



An eye-tracking investigation of natural reading in children



² Royal Holloway University of London, England ³ University of Oxford, England



∝vpescuma@sissa.it

Background

- Reading proficiency may develop through the chunking of lower-level units (e.g., letters) into larger ones (e.g., words and morphemes).
- Morpho-orthographic chunking in adults may be interpreted similarly morphology drives regularities into letter co-occurrence within words ^{1,2}, which the system may exploit to facilitate visual word identification.
- In this perspective, reading may be conceived as a form of statistical \bullet learning.

Aims and Hypotheses

- We try to identify statistical learning proxies in developing readers of Italian (3rd – 6th graders).
- The present work focuses on **n-gram frequency**. Other possible indexes (e.g., transitional probabilities, word predictability) are currently under investigation.
- Age is expected to play a role in the development of sensitivity to statistical learning cues in reading.
- We will make the data available, thus creating the first database of eye tracking data in children.

Methods

Participants:

39 (22 M) native Italian speakers (age range: 8-12 years).

Procedure:

- **Natural reading** task on excerpts from kids' books.
- Simple 2-AFC comprehension questions after every other excerpt displayed.
- Eye movements recorded through a tower-mount Eyelink 1000 Plus eye-tracker.
- **Computerized cloze probability task** currently under analysis.

Additional assessment:

- Reading proficiency test (MT test Speed and Accuracy ³)
- Non-verbal intelligence test (Raven CPM-47⁴).



age, reading speed and non-verbal Participants' intelligence show a nice – neither too weak nor too strong – correlation pattern.

Total looking time depends on word length and word **frequency**, as expected ^{5,6} (p-value: <2e-16).

Total looking time by **MT** speed and word frequency



First-of-many fixations by word length and frequency

Median total looking time by mean n-gram frequency









Significant interaction (p-value: <2e-16) between reading speed and word frequency on total looking time, perhaps partly due to a ceiling effect fixations cannot become any faster at some point.

Length and frequency effects (p-value: <2e-16) on the duration of first-of-many fixations, that is, very early in processing.

N-gram frequency appears to modulate reading times in particular, larger units (4-grams) seem to be exploited as "chunks" by developing readers.

References

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