

Acoustic Analysis of Tone Sandhi in Northern Sixian Hakka

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Tone sandhi in Northern Sixian (NS) Hakka changes a rising tone [35] into a mid-falling tone [$3I_{sandhi}$] when preceding an un-checked high level [55], a checked high level [55], and another [35]. Despite being phonologically analyzed as a categorical replacement of [35] by the lexical tone [31] in the sandhi contexts, acoustically this right-dominant tone sandhi has received sparse attention, leaving unaddressed some issues of interest in investigating the interaction between acoustic phonetics and phonological tone sandhi in NS Hakka. This study therefore examines and compares the acoustic realizations and the coarticulatory effects of the derived [$3I_{sandhi}$] and the lexical tone [31] in the same tonal contexts, and explores relevant issues concerning the completeness of tonal neutralization of [$3I_{sandhi}$] with [31], and the consistency with respect to carryover effects of [$3I_{sandhi}$] and [31] in coarticulation. Acoustic data, analyzed with polynomial modeling and Individual Growth Curve statistical technique, show statistically significant differences in the realizations of tonal F0 contours (see Figure 1) and velocity contours (see Figure 2) between [$3I_{sandhi}$] and [31], indicating incomplete tonal neutralization, and hence a more gradient than categorical nature of NS Hakka tone sandhi. Besides, [$3I_{sandhi}$] and [31] are further distinctive in their carryover influences on the coming tones, with more F0 lowering effects by [31], but more F0 raising effects by [$3I_{sandhi}$], which echoes the same effects as those exerted by its underlying counterpart [35] on the following tones. The gradient nature of NS Hakka tone sandhi, and the presence of the raising effects of [$3I_{sandhi}$], whose underlying high offset (also the raising effect trigger) is not phonetically realized, reveal that in implementing tone sandhi, native NS Hakka speakers may still intend to maintain the phonological distinctiveness between the underlying [35] of [$3I_{sandhi}$] and the lexical tone [31], which indicates a phonological motivation that conditions the surface phonetic variations of [$3I_{sandhi}$] and [31].

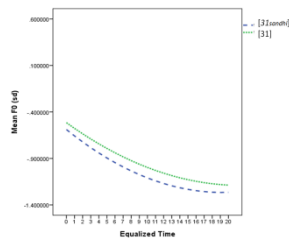


Figure 1

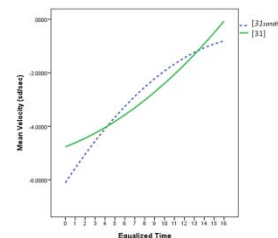


Figure 2

Keywords: acoustic phonetics, Northern Sixian Hakka, phonology, tonal coarticulation, tone sandhi