



Use of contextual information to facilitate semantic processing in reading and listening by lower literate adults

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INTRODUCTION

- Context can be used to facilitate the processing of upcoming words by, e.g., affording prediction and supporting semantic integration.
- For struggling readers, context might allow the preactivation of the relevant concepts and thus, assist decoding (e.g., Perfetti et al., 1997, *Sci study of read*).
- On the other hand, literacy skill may be essential for the development of certain reading strategies, like anticipatory processing, that facilitate word recognition (e.g., Mishra et al., 2012, *J Eye Mvmt Res*).
- In a pair of ERP experiments that used the same materials, the present study compared competent and struggling adult readers in comprehending written and auditory sentences of varying constraints that ended with expected and unexpected target words.
- We aimed to examine whether:
 - 1) struggling readers rely on context more, or instead, have difficulty using context message to aid word processing;
 - 2) context effects generalize across reading and listening in adults with higher and lower literacy.

METHODS

Participants. Adults (20/group/experiment; mean age: 45) were divided into higher (HL; reading level: 11.6 grade) and lower literacy (LL; reading level: 7.3 grade) readers. Reading level was established by the mean scores of SORT, WJ reading fluency, and RAN/RAS).

Stimuli. Target words (underlined below) were plausible sentence endings that varied in expectancy:

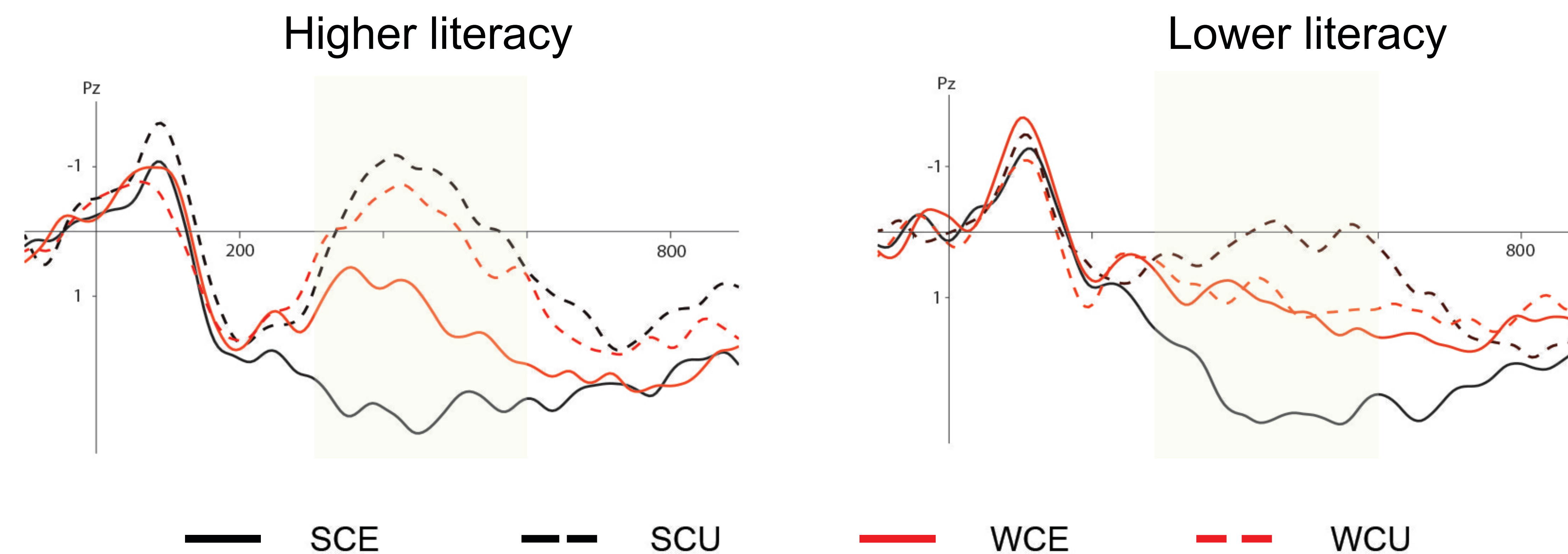
- **SCE** (strongly constraining, expected) (mean cloze: .85)
The prisoners were planning their escape. The time was running out.
- **SCU** (strongly constraining, unexpected) (mean cloze: .01)
The prisoners were planning their party. The time was running out.
- **WCE** (weakly constraining, expected) (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.

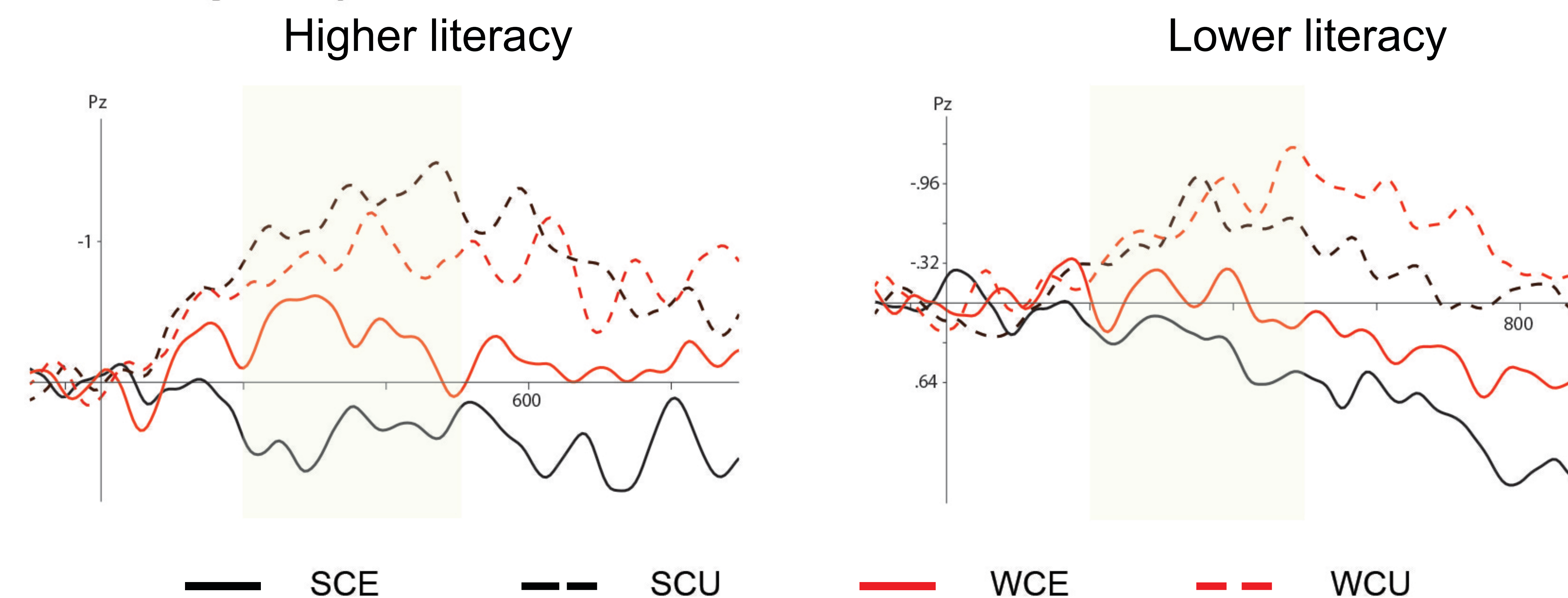
- 1) Reading study: ERPs recorded as participants self-paced through the sentences word-by-word.
- 2) Listening study: ERPs recorded as participants listened for comprehension to continuous speech.

RESULTS

Reading study



Listening study



CONCLUSIONS

Higher literacy readers

- Similar processing strategies were seen in reading and listening.
- In all cases, higher literacy readers show graded effects of contextual fit on processes linked to semantic access (N400), suggesting these comprehenders can quickly build message-level representations from context and use them to predict upcoming words and facilitate semantic integration.

Lower literacy readers

- In reading, this group was unable to utilize all available context information to facilitate word processing. Context facilitated semantic access only when the message-level constraints were strong.
- In listening, this group was sensitive to expectancy in both strongly and weakly constraining contexts, suggesting that the deficits in using weaker contextual information that were seen in reading arose because of difficulties with print decoding rather than more generalized comprehension strategy or ability differences.
- However, in listening, lower literacy adults manifested a delay in the onset of contextual facilitation, suggesting the possibility that reading experience and skills impact auditory comprehension abilities as well.

- HL readers' N400 amplitudes tracked cloze probabilities of the target words, with unexpected words producing the largest N400s, modestly expected words smaller N400s, and highly expected words the smallest N400s.
- LL readers show word expectancy effect for the strongly but not weakly constraining contexts.

- HL adults' N400 amplitudes were graded by cloze probabilities of the target words, similar to their results in the reading study.
- Different from their pattern during reading, LL adults showed an expectancy effect for weakly as well as strongly constraining contexts.
- Expectancy effect started at ~100 ms for the HL group but ~200 ms for the LL group.

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