



ERP Correlates of Semantic Processing During Inattentional Blindness

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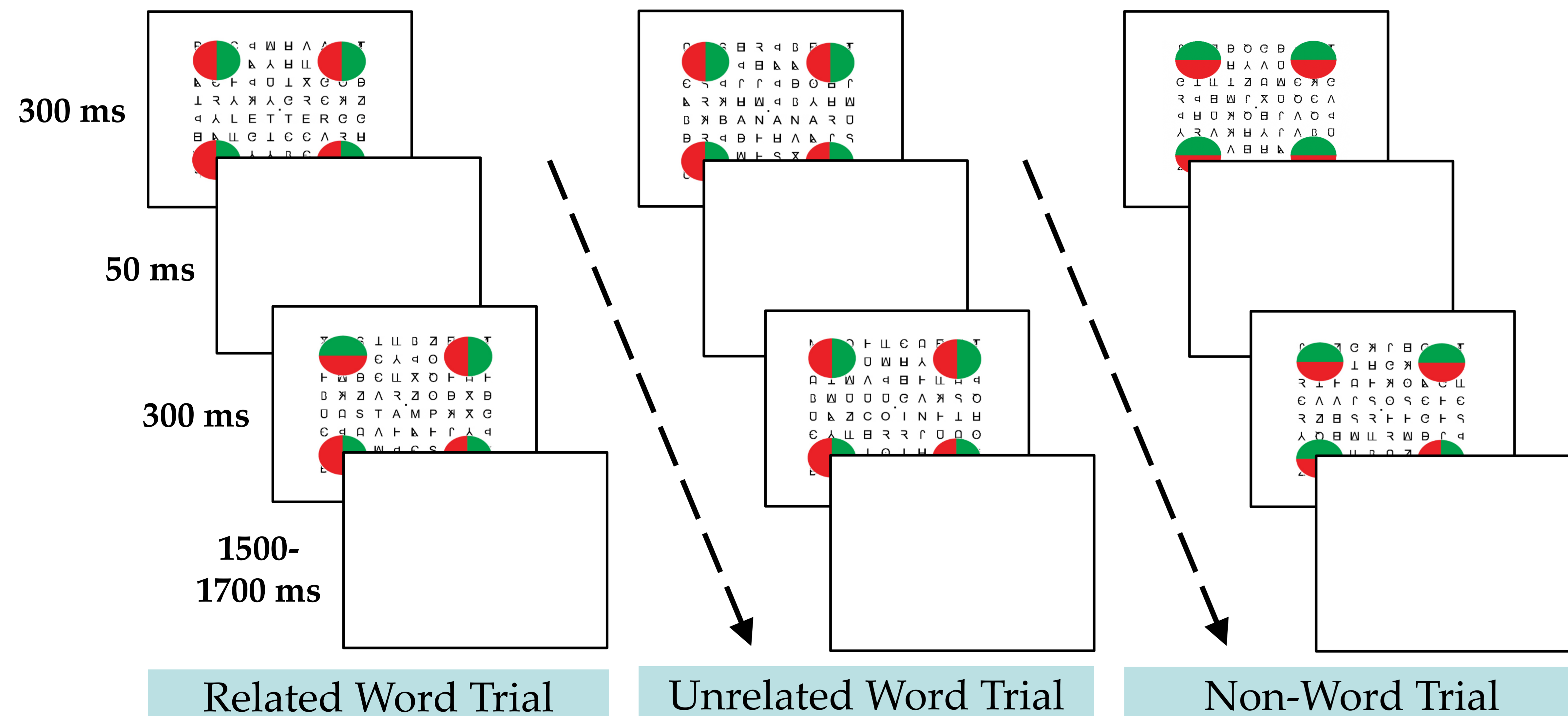
Background and Aims

- The N400 is a well established ERP marker of semantic processing [1].
- Here, we attempt to address the question of whether semantic processing can occur without awareness by examining if the N400 can be elicited under conditions of inattentional blindness.

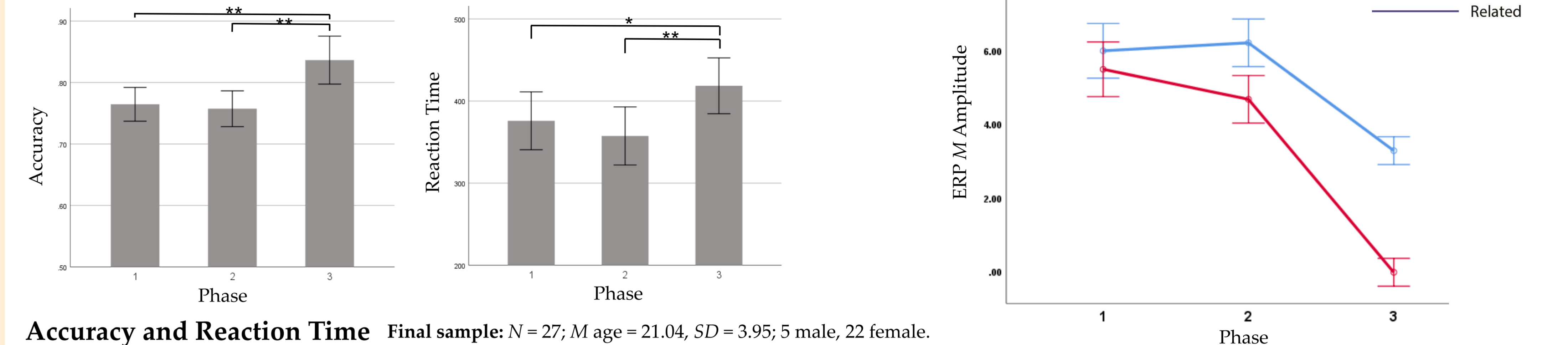
Method

Experiment: three-phase IB paradigm inspired by [2]. Stimulus sequence illustrated in figure (below).

- **Critical (IB) stimulus:** word pairs presented in sequence centrally below fixation for 300 ms within grid of pseudo letters.
- **Three trial types:** related word, unrelated word, and non-word trial. Blocks last approx. 1.5 mins.
- **Three phases:** Stimuli identical across phases. Between each phase, questionnaire adapted from [2] to assess awareness and cue subjects to notice words.
- **Procedure:** 60 trials per block (20 related, 20 unrelated, 30 non-words), 10 blocks per phase, 3 phases, approx. 60 min total run time.
- **Task in phases 1 and 2 (words task irrelevant):** attend red/green circles and detect changes within each pair (“← if no change, →if change”).
- **Task in phase 3 (words task relevant):** attend to words and judge semantic relatedness within each pair (“← if related, ↓ if unrelated, → if no word”).

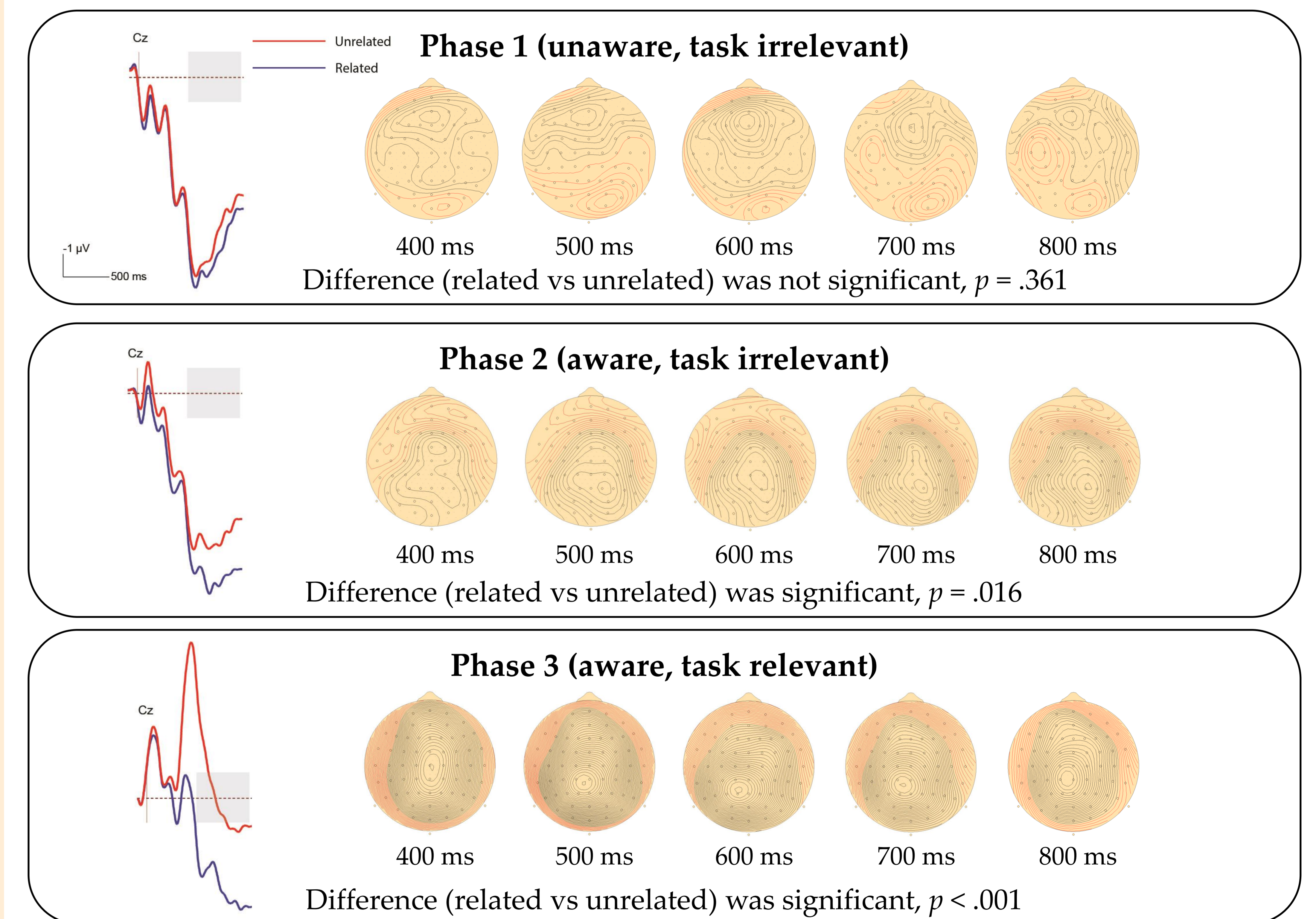


Results



Final sample: $N = 27$; M age = 21.04, $SD = 3.95$; 5 male, 22 female.
Awareness: All subjects were inattentionally blind to the words in phase 1, whereas all subjects reported awareness of words in phase 2.
Electrodes: cluster of central-parietal sites (C1, Cz, C2, CP1, CP2, CP2) chosen for analyses based on max amplitude over entire epoch across all electrodes from all stimuli in all phases pooled together.
ERPs: time-locked to the second word of each pair; mean amplitude from 500-1000ms selected for statistical comparison.
Analysis: 2 (related vs unrelated) \times 3 (phase 1, phase 2, phase 3) mixed factorial ANOVA with follow up t-tests for interaction effects.

ERPs and Scalp Maps



References

1. Kutas, M. & Federmeier, K. D. (2011). Thirty years and counting: Finding meaning in the N400 component of the event-related brain potential (ERP). *Annu. Rev. Psychol.* 62, 621-647. doi: 10.1146/annurev.psych.093008.131123
2. Pitts, M. A., Martínez, A., & Hillyard, S. A. (2012). Visual processing of contour patterns under conditions of inattentional blindness. *Journal of Cognitive Neuroscience*, 24(2), 287-303. doi: 10.1162/jocn_a_0011

Conclusion

- Small but not significant difference emerged in phase 1.
- Preliminary conclusion: No clear evidence for semantic processing (as indexed by N400) without awareness.