Consonants and tones: A view from two Tibeto-Burman languages

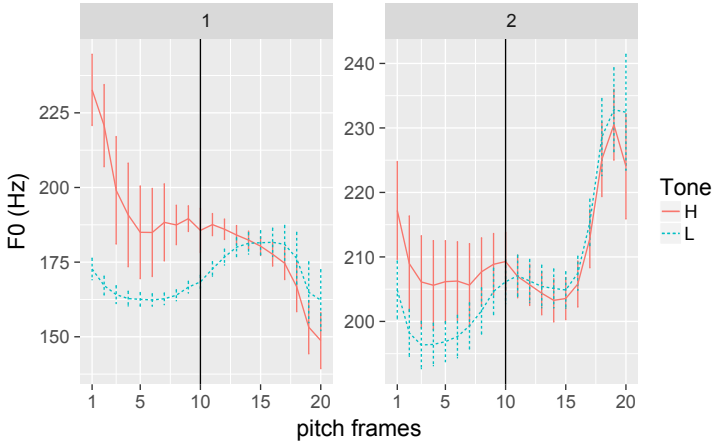
Jeremy Perkins (University of Aizu)
Seunghun J. Lee (ICU, University of Venda)
Shigeto Kawahara (Keio University)
Tomoko Monou (Mejiro University)

BACKGROUND

The relationships between segments and tones have posed an interesting challenge to the theories of phonetics and phonology. On the one hand, at the phonological level, there do not seem to be any languages in which tones are contrastive on consonants. Furthermore, phonetically speaking, f0 differences due to phonological tonal contrasts manifest themselves most clearly during vowels. These observations seem to suggest that tones should be phonologically associated with vowels. As a consequence, in studying f0 patterns of tonal languages, we tend to focus exclusively on examining vocalic intervals. On the other hand, consonants can interact with tones in non-trivial ways; for example, there can be phonological restrictions on tonal distributions given certain types of consonants. For example, only H-tones are allowed after voiceless and aspirated consonants in Dzongkha and Dränjongke. Therefore, consonants need to have some relationship with tonal features. In order to solve this apparent challenge, Lee (2008) proposed that (i) tones can be directly associated with consonants, but that (ii) there are no faithfulness constraints that protect underlying tonal specifications on (non-moraic) consonants. While this theory has successfully accounted for the abovementioned challenge, the theory predicts that consonants can also be tonal targets at the phonetic level, a prediction which remained to be tested. In this talk, first, we report phonetic data from two Tibeto-Burman languages—Dzongkha and Dränjongke—which show that this prediction made by Lee's (2008) theory is in fact born out. Second, we propose phonological representations that account for the tonal realization patterns in these languages, and develop an Optimality Theoretic (Prince & Smolensky 2004) analysis to derive these representations.

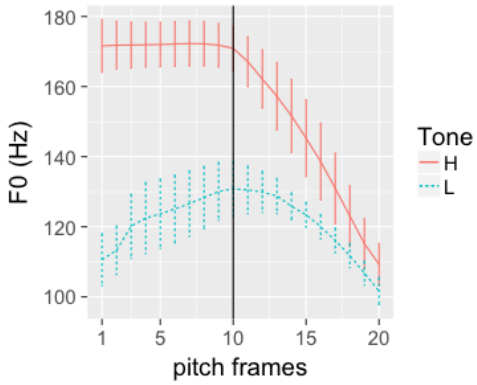
PHONETIC DATA AND PROPOSAL

The phonetic data are based on our research on Dränjongke and Dzongkha (both Tibeto-Burman languages). The phonetic studies examined the tonal realization patterns in CV-syllables (Lee et al. 2018). Figure 1(a) shows the normalized f0 contours of two Dränjongke speakers, who produced CV-syllables in which onset consonants are sonorants. Figure 1(b) shows a similar analysis of Dzonghka.



(a) Dränjongke

(b)

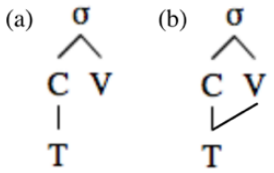


(b) Dzonghka

Figure 1: Tonal contours in Dränjongke (a) and Dzonghka (b). The first 10 pitch frames correspond to sonorants; the last 10 pitch frames correspond to vowels.

Both speakers in Dränjongke, as well as our Dzongkha speaker, show a very clear f0 separation between H-toned and L-toned syllables during the onset consonant intervals. Speaker 2 of Dränjongke neutralizes the difference during the vowel intervals. We posit the phonological representations in (1a) and (1b) to account for the tonal patterns of Speakers 1 and 2 of Dränjongke. The Dzongkha speaker has the representation in (1b), as he shows f0 differences during vowels as well.

(1)



In addition to the finding in Figure 1, our phonetic study also revealed that both in Dzongkha and Dränjonke, different types of obstruents affect the f0 of the following vowels in different ways; for example, in both languages, f0 is higher next to aspirated consonants than next to voiced consonants (see Figure 2). We propose that these patterns also follow from the representation in (1a).

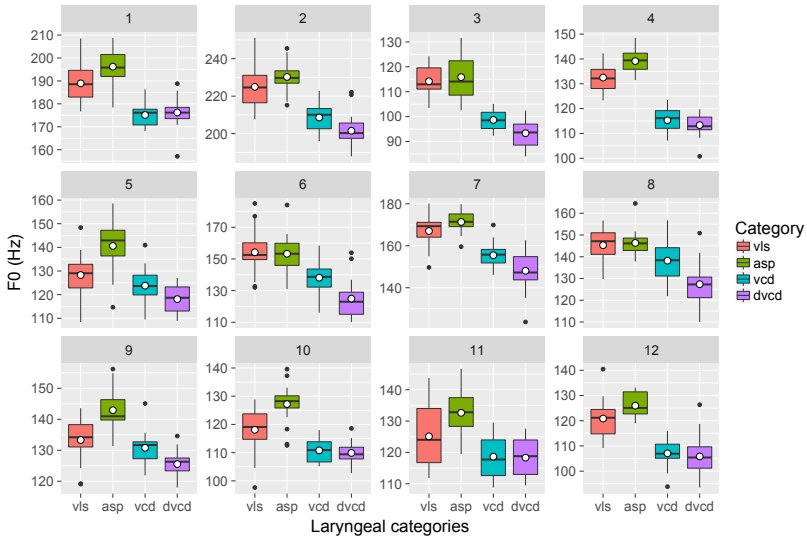


Figure 2: The effects of different obstruent types on F0.

AN OT ANALYSIS

In order to derive the phonological representations in (1), we build on the theory of consonant-tone interactions proposed by Lee (2008), which posits that tones can be directly associated with consonants. For the current dataset, we posit three constraints: (i) an alignment constraint which requires tonal features to be aligned with the left edge of syllables (ALIGN-L(T, σ)), (ii) a constraint that requires tonal features to be associated with a vowel (TONETOVOWEL), and (iii) a constraint that prohibits autosegmental multiple-linking (*MULTIPLELINK). The ranking ALIGN-L(T, σ), *MULTIPLELINK ≫ TONETOVOWEL yields the representation in (1a), while the ranking ALIGN-L(T, σ), TONETOVOWEL ≫ *MULTIPLELINK yields the representations in (1b), as shown in the tableaux (2) and (3).

(2)

	ALIGN-L(T, σ)	*MULTIPLELINK	TONETOVOWEL
(a) 	*!		
(b) ☞ 			*
(c) 		*!	

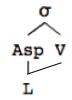
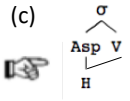
(3)

	ALIGN-L(T, σ)	TONETOVOWEL	*MULTIPLELINK
(a) 	*!		
(b) 		*!	
(c) ☞ 			*

We in addition propose that regardless of whether speakers have the representation in (1a) or (1b) for $C_{[+son]}V$ syllables, tones associated with obstruents need to be associated with vowels. To account for this pattern, we propose that there are constraints that coerce particular types of obstruents to have particular tonal types (e.g. aspirated consonants need to be associated with H-tone: ASPTOHIGH), and tonal features be associated with some sonorant segments (TONETOSON). These constraints dominate *MULTIPLELINK, thereby forcing the CV syllables with an obstruent onset to have the representation

in (1b), as in (4). We conclude that complex interactions of violable constraints account for the tonal manifestation patterns in these two Tibeto-Burmese languages.

(4)

	ASPTOH	TONETOSON	*MULTIPLELINK
(a) 		*!	
(b) 	*!		
(c) 			*

REFERENCES:

Lee, S. (2008) Consonant-tone interaction in Optimality Theory. Doctoral dissertation, Rutgers University.

Lee, Seunghun, Hyun Kyung Hwang, Tomoko Monou, and Shigeto Kawahara (2018) The phonetic realization of tonal contrast in Dränjongke. Proceedings of TAL 2018.

Prince, Alan & Paul Smolensky (2004) Optimality Theory: Constraint Interaction in Generative Grammar. Malden and Oxford: Blackwell.