

**THAI POETRY READING:  
PHONETICS AND PHONOLOGY**

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# THAI POETRY READING: PHONETICS AND PHONOLOGY

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## Abstract

This paper studies the articulatory and acoustic correlates as well as the phonology of Thai poetry reading from a well-known male reader. The verses studied were selected from all five types of poetry; *klooy* (โคลง), *tɕʰǎn* (ฉันท์), *kàap* (กาพย์) *klɔɔn* (กลอน) and *râaj* (ร่าย) from high school textbooks. The reading was tape-recorded and laryngoscopic-videotaped in three different reading styles: normal reading, regular chanting and emotive chanting. The acoustic results were compared with those of a well-known female reader studied by Tumtavitikul (2000, อภิลักขณ์ 2540). The data are found to be very comparable; the raising and/or lowering of the first formant, the shape of the amplitude contour in a crescendo on stressed syllables, and the patterns of the fundamental frequency. However, the laryngoscopic study seems to indicate a different method employed from that of the female reader.

The voice qualities of both male and female readers which can be said to be quite similar confirm the voicing qualities of Thai poetry reading especially those of chanting styles which are perceived as models for teaching. It is these perceivable qualities that have been passed along for imitation. The articulatory correlates found in this study help clarify the aspects of articulation and seem to argue for phonetic motor equivalences.

## 1. Introduction

The pilot study on articulatory and acoustic correlates in Thai poetry reading (Tumtavitikul 2000, 2001, อภิลักขณ์ 2540) investigated a well-known female poetry reader in reading portions of selected pieces from all five types of Thai poetry in three different styles; normal reading, regular chanting and emotive chanting. Acoustic measurements were made on the sound recorded and a laryngoscopic video-tape of the actual reading of poetry samples was observed. It was reported that the amplitude contours on stressed syllables corresponding to metrically strong syllables were observed to be in a crescendo in chanting styles as opposed to a regular shape with peak amplitude during the syllable-nucleus and decreasing towards syllable-final in normal reading. The first formant was found to have a lower average frequency in chanting styles when compared with normal reading. In observing the larynx, the epiglottis was found to be lowered and fully covered the glottis during the stressed syllables. The aryepiglottic folds tightly sphinctered forming medial compressions on stressed syllables in both chanting styles, more so in the emotive chanting style.

In order to confirm voice qualities and articulatory gestures, and specifically to confirm that the laryngeal gestures observed were not just individual techniques, we replicated the initial study by studying a well-known award-winning reader who is

a model male reader for highschool textbooks. Our goal was to compare the data with those of the female reader. Our assumptions were that the voice qualities would be similar between the two readers and the articulatory gestures would be the same.

## 2. Data

Samples of all five types of Thai poetry; *klooŋ*, *tɕʰǎn*, *kàap*, *klɔɔn* and *râaj*, selected from standard highschool textbooks were read and tape-recorded in three different reading styles (normal reading, regular chanting and emotive chanting) at a studio by an award-winning model reader. Video-laryngoscopy was also performed on this same reader while reading sample portions of all the five types of poetry in all three different reading styles at a well-known private hospital in Bangkok. Acoustic investigations were made on a Kay Elemetrics 3700 Multi-Speech program; fundamental frequency, first formant, duration and amplitude were observed, measured and calculated.

### 2.1 Acoustic Features

The average fundamental frequency (F0) of each type of poetry in all types of reading styles, and the F0 ratio of each type of chanting style and normal reading style in every type of poetry were measured, calculated and summarized in tables 1 and 2 below.

	โคลง <i>klooŋ</i>	ฉันท์ <i>tɕʰǎn</i>	กาพย์ <i>kàap</i>	กลอน <i>klɔɔn</i>	ร่าย <i>râaj</i>
Average F0 (Hertz)	145.68	152.46	162	129.67	161.52
Normal reading	145.68	152.46	162	129.67	161.52
Regular chanting	194.54	168.45	192	174.87	201.10
Emotive chanting	196.35	200.25	192	192.52	202.24

**Table 1:** Average fundamental frequency (f0) in Hertz for each type of poetry in each type of reading style (male).

In general, the average Fo is higher in both chanting styles when compared with the normal reading style of each type of poetry. Between the two chanting styles, emotive chanting is found to have a higher pitch (tbl. 1). The Fo ratios of both types of chanting styles and the normal reading style show a pitch raising effect which in both chanting styles is between 2-7 semitones. The pitch raising is found to be greater in *klɔɔn* and *klooŋ* than in other types of poetry (tbl. 2).

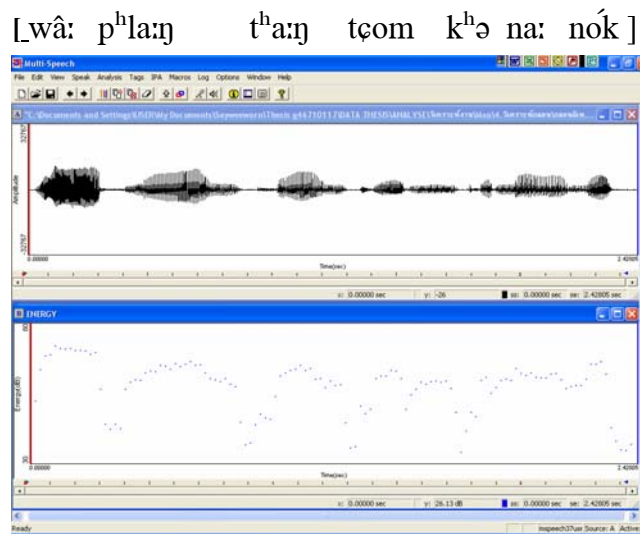
As for amplitude, in all types of poetry, the energy contour is a crescendo in most syllables, especially stressed syllables which are metrically strong in both chanting styles (figs.2 & 3). The crescendo effect is more obvious in emotive chanting (fig. 3) and may be seen as an ascending contour ending with a high plateau in regular chanting (fig. 2). Whereas in the normal reading style, the amplitude contour is in a normal shape ascending from syllable initial to peak amplitude at the syllable nucleus and descending from there on to the end of the syllable in all syllables (fig.1).

For duration, metrically strong syllables on all hierarchical tiers in the metrical structure are more or less longer than those that are “unstressed” or “weak” in all

types of poetry across all three reading styles. The length is more pronounced in chanting styles than in normal reading (tbls. 3 & 4).

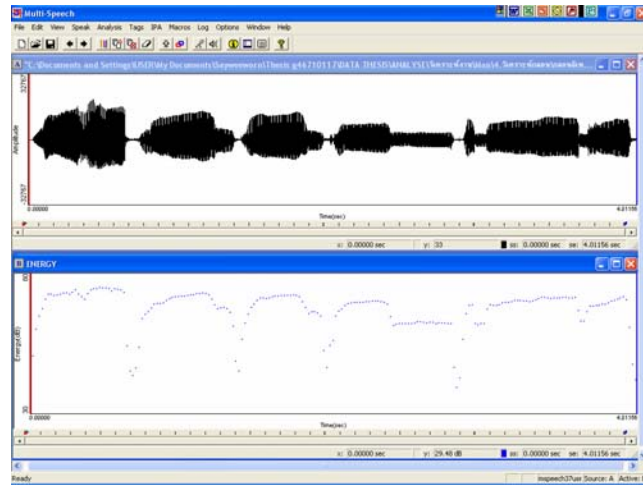
		Chantings(Hz)	NR(Hz)	Ratio	Semitones
<i>klooy</i>	RC: NR	194.54	145.68	1.335	5
	EC: NR	196.35	145.68	1.348	5.2
<i>tɛ<sup>h</sup>ǎn</i>	RC: NR	168.45	152.46	1.105	1.8
	EC: NR	200.25	152.46	1.313	4.7
<i>kàap</i>	RC: NR	192	162	1.185	3
	EC: NR	192	162	1.185	3
<i>klɔɔn</i>	RC: NR	174.87	129.67	1.349	5.2
	EC: NR	192.52	129.67	1.485	6.9
<i>râaj</i>	RC: NR	201.01	161.52	1.244	3.7
	EC: NR	202.24	161.52	1.252	3.8

**Table 2:** Average F0 ratio of regular chanting (RC) vs. normal reading (NR), and of emotive chanting (EC) vs. normal reading (NR) for each type of poetry (male).



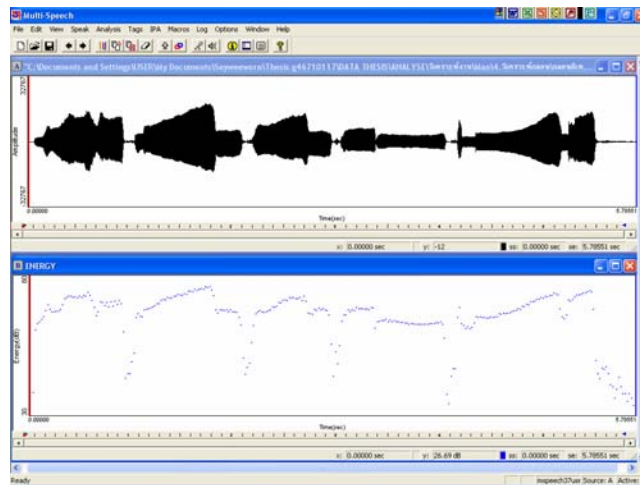
**Figure 1:** Sample waveform and amplitude contour in normal reading style from a *wák*, which is comparable to a metrical phrase, from *klɔɔn ìnǎw* (male). (กลอนบทละครอิเหนา ตอนสี่กะหมังกุหนิง “ว่าพลาทางชมคณานก”)

[ wâ: p<sup>h</sup>la:ŋ t<sup>h</sup>a:ŋ tɔm k<sup>h</sup>ə na: nók ]



**Figure 2:** Sample waveform and amplitude contours in regular chanting style from a *wák*, which is comparable to a metrical phrase from *klɔwŋ ìnǎw* (male). (กลอนบทละครอิเหนา ตอนสี่กษัตริย์ “ว่าพลาตางชมคณานก”)

[ wâ: p<sup>h</sup>la:ŋ t<sup>h</sup>a:ŋ tɔm k<sup>h</sup>ə na: nók ]



**Figure 3:** Sample waveform and amplitude contours in emotive chanting style from a *wák*, which is comparable to a metrical phrase from *klɔwŋ ìnǎw* (male). (กลอนบทละครอิเหนา ตอนสี่กษัตริย์ “ว่าพลาตางชมคณานก”)

Syllable Duration (Second)	รอน รอน	รอน รอน	วอน อ่อน	át อัส	สอ ส	ดอง ดง
Normal Reading	0.417	0.557	0.339	0.179	0.199	0.426
Regular Chanting	0.571	0.959	0.459	0.198	0.239	0.798
Emotive Chanting	0.996	1.459	1.319	0.297	0.238	1.129

**Table 3:** Duration of syllables, which are comparable to *k<sup>h</sup>am* (คำ), within a *wák* (วรรค), which is comparable to a metrical phrase, in three reading styles from *kàap práte<sup>h</sup>aisurija*: (male). (ภาพย์ยานี 11 ภาพย์พระไชย สุริยา). The metrical structure of the *wák* is [ [- ] Σ [ | - - | ] Σ ] P

	bòt1 บท 1				bòt 2 บท 2			
	bàat บาทเอก		bàat2 บาทโท		bàat1 บาทเอก		bàat2 บาทโท	
Metrical Phrase [wák] Duration (Second)	wák1 วรรค1	wák2 วรรค2	wák3 วรรค3	wák4 วรรค4	wák1 วรรค1	wák2 วรรค2	wák3 วรรค3	wák4 วรรค4
Normal Reading	2.12	2.56	2.17	2.67	2.32	2.65	2.00	2.53
Regular Chanting	3.22	4.33	3.41	3.84	3.26	4.33	3.04	3.70
Emotive Chanting	5.44	6.72	5.35	6.08	4.75	5.89	4.17	5.70

**Table 4:** Sample *wák* duration in a *bàat* (บาท), and in a *bòt* (บท), which is comparable to a stanza, in three reading styles from *kàap práte<sup>h</sup>aisurija*: (male). (ภาพย์ยานี 11 ภาพย์พระไชย สุริยา)

For formant frequencies, the average first formant (F1) of the vowel [a] shows a tendency to be higher in both chanting styles than in the normal reading style, and more so in emotive chanting. However, it is noted that the vowel [a] in *klooŋ* is in the opposite direction where F1 in normal reading has the highest frequency and the first formant tends to be lower in chanting styles and is lowest in emotive chanting (tbl. 5).

F1 (Hertz)	Reading Style	a
<i>klooj</i>	Normal reading	698.81
	Regular chanting	693.45
	Emotive chanting	662.32
<i>tɛ<sup>h</sup>ǎn</i>	Normal reading	674.79
	Regular chanting	751.13
	Emotive chanting	844
<i>kàap</i>	Normal reading	719.17
	Regular chanting	761.59
	Emotive chanting	830.35
<i>klɔɔn</i>	Normal reading	749.44
	Regular chanting	755.5
	Emotive chanting	799.58
<i>râaj</i>	Normal reading	792.91
	Regular chanting	929.37
	Emotive chanting	1058.66

**Table 5:** Average first formant frequency (F1) in Hertz of the vowel [a] in all types of poetry in each type of the three reading styles

## 2.2 Laryngeal Gestures

The laryngoscopic video-tape reveals that in chanting styles, the epiglottis is often lowered but does not fully cover the glottis. Aryepiglottic folds do not seem to tightly sphincter. The Supraglottal mechanism against the base of the epiglottis may only approximate and does not form a full closure. The articulatory of which is described for voiceless epiglottal fricative (Esling 1996).



**Figure 4:** Male reader pronouncing “Suang” in “Suang sawan” in emotive chanting “สรวง” ในคำว่า “สรวงสวรรค์” ในการ อ่านทำนองเสนาะแบบเน้นอารมณ์ กลอนสามกรุง ( ข )

To compare the laryngeal gestures with the female reader, the laryngoscopic video-tape of the female reader was reviewed. The epiglottis was observed to fully cover the glottis during stressed syllables in both chanting styles (figs. 5). The adduction of arythenoid cartilages and the tightly sphinctering of the aryepiglottic folds were noted on stressed syllables in chanting styles. Also, viewed in the posterior-anterior position of the larynx (fig. 6). It seems that the supraglottal mechanism forms a full closure against the base of the epiglottis. Such gestures are described for voiced epiglottal fricatives (Esling 1996).



**Figure 5:** The adduction of arythenoid cartilages and the tightly sphinctering of the aryepiglottic folds were noted on stressed syllables in chanting styles for female reader



**Figure 6:** Female reader pronouncing “Suang” in “Suang sawan” in emotive chanting  
 “สรวง” ในคำว่า “สรวงสวรรค์” ในการ อ่านทำนองเสนาะแบบเน้นอารมณ์ กลอนสามกรุง (ญ)

### 3. Discussions

#### 3.1 Voice qualities of Thai verse chanting

The acoustic features observed in our present male reader seem to be more or less comparable to those of the female previously investigated (Tumtavitikul 2000, 2001, อภิลักษณ์ 2540). The similarities are in the raising and/or lowering of the first formant, the shape of the amplitude contour in a crescendo especially on stressed syllables, and the shifting of the pitch level in both chanting styles as compared with normal reading style.

It is reported for the female reader that in the particular *klɔɔn* observed, the average F0 was higher in ascending order from normal reading to regular chanting to



emotive chanting. The opposite was found in the particular *klooy* observed where F0 was found to be higher in normal reading style than in both chanting styles. The direction of the F0 shift, either up or down from the normal pitch level may depend on the type and content of the poetry read. The first formant of vowel [a] for the female reader is reported to be lower in both chanting styles when compared with normal reading in *klooy*.

The F1 of the vowel [a] in our present male reader tends to be higher in chanting styles in all types of poetry except *klooy* where normal reading is found to have the highest F1 values (tbls. 5). F1 in both readers for *klooy* are thus, in agreement. While the shifting of Fo in the female data shows bi-directional in chanting styles, our male data shows a unidirectional shift in both chanting styles in all types of poetry without exception (tbls. 1 & 2). As for amplitude contour, the crescendo shape was found on stressed syllables in both chanting styles in the female data. Our male reader frequents the crescendo contour in most syllables in both chanting styles (figs. 2 & 3). The crescendo is more pronounced in emotive chanting than in regular chanting where some contours level off in a high plateau at the end of the syllables.

The duration (tbls. 3 & 4) of prosodic constituents at all hierarchical levels measured ; *k<sup>h</sup>am* (คำ) which is comparable to a syllable, *wá<sup>k</sup>* (วรรค) which is comparable to a metrical phrase, *bàat* (บาท), and *bòt* (บท) which is comparable to a stanza, seems to support the metrical structure of Thai poetry (Tumtavitikul 2001) where the meters are always right-headed.

In order to gain more insight on the average Fo shift in both chanting styles, which is unidirectional for the male reader and bi-directional for the female reader, F0 was reinvestigated over several phrases in a continuum for each type of poetry read in both chanting styles. A striking pattern of alternate Fo as two split pitch levels, one higher and the other, lower, is found in the male reader. An alternate Fo pattern is most obvious in *klawn* (กลอน) as shown in figure 7 below.

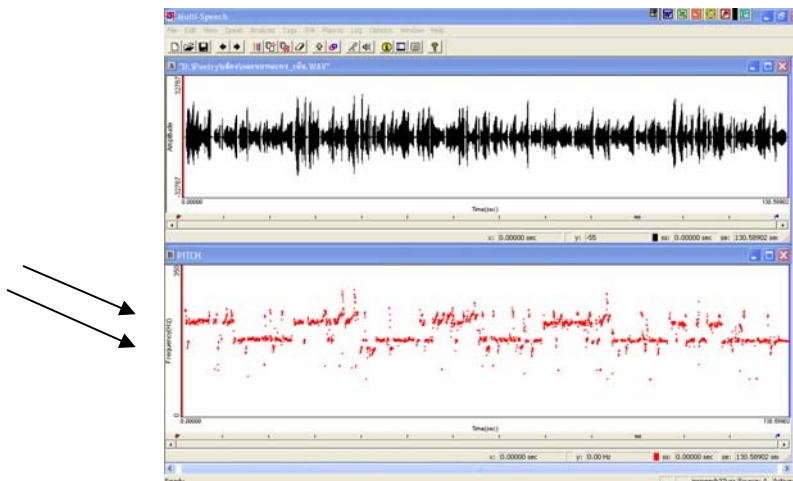


Figure 7: The alternate pitch levels found in male emotive chanting in *klawn ináw* (กลอนบทละครอิเหนา ตอนศึกกะหมังกุหนิง “ว่าพลางทางชมคณานก...”)

For this particular portion (fig. 7), which consists of 6 phrases or *wāk* (วรรค) from *klɔɔn inǎw* (กลอนบทละครอิเหนา ตอนสี่กษัตริย์หนึ่ง “ว่าพลาทางชมคณานก...”), the average higher pitch is 216.14 Hz. and the lower pitch, 177.99 Hz., with 3.3 semitones difference.

This leads to a similar investigation on the female data in chanting styles. Dual (or multiple) pitch levels are found in the female reader as shown in figure 8. For this particular portion (fig. 8) of *klɔɔn sǎmkruy* (กลอนสามกรุง “สรวงสวรรค์...”), the average pitches displayed for the female are 331.12 Hz and 171.97 Hz., with 11.4 semitones, almost one octave difference.

For both readers, the striking pitch patterns are more pronounced in the emotive chanting style than in the regular chanting style.

In summary, overall voice qualities in Thai poetry reading, specifically in chanting styles, may be said, to a certain extent, to be the combination of all these acoustic features observed. These features are summarized in table 6 below.

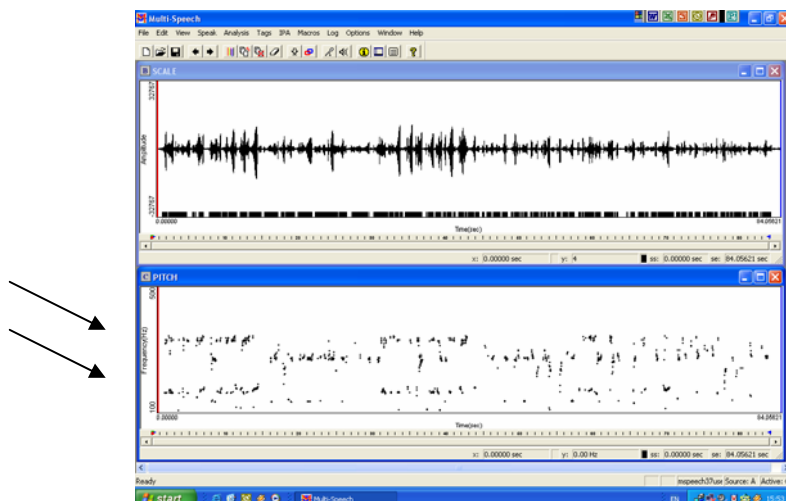


Figure 8: The dual pitch levels found in female emotive chanting of *klɔɔn sǎmkruy* (กลอนสามกรุง “สรวงสวรรค์...”)

### 3.2 Acoustic and laryngeal correlates

Esling, Fraser and Harris (2005) proposes a model of the larynx and supraglottal cavity as a tube with three successive valves, one on top of another, which are the lower parts of the arytenoids and the vocal folds, the ventricular folds and the aryepiglottic folds and the epiglottis. Each valve is interdependent of one another in varying degrees. The “laryngeal constrictor” mechanism at the uppermost part of the supraglottal cavity primarily involves the sphinctering mechanism of the aryepiglottic folds being active articulators and the epiglottis as the passive articulator. The acoustics and the laryngeal gestures observed in both male and female Thai poetry readers in the present study may be interpreted in light of the proposed model of the larynx and supraglottal cavity (Esling, Fraser and Harris 2005) in that

both our readers utilized the laryngeal constrictor mechanism initiated by the aryepiglottic folds to a different degree. Such entails the various degrees of the lowering of the epiglottis fold over the larynx. It is the complex gestures involved in this laryngeal mechanism that prolongs the syllable duration in verse chanting as compared to less complex gestures involved at a lower level of the so-called “tube” in normal reading. The various degrees of the epilaryngeal constriction are responsible for the modulation of the air-flow resulting in the varying shapes of crescendo of the amplitude. The raised larynx which may be set as a default for the laryngeal constrictor mechanism is responsible for the raising of the first formant. Vice versa, the lowering of the larynx is a probable cause for the lowering of the first formant. As for the coupling of pitch in the female reader and the alternate pitch in split levels in the male reader, it is possibly a result of an attenuation of the harmonics to the nearest formant frequencies, a technique known as “throat singing” which involves supraglottal sources such as aryepiglottic folds, ventricular folds, other than the vocal folds (Levin and Edgerton 1999). The different patterns in the two readers are subject to further scrutiny in future research.

Acoustic features in chanting styles	Male reader	Female reader
Fundamental frequency (F0)	In general, F0 shifts to higher average F0	F0 shifts to either higher or lower average F0, depending on the type and content of poetry
	When viewed continually over several phrases, there are two alternate pitch levels, higher and lower, forming two pitch registers	When viewed continually over several phrases, there are two (or more) parallel frequencies with high intensity; two (or more) pitch levels co-occur
First Formant (F1)	For the vowel [a], in general F1 is higher with an exception of [ <i>klooy</i> ] where F1 is lower	F1 is lower for the vowel [a] in [ <i>klooy</i> ]
Amplitude	Amplitude contour is in a crescendo on stressed syllables, and may also occur on most syllables	Amplitude contour is in a crescendo on stressed syllables
Syllable duration	Longer in chanting styles	Longer in chanting styles
	Longer on stressed syllables	Longer on stressed syllables

**Table 6:** Summary of acoustic features of chanting styles (male and female)

#### **4. Conclusion**

The voice qualities of Thai poetry reading in chanting styles which can be said to be quite comparable between the male reader in our present data and the female reader reported earlier (Tumtavitikul 2000) and presently reinvestigated, are characterized by: 1) the shift of average fundamental frequency to either higher or lower than normal reading, 2) the two (or more) pitch levels which either alternately occur or co-occur, 3) the prolonging of syllable and phrasal duration and 4) the raising or lowering effect of the first formant, together with 5) a crescendo in loudness on stressed syllables which may also apply to most syllables. These are the unique characteristics of chanting styles in Thai poetry reading. These are perceivable qualities that are passed along for imitation in formal and informal instructions. The information obtained from laryngoscopic studies helps clarify the articulatory and phonatory aspect correlates of these acoustic features.

It has been long observed by phoneticians that in achieving the same acoustic end results, there may be more than one articulatory gesture. The gestures producing similar end results are known as being “motor equivalent” (Ladefoged 2006). Such are, for example, ‘flap’ and ‘tap’ in English. Overtly, the two consonants may sound similar and may even be said of being the same sound to ordinary ears. Articulatorily, they are produced with minor differences. Taps are produced with the tongue tip moving vertically whereas flaps are produced with, more or less, a horizontal tongue tip movement from back to front in the oral cavity. Motor equivalences may be said of the method employed by these two Thai model poetry readers. While the female reader seems to articulate with full epiglottal closure in chanting styles, the male reader seems to have a lesser degree of epiglottal folding over the larynx. The differences may be compared to the articulation of epiglottal voiced and voiceless fricatives (Esling 1996). The differences are primarily the different degree of constriction of the aryepiglottic folds in the supraglottal cavity (Esling, Fraser and Harris 2005).

The findings have implications for language instruction. One can be more precise as to how the verse chanting is to be read. Mere imitations from auditory input may result in different methods used by the learners, which may or may not achieve the desirable end results. Moreover, the clarities on articulation and phonation help preserve the strategic verse chanting methods for later generations to appreciate fully the aesthetics of Thai poetry reading.

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