

# Does Adult Tonal Second Language Experience Facilitate the Perception of a New Tonal Language?

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## Abstract

The influence of native tonal-language experience on pitch processing is well established [1], [2], but it remains less clear whether tonal experience acquired in adulthood through a second language can provide a comparable perceptual advantage. This study investigates how L2 backgrounds in tonal (Mandarin) versus non-tonal (Spanish) influence the perception of unfamiliar lexical tones (Southern Vietnamese) among L1 English speakers. Following PAM-L2 [3], we hypothesized that Mandarin experience would improve Vietnamese tone discrimination overall, but that this advantage would vary across tone contrasts depending on how Vietnamese tones are perceptually assimilated to existing Mandarin tone categories.

Thirty-three L1 English speakers, 18 with L2 Mandarin and 15 with L2 Spanish, completed a 150-trial AX discrimination task with Southern Vietnamese CV syllables carrying one of five lexical tones. Participants judged whether paired syllables carried the same or different tones. Tone pairs were balanced across segmental contexts to reduce consonants and vowel confounds. Stimuli were designed using the five-tone tonal system of Southern Vietnamese dialect, selected because its tones are strongly cued by pitch contour [4], making it suitable for testing transfer from Mandarin tonal experience [5] while reducing reliance on glottal or laryngeal cues.

Accuracy was analyzed using a logistic generalized linear mixed model with fixed effects of Group, Tone Pair, and their interaction, and a random intercept for participant. Results showed significant effects of Group,  $\chi^2(1) = 40.6$ ,  $p < .001$ , Tone Pair,  $\chi^2(14) = 250.7$ ,  $p < .001$ , and Group  $\times$  Tone Pair,  $\chi^2(14) = 50.2$ ,  $p < .001$ . Thus, the Mandarin group performed better overall, but the size of this advantage depended on the specific tone pair.

Follow-up Holm-corrected contrasts showed large Mandarin advantages for tone pair 2–3, 93.6% vs. 60.0%, OR = 9.75,  $p < .001$ ; tone pair 1–4, 92.6% vs. 68.0%, OR = 5.91,  $p < .001$ ; and tone pair 3–4, 91.9% vs. 69.9%, OR = 4.91,  $p = .021$ . In contrast, the advantage was minimal for tone pair 2–4, 53.3% vs. 49.0%,  $p = .968$ . This contrast-level pattern suggests that adult L2 tonal experience facilitates the perception of some unfamiliar tone contrasts but does not provide a general benefit across the entire tonal system.

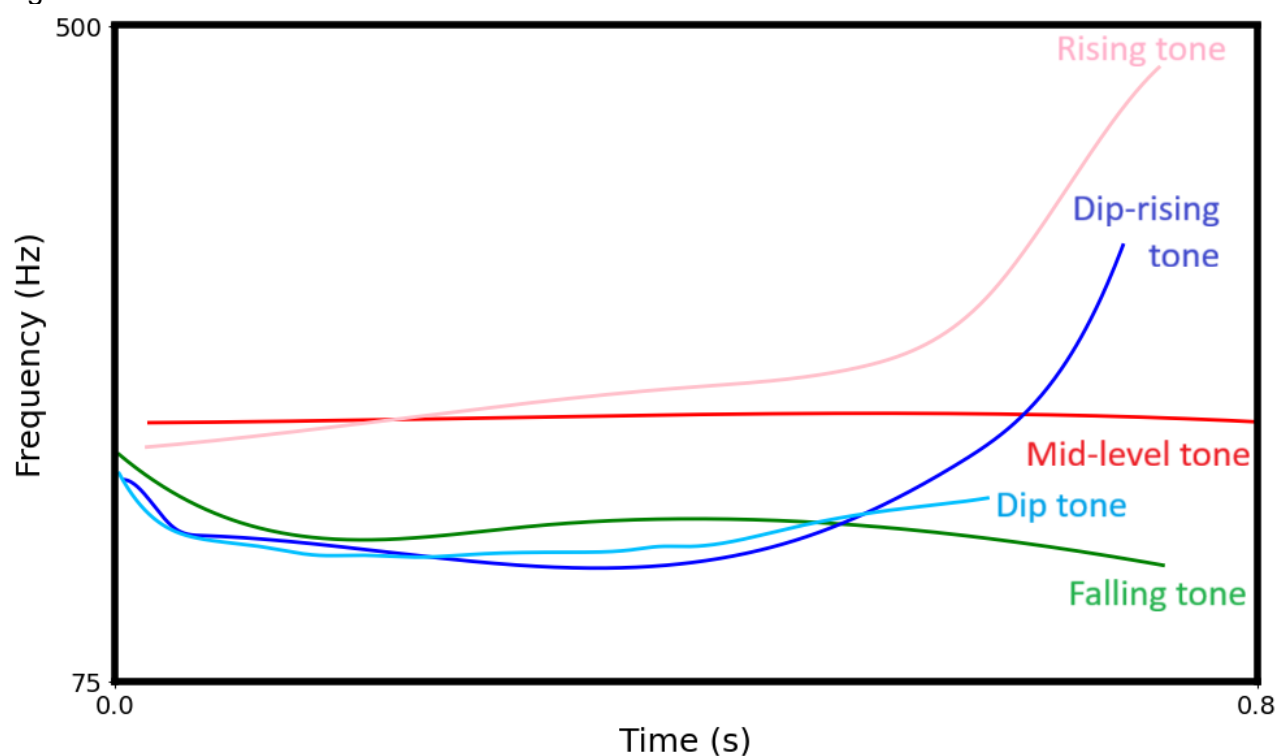
This selective advantage aligned with the visual structure of the Southern Vietnamese tone contours (figure 1). The largest Mandarin advantage occurred for tone pair 2–3, a rising–falling contrast, and for tone pair 3–4, where a falling contour contrasts with a dip–rising contour. In contrast, the Mandarin advantage was minimal for tone pair 2–4, where both tones share a rising component and differ more subtly in early dipping movement. This suggests that L2 Mandarin experience may enhance sensitivity to broad pitch-contour contrasts, while offering less support for finer distinctions between partially overlapping contours. A complementary PAM-L2 [3] interpretation is that these contrasts differ in how they are assimilated to Mandarin tone categories: tone pair 2–3 may map onto distinct Mandarin categories, whereas tone pair 2–4 may partially assimilate to the same rising category. Thus, Mandarin experience may help most when Vietnamese tones are both acoustically distinct and perceptually mapped to different existing tone categories, although this account requires future testing with explicit assimilation judgments.

## References

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## Figures and Tables

Figure 1: Pitch Contour of five Southern Vietnamese tones



Note. Tone 1 = Mid-level tone, Tone 2 = Rising tone, Tone 3 = Falling tone, Tone 4 = Dip-rising tone, Tone 5 = Dip tone.