A Comparison Between Speech and Musical Rhythms: A Case Study of Folk Music in Standard and Northern Thai

Chawadon Ketkaew

English Department, Faculty of Humanity, Chiang Mai University, Thailand

`Chawadon.k@cmu.ac.th`

Abstract

After the work of [1], nPVI is a popular tool used for investigating the relationship between speech and musical rhythm. Their work left an intriguing observation that music with lyrics will unsurprisingly reflect the same pattern as speech rhythm. Then, [2] tested whether popular music with lyrics between Standard Thai and Northern Thai would yield the same result as in [1]. The result did not confirm the hypothesis that the pattern of speech nPVI should be parallel to musical nPVI. They claimed that the incongruousness might have resulted from the influence of Western melodies on Standard Thai popular music. Thus, this experiment tries to find out whether genre can interfere with the relationship between speech and musical rhythm by looking at folk music in Standard and Northern Thai songs. The result showed that the nPVI values obtained from both speech and folk music of Standard Thai and Northern Thai are parallel. That is, the speech nPVI of Standard Thai was higher than the nPVI obtained from Northern Thai. In the same way, the nPVI in folk music of Standard Thai was higher than in folk music of Northern Thai. This result confirmed the hypothesis that speech rhythm can influence musical rhythm, and that genre is another factor that can interfere with the link between speech and musical rhythm.

Index Terms: nPVI, Standard Thai, Northern Thai, Speech Rhythm, Musical Rhythm, Folk music.

1. Introduction

Rhythm refers to patterns that are repeatedly organized and arranged in time, and it is a crucial component in both speech and music. In music, rhythm refers to the repetitive pattern of strong and weak beats arranged in time. It combines with the melody to create music. In a speech, rhythm refers to the arrangement of prominent elements (stressed and unstressed syllables) of the utterance. At this point, rhythm in speech and music seems similar. However, the empirical study of the relationship between the two is underdeveloped.

[1] gave a new method to compare the similarity of speech and musical rhythm by using the nPVI equation. The equation was used to examine the contrast of successive elements by treating syllables and musical notes as fundamental units of analysis. They observed the difference between English and French instrumental themes around 1900 and found that English and French, which have a different speech rhythm, influenced the musical rhythm. This method was then used by [3], [4] and [5] to examine the similarity between speech and musical rhythm across the languages. However, few studies look at the similarity between speech and musical rhythm within the dialects. [6], [7].

In Thai, there is a scarcity in the study of rhythmic properties within the dialects. An informal observation has been made that Standard Thai and Northern Thai are different in terms of rhythmic characteristics. Only the work of [8,9] examined the rhythmic characteristics between the two. Given the data of nPVI from both languages (Standard Thai (54.63) and Northern Thai (48.71)), their interpretation suggested that Standard Thai is a more stress-timed language than Northern Thai.

The difference between rhythmic characteristics of Standard and Northern Thai songs was further examined whether the two would demonstrate similar characteristics as shown in language. The work of [2] tested their hypothesis by looking at the 10 popular songs in Standard and Northern Thai. They analyzed the songs with lyrics to see whether popular songs would yield the same results as in [1]. The result, however, showed that the nPVI values obtained from speech and music in Standard and Northern Thai were not compatible. The nPVI values obtained from Standard Thai speech was higher than the Northern Thai's nPVI. In the music, the nPVI obtained from those two dialects was opposite to the nPVI obtained from speech. They suggested that this incongruousness might result from the influence of Western melodies on Standard Thai popular songs and that another genre like folk songs might yield results consistent with the speech.

To prove whether the genre affects the rhythmic similarity of the two languages, folk music with lyrics in both Standard Thai and Northern Thai were examined.

2. Literature Reviews

2.1. Standard Thai and Northern Thai language

Standard Thai and Northern Thai are the members of the southwestern branch of Tai-Kadai language family [10]. Standard Thai is an official language that is used throughout Thailand, while Northern Thai is a dialect spoken in Chiang Mai, Chiang Rai, Phayao, Nan, Phrae, and Lampang. The language is close to many Tai varieties spoken across Southeast Asia, including Lao and Shan [11]. Linguistically speaking, even though these two languages are in the same branch of a language family, they are considered as different languages. They have their own writing systems and the phonology of Northern Thai and Standard Thai is different. In terms of tones, Northern Thai has six tones, while Standard Thai has five.

2.2. Thai Songs

2.2.1 Standard and Northern Thai Folk music

According to [12], folk music in Thai is strongly related to people's lifestyles, plays, dance and ceremony. They may vary according to the regions, and they can reveal the culture, lifestyle and beliefs of local people. The folk songs in Thai are sung in different dialects according to their regions. Folk songs that are sung in the central part of Thailand are mostly performed with Standard Thai, while folk songs that are sung in the Northern part of Thailand are performed with Northern Thai.

Standard Thai and Northern Thai folk songs are similar in many aspects. The most important feature of the two is simplicity. They are sung and developed by the local people working in specific tasks, resulting in the simple lyrics and beats. They are developed from prose or utterances and composed of repetitive and simple words to facilitate memorization. Also, there are no fixed lyrics for both Standard and Northern folk songs, and singers can adapt them for different purposes. Typically, the lyrics are related to the local people's lifestyle. Folk music is primarily performed as an entertainment connection with the harvest season, Buddhist festival, or passing on some morals to the next generation. Moreover, musical instruments are simple, and their role is simply to maintain the rhythm of the music. For example, they use simple instruments like drums or "*Ching*" (Thai finger cymbals) to maintain their rhythm.

2.2.2 Thai popular songs

Thai popular songs have been influenced by Western civilization for over a half-century, and their popularity is still growing. According to [13], popular music in Thai can be classified into four groups: *"Pleng Luk Krung", "Pleng Luk Thung", "Pleng String"* and *"Pleng Puea Chiwit"*. However, in this study, the term "popular music" refers to *"Pleng String"* which can be classified with the following criteria. Firstly, popular songs are more modern than *"Pleng Luk Krung"* which is an imitation of Western music both in lyrics and music. Secondly, the form and the rhythm of popular songs are similar to Tin Pan Alley (AABA or ABAB). Finally, the main themes of popular songs are mainly about young love. Normally, Thai popular songs are similar to Western popular music, and they can be further classified into many sub-genres such as pop, pop-rock, or alternative pop. Northern Thai popular songs or *"Pleng Kam Mueang"* are similar to Standard Thai pop songs but are sung in Northern Thai.

2.3 nPVI equation

nPVI (normalized Pairwise Variability Index) is the equation that initially developed by phoneticians. It can examine rhythmic characteristics in languages. The equation aims to capture the variability of interval duration from the difference between the duration of two successive intervals. It can demonstrate the difference between the duration of stressed and reduced vowels. However, there is a concern that different speech tempo can directly affect vocalic durations, [14] normalized the durations of vocalic intervals using Equation (1).

$$nPVI = 100 \times \left\lceil \sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1})/2} \right| / (m-1) \right\rceil \quad (1)$$

From Equation (1), m represents the number of vocalic intervals present in an utterance, while d_k represents the duration of the kth interval. When measuring the nPVI for a given utterance, larger contrasts between successive durations result in higher nPVI value. If the language shows a lower nPVI, it might result from their less complex consonant clusters and a lack of vowel reduction. The language with lower nPVI is classified as a syllable-timed language. On the other hand, stress-timed languages will yield a higher value of nPVI due to more complex consonant clusters and the difference between reduced and stressed vowels. In [14], Thai, German and Dutch are among languages with higher values of nPVI, and they are stress-timed languages while Spanish and French are considered syllable-timed for their low nPVI.

The nPVI was then used to compare the rhythmic similarity of speech and music as well. [1] compared English and French speech and music, as shown in Figure. 1,
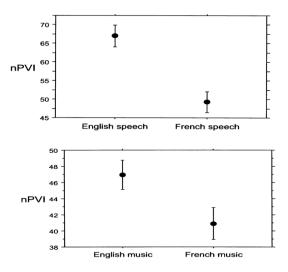

Figure.1. The nPVI of English and French musical themes compared to speech [1].

From Figure 1, [1] found that the nPVI of English in both music and speech yield more durational contrast (a higher nPVI) than did in French music and speech. The result from [1] is one of the evidence showing that speech rhythm can influence musical rhythm.

The method was further used in analyzing the rhythmic similarity of speech and music across the dialects. [7] found that the vocalic duration variability among the dialects is correlated with the vocalic duration variability of music as well.

However, [1] avoided analyzing music with lyrics because they thought that it would unsurprisingly affect musical rhythm. However, the research of [2] examined the relationship of rhythmic characteristics of Standard Thai and Northern Thai in both music and speech. 10 Standard and 10 Northern Thai popular songs were analyzed, and the result showed that the nPVI obtained from speech and the nPVI obtained from music are not compatible. They left the hypothesis that maybe the genre of music might have an influence on this incongruousness.

3. Method

3.1. Speech data

The speech data in this study were retrieved from [8,9]. The spontaneous speech was recorded from three native speakers of each language. 46 utterances in Standard Thai and 40 utterances in Northern Thai were then segmented and labeled into vocalic and consonantal intervals using Praat. Also, the interval boundary which begins with a stop consonant was excluded from the analysis for consistency. To avoid lengthening effects, the last syllables of each utterance were excluded. The clear patterns of vowel formants were marked as vocalic interval boundaries. Then, the duration of 486 vocalic intervals in Standard Thai and 520 vocalic intervals in Northern Thai were then computed into nPVI values using Equation (1). The average nPVI values for Standard Thai and Northern Thai were 54.63 and 48.71, respectively.

3.2. Musical data

10 Standard Thai folk songs and 10 Northern Thai folk songs were randomly chosen. The selected Northern Thai folk songs were sung by singers from Chiang Mai, which is the same as the speech participants. In [1], only the chorus in each music is analyzed, but for this study, the whole songs are analyzed as it would represent the rhythmic characteristics of songs better than analyzing only the chorus as they did. Musical phrases of each folk song are parsed according to their syntactic boundaries. Also, the last note in each musical phrase was excluded to avoid lengthening effect. Each note of the musical boundaries will be assigned the duration according to their time signatures. For example, a half note in 4/4 is assigned a duration of 2, and the eighth note is assigned as ½ as in Figure 2.

Figure 2. Example of note duration coding

Note durations obtained from this conversion were then analyzed in Equation (1) to get the musical nPVI value. Then, a Two-sample t-test was used to compare the means with a .05 level of significance.

4. Result

According to the previous study [2], the average nPVI value of Standard Thai speech (54.63) is higher than that of Northern Thai speech (48.71). However, the average nPVI value of Standard Thai pop songs (33.38) was found to be statistically significantly ($p < 0.05$) lower than that of Northern Thai pop songs (41.95).

In this study, the nPVI values obtained from 10 Standard Thai folk songs range from 36.12 to 81.91, while the nPVI values obtained from Northern Thai folk songs range from 13.54 to 45.25. The average nPVI values of speech and music, both in popular and folk music, in Standard Thai and Northern Thai are shown in Figure 3.
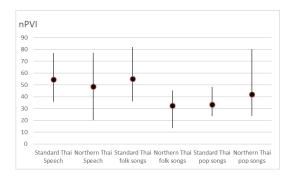

Figure 3. Speech and musical nPVI in Standard Thai and Northern Thai

From Figure 3, again, the average speech nPVI of Standard Thai (54.63) was higher than that of Northern Thai (48.71). In the same format as in speech, the average nPVI value of Standard Thai folk songs (55.15) was found to be statistically significantly ($p < 0.05$) higher than that of Northern Thai pop songs (32.54).

5. Discussion

The result obtained from Standard and Northern Thai folk songs confirm the hypothesis, saying that speech rhythm can influence musical rhythm. The result also refutes the claim that spoken prosody will leave an imprint on the music of a culture. Genre, on the other hand, is a crucial factor that can interfere with the associations between rhythm in speech and music.

It is found in this study that even though the songs are categorized in the same genre, the variation is still high. *"Pleng Rum Tone"* like *"Chart"* provided the highest nPVI value (81.91) in Standard Thai folk songs, whereas *"Choi"* provided the least nPVI value (36.12). This difference can be accounted for the difference in the period of origin. *"Pleng Rum Tone"*, became popular after World War II, while the origin of *"Choi"* can be traced back to King Rama V's era (1868-1910). Moreover, if the nPVI can capture the similarity between speech and music rhythm, future studies may examine songs from different periods to see whether the rhythmic characteristics vary or not. It may serve as supporting evidence for the change of speech rhythms over time.

6. References

[1] Patel, A.D., Iversen, J.R., Rosenberg, J.C.: Comparing the rhythm and melody of speech and music: the case of British English and French. J. Acoust. Soc. Am. 119(5), 3034–3047

[2] Ketkaew C, Sawanakunanon Y. A Comparison Between Musical and Speech Rhythms: A Case Study of Standard Thai and Northern Thai. In International Workshop on Language, Music, and Computing 2017 Apr 17 (pp. 58-64). Springer, Cham.

[3] Huron D, Ollen J. Agogic contrast in French and English themes: Further support for Patel and Daniele (2003). Music Perception: An Interdisciplinary Journal. 2003 Dec 1;21(2):267-71.

[4] Jekiel M. Comparing rhythm in speech and music: The case of English and Polish. InYearbook of the Poznan Linguistic Meeting 2014 Dec 1 (Vol. 1, No. 1, pp. 55-71). De Gruyter Open.

[5] London J, Jones K. Rhythmic refinements to the nPVI measure: A reanalysis of Patel & Daniele (2003a). Music Perception: An Interdisciplinary Journal. 2011 Sep 1;29(1):115-20.

[6] Lee CS, Brown L, Müllensiefen D. The musical impact of Multicultural London English (MLE) speech rhythm. Music Perception: An Interdisciplinary Journal. 2017 Apr 1;34(4):452-81.

[7] McGowan RW, Levitt AG. A comparison of rhythm in English dialects and music. Music Perception: An Interdisciplinary Journal. 2011 Feb 1;28(3):307-14.

[8] Sawanakunanon, Y.: Segment timing in twelve Southeast Asian languages. Manusya 20, 124–156 (2014)

[9] Sawanakunanon, Y.: Segment timing in Southeast Asian languages: implications for typological classification. Unpublished Doctoral Dissertation, Chulalongkorn University, Bangkok (2012)

[10] Herington J, Potter M, Ryan A, Simmons J. Sociolinguistic Survey of Northern Thai. Linguistics Institute, Payap University; 2012.

[11] Lewis MP. Ethnologue: Languages of the world. SIL international; 2009.

[12] Yannavut W. An exploration of Thai traditional music for Western percussion instruments.

[13] Eamsa-Ard L. Thai popular music: the representation of national Identities and Ideologies Within a Culture in Transition.

[14] Grabe, E., Low, E.L.: Durational variability in speech and the rhythm class hypothesis. In:Gussenhoven, C., Warner, N. (eds.) Laboratory Phonology 7, pp. 515–546. Mouton de Gruyter, Berlin (2002).