

# Tracking the pace of reading with finger movements

Recent experimental evidence in visual perception analysis [1] shows that eye and finger movements strongly correlate during scene exploration, at both individual and group levels. A familiar context which exploits this synergistic behaviour is when children learn to read, with the practice of finger-pointing to text as a support for their attention focus, directional movement and voice-print match [2, 3]. Using a tablet to display short texts, we collected evidence on the finger-pointing behaviour of 3<sup>rd</sup>–6<sup>th</sup> Italian graders engaged in both silent and oral reading. “Finger-tracking” data, sampled by the tablet and aligned with the text, made it possible to time a child’s reading pace at word and sentence level. Results are shown to replicate established benchmarks in the reading literature, such as the difference in reading pace between age-matched typical and atypical readers as a function of word frequency and length (Fig. 1a), and neighbourhood entropy and *Old20* [4] (Fig. 1b). Atypical readers show increasing difficulty with longer words, with a steeper time increment for word length > 6, integrating previous evidence [5]. In addition, neighbourhood density plays a sparse facilitative role in atypical reading, with no significant interaction with neighbourhood entropy, pointing to a non trivial developmental interplay between sublexical reading and the richness of the Italian orthographic-phonological lexicon. Despite their different dynamics, optical and tactile strategies for text exploration prove to be highly congruent: this suggests that finger-tracking can be used as an ecological proxy for eye-tracking in reading assessment.

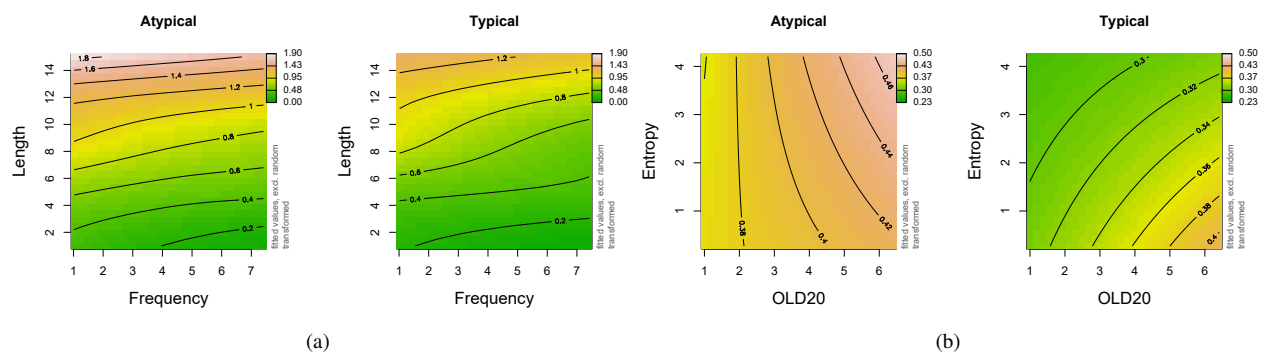


Figure 1: Non linear generalized additive models of reading time, expressed on a green(low) - brown(high) scale, with (a) word length and Zipf frequency, and (b) neighbourhood entropy and *Old20* (*i.e.* mean distance from the top 20 neighbouring words), as fixed effects.

## References

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