of the Degree Course in Optics and Optometry at IRSOO Vinci, Italy. All participants are emmetropic or corrected by ophthalmic lenses.

Reading performance was assessed, in a random assigned sequence, in their habitual refractive condition and with a mixed astigmatism of 1.25D with the rule induced by the fitting of toric contact lenses. The measurements were made after the subject were adapted to contact lens wear. Measures were taken by the use of Radner Reading Charts (fig 1), by which reading speed, reading acuity and critical print size (CPS) were evaluated.

Results

Data collected in the two different visual conditions were plotted on a graph for every single subject, showing a comparison of the reading performance, as reading speed, reading acuity and CPS. Two typical different trends are showed in fig 2 and 3.

Both the reading acuity and the CPS were significantly reduced ($p < 0.001$) with contact lens induced astigmatic error. Reading speed remain quite constant for the two refractive conditions (emmetropia and mixed astigmatism) for larger print, showing that the deterioration of the quality of the retinal image induced by astigmatic error begins to have an effect for letters smaller than 0.5 LogMAR (Fig 4). This effect is comparable to the results of Chung et al⁵, which induced a spherical blur, finding that the reading speed remains relatively constant until it reaches the CPS, declining rapidly with smaller fonts. The reading speed decrease significantly ($p < 0,001$) when the comparison is made with the mean value obtained taking into account the cps values measured with habitual refractive condition.

Conclusions

Induced astigmatism of 1.25D reduces performance on reading speed, reading acuity and cps. The results of this study should be considered in light of some potential limitations: the observed results in case of simulation of a visual impairment may be greater than that for individuals with real visual impairment who adapted to their conditions. However, this findings stress the importance of the astigmatic refractive errors correction, especially in school-age children to safeguard their visual maturation. As the findings of these studies could have implications for the minimal prescribing criteria for contact lens, performing a new study with an induced astigmatism of 0.75D could be suggested.

Reference

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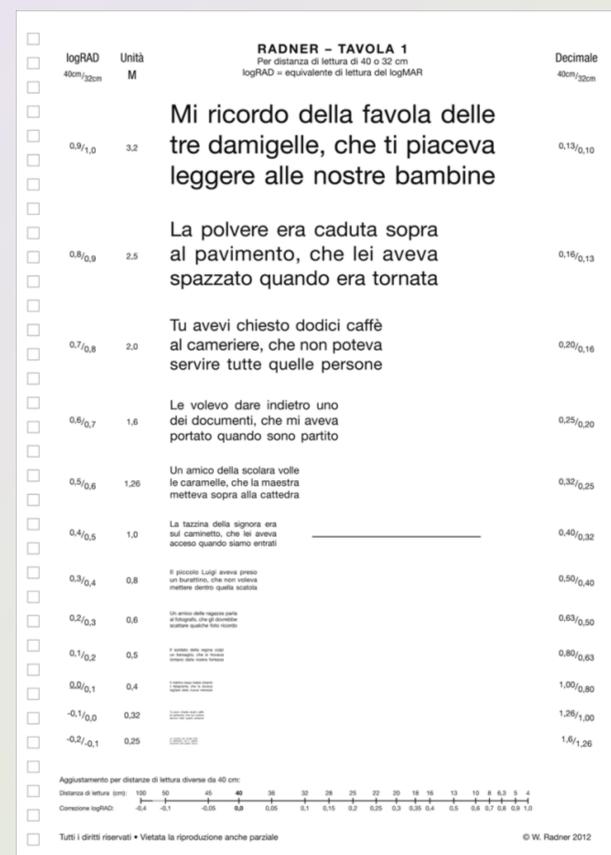


Fig 1 – The Italian Radner Chart 1

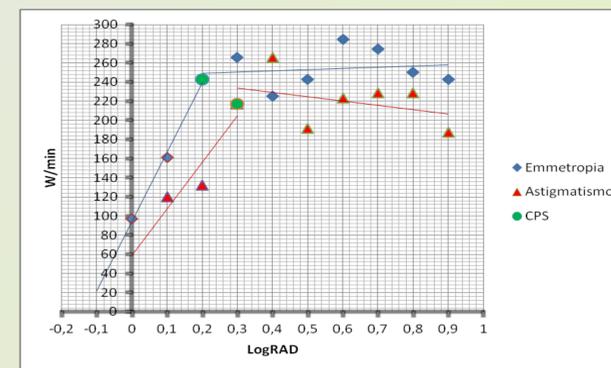


Fig 2 – Example of a typical trend. Little variation of reading speed, small variation of CPS

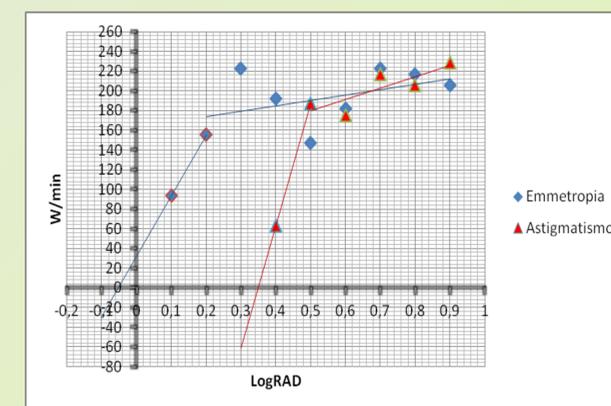


Fig 3 – Example of a typical trend. No variation of reading speed, large variation of CPS

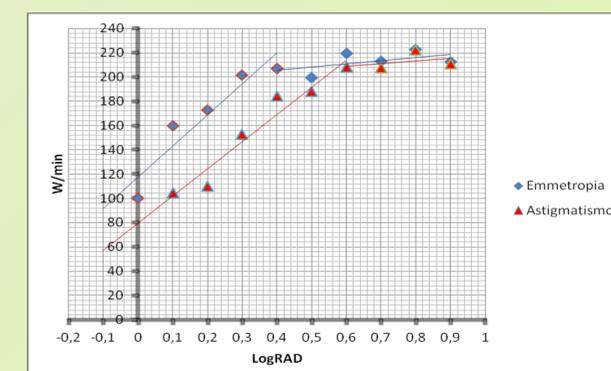


Fig 4 – Graph showing the trend of the average reading speed for the entire sample.

Contact Information

You can download the poster at http://www.irsoo.it/doc/poster_ocsee.pdf
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