

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 (15 females; age range 21-27 years, Mean age = 23 years).

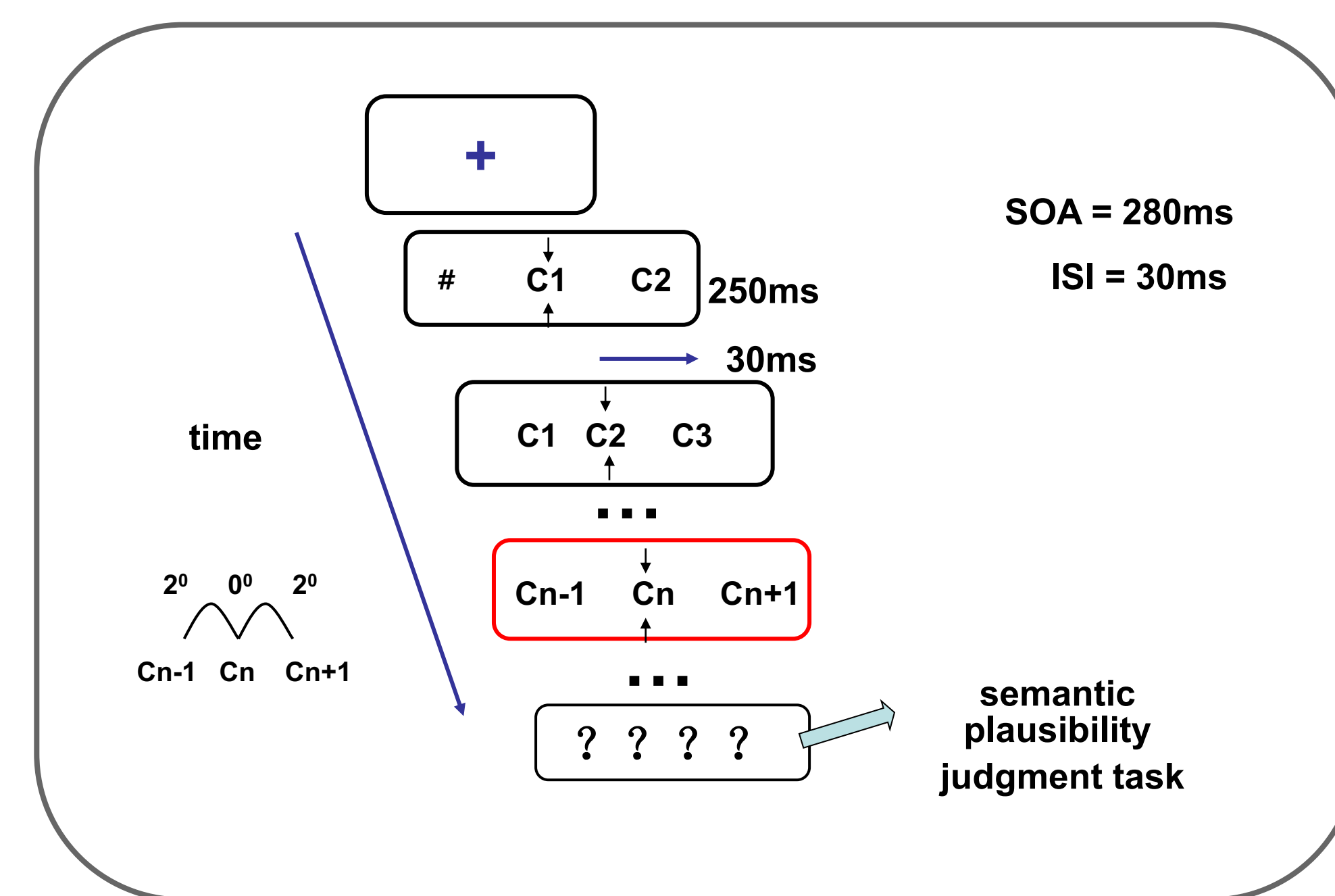
Materials: 240 experimental sentences were presented character by character at central fixation, and each character (n) was flanked 2° bilaterally by the preceding character (n-1) on the left and the next character (n+1) on the right. Each sentence contained a single-character target noun either congruent or incongruent, and either in parafovea or in fovea.

Experiment

Example

Condition		Sentence	Congruency 1	Congruency 2
preview congruent	(1) foveal identical	赵紫妍阅读了那几份①报-②报用来消磨时间。 Zhao Ziyan read those ①newspapers-②newspapers to kill time.	4.34 (0.61)	4.34 (0.61)
	(2) foveal congruent	赵紫妍阅读了那几份①报-②表用来消磨时间。 Zhao Ziyan read those ①newspapers-②forms to kill time.		
	(3) foveal incongruent	赵紫妍阅读了那几份①报-②盘用来消磨时间。 Zhao Ziyan 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盘后显得很慌张。 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表后显得很慌张。 Liu Yutong knocked over ①newspapers-②forms on the table and looked nervous.		

Note: ① the target noun in preview; ②The target noun in fovea. Congruency¹ refers to the plausibility rating of how well the preview word fit into the first part of the sentences, which from the beginning up to (including) the target word. Congruency² refers to the plausibility rating of how well the foveal word fit into the first part of the sentences. For both congruence ratings, 1 is extremely unacceptable, and 5 is fully acceptable.

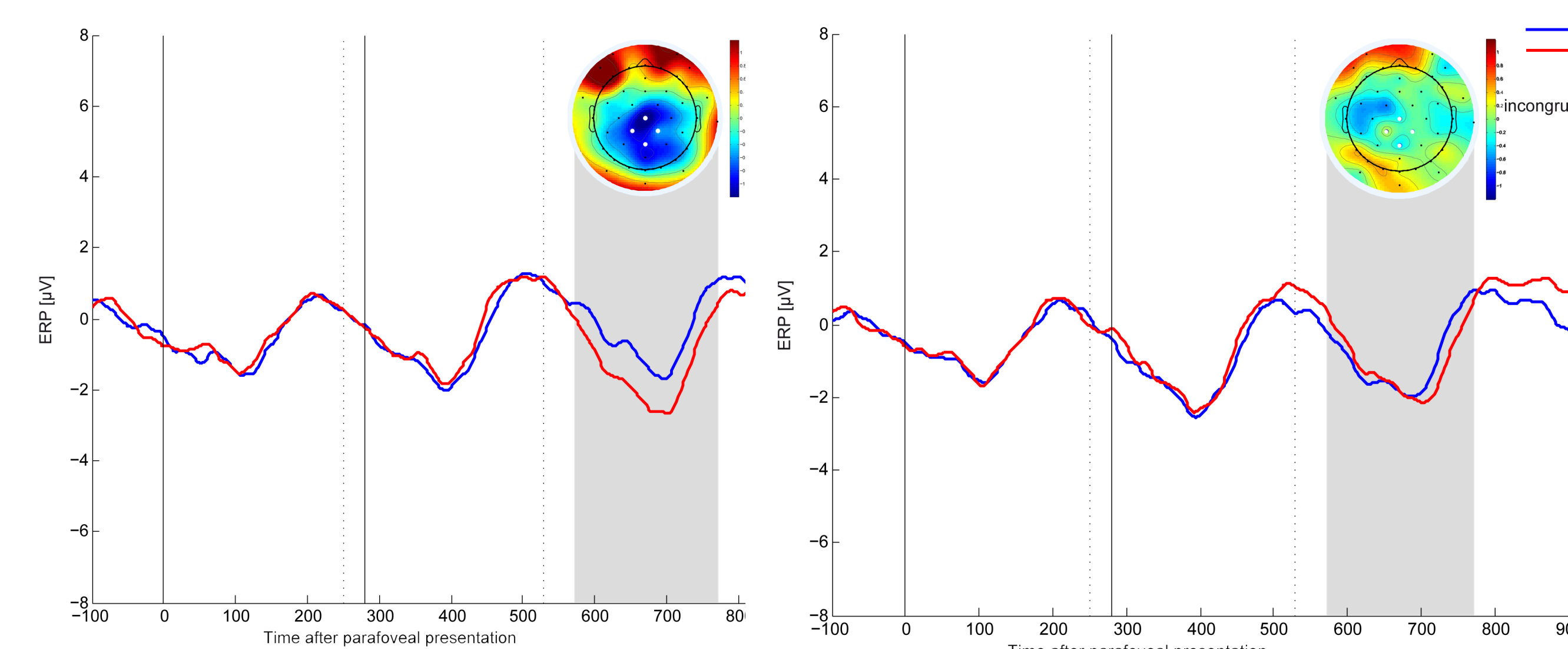


Data acquisition

EEG Signals were amplified with Brain Products DC amplifiers, with a time constant of 10 s, and sampled at 500 Hz. Eye movements were recorded with an SR Eyelink 1000 table-mounted eye-tracker at a rate of 1000 Hz. Eye track and EEG were synchronized using the EYE-EEG plugin (Dimigen et al., 2011) for EEGLAB.

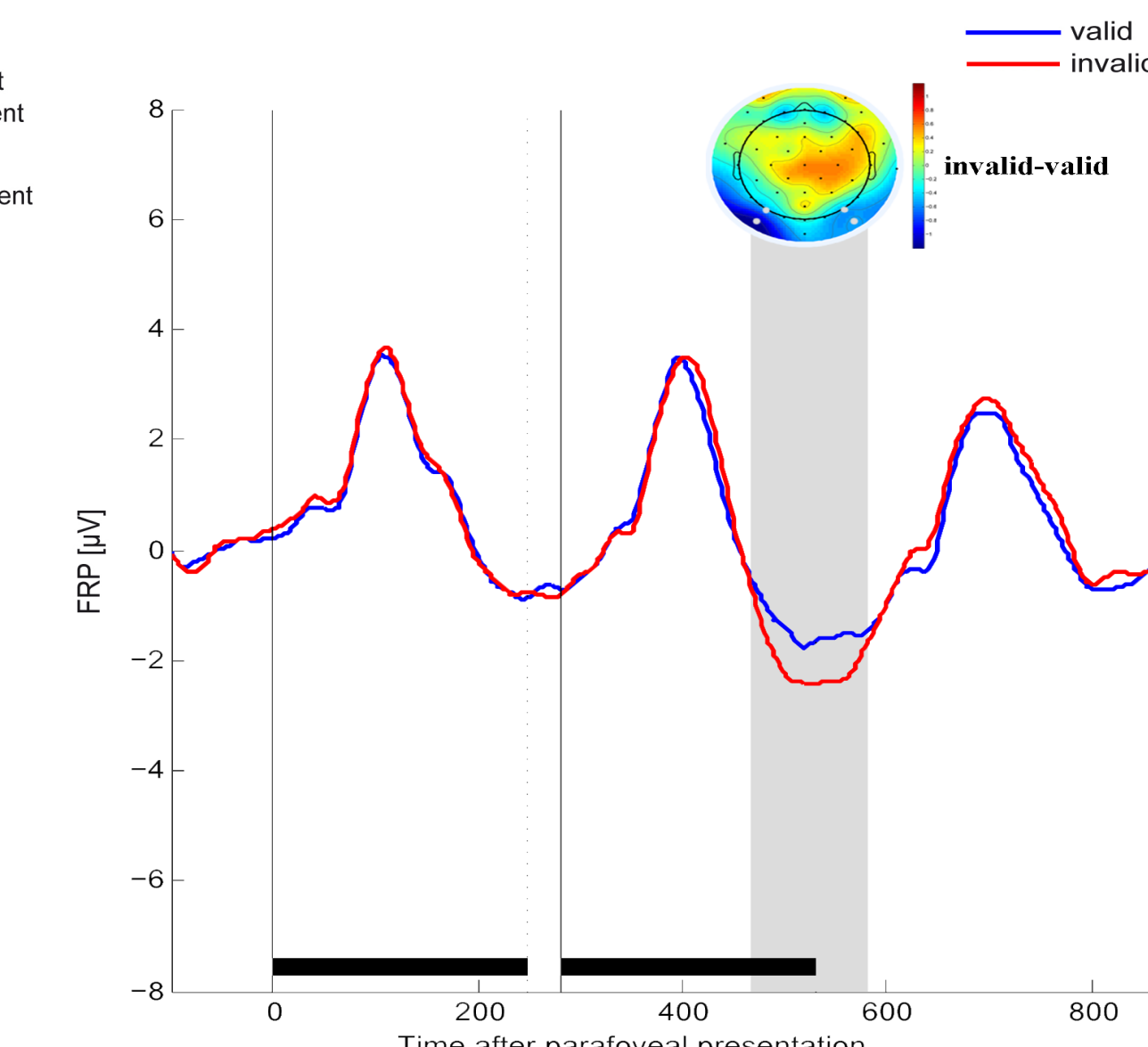
Result

Preview effect of semantic congruence



Foveal congruence effect. Left: congruent preview; Right: incongruent preview

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.
- Preview validity effect was observed for the occipitotemporal area 200–300 ms after the foveal target word onset, which is consistent with findings of previous studies (Dimigen, et al., 2012; Li, et al., 2015). This effect was not shown in N400 time window.

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

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