

A developmental database of eye movement measures during natural reading

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A highly ecological ability such as reading is often investigated through non-ecological experimental paradigms. The present work aims at complementing this approach by providing the community with a developmental database of eye movement measures during natural reading. Eye movements were recorded from a large sample of Italian developing readers (N=140), aged 8–11, as they read 12 multi-lined passages taken from story books for children (1566 tokens and 762 distinct types). Eye-tracking data were also recorded from a group of skilled adult readers (N=33), for comparison.

In line with previous literature (e.g., Rayner, 1986; Blythe & Joseph, 2011), our results show well-known developmental changes in reading behaviour, including a significant increase in reading rate as expressed in number of words per minute ($p < .001$; fig. 1a), as well as a decrease in saccade length ($p < .001$; fig. 1b) and in fixation duration ($p < .001$; fig. 1c). Benchmark effects of word length and frequency also emerge: first-of-many fixation duration (*FoM*, figs. 2a, 2b) and gaze duration (*GD*, figs. 2c, 2d) are greater for longer, compared with shorter words (length effect on *FoM*: $p = .02$; on *GD*: $p < .001$) and for low-frequency, compared with high-frequency words (frequency effect on *FoM*: $p < .001$; on *GD*: $p < .001$). Furthermore, the effects of word length and frequency on gaze duration are modulated by age, with both effects getting progressively smaller as a function of age ($p < .001$).

These results corroborate evidence from single sentence reading tasks, and validate the database as a valuable resource for the investigation of reading acquisition. The large amount of data, as well as the naturalistic nature of the materials and the task, will allow researchers to complement findings from controlled experiments and potentially address questions that are left open by those.

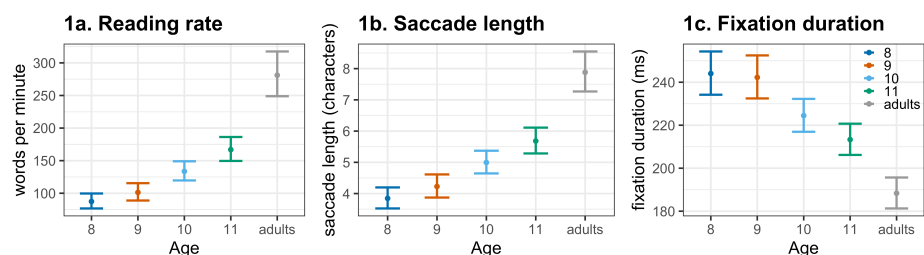


Figure 1. Developmental changes in eye movements. LME outputs. Error bars: 95% CIs.

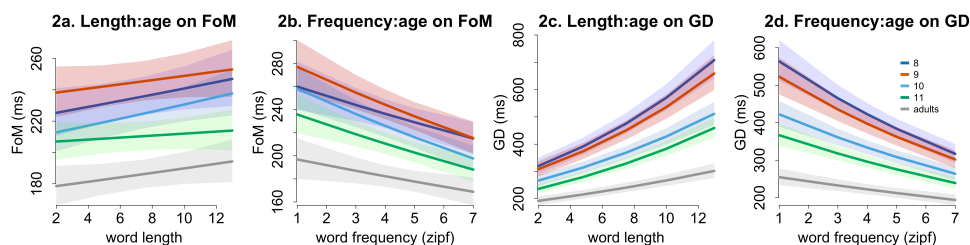


Figure 2. Length and frequency effects in interaction with age. LME outputs. 95% CIs shaded.

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- Blythe, H. I., & Joseph, H. S. S. L. (2011). Children's eye movements during reading. In S. P. Liversedge, I. D. Gilchrist, & S. Everling (Eds.), *The Oxford Handbook of Eye Movements* (pp. 643-662). Oxford University Press.