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Phonologically-conditioned variations in tonal timing in Tokyo Japanese

This research shows that tonal alignment patterns depend on phonological properties of the tones. We analyzed the timing of the L and H tones of Tokyo Japanese in phrase-initial positions that have different phonological status (accented, unaccented) and phonological contexts (word-medial, word-final). Six native Tokyo Japanese speakers read the speech materials at fast, normal, and slow speech rates. The L and H tones had a highly positive linear correlation with their anchors (the effects of segmental anchoring, Ladd et al., 1999), but there was also a systematic deviation of the tone from its anchor depending on speech rate. That is, the faster the rate the later the peak occurs relative to its anchor. The deviation pattern varied depending on the phonological status and context of the tones. i.e. the accentual H peaks in accented words showed a more strict alignment pattern than the phrasal H peaks in unaccented words. The accentual peaks were more strictly aligned in the word-final context than the word-medial context, which was to avoid crossing the upcoming word-boundary. These findings were modeled in terms of weighted constraints (Cho 2010, Flemming 2001). The proposed model consists of alignment constraints (Align(L), Align(H)), a target-duration constraint (LtoH), and a DelayL constraint. The constraint weights were obtained by fitting mixed-models to the data. The relative weights of the constraint reflect the differences in tonal alignment depending on phonological status and contexts. That is, the weight of the Align(H) (w_H) was higher in the accentual peaks in word-final positions than in word-medial positions, reflecting the strong alignment pattern of H peaks in the word-final context. The weight w_H was the lowest in the unaccented words, reflecting that the timing of H peaks in unaccented words is more flexible than the timing of H peaks in accented words. The weights of the other constraints were relatively low, suggesting that aligning H peaks is an important feature in phonetic realization of tones in Tokyo Japanese.

References

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