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## Effects of lexical tone on the prosodic marking of vocal emotions in Mandarin Chinese

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Prosodic properties, such as pitch, intensity, duration, voice quality, and articulatory precision, express emotions in spoken languages (Xu, 2023). However, in Mandarin, the pitch contour also serves to express distinctive lexical tones. This duality poses intriguing questions regarding the interplay between lexical tones and emotional expression. Building upon previous studies (Zahner-Ritter et al., 2022), our research investigates the intricate relationship between four lexical tones and emotional prosody in Mandarin, employing production and perception studies.

In the production study, we focus on the underlying production dynamics associated with the fusion of lexical tones and emotional expressions in Mandarin. We analyzed the acoustic characteristics of bisyllabic Mandarin nouns (eight words for each tone) recorded in four emotions (HAPPINESS, PLEASANT SURPRISE, SADNESS, DISGUST), and in NEUTRAL mode. Our analysis revealed that positive emotions were associated with higher pitch and intensity, along with shorter word duration, while negative emotions exhibited lower pitch and intensity but longer word duration. Notably, the differences between phonetic markers of positive and negative emotional prosody were less pronounced in words exhibiting tone 3 at the second syllable.

Using the same nouns in a perception study, we investigated how native Mandarin (n=20) and non-Mandarin speakers with German as L1 (n=20) perceive emotional prosody in Mandarin. The participant's task was to categorize the emotion of each stimulus as positive, negative, or neutral. Behaviorally, Mandarin native speakers demonstrated higher accuracy (mean=93%) than German speakers (77%). The analysis revealed a significant interaction between EMOTION and GROUP ( $F=5.1$ ,  $p<0.01$ ), but not for EMOTION and TONE. Specifically, German speakers performed worse in categorizing the emotions DISGUST and HAPPINESS than Mandarin native speakers. Taken together, our findings indicate that the acoustic characteristics of vocal emotions in Mandarin vary depending on the type of lexical tone a word is specified for. This variation, however, did not affect the perception of emotional prosody.

**References:** • Xu, Y. (2023). *Phonetics of Emotion*. In Oxford Research Encyclopedia of Linguistics. • Zahner-Ritter, K., Chen, Y., Dehé, N., & Braun, B. (2022). *The prosodic marking of rhetorical questions in Standard Chinese*. *Journal of Phonetics*, 95, 101190.