

Manual Conversion of Sadhukarn to Thai and Western Music Notations and Their Translation into a Rhyme Structure for Music Analysis

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Abstract: Sadhukarn plays an important role as the most sacred music composition in Thai, Cambodian, and Lao music cultural areas. Due to various versions of unverified Sadhukarn main melodies in three different countries, notating melodies in suitable formats with a systematic method is necessary. This work provides a data descriptor for music transcription related to 25 different versions of the Sadhukarn main melody collected in Thailand, Cambodia, and Laos. Furthermore, we introduce a new procedure of music analysis based on rhyme structure. The aims of the study are to (1) provide Thai/Western musical note comprehension in the forms of Western staff and Thai notation, and (2) describe the procedures for translating from musical note to rhyme structure. To generate a rhyme structure, we apply a Thai poetic and linguistic approach as the method establishment. Rhyme structure is composed of melodic structures, the pillar tones Look-Tok, and melodic rhyming outline.

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Dataset License: CC0

Keywords: Sadhukarn; Khong Wong Yai; music notation; rhyme structure; Look-Tok



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1. Introduction

Sadhukarn is an important traditional music piece in Thailand, Laos, and Cambodia that has been worshiped by musicians and dancers. It has been played for opening ceremonies and feasts, at the beginning as a prelude to salute and invite the holy items, i.e., deity and spirit of ancestor teacher, as well as the power of *Triratna* (the three jewels in Buddhism) that is the way to get a blessing and prevent misfortune [1,2]. In other words, Sadhukarn is used as a symbolic medium to sanctify unfavorable conditions, and process time-space to become a pure, holy and auspicious moment-place.

Originally, this musical piece was composed and played by *Wong Phi Phat*, a traditional percussion ensemble including four kinds of instrument such as oboe, gong chime, xylophone, barrel drums, and cymbals [1,3]. Sadhukarn's melody transmission has been passed down directly from teacher to student by oral tradition. Normally, the composition is relatively stable, and performers usually do not have liberty to make variations spontaneously.

Sadhukarn is a primary musical work in the first level of the sacred repertoire that all Thai/Laos and Cambodian musician have to learn. For beginner students, the initiation ceremony or *wai kru/sampeah-kru* is required by a music master before learning Sadhukarn. Especially in Thailand, Sadhukarn is commonly the first piece taught to students following the *wai khru* ceremony. Student beginners have to learn the main melody of Sadhukarn, played on the large gong circle *Khong Wong Yai* [4].

Although Sadhukarn main melodies occurring in Thailand, Laos, and Cambodia are similar in terms of using ensembles, instruments, and customs, the nature of oral tradition using memorization provides musicians with an opportunity to decorate, modify, or even change melodies independently [4]. As a consequence, there are many different versions of the Sadhukarn main melody among different countries and even within the same country. Furthermore, the notations of different versions of the Sadhukarn main melody are still not fully documented and the existing documentation has not been proven or systematically analyzed. Actually, musical notational systems exist in Thai/Lao/Cambodian music for transcribing traditional musical compositions, for instance Western staff, Thai solfege, and tablature. It should be noted, however, that essential musical details in these notations are still missing. Moreover, traditional music from Thailand, Cambodia, and Laos normally contains rhyme music structure and a variety of poetic elements that have not been considered so far. Essentially, music rhyme is a music aesthetic element based on poetic consonance. It determines a music composition in term of structure, form, characteristic, melodic motion, etc. Similar to poetry and song, music rhyming is a presentation of the consonant pitches of notes existing both in the same and different music phrases. This can be challenging for music analysis based on the Eurocentric perspective in ethnomusicological study which does not include the rhyme music structure.

Studying music in Western traditions usually includes analyzing repertory based on a standardized system emphasizing Western music notation [5]. In different ways, traditional music in Thailand, Cambodia, and Laos are clearly distinguished from Western art music in term of compositional form and structure, tone and notational system, and transmission. In other words, to study music that lies outside the European culture using methods from Western traditions is an impediment to a deep understanding and listening to music in such a way as a local musician would. Thus, it is necessary to create a new approach for translating music melody into rhyme structures that can be efficiently used to identify the hidden melodic rhymes and structure. Furthermore, the rhyme music structure approach could alternatively be a neutral way to analyze all music without a biased view.

In this study, we aimed to (i) transcribe/modify 25 different versions of the Sadhukarn main melody collected from Thailand, Laos, and Cambodia, as well as their border areas, into Thai and Western notations and (ii) develop a new concept for music analysis using rhyme structure. Firstly, we systemically transcribed/modified 25 different versions of the Sadhukarn main melody collected from Thailand, Laos, and Cambodia, as well as their border areas, into Thai and Western notations (Table 1). We further proved the notations of these 25 different versions of the Sadhukarn main melody. We propose a novel approach for music analysis based on rhyme structure. Our work has the potential to play significant role in music analysis of non-Western cultures.

Table 1. Information of the 25 versions of the Sadhukarn main melody using in this study.

No	Name of Version	Location	Geographical Co-Ordinate	Sources	Published/ Collected Year
1	Thai Fine Arts Department [TF]	Bangkok, TH	13.759778, 100.491639	Book (Western notation)	1950
2	Luang Bamrung Chit Chareon [TB]	Bangkok, TH	13.759778, 100.491639	fieldwork	2015
3	Samran Kerdphol I [TS1]	Ayutthaya, TH	14.42825, 100.482139	fieldwork	2015
4	Pinij Chaisuwan I [TP1]	Ayutthaya, TH	14.579583, 100.511917	fieldwork	2015
5	Thai music ensemble of Bangkok [TK]	Bangkok, TH	13.773298, 100.559729	Book (Thai Notation)	1989

Table 1. Cont.

No	Name of Version	Location	Geographical Co-Ordinate	Sources	Published/Collected Year
6	Chub Sowat [TC]	Ayutthaya, TH	14.464167, 100.605556	thesis (Western notation)	1990
7	Chue Dontrirod [TD]	Ayutthaya, TH	14.458333, 100.37	thesis (Western notation)	1990
8	Tuen Phatayakul [TP]	Petchaburi, TH	13.111944, 99.943889	thesis (Western notation)	1990
9	Thawin Attakisna [TT]	Ayutthaya, TH	14.4625, 100.544722	thesis (Western notation)	1990
10	Pinij Chaisuwan II [TP2]	Ayutthaya, TH	14.579583, 100.511917	thesis (Western notation)	1990
11	Rasi Phumthongsuk [TR]	Bangkok, TH	13.725306, 100.466167	thesis (Western notation)	1990
12	Siri Nakdontri [TN]	Samut Songkhram, TH	13.424722, 99.957222	thesis (Western notation)	1990
13	Sangobsuek Thamviharn [TW]	Bangkok, TH	13.738358, 100.532097	thesis (Western notation)	1990
14	Samran Kerdphol II [TS2]	Ayutthaya, TH	13.739917, 100.491722	thesis (Western notation)	1990
15	Subin Chankeaw [TJ]	Sing Buri, TH	14.892222, 100.317222	thesis (Western notation)	1990
16	Sadhukarn Chan Dio [TTP]	Ayutthaya, TH	13.739917, 100.491722	Book (Western notation)	2015
17	Keo Sonankavai I [KS1]	Phnom Penh, CA	11.564944, 104.928111	fieldwork	2014
18	Keo Sonankavai II [KS2]	Phnom Penh, CA	11.564944, 104.928111	fieldwork	2014
19	Royal University of Fine Arts [KR]	Phnom Penh, CA	11.564944, 104.928111	fieldwork	2016
20	Ban Pang Lang [IP]	Sa Kaeo, TH	14.008111, 102.792194	fieldwork	2016
21	Ban Nong Sai [IN]	Buriram, TH	14.523544, 102.771032	thesis (Thai Notation)	2015
22	Boonthieng Sisackda I [LB1]	Vientiane, LAO	17.948722, 102.642167	fieldwork	2014
23	Boonthieng Sisackda II [LB2]	Vientiane, LAO	17.948722, 102.642167	fieldwork	2014
24	Boonthieng Sisackda III [LB3]	Vientiane, LAO	17.948722, 102.642167	modified	2014
25	Boonyadech Meunsanit [LY]	Luang Prabang, LAO	20.21, 102.62	fieldwork	2014

2. Data Description

The dataset contains 25 versions of the Sadhukarn melody obtained from Thailand, Laos, and Cambodia. In this study, 16, 4, and 3 versions were obtained from Thailand, Laos, and Cambodia, respectively, and 2 versions were obtained from the border area of Thailand and Cambodia (Sa Kaeo and Buriram provinces, Thailand). Name, locations, geographical co-ordinates, sources, and dates of all versions of the Sadhukarn melody are presented in Table 1. The version obtained from the book “evening prelude” by the Thai Fine Arts Department (TF) was used as the model for Western music notation [6]. However, we modified the notation of this version for performing practice by the addition of hand positions and music ornament. Among these 25 versions of the Sadhukarn melody, 10 versions by Sumetus Eambangyung were collected. These include Luang Bamrung Chit Chareon (TB), Samran Kerdphol I (TS1), Pinij Chaisuwan I (TP1), Keo Sonankavai I–II (KS1

and KS2, respectively), Royal University of Fine Arts or RUFA (KR), Ban Pang Lang (IP), Boonthieng Sisackda I–III (LB1, LB2, LB3, respectively), and Boonyadech Meunsanit (LY). There are 10 versions of the Sadhukarn melody in the form of Western notations obtained from the MA thesis of Narongchai Pidokrajt [4]. However, we modified these notations according to our model music notation. We further converted these variations into Thai notation and rhyme structure. There are two versions—Thai music ensemble of Bangkok (TK) and Ban Nong Sai (IN)—which were transcribed into Thai solfège notation [7,8]. We then converted these variations into Western notation and rhyme structure. One variation was self-modified from Vientiane I, based on Laos’s historical background information by a Laotian music master (Boonthieng Sisakda).

3. Materials and Methods

By historical and cultural background, the musical materials of Thailand, Cambodia, and Laos are similar—that is, the seven fundamental tones are used as the basic of composition, and their music repertoires are common, though there may be slight differences in terms of name and ornamentation [8–10]. Therefore, to transcribe all different versions of the Sadhukarn main melody into the same notation form is practicable. To transcribe the main melodies of Sadhukarn through Western music score along is profitable. On one hand, using Western music notation for recording the Sadhukarn main melodies of Thailand, Laos, and Cambodia is very helpful for worldwide musicians and/or music scholars who are interested. The Thai music notation, on the other hand, is effective for transcribing the music and also suitable for many local musicians in Thailand, Laos, and Cambodia who cannot read Western music scores. The rhyme music structure, a new music analysis method created first in this study, represents the hidden poetic and linguistic structure existing in the various variants of Sadhukarn main melodies with the visible outline.

3.1. Music Transcribing from Fieldwork Audio and/or Video into Notation

There are two types of music data source for the transcribing: audio and video recordings from field trips and music documentaries, i.e., music scores and a master’s thesis. All music data from fieldwork came from self-observation and participation of the first author of this study as a music observer/student with the informants/music teachers. A sound recorder application on a Samsung Galaxy G7 smartphone was used for recording all main Sadhukarn melodies as audio sound, while a Sony Handycam HDR-CX240E video camera was used for recording videos of the music lesson, performances by informants/music teachers, interviews, etc. From the audio and video record, notations were assigned according to their pitches. Performing practices and music decorations were determined by the video record. All these obtained data were combined to generate the notations of different versions of the main melody (Supplementary Files S1 and S2).

3.2. Transcribing Thai Music Notation into Western Music Notation

For transcribing the Sadhukarn main melodies from Thai into Western music notation, we decided to use the Thai Fine Arts Department method by Phra Chen Duriyanga [11] and Yun Khean [12] for determining notes and pitches played in Khong Wong Yai. Briefly, notation of Khong Wong Yai is written in a five-lines staff with treble clef in 2/4 m. The instrument consists of 16 tuned gongs arranged by pitch from low to high. For Thai traditional music, there are two scale systems or *Thaang* used to play with the instruments including *Thaang Phi Phat* (the scale system for Wong Phi Phat or a percussion ensemble) and *Thaang Mahori* (the scale system for Mahori ensemble or a combination of percussion and string ensemble). The difference between these two scale systems is that *Thaang Phi Phat* begins note C at the 7th pitch degree of a gong, whereas note C for *Thaang Mahori* shifts back to the 6th degree (Figure 1). According to the octave naming and Scientific Pitch Notation Method (SPN), the 1st gong head (from the far left) as the position of lowest pitch starts from bass D or D₃. The following pitches from 2nd to 16th are E₃, F₃, G₃, A₃, B₃, C₄, D₄ . . . , B₄, C₅, D₅, and E₅ sequentially (Figure 1).

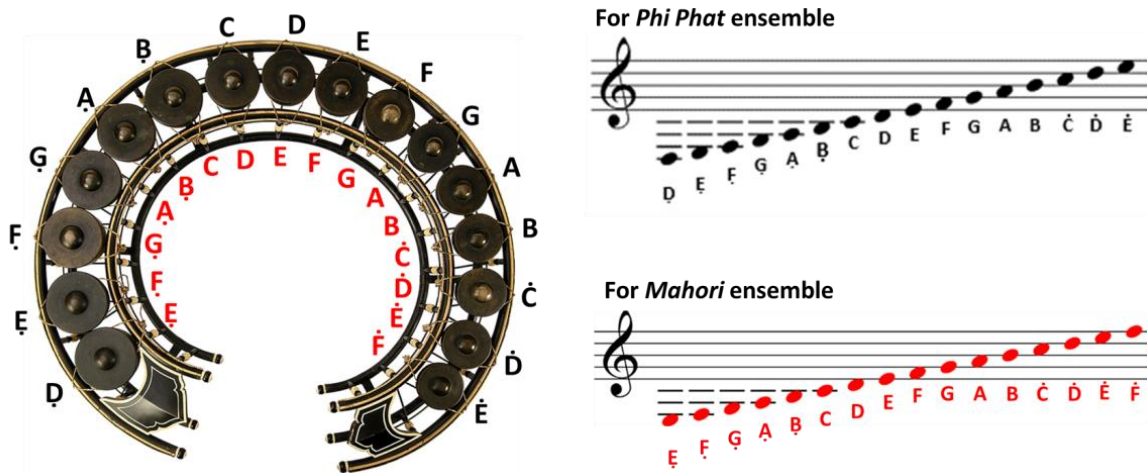


Figure 1. Presenting the notation, pitch, compass, and scale systems of Khong Wong Yai.

Due to the consistency with the Thai notation system, we applied a sign “dot” (.) to determine the pitch of notes instead of using numbers. The dot under the letter is for every low pitch note in a small octave, and the dot above the letter is for every high pitch note in a two-line octave, for example $\underset{\cdot}{D}$ = D3, $\overset{\cdot}{D}$ = D5. In addition, two letters (L and R) are used for determining the hand striking (Figure 2). Western music notation of the Sadhukarn main melodies collected in Thailand, Laos, and Cambodia are presented in Supplementary File S1.



Figure 2. Demonstrating the introduction phrase of the Sadhukarn main melody in Western staff notation (I) and Thai solfege notation (II).

3.3. Transcribing Western Music Notation into Thai Music Measure

For transcribing music into a Thai music measure, we decided to use the Thai solfege notation system for determining notes, pitches, and hand striking. The Thai music measure is designed to write syllable notes in a two-layered horizontal table with vertical lines that separate the table into 8 measures equally [12–14]. Each measure consists of 4 rhythmic units, in which 1 unit equals 1 syllable or one sixteenth note in Western music. The total rhythmic length of one lined measure is 32 rhythmic units or 4 measures in Western staff notation. Especially for *Khong Wong Yai*, two layers on the music measure is set to determine hand striking; top row = right and bottom row = left (Figure 2).

According to notation using in a Thai music measure, seven solfege syllables written in the Thai alphabet, including ด, ร, ม, ฟ, ส, ล, and ต (daw, raw, maw, faw, saw, law, and taw corresponding to do, re, me, fa, sol, la, and ti, respectively), are assigned to be the notes written down in the measure. (Tables 2 and 3). Besides this, a dot sign is used to represent pitch determination. The dot under the letter is for every low pitch note in a small octave, and the dot above the letter is for every high pitch note in a two-line octave, for example $\underset{\cdot}{ร}$ = D3, $\overset{\cdot}{ร}$ = D5 (Figure 2). Thai music notation of the Sadhukarn main melodies collected in Thailand, Laos, and Cambodia are presented in Supplementary File S2.

Table 2. The solfege syllables with pronunciation using for transcription in this study.

Pitch Class No.	1	2	3	4	5	6	7
Thai solfege	๑	๒	๓	๔	๕	๖	๗
Western Note	C	D	E	F	G	A	B
Pronunciation	do	re	mi	fa	sol	la	ti

Table 3. Pitch range and compass of Khong Wong Yai in Thai and Western syllable.

Pitch Degree ¹	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Thai	๑	๒	๓	๔	๕	๖	๗	๘	๙	๑๐	๑๑	๑๒	๑๓	๑๔	๑๕	๑๖
Western	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E

¹ This pitch range is for Phi Phat ensemble.

3.4. Rhyme Music Structure

The rhyme music structure was obtained by the combination of data from Thai and Western notations. Specifically, the material outcomes synthesized by Thai music measure and solfege syllables in Western music notation are applied for setting the rhyme structure format. For a better efficiency of music structure analysis, we analyzed it using Thai music syntactic approach adopted from linguistic and poetic ideas.

The format of rhyme music structure is designed as a horizontal lined table. The vertical lines separate a table into 16 measures. Each measure equals two Thai rhythmic units or one eighth note in Western staff notation. Thus, the total length of rhythmic units per one lined table is 32 Thai rhythmic units or 4 measures of Western staff notation. In order to assign data into a measure, only 16 units of Thai syllabic musical notation and/or tie symbol (-) occurring in rhythmic units of even number are obtained. To define Thai rhyme music structure, a skeletal note or “Look-Tok” in Thai musical terms is a necessary material used for the process. Briefly, the smallest pitch-unit in Thai music composition, Look-Tok, is a significant note that is played to present the end of a musical phrase [3,13]. The position of Look-Tok, according to Thai musical phrase length (one Thai musical phrase equals five measures in Western staff notation or eight measures in Thai music notation), is normally at the last beat of the phrase. In other words, it is placed permanently at the last rhythmic unit in Thai measure notation (at the fourth beat of measure eight) or the first accented beat of measure five of Western staff notation. For Thai musicians, Look-Tok has been known as “pillar tone” because it is used to define the melodic structure as well as the melodic contour in reductive form, and also specifically used to shape a melodic outline [3]. A melodic outline is similar to an ideal block for musicians to create individual idiomatic melodies and variants. Although there is traditionally one Look-Tok for one musical phrase, the other seven notes occurring in Thai music measures as last rhythmic units present their accented sound and function in a similar way to the characteristic of Look-Tok (Figure 3). Furthermore, it seems the pitches present rhyming sounds that link all musical phrases together, like rhyming verse (Figure 4). Therefore, we determined the seven partial notes mentioned above to be the secondary pillar tones and used these as the factors in order to represent the melodic rhyme and alliteration appearing in Sadhukarn main melody.

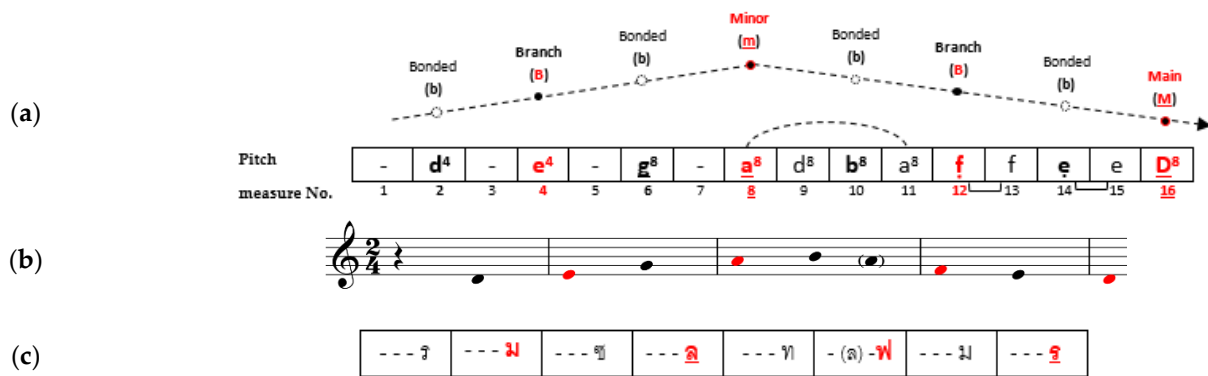


Figure 3. The positions of pillar tones (Look-Tok) occurring in the introduction phrase is represented in Thai rhyme music structure (a), Western staff (b) and Thai music measure (c).

A – 0: Introduction (P0)

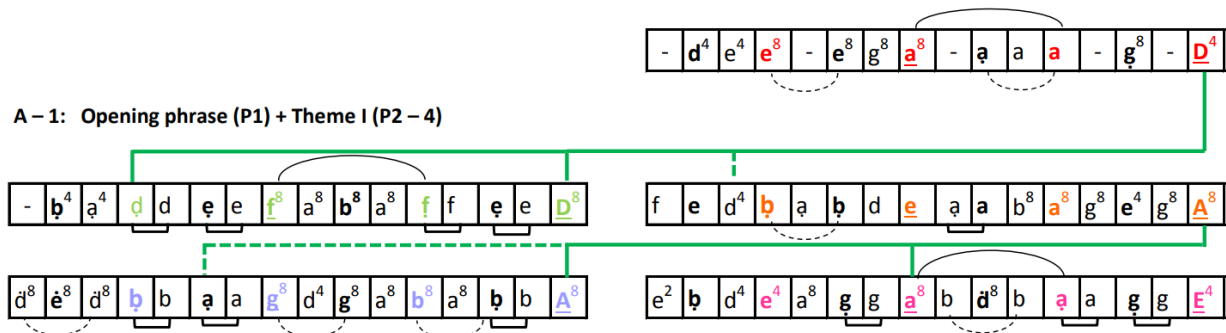


Figure 4. Demonstrating the introduction (Phrase 0), opening phrase (Phrase 1), and Theme I (Phrase 2–4) of the Sadhukarn main melody in rhyme music structure, which melodic rhymes including internal (above arc black line) and external (green line), alliterations (below arc black—dashed line and below black line), and scheme are comparable to Thai poetic structure.

Following the approach mentioned above, Look-Tok could be further divided by ranking according to 3 types, as follows:

Minor Look-Tok is a minor pillar tone placed at the half of musical phrase or at the end of the first musical sentence. Minor Look-Tok identifies the melodic identity like the main Look-Tok and joins musical sentences together. Its position is at the first beat of measure three in Western staff notation or the fourth rhythmic unit of measure four in Thai measure notation.

Branched tones are two tones used to link music segments together. These kind of tones are placed at the first accented beat of measure two and four in Western staff notation or at the fourth rhythmic unit of measure two and six in Thai measure notation.

Bonded tones are four of the partial pillar tones occurring at the second accented beat of measure one, two, three and four in Western staff notation or at the fourth rhythmic unit of unit of measure one, three, five, and seven in Thai measure notation.

According to the melodic symbols using in rhyme structure, seven solfege written in Western syllables, including C, D, E, F, G, A, and B, respectively, are assigned to be the notes written down in the measure. The characteristics of typography i.e., bold, colored, size, etc. are used to define and classify the type of pillar tones played in each measure. Furthermore, there are three types of melodic symbol adapted from Thai music notation providing the levels of interval and pitch, as well as the structure of melodic rhyme. Dataset of rhyme structure is provided in Supplementary Material (<https://doi.org/10.5281/zenodo.7248870>). This dataset can be used for a wide spectrum of music analysis. Rhyme structure of the Sadhukarn main melody collected in Thailand, Laos, and Cambodia are presented in Supplementary File S3.

The outcome based on analysis of music rhyme structure, the different numbers of phrases occurring in 25 versions of the Sadhukarn main melody in Thailand, Laos, Cambodia, and border areas are presented as a bar chart (Figure 5). The Sadhukarn main melody in Thailand had significantly higher numbers of phrases (54) than those in Laos (32), border areas (32) and Cambodia (20). In addition, the number of Look-Tok in different positions using variety of intervals and hand strikes is also presented in Supplementary Material (Supplementary File S4), including first and second segments and overall summary.

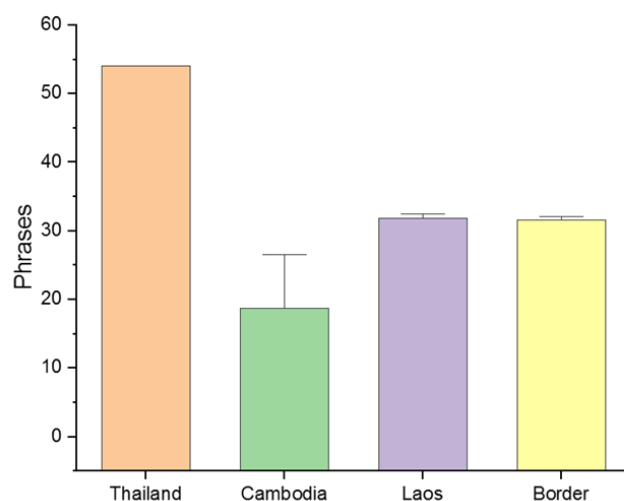


Figure 5. Average numbers of music phrases occurring in 25 versions of the Sadhukarn main melody in 4 different origins (error bars = SE).

4. Conclusions

In this study, we successfully transcribed and recorded 25 versions of the Sadhukhan main melody from Thailand, Laos, and Cambodia. We also developed a novel procedure for music analysis based on rhyme structure. The music transcription process produced Thai measure notation, Western staff notation, and rhyme music structure which allows us to comprehend the correlation between Thai and Western notational systems and to characterize the rhyme structure, pillar tone, and melodic line contained in a dataset. In addition to notating the Sadhukarn main melody, the music transcriptions can be identified with nationality, location, source, and number of phrase (Tables 1 and 4). Furthermore, the dataset of rhyme music structure can be correlated with melodic diversity. This dataset can be used for a wide spectrum of music analysis related to melodic structure, pillar-tones, intervals, rhyming position, and characteristics. We emphasize the identification of melodic origin, diversity, similarity, cluster, and lineage.

Table 4. Types and position of all pillar tones (Look-Tok) appearing in Western Staff, Thai music measure, and rhyme structure.

Types of Look-Took	Look Took Position in Western Staff	Look Took Position in Thai Music Measure	Look Took Position in Rhyme Structure
1. Main Look-Tok (M)	1st beat; measure 5	4th beat; measure 8	measure 16
2. Minor Look-Tok (m)	1st beat; measure 3	4th beat; measure 4	measure 8
3. Branched tone (B)	1st beat; measure 2 and 4	4th beat; measure 2 and 6	measure 4 and 12
4. Bonded tone (b)	2nd beat; measure 1, 2, 3, 4	4th beat; measure 1, 3, 5, 7	measure 2, 6, 10 and 14

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/data7110150/s1>, Supplementary File S1: Western music notation of Sadhukarn main melody collected in Thailand, Cambodia, and Laos. Supplementary File S2: Thai measure notation of Sadhukarn main melody collected in Thailand, Cambodia, and Laos. Supplementary File S3: Rhyme structure of Sadhukarn main melody collected in Thailand, Cambodia, and Laos. Supplementary File S4: Look-Tok in different positions of Sadhukarn main melody collected in Thailand, Cambodia, and Laos. <https://doi.org/10.5281/zenodo.7248870>, accessed on 13 August 2022.

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