The Influence of Native Tonal Background on The Categorical Perception and Word Recognition of Lexical Tones in Chinese as L2

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Mandarin is a lexical tone language in which tones serve as suprasegmental phonemes that differentiate meanings by pitch contours. This language feature determines the importance of perceiving Mandarin tones correctly and using tone cues for lexical representation in spoken word recognition. Previous research has found that advanced native English learners of Mandarin had persistent difficulties in using tones for lexical recognition, although they showed a native-like performance in perceiving isolated monosyllabic tones. The present study was conducted to further investigate whether this phenomenon is widespread among non-tonal background learners of Mandarin and what specific effects native language background has on the categorical perception of Mandarin tone and word recognition.

This study conducted two behavioral experiments with three subject groups: Mandarin native speakers, advanced Mandarin learners whose first language is tonal, and advanced Mandarin learners whose first language is a non-tonal language. Experiment 1 was a tone categorical perception (CP) experiment, including tone identification and discrimination tasks, using Mandarin Chinese T1-T2 continuum as materials, to examine the categorization degree of tone perception for the three groups of subjects. Experiment 2 was an auditory lexical decision experiment using 46 bisyllabic real words (e.g., "xiang1jiao1", which means 'banana') and their corresponding vowel and tone-pseudowords (e.g., "xing1jiao1" and "xiang2jiao1," respectively) as materials, to examine the ability of different groups of subjects to use tones as lexical cues in Mandarin spoken word recognition.

The results of experiment 1 showed that: (1) the position and width of the category boundaries in the identification task and the within-category and between-category discrimination rates in the discrimination task did not significantly differ between the two groups of L2 learners and native speakers, indicating that the two groups of subjects had near-native level tone categorical perception ability. (2) In terms of the relationship pattern between recognition and discrimination performance, boundary width was significantly negatively correlated with the between-category stimulus discrimination rate in the tonal background group (r = -0.59), which was consistent with the native speaker pattern, whereas the two were unrelated in the non-tonal background group

The results of experiment 2 showed that: (1) the accuracy for real words (86%), vowel-pseudowords (84%), and tone-pseudowords (82%) did not significantly differ among tonal background learners and were consistent with the native speaker pattern, whereas the tone-pseudoword accuracy of the non-tonal background learners (70%) was significantly lower than that of real words (80%) and vowel-pseudowords (82%). (2) Between-group comparisons showed no significant difference in the accuracy of real words and vowel-pseudowords for both groups of learners, but the tone-pseudoword accuracy of the non-tonal background group was significantly lower than that of the tonal background group.

In terms of the relationship between the two experiments, the non-tonal background group's between-category discrimination rate had a significant negative correlation with the tone-pseudoword accuracy (r=-0.53) and a significant positive correlation with the reaction time of tone-pseudowords (r=0.58), while such correlations were not found in the tonal background group.

These results suggest that even at an advanced level, L1's tonal experience has an important influence on Mandarin learners' categorical perception and lexical representation of lexical tones. L2 Mandarin learners whose first language is a non-tonal language are more likely to face a lack of automation in the categorical perception of lexical tones and an underweighting of lexical representations of tones in the mental lexicon compared with learners from tonal language background.