Do English Speakers Assimilate Mandarin Tones to English Prosodic Categories?

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Abstract

This study examined whether native English (NE) speakers perceive non-native tones of Mandarin in terms of their English intonational categories (Flat pitch, Question, Uncertainty, and Statement). The results indicated that NE listeners assimilated non-native tones to their native intonational categories, which share phonetic similarities with those of Mandarin tones. Thus, the assumption that assimilations of non-native prosodic categories (e.g., tones) to native prosodic categories – an extension from the Perceptual Assimilation Model (PAM) – is supported.

Index Terms: tones, intonation, Perceptual Assimilation Model

1. Introduction

Previous studies generally found that native native English (NE) speakers are able to perceive Mandarin tones to a certain extent. A previous study [2] has shown that assimilating non-native tones to the categories of listeners’ prosodic (e.g., tone, pitch-accent, and intonation) systems seems to be feasible, and this is consistent with the assumption of the Perceptual Assimilation Model (PAM) [1]. This raises an important question as to how NE listeners perceive lexical tones. Do they perceive Mandarin tones (Tone 1 High level, Tone 2 mid-rising, Tone 3 falling-rising, and Tone 4 high falling) according to the pitch patterns of the intonational categories (i-Categories) in their prosodic system (e.g., rising patterns for questions)?

To answer this question, the present study examined whether NE listeners perceive non-native tones in terms of their i-Categories. We hypothesized that non-native prosodic categories (e.g., tones) will be assimilated to the categories of listeners’ native prosodic system, as an extension from PAM. Therefore, we predicted that NE listeners in this study would assimilate the phonetic properties of Mandarin tones (e.g., pitch patterns) to those of English i-Categories, when both substantially share similar phonetic features: They would perceive Tone 1 as Flat Pitch, Tone 2 as Question, Tone 3 as Uncertainty, and Tone 4 as Statement.

2. Method

Eighteen Australian NE speakers, who had neither learned Mandarin nor received formal musical training, were asked to categorize randomized individual presentations of 72 tokens of the four Mandarin tones on the syllable /fu/ (3 speakers x 4 tones x 3 samples per tone x 2 repetitions) into four English i-Categories (Flat pitch, Question, Uncertainty, and Statement) from a PC screen, on which five buttons were provided corresponding to the four i-Categories and the 5th button was labeled as Unknown. Listeners were instructed to select it when they could not identify a tone into any i-Category.

3. Results

A Chi-square test revealed a significant association between Tone (x4) and i-Category (x5), $\chi^2 (12) = 450.532, p < 0.001$. A further mixed design 2-way ANOVA (Tone x i-Category) found significant effects of Tone ($p<0.05$), i-Category ($p<0.001$), and their interaction ($p<0.001$) on listeners’ mean assimilation percentage (%). Individual 1-way ANOVAs for the five i-Categories found that Tone differences were significant for each i-Category ($p<0.001$). Post-hoc LSD tests revealed significant differences among tones in each category (Figure 1).

4. Conclusions

The results showed 3 of our 4 predictions were upheld, except that the one for Tone 3: Perceiving Tone 3 as Uncertainty was not reliably supported; both Tone 2 and Tone 3 were equally assimilated to Uncertainty. Overall, NE listeners assimilate non-native Mandarin tones to their native English i-Categories that share substantial phonetic similarities between the pitch contours of English intonations and those of Mandarin tones. Thus, the hypothesis that assimilations of non-native prosodic categories (e.g., tones) to native prosodic categories – an extension from PAM – is supported.

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6. References