Tonal Preservation verse Prosodic Transfer: How Cantonese-L1 Speakers Navigate Mandarin Question Intonation

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Objective

This study investigates how Cantonese-L1 speakers use prosodic cues, particularly pitch height and boundary tone, to signal interrogativity in their L3-Mandarin utterances ending with final-rising tone (T214). Prior work shows that Cantonese marks questions via boundary tone, a salient final-syllable F0 rise overriding lexical tones (Gu et al., 2005; Ma et al., 2006). When questions end with T23 (low rising) which is contingent with boundary tone, T23 under boundary tone accelerates its F0 rise to approximate T25 (high rising). In contrast, Mandarin questions preserve lexical tonal shapes in the final sentence position (Chen, 2022) but raises overall pitch rather than imposing a final rise (Liu, 2009). We address two questions: 1) Do Cantonese-L1 speakers transfer the final-rising timing to their L3 Mandarin? 2) How does Cantonese-L1 speakers' Mandarin proficiency modulate this transfer?

Method

As part of a forensic phonetic corpus (Cao & Mok, 2023), 20 young gender-balanced Cantonese-L1 speakers from Hong Kong completed mock police dialogues in Mandarin-L3, producing four sentence types: statements, yes-no questions, intonation questions, and wh-questions. All sentences ended with "腦" (T23 in Cantonese; T214 in Mandarin). Two Mandarin-L1 raters graded speech proficiency on a 10-point scale. Target sentences were annotated in Praat, with 10 F0 points per syllable extracted via ProsodyPro for calculation of pitch height and F0 mean values. Boundary tone divergence points were identified through visual inspection and validated via ANOVA. A linear mixed-effects model assessed the effect of proficiency and sentence type on final-syllable F0 height.

Results & Discussion

The F0 contours of the last three syllables (Figure 1) revealed systematic differences between Cantonese and Mandarin-L3. In Cantonese, yes-no questions diverged from statements at the final syllable, while intonation questions overlapped with statements until the final syllable's midpoint before sharply rising to mimic T25. In Mandarin-L3, intonation questions diverged earlier (penultimate syllable), whereas yes-no and wh-questions retained final-syllable divergence. Critically, all Mandarin-L3 sentence types preserved T214's fall-rise shape, contrasting with Mandarin-L1 speakers' use of falling contours for statements, and falling-rising for the yes-no, confirmation and particle questions (Liu, 2009).

Descriptively, final-syllable F0 in questions was higher than in statements for both languages (Figure 1 and F0mean), though ANOVA revealed no significant differences. Since Mandarin-L1 relies on elevated final-syllable F0 to distinguish questions (Liu, 2009), a linear fixed model examined the effect of factors influencing F0 values of the final syllable. A significant positive effect of Mandarin proficiency was found for F0 values ($\beta = 11.41$ Hz, $t = 6.09$, $p<0.001$), and a mild negative effect of statement ($\beta = -9.51$ Hz, $t = -1.97$, $p=0.05$), suggesting advanced speakers adopt Mandarin-L1's pitch height strategy.

Cantonese-L1 speakers exhibit asymmetric prosodic transfer in Mandarin-L3: L1 boundary tone timing partially persists in Mandarin-L3 (e.g., divergence timing in yes/no questions), but higher proficiency facilitates L3-like pitch height modulation. This duality reflects tension between tonal preservation (Mandarin's lexical integrity) and prosodic transfer (Cantonese's boundary tone dominance), highlighting how tonal typology constrains bilingual intonation.

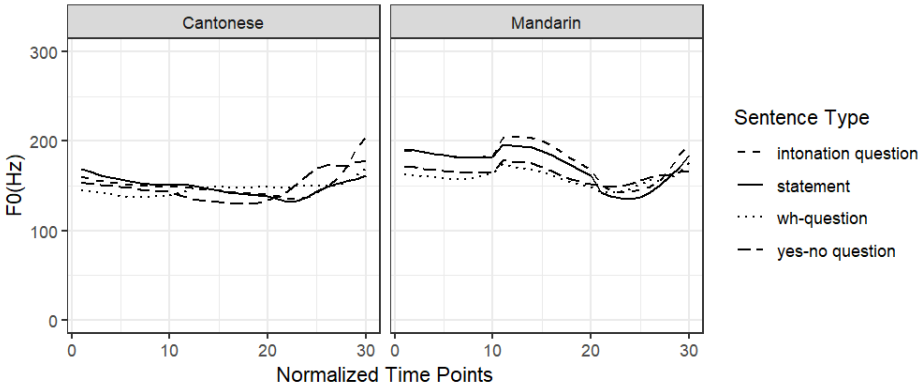

Figure 1. The last three syllables' F0 contours of four sentence types in Cantonese and MAN-L2.