

An asymmetric effect of the following laryngeal category on VOT in Korean

This study investigates whether and to what extent the laryngeal category of a non-local segment affects VOTs of a word-initial aspirated and lenis stops stop in Korean. By showing that 1) VOTs of lenis and aspirated stops are modulated by the laryngeal category of the following stop and that 2) the shortening effect on VOT arising from the following laryngeal category is asymmetrical across the two stop categories, we propose that similarity avoidance is in action at phonetic level.

Non-local laryngeal co-occurrence restrictions are widely attested across languages (Gallagher, 2010). Ito (2007) contends that aspirated consonants may not co-occur in pure Korean C₁VC₂ stems and the existence of the aspirated C₂ blocks another aspirated C₁. Given that VOT is a good indicator of aspiration, we hypothesized that such effect of C₂ on C₁ against a non-local sequence of aspirated stops might also affect the magnitude of VOT variations of aspirated stop.

A production experiment was carried out to test the hypothesis. Ten Seoul Korean speakers produced nine word-initial stops (/p, p^h, p*, t, t^h, t*, k, k^h, k*/), embedded in two types of carrier sentence “iketto Calita” (“this is also ____”) and “ikesi C_iaC_iata” (“this is ____”). Mean VOTs from the tokens generated from the production experiment are summarized in Table 1.

A linear mixed effect model tested statistical significance of laryngeal feature and context on VOTs. Fixed effect of aspirated feature was not significant ($\beta = 2.98$; ns at alpha level of 0.05; p-values were calculated by Satterthwaite’s approximation), confirming results from previous studies on VOT overlap between lenis and aspirated stops (Silva 2006). Fixed effect of /#C_iaC_i ta/ context ($\beta = -12.35$; $p < 0.01$) and the interaction between /#C_iaC_i ta/ context and aspirated category ($\beta = -23.14$; $p < 0.01$) were statistically significant, suggesting that VOTs of word-initial stops were affected by the laryngeal category of the following stop.

In the production study, however, laryngeal feature of the segment and context were not orthogonally controlled. The same syllable was repeated in the /#C_iaC_i ta/ carrier, potentially confounding whether the effect is due to the repetition of aspirated consonants, identical aspirated consonants, or syllables. In order to test whether the effect of context is attributable to the following laryngeal category, we conducted a corpus study.

Two-, 3-, and 4-syllable words that begin with an aspirated stop and whose second syllable starts with a stop were selected from The Korean Corpus of Spontaneous Speech (Yoon et al., 2015). About 1.4K words met the criteria and VOTs were measured from the tokens. Mixed effect model tested whether the laryngeal category of the following syllable onset conditioned the VOT of word-initial aspirated stops. The analysis revealed that VOTs of word-initial aspirated stops were significantly shorter when the second syllable of the word also began in an aspirated consonant ($\beta = -16.34$; $p < 0.001$). Currently, we are in the process of obtaining VOT data for word-initial lenis stops to further test whether the extent to which laryngeal context affects VOT of word-initial stops depends on stop categories.

At this point, our results are at odds with the systematic variation in VOT conditioned by speech rate (Oh 2008; Smiljanic & Bradlow, 2008) and domain-initial strengthening (Cho & Jun, 2000) in that the effect of rate and prosody are constrained by the laryngeal feature of the target segment. From the asymmetrical effect of subsequent laryngeal context, we suggest that a sequence of long-VOTs within a single unit is avoided although a sequence of non-local aspirated stops is not underrepresented in Korean lexicon (Kang & Oh, 2015). This opens up the possibility that co-occurrence avoidance mechanism might modulate phonetic realizations of speech sounds, which is in principle similar to, but distinct from the Obligatory Contour Principle operating at a phonological level.

Table 1: Mean VOTs of Korean stops as a function of the laryngeal feature and context (ms)

Initial C Context	Lenis	Aspira ted
#Calita	76.01	78.94
#C _i aC _i ata	62.73	43.10

Selected references

- Cho, Taehong and Jun, Sun-Ah. 2000. Domain-initial strengthening as enhancement of laryngeal features: Aerodynamic evidence from Korean. *CLS* 36.
- Gallagher, Gillian. 2010. Perceptual distinctness and long-distance laryngeal restrictions. *Phonology* 27, 435-480
- Ito, Chiyuki. 2007. Morpheme structure and co-occurrence restrictions in Korean monosyllabic stems. *Studies in Phonetics, Phonology and Morphology* 13, 373-394.
- Silva, David. 2006. Acoustic evidence for the emergence of tonal contrast in contemporary Korean, *Phonology* 23, 287-308.