

## **Tonal Assignment for English Loanwords in Mandarin: An Experimental Approach**

Zhuting Chang & Dianne Bradley (CUNY Graduate Center)

Mandarin Chinese employs four tones, but since English is not a tonal language, speakers must assign tones when borrowing words from English into Mandarin. In what ways do phonological considerations constrain tone choice? Previous work on this problem has analyzed corpora of existing loans, e.g., Miao 2006, Wu 2006, but several difficulties confront that approach. Existing loan forms vary in both chronology and route, may be sparse at points that are crucial (Duanmu 2008), and can have been shaped by advice from authorities, e.g., the Ministry of Civil Affairs (place names), the Xinhua News Agency (political terms), or the National Committee for Terms in Science and Technologies. The current study sidesteps such difficulties by eliciting Mandarin speakers' immediate adaptations of phonotactically legal English nonwords.

Stimulus materials (N=84, plus fillers) conformed to 'CV(N).Cə and Cə.'CV(N) templates, i.e., critical syllables carried primary stress, assumed initial or final position, and were open or closed, e.g., ['bi.kə], [kə.'bi], ['mæn.tə], [tə.'mæn]. The experiment's design targeted syllables for which segmental adaptation was likely to be uniform (Lin 2008) and tone-choice maximally free, and incorporated both vocalic and consonantal contrasts, e.g., ±high, ±back; ±sonorant, ±aspiration. Each stimulus was recorded in isolation by a male native speaker of American English, who used a declarative intonation assigning pitch accent H\* and boundary tones L–L%. Eight adult native speakers of Mandarin, who had lived in the United States from 1 to 4 years, participated in the experiment by providing 'the most natural' Mandarin adaptation for each stimulus. The data analysis set aside 19% of 672 total responses on the grounds that these took non-target segmental values or were tonally ambiguous because of tone sandhi. For the N=544 responses remaining, the distribution of assigned tones was examined in analyses that adjusted for 'tone opportunity' to minimize distortion due to occasional tone gaps, e.g., \*Tone 2 (Rising, 35) for Mandarin [san].

Because tone distributions in these data were complex, we sketch only a few major findings here. One such finding contrasts with that emerging from previous loanword corpus studies: In 'live' adaptations of English CV syllables, Tone 4 (Falling, 51) was favored above Tone 1 (High, 55), across the board. And in adaptations of English CVN (but not CV) syllables, stimuli with sonorant onsets triggered a strikingly different pattern: Tone 2 commanded center stage with 71% realization of tone opportunities, where elsewhere that tone largely saw minor usage other than for stimuli with aspirated onsets. An account of such preference patterns necessarily weighs influences of several kinds: the perceptual similarity of English intonational and Mandarin tonal pitch contours, tone frequency across the Mandarin lexicon, and phonetic effects like lowered F0 at the onset of vowels following voiced (and perhaps aspirated) consonants. This last factor holds particular interest, because it may bring out parallels between the phonetic biases driving the development of modern Mandarin's tone system and current influences on tonal assignment.

### **References**

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