



The role of context predictiveness in younger and older adults: EEG coherence in alpha and theta frequency bands

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Background

- Rapid and efficient communication is supported by our ability to predict upcoming input when comprehending language (Altmann & Kamide, 1999).
- N400 ERP studies in older adults suggest less efficient predictive processing in late adulthood (Federmeier, 2007).
- But, we cannot easily differentiate between facilitated integration and pre-activation of the stimulus with the N400.

Question/Hypothesis

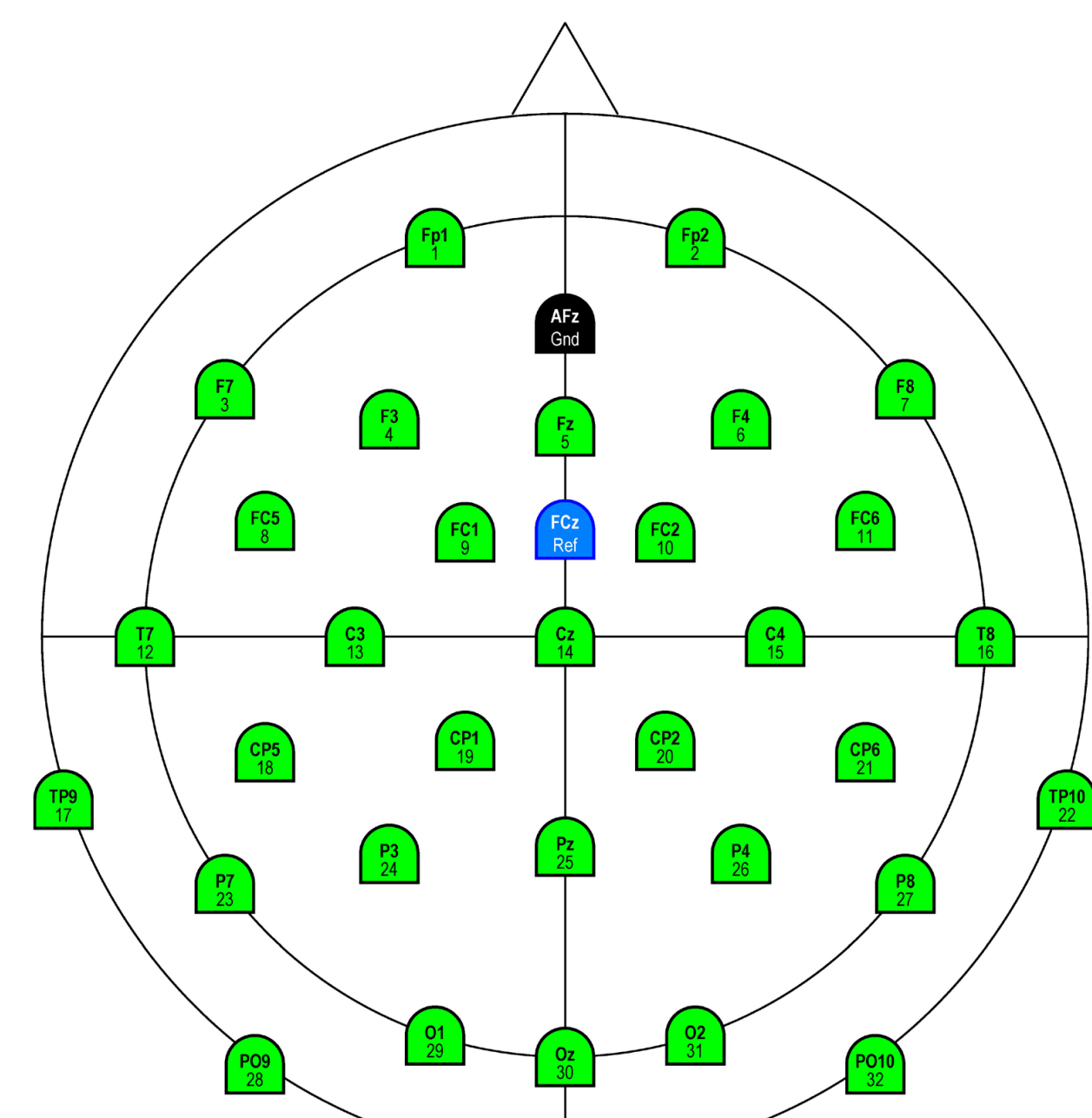
- How do younger and older healthy adults differ in predictive processing?
- Is it the problem in integration or pre-activation?
- If older adults use prediction less efficiently than younger adults, as the N400 literature suggests, then they should also show weak pre-activation effects.

Participants

- 22 (9 females) younger ($M = 24, SD = 4.9$)
- 22 (11 females) older ($M = 67, SD = 4.2$)

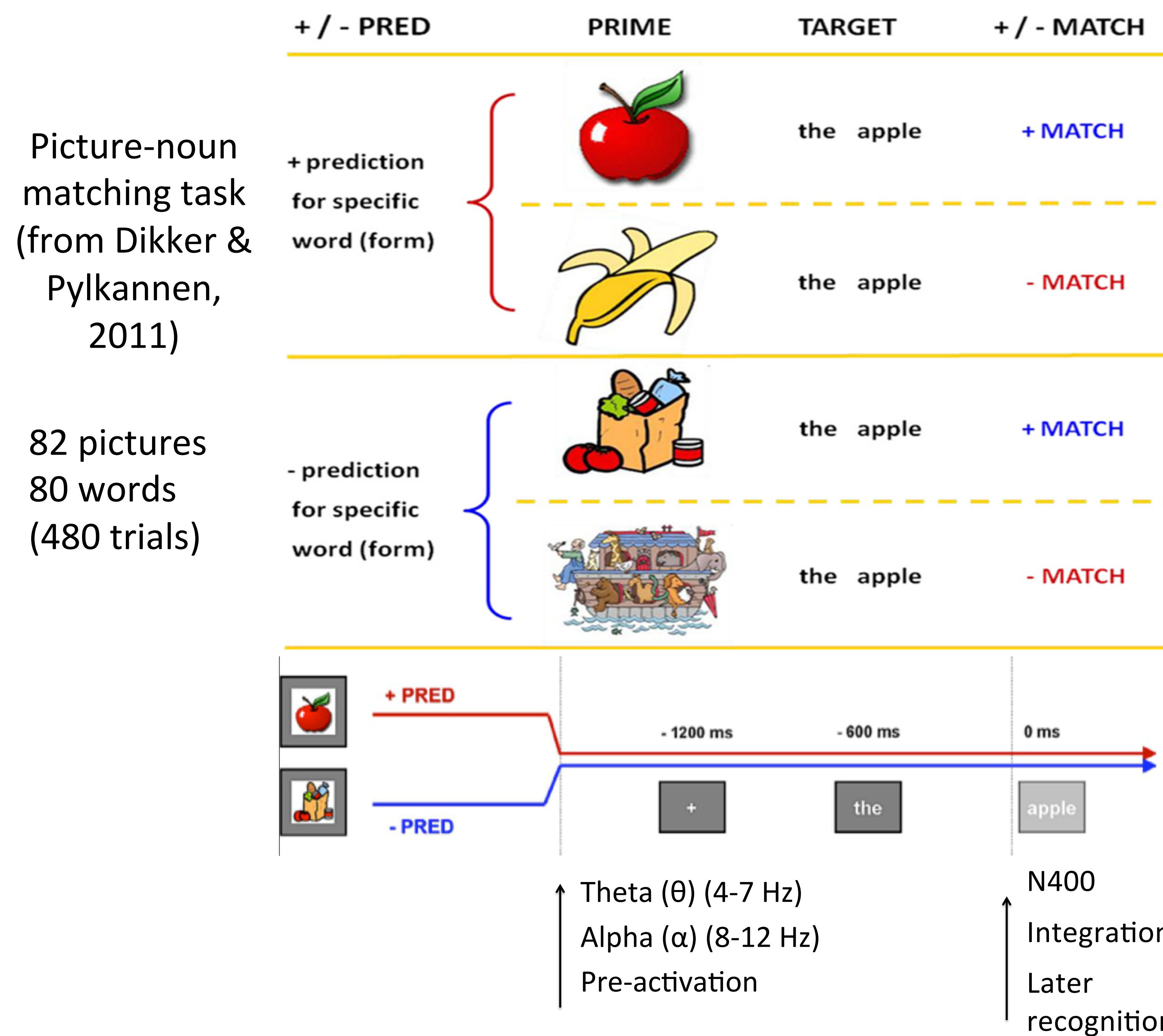
Materials and Method

- EEG data were recorded by 32 electrodes following the I 10/20 at a sampling rate of 500 Hz, amplified by ActiCHamp system (Brain Products, Inc.), and analyzed with Brain Vision Analyzer

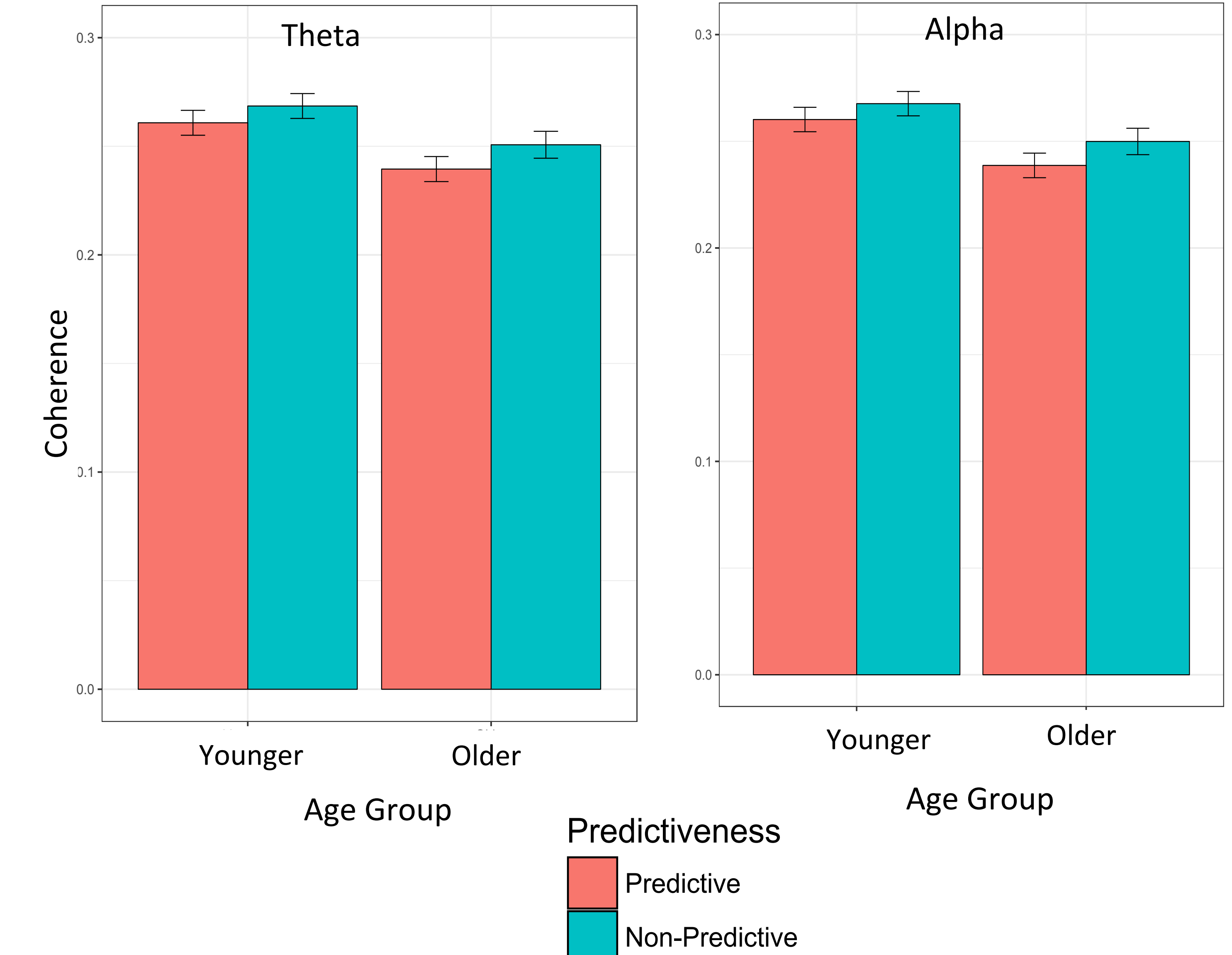


- Coherence analysis (pre-stimulus onset): Inter-hemispheric and intra-hemispheric EEG coherence
- N400 ERP component (post-stimulus onset): Peak amplitude

Materials and Method (Cont'd)

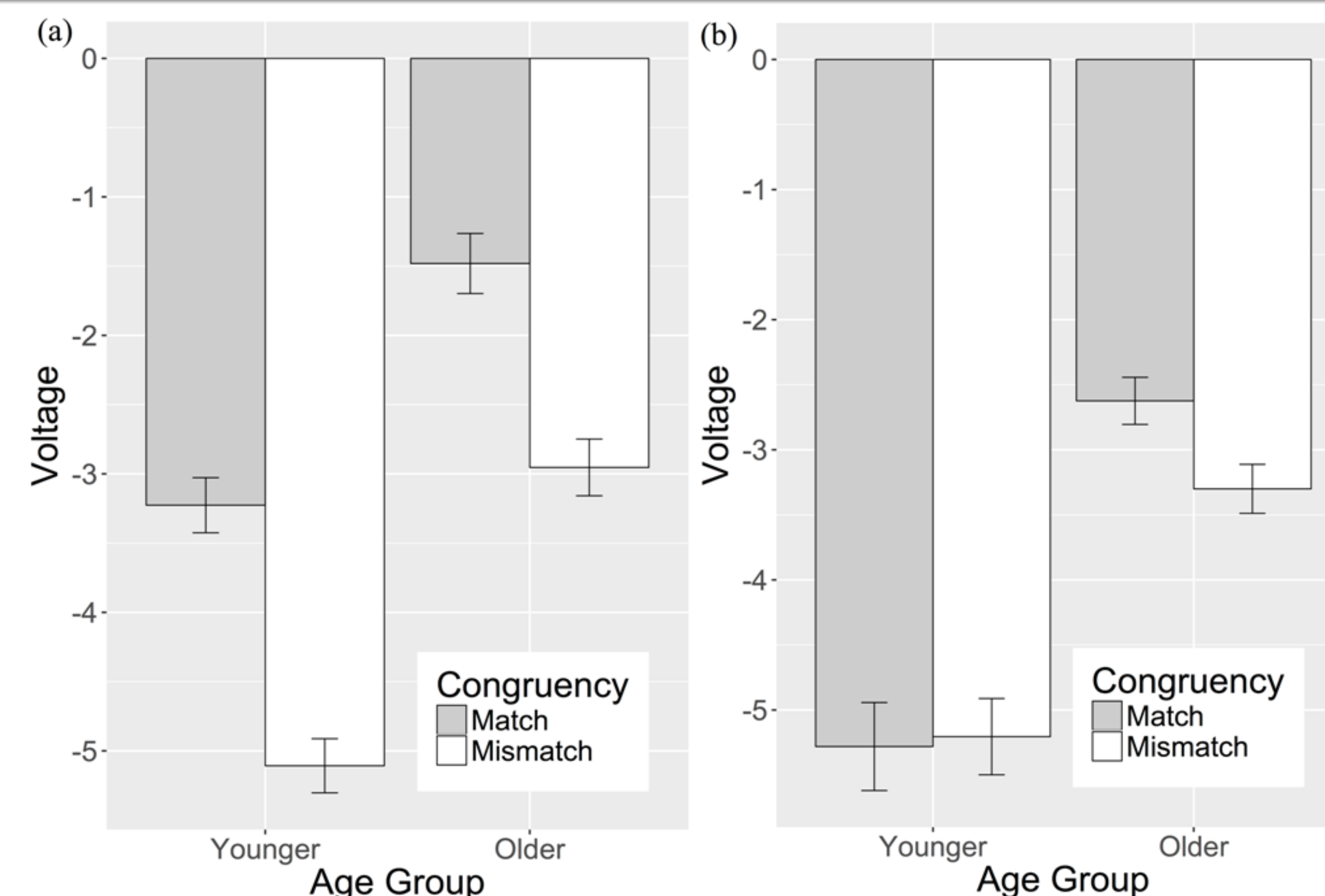


Results (Cont'd)



Coherence difference in theta and alpha frequency bands for younger and older adults in predictive and non-predictive trials.

Results



Predictive (a) and Non-Predictive (b) conditions contrasting the N400 component in younger and older individuals. The error bars present standard error of the mean.

Discussion

- Older and younger adults did not differ in coherence, but they differed in N400: Older adults showed N400 effect in both predictive and non-predictive items, contrary to younger adults.
- They may use the same pre-activation processes, but the integration process or prediction error may be different.
- Older adults may be more affected by context than younger adults, which may explain the presence of a prediction error even when the context is subtle.

References

- Altmann, G. T., & Kamide, Y. (1999). Incremental interpretation at verbs: Restricting the domain of subsequent reference. *Cognition*, 73(3), 247-264.
- Dikker, S., & Pykkänen, L. (2011). Before the N400: Effects of lexical-semantic violations in visual cortex. *Brain and Language*, 118(1), 23-28.
- Federmeier, K. D. (2007). Thinking ahead: The role and roots of prediction in language comprehension. *Psychophysiology*, 44(4), 491-505.

Acknowledgments

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