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Tonal Behavior in Some Tone Languages
一些聲調語言中的聲調變化

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Abstract

This thesis explores some cross-linguistic constraints on tonal behavior. Phonologically, tones behave like segmental sounds in some tone languages. Therefore, linguistic principles such as the Margin Principle and the Size Principle, which are based on segmental phonology, are investigated here for their applicability on tonal behavior. Specifically, we focus on the production and perception of tones from a phonetic angle.

With regard to tonal production, a quantitative comparison of the amount of contextual tonal variation among three languages, i.e. Mandarin, Jinanese, and Hong Kong Cantonese is carried out. These languages differ either in tonal inventory size or in tonal contrast. The results show that tones in Mandarin and in Jinanese vary more greatly on average than do tones in Cantonese in contexts, though all vary in a confined space. This demonstrates the presence of both the Margin Principle and Size Principle in tonal production. Tones in a system with a smaller inventory size would undergo a greater amount of contextual perturbation, while tones in a system with a larger inventory size could tolerate a smaller amount of contextual perturbation. That the tones vary in a confined space indicates that tonal variation due to coarticulation is not sufficient to damage the identifiability of particular tones. The statistical results further strengthen this point. Moreover, the cross-language investigation of this study shows that tonal coarticulation is mostly assimilatory in nature, as is the case with vowel-to-vowel coarticulation. A dissimilatory coarticulation only occurs when a tone is followed by a low tone, primarily because of physiological constraints. A register effect is also found to exist in tonal coarticulation: tones at the high register usually vary more greatly than tones at the low register. In addition, a direction change in F_0 movement is observed to occur consistently with falling contour tones across languages, suggesting a possible link between phonetic variation and historical change.

Concerning the Margin Principle in tonal perception, several experiments of categorical perception are carried out with pairs of tones from each of the three languages. However, the results show some inconsistency. While the perceptual boundary between Mandarin tone 1 and tone 4 is rather clear-cut, indicating a categorical perceptual mode, the perception of the boundary between Mandarin tone 2 and tone 3 shows a continuous mode. The perception of the boundary between the two Jinanese falling tones is somewhat different from that between the two Cantonese rising tones. The transition stage lasts longer between the two falling tones than between the two rising tones, indicating that listeners are more sensitive to the F_0 difference on the tonal offsets than on the onsets. However, in either perceptual mode, categorical or continuous, the perceptual margin between tone categories shifts along a variety of other factors. These factors could be intrinsic, such as vowel quality, tonal duration, and extrinsic, such as language background, physiological constraints and psychological experience. Further refined studies are needed to reveal the mechanisms for the perception of lexical tones.

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