Position-sensitive sandhi: a case study of Jinan Tone 4 sandhi

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The Jinan dialect is spoken in a northern area of China. Like Mandarin, it has four tones, and tone sandhi (A+A→B+A) may be triggered by some sequences of tones. However, under closer scrutiny, the sandhi in the Jinan dialect shows much more complex characteristics than Mandarin tone sandhi. As is common in studies of Chinese tones in other dialects, previous work (Qian, 1963) on this dialect consists only of subjective description (Zhang, 2010). Based on a case study in Jinan Tone 4 sandhi, this paper will provide novel empirical data. It shows that this sandhi is blind to morphosyntactic structure and that it is position-sensitive.

Traditionally, Chinese tones are transcribed on a scale from 1 to 5, where 1 is the lowest. Tone 4 (henceforth T4) in the Jinan dialect is a falling contour tone that would correspond to 4 to 1 on the same scale. When it precedes another T4, it becomes a sandhi tone (henceforth S4) featured by a falling pitch followed by a raising pitch (Fig. 1). However, Tone 4 sandhi only applies to the penultimate syllable in a large phrase and no other positions (e.g. T4+T4+T4+TX, where X stands for any tone other than T4; T4+T4+T4+T4→T4+T4+S4+T4).

Unlike Mandarin Tone 3 sandhi where sandhi application is sensitive to morphosyntactic structure (Chen 2000; Cheng 1987; Duanmu 2007; Shih 1986 a.o.), the Tone 4 sandhi in the Jinan dialect is blind to morphosyntactic information. Take trisyllabic units as an example, Tone 4 sandhi does not apply to the initial syllable of a trisyllabic unit ending with a syllable that is not characterized by T4, no matter whether this unit is left-branching ([[σσ]σ]) or right-branching ([σ[σσ]]). A more detailed comparison shows that the pitch range of the initial syllable of a trisyllabic left-branching phrase is not significantly different from that of a right-branching tree ($t = -0.48$, p-value = 0.63 for maximum pitch; $t = -0.27$, p-value = 0.79 for minimum pitch). In addition, the pitch range of penultimate syllables of the left-branching phrases does not differ from that of the right-branching phrases ($t = -0.098$, p-value = 0.92 for maximum pitch; $t = 0.015$, p-value = 0.99 for minimum pitch). When the trisyllabic unit has only T4 syllables, only the middle T4 undergoes T4 sandhi (i.e. to result in T4+S4+T4) regardless of its morphosyntactic structure. Therefore, the non-application of T4 sandhi in trisyllabic units cannot be explained by the interaction between phonology and morphosyntax. It also cannot be accounted for by the correspondence between derivationally related forms (Steriade 2000, Kenstowicz 1996), because the same morpheme has different tonal outputs in bisyllabic and trisyllabic units.

The cases of T4+T4+T4 as the input show that the directionality of this sandhi is right-to-left. Otherwise, the sandhi result should be S4+S4+T4 instead of T4+S4+T4. It is argued that some sandhi phenomena in Chinese dialects are affected by different stress patterns (Duanmu, 2007). The sandhi, as has been shown above, always targets the penultimate syllable, parsing from right to left; it is insensitive to morphosyntactic structure. A possible explanation to the non-application of T4 sandhi on the initial syllable of a trisyllabic unit would be that, the penultimate syllable is stressed so the sandhi targets that particular position (positional markedness). However, whether a tonal language like the Jinan dialect has stress is controversial, and a phonetic analysis does not show that the penultimate syllable carries and significant stress.

In the experiment, a comparison is made between two groups with the form ABC and DAB where the same letter stands for the same morpheme. Paired t-tests show that the duration of the initial A is shorter than that of the penultimate A ($t = -7.48$, p-value <0.05) and the penultimate B is shorter than the final B ($t = -3.31$, p-value<0.05). The intensity and pitch comparisons only show a significant intensity difference between the final and penultimate positions (intensity paired B: t =

2.46, p-value = 0.038); no other significant difference is detected in any other tests (intensity paired A: t = -1.94, p-value = 0.087; pitch paired A: t = 1.08, p-value = 0.34; pitch paired B: t = 1.45, p-value = 0.22). To sum up, the penultimate syllable may be phonetically stronger than the initial syllables but it is weaker than the final syllables. Therefore, were there to be stress, it is not expected that the stress is placed on the penultimate syllable.

In conclusion, this paper provides novel data from Jinan Tone 4 sandhi. It examines the empirical data from a phonetic perspective and argues that this sandhi is blind to morphosyntactic structure. The data shows that this sandhi is constrained by the position of the target syllable; only the penultimate syllable will undergo sandhi. However, the sandhi is not triggered by any phonetically observable stress.

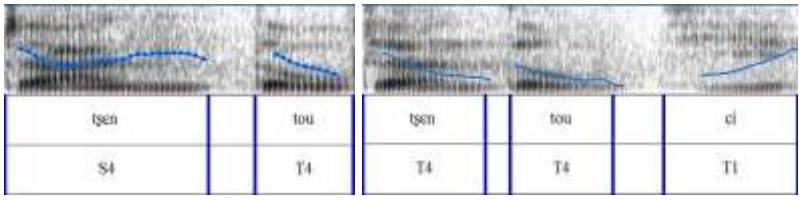

Fig. 1

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