Guangzhou Cantonese has a rich tonal system. It has six contrastive tones: High level (T1), High rising (T2), Mid level (T3), Low falling (T4), Low rising (T5) and Low level (T6). It is generally believed that native speakers mainly rely on various fundamental frequency (F0, henceforth) dimensions as perceptual cues to differentiate Cantonese tones (Khouw & Ciocca, 2007; Gandour, 1981, 1983; Vance, 1977; Fok, 1974). Khouw and Ciocca (2007) specifically pointed out that F0 change over the later portion of the vocalic segment was most crucial in identifying tones in Cantonese. In recent years, the complex Cantonese tone system is undergoing changes that some speakers no longer distinguish some of the six tones and merged some tones (e.g. Kei, etc. 2002, Bauer, etc. 2003, Yiu, 2009, Mok and Wang, 2010ab). In particular, the two rising tones, T2 and T5, are two most readily confused tone pairs. T2 and T5 share similar onset F0 but differ mainly in the F0 magnitude of the later portion. The question arises as to whether the tone mergers employ the same perceptual cues as the non-tone mergers in perceiving T2 and T5 tones.

The stimuli include three acoustic continua generated from the syllables /jì/, /sì/ and /fù/. For each continuum, values of onset and inflection points plus the time at which the inflection point located were identical across the ten tokens, differing only in offset points. Each continuum consisted of ten tokens varying in F0 value at equal intervals, with other acoustic properties controlled, such as amplitude envelope contour, duration, etc. A stylized F0 contour was imposed on the base syllable, using the PSOLA method. For example, tone contour for /sì/ continuum is illustrated in figure 1:

The results of identification proportion are shown in figure 2 and figure 3 for tone-mergers and non-tone-mergers respectively. As shown in figure 2, no salient boundary between two categories is observed in the results of tone-mergers, whereas non-tone-mergers demonstrated crossover of the two identification function to indicate the presence of two tone categories. Evidently, the F0 change in the later portion of the vocalic segments does not cue the perception of T2 and T5 among tone-mergers as it does among the non-tone-mergers.

References:


