How does **visual similarity** and **sentence context** impact word recognition?

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BACKGROUND

Holcomb, Grainger & O'Rourke (2002):

• The N400 event-related potential (ERP) component indexes processes required for word recognition.

• When presented in isolation, the N400 amplitude is less negative for real words compared to nonwords.

Laszlo & Federmeier (2009):

• The lexicality effect; larger N400 for pseudowords, disappears within sentence context if the nonword/word is orthographically (i.e., visually) similar to the most expected word.

. • The N400 reflects not only retrieval of semantic information from long-term memory, but also early word-level semantic analysis and activation of early visual information related to the most expected word.

RESEARCH QUESTIONS

(1) How readers recognize words and how does this recognition process is affected by expectations created by the sentence context?

(2) How does visual similarity of words impact word recognition processes? Additionally, what if the presented item is not even a real word?

(3) How are words and non-words processed in sentence structures that do not generate strong expectations?

PARTICIPANTS

48 individuals from ages 18-35 that are Native English speakers with no neurological and psychiatric disorders.

MATERIALS & DESIGN

The experiment will include a 2 (Orthographic Relationship: Neighbor vs. Non-Neighbor) x 2 (Sentence Constraint: High vs. Low) x 3 (Word Type: Expected vs. Anomalous vs. Pseudoword) factorial design.

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Plausibility Effect

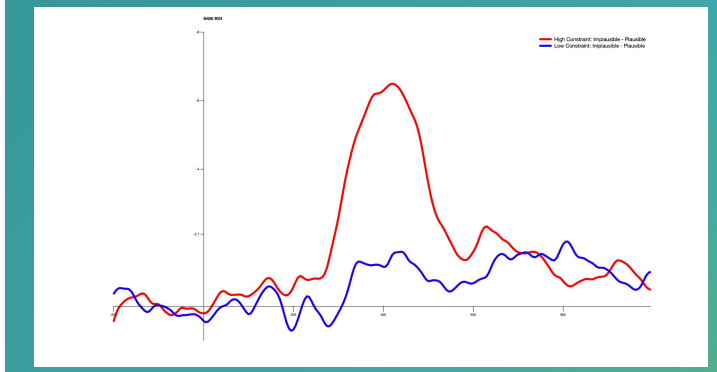


Figure 1. The grand average ERPs for the plausibility effect on the N400 ROI.

Lexicality Effect

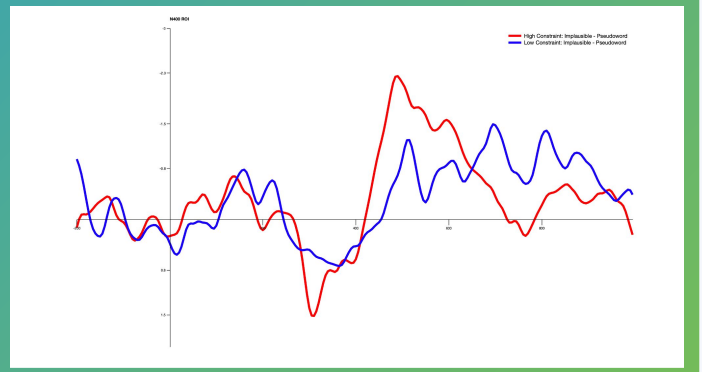


Figure 2. The grand average ERPs for the lexicality effect on the N400 ROI.

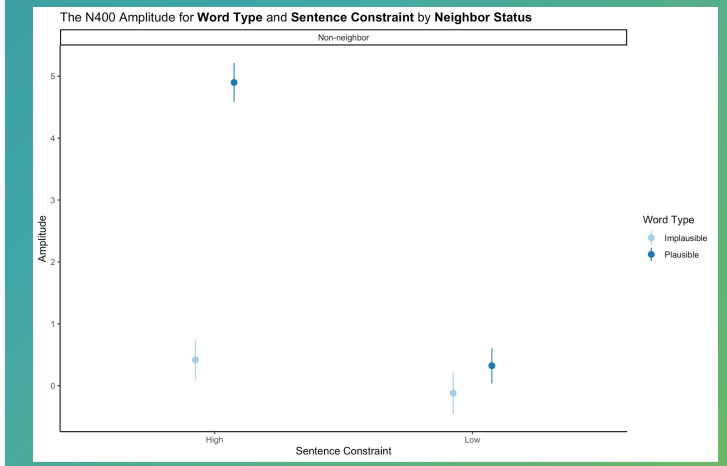


Figure 3. The interaction of word type, sentence constraint and neighbor status for words.

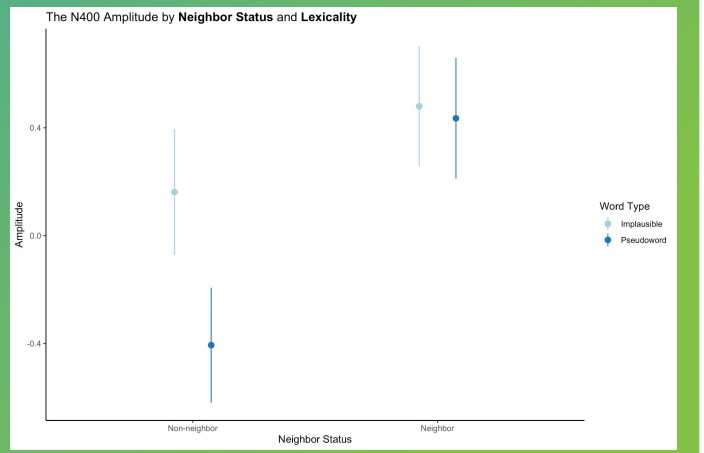
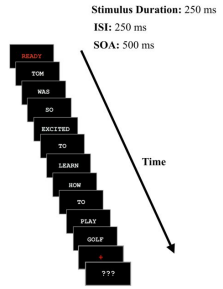


Figure 4. The N400 amplitude modulated by neighbor status and word type.

PROCEDURE

The stimuli will be presented through Rapid Serial Visual Presentation (RSVP) paradigm with a stimulus onset asynchrony of 500 ms and inter stimulus interval of 250 ms. At the end of each trial, participants will be completing a plausibility judgement task.



PRELIMINARY RESULTS

- Pilot data was collected from 23 participants so far.
- Visual similarity between words matter when contextual predictions are sufficiently strong.
- The N400 amplitude is significantly larger for implausible words in high constraint sentences compared to low constraint sentences.
- Sentence constraint, plausibility and visual similarity has a significant impact on processes required for word recognition.

Predictor	Estimate	t value
(Intercept)	1.57733	3.951***
Constraint	-1.79431	-5.447***
Implausible/Plausible	-4.45835	-8.222***
Implausible/Pseudoword	-0.42858	-0.999
Neighbor Status	0.9882	4.119***
Constraint: Implausible/Plausible	3.66909	6.443***
Constraint: Implausible/Pseudoword	0.06711	0.118
Constraint: Neighbor Status	-1.24644	-3.861***
Implausible/Plausible: Neighbor Status	0.98396	1.753
Implausible/Pseudoword: Neighbor Status	0.57831	1.031
Constraint: Implausible/Plausible: Neighbor Status	-1.36835	-1.73
Constraint: Implausible/Pseudoword: Neighbor Status	-0.58869	-0.743

Table 1. Linear mixed effects model for neighbor status, sentence constraint, word type and their interaction.

REFERENCES

Laszlo, S., & Federmeier, K. D. (2009). A beautiful day in the neighborhood: An event-related potential study of lexical relationships and prediction in context. *Journal of Memory and Language*, *61*(3), 326-338.

Holcomb, P. J., Grainger, J., & O'rourke, T. (2002). An electrophysiological study of the effects of orthographic neighborhood size on printed word perception. *Journal of Cognitive Neuroscience*, *14*(6), 938-950.