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Neural semantic effects of morphologically conditioned tones

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Introduction

- Swedish tone accents are two types of pitch contours (accent 1 and accent 2) on the stressed syllable.
- Previous studies revealed that tone accents facilitate prediction for the upcoming morpheme via a compositional route (Roll, 2015; 2022; Schremm et al., 2018; Söderström et al., 2016; Söderström et al., 2017).
- However, as the word tone is present at the lexical level, it can be assumed that tone accents have a strong association with the lexemes and semantic features.

Methods

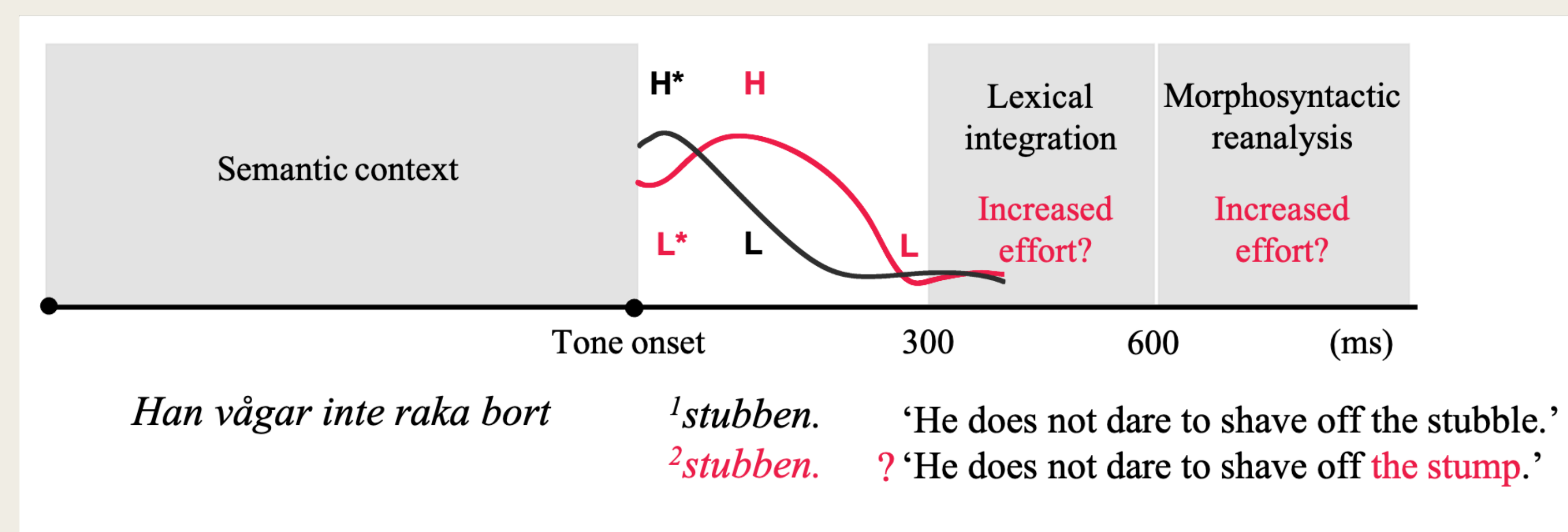
- Participants: Twenty native speakers of South Swedish
- Stimuli: Sentences with either congruent or incongruent final (target) word based on the tone accents. Each sentence led to a certain semantic expectation for the upcoming target word, either member of a minimal pair distinguished by tone.
- Task: Auditory comprehension, forced choice of the most relevant image to the sentence heard
- EEG was recorded using 32 channels.

Results

- Tone accent incongruency in a sentence caused a longer reaction time, implying that tone accents contribute to sentence comprehension.
- An N400 effect was observed, indicating that the tones and the word forms can be stored together in one lexical unit in the mental lexicon.
- Functional difference between the tones: Accent 1 with a greater negativity compared to accent 2, resembling a pre-activation negativity (PrAN) (Roll, 2015; Hjortdal, Frid, & Roll 2022).

Conclusion

- Swedish word accents are lexically distinctive.
- The prosodic contours are stored as part of the full form representations of words in the mental lexicon.
- Semantic integration of a sentence is hindered upon discrepancy between the expected prosodic form and the sensory input of the target word.
- Swedish pitch accents have dual functions: Contributing to lexical retrieval, as well as morphologically facilitative function.



Pitch contours of accent 1 (black line) and accent 2 (red line) in South Swedish

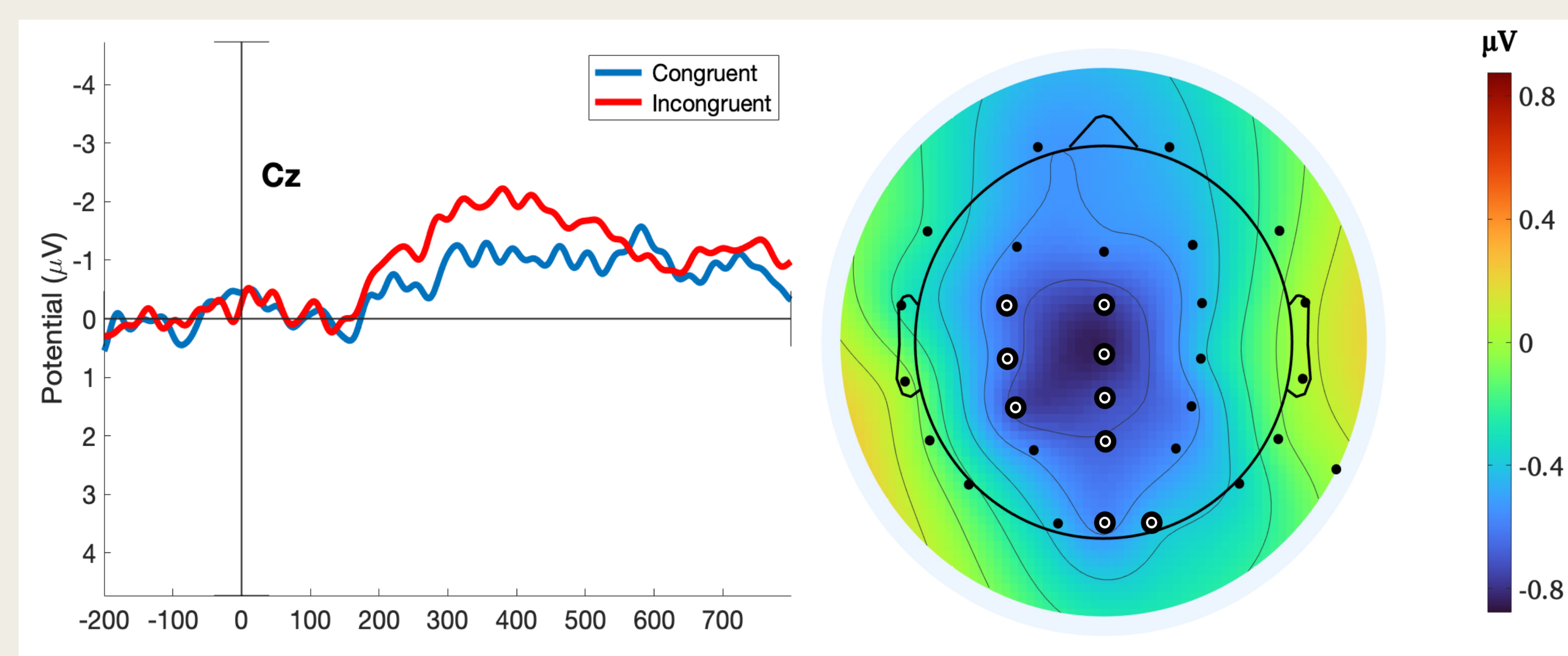
Han vågar inte raka bort ¹stubben.
He does not dare to shave off **the stubble**.

* Han vågar inte raka bort ²stubben.
* He does not dare to shave off **the stump**.

Sample stimuli



Example screen for image choice task



Incongruency between context and target word tone resulted in increased N400 amplitude but no P600.

Subtraction of average between 300 – 500 ms after tone onset

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