

Tell Me Something I Don't Know: Influences of World Knowledge, Contextual Fit, and Linguistic Regularity on Language Comprehension

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Introduction

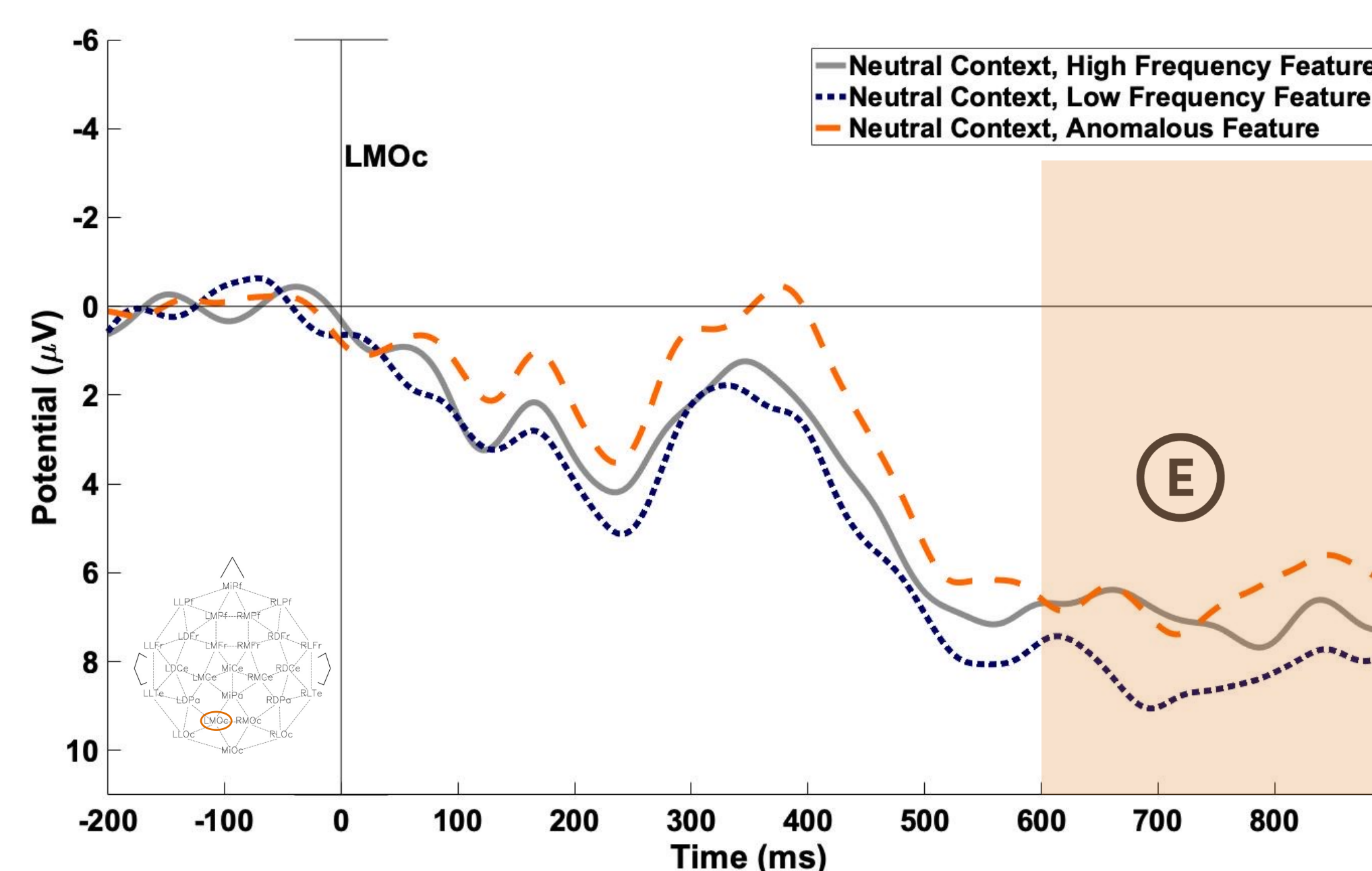
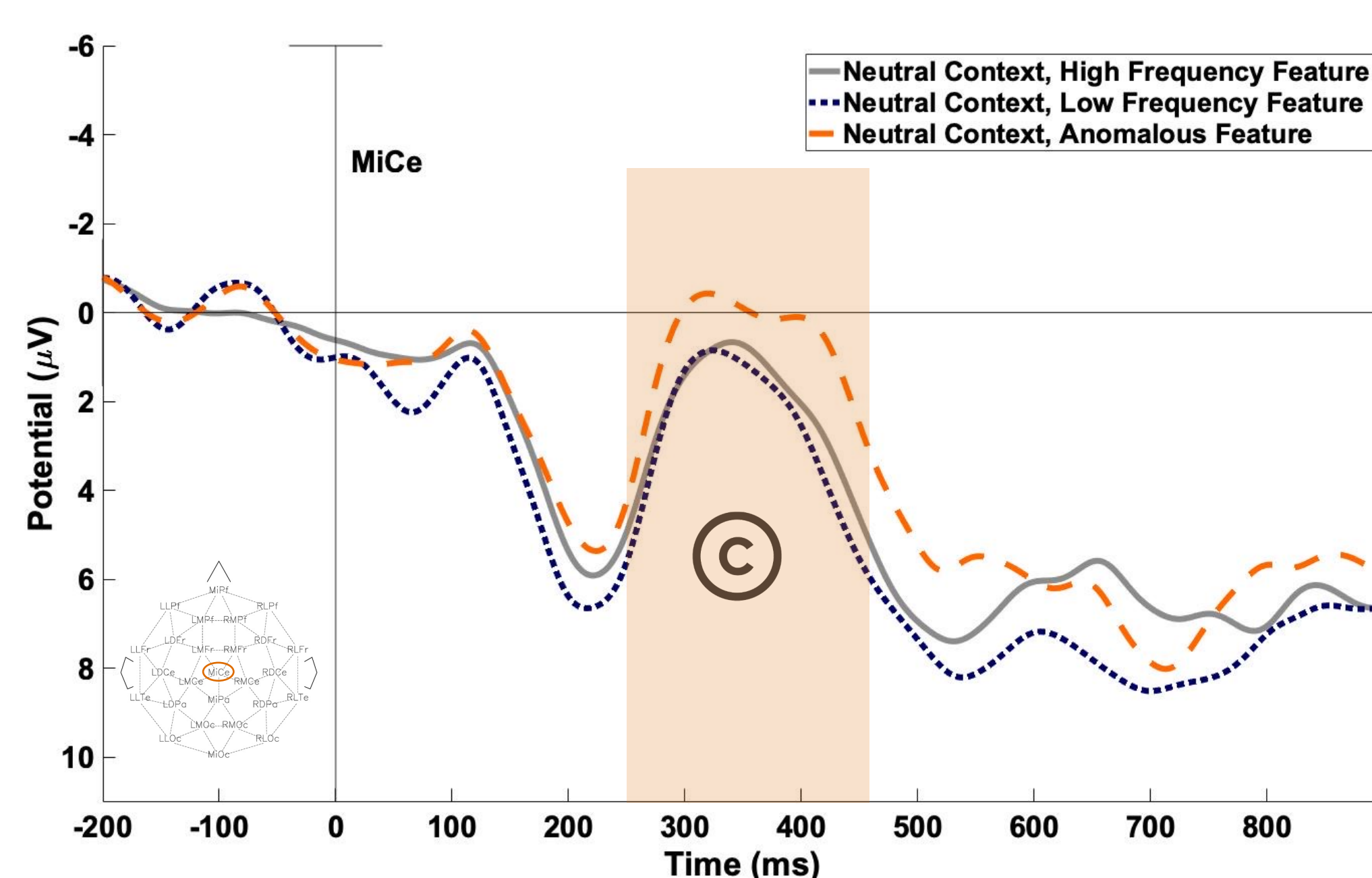
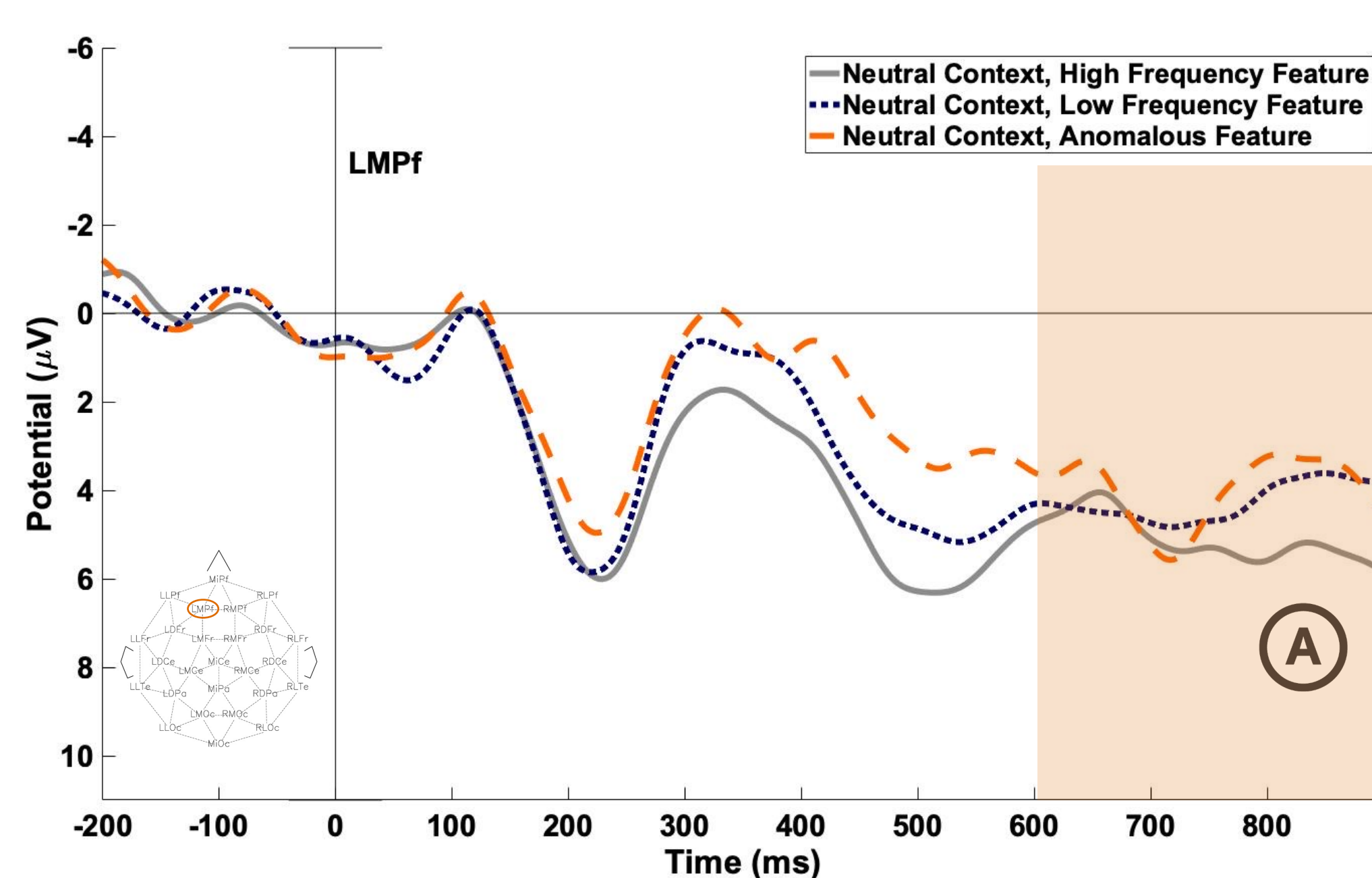
- Language comprehenders can use context to rapidly activate concepts from semantic memory to understand an unfolding message. (Kutas & Federmeier, 2000)
 - However, understanding any given message usually does not require activating all of a concept's features: knowing that shoes can have heels is not necessary to understand that some shoes have buckles.
- Do comprehenders differentially activate features of concepts depending on what facet of knowledge is relevant in the current context? (Hald et al., 2007; Willits, et al., 2015)
- The impact of world knowledge, linguistic regularity, and contextual fit on language comprehension can be studied with several ERP components:
 - Post-N400 Anterior Positivity:** linked to processes engaged when people encounter plausible but unexpected information (Van Petten & Luka, 2012)
 - N400:** linked to access of semantic knowledge and sensitive to linguistic regularity (Kutas & Federmeier, 2011; Van Petten, 2014)
 - Post-N400 Posterior Positivity (LPC):** linked to the processing of both unexpected and anomalous words in sentences (Van Petten & Kutas, 1991)

Methods

- Sentences with concept-*feature* pairs (e.g., *shoes* – *heels*) varying in typicality (McRae et al., 2005) were presented with RSVP (ISI = 200ms, SOA = 300ms) to 19 young adults
- Contexts provided minimal information about the sentence-final feature (**Neutral**) or biased the meaning towards the low frequency feature (**Biased**)
- Anomalous sentences were included for reference (e.g., *shirts* - *bitter*)
- Global linguistic regularity, operationalized as pointwise mutual information (PMI) calculated in a Wikipedia corpus, varied continuously across pairs

Context	Sentence	Low Frequency Feature (PF=6.62)	High Frequency Feature (PF=19.08)
Neutral	The woman needed <u>shoes</u> with ...	<i>buckles.</i> CP: 0.07, range: 0-0.63	<i>heels.</i> CP: 0.27, range: 0-0.94
Biased	For the Thanksgiving play, the costume director needed <u>shoes</u> with...	<i>buckles.</i> CP: 0.58, range: 0.04-0.96	<i>heels.</i> CP: 0.03, range: 0-0.8

Results



Post-N400 Anterior Positivity

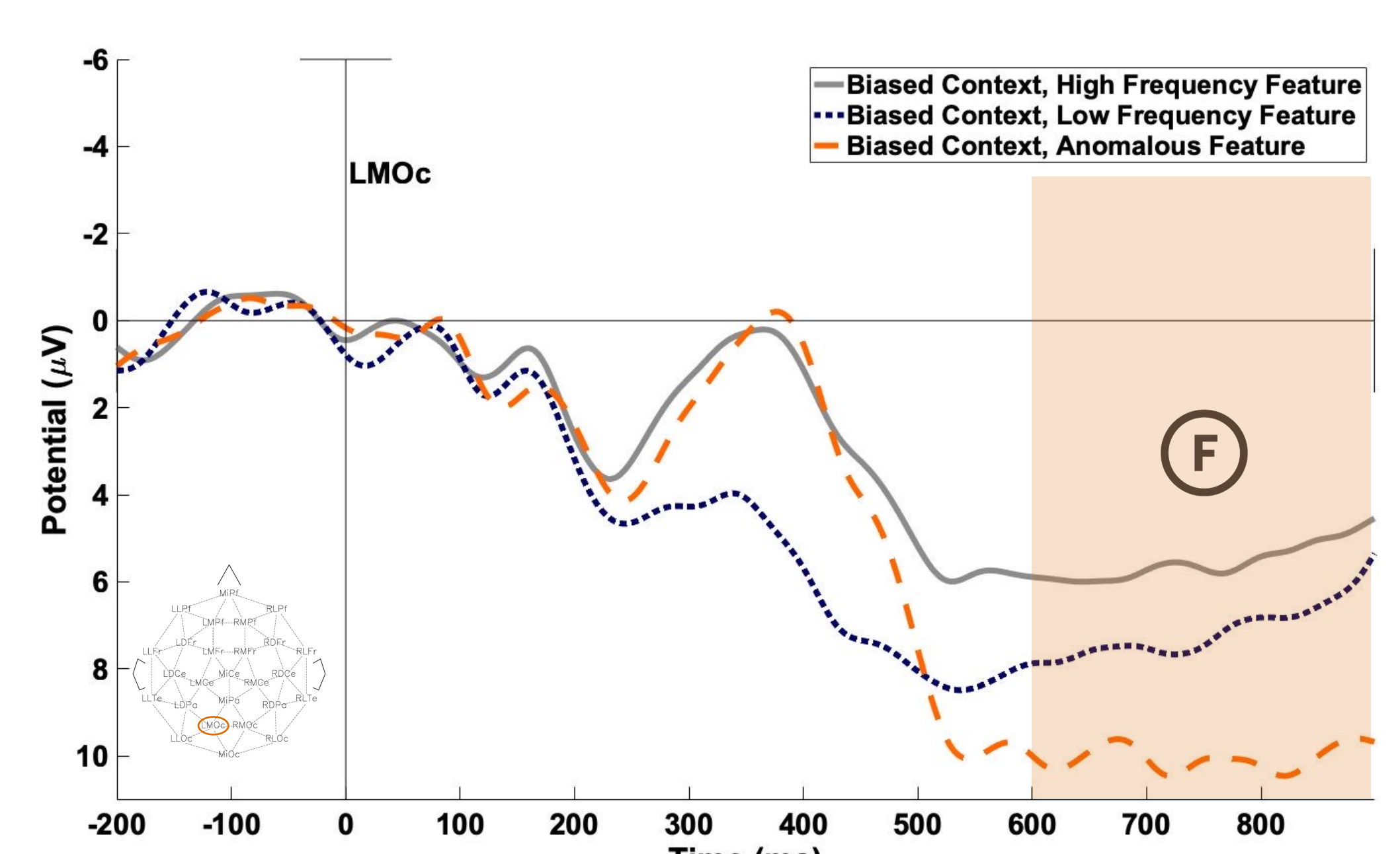
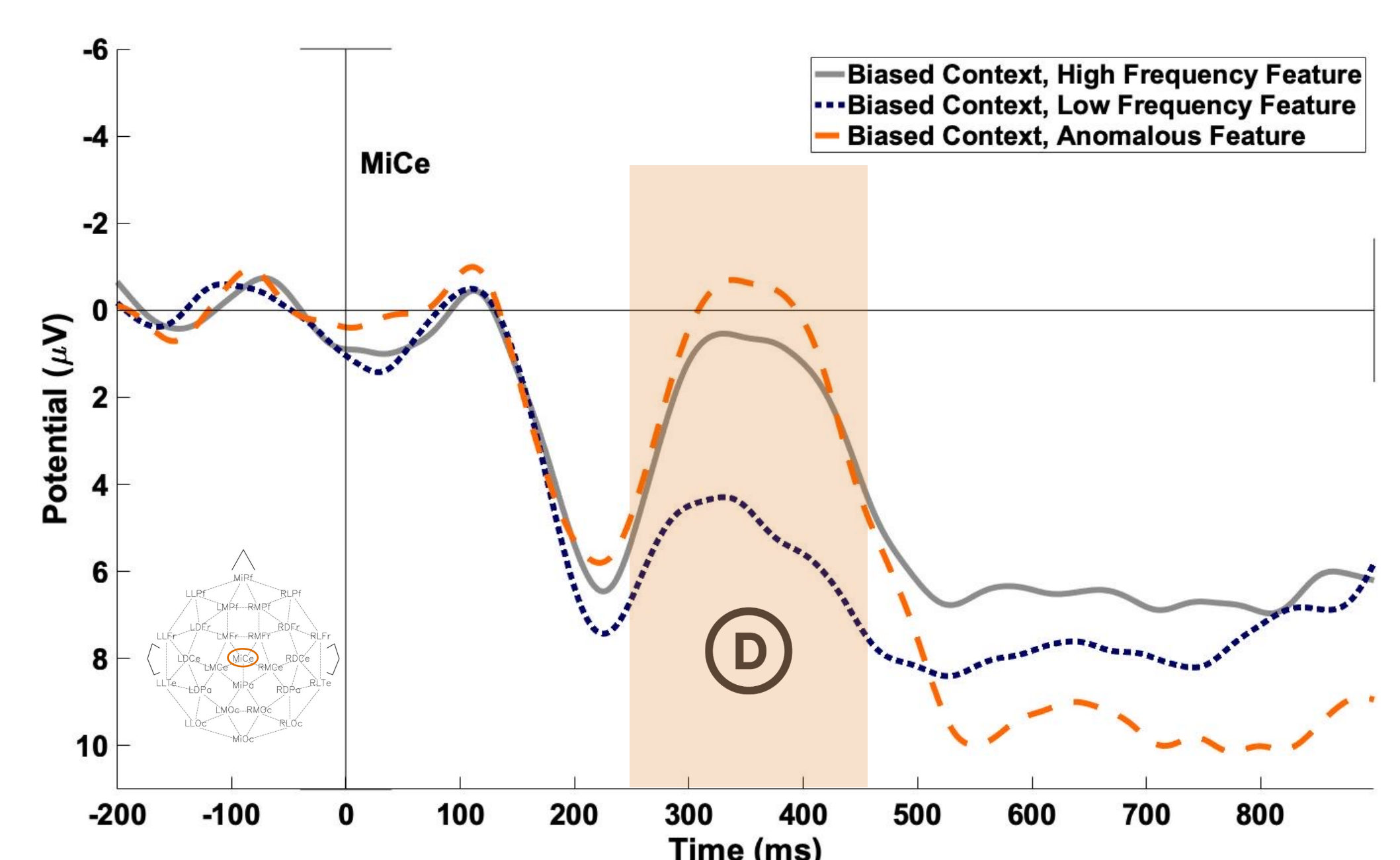
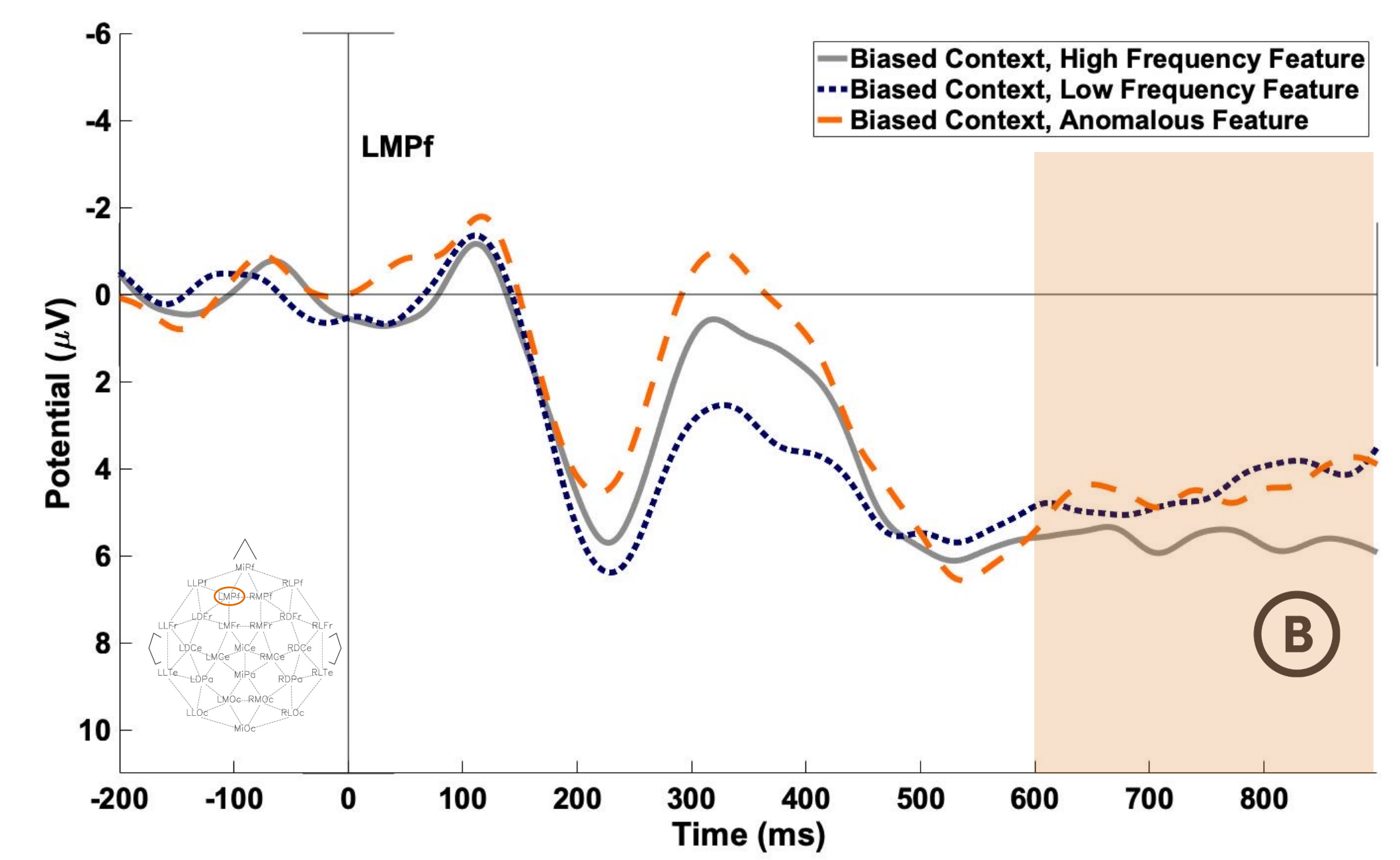
- Different from work using category/exemplar pairs (e.g., Federmeier et al., 2010), positivity was not enhanced for Low Frequency Features. Instead, the largest positivity is seen for High Frequency Features.
- Consistent with expectations, a positivity was elicited for High Frequency Features that were plausible but not preferred by the biased context.

N400

- High and Low Frequency Features were facilitated to a similar degree relative to the anomalous feature. This may suggest sentence contexts create an expectation for non-obvious information to be communicated.
- As predicted, the greatest facilitation was observed for context-preferred Low Frequency Features, followed by High Frequency Features, and subsequently Anomalous Features.

Post-N400 Posterior Positivity

- No clear effect in neutral context
- The greatest positivity was seen to Anomalous Features, and an intermediate positivity was seen to Low Frequency Features. This suggests that the effect may only arise when there is a richer mental model.



Conclusions

Preliminary findings suggest that at the sentence-final feature words, the N400 was sensitive to the fit of the particular feature to its context, whereas post-N400 positivities remained sensitive to concept-feature strength even when the feature was irrelevant in context. This pattern of results suggests that although context can initially modulate conceptual activation, later processing may remain sensitive to contextually irrelevant features of concepts. In the future, we will assess how indices of contextual fit (cloze probability) and linguistic regularity (PMI) may interact to impact comprehension.

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