Symposium: Tone and prediction in language

17th November 2023

Organisers Sabine Gosselke Berthelsen and Mikael Roll

Programme

Welcome

09.00-09.30 Mikael Roll, Lund University
Lexical tone accents and prediction in the brain

09.30-10.00 Pelle Söderström, Western Sydney University
Within-word prediction: from tones to segments

10.00-10.30 Sabine Gosselke Berthelsen, University of Copenhagen
Morphophonological prediction in second language learners

Coffee break

11.00-11.30 Pei-Ju Chien, Lund University
Neural correlates of lexical tone and intonation perception in Mandarin Chinese

11.30-12.00 Wing Yee Chow, University College London
Incremental prediction in real-time language comprehension: from meaning to pitch contour

12.00-12.30 Yiling Huo, University College London
Limited involvement of Mandarin Chinese tone sandhi in prediction during language comprehension: evidence from eye-tracking and behavioural measures

Lunch

14.00-15.00 On-site: general discussion

Abstracts

Mikael Roll
Lexical tone accents and prediction in the brain

Swedish lexical tone accents, often characterized by their low 'functional load,' play a unique role in the dynamic process of speech perception. While they may only distinguish a limited number of minimal pairs in a static language view, these accents take on a pseudo-distinctive function at the onset of words, effectively constraining lexical access by eliminating numerous potential word candidates. This presentation delves into the neural correlates of this predictive function of word accents.

Pelle Söderström
Within-word prediction: from tones to segments

For more than a decade, connected and fruitful lines of research have shown that Swedish and Danish listeners use word- and clause-initial prosody to predict upcoming linguistic information. In spoken-word recognition, Swedish listeners take advantage of both tones – word accents – and segments at word onsets to predict how words are going to end. This is reflected in an event-related potential: the pre-activation negativity (PrAN). In a recent lexical decision study with English listeners, we found a functionally identical but reversed PrAN effect in event-related potentials. PrAN amplitudes increased as a function of lexical competition, suggesting an important role of task and paradigms in within-word prediction research, and indicating that listeners benefit from more dense lexical neighbourhoods when deciding whether an incoming word is real or not.

Sabine Gosselke Berthelsen
Morphophonological prediction in second language learners

A long line of research on prosody alternations during word composition has shown that listeners can use prosodic cues on word stems to predict upcoming linguistic features. This type of prediction is highly automatic and based on implicit knowledge of often complex morpho-phonological patterns. These characteristics make morphophonological prediction a difficult feature to acquire for second language learners. In this talk, I will present behavioural and neurocognitive data to discuss how, when, or whether morphophonological prediction becomes accessible to second language learners. I will also what the most likely prerequisites for this are and how second language learners' processing of highly systematic prosodic predictors can be improved.

Pei-Ju Chien
Neural correlates of lexical tone and intonation perception in Mandarin Chinese

In Mandarin Chinese, pitch cues are crucial to contrast lexico-semantic meaning as lexical tone and to indicate speech intonation. Previous neuroimaging studies have suggested bilateral overlap of tone and intonation for shared general pitch-related and phonological processes, yet it remains an open question whether and how the neural correlates of the two domains dissociate from each other. This talk will present two fMRI studies investigating the neural bases of Mandarin tone and intonation in native listeners through cross-domain comparisons. The combined results suggest that while both domains similarly recruit bilateral temporal areas for auditory representation, intonation specifically recruits left-predominant fronto-temporal phonological network and bilateral lateral-medial frontal verbal response preparation network. Together, these findings shed new light on the neural architecture of tone and intonation perception and broaden the current knowledge about dynamics of pitch cues and language comprehension.

Wing Yee Chow
Incremental prediction in real-time language comprehension: from meaning to pitch contour

The ability to generate and update predictions on the fly is key to our success in comprehending language in real time. In this talk I will describe a programme of work that examines how comprehenders may incorporate different sources of information to predict upcoming language, and what we can learn from their successes and failures. I will review some earlier work that investigated comprehenders' apparent failure in using argument role information in verb predictions as well as our recent work on prediction revision. I will present eye-tracking and event-related potential (ERP) evidence from Mandarin Chinese and English which suggests that comprehenders can incorporate rich incoming information to update their predictions incrementally, but crucially that some predictive computations take longer than others. Lastly, I will explain how our earlier work in Mandarin Chinese, a tonal language, has led us to our latest venture in examining whether and how listeners can incorporate units of information as small as a syllable's pitch contour to anticipate upcoming words in real-time language comprehension.

Yiling Huo
Limited involvement of Mandarin Chinese tone sandhi in prediction during language comprehension: evidence from eye-tracking and behavioural measures

Comprehenders can use a variety of cues to generate predictions about upcoming language on the fly, but it is unclear to what extent phonological information is involved in predictive processing. In this talk, I will present a series of our recent works that investigate (1) whether listeners make use of phonological cues to generate predictions of upcoming language and (2) whether they make predictions as detailed as a word's phonological form. We capitalise tone sandhi patterns in Mandarin Chinese (the T3 sandhi and the *yi* sandhi), where the lexical tone of a syllable can change systematically depending on the tone of the syllable that follows. Using visual world eye-tracking, mouse cursor tracking, as well as behavioural methods, we asked whether listeners could make use of tone sandhi cues in Mandarin numerals to anticipate an upcoming noun and whether they can use these cues to update previously made predictions. Our results suggest that despite listeners being highly sensitive to tone sandhi patterns, we found (surprisingly) little evidence for tone sandhi's involvement in predictive processing.