



Research Article

The emergence, progress, and impact of sound change in progress in Seoul Korean: Implications for mechanisms of tonogenesis



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ABSTRACT

This study examines the origin, progression, and impact of a sound change in Seoul Korean where the primary cue to a stop contrast in phrase-initial position is shifting from VOT to f₀. Because it shares similarities with the initial phase of tonogenesis, investigating this “quasi-tonogenetic” sound change provides insight into the nature of the emergence of contrastive f₀ in “tonogenetic” sound changes more generally. Using a dataset from a large apparent-time corpus of Seoul Korean, we built mixed-effects regression models of VOT and f₀ to examine the time-course of change, focusing on word frequency and vowel height effects. We found that both VOT contrast reduction and f₀ contrast enhancement are more advanced in high-frequency words and in stops before non-high vowels, indicating that the change is spreading across words and phonetic contexts in parallel. Furthermore, speakers suppress non-contrastive variation in f₀ as f₀ emerges as a primary cue. Our findings suggest that one impetus for tonogenetic change is production bias coupled with an adaptive link between the cues. We further discuss the role of Korean intonational phonology on f₀ which may help explain why the phonetic precondition leads to change in Seoul Korean but not in other languages.

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1. Introduction

Tonogenesis (Matisoff, 1973) is a linguistic process whereby redundant pitch patterns become phonologized and contrastive over time. It is a common type of sound change, and has occurred across many genetically unrelated languages (Hombert, Ohala, & Ewan, 1979; Kingston, 2011). Tonogenesis has its origins in various phonetic sources (Kingston, 2011) but the most common and well-documented source of tonogenesis is the f₀ differences in vowels adjacent to consonants with different laryngeal settings developing into contrastive tone (Hombert, 1977; Hombert et al., 1979; Löfqvist, Baer, McGarr, & Story, 1989). When the traditional consonantal cue is lost as the tonal contrast emerges, *transphonologization* is said to have taken place (e.g. Hagège & Haudricourt, 1978; Hombert et al., 1979; Hyman,

1976; Kingston, 2011; Maran, 1973). Transphonologization is often assumed to have a functional motivation of contrast maintenance (Hyman, 2008, p. 387).

Many phonetic studies on tonogenetic sound change examine languages in a transitional state from consonantal to tonal contrast (e.g. Chen, 2011; DiCanio, 2012; Mazaudon & Michaud, 2009; Misnadin, Kirby, & Remijsen, 2015). Most studies documenting the diachronic trajectory of tonogenesis do so indirectly by comparing different endpoints of sound change in related languages or dialects (Kingston, 2005; Purcell, Villegas, & Young, 1978; Svantesson & House, 2006). In addition, a growing body of instrumental studies examine variation within a single speech community to track sound change in progress (Coetzee, Beddor, & Wissing, 2014 (as cited in Beddor, 2015), Abramson, L-Thongkum, & Nye, 2005, 2009, 2014).

For example, Kirby (2014) examines production and perception for an ongoing sound change in Phnom Penh Khmer, where /r/ in consonant clusters in onset position is being replaced by other acoustic cues associated with the following

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vowel (e.g. breathiness, f₀ contour). The origin of the sound change is argued to lie in perceptual reanalysis of colloquial speech variants. Coetzee et al. (2014) examine an emergent tonogenetic sound change in Afrikaans, which traditionally contrasted prevoiced and voiceless unaspirated stop series in word initial position. However, in present-day Afrikaans VOT is similar for the two stop series, which now differ primarily in f₀. The focus of this body of work is, however, limited to either the precondition or origin of change at the language level or its spread at the community level.

Building on this existing literature, the current study focuses on Seoul Korean as a case study for understanding the broader pathway of a sound change which bears similarities to cases of tonogenesis, using a large corpus dataset. We address how this sound change originates, progresses, and impacts other aspects of the linguistic system. Seoul Korean provides a rich empirical foundation for understanding tonogenetic sound changes, for several reasons. First, a sound change is currently in progress whereby the primary cue to the aspirated/lax stop distinction in phrase-initial position is shifting from VOT to f₀ over time. (Korean has a three-way aspirated/lax/tense stop contrast, discussed below.) We call this ongoing change *quasi-tonogenesis* because the change does not to date exhibit all features of tonogenesis, where lexical tonal contrast develops from consonant-induced f₀ distinction. The change affects only sounds at the left edge of the accentual phrase (AP) and higher prosodic domains, conditioned by Korean intonational phonology (Jun, 1996, 1998, 2005) (see Section 5.4). Hence, in present day Seoul Korean, for speakers where this change has occurred, high/low tone differentiates the meaning of relevant lexical items only in phrase-initial position. For example, the minimal pair [p^hal] ‘arm’ vs. [pal] ‘foot’ (where [p] is used for a lax stop) is realized approximately as [pá] vs. [pà] phrase-initially, while the same words are distinguished by the traditional consonantal cues in phrase-medial position.¹ Despite the fact that f₀ cannot be used to mark arbitrary syllables as H/L in Seoul Korean, we make reference to the tonogenesis literature because we believe our results have implications for a better understanding of tonogenesis. The change in Seoul Korean essentially exhibits the same type of transphonologization we find in cases of ‘tonogenesis’ reported in the literature (e.g. Khmer, Afrikaans), where f₀ shifts from a redundant phonetic property of a laryngeal contrast to a primary cue. Furthermore, there is a large phonetic literature on laryngeal contrasts in Seoul Korean and a large apparent-time corpus (The National Institute of the Korean Language, 2005) spanning much of the time period over which the change has occurred. For all these reasons, Seoul Korean is an ideal case study for better understanding the pathway and mechanism of tonogenetic sound change.

Seoul Korean has a three-way laryngeal contrast of *tense* (or *fortis*), *lax* (or *lenis*), and *aspirated*. When described across all speakers of different ages, the three categories are contrasted by a combination of acoustic cues: primarily VOT and f₀ on the following vowel, and also closure duration, F₁ trajectory, and breathiness (Cho & Keating, 2001; Cho, Jun, &

Ladefoged, 2002; Hardcastle, 1973; Kang & Guion, 2008; Lee & Jongman, 2012; Lisker & Abramson, 1964; Park, 2002). In traditional descriptions, in phrase-initial position, aspirated, lax, and tense stops have progressively shorter VOT, and f₀ on the following vowel is higher for aspirated and tense stops than for lax stops. The contrast between lax and aspirated stops—which is of main interest here—was traditionally realized primarily using VOT with f₀ playing a secondary role (Han & Weitzman, 1965, 1967; Hardcastle, 1973; Kang & Han, 2013; Kim, 1965). For example, Han and Weitzman (1967) found that f₀ values for all three categories overlapped significantly, and Kang and Han (2013) found that a 41-year-old speaker recorded in the 1930s realized the aspirated/lax distinction exclusively using VOT. However, the VOT difference between lax and aspirated stops reported in more recent studies is much smaller compared to those reported for the 1930s–1960s, while the f₀ difference has increased (Beckman, Li, Kong, & Edwards, 2014; Silva, 2002). f₀ is also the primary perceptual cue to the lax/aspirated stop contrast in present-day Seoul Korean (Kim, Beddor, & Horrocks, 2002; Kong, Beckman, & Edwards, 2011; Lee, Politzer-Ahles, & Jongman, 2013).

More direct evidence for this sound change has come from apparent-time studies (Bailey, Wikle, & Tillery, 1993; Weinreich, Labov, & Herzog, 1968) that map out the diachronic change by comparing the realization of aspirated and lax stops among different age groups of Seoul Korean speakers (Kang & Guion, 2008; Kang, 2014; Kang & Nagy, 2016; Silva, 2006; Wright, 2007), or from meta-analysis of studies spanning 60 years (Beckman et al., 2014). These studies have all found that the VOT contrast between aspirated and lax stops is reducing in younger speakers’ speech, while some (but not all) also found that the f₀ contrast is similarly increasing. Kang and Han (2013) examined the lifespan change of a single male speaker of Seoul Korean by comparing his stop productions recorded in 1935 and 2005 (ages 11 & 81), and found change in the direction of the community: the speaker used a greater aspirated/lax stop f₀ contrast in 2005. While based on a single speaker, this finding suggests that age-dependent variation in contemporary Seoul Korean cannot be an artifact of *age-grading* (Wagner, 2012), where speakers adopt age-appropriate speech patterns as they age. Given the attested lifespan change, the apparent time data if anything underestimate the rate of ongoing change in Seoul Korean.

Women have been found to be more advanced in the sound change, for VOT alone (Oh, 2011), or for both VOT and f₀ (Kang, 2014). This gender effect is mirrored in perception, with listeners relying on f₀ more (and VOT less) when responding to female speech (Kong et al., 2011). In sum, previous work suggests a quasi-tonogenetic sound change in Seoul Korean involving VOT contrast reduction and f₀ contrast enhancement gradually spreading across speakers (over time), and that this change is more advanced in female speakers.

While much is known about how the change is spreading across speakers of the language, little is known about how the change is propagating through different phonological and lexical conditions. These aspects of the change are crucial for understanding its mechanism, as elaborated below (Section 2.2, 2.3). The current study uses the same corpus examined in Kang (2014), but a much larger subset of data is

¹ IPA symbols indicate approximate phonetic realizations, based on previous literature on this sound change discussed below. The use of [pá] in particular should not be taken to indicate total absence of aspiration.

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