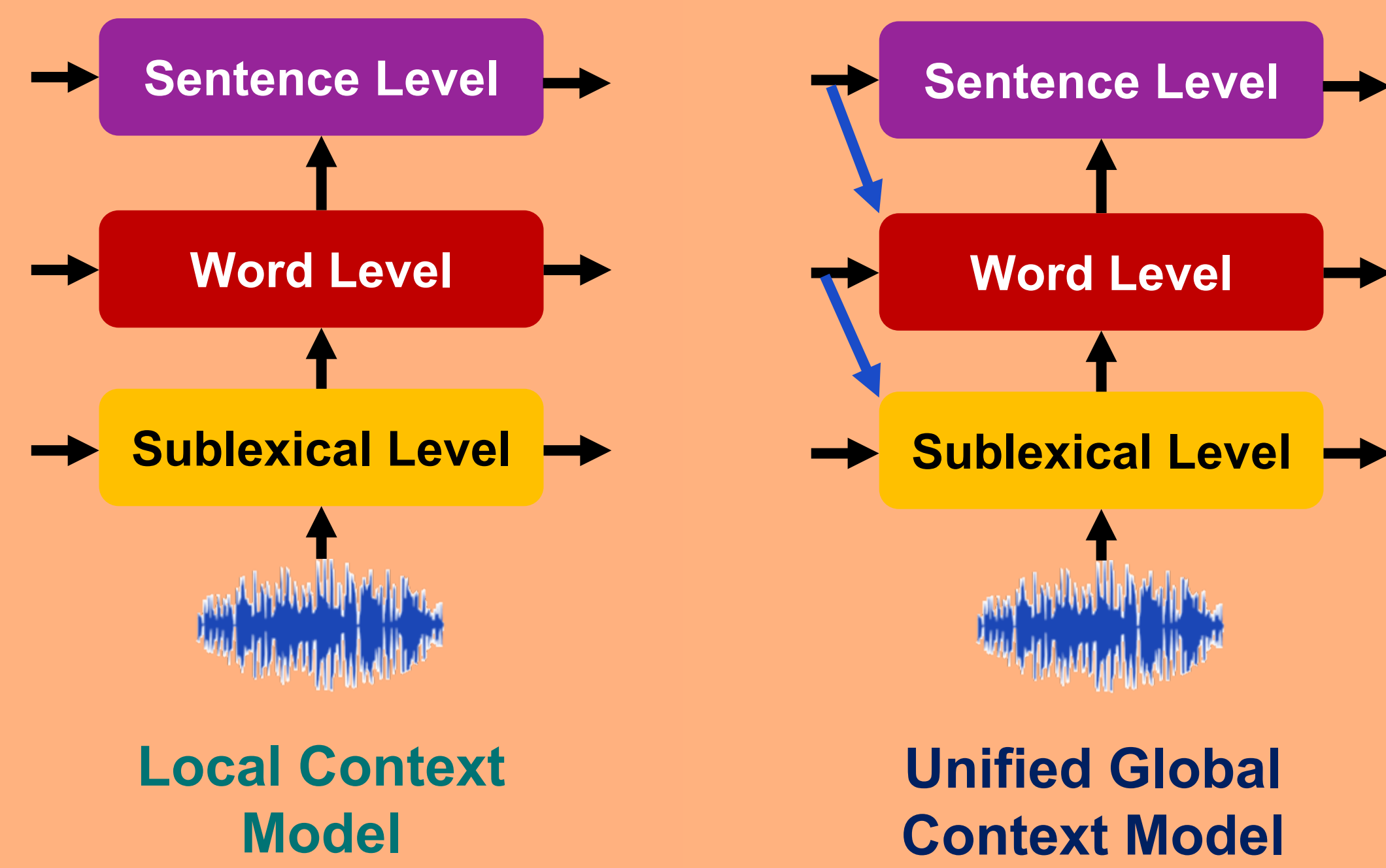


Background

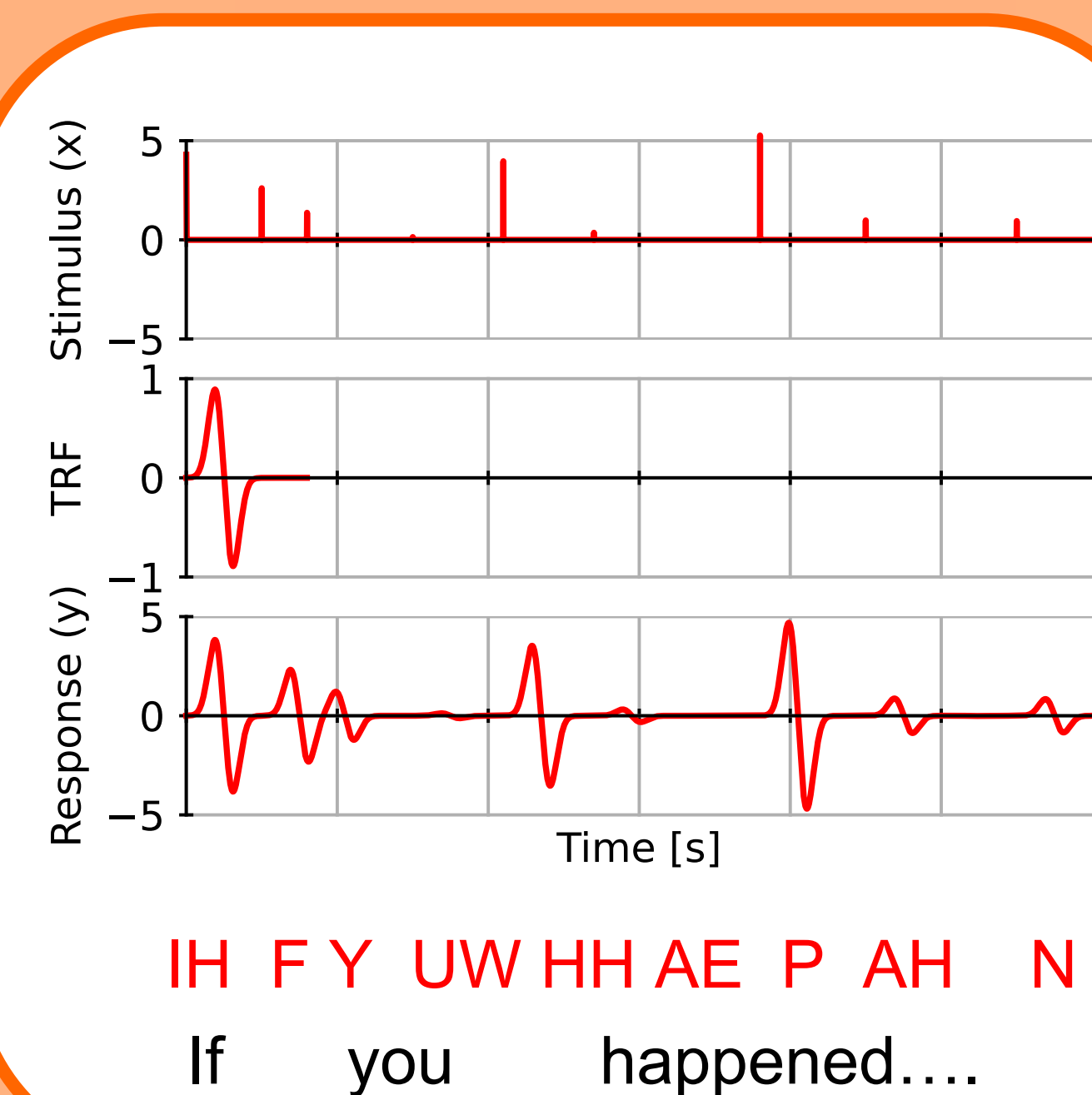
- Listeners continuously anticipate upcoming words and phonemes using prior context [1]
- Native English speakers form predictions using two separate context models simultaneously [2]



- In a local model, upcoming phonemes are predicted using only previous phonemes, where a unified global model makes predictions accounting for word and sentence context
- We investigate how non-native speakers may differ in their use of different context models

Methods

- 13 subjects listen to 45 minutes of the audiobook 'The Botany of Desire' while recording MEG data
 - 4 Native Mandarin Speakers
 - 9 Native Sinhalese Speakers
- Sublexical predictors indicate usage of a **Local Context Model**, where word and sentence predictors indicate a **Global Context Model**

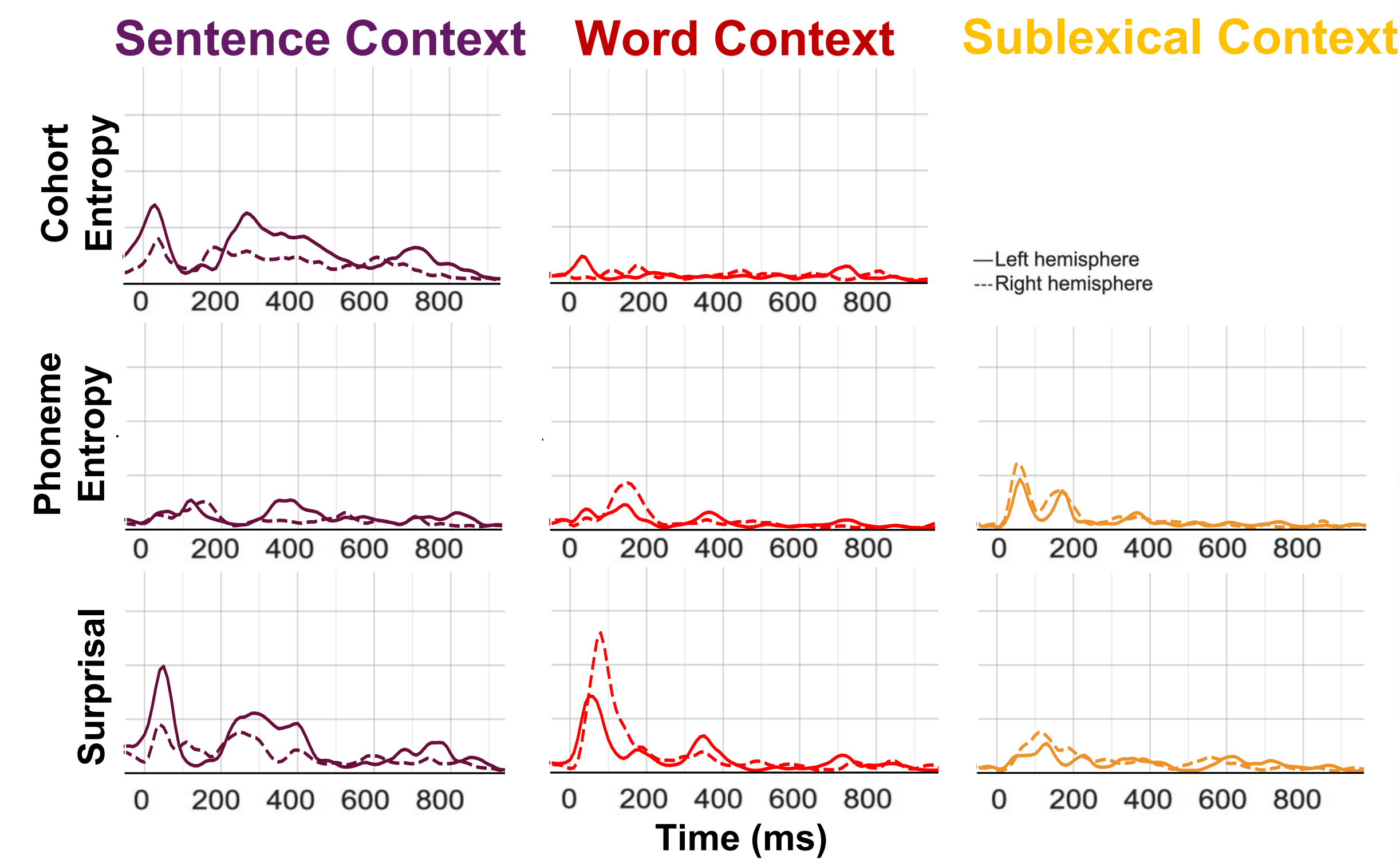


- We use TRF Analysis to investigate representation of each predictor within MEG Data [3]
- Analysis restricted to superiotemporal and transversetemporal regions

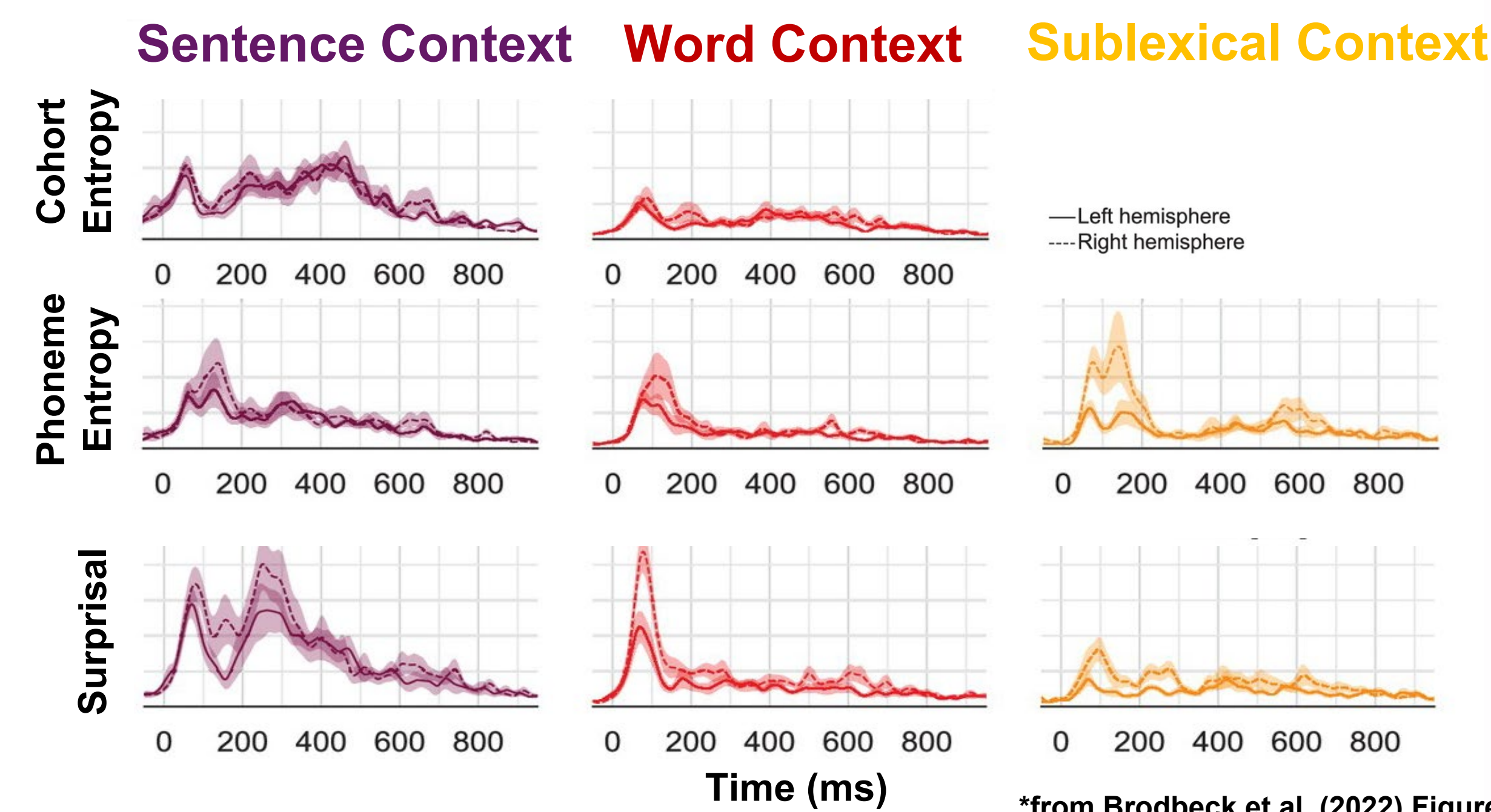
Results

Temporal Response Functions for Primary Predictors

Non-native Speakers

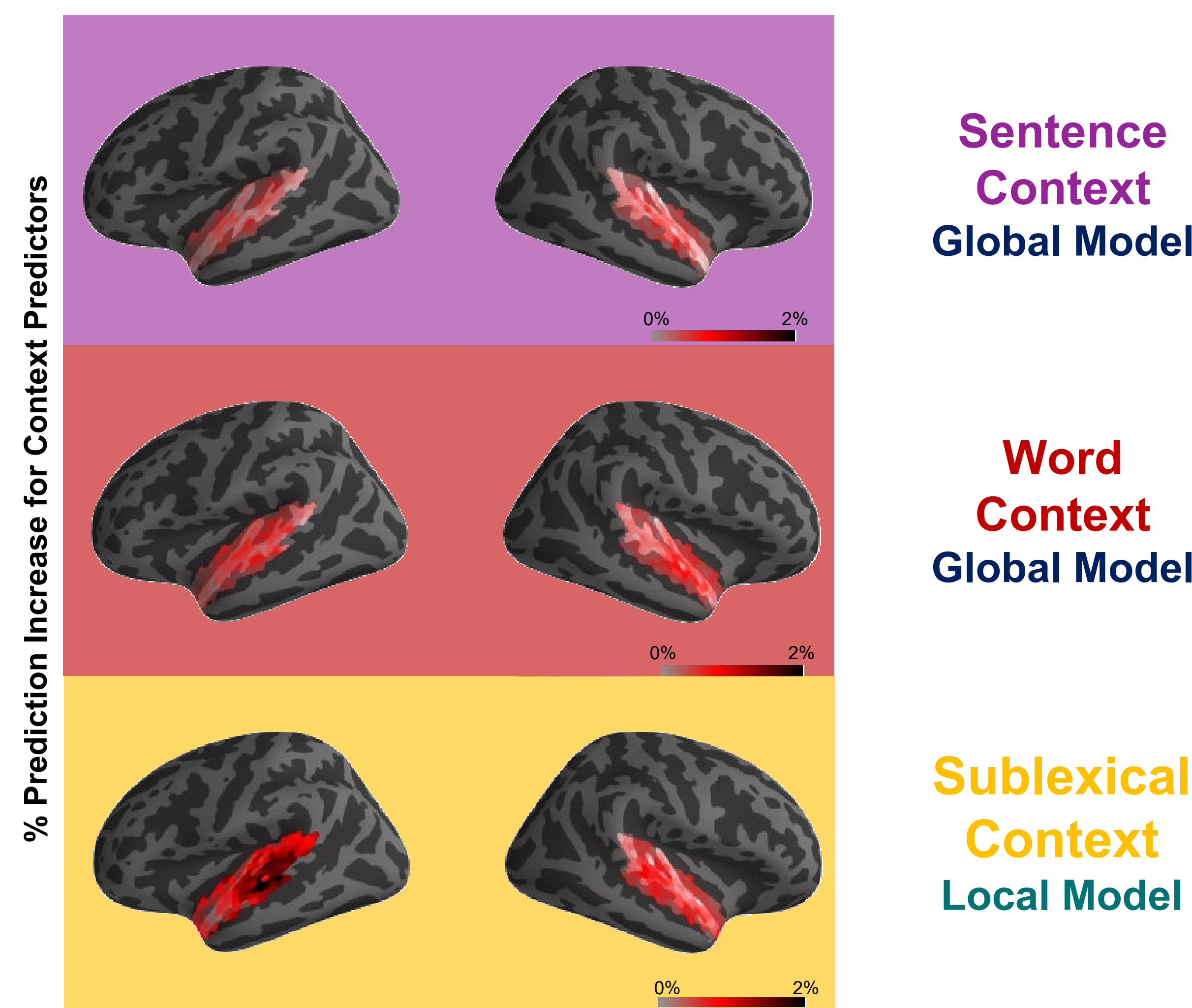


Native Speakers*



*from Brodbeck et al. (2022) Figure 5

Predictive Power of Context Levels Across Subjects



Hypotheses

We expect that non-native speakers do not predict upcoming materials to the same extent as native speakers [4,5,6]

We may see:

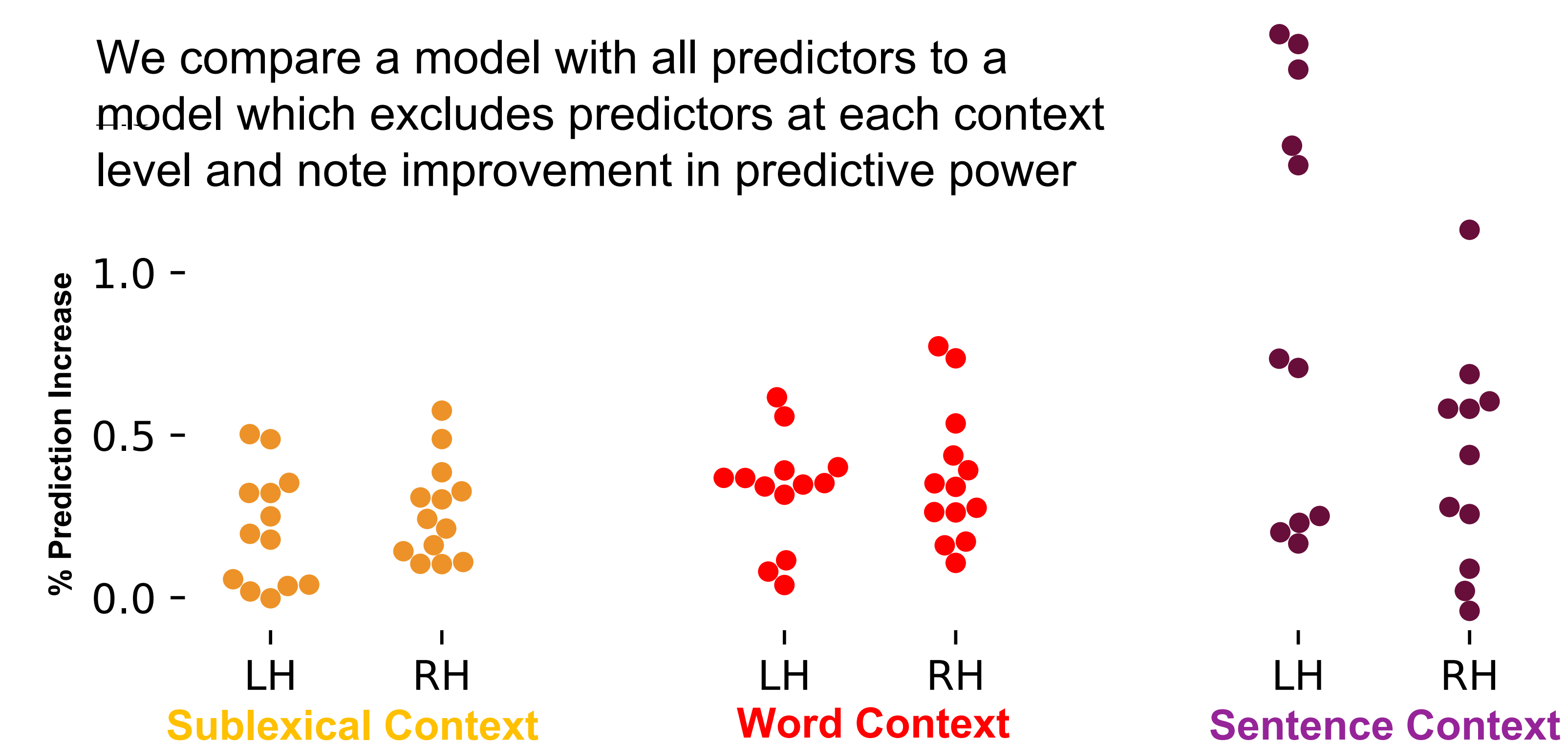
- More reliance on local context models instead of predicting upcoming phonemes using higher level context models
- Later TRFs from sentence level predictors exhibiting later integration of information
- Increased integration of higher-level information when encountering phonemes that are not in the native language

Observations

- Some similar lateralization effects are observed, although right lateralization of lexical and sublexical levels is diminished
- Little response to phoneme entropy across non-native speakers
- Sentence level predictors are observed in non-native speakers, although potentially less robust
- Word level entropy TRFs appear smaller for non-native speakers
- Lower TRF responses overall may indicate temporal variability

Predictive Power of Context Levels for Each Subject

We compare a model with all predictors to a model which excludes predictors at each context level and note improvement in predictive power



References

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[1] Ferreira and Chantavarin, *Current Directions in Psychological Science* (2018); [2] Brodbeck et al., *eLife* (2022); [3] Brodbeck et al. (2018), *NeuroImage*; [4] Hopp, *Second Language Research* (2016); [5] Lew-Williams and Fernald, *J Mem Lang.* (2010) [6] Kaan, *Linguistic Approaches to Bilingualism* (2014)