

Pitch Target of Mandarin Neutral Tone

While it is unanimously agreed that there are four distinctive lexical tones in Beijing Mandarin (high level, high rising, low falling-rising, and high falling), there exist a number of items described by the cover term neutral tone (Chao, 1968), the tonal status of which has aroused much interest and debate. Typical examples include grammatical morphemes (e.g. the genitive/nominalizer marker *de* in 1a), lexical items (*li* in 1b), diminutive terms (*mei* in 1c), and reduplication (the second *xiang* in 1d). (Syllables without tonal marking indicate neutral tone.)

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| (1) | a. làde | ‘something spicy’ |
| | b. bōli | ‘glass’ |
| | c. mèimei | ‘sister (diminutive)’ |
| | d. xiángxiang | ‘to think (for a little while)’ |

What these syllables have in common is that they do not surface with any of the lexical tones. Instead, their f_0 contours seem to vary depending on the tone of the preceding syllable. The received wisdom is that these syllables are toneless. Traditionally, much controversy surrounds the theoretical account of the f_0 realization of neutral tone. The fundamental question pits one school against the other: Is neutral tone realized by tonal spreading from the preceding syllable (Yip 1980) or by interpolation between the immediately preceding and following tones (Shih 1987)?

To seek phonetic evidence for the construction of an appropriate phonological theory, this study was designed to investigate the detailed f_0 realization of sentence medial neutral tone. The test material consists of 32 sentences which vary in 1) the number of consecutive neutral-tone syllables (ranging from one to three); 2) the tone of the syllable preceding the neutral-tone syllables (all four lexical tones); and 3) the tone of the syllable following the neutral-tone syllables (two lexical tones, one starting high and the other low). Four subjects were recorded, each producing 6 repetitions (three at normal and three at fast speaking rates).

Our data show that the f_0 contour of a neutral tone syllable does exhibit an influence from its preceding lexical tone. When there is only one neutral tone syllable, the magnitude of the influence is substantial. As the number of neutral-tone syllables increases, however, the f_0 contour of the neutral tone seems to take on its own course. It approaches a particular value, which, by the end of a string of 3 consecutive neutral tone syllables, approximates the lower mid range of our speakers’ pitch range. This is especially clear when the string of neutral tones follows a rising tone and precedes a falling tone. With only one neutral tone syllable in between, we see that between the two high peaks of the rising and falling tones, there is only a slight dip of f_0 over the second half of the neutral tone syllable (i.e., with an f_0 peak occurring after the mid point of the neutral tone syllable). As the number of neutral-tone syllables increases, the f_0 value of the following neutral tone gradually lowers, until it approximates that particular value, which is lower than the peaks of both the preceding rising tone and the following falling tone. As a result, the f_0 contour of the falling tone syllable starts at a relatively low value

and rises to its highest point before it starts to fall. This pattern is similar to the f0 pattern when a lexical falling tone follows a lexical low tone.

It became apparent to us that such a declining slope of f0 pattern can not be explained by either tonal spreading or tonal interpolation, both of which would predict an f0 contour that remains high after the rising tone and stays high to connect to the following falling tone. We argue that the observed f0 patterns can be better explained by assuming that neutral tone has a target of its own. This target, however, seems to differ from those of the other four lexical tones in two ways. First, it has a pitch value that is relatively centralized. Second, its articulatory implementation is much less vigorous than that of the other lexical tones. Thus the target value itself and the manner at which it is implemented are jointly responsible for the f0 contour of the neutral tone.

We will discuss the implications of this interpretation for the relationship of phonological feature specifications of tones and their phonetic targets for f0. Results of our data will also be compared with data from recent studies on English intonation, in light of which, we will discuss the f0 realization of tonal targets in general.

References

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