An Assessment of Non-Native Learner's Chinese Tone Production

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Abstract

Speech sounds are perceived categorically and listeners sometimes integrate visual information to identify the speaker's utterances (Ludden, 2016: 85-123). However, tone is a remarkable system. It could not be seen through physical movement and only the native speakers know how the different pitch affects the meaning of the word (Jain et al 2017: 66-71). This study is about to investigate the tones production of a Burmese speaker. After the total of 30 hours, 3-4 hours a week, of instruction and practice, the learner who performed the best in perception was assigned to produce the continuum utterance by reading 4 passages aloud. The voice recording was made. 15 Chinese native speakers were invited to rate the accuracy of tones of 242 syllables made by the informant. There are 182 syllables which were rated as correct. The inter-rater agreement, calculated by Kappa, is 0.66. The falling tone syllables got the highest percentage of accuracy while the rising tone got the lowest. The accuracy rate of each tone supports the Tonal Markedness Scale of Zhang (2002, 2004: 157-190) that falling tone is less marked than the rising tone. Furthermore, the familiarity of falling tone which exists in the informant's mother tongue also plays an important role in production.

Keywords : Language Learning, Phonology Perception, Mandarin Tones, Production

Background

Language learning is determined as a copy of the set of habit. For instance, learner learns the way to pronounce consonant or vowel sounds from sources and try to move their articulation in the same way. Like it was proposed in motor theory of Liberman et al (1957: 358-368), production of sound is made accordingly to the knowledge of how articulation produces the sound. Speaker makes in accordance with his/her language capacity. However, some sound features, especially the suprasegment like stress, intonation and tone, are hard to distinguish unless the speaker is the native of the language. It is hard because the suprasegment features produced by making the different tension of vocal folds. This causes different frequencies and intensity (Ladefoged 2006: 247-253). Tone is one of suprasegment features that could not be seen through physical movement. It is the set of fundamental frequency, perceived as pitch. There is no way to learn or copy the physical movement to produce these items, learners have to perceive and collect the data of frequency in their brain, practice a lot to check themselves until they have enough data to be able to produce the similar frequency.

This study finds the achievement of Chinese tone perception and production of the learner who has a different tone system in her native language, Burmese. Even the learner is able to discriminate the different pitch and the gliding movement due to the tonal feature in her native language, but Chinese tones convey lot more constraints than Burmese.

Related Framework

Tone system and constraints of Burmese and Chinese

Burmese is a part of Sino-Tibeto family. There have been several studies about tonal system in Burmese. It was mentioned in Muangwijit (1987) that there are five distinctive tones as following; a mid-rising falling tone, a mid falling tone, a low falling tone, a high rising falling tone and a high falling tone. While Jenks (2007) had summarized the tones' quality from studies of Bernot (1963: 1-164) and McDavid (1945: 1-4) and characterized five

distinctive tones in Burmese. From the studies also found that pitch in Burmese tones always fall at the end. The five tones categorized by Jenks P. are creaky tone, check tone, high tone, low tone and reduced vowels syllable. Even the considering tones come in different names, but there is a similar movement that the pitch always fall at the end of the syllable. Further in Jenks, the environment influences the tone occurrence as check tone would occur only in syllable end with glottal stop.

In contrast, Chinese tones consist of high-level tone (tone 1), low rising tone (tone 2), low falling-rising tone (tone 3) and high falling tone (tone 4). The similar tone feature in Burmese and Chinese is the falling tone. The rising of frequency at the end of utterance is not permitted in Burmese while Chinese allows the inventory of Tone 2 and 3 to have rising frequency. Besides that, Chinese tone is influenced by the surrounding syllable, especially the syllable that comes after. There are several tone Sandhi constraints as below (Chen, 2000).

The tone 3 Sandhi: tone 3 is changeable whether being low falling or high rising. The changes occur in accordance to the adjacent follow syllable. When tone 3 syllable(s) precedes another tone 3, the preceding one must be changed to tone 2 which is high rising tone. On the other hand, the tone would be made as low falling tone when it is in the final position of the utterance or precede the level tone.

The tone 2 Sandhi happens when tone 2 comes after the tone 1 or tone 2 and follows by any tone, it becomes tone 1.

The neutral tone occurs as the syllable becomes toneless when it is an unstressed syllable or being a function word in the sentence.

Yi-bu-qi-ba is the phenomena of the words that convey more than one lexical tone without the change of the meaning. The tone changes in accordance with its environment except when it works as a content word or being a part of phrase. This is the lexically marked that native speakers would retrieve which to use and to be considered.

The different movement of pitch between Burmese and Mandarin together with the tone Sandhi constraints would lead some difficulties in production among the learners, especially, in the long utterance. This study aims to investigate the acceptability of Chinese tones in long utterance produced by Burmese learner, and whether Tonal Markedness Scale affects the native tonal language learner.

Tone perception

Ning et al. (2014: 55-69) studied Mandarin tone learning in L2 adults by investigated the two types of tone perceptual: music tone discrimination and linguistic tone discrimination. The findings indicate that language experience affects the tone perception and production as the tonal language speakers as Mandarin speaker showed higher performance than those speak non tonal language.

Jain et al. (2017: 66-71) had studied the pitch discrimination capacity of the native Chinese speakers and native Kannada speakers. The study aimed to find out whether both listeners who have the different linguistic background would perceive the different of pitch in Mandarin or not. Another research question was the influencing of meaning on tone discrimination. Results indicate that both native and non-native groups performed similarly on tone perception. They perceived tones categorically without any influencing of the linguistic background. In addition to the steps of contour tone, Kannada listeners considered more steps in both falling-rising and rising-falling tone than the native listeners, especially the non-meaning word. The result pointed out that even both native and non-native are able to perceive tone categorically; the non-native listener would have wider range of categorization than the native.

Tone Production: The tone markedness scale

Zhang H. (2017: 57-80) had studied the factors that affect to the tone production. In the study, Tone Markedness Scale (TMS) proposed by Zhang (2002, 2004: 157-190) was the major point of discussion. 60 subjects of non-tonal language speakers; English, Japanese and Korean, were assigned to record the disyllabic words. The stimuli convey all of possible tone occurrence in Chinese. Two native raters, who are well trained in linguistics, were employed to check the accuracy of the productions. The study aimed to (1) find out whether TMS affects tones production of the subjects and (2) which tone in which environment were produced better.

According to TMS, level tone is unmarked while rising tone is a marked item among all of tones. It is easier to perceive and produce level tone or falling tone than the rising one. If the language allows the inventory of rising tone, then the falling tone and level tone are possible as they are less marked. Chinese is a good example for the language that contains both marked and unmarked items. It is hypothesized that there would be more errors occur in T2 (rising tone) which is more marked than T4 (falling). In this study, the T3 (falling-rising) was not focused as it could be assimilated to be whether T2 or unstressed according to the tone-Sandhi constraint.

Beside the TMS, position of occurrence also influences the perception capacity and production possibility. In production, rising tone would be most accurate when it's at the initial position while falling tone would have a better performance when it occurs at the final position. In disyllabic, the tone that usually be employed in case of error is T4, especially at the word-final position. At the initial, tone 2 would be more preferable.

The adjacent pitch affects to the tone as well. It is mentioned in tone articulation that the F0 of tone would change accordingly to the preceding offset value (Gandour et al 1994: 477-492, Xu 1997: 61-83). For instance, a low onset value rises when the preceding tone is high tone. On the other hand, the onset of a high tone will be lower to the maximum F0 value of the preceding low tone. However, the variation is not large enough to change the overall tone, there will be the most quality of tone remain that the listener can retrieve the possible tone.

The study indicated that T2 would have higher error rate than T4. According to the substitution frequency, T1 and T4 were the preferable choice substitution while T2 was used the least. The error occurrence in disyllabic pointed out that there were less errors of T2 at the initial position than the final. However, the error rate was still higher than T4 in both initial and final position. In conclusion, TMS plays an important role of production in this study. There are other factors led to the errors such as position of the target syllables and the coarticulation.

Methodology

Informant and assessors

The informant was chosen from 5 learners who performed the best in perception measure by pinyin transcription dictation. She is a native Burmese speaker at the age between 16-22 years old to be sure that his/her native languages are fully-developed. He/she must not have any experience in Mandarin training before the training in class.

The assessors are Chinese native speakers at the age between 16-22 years old, 14 females and 1 male. They do not have any disorder or loss of hearing. They were the students attended English classes in a private small-size university in Thailand for 8 months.

Data collection
Training session

The subject was trained to read pinyin transcription and tones in Mandarin for 30 hours. The instruction and practice were made once a week for 3-4 hours. The training focused only on pronunciation. The learners learnt the possible syllable in Chinese and the pinyin transcription. They learnt to read the pinyin and transcribe the sound they heard into pinyin. Moreover, they practiced pronunciation by speak after the instructor repeatedly.

Data collecting session

The subject was chosen, she was assigned to read 4 paragraphs which were transcribed in pinyin in an impromptu situation to see whether the subject was able to process the tone in the immediate situation. Subject had never seen the paragraphs before and had no time to practice. The recording was made with Audacity program by Samsung headset microphone.

Analysis

The stimuli were played in a quiet room with 2 speakers on the left and right in the front of the room. 15 Chinese native speakers sat separately and rated the heard stimuli whether the tones are correct or not. Kappa was employed to evaluate the inter-rater agreement. Below outlines for evaluation was proposed by Landis and Koch (1977: 159-174):

< 0	Poor agreement
0.01 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Result and discussion

The inter-rater agreement on rating the accuracy of the stimuli is in the substantial agreement rank (0.66). 182 syllables out of 242 are considered as correct by 13 - 15 raters (85% of all). According to the purpose of the study, I'll focus mostly on the syllables which are rated by more than 85% of all raters as the syllables are obviously considered as correct. The 182 correct syllables can be divided into 5 features as in table 1.

Table 1: Tonal production accuracy number

Tone feature	Total Syllables	Number of correct production
Tone 1 (high level tone)	55	42
Tone 2 (rising tone)	50	33
Tone 3 (falling-rising tone)	44	32
Tone 4 (falling tone)	78	66
Neutral (unstressed syllable)	15	9
Total	242	182

From the table 1, T4 syllables were occurred the most frequent among the 5 tones. The least occurrence is the syllable with the neutral tone which would not be concluded in the discussion. Possibility of T3 in the unchangeable condition is less than T1 and T2 included the syllables transmitted from original T3.

The total number of correct production rated by Chinese native speakers was 182 syllables out of 242 or 75.21%. T4 syllables have the highest accuracy rate with 66 syllables out of 78 syllables (84.62%). T2 and T3 received the closed number of correct production of

33 and 32, respectively. However, compared to the total number of syllable occurrence, T2 correct production is less than T3. Below figure presents the percentage of accuracy in production of each tone.
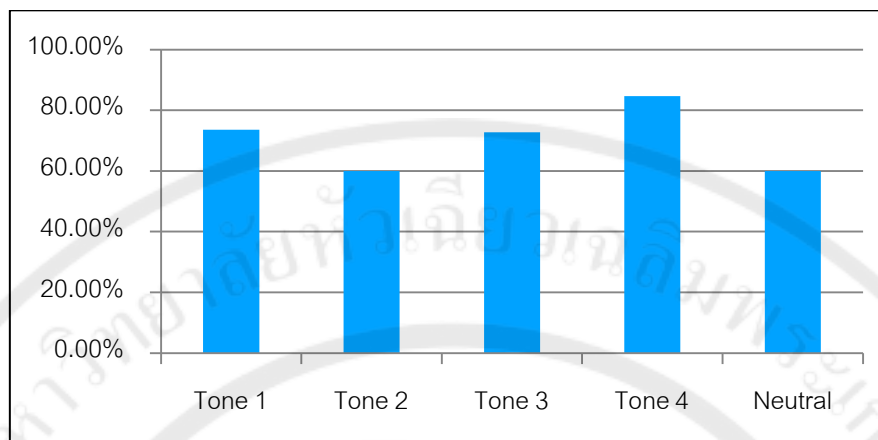
Figure 1 Percentage of accuracy in tone production in each category

According to the chart, it is obvious that the falling tone or T4 got the most accuracy rate for about 85%. T1 and T3 have the very close value of around 70 percent. T2 and neutral unstressed tone got the same value of 60 percent.

The high rate of accuracy of tone produced by Burmese speaker who learnt Chinese imitates that the production is acceptable among the Chinese native speakers. The result indicates that Tonal Markedness Scale (Zhang 2002, 2004) also affects the production even the learner is the speaker of a tonal language. Beside the level tone which is easy to perceive and produce in any languages, falling tone is less marked than the rising one. However, it is interesting that the subject showed poorer performance on the level tone or tone 1 than the falling tone.

Conclusion

Based on the findings, it is implied that the native language(s) of the learner plays some important role in perceiving new system and also in the production. The familiarity of native language and target language would be both advantage and disadvantage for learner. According to the result, learner performed well on syllables consist of the falling pitch, both in tone 3 and 4 while there was the difficulty in making rising pitch as in tone 2 syllables. Then, it is necessary to understand the nature of both native and target language to make the most appropriate teaching for different learners. Further studies should focus on how the position of the syllable affects tone production and also the types of tonal error occurred in the impromptu situation.

Furthermore, for other learners who could not achieve their goals in learning Chinese tones even they shared the same amount of instruction and practice, it is interesting to find the factors that block their abilities and strategies to overcome language learning obstacles.

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