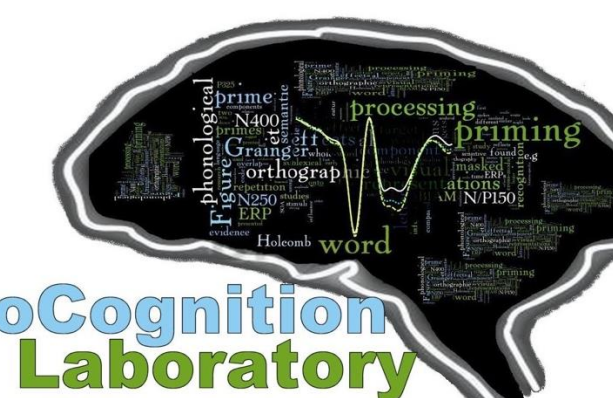
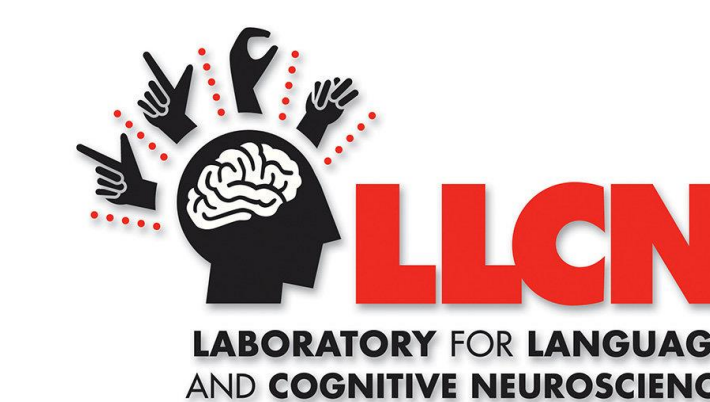


Readers extract syntactic and semantic information during Rapid Parallel Visual Presentation (RPVP) sentence reading: Evidence from event-related potentials (ERPs)

Sofia E. Ortega^{1,2}, Jonathan Grainger³, Katherine J. Midgley¹, Karen Emmorey¹, Phillip J. Holcomb¹
 San Diego State University¹, University of California, San Diego², CNRS and Aix-Marseille Université³



INTRODUCTION

- ❖ Converging evidence in support of parallel processing comes from both behavioral and ERP studies.
- ❖ The N400 and P600 ERP components are sensitive to semantic and syntactic anomalies in rapid serial visual presentation (RSVP) studies, but they have not yet been examined in the RPVP paradigm.
- ❖ The current study aims to provide electrophysiological evidence for the rapid extraction and integration of linguistic information when presented with a sentence in parallel.

METHODS

Participants

- ❖ N = 24
- ❖ English speakers
- ❖ $M_{age} = 27.63$ years, $SD_{age} = 7.65$, Range = 18 - 49

Stimuli & Design

- ❖ 300 five-word sentences
- ❖ Latin square

Procedure

- ❖ Sentence acceptability judgment task

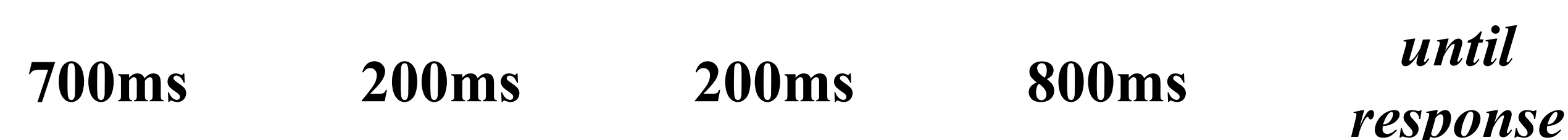
Data Analysis

- ❖ LMER-ANOVAs, R
- ❖ Correct response trials only

Response Dominance Index (RDI)

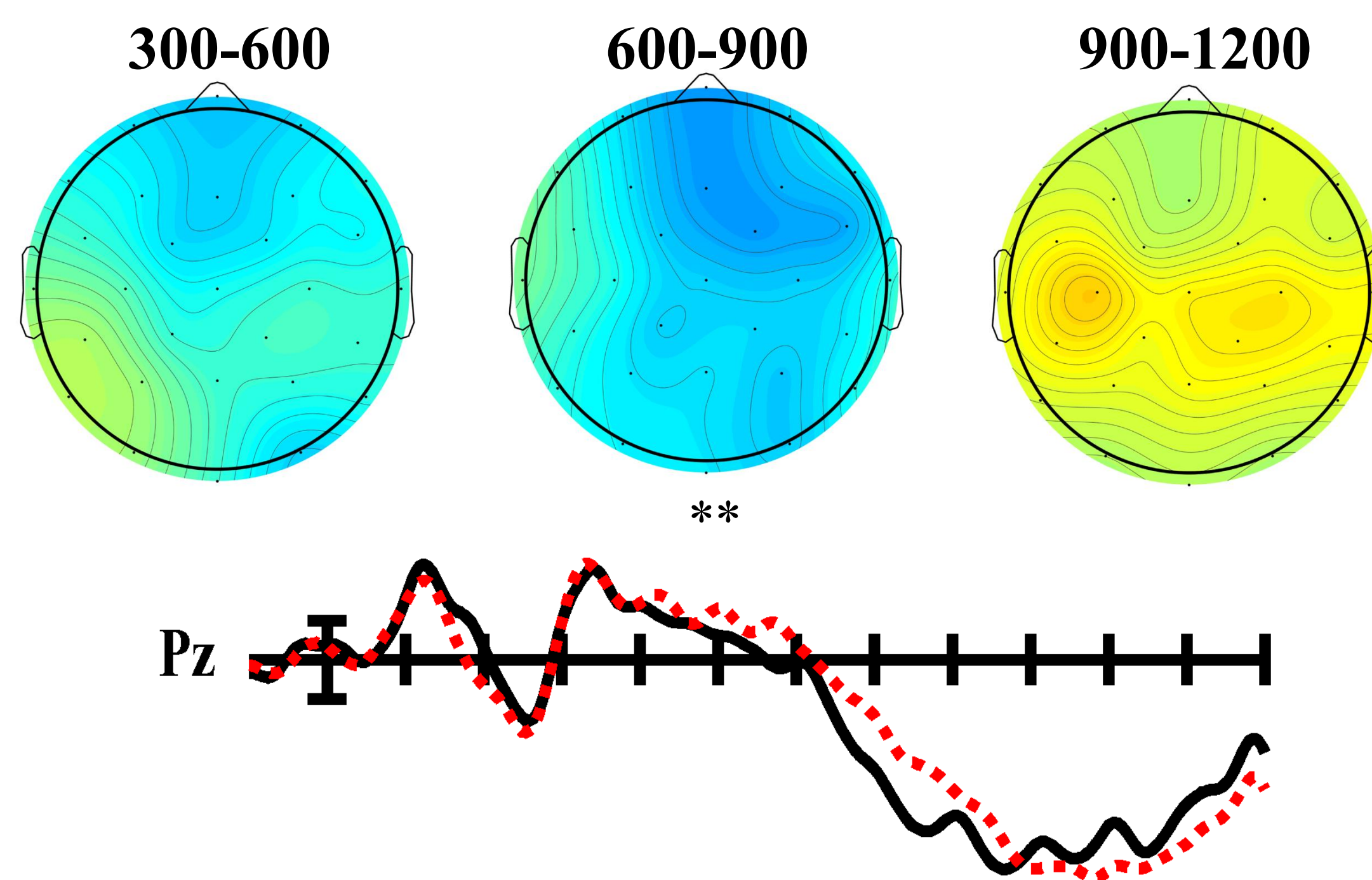
- ❖ Centro-parietal ROI (C3, Cz, C4, CP1, CP2, P3, Pz, and P4)
- ❖ N400 (300-750ms)
- ❖ P600 (750-1200ms)

$$RDI = \frac{(P600_{vio} - P600_{well}) - (N400_{well} - N400_{vio})}{\sqrt{2}}$$



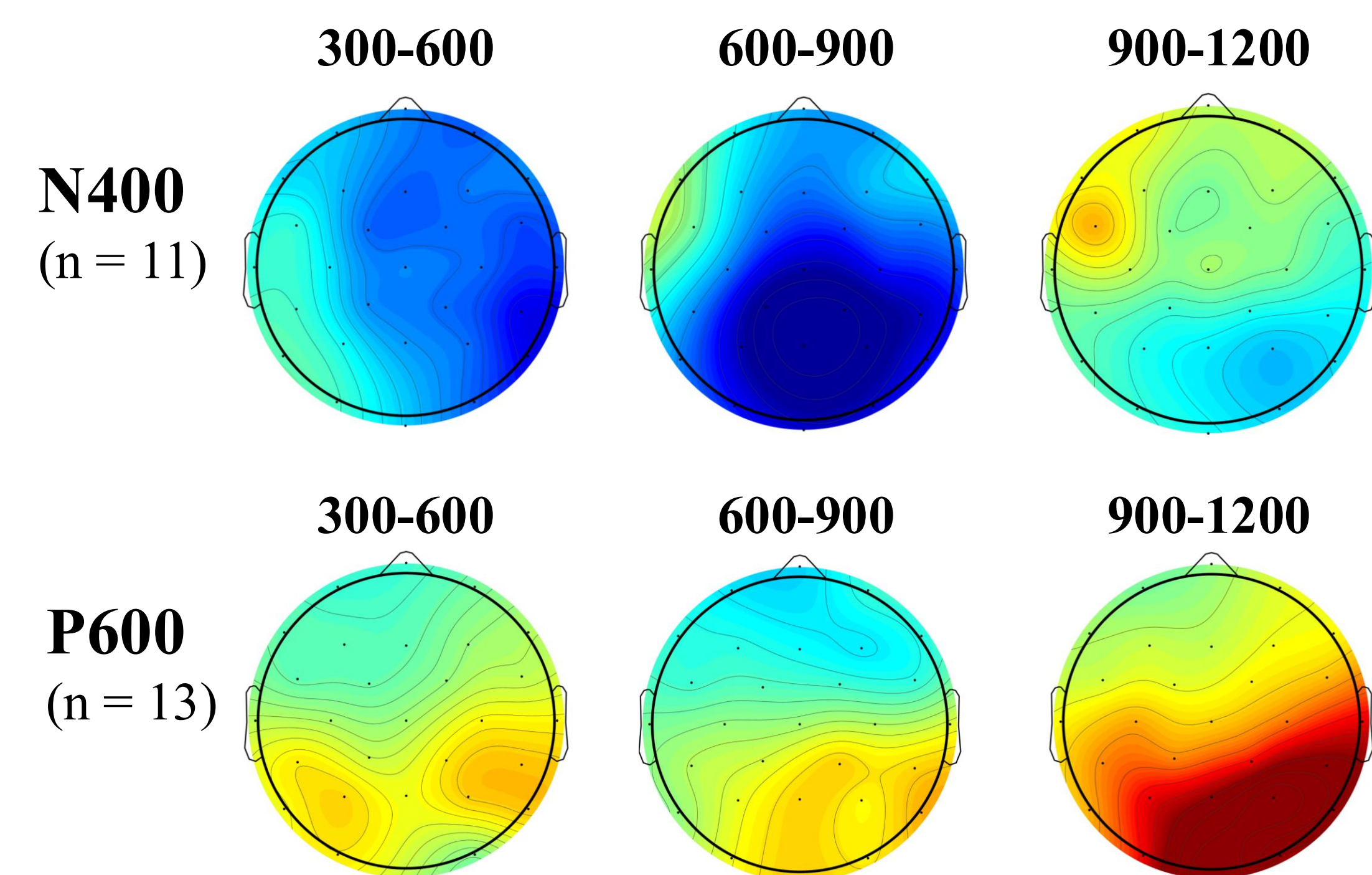
Word Order Violation

The player **the** kicks ball.



Word Order Response Dominance Index

(Tanner 2019; Tanner & Van Hell 2014)



RDI sorting results suggest individual differences in sentence processing strategies for word order violations.

RESULTS

Sentence Acceptability Judgment Task

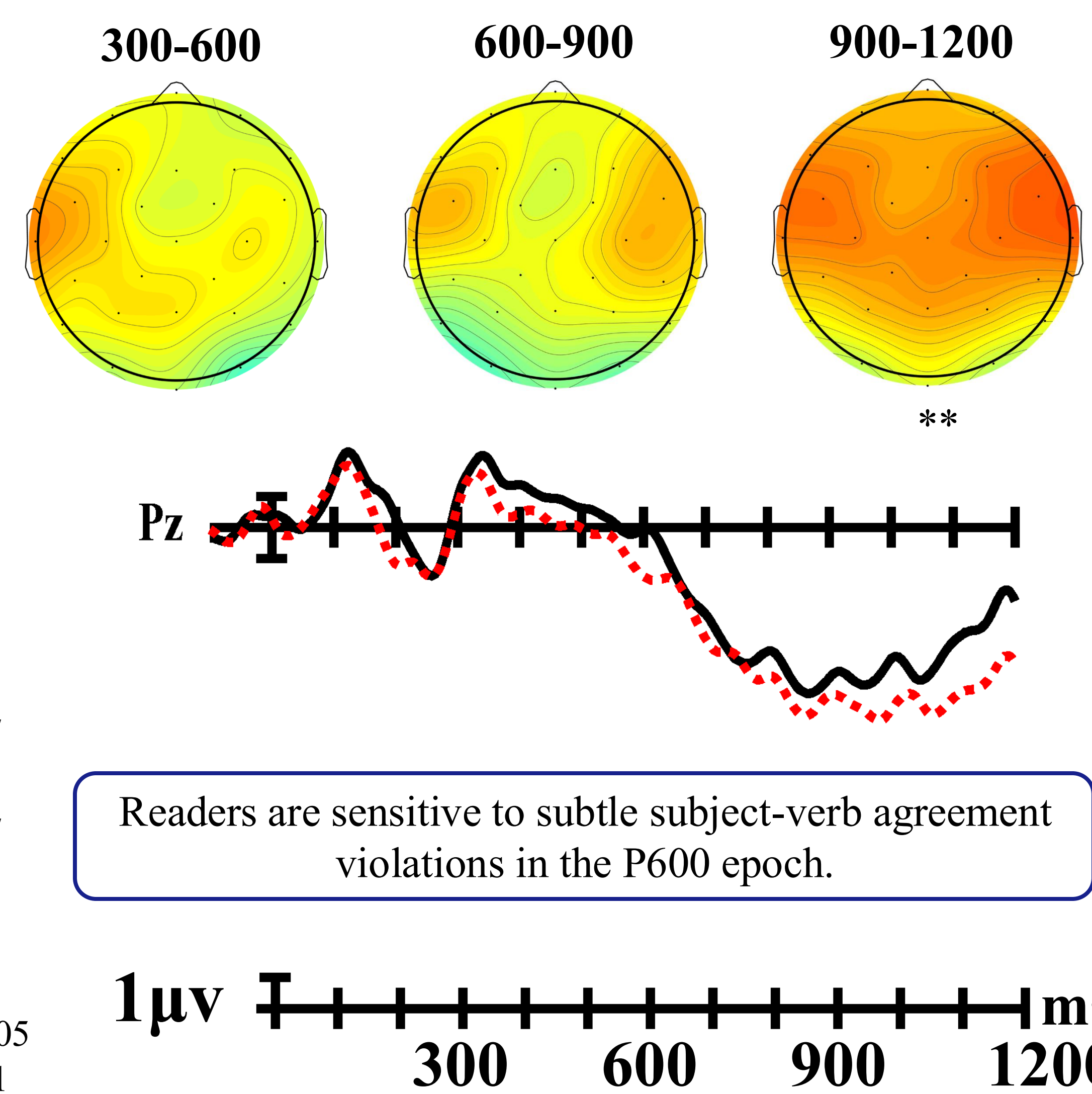
Word Order	Agreement	Semantic Verb	Semantic Final
74%	60%	64%	44%

— Well-Formed Sentences

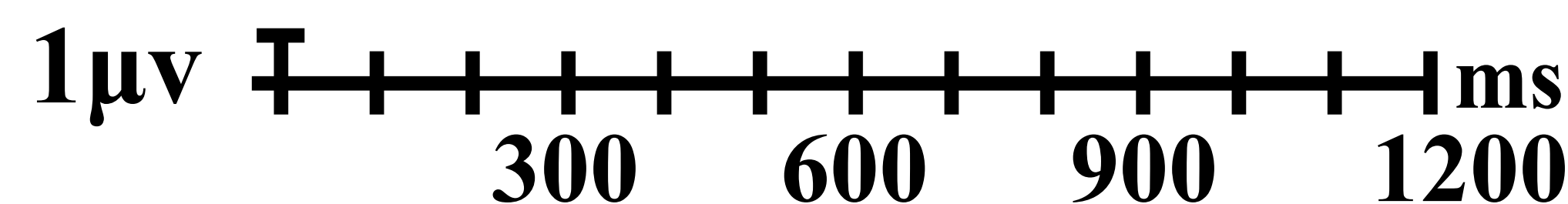
..... Violation Sentences

Agreement Violation

The player **kick** the ball.



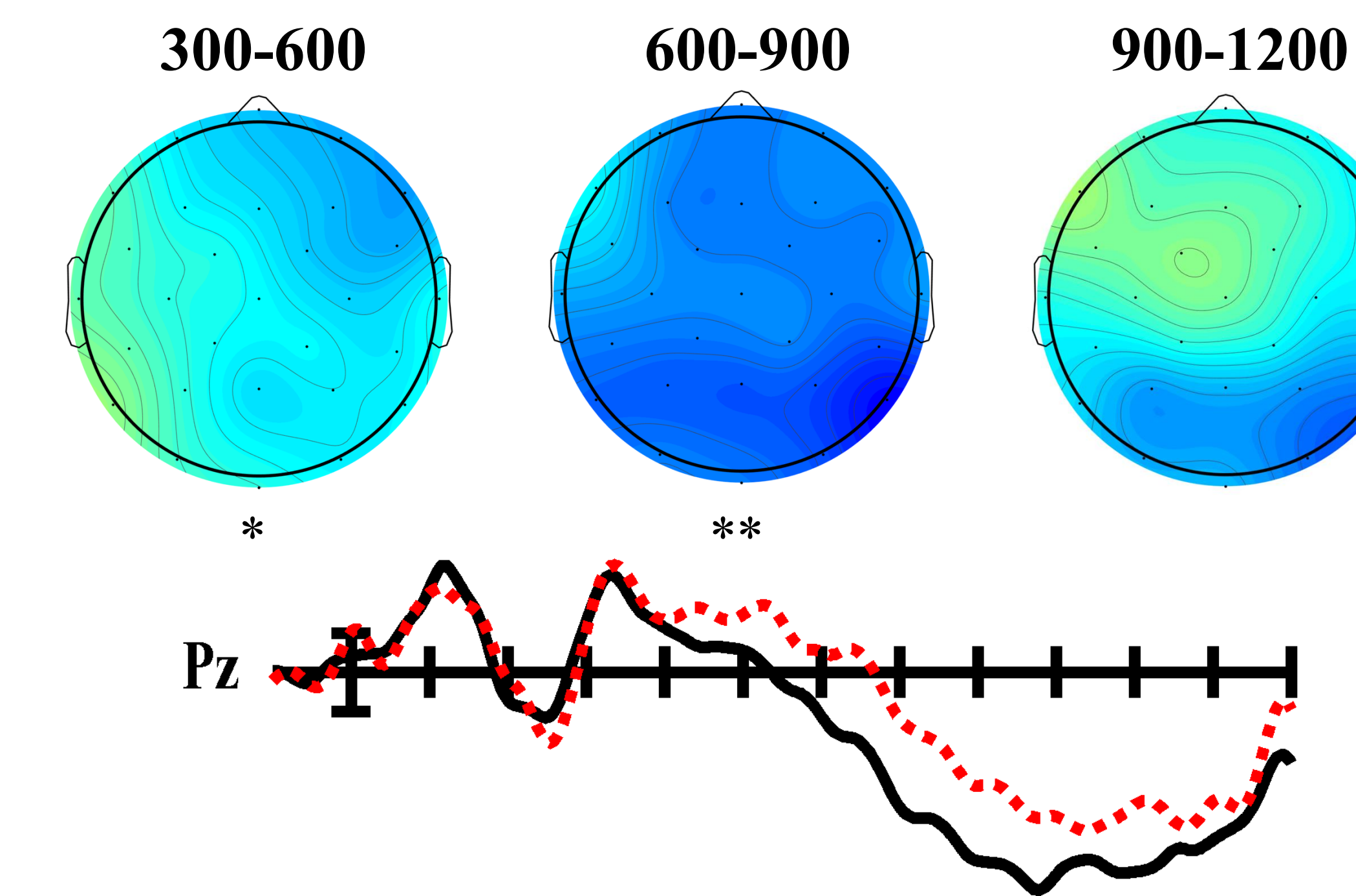
Readers are sensitive to subtle subject-verb agreement violations in the P600 epoch.



** = $p < .05$
 * = $p < .1$

Semantic Verb Violation

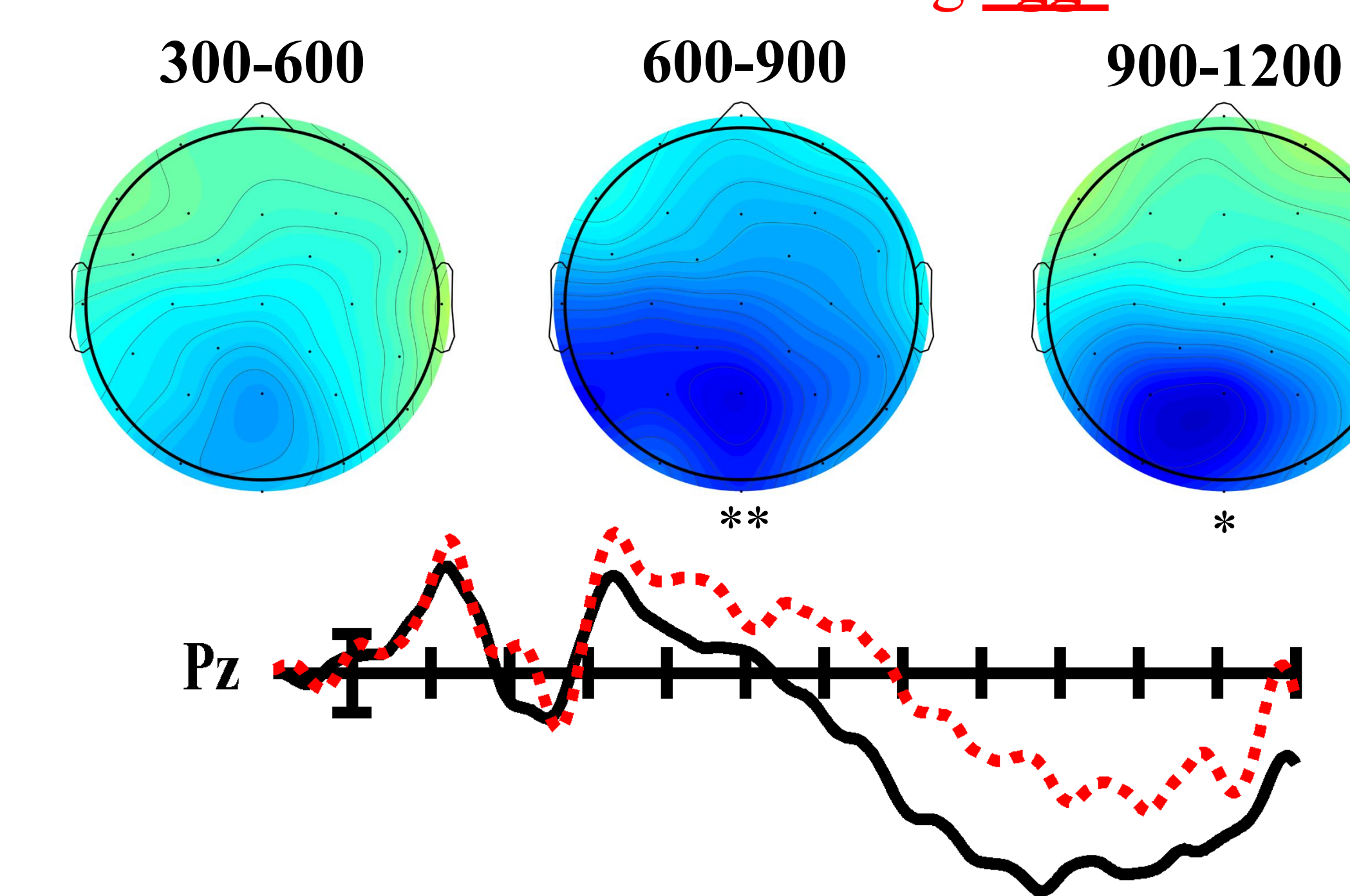
The clown **roasts** big shoes.



Late N400 effects indicate that participants were sensitive to semantic anomalies on the verb.

Semantic Final Word Violation

The clown wears big **eggs**.



Despite low behavioral performance, readers revealed final word semantic anomaly effects in the late N400 window.

CONCLUSIONS

- ❖ The observed pattern is consistent with a large literature using more natural presentation conditions and suggests that, other than a small delay in the peak response, a normal pattern of sentence processing was observed for our participants in this difficult reading task.
- ❖ Since participants could not anticipate anomaly locations, these findings are incompatible with a simple guessing strategy and suggest that readers can extract and process semantic and syntactic information in parallel during RPVP sentence reading.

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Contact: sofiaortega.seo@gmail.com



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 References: Tanner & Van Hell (2014). *Neuropsychologia*