Northern Wu Chinese dialects, which arguably provide the most interesting tone sandhi patterns across Chinese languages, show two contrasting sandhi processes that frequently correlate with different morphosyntactic structures (e.g., Shanghai [1], see a typology in [2]): (a) Left-dominant: rightward tone extension of the initial tone that usually applies to Lexical Compounds (LC), Modifier-Head phrases (MH), etc.; (b) Right-dominant: neutralisation of non-final tones that is usually found in structures such as Verb-Object phrases (VO). This study aims to give a detailed acoustic analysis of tone sandhi patterns regarding its interaction with morphosyntax in Xiangshan dialect, an understudied Northern Wu Chinese dialect spoken in Xiangshan County, Zhejiang Province in China.

Xiangshan dialect has 6 lexical tones: 4 non-checked tones (HH, HL, LHL, LH) and 2 checked tones (Hq and LHq). The current analysis looks at non-checked tone combinations with an initial LHL underlying tone in disyllabic and trisyllabic contexts. The three morphosyntactic structures mentioned above (i.e., LC, MH, and VO) were selected for the disyllables. The trisyllables were left-branching Modifier-Head phrases with two different internal morphosyntactic structures: (a) [[Verb-Noun]-Noun], e.g., [[sell-flower]-person] ‘a person who sell flowers’; (b) [[Adjective-Noun]-Noun], e.g., [[yellow-melon]-soup] ‘cucumber soup’. A total of 30 frequently encountered tokens were selected, including 22 disyllables (6 LC, 10 MH, 6 VO) and 8 trisyllables (4 [[Vb-N]-N], 4 [Adj-N]-N). There were 8 Xiangshan native speakers (mean age: 50, 4 female) who participated in the study, resulting in a total of 240 tokens. F0 values at 10 equidistant measurement points in each rhyme were obtained and normalised via z-scores of log-transformed raw data for each speaker. The F0 value at the first time point in each rhyme was discarded to eliminate possible F0 perturbations from onset consonants.

The findings of the study validate the presence of both left- and right-dominant tone sandhi patterns in disyllables in Xiangshan dialect. Specifically, disyllabic LC and MH exhibit a left-dominant sandhi pattern for all but the LHL-HL underlying tone combinations, as they converge to similar sandhi patterns regardless of the second underlying tone (i.e., sandhi1 and sandhi2 for LHL-HH/LHL/LH combinations in Figure 1). This suggests that the leftmost tone determines the whole contour for the entire disyllable. On the contrary, the VO structure in general demonstrates a right-dominant sandhi pattern, preserving the second tone whilst neutralising the first tone to either a L or a LM tone (see Figure 2), with the only exception sandhi1 for the LHL-HH underlying tone combination.

The trisyllables also show an asymmetry in the sandhi patterns correlated with morphosyntax. The sandhi of the [[Adjective-Noun]-Noun] structure mirror those of its disyllabic counterpart, both of which exhibit an overall rise-fall (sandhi1) or rise (sandhi2) contour across the entire sandhi domain, with the rise or rise-fall realised on the final syllable (see Figure 3). Essentially, the disyllabic domain within the trisyllable is eliminated, leading to a rightward tone extension over the whole trisyllable. The [[Verb-Noun]-Noun] structure, on the other hand, preserves the sandhi contours of the contained disyllables (see Figure 4), which could be accounted for as a cyclic application of sandhi. In this scenario, the right-dominant sandhi would initially be applied within the internal disyllabic domain of the initial two syllables, after which the tone features of the second syllable spread to the third syllable, showing a left-dominant sandhi across the boundary.

The asymmetry of left- vs. right-dominant tone sandhi has fostered abundant valuable theoretical works, such as Selkirk & Shen’s edge-based approach [3], which aligns the left edge of a tonal domain (phonological word) with that of a lexical word, and Duannu’s stress-based account [4] which proposes a syntactic nonhead to be stressed and thus able to preserve its underlying tone. While the disyllabic data in Xiangshan dialect fit well in either theory, the trisyllabic patterns pose a challenge to the existing frameworks. Given that both trisyllabic structures are left-branching and surface as Modifier-Head phrases as a whole, the sandhi behaviours are predicted to be similar by previous frameworks, which, however, has not been attested here. Rather, Xiangshan seems to apply two distinct strategies to form tone sandhi domains, i.e., ‘flattening’ the internal syntactic structures and creating a single domain for [[Adjective-Noun]-Noun], or forming two tone sandhi domains cyclically according to morphosyntax of [[Verb-Noun]-Noun].
Figure 1: Sandhi patterns for Lexical compounds & Modifier-Head phrases with LHL-σ₂ underlying tones (UR)

Figure 2: Sandhi patterns for Verb-Object phrases with LHL-σ₂ underlying tones (UR)

Figure 3: Sandhi patterns for [[Adjective-Noun]-Noun] trisyllables with LHL-HH/LHL-HH/LHL underlying tones (right panel) & sandhi patterns for their contained disyllables (left panel)

Figure 4: Sandhi patterns for [[Verb-Noun]-Noun] trisyllables with LHL-HH-HH/LHL underlying tones (left panel) & LHL-LHL-HH/LHL underlying tones (right panel) and their corresponding disyllabic sandhi

* Note: the sandhi outputs in the figures above, which are named as sandhi1, 2, etc., are random variants that do not seem to correlate with certain specific tokens.

References: