

A generative phonetic approach to the ongoing sound change in Kyongsang Korean

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Outline: While the redistribution of cue weights from VOT to F0 in three-way laryngeal contrast has been well documented in many Korean dialects [1], its effect on dialects with a pitch-accent system, such as Kyongsang Korean, is less clear. However, it is expected that the F0 cues for both laryngeal and tonal contrasts will have mutual influence given the difficulty of rapid pitch changes in a limited time span [2, 3], and this interaction indeed has been reported for Kyongsang Koeran [4, 5]. This study aims to test two competing hypotheses regarding the long-term consequences derived from this physiological constraint. The first hypothesis predicts that the tonal contrast in Kyongsang Korean will not be able to use F0 to maintain unambiguous pitch distinctions as the cue becomes devoted to discriminating the laryngeal categories. In contrast, the second hypothesis proposes that the laryngeal contrast in the dialect will not successfully utilize F0 as a substitute for VOT, as F0 is dedicated to maintaining the tonal contrast.

Experiment: To evaluate these hypotheses, an experiment with three different age groups was conducted. 24 North Kyongsang Korean speakers from Taykwu (Daegu) or nearby regions participated in a speech production experiment, divided into three age groups: 20s-19 (innovative), 40s-50s (transitional), and 70s (conservative), each with four female and four male speakers. C1V1C2V2(C) disyllabic stimuli were balanced with regard to the C1 laryngeal categories (nasal, lax, tense, and aspirated) and the accentual categories (HL, HH, and LH). Subjects who participated in a speech production experiment were exposed to the test items embedded in a sentential frame “*kulimey ___pointa* (___ is seen in the picture).” Participants repeated a sequence of 24 words twice.

Results: Four phonetic dimensions were measured: LarF0 (onset F0 of V1 voicing), AccF0 (F0 at accentual peak), AccPT (accentual peak timing), and VOT of C1. Generational differences were observed in all these dimensions. The results showed that the realizations of LarF0, AccF0, and AccPT were increasingly dependent on the laryngeal categories as age decreased, while the difference in the measurements based on the accentual categories became less distinct (Figure 1). These changes in F0 realizations were accompanied by the gradual VOT merger between lax and aspirated stops. Mixed-effects regressions confirmed this trend. For instance, among the significant statistical results, there were significant differences in the mean AccF0 values between aspirated stops and other stop types across age groups: The transitional group was distinct from the conservative group ($\beta = 12.42, t = 4.51$), and the innovative group was distinct from the two older groups ($\beta = 5.78, t = 2.46$). The overall findings supported the first hypothesis that the tonal contrast will become less distinctive as the laryngeal contrast takes advantage of the F0 cue.

Modeling: The results were analyzed using weighted constraints within a generative phonetics framework [3, 6] to explain how these cue redistributions lead to a potential loss of the language’s tonal contrast. In this model, phonetic goals are subjected to compromise. For instance, the realizations of LarF0 and AccF0 need to be reconciled with each other as a function of their temporal distance to avoid a marked F0 change in a short period of time. This model can adequately capture the two hypotheses expected under the physiological constraint on the realization of F0 contours. If the first hypothesis is true, the realization of the LarF0 target incrementally outweighs that of the AccF0 target in a model; if the second hypothesis is true, a model can be constructed with reverse weighting. The overall model trained based on the experimental results captured the different patterns in F0 realizations over the generations relatively well (Figure 2).

Summary: This research confirms the presence of a sound change taking place in Kyongsang Korean. The experimental results over the generations showed that the laryngeal contrast based on F0 enhanced while the tonal contrast weakened as age decreased. This trend was explained through a phonetic grammar formalized with weighted constraints: The ongoing sound change can be seen

as a process in which the realization of LarF0 becomes relatively prioritized under the grammatical controls.

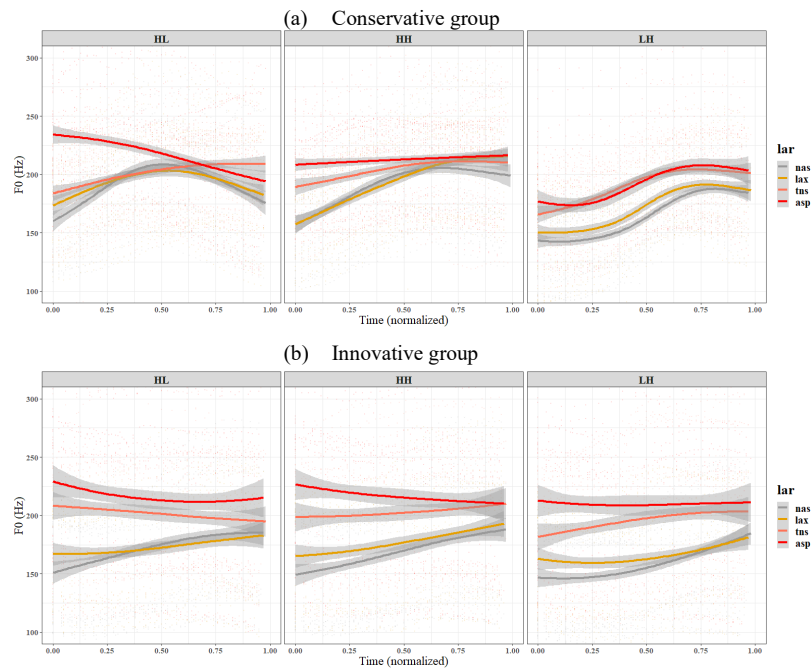


Fig.1 Schematic illustrations of the pitch contours for the conservative group (a) and the innovative group (b). The observed F0 values were plotted against the normalized time. The representative contour shapes in colored lines were derived from the data by loess method.

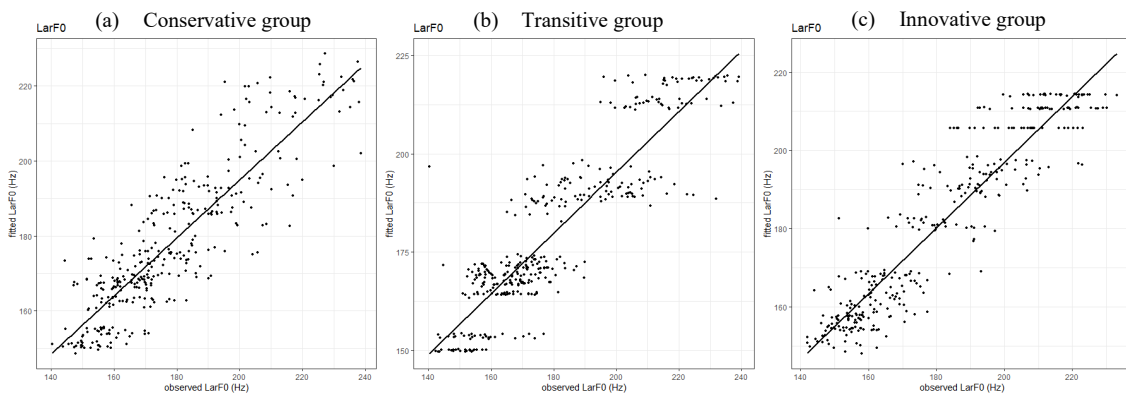


Fig.2 Scatter plots of fitted values (y-axis) against observed values (x-axis) for LarF0 over three generations. The model used was $w_{LarF0}(LarF0 - T_{LarF0})^2 + w_{AccF0}(AccF0 - T_{AccF0})^2 + w_{AccPT}(AccPT - T_{AccPT})^2 + w_S((M/AccPT) - T_S)^2 + w_M(M - T_M)^2$, where w , T , S , and M stand for weight, target, slope, and magnitude, respectively.

References

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