Dissociating top-down preactivation and bottom-up priming in prediction revision

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INTRODUCTION

- Research has shown that comprehenders can use local informative cues to revise predictions for upcoming nouns: upon encountering a prenominal cue that conflicts with their initial noun predictions, comprehenders can use this cue to pre-activate a previously unexpected noun [1-2].

e.g., Anna went to Starbucks to buy one ……

> *(a) CL$_{bei}$ (cup) / CL$_{xie}$ … coffee* ← *expected*
> *(b) CL$_{kuai}$ (piece) / CL$_{xie}$ … cake* ← *unexpected*
>   ↑   ↑
>   *specific*   *general*

The unexpected noun (*cake*) elicited a smaller N400 response when it was preceded by a specific classifier (*CL$_{kuai}$*) than when it was preceded by a general classifier (*CL$_{xie}$*).

However, some evidence suggested that even nouns that are implausible or unrelated to the global discourse context may become pre-activated if they are associated with words preceding the target word [3-4].

e.g., (discourse context) ……
>   *associated*
> *Lynn couldn't stop scratching her <u>arms</u> and LEGS.*
> *Lynn couldn't stop scratching her <u>arms</u> and NOSE.*
>   *unassociated*

The target word elicited a smaller N400 response when it was preceded by an associated prime word (*arms … LEGS*) compared to when it was preceded by an unassociated word (*arms … NOSE*), no matter whether the target word was congruent in the global discourse context or not.

➡ Does this also happen in the context of prediction revision?

THE PRESENT STUDY

We aimed to investigate the role of top-down global context and bottom-up lexical association in prediction revision.
- We used a local cue to disconfirm an existing noun prediction and examined comprehenders' sensitivity to the plausibility of previously unexpected nouns that matched the local cue.

METHODS

Participants (n = 44) read Chinese sentences word by word at a fixed rate (SOA = 600 ms).

为了打扫脏兮兮的地板，王芳到储藏室拿了一
To clean the dirty floor, Wang Fang went to the storage room to get

(a) Specific Cl – Plausible N:
　　一　　块　　肥皂 …
　　one CL$_{kuai}$ soap …

(b) General Cl – Plausible N:
　　一　　个　　肥皂 …
　　one CL$_{ge}$ soap …

(c) Specific Cl – Implausible N:
　　一　　块　　蛋糕 …
　　one CL$_{kuai}$ cake …

(d) General Cl – Implausible N:
　　一　　个　　蛋糕 …
　　one CL$_{ge}$ cake …

Sentences were designed to be highly predictive of a specific noun (e.g., "*broom*") but they always continued with an unexpected noun.

Noun Plausibility (plausible vs. implausible)

Classifier (specific vs. general)

- Specific classifiers were incompatible with the most expected noun ("*broom*") but compatible with both the plausible and implausible target nouns ("*soap*" and "*cake*").
- General classifiers were compatible with all three nouns.

Note: Implausible nouns were taken from another item with the same specific classifier. This ensured that the classifier was equally compatible with both plausible and implausible nouns across all sentences.

RESULTS

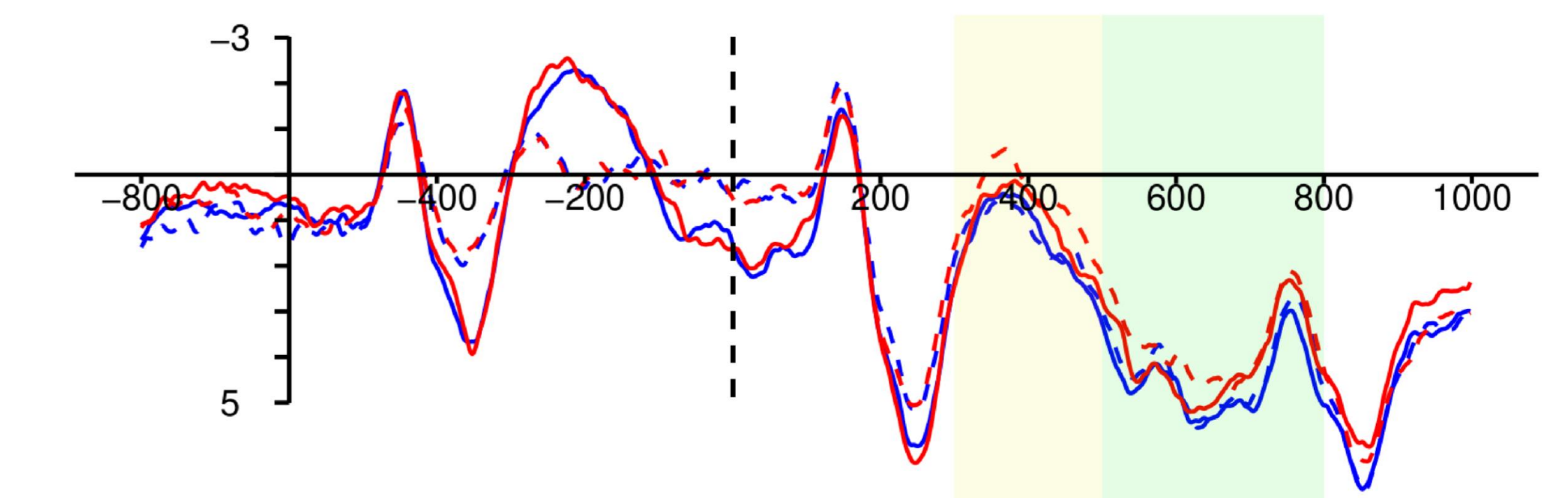300-500 ms (centro-parietal ROI):
- Plausible nouns elicited a smaller N400 response than implausible nouns.
- Nouns following a specific classifier elicited a smaller N400 response than those following a general classifier.
- **No significant interaction between Classifier and Noun Plausibility.**
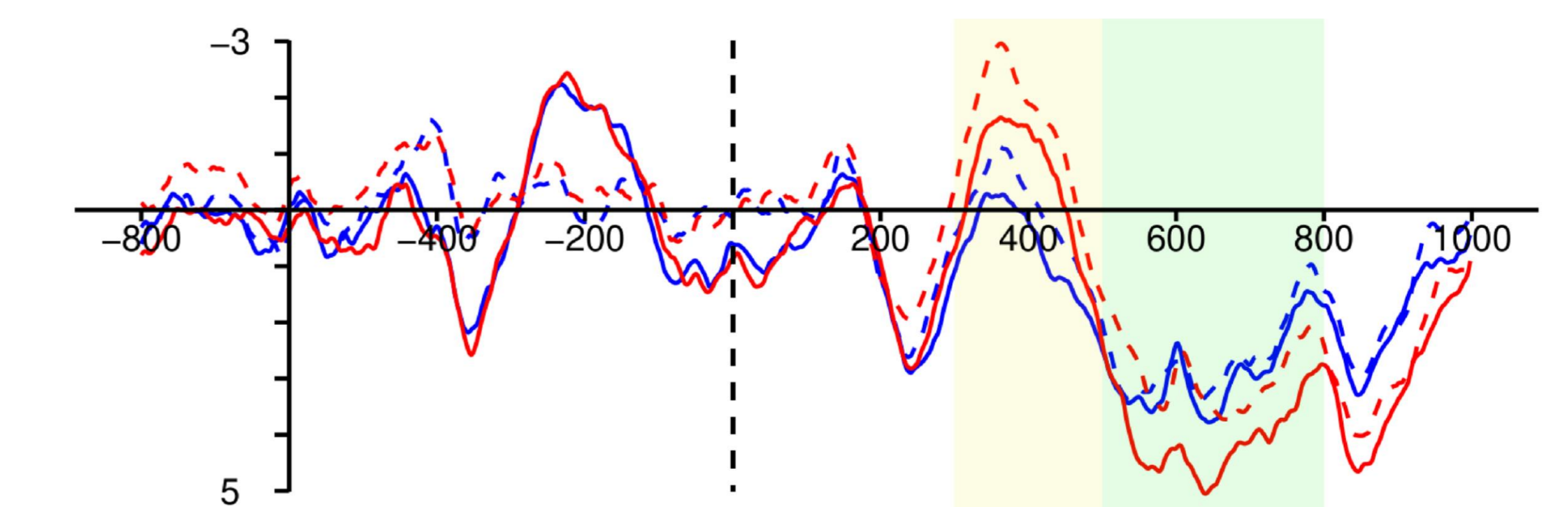
500-800 ms (centro-parietal ROI):
- Implausible nouns elicited a larger positive amplitude than plausible nouns
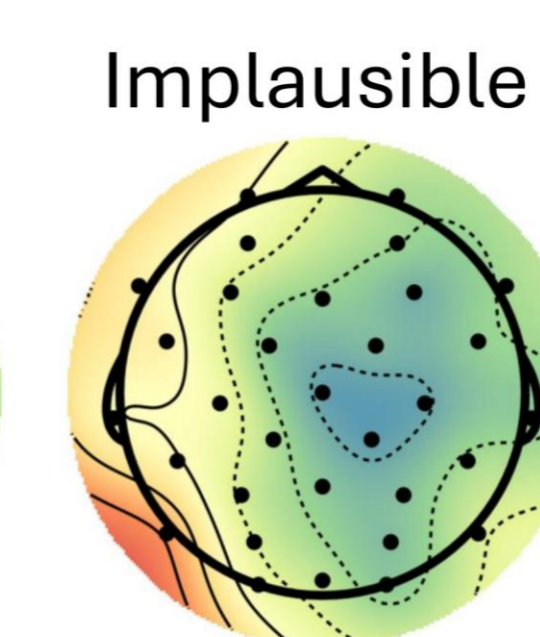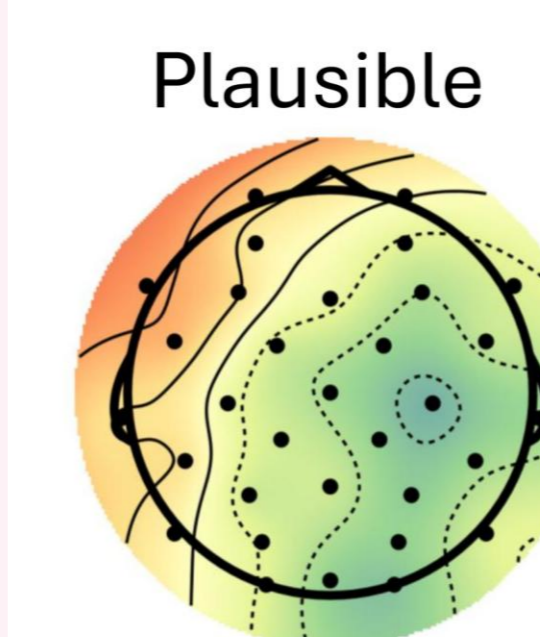
RESULTS (continued)

Frontal

Centro-parietal

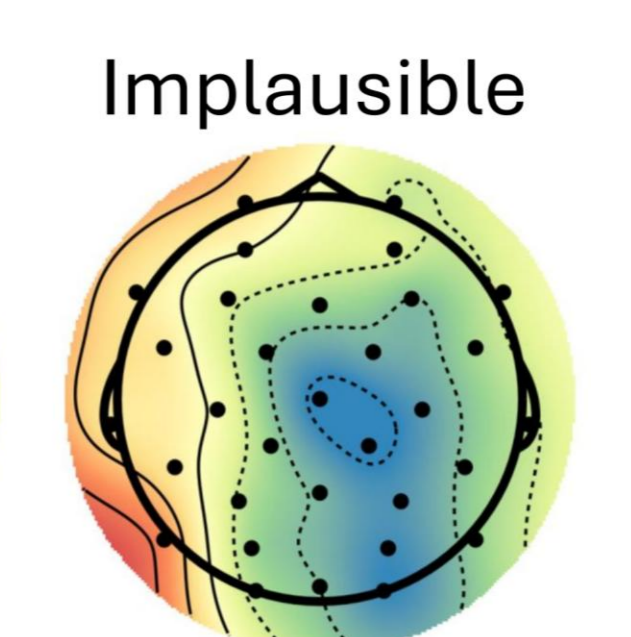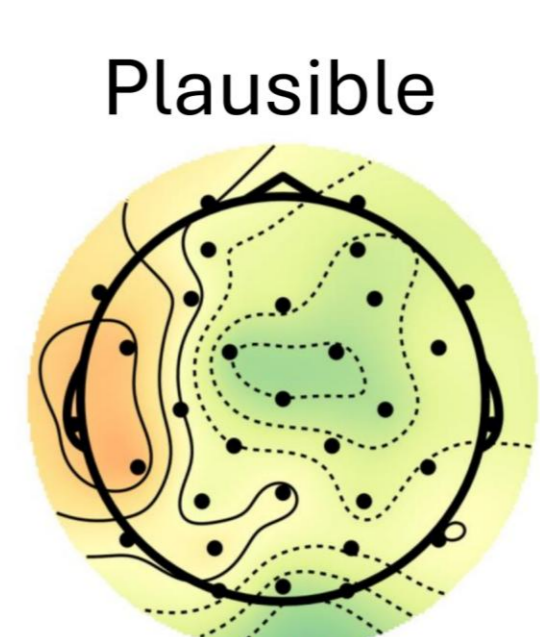- - - General Cl, Plausible N   - - - General Cl, Implausible N
——— Specific Cl, Plausible N   ——— Specific Cl, Implausible N
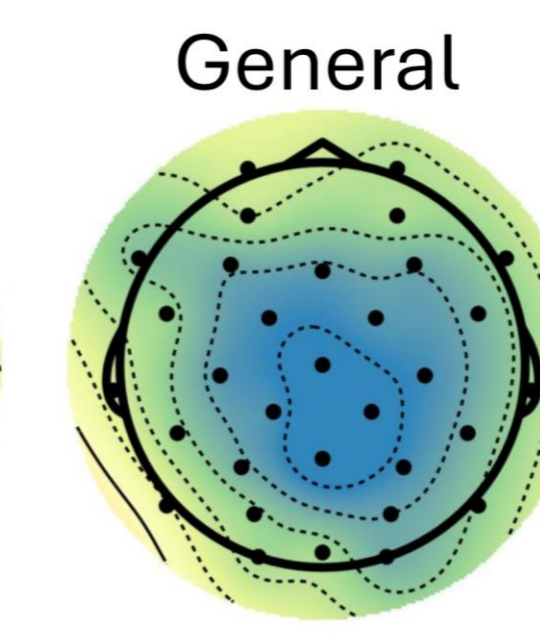

300-500 ms

Plausible   Implausible

Specific   General
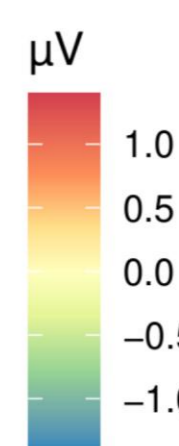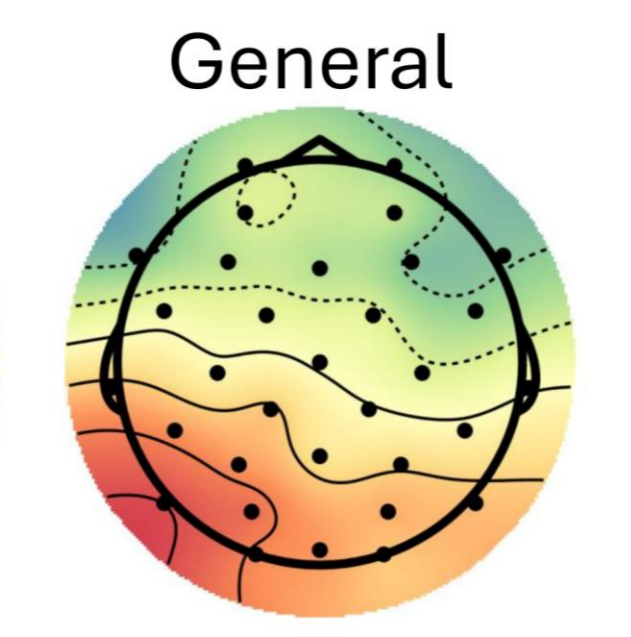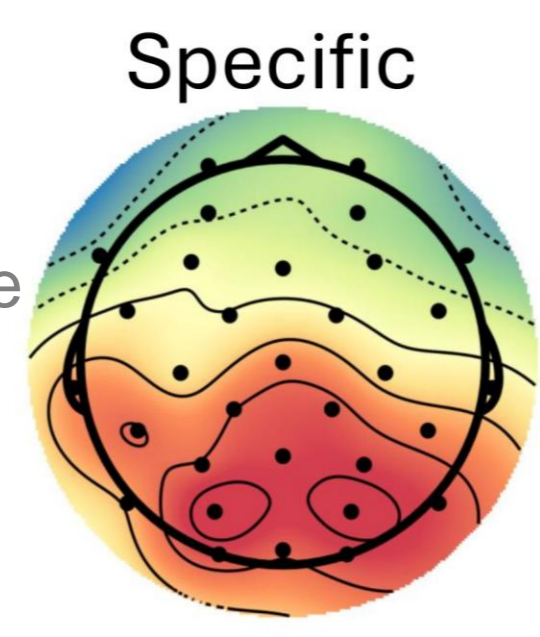
500-800 ms

Plausible   Implausible

Specific   General

General minus Specific
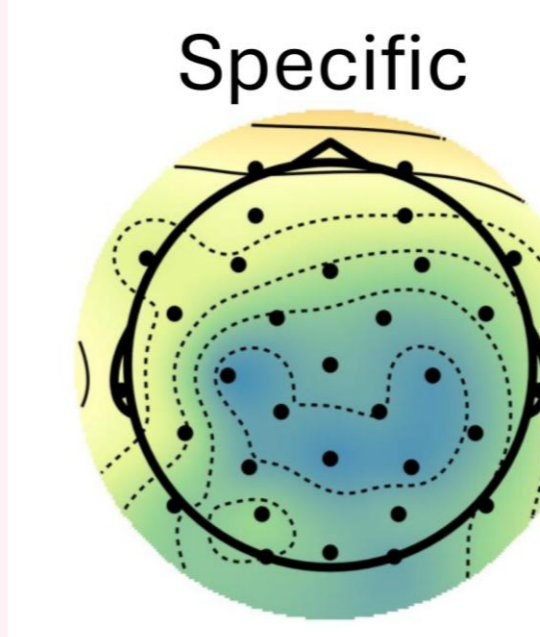
Implausible minus Plausible

CONCLUSION

- Local informative cues facilitate retrieval of a subsequent noun regardless of its plausibility within the global context, suggesting independent effects of global and local context in prediction revision.

Reference
[1] Chow, W.-Y., Chen, D., & Wang, S. (2019). Immediate revision of disconfirmed predictions: Evidence from Eye-tracking and ERPs [Poster presentation]. The 32nd annual CUNY Human Sentence Processing Conference, Boulder, CO.
[2] Szewczyk, J. M., Mech, E. N., & Federmeier, K. D. (2022). The power of "good": Can adjectives rapidly decrease as well as increase the availability of the upcoming noun? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 48(6), 856–875.
[3] Szewczyk, J. M., & Wodniecka, Z. (2020). The mechanisms of prediction updating that impact the processing of upcoming word: An event-related potential study on sentence comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 46(9), 1714–1734.
[4] Camblin, C. C., Gordon, P. C., & Swaab, T. Y. (2007). The interplay of discourse congruence and lexical association during sentence processing: Evidence from ERPs and eye tracking. *Journal of Memory and Language*, 56(1), 103–128. https://doi.org/10.1016/j.jml.2006.07.005