Title: Lexical Tone Effects on Voice Onset Time in Cantonese
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Abstract
This study investigates the effects of lexical tone on the Voice Onset Time (VOT) of prevocalic stops in Cantonese. Previous studies that have examined the relationship between tone and VOT include studies on Mandarin and Hakka (Chen et al 2009), Shanghainese (King and Schieffer 1990), Taiwanese (Lai 2004), Mazatec (Herrera 2003), and Kera (Pearce 2009). These studies have shown mixed results. Research on more languages is needed in order to determine whether or not any cross-linguistic generalizations can be made. For the present study, the specific research questions to be addressed are (1) Does tone have an effect on VOT in Cantonese?; (2) If so, what kind of an effect does it have?; and (3) Is this effect purely an automatic articulatory consequence of F0 modulation or is this effect also mediated by lexical tone and hence a potential cue that contributes towards maintaining phonological contrasts between different tonal categories? To address these questions, the speech of 6 native speakers (5 male and 1 female) of Hong Kong Cantonese was examined. All recordings were made in a sound proof room. The subjects were all students at a US university at the time of recording. A total of 80 tokens of words contrasting in tone and aspiration were analyzed for each speaker for a grand total of 480 tokens. Results from an ANOVA test showed that there is a statistically significant effect ($p < 0.000$) of tone category on VOT. In particular, a post-hoc analysis revealed a two-way split between words with a low-falling (21) or mid-rising (25) tone, which have higher VOT, and words with either a mid-level (33) or high-level tone (55), which have lower VOT. A Pearson's Correlation Test also showed statistical significance ($p = 0.01$) with an inverse relationship between VOT and onset F0 height. An analysis of individual speakers, however, showed that this correlation was statistically significant for only 3 of the 6 subjects while ANOVA tests on each individual speaker showed statistical significance for all 5 male subjects but not for the female subject. The more consistent results on the ANOVA tests on individual speakers suggest that VOT differences can serve as a potential cue used to distinguish between different tonal categories. The effects of tone on VOT are, thus, likely to be language-specific. This study has implications for developing a better understanding of how phonological contrasts are implemented especially in tonal languages.

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