Contour Restrictions and Faithful Alignment in Chinese Tone Sandhi Systems

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Chinese tone sandhi systems are often classified as either left-dominant or right-dominant, depending on whether it is the initial or final syllable in a sandhi domain that retains its citation tone while the rest of the syllables undergo tone sandhi (Yue-Hashimoto 1987, Chan and Ren 1989, Chan 1995, Chen 2000). One noted asymmetry between the two systems is that in left-dominant sandhi, e.g., Shanghai, Wuxi, and Changzhou, the tonal melody defined by the initial syllable often spreads to the entire sandhi domain; but in right-dominant sandhi, e.g., Mandarin, Fuzhou, and Wenling, the tonal melody of the final syllable does not spread leftward, and the nonfinal syllables take on sandhi tones that often involve simplification of the tonal shape and neutralization. Tangxi (Kennedy 1953), which has both types of sandhi depending on the location of stress in a polysyllabic construction, serves as an illustration of this asymmetry.

(1) Tangxi tone sandhi:

a. Left-dominant sandhi in adjective-noun compounds involves spreading:
   ka51-se33 → ka53-se31 ‘rockery’
   sjʊ51-njɪn24 → sjʊ53-njɪn31 ‘children’
   kwɤn51-se51 → kwɤn53-se31 ‘boiling water’

b. Right-dominant sandhi in verb-noun phrases involves default tone insertion:
   saʊ33-tsʰʊ51 → saʊ22-tsʰʊ51 ‘cooking wine’
   mɑ24-tsʰʊ51 → mɑ22-tsʰʊ51 ‘sell wine’
   mɑ51-tsʰʊ51 → mɑ22-tsʰʊ51 ‘buy wine’

This asymmetry has not received a principled formal account in the literature. E.g., Chen (2000), in his account of Tangxi, simply states that a default tone is necessary in verb-noun phrases as “tones associate only rightwards.” (p.298)

I propose a theory of tonal melody mapping from which this asymmetry emerges as a prediction. The crucial elements of the theory are as follows.

First, although the phonetic correlates of stress in Chinese languages are generally elusive, there are other phonological phenomena such as word-length and word-order restrictions that provide stress evidence for speakers (Duanmu 2000), so that MAX(tone)/STRESS protects the tone of the correct syllable (left or right) for any given polysyllabic construction.

Second, the occurrence of contour tones is positionally restricted, and the restrictions are durationally based—ceteris paribus, contour tones preferentially occur on the final syllable of a prosodic domain to nonfinal syllables due to the durational advantage afforded by final lengthening (Oller 1973, Wightman et al. 1992; Zhang 2002, Zoll 2003). In Optimality Theory, this can be captured by positional markedness constraints with an intrinsic ranking: *CONTOUR,-σ(NONFINAL) » *CONTOUR,-σ(FINAL). This provides a greater incentive for a contour to spread across the sandhi domain from initial syllable than from final syllable, as the initial syllable is under greater pressure to simplify its contour.

Third, I propose a family of faithfulness constraints, which I term Faithful Alignment (FA), to prevent tones from spreading from its original carrier syllable to neighboring syllables. There are two subfamilies of FA constraints, FA-LEFT and FA-RIGHT, which ban leftward- and rightward-spreading respectively; and within each subfamily, there are intrinsically ranked constraints FA-EDGE(n) » FA-EDGE(n-1) » … » FA-EDGE(2) » FA-EDGE(1), EDGE = L or R, where FA-EDGE(i) is violated by an output in which a tonal target is spread i syllables to the left or right. E.g., /51-T-T-T/ → /53-31-11-11/ violates FA-R(3), as the tonal target /1/ is spread three syllables to the right. These constraints are necessary to distinguish default-tone insertion (/24-51/ → /22-51/) from spreading (/24-51/ → /55-51/) in the output. And crucially, the system has the following set of intrinsic rankings: for all i, FA-L(i) » FA-R(i). This is projected from
the crosslinguistic phonetic observation that tonal coarticulation is of greater magnitude and duration progressively than regressively (Han and Kim 1974, Gandour et al. 1994, Peng 1997, Xu 1997). It is in potential agreement with the P-map theory of correspondence rankings (Steriade, to appear), as an output with rightward spreading will be perceptually more similar to the input than one with leftward spreading if the speaker knows that the input, if pronounced as is, will have progressive coarticulation. By incorporating this set of rankings, the system further discourages leftward tone spreading from the final syllable.

The factorial typology of the proposed constraints restricted by their intrinsic rankings exhibits a good match with the empirical data. It predicts the following seven types of languages: (a) left-dominant spreading, right-dominant default insertion; (b) spreading for both left- and right-dominance; (c) default insertion for both left- and right-dominance; (d) left-dominant spreading only; (e) left-dominant default insertion only; (f) right-dominant spreading only; and (g) right-dominant default insertion only. Type (a) is the asymmetrical Tangxi pattern; type (d) is the typical Northern Wu left-dominant pattern; type (g) is the typical Min and Southern Wu right-dominant pattern. Types (b), (c), (e), and (f) are rare, but existent, as exemplified by Danyang, Huojia, Dongkou, and Wenzhou (certain melodies), respectively. Crucially, the pattern in which left-dominant sandhi uses default insertion while right-dominant sandhi uses spreading is predicted not to exist, and to the best of my knowledge, it does not.

References


