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A Laryngoscopic Study of Chong Registers

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ABSTRACT

Chong, a Pearic language of the Mon-Khmer family is described with four registers; clear, clear and creaky, breathy, and breathy and creaky. The voice qualities have been investigated instrumentally by observing salient acoustic features and by studying the glottograms through inverse filtering. Both of these previous instrumental studies provide indirect information on the glottal state in vowel production. This paper is set out to explore the larynx itself through a direct investigation of the configuration and movement of the larynx by means of videolaryngoscope recording. The findings help clarify the production of the four registers and have implications for phonological representations.

Key words: Chong, Chong registers, endangered language, laryngoscope, Mon-Khmer language

CHONG REGISTERS

Chong is an endangered language with approximately 500 speakers in Thailand and another 5,000 in Cambodia (Ethnologue, 2002; Chareontham, 1987; Suphanphaiboon, 1982). The language is currently undergoing a language revitalization program in Thailand. All the previous studies; Huffman (1985), L-Thongkum (1992), Edmonson (1996), are on Chong spoken in Thailand. The distinctive voice qualities for the four registers have been described auditorily as produced with tense vowel, tense vowel with glottal coda, lax vowel, and lax vowel with glottal coda, respectively (Huffman, 1985)--tenseness being the quality with glottal constriction throughout the vowel production. A study on acoustic features; pitch contour, amplitude onset, formant frequencies and vowel duration, suggests that tense and lax qualities are the effects of two distinctive modes of phonation; modal and breathy, glottal coda being creakiness superimposed on the later portion of the vowel (L-Thongkum, 1996). Hence, the four registers with long vowels are transcribed phonetically as [vv, v̰v, v̤v, v̰̤v] The analysis is taken up and supported by a study on the glottal wave through inverse filtering (Edmonson,

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1996).

All of these previous studies are indirect implications of the laryngeal activities during vowel production. The features instrumentally observed are the physical manifestations of the laryngeal state. The laryngoscope provides a direct investigation of the configuration of the larynx as well as the movements involved for each production of the so-called 'register'. This study is an investigation of the larynx itself.

PROCEDURE

The subject for this laryngoscopic study is a 31 year old male speaker from Tambon Pluang, Chantaburi. The videolaryngoscope was performed on him using an Olympus CV-140 at a private hospital in Bangkok. The laryngoscopic video was recorded as he spoke 40 basic vocabularies. Each word was given to him in Thai and he was to say it slowly and as clearly as possible three times in Chong. Pauses were made inbetween words. The list consists of words with four registers in long and short vowels. The words were also tape-recorded separately on a Sony WM-SR1 cassette recorder and analyzed acoustically on a CSL 4300 and also with the Speech Analyzer version 1.5 program. The acoustic data was compared with those of two native male speakers, 50-55 years old, who were tape-recorded separately on a cassette recorder at a local site in the reservation area in Chantaburi province.

FINDINGS AND IMPLICATIONS

Main features of laryngeal activities observed based on Esling 1999 and Esling, Clayards, Edmonson, Qiu and Harris 1998 are larynx elevation, tongue retraction and laryngeal sphincter. Vocal cords and glottal configuration were also observed whenever possible. Generally, the following were found:

1. Words with the first register (R1). As illustrated in Figures 2 and 3, the larynx is either slightly raised or neutral, with no tongue retraction. The distance of the larynx from the posterior pharyngeal wall seems to slightly increase, which may indicate the opposite effect of tongue root retraction. Ventricular folds are slightly sphinctered but not to the point that the glottis is fully covered.

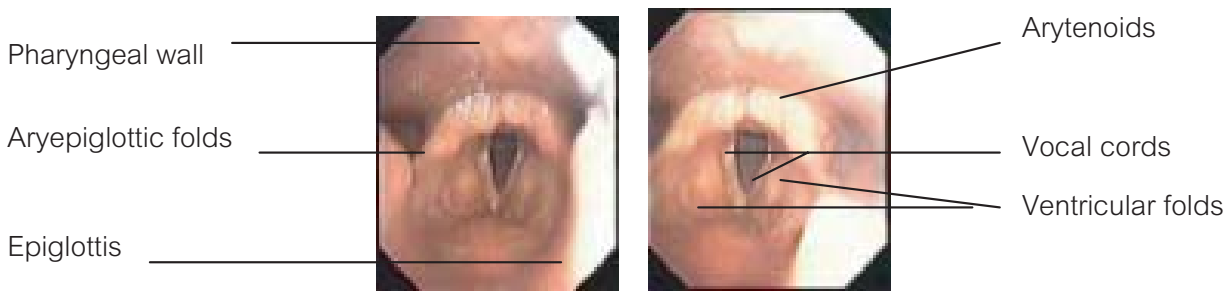

Figure 1 Neutral position during breathing- no larynx elevation , tongue retraction, nor laryngeal sphinctering.

Vocal cords are normal as seen in the neutral position in Figure1. Vocal cords are clearly seen thoughout the production of the word.

2. Words with the second register (R2). As shown in Figure 4, the larynx is slightly raised. Ventricular folds are sphinctered but not completely covering the glottis. Some opening at the posterior end of the glottis is seen.

Epiglottis is lowered to some degree in the picture to the right, but it is not to the extent of folding

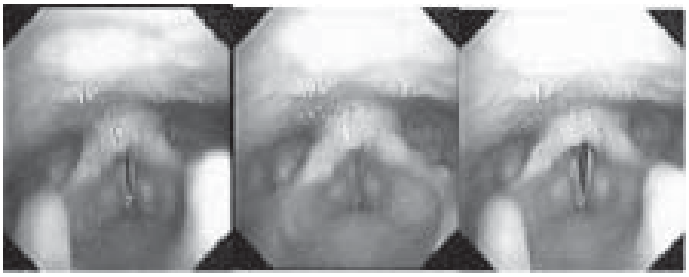

Figure 2 [ceew] "go" R1 in sequence with slight larynx elevation seen in the middle frame. Vocal cords are clearly seen as normal as in the neutral position.

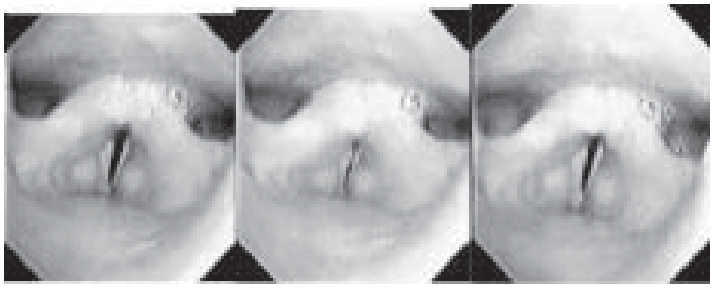

Figure 3 [takaa] "mouth" R1 in sequence showing the larynx in neutral position and a distance away from the posterior pharyngeal wall. Ventricular folds sphinctered but not to the extent of covering the glottis. Vocal cords are clearly seen as normal as in the neutral position but do not close completely as seen in the middle frame.

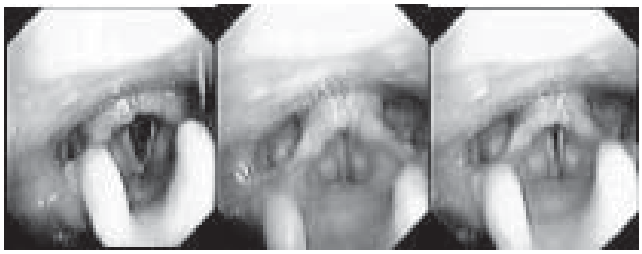

Figure 4 [pheew] "three" R2 in sequence showing some degree of larynx raising and a mild degree of lowered epiglottis. Ventricular folds are sphinctered but not fully covering the glottis. A slight glottal opening is seen at posteriorend in the middle frame.

over the glottis. This may indicate some mild degree of aryepiglottic folds sphinctering.

3. Words with the third register (R3). As seen in Figures 5 and 6, the larynx is lowered. Ventricular folds are fully sphinctered with a slight opening at the posterior end. The larynx is a little further away from the pharyngeal wall.

4. For the fourth register (R4). As observed in Figures 7 and 8, there is some degree of larynx raising and then lowering without aryepiglottic sphinctering. Ventricular folds contracted but not to the extent of covering the glottis. A slight opening of the glottis at the posterior end is seen. The observed data of the physiology involved in the

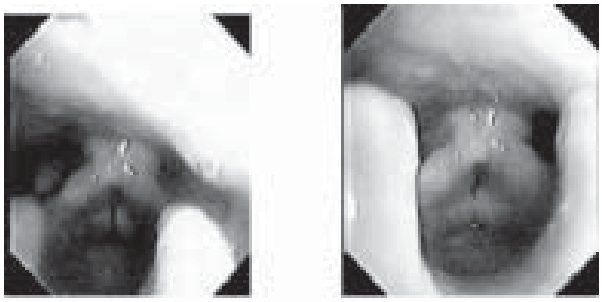

Figure 5 [m̄it] "eye" R3 (different utterances) showing lowered larynx. Ventricular folds are sphinctered with a slight opening at the posterior end.

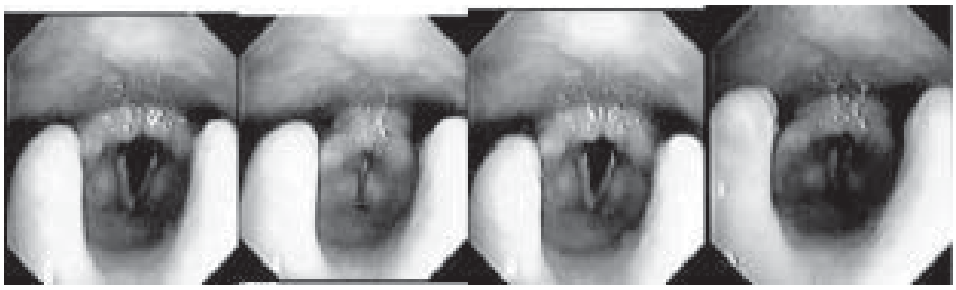

Figure 6 [thaak] "water" R3 in sequence from left-to-right, shows a lowering of the larynx in the second frame.

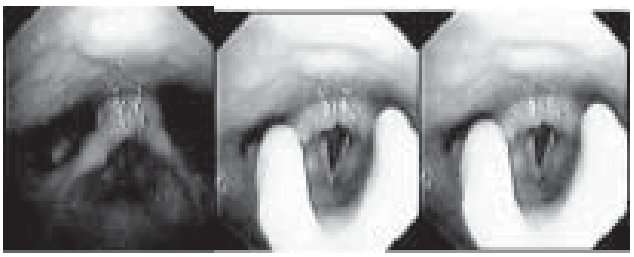

Figure 7 [miiw] "fish" R4 in sequence. The first frame to the left shows larynx elevation and stretched aryepiglottic folds with a slight degree of ventricular folds sphinctered. The larynx is then lowered in the second frame.

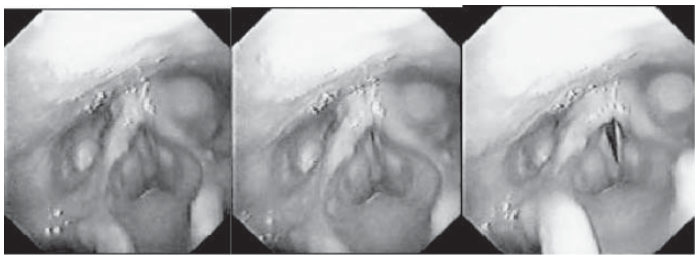

Figure 8 [mooj] "one" R4 in sequence showing larynx lowering (after elevation). Aryepiglottic folds stretched with some degree of ventricular folds compressed. The glottis is observed with an opening at the posterior end.

production of the four registers are compared with the acoustic correlates as summarized in Table 1 below.

The pitch patterns of the four registers and the waveforms, spectrograms, spectrums, energy contours, jitter and harmonic/noise ratio of the four registers are also compared between CP, the subject for the laryngoscopic study and the other two older speakers, WW and SP as summarized in Table 2 below.

It is noticed that all speakers have voice qualities that often blend both breathiness and

Table 1 Articulatory and acoustics correlate of the production of the four registers (? = uncertain)

	Larynx	Retracted Tongue root	Aryepiglottic sphincter	Ventricular sphincter	F0	Formant (F1)
R1	Neutral/Raised	-	-	-	-H	-
R2	Raised	?	+ ?	+	+H	-
R3	Lowered	?	+ ?	+	-H	Lower
R4	(Raised) then Lowered	-	-	+	+H	Lower

Table 2 Comparison summary of acoustic data between CP, (laryngoscopic subject) and two older speakers, WW and SP.

	Voice quality			Pitch patterns		
	CP	WW	SP	CP	WW	SP
R1	Clear/Creaky	Clear/Creaky	Clear/Creaky	LF	M F	L F
R2	Creaky	Creaky	Creaky	H F	H F	H F
R3	Breathy and Creaky	Breathy and Creaky	Breathy and Creaky	L F	L F	L F
R4	Creaky may +Breathy	Breathy and Creaky	Breathy and Creaky	H F	M R- F	L R- F

creakiness into the words pronounced. The degree of breathiness and creakiness varies from utterance to utterance and from one speaker to another. The summary in Table 2 above shows the dominant qualities but not necessarily exclusive. It is found that in most utterances of all speakers breathiness and creakiness in R3 and R4 are superimposed. The clear boundary between clear and creaky, as well as breathy and creaky voice produced as a sequence during vowel duration (L-Thongkum, 1992; Edmonson, 1996) is hardly observed in the present data. This is not unexpected. Esling (1999) noted that 'In lowered larynx quality, sphinctering is generally much less severe; the epilarygeal vestibule is open; and glottal quality tends to breathiness.'

The articulatory and acoustics properties summarized in Table 1 for the four registers may be interpreted in light of Esling (1999) and the studies in Esling (1996), Esling et al (2002), Esling (2002), and Tumtavitikul (2000) as two different modes of phonation; raised and lowered larynx with and without laryngeal sphincter. The differences between CP and both WW and SP may only be the degree of severity of production on a continuum. Hence, phonologically, the four registers remain the same, as postulated in (1), as the language is passed on from one generation to another, but the phonetic output may have become much milder. And such is evidenced in CP's less harshness in his speech when compared with WW and SP, especially with the marked R3 words.

[+ or - lowered larynx, + or - laryngeal sphincter] (1)

On the pitch patterns, from Table 2, the "marked" difference in the overall tonal patterns for the four registers is in R4. It seems CP has modified the rise-fall pattern to a falling pattern, more or less, parallel to the pattern of R2. This may also implicate levelling such that the four-way contrasts may be represented by only two parameters; larynx elevation and pitch level as demonstrated in (2).

[+ or - lowered larynx, + or - High tone] (2)

CONCLUSION

The laryngoscopic study of a 31 years old male speaker reveals the four contrastive so-called 'registers' in Chong. The production of the contrasts may involve two main parameters of the larynx; larynx lowering or raising, and laryngeal sphinctering. The acoustic correlates when compared with two older male speakers, 50-55 years old confirms the four contrastive registers being preserved but to a lesser degree of severity in voice quality, especially in the harshness of the third register. The pitch patterns of the younger speaker may be undergoing levelling to two, more or less, parallel patterns of a higher and lower frequency level. This may have implications for an ongoing change in the phonological representations.

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