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Acoustic analysis of lexical pitch accent in Japanese Infant-Directed Speech

The present study examined the acoustic modifications of lexical pitch accent in Japanese infant-directed speech (IDS). In Japanese, accent is principally manifested by F0 modulation, as a sharp F0 fall. The turning point (the start of the sharp F0 fall), however, is occasionally placed in the later syllable rather than in the accented syllable (Sugito, 1982). This phenomenon is known as *ososagari* (delayed F0 fall) and observed in Japanese IDS as well as in adult-directed speech (ADS), with the amount of delay being larger in IDS than in ADS (Kitahara et al., 2008). The present study extended the previous investigation by considering the effects of Boundary Pitch Movements (BPMs). BPM is a characteristic pitch change that marks the end of a prosodic phrase (e.g., H% (rise), HL% (rise-fall)) and contributes to the pragmatic interpretation, such as questioning and emphasis (Venditti, 2005). Considering the acoustic constraint mandating the occurrence of low F0 region before the F0 rise at the syllable bearing BPM, the frequency of the delayed pitch fall would depend on the presence of BPM on the syllable following the accented syllable. We also considered other factors which may affect the alignment of the turning point, including the syllable structure of the accented syllable (a) cv, b) cvN, and c) cvv (vv: long vowel)) and the presence of non-linguistic lengthening of the accented syllable. We analyzed the RIKEN Japanese Mother-Infant Conversation Corpus (R-JMICC) (Mazuka, et al., 2006). The location of the turning points associated with the pitch accents was determined by using the two-piece linear regression, fitted through the region from the onset of the accented syllable to the end of the following syllable. Based on the alignment of the turning point with the syllable boundary, we calculated the percentage of *ososagari* tokens in each mother's data, and took the average across mothers. The overall results showed that *ososagari* tokens were observed in both ADS and IDS with a slightly higher average frequency in IDS (17.8% in ADS, 21.4% in IDS). Further analysis showed that *ososagari* tokens occurred more frequently for the "cv" syllable structure, especially when the accented syllable was not followed by the syllable with BPM or when the accented syllable was not non-linguistically lengthened. BPM tokens and non-linguistically lengthened tokens occurred far more frequently in IDS than in ADS, and after removing these tokens, the difference in the average frequency of *ososagari* tokens between IDS and ADS appeared to be more pronounced, especially for the "cv" syllable structure (26.2% in ADS, 38.8% in IDS). The preliminary results suggest that while delayed pitch fall in pitch accents in IDS might be one way to exaggerate prosody, Japanese phonology may restrict it when the accented syllable was either followed by the syllable bearing BPM, or lengthened non-linguistically, pointing to the importance of considering the phonological structure of intonation in the comparison between ADS and IDS (Igarashi & Mazuka, 2008).

References

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