Left dominant or right dominant?

Problematic sandhi types in the Chinese Wu dialect of Jinshan 金山

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1. What it's about

A concept of *phonological dominance* plays an important role in typologizing the tone sandhi behaviour in Sinitic languages (Ballard 1984, Hashimoto 1987, Qian 1997, Zhang 2007, 2014).

- ***Left-Dominant type* (Northern Wu):** the sandhi shape of words is determined by tones on the morphemes on syllables at the beginning of a word. The word-initial morphoneme often spreads onto following syllables, thus obliterating any non-initial tonal contrast.
- ***Right-Dominant type* (Southern Wu, Northern Min):** Morphotonemes on word-final syllables determine the word's tonal shape. The tone on the word-final syllable is 'preserved', 'unchanged' or 'in agreement with' the citation tone; tonal contrasts on preceding syllables tend to be neutralised, although the neutralisation groupings are often bewilderingly complicated.

Common to the research on dominance are two ideas:

- Dominance involves the relationship between some kind of basic tone (tone, toneme, citation tone, monosyllabic tone, unique underlying morphotoneme) and its realisation in sandhi.
- Dominance is shown by the extent to which the basic tone is preserved. Lack of dominance, on the other hand, is shown in the extent to which the reference tone is modified, neutralised, or in some other way lost.

Tonal **stability**, tone **modification**, tonal **neutralisation**, and tonal **loss** are also the main tonal properties associated with metrical strength (Chen 2000), so dominance is probably just metrical strength in another guise.

Our paper's aim is to assay these diagnostic criteria for dominance in greater depth using citation tone and selected lexical sandhi data from the Chinese northern Wu dialect of Jinshan (Rose & Yang, 2022). Jinshan is a close neighbour of the canonical left-dominant Shanghai, but has much more complicated tone sandhi (Qian 1997), and so provides much better data for testing the criteria for dominance. We thus investigate how well the Jinshan word pitches can be assigned a dominance value according to the customary criteria of preservation vs. modification / neutralisation / loss.

We also show that both types of sandhi can in fact be found in the same phonological sub-system (lexical tone sandhi) in a single variety.

2. Procedure

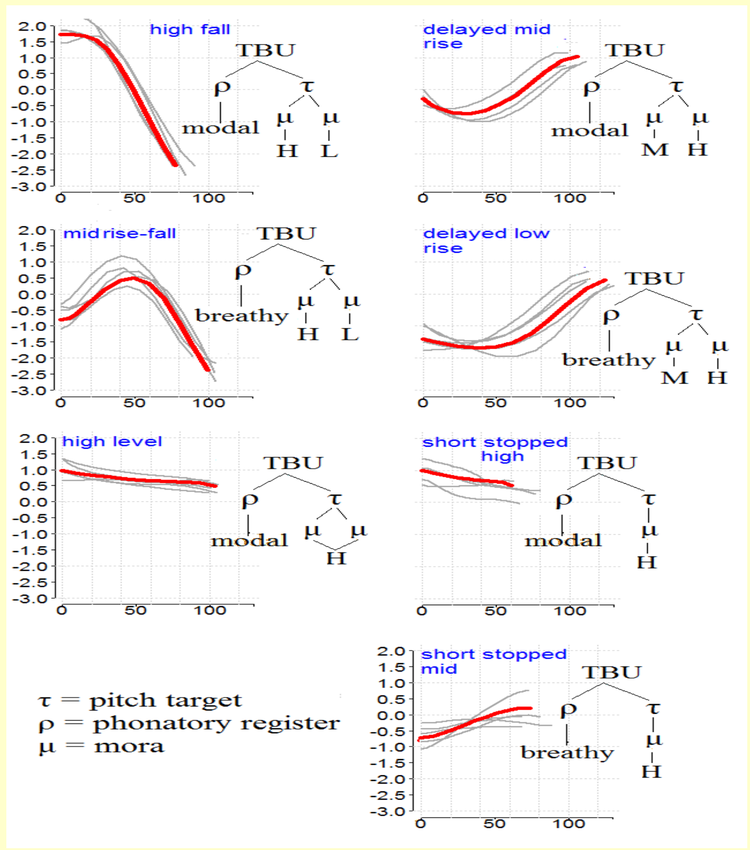
Nine locals over 60 years old were selected and recorded. All participants self-reported to be native speakers of Jinshan who speak dialect in their daily life. Informants were given the list of 453 basic words for exemplifying Chinese dialect lexicon from the 1964 *Chinese Dialect Vocabulary* 漢語方言詞彙, and asked to read out the equivalent Jinshan word. Recordings were made at 48kHz, 24-bit in an acoustically absorbent recording studio. Consent from all participants was acquired before the experiment. The recordings were phonetically transcribed and manually labelled in *Praat*. Tone acoustics were quantified by first identifying the token's tonally relevant F0 from wideband spectrograms with superimposed F0 in *Praat*, extracting it with a *Praat* script, and modelling it in *R* by an 8th order polynomial. This enabled F0 values to be sampled from the polynomial F0 curve with a sufficiently high sampling frequency (at 10% points of the curve as well as 5% and 95%) to capture the details of its time-course.

3. Monosyllabic Word Tone

Jinshan has seven tones on monosyllabic words (Rose & Yang 2022): *high fall, mid rise-fall*, *high level, delayed mid*, *delayed low rise, short high* and *short mid rise*. Figure 3 shows normalised acoustics from five speakers, as well as a tonological representation. Jinshan has binary phonatory register: modal and breathy (Rose & Yang 2022). Register governs the distribution of many segmental and suprasegmental units and is not primarily a matter of pitch range, since modal and breathy tones can overlap in pitch/F0.

The separate tonological encoding of register, shown in Figure 1, allows factoring out of three pitch targets: HL, MH and H. Thus, for example, the high fall and mid rise-fall tone share a HL pitch target but differ in register. Tones sharing pitch target and/or register act as natural classes.

Figure 1. *Normalized acoustics and tonological representation of the seven Jinshan tones on monosyllabic words. Thick red lines = mean normalized values. Thin lines = normalized values of 5 individual speakers. X-axis = normalised duration (%). Y-axis = z-score normalised F0 (sds around mean).*



4. Case-studies

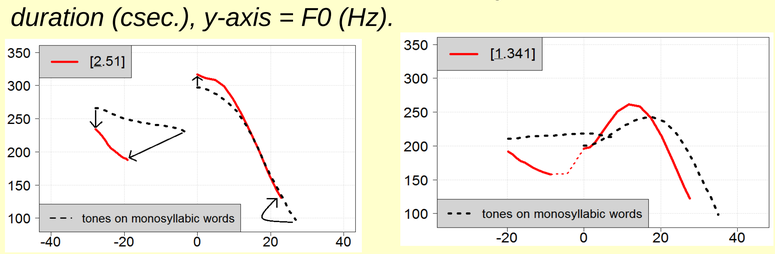
4.1 Short word-initial morphotoneme + long word-final morphotoneme. (阿哥 壁虎 勿要, 竹头 一定; 辣椒 侄子 十四, 木柴 热闹)

In these combinations, the word-final syllable tone shows a clear resemblance to its monosyllabic tone. Thus the high fall and mid rise-fall tones do not change; the high level is a slightly lower [33] after a preceding [23]; and the delayed rising tones have a slightly higher onset. The phonation type is also preserved on the word-final syllable.

The duration and phonation type of the short word-initial tones is preserved, but their pitch changes. The short high tone becomes lower-mid [2] before all tones except the high level, when it has a slightly lower [4] value than in monosyllabic words. The short mid-rise tone is realised as short low [1] before all tones except the high level /44/, when it has a slightly lower offset than in monosyllabic words: [23]. Figure 2 shows a single speaker's typical mean acoustics for morphotonemic combinations of /short high/ + /high fall/, and /short mid/ + /mid rise-fall/. Corresponding monosyllabic tonal F0 is also shown.

In terms of word-final tonal preservation and word-initial tonal modification, these combinations constitute a canonical example of right dominance.

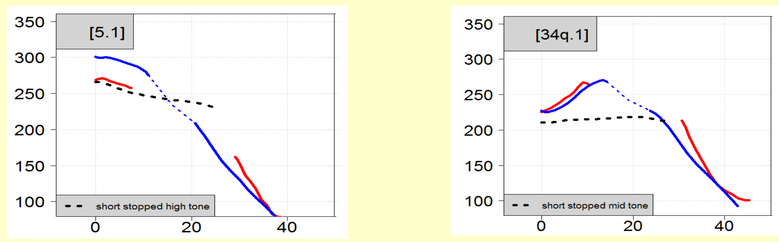
Figure 2. *Mean F0 and duration for a speaker's disyllabic words with word-initial short high morphotoneme and word-final long high fall (left), and short mid plus mid rise-fall morphotonemes. Thicker dotted line shows F0 on monosyllabic tones. X-axis = duration (csec.), y-axis = F0 (Hz).*



4.2 Short word-initial morphotoneme + short word-final morphotoneme. (隔壁 一直; 值得 十六)

In these combinations, the contrast between the short high and short mid tones on the word-final syllable is neutralised. The result of the neutralisation is a pitch at the bottom of the speaker's' range which often becomes creaky and is unlike the corresponding monosyllabic word tones. This marks this neutralisation typologically as one where neither member of the opposition appears. The word-initial tones, however, have pitches similar to the corresponding tones in monosyllabic words, with phonation type and truncation also preserved. Figure 3 shows the mean acoustics of these patterns. In terms of word-final tonal neutralisation and word-initial tonal preservation, these combinations constitute a canonical example of left dominance.

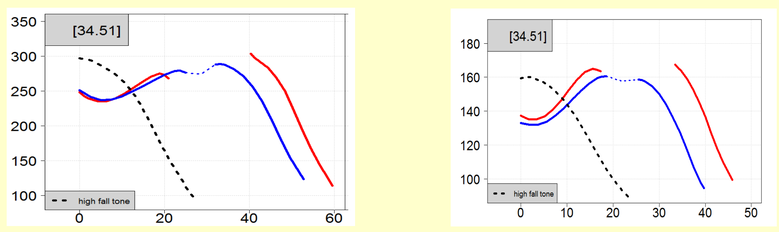
Figure 3. *Mean F0 and duration for a speaker's disyllabic words with short morphotonemes on both syllables. Left panel = words with short stopped high morphotoneme on word-initial syllable. Right panel = words with short stopped mid morphotoneme on word-initial syllable. Red lines = words with voiceless intervocalic Onset. X-axis = duration (csec.), y-axis = F0 (Hz).*



4.3 Word-initial high fall morphotoneme + word-final high fall ~ mid rise-fall ~ high level morphotonemes. (今朝 猪油 抽斗)

These combinations have a rising pitch on the word-initial syllable followed by a high falling pitch on the word-final syllable. All word-final syllables are modally voiced, even if they are breathy register morphotonemes. Figure 4 shows mean acoustics from two speakers.

Figure 4. *Mean tonal acoustics from two Jinshan speakers of disyllabic words with [34.51] word pitch. Small dotted lines show F0 on voiced intervocalic Onsets. Thicker dotted line shows F0 on monosyllabic high falling tone.*

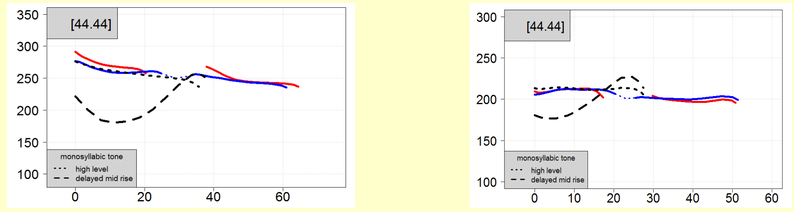


This case appears *prima facie* to involve quite a lot of tone change and consequently very little preservation of tone involved on either syllable. Certainly there is no preservation on the word-initial tones. The only case in which preservation appears clear is when the word-final morphotoneme is high fall. However, both high fall and mid rise-fall tones share a HL pitch target (Figure 1), so it is better to make pitch target preservation a diagnostic rather than tone *per se.* However, this will not handle the case of the word-final high level tone. This involves neutralisation, which is supposed to be indicative of lack of dominance. This is a different type of neutralisation from that in section 4.2, however. Here, one member of the neutralised opposition – high fall – appears to the complete exclusion of the other – high level. Far from being an indicator of weakness, then, it is possible to consider this an additional indicator of strength. In terms of word-final tonal neutralisation and pitch target preservation, and word-initial modification, these combinations may be regarded as right-dominant.

4.4 Word-initial high level ~ delayed mid-rise morphotoneme + word-final delayed mid- and low-rise morphotonemes. (手套 早饭 世界 半路)

These combinations have high level pitch on both syllables. All word-final syllables are modally voiced, even if they are breathy register morphotonemes. Figure 5 shows mean acoustics from two speakers.

Figure 5. *Mean F0 and duration for two speakers' disyllabic words with word-initial high level and delayed mid rising morphotonemes and word-final delayed mid- and low-rise morphotonemes.*



The high level word pitch with word-initial high level morphotoneme would be conventionally considered the result of autosegmental spreading, and thus a canonical example of left dominance. The same high level word pitch with an word-initial delayed mid rising tone clearly cannot be so diagnosed. However, since the second type of neutralisation is involved – between high level and delayed mid rise morphotonemes in favour of high level – it is possible to consider this also as a case of left-dominance.

6. Summary

We have examined diagnostic criteria for dominance in several lexical tone sandhi patterns in Jinshan. We have pointed out the need to distinguish between two different types of neutralisation, one indicative of dominance and one of lack of dominance. Preservation of *tone* may also need refinement to preservation of *pitch target*.