Predictive tones facilitate Mandarin lexical identification: evidence from ERPs

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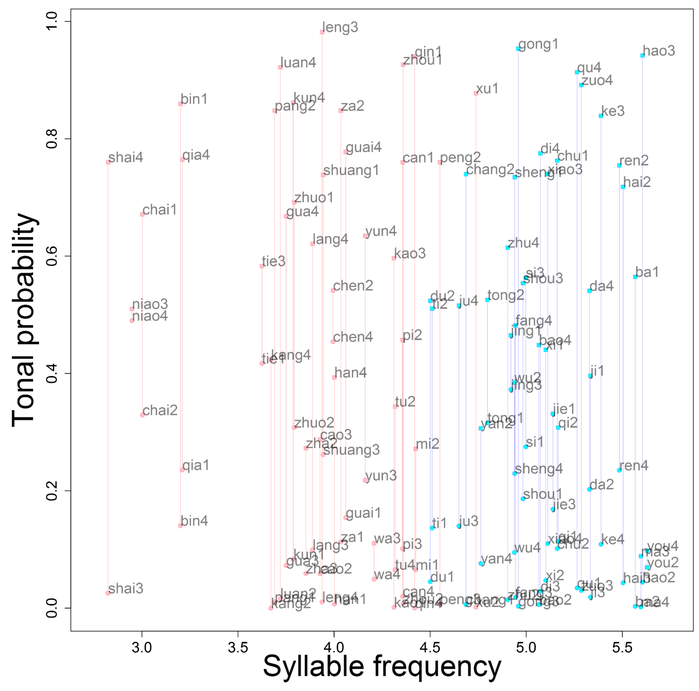
Background

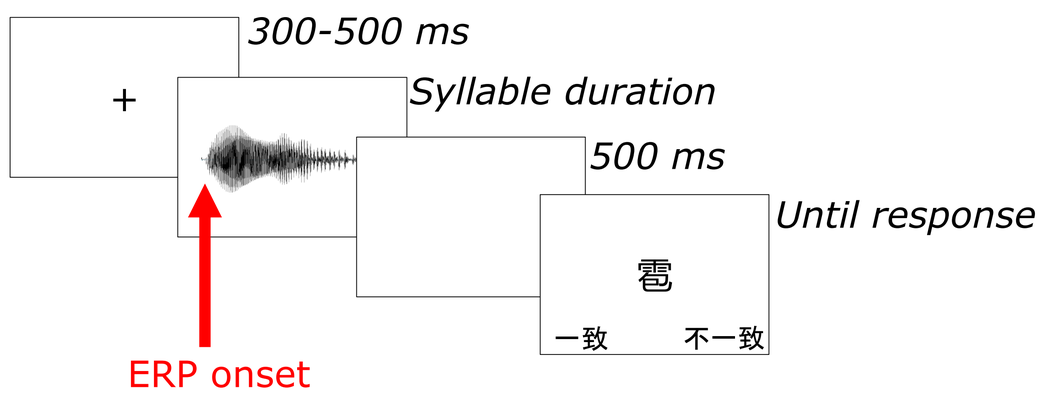
- Spoken word recognition in Mandarin involves extracting segmental (syllable) and suprasegmental (tone) information.
  - Not all 400 (C)V(C) Mandarin syllables appear with all four tones.
  - Not all tones are equally probable given a syllable.
  - Native Mandarin speakers predict tone during an early stage of word recognition to facilitate the processing of infrequent syllables (Wiener & Ito, 2015, *LCN*).
  - Because high frequency syllables tend to have more tonal homophones/dense neighborhoods, probabilities are not as useful.
  - **If syllable-specific tonal probability aids online predictive processing, low-frequency syllables with low-probability tones should show a larger (more negative N400) than with high-probability tones**

	High tonal probability	Low tonal probability
High syllable frequency	*ba*[1]	*ba*[2]
Low syllable frequency	*tie*[3]	*tie*[1]

Design

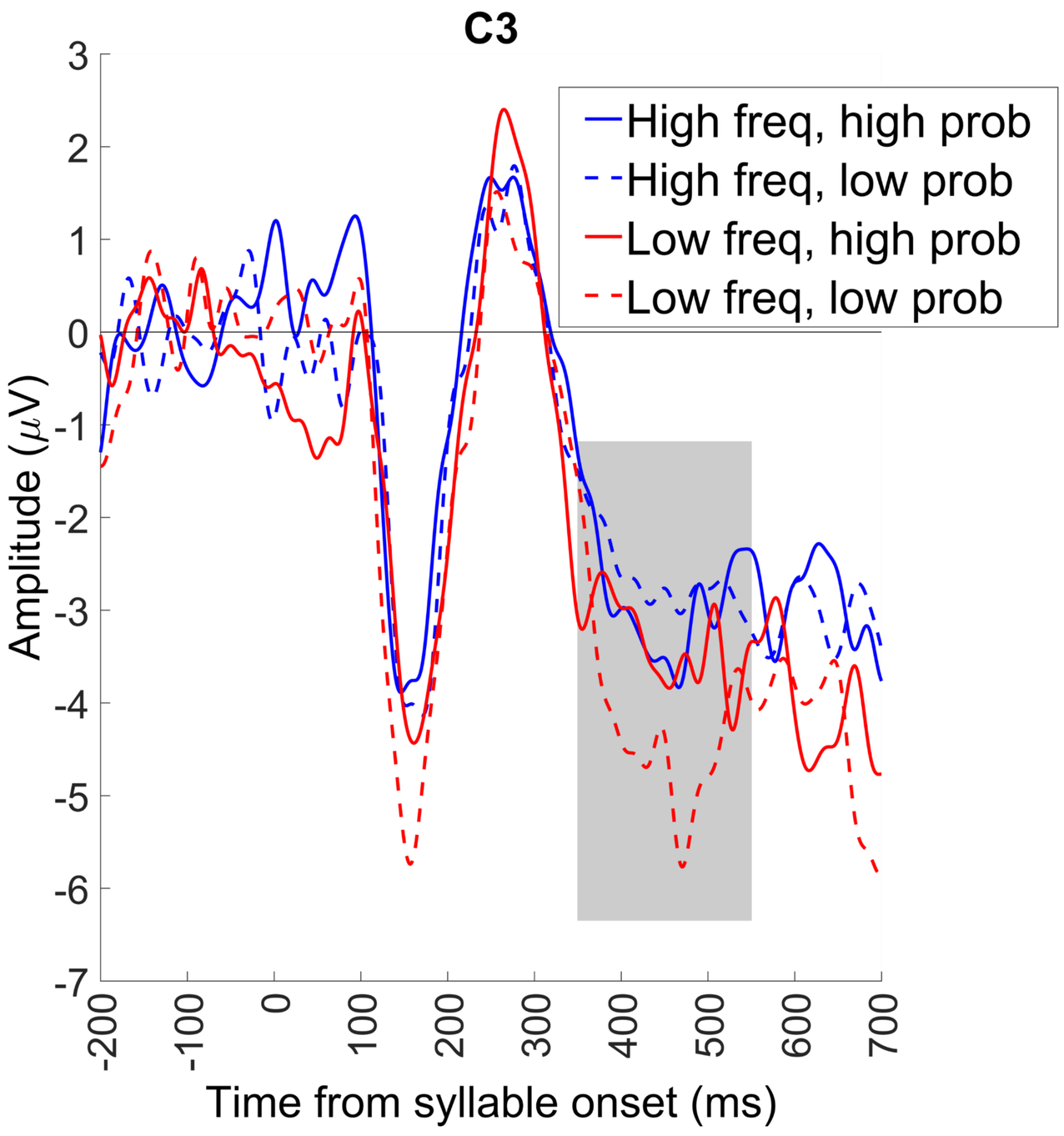
- Stimuli calculations from SUBTLEX-CH.
- 32 high frequency and 32 low-frequency syllables
- Each occurred in a low-probability and a high-probability tone
- Task: judge whether a written character matches a sound just heard



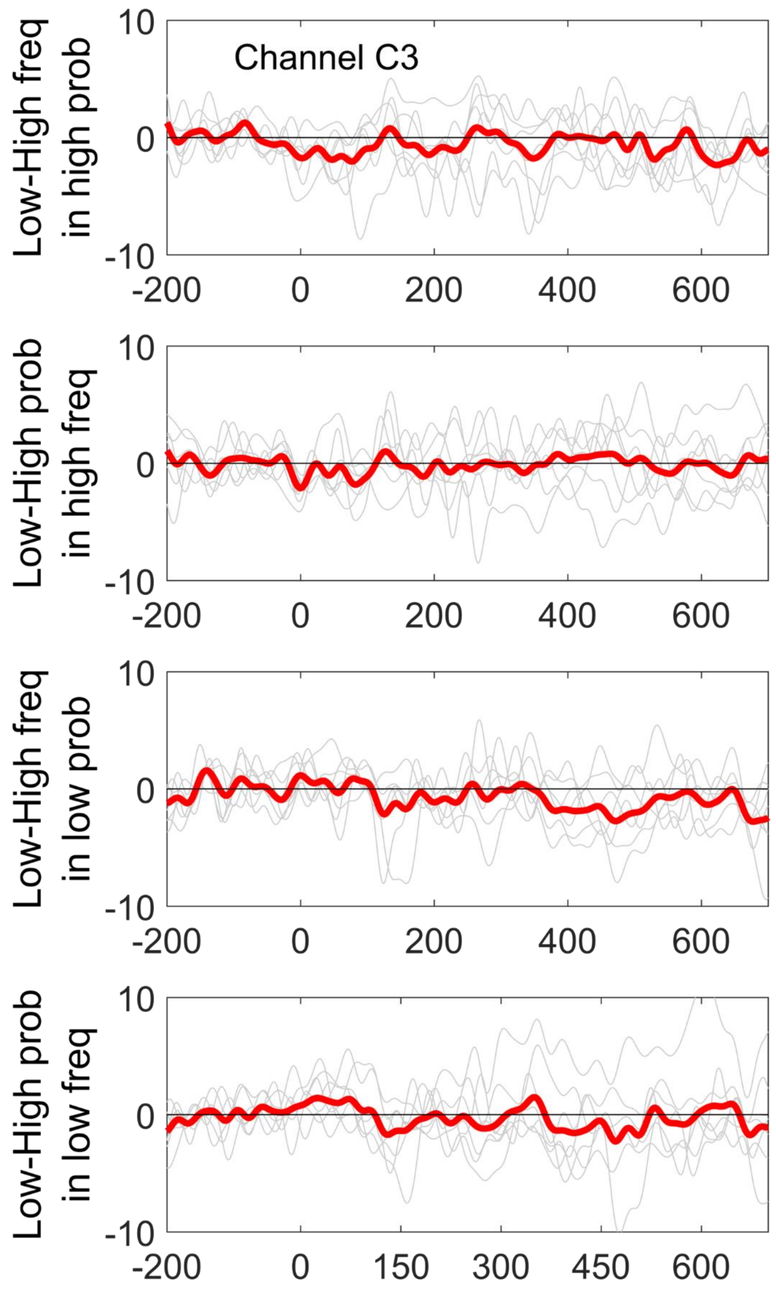


Pilot results (*N*=8)

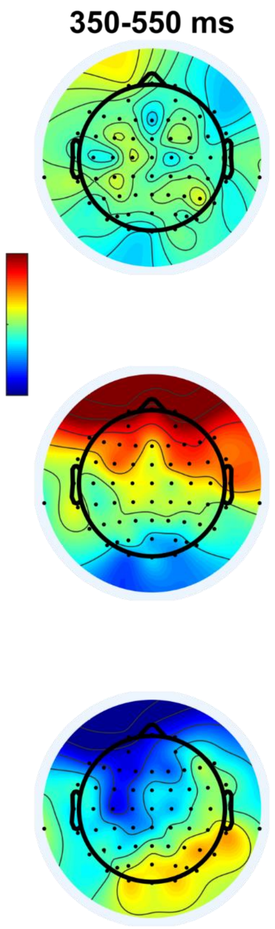
Grand average waveforms



Individual waveforms



Topoplots



Discussion

- N400-like tonal probability effect on low-frequency syllables
  - Less predictable tone hinders identification, more predictable tone facilitates identification?
- No substantial probability effect on high-frequency syllables
  - High-frequency syllables are in such dense neighbourhoods that tonal probability is less useful for predicting/activating wordforms? (consistent with Wiener & Ito, 2015, *LCN*)
- N400-like response might be more sensitive to tonal frequency than to tonal probability
- Future work: collect a high-powered (*N*>60) sample, analyze frequency and probability as continuous predictors
  - Preliminary data (*N*=12) suggest that the probability effect might not interact with frequency as reported here

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