Cantonese tone word learning by tone and non-tone language speakers

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Abstract

Adult non-native perception is subject to influence from a variety of factors, including native language experience. The present research examines the effect of linguistic experience on non-native tone perception and tone word learning. Native Thai and English-speaking participants completed seven sessions of lexical identification training on words distinguished by Cantonese tones. A tone identification task was administered before and after training. Both groups had comparable tone identification accuracy; however, Thai listeners obtained greater tone word learning proficiency. The findings suggest that native language experience with employing pitch lexically facilitates the incorporation of non-native tones into novel lexical representations.

Index Terms: lexical tone, word learning, Cantonese, non-native perception, linguistic experience

1. Introduction

1.1. Background

Over the course of native language (L1) development, the perceptual sensitivities of a given speaker become attuned to the critical acoustic characteristics of their L1, which may later cause "perceptual interference" when attempting to tune into the important cues of a foreign language [1]. However, it is not the case that all contrasts are uniformly challenging for all listener groups [2]. Learners' L1 phonetic systems can interact with the second language (L2) system, shaping perception and the formation of new phonetic categories (e.g. [3]).

Previous studies have reported that listeners' native phonetic systems affect the perception of foreign sounds, and that the interaction of new phonetic structures, both segmental and suprasegmental, with native ones can have a significant

2. Methods

2.1. Participants

Eighteen native Thai and sixteen native Canadian English adults participated in this study. All participants had no prior knowledge of Cantonese or any other lexical tone language (other than their L1). They also had less than 4 years of musical experience, and no experience within the last 5 years. Furthermore, they were college-educated and possessed normal hearing and cognitive abilities. The Thai group (10 male, 8 female; mean age: 22 years) was recruited from Chulalongkorn University in Bangkok, Thailand, and considered the Bangkok dialect (Standard Thai) to be their first and dominant language. The English participants (6 male, 10 female; mean age: 24) were recruited at Simon Fraser University and the University of British Columbia in Vancouver, Canada.

2.2. Stimuli

2.2.1. Pre-/post training identification task

Two native Cantonese speakers (1 male, 1 female) produced five CV monosyllables (*waj, low, si, pej, fu*) with five Cantonese tones (high-level, high-rising, low-falling, low-rising and low-level), for a total of 25 real-word stimuli. The mid level-tone was not included, as it may be easily confused for the high and low level tones, particularly in the absence of any contextual cues [4]. To maintain focus on the suprasegmental inflhation, the phhnhes were commonho Thai, English and Cantonese.

2.2.2. Training

Four novel speakers (2 male, 2 female) not used in the pre-/post-tests produced three CV monosyllables (*tsou, k^{w}aaj, wu*) with five Cantonese tones. These 15 words were associated with meanings (common concrete nouns), as represented by a picture presented on the screen. Pictures were selected from a set of 260 standardized pictures, controlled fr visual complexity and cultural familiarity [9]. Because participants would be receiving lexical identification training (learning sound-meaning pairings), these particular syllables were selected because they do not contain semantic content in Thai or English, so as to reduce lexical competition with existing words in participants' lexicons. The speakers were recorded in a sound-attenuated booth at a 44.1 kHz sampling rate.

2.3. Procedure

2.3.1. Pre-/post-training identification task

Both groups first completed a familiarization task in order to become familiar with the five Cantonese tones and learn how to identify th. They hch Cantonese tone pronounced in isolation and viewed a corresponding tone diagram on the screen. The participants were then asked to respond after each stimulus, identifying the tone they heard by pressing the number on the keyboard corresponding to the appropriate tone diagram. They received feedback onhe accuracy ofeir response as well as the correct answer. This task used productions of */ji/* by the female pre-/post-test talker. Three randomized repetitions produced a total of 15 trials, lasting approximately 2 minutes.

The maink was a five alternative forced-choice identification task, where the participants identified the tone of each syllable, similar to the familiarization section. However, they did not receive any feedback on their identification accuracy. They identified 100 randomized stimuli (5 syllables x 5 tones x 2 speakers x 2 repetitions), presented with an inter-stimulus-interval of 3 seconds. The task took approximately 8 minutes.

2.3.2. Training

Participants engaged in a series of seven training sessions, approximately 30 minutes each, administered on four separate days over the course of two weeks. Each day of training was separated by 2-4 days. They learned the full set of 15 training words and their associated meanings in each session. Training listeners on sound-meaning associations was utilized to simulate a m(h)-1arse "nhral" learning paradigm. Stimulus presentation and testing procedures were modeled after training in [7-8].

Each training session included 5 training blocks, 2 review blocks and a session test. The format of each training block consisted of listening to 4 randomized repetitions of 3 words while viewing the visual representation ofeir meaninh (2 speakers x 3 words x 2 repetitions). Each block of wo0 -1.r]TJ0 -1.1408 TD-.0 p 7tof 7.(evto res (o)v7.(evres a(ll)-8ey)(t)wc1(x)-8.7)(t)p2(2s)34(e 8t(g))5.7((oup

A significant main effect of Test was obtained [$F(1,32)=19.40$, $p<.0001$], indicating that participants significantly increased their lexical tone identification accuracy after training (41% to 54%). However, no significant group difference was found in tone identification accuracy across tests [$F(1,32)=2.505$, $p=.123$], as English (51%) and Thai listeners (45%) performed comparably. The interaction of Test x Group was also not significant [$F(2,32)=.965$, $p=.392$].

Figure 1: *Mean identification accuracy by tone across*

language, as well as to what degree these pairs are contrastive (e.g. lexical, pragmatic). In English, pitch has relatively low functional load, as stress and intonation are primarily used to mark grammatical contrasts or denote pragmatic or emotive information. On the other hand, pitch in Cantonese and Thai has high functional load, as it is used phonemically on all words. Given the present findings, it is perhaps more challenging for listeners to acquire words where there is an L1-L2 disparity in functional load for a contrast, particularly when they are required to shift from low to high functional load [13]. These listeners need to learn not only to attune to cues that hold less linguistic significance in their native language but also to apply them to make lexical contrasts.

On the other hand, with regards to the pre-/post-training tone identification task, it appears that having a tone language background is not necessarily advantageous for non-native phonemic tone perception, consistent with previous findings reporting no significant advantage of L1 tone experience on the identification of L2 tones [4]. The present results showed no significant difference in tone identification accuracy between the Thai and English groups across tests. However, group differences did arise with respect to tonal confusion and tonal accuracy patterns, which could be attributed to L1 influence. For instance, English listeners most commonly misidentified low-falling tones as low-level; whereas, the Thai