

Use of contextual information and prediction in reading by low-literate adults: an ERP and reading-time study

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Introduction

- College-aged adults have been shown to use context to facilitate word processing and predict upcoming words.
- In ERP studies, the N400, which has been linked to semantic access, is graded by cloze probability, with the largest amplitude responses to unexpected words and the smallest responses to expected words in strongly constraining contexts (Federmeier et al., 2007).
- In a later time window, effects have been seen over frontal electrode sites, including a frontal positivity linked to the appreciation of disconfirmed predictions and a frontal negativity linked to reinterpretation of the contextual frame (Federmeier et al., 2007; Wlotko & Federmeier, 2012)
- Readers who have weaker sensory abilities and comprehension skills (e.g., older adults and second language learners) seem to use less predictive processing (Martin et al., 2013; Wlotko et al., 2012).
- **In the current study, we ask how reading skill affects the use of contextual information and prediction, by comparing processing in adults with higher and lower literacy skills.**
- Do lower-literate adults rely more on contextual information or even prediction to assist their reading, which could compensate for their weaker decoding skills? Or, do low-literate adults have greater difficulty in constructing message-level representations through incremental processing, which therefore hinders their ability to use contextual information to predict and to facilitate word processing?

Method

Participants (Reading level was established by the mean scores of SORT, WJ reading fluency, and RAN/RAS)

- Higher-literate (N = 20; mean age = 46; mean reading level = 11.2 grade)
- Lower-literate (N = 20; mean age = 46; mean reading level = 7.1 grade)

Stimuli (target words are plausible endings and underlined)

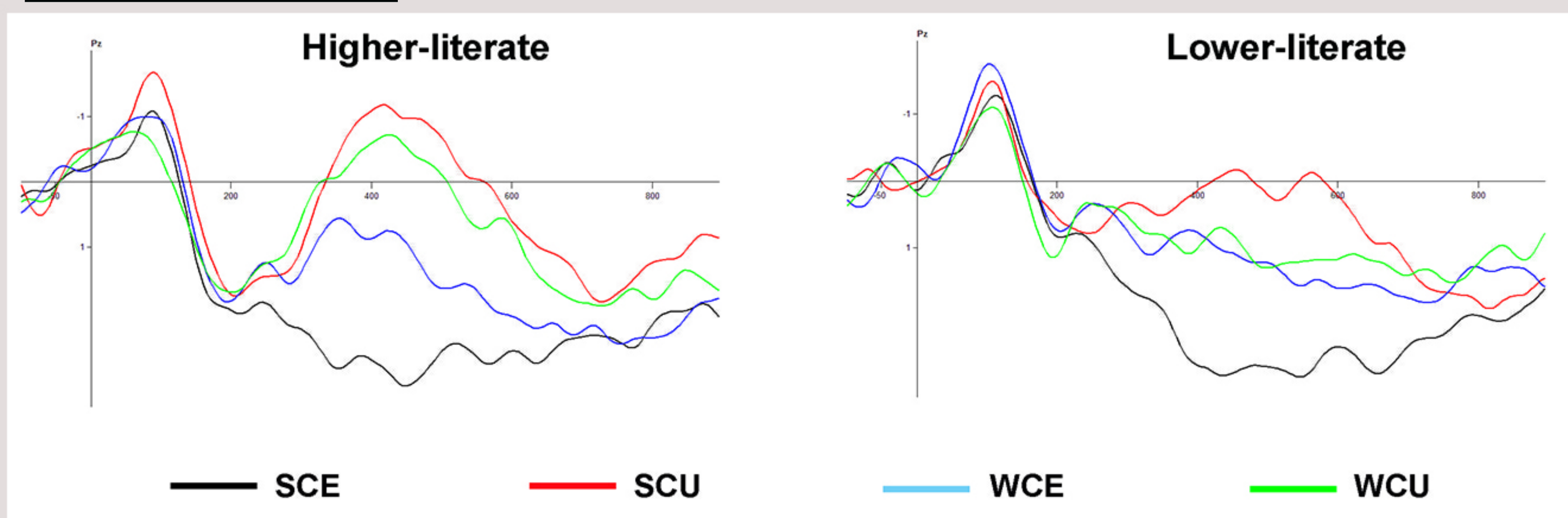
- **SCE (strongly constraining, expected)** (mean cloze: .85)
The prisoners were planning their escape. The time was running out.
- **SCU (strongly constraining, unexpected)** (mean cloze: .01)
The prisoners were planning their party. The time was running out.
- **WCE (weakly constraining, expected)** (mean cloze: .27)
He slipped and fell on the floor. He had to go to the hospital.
- **WCU (weakly constraining, unexpected)** (mean cloze: .02)
He slipped and fell on the rock. He had to go to the hospital.

Procedure

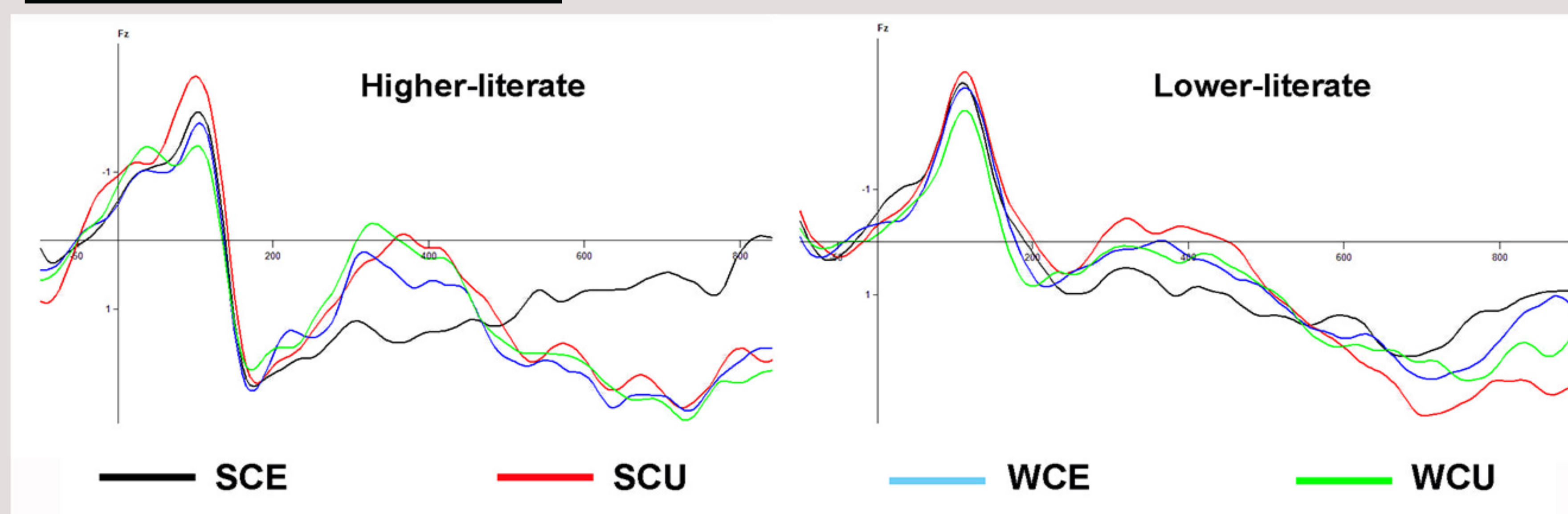
- Simultaneous ERP and self-paced reading

Results

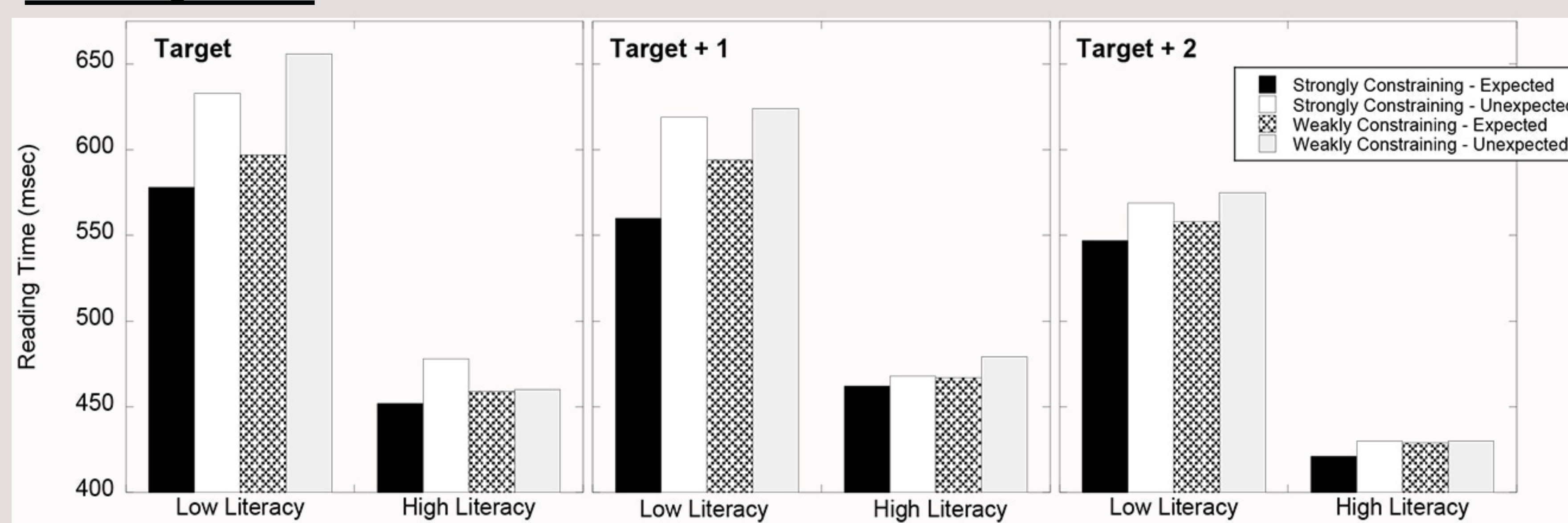
N400 (300-500 ms)



Frontal ERPs (600-900 ms)



Reading times



Conclusion

- Low-literate readers are able to use contextual facilitation only if the context is strongly constraining for the target.
- Low-literate readers do not seem to use predictive processing as no ERP or reading-time difference was observed for the unexpected words in strongly and weakly constraining contexts.
- The frontal negativity observed for the higher-literate readers may reflect a reinterpretation of the contextual frame. Low-literate readers do not show contextual revision.

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- Higher-literate readers had a N400 pattern similar to that of young college readers.
- Lower-literate readers showed expectancy effect for the strongly but not weakly constraining context.

- Higher-literate readers had a frontal negativity for SCE.
- Lower-literate readers did not show significant frontal ERP effects.

- Higher-literate, but not lower-literate, readers showed cost of prediction at the target word (SCU>WCU).
- Lower-literate readers had persistent difficulty when targets were unexpected or in weakly constraining contexts.