

An Acoustic Study of Mandarin Neutral Tone: durational variations and pitch features and vowel reduction

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The neutral tone (NT) is one of the most controversial issues in Mandarin tonology. It has been defined by different phonologists as a special kind of tone sandhi, an unstressed syllable, or, less commonly, a tonal category (cf. Liu, 2002).

The existing studies of NT add to the difficulty in resolving these controversies by neglecting the following aspects. Firstly, NT is not a homogeneous group but needs to be sub-classified as clitic NT and non-clitic NT based on morphophonological evidence (Shen, 1992). Clitic NT does not bear citation tones (CTs) intrinsically while non-clitic NT has its CT deleted. In addition, because of the potential interaction between NT and the preceding CT, research into NT should be done on disyllabic CT-NT words rather than the NT-bearing syllables alone. Durational variation needs to be taken account as well because it may confound the measurement of the other acoustic features of NT.

To address these shortcomings, we conducted a story-reading experiment with NT subtypes and focus as variables. In contrast with the previous literature, neither a small duration ratio ($DR = \frac{\text{the duration of the NT rhyme}}{\text{the duration of the preceding rhyme}}$) nor vowel centralization was found to be the unique feature of NT. Instead, we have found evidence for a [-high] target of NT as well as acoustic correlates of the subtypes of NT, especially in the tokens with larger DR. The underlying CTs (i.e. CTs potentially be carried by non-clitic NT) seem to promote the anticipatory dissimilation (a raising in the contour of tones before other tones with relatively low targets common in tonal languages) in the CT rhymes preceding non-clitic NT. The f_0 -based differences, however, are not obvious in the NT-bearing units themselves in accordance with previous studies (e.g. Lee and Zee, 2014). Both duration ratio and individual difference are confounding factors to this prohibitive effect.

Based on these findings, we propose NT to be a tonal category rather than merely the result of lack of stress. Clitic morphemes are intrinsic NT-bearing units while non-clitic morphemes become NT-carrying units through NT sandhi (i.e. CTs becoming NT), presumably caused by the loss of the lexical importance in a certain context. However, further research from the psycholinguistic perspective is required into how the [-high] target of NT and the rule of NT sandhi are represented in the mental lexicon of different individuals.

Reference:

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