

Preview effect of semantic integration in Chinese Sentence Reading

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Introduction

Background

Reading words in sentence starts once the word appearing in the parafoveal vision. Preview of a word influence the processing on this word when it is fixated (Preview effect). Previous studies have shown this preview effect can cover many lexical levels, like the level of word's length, shape, morphology, phonetics, and in some conditions for semantics (for a review, see Schotter et al., 2012), suggesting that processing of words in sentence is well influenced by visually degraded information in preview.

Recent studies with ERPs have reported a N400 effect of preview congruence, indicating that the meaning of words in preview can not only be extracted but can also be integrated during reading (Barber, et al., 2013; Li et al., 2015). Then, it raise the question that whether the preview effect can extend to the level of semantic integration, that is, whether processing of foveal word can be influenced by the congruence of the preview word.

Current Study

Using RSVP flankers paradigm (Barber, et al., 2010) combined with a co-registration method of ERP and eye movement (Dimigen et al., 2011), we tested the preview effect of congruence by simultaneously manipulating whether the fixated word was congruent with sentence meaning, and whether the preview word was congruent with sentence meaning.

Method

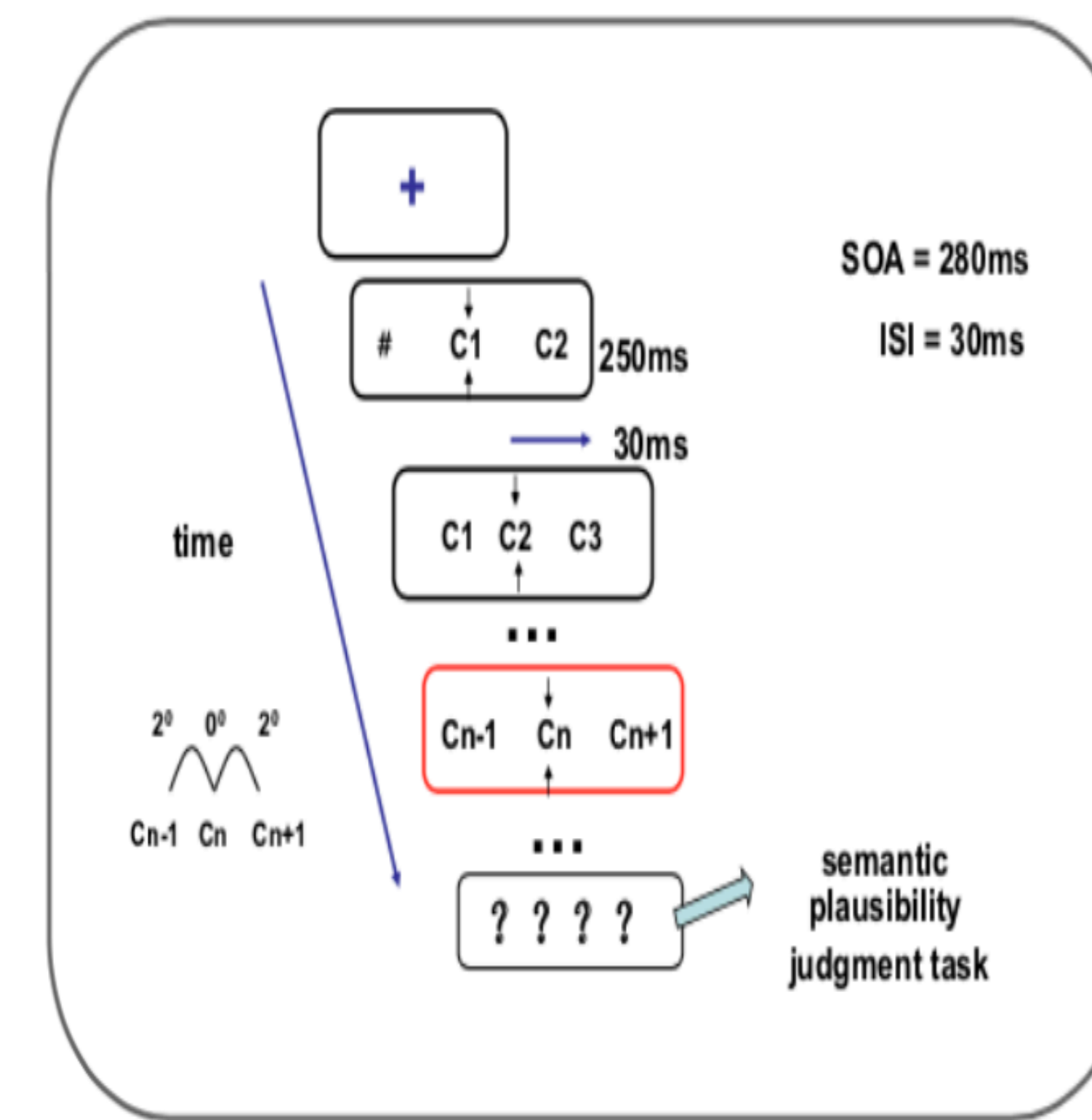
- Participants:** 24 right-handed native Chinese speakers participated in the experiment (9 males; age range 21-27 years, Mean age = 23 years).
- Materials:** 240 experimental sentences, each of which contained a single-character target noun either congruent or incongruent, and either in parafovea or in fovea.
- Data acquisition:** EEG Signals were amplified with BP DC amplifiers, EM were recorded with SR Eyelink 1000. EM and EEG were synchronized using the EYE-EEG plug-in for EYELAB.

Experiment

Example

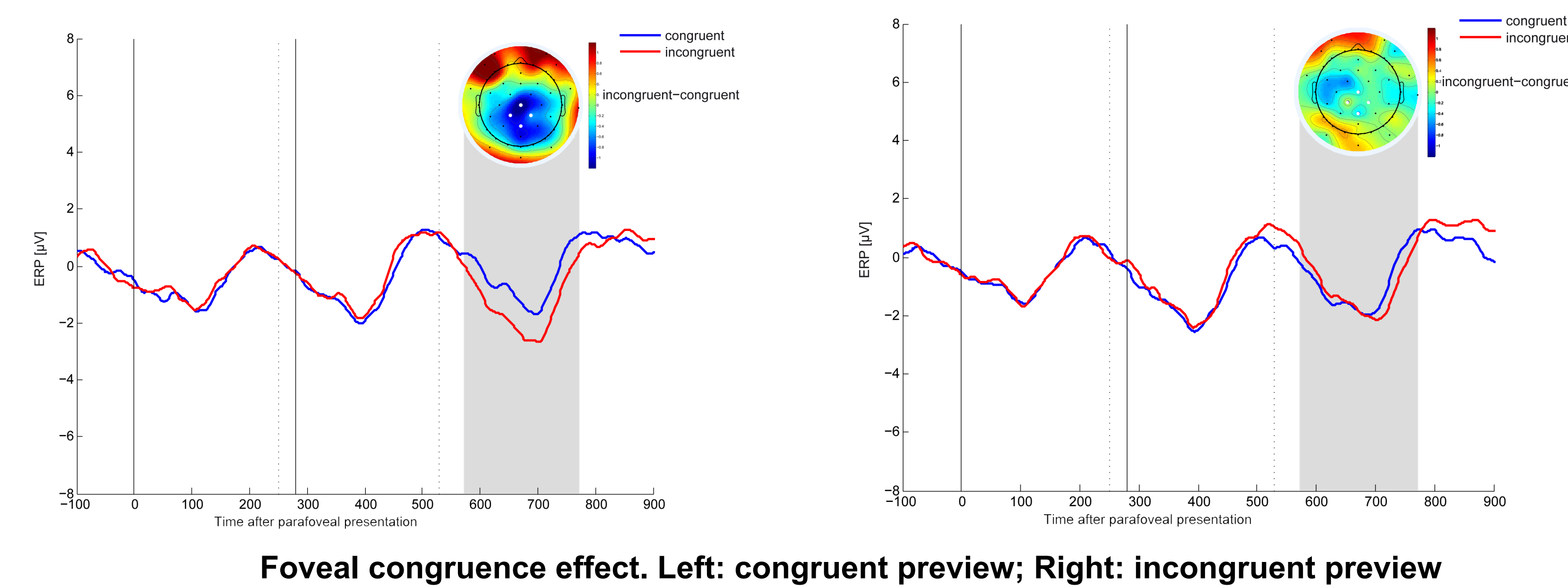
	Condition	Sentence	Congruency 1	Congruency 2
preview congruent	(1) foveal identical	赵紫妍读了那几份①报-②报用来消磨时间。 Zhao Ziyen read those ①newspapers-②newspapers to kill time.	4.34 (0.61)	4.34 (0.61)
	(2) foveal congruent	赵紫妍读了那几份①报-②桌用来消磨时间。 Zhao Ziyen read those ①newspapers-②forms to kill time.		
	(3) foveal incongruent	赵紫妍读了那几份①报-②盘用来消磨时间。 Zhao Ziyen read those ①newspapers-②dishes to kill time.		
preview incongruent	(4) foveal identical	刘雨桐打翻了桌上的①报-②报后显得很慌张。 Liu Yutong knocked over ①newspapers-②newspapers on the table and looked nervous.	1.72 (0.60)	1.72 (0.60)
	(5) foveal congruent	刘雨桐打翻了桌上的①报-②桌后显得很慌张。 Liu Yutong knocked over ①newspapers-②dishes on the table and looked nervous.		
	(6) foveal incongruent	刘雨桐打翻了桌上的①报-②桌后显得很慌张。 Liu Yutong knocked over ①newspapers-②forms on the table and looked nervous.		

Note: ① the target noun in preview; ② the target noun in fovea. Congruency refers to the plausibility rating of how well the preview word (Congruency¹) or target word (Congruency²) fit into the first part of the sentences. 1 is extremely unacceptable, and 5 is fully acceptable.

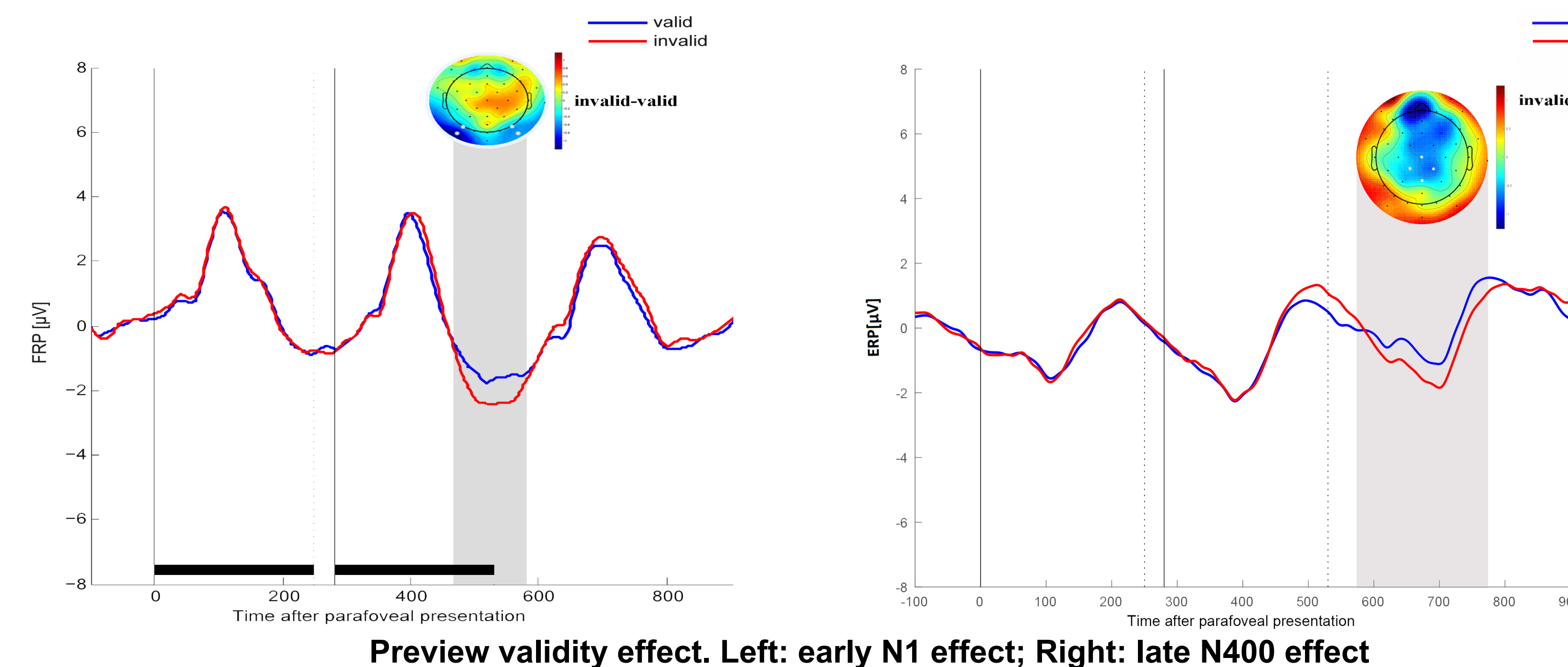


Results

Preview effect of semantic congruence



Preview validity effect



Conclusion

Results summary

- N400 effect of semantic congruence in fovea was only found when preview word was congruent in the sentence, but this effect was not shown when preview word was incongruent.
- Words after a valid preview elicited a smaller N1 and a weaker N400 than those after an invalid preview.

The present study demonstrates

- Preview effect occurs at the level of semantic integration.
- Context of sentence updated through degraded information in preview can interact with the semantic integration that occurs in fovea, indicating an in-depth interaction between different sources of processing in our language system.
- Importance of considering the semantic preview effect in electrophysiological studies on reading.

Reference

- Barber, H. A., Donamayor, N., Kutas, M., & Munte, T. (2010). Parafoveal N400 effect during sentence reading. *Neuroscience Letters*, 479, 152–156.
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