Prosodic accommodation in Seoul Korean Accentual Phrases

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The goal of this study is to investigate speech accommodation at the prosodic level using an artificially-created prosody. Only a few studies have investigated accommodation of prosodic structure, and the results have been mixed, finding some evidence of accommodation for pitch accents (D'Imperio et al., 2014 for two dialects of Italian) but not for lexical stress (Ní Chiosáin, 2007 for two dialects of Irish). Preliminary results reported in Cole & Shattuck-Hufnagel (2011) provide some indication of accommodation for phonological properties of boundary and prominence in that the prosodic structure of model speech was more reliably imitated than the phonetic details of prosodic structure (such as pause duration at prosodic boundaries). The present study contributes to this body of work by examining accommodation in the f0 contours associated with a prosodic boundary, specifically the Accentual Phrase boundary in Seoul Korean. The major hypothesis of this study is that, when Seoul Korean speakers are exposed to the novel prosody of a model speaker, prosodic convergence will take place. The Accentual Phrase (AP) in Korean is an intonationally defined prosodic unit. Previous work indicates that the rising (LH) intonation of the phrase-final syllable is a characteristic feature of Seoul Korean AP (Jun, 1993). The current study therefore manipulated the AP-final rise by lowering the f0 peak in the AP-final rise (LH) by 20% (about 40-50 Hz) with appropriate interpolation that affected AP-final syllables for an interval of about 200ms around the f0 peak. All other aspects of the original Seoul Korean stimuli remained unchanged. The f0 lowering was done at every IP-medial AP boundary using a Praat script; a token-by-token inspection was also conducted to ensure natural-sounding speech.

Participants were 16 female speakers of Seoul Korean. The experiment was a sentence completion task. The first portion of experiment, the baseline condition, established participants’ reference productions of the APs of Seoul Korean (i.e., their natural productions before any accommodation might take place). Speakers silently read a short sentence that provided the context for a following incomplete target sentence, and were asked to complete the target sentence by saying the full, completed sentences loud (see below for a sample pair of sentences). The practice session provided sufficient information about the completion of all the sentences.

Context sentence: “Ahn Mina is four years older than Ahn Yuri.”

anmina-nun anyuri-pota nesalina naiga-manta
Ahn Mina-Subj Ahn Yuri-than four-year age-more

Target sentence: “Therefore Ahn Mina is (…….).”

kuromuro anmina-nun (… …)
Therefore Ahn Mina-Subj (… …)

The second portion of the experiment was the test condition, which followed a short break. Participants listened to the context sentence and the first two words of the target sentence over headphones, after which they repeated the first two words and then produced the remainder of the completed target sentence. After the experiment, all participants completed an exit survey that asked for their language background and provided ratings of the model speaker.

Each participant produced on average 35 target sentences in each condition. For the acoustic analysis, four f0 measures – f0 maximum, minimum, mean, and range – were taken in the final syllable of all IP-medial APs from the baseline and test productions. For the statistical analysis, a set of one-way
ANOVAs was performed for each participant that tested the difference between the f0 measures in the baseline and test conditions. If participants accommodate to the model speech, they should produce lower f0 at AP boundaries after exposure to the artificial prosody.

Preliminary results based on the four of the 16 participants analyzed to date are presented here. There was significant lowering in the f0 measures in the test condition for subjects S8 (\(F(480,1) = 67.73, 45.51, \) and 47.69, \(p < .001\); for f0 maximum, mean, and range respectively), S13 (\(F(480,1) = 328.90, 142.10, \) and 317.40, \(p < .001\) for f0 maximum, minimum, mean; \(F(480,1) = 7.00, p < .01\); for f0 range), and S22 (\(F(466,1) = 10.39, \) and 10.1, \(p < .01\); for f0 maximum and mean). A fourth participant, S15, showed no significant difference between baseline and test productions (\(p > .10\) for all measures). Figure 1 and 2 below illustrate the differences in f0 maximum and mean values between the baseline condition (white boxes) and the test condition (grey boxes) for four participants. The pattern of accommodation is consistent with the AP-final rise (LH) in the test condition becoming more similar to the artificially lowered AP-final rises of the model speaker.

Figure 1. f0 max difference (**p < .01, ***p < .001) Figure 2. f0 mean difference (**p < .01, ***p < .001)

The results can be interpreted as evidence of convergence at the prosodic level, found in the difference between the f0 contours associated with the Accentual Phrase of Seoul Korean. In line with previous studies that reported cases of prosodic convergence, the study demonstrated that, using artificially-created prosody, the effects of accommodation may be observed in the phonetic details relevant to a prosodic boundary. The lack of accommodation in the productions of S15 might be due to this speaker retaining her own prosody even though she had detected the atypical prosody. Alternatively, social factors might underlie maintenance, in which case relating the f0 analysis to the exit survey results might shed light on this issue. In addition, analyzing the data from the remaining speakers and including additional measures in the acoustic analysis may provide a more comprehensive assessment of the pattern of prosodic accommodation.


