The interaction of tone and stress in Seoul Korean

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BACKGROUND & ISSUE: The prosodic nature of Seoul Korean has been controversial. Some claim that Seoul Korean has a metrical system (Lee 1989, Kim 1997, Koo 1986), while others argue that it shows phrasal prominence (Cho 2011, S.-A. Jun 1993, 1998, 2006). The most widely accepted framework for analyzing Seoul Korean intonation is the K-ToBI system (S.-A. Jun 1993, 1998, 2006). Jun states that LH-LH is a common tonal pattern in Seoul Korean unless the AP-initial segment is aspirated/tensed, /h/, or /s/. However, the K-ToBi system has been criticized as well in that it lacks a clear explanation as to why the H tone occurs on the second and fourth syllables. Given that H tone is universally marked (de Lacy 2002), it is likely that LL-LL is preferred over LH-LH. In addition, even if we assume that an AP must contain a high tone for prosody, it is still puzzling that HL-HL is never found in Seoul Korean. Since not much is known about the structure of Seoul Korean intonation, this study tries to shed light on its prosodic nature, by conducting a perception experiment with sixteen tonal patterns (two tones in four syllable positions=2^4) and providing an OT analysis of favored tonal patterns found from the experiment.

METHOD: We employed two utterances, in which target words are in boldface type (1). The pitch contours of the utterances were modified to generate 16 tonal patterns using Praat. Figure 1 displays the 16 tonal patterns, where L was set up to 105 Hz, and H to 125 Hz. Eleven Seoul Koreans evaluated whether or not each tonal pattern sounded natural using a 7-point scale ("very natural"=7, "neither natural nor unnatural"=4, "very unnatural"=1).

(1) mantoli-nɯn **ʧakɯn ʧib-e** sam-ni-ta
Mandori-Top little house-Loc live-Hon-Decl
'Mantori is living in a little house'

RESULTS: The result of this experiment shows that the following tonal patterns (LHLL=5.57, LLLL=5.7, LHLH= 5.98, LLLH=6.05 (p = *n.s*)) produced the most favored results ($p < 0.05$). HHLL (3.64), HLLL (3.86), LHHL (3.91), HHLH (3.95), HLLH (4.07), and LHHH (4.64) received results that were neither natural nor unnatural. The remaining tonal patterns were distinguished as unnatural. A one-way nested ANOVA revealed that the main effect of TONAL PATTERN is significant ($F(351, 352) = 5.88$, $p < .001$) – the naturalness of Seoul Korean intonation heavily depends on which tone is aligned in the AP.

DISCUSSION: The results demonstrate that LH-LH is perceptually favored, which corresponds to the K-ToBI framework. LH-LL, LL-LL, and LL-LH are also found to be among the most favored tonal patterns. In light of de Lacy's work (2002) on the interaction of tone and stress, in this study, we propose that these preferred tonal patterns in Seoul Korean are reflected by its metrical structure. This kind of tonal pattern is called stress-driven tone, where a metrical structure determines the distribution of tone.

Considering that Seoul Korean has been claimed to have iambic foot structures (J. Jun 1993), we assume that Seoul Korean parses sequences of syllables into weak-strong rhythmic units. According to de Lacy, foot heads attract H tone and foot non-heads attract L tone, and tone alternates to satisfy this requirement. Thus, we propose that the reason LH-LH is preferred over HL-HL is because Seoul Korean has iambic foot structure, and foot heads in the second and fourth syllable attract the H tone (i.e. ʧà.ˈkún.ʧ ì.ˈbé). We rank FT-BIN and PARSE-SYL as undominated constraints, assuming that a foot must contain two syllables and all syllables are parsed by feet in Seoul Korean. RHTYPE=I is also undominated, ruling out candidates with trochaic foot structure such as (2k). Next, based on the results in our perception experiment, we propose that Seoul Korean requires foot non-heads to be L-toned, but it does not require foot heads to be H-toned. This demonstrates that *NONHD/H must dominate *HD/L, ruling out disfavored candidates such as (2e, f, g, h). Finally, we add *H, a universally marked constraint (Prince & Smolensky 1993), to the set of dominated constraints. Therefore, we have LH-LH (2a), LL-LH (2b), LH-LL (2c), and LL-LL (2d) as our optimal candidates, for violating the least constraints.

CONCLUSION: This study proves that LH-LH pattern is preferred in the perception experiment as well and shows that the favored tonal patterns in Seoul Korean are driven by its metrical structure. This study contributes to our understanding of Seoul Korean prosody by giving a theoretical analysis of favored tonal patterns, correctly explaining the occurrence of H tone in the second and fourth syllables, and proposing that the previous approaches to Seoul Korean prosody are not opposed to each other, but rather closely related.

(2)

Input: /tʃakɯntʃibe/[1]	FT-BIN	PARSE-SYL	RHTYPE=I	*NONHD/H	*HD/L	*H
a. ☞ (tʃà'kɯ́n)(tʃì'bé)						**
b. ☞ (tʃà'kɯ̀n)(tʃì'bé)					*	*
c. ☞ (tʃà'kɯ́n)(tʃì'bè)					*	*
d. ☞ (tʃà'kɯ̀n)(tʃì'bè)					**	
e. (tʃà'kɯ̀n)(tʃí'bè)				*!	**	*
f. (tʃá'kɯ́n)(tʃì'bé)				*!		***
g. (tʃá'kɯ́n)(tʃí'bé)				*!*		****
h. (tʃá'kɯ̀n)(tʃí'bè)				*!*	**	**
i. tʃa('kɯ́ntʃì)('be)	*!	*	*			*
j. tʃa('kɯ́n)(tʃì'bé)	*!	*				**
k. ('tʃákɯ̀n)('tʃíbè)			*!			**

[1] Seoul Korean is not a tonal language, so we assume the underlying input of an AP must be LL-LL (i.e. /bàm.nà.mù.gà/).

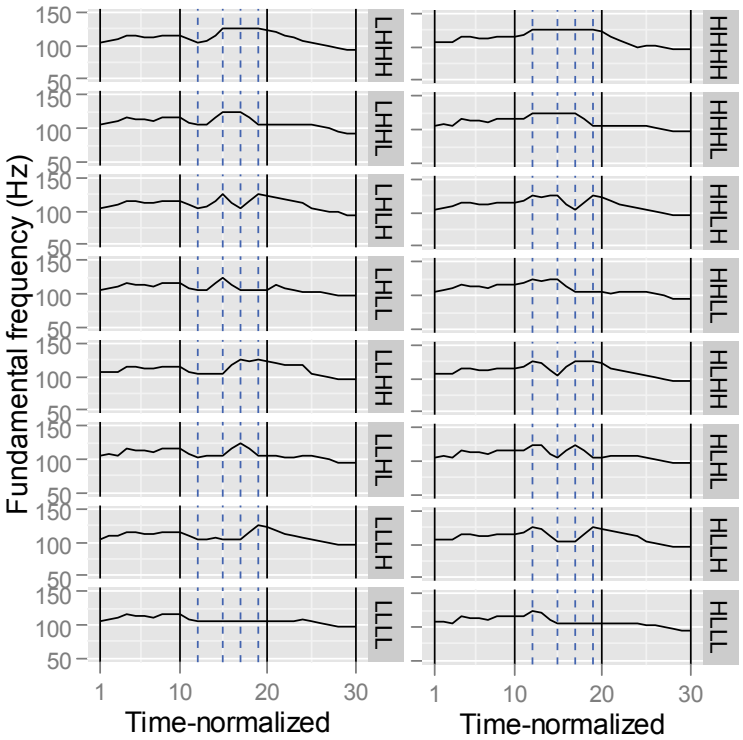

Figure 1: *Time-normalized F0 contours of the utterance (1b). The vertical lines show the word boundary, and the dashed lines show the pitch target of each syllable.*

Selected references

de Lacy, Paul. 2002. The interaction of tone and stress in Optimality Theory. *Phonology* 19(1): 1-32.

Jun, Jongho. 1993. Prosodic approach on Korean partial reduplication. In P. Clancy ed., *Japanese/Korean Linguistic 2*, 130-146. Stanford: CSLI.

Jun, Sun-Ah. 1993. The Phonetics and Phonology of Korean Prosody. Ph.D. dissertation. The Ohio State University.

Jun, Sun-Ah. 1998. The Accentual Phrase in the Korean prosodic hierarchy. *Phonology* 15(2): 189-226.