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Contrast in vowel quality in Burmese and Thai Mon varieties: Phonetic indicators towards a restructured language

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Abstract

The Mon language, a register language, has a number of vowels with on-gliding phases that could eventually develop into diphthongs. These have never been acoustically studied. The objective of this study was to clarify the vowel characteristics in order to assess the possibility for change toward a restructured language. The results showed that some F1, F2, and F3 values in Burmese Mon (BM) could be used to differentiate clear from breathy vowels, especially in the on-gliding phase. F3 values as well as a tendency to diphthongization could be crucial factors in how BM vowels differ from Thai Mon (TM) vowels. Nonetheless, it is likely to take some time to justify whether the Mon language will change and whether BM will ultimately become a different language type from TM. These Mon varieties seem to be on the continuum of language change.

Introduction

After a complete merger of voiced and voiceless initial stops, the Mon language has been categorized as a 'pure' register language in which clear vowels differ from breathy vowels (Huffman, 1976); for example, /klɜŋ/ 'come' and /kl̤ɜ̤ŋ/ 'boat'. The Mon speakers mostly live in Burma (Myanmar) and Thailand. Speakers of Burmese Mon (BM) can speak both Burmese and Mon. Many elderly Thai Mon (TM) speak both Thai and Mon. When more than two languages are involved, bilingualism is recognized (Appel & Muysken, 1990). The speakers often express their solidarity or social distance by using one language for officialdom and another one for shopping and speaking with friends (Loveday, 1982). As a result of the growth of bilingualism, one language might interfere with another (Weinreich, 1953). Therefore, the BM might interfere with the Burmese language and the Thai language might affect TM speakers.

If TM and BM varieties still belong to the same language (Huffman, 1987–1988), they should exhibit similar phonetic characteristics. According to the acoustic results from TM (Abramson, Tiede, & Luangthongkum, 2015; Behr, 2013; Luangthongkum, 1990) and BM (Behr, 2013), both are register languages, where relative amplitude (H1-A1) and fundamental frequency (F0 values) clearly distinguish the contrastive phonation types and pitch patterns in the Mon language (Behr, 2013). Nonetheless, BM shows the possibility for on-gliding and off-gliding phases of vowels which are hardly found in TM (Behr, 2013).

As a pathway to a change in a register language, phonation type may correlate with vowel quality. Clear vowels (High Register) are possibly monophthongs whereas breathy vowels (Low Register) are possibly diphthongs with higher vowel quality. The breathy vowels tend to be on-gliding and more back, while the clear or tense ones seem to be off-gliding and more front (Thurgood, 2000). Vowels may show characteristics like on-gliding and off-gliding

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phases before diphthongization. On-gliding and off-gliding vowels (which could be best described as various vowel characteristics and tend to occur in the restructured language in Mon) have not been acoustically studied.

In addition, previous studies show that varieties of register languages tend to change to tone languages (Abramson, Luangthongkum, & Nye, 2004; Abramson, Nye, & Luangthongkum, 2007; Premsrirat, 2004). This might not be the case for BM. BM might instead enhance various vowel characteristics in order to compensate for the loss of contrastive phonation types in the future. Then BM would become a restructured language, in contrast to TM, which may become tonal.

Literature Review

In a register or tone language, a single phonetic feature might not best explain phonemic contrasts since laryngeal parameters may combine to distinguish contrastive voice quality or tone (Abramson & Luangthongkum, 2009; Brunelle & Kirby, 2016). Phonation type differences are possibly dominant in a register language compared to pitch, vowel quality, and vowel length whereas pitch may play the most important role in a tone language. Previous acoustic studies on register languages suggest that the main phonetic component may be able to predict the direction of language change in the future. Many dialects of Khmu (Abramson et al., 2007; Premsrirat, 2004) and Suai (Abramson et al., 2004), show salient pitch patterns with a possible disappearance of phonation type distinction. This could suggest a tendency to change toward a tone language.

From the acoustic studies on Mon (Abramson et al., 2015; Behr, 2013; Luangthongkum, 1990), a few clear and breathy vowels in TM exhibited differences in formant frequencies but this was not systematic. Vowel quality did not seem to be the most prominent parameter that differentiated clear and breathy vowels in TM. In Mon language, Shorto (1966) noticed the complexity of the Mon vowel. This complexity was also observed by Huffman (1976) and Bauer (1982). Clear vowels (Head Register) in Mon were likely to be less centralized than breathy ones (Chest Register). After a loss of contrastive phonation types, some register languages changed to a restructured one; for example, vowel height in standard Khmer replaced pitch and phonation type (voice quality) (Huffman, 1985), and vowels in the Bru language could be explained in terms of complexity, distinguishing complex and non-complex nuclei of vowels (Miller, 1967), or vowels with short, long, glided, and registered qualities (Miller, Miller, & Phillips, 1976), or a vowel system with 32 single vowels and 10 diphthongs (VƯƠNG, 1999) instead of contrastive phonation types.

We hypothesize that BM and TM varieties have different vowel qualities due to (i) a correlation of phonation type and vowel quality and (ii) language contact with Burmese, a tone language with phonation type co-occurrence (Bradley, 1982; Gruber, 2011). This may have triggered the development of vowel quality distinctions in BM. Conversely, clear and breathy vowels may not have various vowel qualities in TM because of language contact with Thai, 'a pure tone language'. This type of contact is less likely to affect vowel quality. Consequently, BM and TM may diverge into distinct languages in the future.

Methods

Data Collection

Language Consultants

Three male native speakers of the Mon language in two BM varieties and two TM varieties were selected to be consultants. The BM speakers were 25–40 years old from Thaton (BM1) and Mudon (BM2) villages in Mon state, Myanmar. The BM speakers were migrants who at the time were working in Samut Sakhon and Ranong, Thailand respectively. They were bilingual (Mon and Burmese) with the same educational background (Grade 4–6). They used Mon language in their community and Burmese at their workplace. They had had not much language contact with Thai.

The TM speakers were from Ban Bang Pla village in Samut Sakhon, Thailand (TM1) and Ban Bangkhanmak Tai village in Lopburi, Thailand (TM2) where there are some Thai Mon native speakers. The speakers were over 60 years old and had finished Grade 12. They spoke Mon when amongst people of their own generation and Thai when with their family members.

Vowel System and Word lists

BM1 and BM2 share the same vowel system as /i-i̤, e-e̤, ɛ-ɛ̤, a-a̤, u-ṳ, o-o̤, ɔ-ɔ̤, ɜ-ɜ̤, ɨ-ɨ̤, ɒ/ while TM1 has /i-i̤, e-e̤, ɛ-ɛ̤, a-a̤, u-ṳ, o-o̤, ɔ-ɔ̤, ɜ-ɜ̤, ɑ/ and /i-i̤, e-e̤, a-a̤, u-ṳ, o-o̤, ɜ-ɜ̤, ɛ, ɔ, ɑ/ for TM2. However, only single vowels with contrastive phonation types (clear *vs.* breathy) were selected to create a citation form. Therefore, there were 18 vowels for BM1 and BM2, 16 vowels for TM1 and 12 vowels in TM2. Vowels /ɒ/ in BM1 and BM2, /ɑ/ in TM1 and /ɛ, ɔ, ɑ/ in TM 2 were not included in the citation form. Closed syllable structures like CVh (ending with glottal finals), CVT (with stop finals) and CVN (with nasal finals) were used. Some syllable structures occurred in either clear or breathy phonation types. All speakers from each variety had to know the meaning of the test words in their own variety. If there were any words they did not understand, the words were omitted from the citation form. Therefore, the number of test words was different in each variety; 47 words in BM1 and BM2 (5 words for /i-i̤/, 5 words for /e-e̤/, 5 words for /ɛ-ɛ̤/, 5 words for /a-a̤/, 6 words for /u-ṳ/, 6 words for /o-o̤/, 4 words for /ɔ-ɔ̤/, 5 words for /ɜ-ɜ̤/ and 6 words for /ɨ-ɨ̤/), 43 in TM1 (6 words for /i-i̤/, 4 words for /e-e̤/, 6 words for /ɛ-ɛ̤/, 5 words for /a-a̤/, 6 words for /u-ṳ/, 5 words for /o-o̤/, 6 words for /ɔ-ɔ̤/ and 5 words for /ɜ-ɜ̤/), and 34 in TM2 (6 words for /i-i̤/, 6 words for /e-e̤/, 5 words for /a-a̤/, 6 words for /u-ṳ/, 6 words for /o-o̤/, and 5 words for /ɜ-ɜ̤/). Each word was pronounced three times randomly. Test tokens for BM1 were 423 (47 × 3 times × 3 speakers) and for BM2 were 423 (47 × 3 times × 3 speakers), with 387 for TM1 (43 × 3 times × 3 speakers), and 306 for TM2 (34 × 3 times × 3 speakers) There were 1,539 test tokens, all of which were analyzed. Examples of the wordlists are:

/i-i̤/ in BM1 and BM2				
CVT	/həcit/	‘nine’	/li̤p/	‘to comprehend’
CVN	/ʔətin/	‘stingy’	/paki̤n/	‘to hand something to a monk
/i-i̤/ in TM1 and TM2				
CVT	/kit/	‘to bite’	/həki̤t/	‘a gnat’
CVN	/həcin/	‘a ring’	/həki̤n/	‘to hand something to a monk’

Acoustic Analysis

Recording

The language consultants were asked to pronounce the citation form for each word in a randomized sequence three times through an ECM-719 SONY microphone connected to a laptop with a 22,500 sampling rate. There were 1,539 test tokens for the acoustic measurement.

Acoustic Measurement

Initials and finals were omitted by visual identification along with listening to the sounds as single vowels to avoid any influences of consonants on vowels. Vowels were acoustically analyzed using Praat version 5.2.27 (Praat, Amsterdam, the Netherlands). Each vowel was divided into on-gliding and steady state phases for analyzing formant frequencies and duration (Figure 1). A t-test at a *p* value < .05 was used to statistically differentiate the significance of these acoustic characteristics in the on-gliding phase and steady state phase between clear and breathy vowels in each variety as follows:

(1) F1, F2 and F3 values were analyzed at 50 percent of two phases.

(2) Duration was measured from the onset to offset of each phase; and the combination of these two phases was the measurement for total vowel duration in milliseconds (ms)

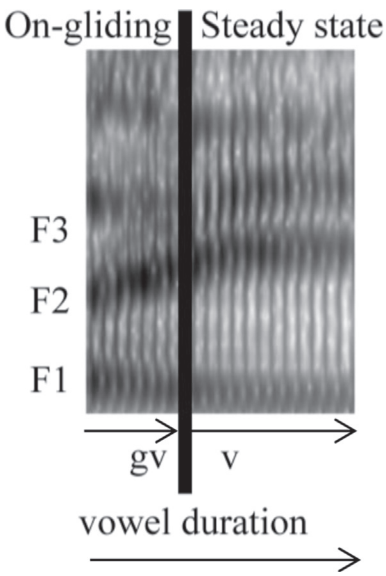

Figure 1 Example of acoustic measurement for vowels with on-gliding phase of /i̤/

For F1, F2 and F3 values, mean values were used to differentiate between clear and breathy vowels in on-gliding and steady state phases. The values of F1 and F2 between clear and breathy vowels were also displayed as vowel space in order to exhibit whether clear vowels are more front than breathy vowels.

All test tokens were acoustically analyzed even though some vowels were without an on-gliding phase. There were 16 vowels with on-gliding phases from 18 vowels in BM1, 18 from 18 in BM2, 13 from 16 vowels in TM1, and 8 from 12 vowels in TM2.

Results

Formant Frequency

On-gliding Phase

In each variety, vowels with on-gliding phases were /i, i̤, e, e̤, ɛ, ɛ̤, a, u, ṳ, o, o̤, ɔ, ɔ̤, ɜ, ɜ̤, ɨ/ in BM1, /i, i̤, e, e̤, ɛ, ɛ̤, a, a̤, u, ṳ, o, o̤, ɔ, ɔ̤, ɜ, ɜ̤, ɨ, ɨ̤/ in BM2, /i, i̤, e, e̤, ɛ, ɛ̤, a, u, ṳ, o, o̤, ɜ, ɜ̤/ in TM1, and /i, i̤, e, e̤, u, ṳ, o, ɜ̤/ in TM2. The values of F1, F2 and F3 at 50 percent in the on-gliding phase could significantly differentiate many clear vowels from breathy ones in BM. F1 and F3 values of /e-e̤/ and /ɔ-ɔ̤/ in BM1 and /ɜ-ɜ̤/ in BM2, F2 and F3 values of /ɛ-ɛ̤/ in BM1 and /u-ṳ/ in BM2 were significantly different. F2 values of /i-i̤/ and F3 values of /o-o̤/ in BM1 and /a-a̤/ in BM2 also showed significant differences (Figure 2 (A) and (B)). On the contrary, only F1 values between /i-i̤/ in TM1 and F2 values between /e-e̤/ in TM2 were statistically different (Figure 2 (C) and (D)).

F3 values in BM were likely to identify more vowels than F1 and F2 values. The range of F3 values in all vowels was between 2,000 and 3,000 Hz. This was a 1,000 Hz difference in BM. The range of F3 values in TM was 2,400 −2,600 Hz; thus, F3 was unlikely to show any significant difference. Based on F3 values, a degree of lip rounding may be one factor that enhances distinctive BM vowels, whereas this is not the case for TM vowels.

Steady State Phase

Even though the values at 50 percent varied in BM, they could help to identify some vowel characteristics whereas these values did not exhibit much difference in TM. A significant difference in F3 values was found only in BM as shown for /o-o̤/ and /ɜ-ɜ̤/ in BM1 and /o-o̤/, /ɔ-ɔ̤/ and /ɨ-ɨ̤/ in BM2 (Figure 3).

In BM, the F1 values of breathy vowels were less than those of clear ones as /i̤/ was at 398.25 Hz and /i/ was at 454.39 Hz in BM1 and the values were 440.57 Hz for /i̤/ and 471.44 Hz for /i/ in BM2. F1 values of /ɨ-ɨ̤/ were 472.32 Hz and 440.53 Hz, /u/ was 457.29 Hz and /ṳ/ was 434.98 Hz in BM1, and /u-ṳ/ was 500.31 Hz and 466.56 Hz, respectively, in BM2. Thus, these breathy vowels were higher than the clear ones. For F2, the values in breathy vowels were less than those of clear ones. For example, /i-i̤/ was 2,025.88 Hz and 1,895.39 Hz and /u-ṳ/ was 1,097.31 Hz and 955.79 Hz in BM1, and /ɨ-ɨ̤/ was 1,898.38 Hz and 1,594.16 Hz in BM2. The

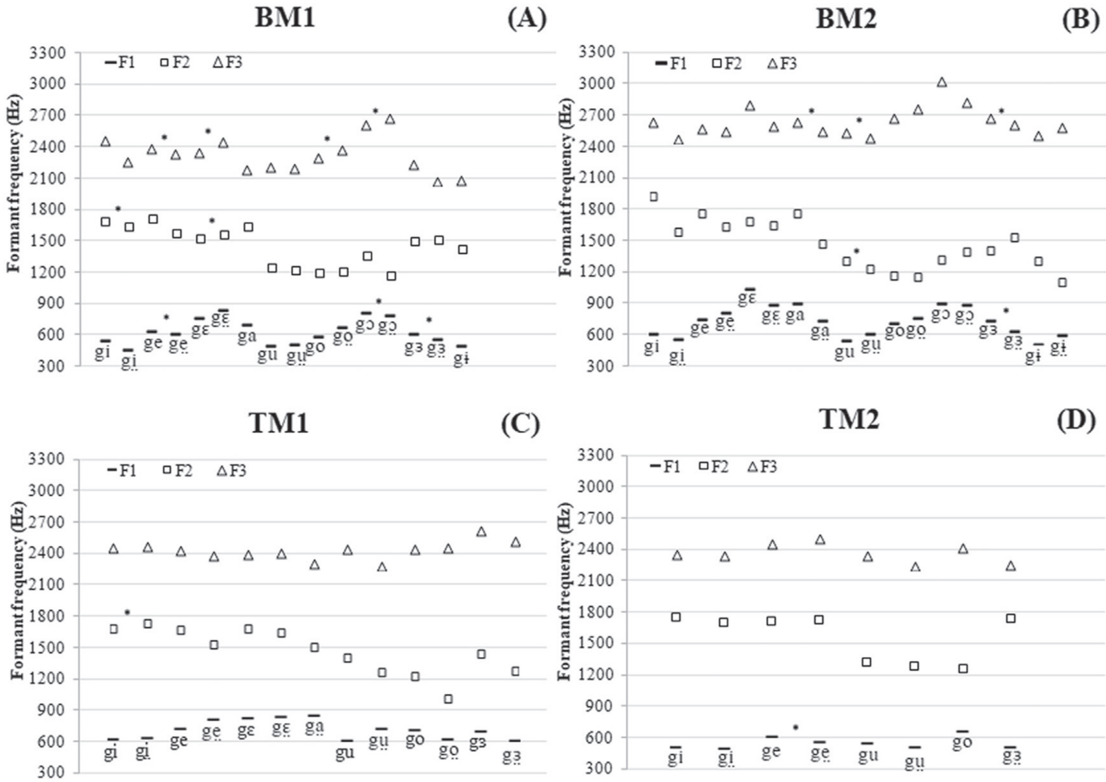

Figure 2 Mean values at 50 percent of F1, F2 and F3 values of on-gliding phase in Mon varieties

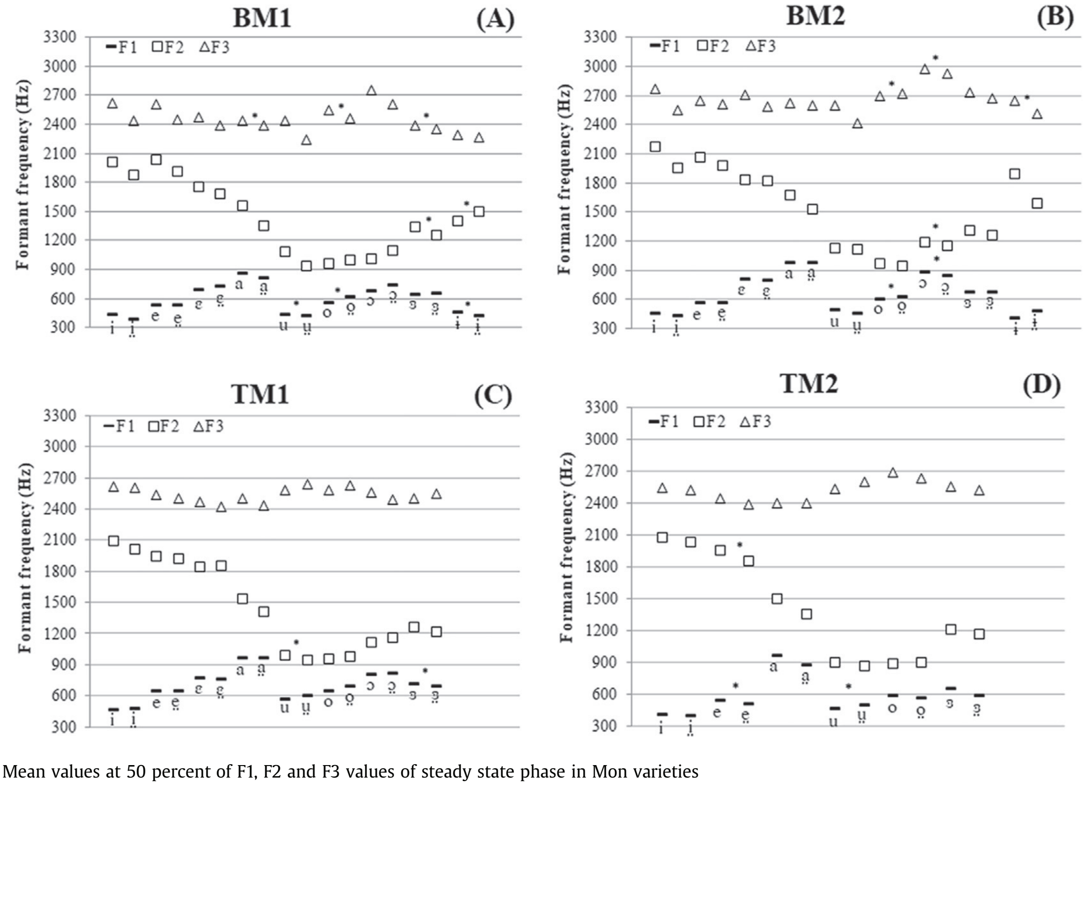

Figure 3 Mean values at 50 percent of F1, F2 and F3 values of steady state phase in Mon varieties

breathy vowels seemed to be more back than clear ones in BM (Figure 4 (A) and (B)).

In TM, only front vowels with contrastive phonation were likely to be different in terms of F1 and F2 as /e-e̤/ and /ɛ-ɛ̤/ in TM2. The breathy ones were more back than the clear ones but they were likely to share the vowel space for the back vowels (Figure 4 (C) and (D)).

Duration

On-gliding Phase

No explicit patterns in on-gliding duration were found between clear and breathy vowels (Figure 5). It could not be determined whether the on-gliding phase of all clear vowels was shorter than for the breathy ones. For example, clear vowels were longer than breathy ones such as /e-e̤/ with 8.85 and 6.64 ms in BM1, /ɜ-ɜ̤/ with 9.98 and 7.11 ms in BM2, and /ɛ-ɛ̤/ with 9.20 and 7.29 ms in TM1 but they were shorter for /ɛ-ɛ̤/ with 6.19 and 7.21 ms in BM1, /e-e̤/ with 7.80 and 8.83 ms in BM2, and /e-e̤/ with 6.04 and 8.89 ms in TM1.

Steady State Phase

Many of the clear vowels were observed to be shorter than breathy ones; for example, /e-e̤/, /u-ṳ/ and /ɜ-ɜ̤/ in all Mon varieties, /i-i̤/ in BM1, BM2 and TM1; /ɛ-ɛ̤/ in BM1 and BM2, and /o-o̤/ in BM1, BM2 and TM1. From the results, a few clear vowels were longer than the breathy ones such as /a-a̤/ in BM1, BM2, and TM2, /ɔ-ɔ̤/ in BM1, BM2, and TM1, /ɛ-ɛ̤/ in TM1, and /i-i̤/ in TM2. There were significant differences between /a-a̤/ and /u-ṳ/ in all Mon varieties and /e-e̤/ in BM1 and TM2, /ɔ-ɔ̤/ in BM1 and TM1, /ɨ-ɨ̤/ in BM1 and BM2, and /ɜ-ɜ̤/ in BM2.

Total Vowel Duration

There were six vowels with significant differences in BM2: /i-i̤/ , /ɛ-ɛ̤/, /a-a̤/, /u-ṳ/, /o-o̤/, and /ɨ-ɨ̤/. Four vowels with contrastive phonation were found in other varieties: /e-e̤/, /a-a̤/, /u-ṳ/, and /ɔ-ɔ̤/ in BM1, /e-e̤/, /a-a̤/, /u-ṳ/ and /ɔ-ɔ̤/ in TM1, and /e-e̤/, /a-a̤/, /u-ṳ/, and /ɜ-ɜ̤/ in TM2. Although some clear and breathy vowels were likely to have different lengths in BM and TM varieties, not all of them were significantly different.

The results could not identify absolute patterns between the durations of clear and breathy vowels in Mon varieties. Duration differences are likely to play a secondary role in the language.

Discussion

Register complexes with a cluster of laryngeal activities (Henderson, 1952) possibly clarify the correlation between

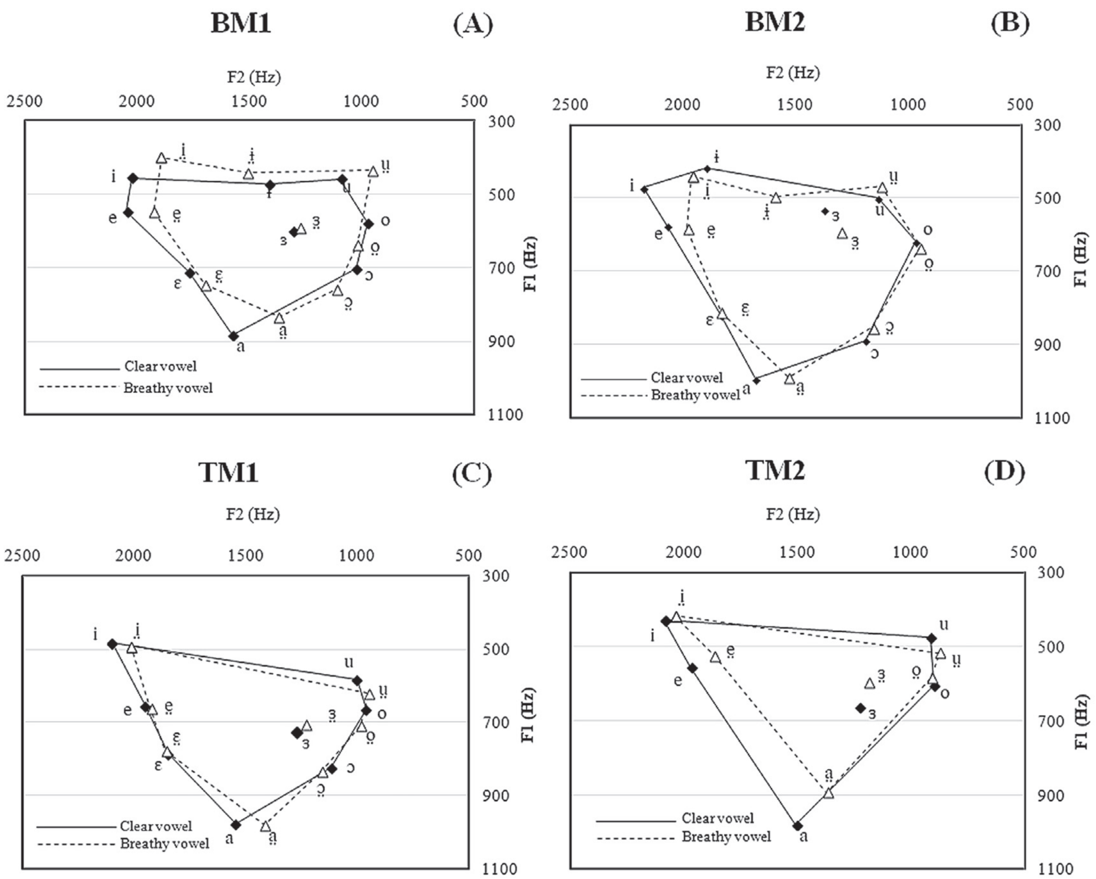

Figure 4 Vowel space between clear and breathy vowels in Mon varieties

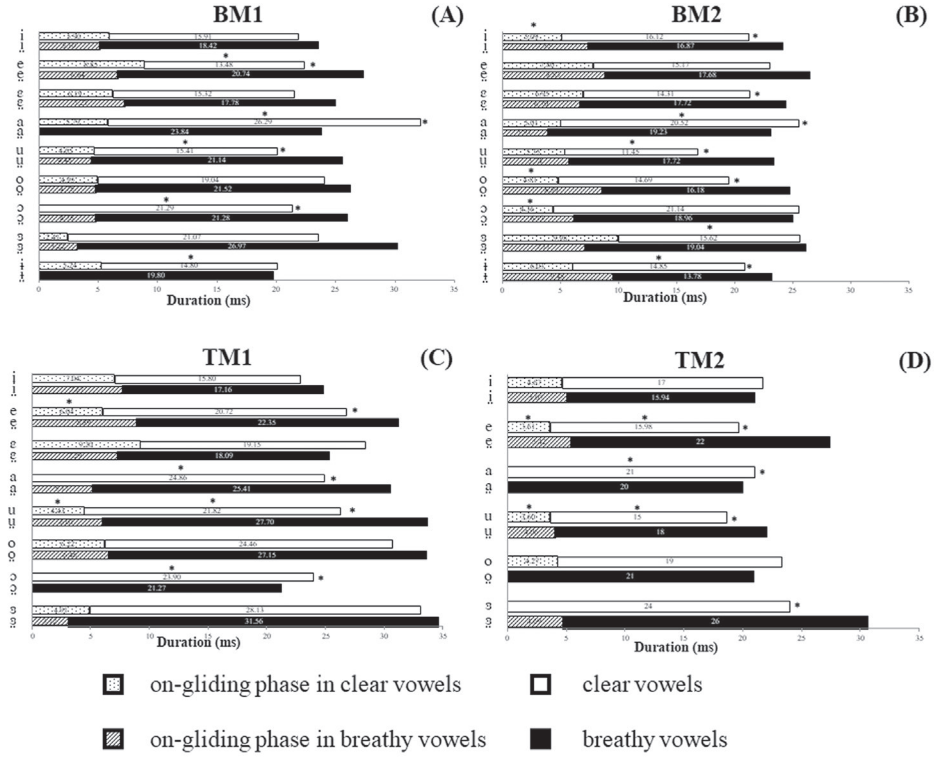

Figure 5 Vowel duration between clear and breathy vowels in Mon varieties (An asterisk on top of a bar indicates a significant difference in each phase and at the end of a bar indicates significant differences of the whole duration between clear and breathy vowels)

phonation types and vowel quality especially in two varieties of BM. Most clear and breathy vowels in BM exhibited an on-gliding phase. This was not the case for vowels in TM. In BM, the F1, F2, and F3 values at 50 percent of the on-gliding phase are varied. A degree of tongue height, tongue advancement, and lip rounding to produce vowels with contrastive phonation types was more distinct in BM than TM. F3 values of vowels in a language, which normally do not change much and are likely to be predictable from F1 values (Ladefoged, 2005), showed various degrees of lip rounding and tended to manifest distinct vowel characteristics in BM as shown in Table 1. In addition, the F1 and F2 of breathy vowels in BM had lower values than those of clear ones as a result of lengthening the vocal tract in

Table 1
Mean values at 50 percent of F3 values in on-gliding (gv) and steady state phase (v) in Mon varieties

Vowel	Phase	BM1		BM2		TM1		TM2	
		Clear	Breathy	Clear	Breathy	Clear	Breathy	Clear	Breathy
/i-i̤/	gv	2,470.39	2,259.24	2643.29	2,478.31	2,457.10	2,475.12	2,355.07	2,345.84
	v	2,637.23	2,444.55	2,779.00	2,558.30	2,629.06	2,617.71	2,561.04	2,539.68
/e-e̤/	gv	2,386.47*	2,338.85*	2,576.46	2,547.60	2,435.32	2,381.78	2,455.88	2,501.24
	v	2,618.12	2,465.55	2,653.54	2,620.14	2,553.14	2,510.68	2,460.13	2,399.55
/ɛ-ɛ̤/	gv	2,356.00*	2,446.02*	2,807.99	2,598.72	2,399.99	2,406.45	–	–
	v	2,481.80	2,398.77	2,720.22	2,595.68	2,486.30	2,431.90	–	–
/a-a̤/	gv	2,191.04	–	2,643.47*	2,555.70*	–	2,311.14	–	–
	v	2,448.97*	2,397.45*	2,634.556	2,608.079	2,519.54	2,443.46	2,411.65	2,413.8
/u-ṳ/	gv	2,216.32	2,201.78	2,542.04*	2,486.75*	2,444.13	2,286.75	2,347.63	2,244.78
	v	2,450.46	2,257.81	2,601.03	2,420.09	2,590.42	2,651.99	2,551.18	2,613.23
/o-o̤/	gv	2,295.26*	2,382.55*	2,671.40	2,767.26	2,444.13	2,452.58	2,418.05	–
	v	2,561.29*	2,478.62*	2,698.75*	2,732.09*	2,596.33	2,641.12	2,703.33	2,652.40
/ɔ-ɔ̤/	gv	2,618.00*	2,673.54*	3,023.95	2,824.24	–	–	–	–
	v	2,765.52	2,621.77	2,981.75*	2,929.40*	2,567.30	2,499.40	–	–
/ɜ-ɜ̤/	gv	2,233.79	2,075.41	2,679.65*	2,616.80*	2,616.41	2,522.55	–	2,255.06
	v	2,394.63*	2,359.11*	2,743.29	2,673.76	2,511.53	2,562.78	2,574.98	2,540.02
/ɨ-ɨ̤/	gv	2,089.17	–	2,517.49	2,589.01	–	–	–	–
	v	2,306.64	2,272.97	2,655.96*	2,523.01*	–	–	–	–

* Indicates a significant difference in F3 values of each phase between clear and breathy vowels

breathy vowel production (Thurgood, 2000). This made many breathy vowels higher and more back than clear ones in BM. The finding for breathy vowels in BM was similar to the acoustic study of vowels in Burmese, where historical breathy register vowels tend to be higher and back (Thein Tun, 1982). Burmese might have an influence on BM varieties. Conversely, only front vowels with breathy voice were likely to be more back in TM. All speakers tended to use vowel length as a secondary component for contrastive vowels. This was different from the findings on Pakkret (Thai Mon) (Lee, 1983) in which vowel length could differentiate clear and breathy vowels.

In BM and TM, there were some overlapping features such as phonation types and pitch in each variety as in previous studies (Behr, 2013). They seemed to have similar phonetic characteristics but dissimilar vowel quality. Phonation type distinctions may simultaneously exhibit various vowel characteristics toward diphthongization in BM. Both clear and breathy vowels seemed to be developing into diphthongs and most likely into rising diphthongs due to gliding onsets being mostly lower or more open than the latter vowels (Figure 6). It is possible that some stages of language change might overlap and the evolution may be gradual as in Khmer (Wayland & Jongman, 2002). Wayland and Jongman (2003) found that not all vowels in Khmer became diphthongized at the same time. Some vowels were affected earlier than others due to the interaction between the F1 and F2 of the transition and the F1 and F2 of the following vowels (Diffloth 1990 as cited in Wayland & Jongman, 2002). From the current study, phonation type distinction could exhibit at the same time as various vowel characteristics towards diphthongs. If contrastive phonation types disappear in the future, BM may retain diphthongs as the salient parameter in the language and then develop into a restructured language. This may eventually occur in BM along the continuum of language change.

For BM, various vowel characteristics could be a result of an internal factor and language contact. Register complexes might enhance various vowel characteristics. This internal factor could result in clear and breathy vowels developing into diphthongs in the future, similar to Battambang Khmer with its large vowel system with 8 long monophthongs, 8–10 short monophthongs 10 long diphthongs, and 3 short diphthongs. It is likely a restructured language (Wayland, 1998).

In addition, it is likely that growth of bilingualism has resulted in language interference from language contact (Weinreich, 1953) in BM also. Burmese seems to have had an influence on BM vowel characteristics. This could have been caused by phonation types in Burmese, a tone language associated with phonation types (Bradley, 1982), whereas Thai is a pure tone language where pitch height and contour are dominant and may have less influence on TM vowel quality.

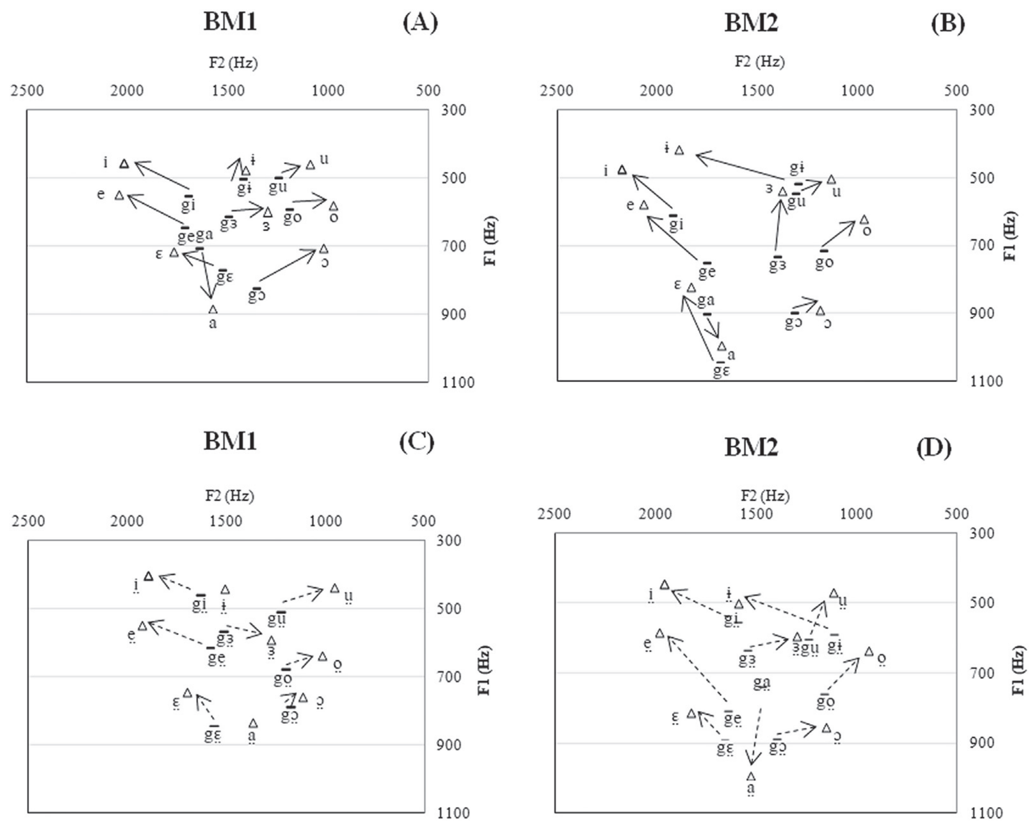

Figure 6 Direction of F1 and F2 values from on-gliding (gv) towards steady state phase (v) in clear (top (A) and (B)) and breathy vowels (bottom (C) and (D)) of BM1 and BM2

Nonetheless, a possible amount of disturbance during the transmission between dialects in contact (Trudgill, 1986) might cause the variation between Mon varieties. Linguistic diffusion of a tone language tends to be dominant in this area. Many dialects of Khmu (Abramson et al., 2007; Premsrirat, 2004) and Suai (Abramson et al., 2004) are considered likely to develop into tone languages. Even though TM is still a register language, TM might become a tone language due to the less frequent use of the language and the language contact with Thais. In addition, more Burmese Mon speakers are coming to Thailand due to labor needs. This may cause them to adopt salient pitch patterns from standard Thai, instead of encouraging various vowel characteristics. Language change in Mon may take some time because BM and TM are likely to be on the continuum of change.

Conclusion and Recommendation

Vowel quality was correlated with phonation types and many rising diphthongs seemed likely to develop in BM in both varieties. This parameter seems to distinguish BM from TM vowels especially in F3 values. Nevertheless, the results might not be able to determine whether BM will eventually change to a restructured language. Both internal factors, register complexes, and external factors like language contact with Thais may arise during the pathway of language change due to the settlement of more BM speakers in Thailand. BM and TM seem to be on the continuum of language change. Further study on vowels in different Mon varieties is needed in order to determine the language change.

Conflict of interest

There is no conflict of interest.

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References

Abramson, A. S., & Luangthongkum, T. (2009). A fuzzy boundary between tone languages and voice-register languages. In G. Fant, H. Fujisaki, & J. Shen (Eds.), *Frontiers in phonetics and speech science* (pp. 149–155). Beijing, China: Commercial Press.

Abramson, A. S., Luangthongkum, T., & Nye, P. W. (2004). Voice register in Suai (Kuai): An analysis of perceptual and acoustic. *Phonetica, 61*, 147–171.

Abramson, A. S., Nye, P. W., & Luangthongkum, T. (2007). Voice register in Khmu': Experiments in production and perception. *Phonetica, 64*(2–3), 80–104.

Abramson, A. S., Tiede, M. K., & Luangthongkum, T. (2015). Voice register in Mon: Acoustics and electroglottography. *Phonetica, 72*(4), 237–256.

Appel, R., & Muysken, P. (1990). *Language contact and bilingualism*. New York, NY: Routledge, Chapman and Hall, Inc.

Bauer, C. (1982). *Morphology and syntax of spoken Mon* (Unpublished doctoral dissertation). University of London, London.

Behr, N. S. (2013). A comparison between the vowel systems and the acoustic characteristics of vowels in Thai Mon and Burmese Mon: A tendency towards different language types. *The Mon-Khmer Studies Journal, 42*, 54–80.

Bradley, D. (1982). Register in Burmese. In D. Bradley (Ed.), *Papers in southeast asian linguistics No.8, Tonation, 8* (pp. 117–132). Canberra, ACT, Australia: Australian National University.

Brunelle, M., & Kirby, J. (2016). Tone and phonation in southeast Asian languages. *Language and Linguistics Compass, 10*(4), 191–207.

Gruber, J. F. (2011). *An articulatory, acoustic, and auditory study of Burmese tone* (Doctoral dissertation, Georgetown University). Retrieved from https://repository.library.georgetown.edu/

Henderson, E. J. A. (1952). The main features of Cambodian pronunciation. *Bulletin of the School of Oriental and African Studies, 14*, 149–174.

Huffman, F. E. (1976). The register problem in fifteen Mon-Khmer languages. In P. N. Jenner, L. C. Thompson, & S. Starosta (Eds.), *Oceanic linguistics special publication No.13: Austroasiatic studies I, Honolulu* (pp. 575–589). New York, NY: Cornell University.

Huffman, F. E. (1985). Vowel permutations in Austroasiatic languages. In G. Thurgood, J. A. Matisoff, & D. Bradley (Eds.), *Linguistics of the Sino-Tibetan Area: The state of the art. Papers presented to Paul K. Benedict for his 71st birthday (Pacific Linguistics C, No.87)*. Canberra, ACT, Australia.

Huffman, F. E. (1987-1988). Burmese Mon, Thai Mon, and Nyah Kur: A synchronic comparison. *The Mon Khmer Studies Journal, 16–17*, 31–84.

Ladefoged, P. (2005). *An introduction to the sounds of languages* (2nd ed.). Oxford, UK: Blackwell Publishing.

Lee, T. (1983). An acoustical study of the register distinction in Mon. *UCLA Working Papers in Phonetics, 57*, 79–96.

Loveday, L. (1982). *The sociolinguistics of learning and using a non-native language*. Oxford, New York: Pergamon Press.

Luangthongkum, T. (1990). The interaction between pitch and phonation type in Mon: Phonetic implications for a theory of tonogenesis. *The Mon Khmer Studies Journal, 16–17*, 11–24.

Miller, J. (1967). An acoustical study of Brôu vowels. *Phonetica, 17*(3), 149–177.

Miller, C. P., Miller, J. D., & Phillips, R. L. (1976). The Brū vowel system: Alternate analyses. *The Mon-Khmer Studies Journal, 5*, 203–217.

Premsrirat, S. (2004). Register complex and tonogenesis in Khmu dialects. *The Mon-Khmer Studies Journal, 34*, 1–17.

Shorto, H. L. (1966). Mon vowel systems: A problem in phonological statement. In C. Bazell, J. Catford, M. Halliday, & R. Robins (Eds.), *In memory of J. R. Firth* (pp. 398–409). London, UK: Longmans.

Thein Tun, U. (1982). Some acoustic properties of tone in Burmese. In D. Bradley (Ed.), *Papers in southeast asian linguistics No.8, Tonation, 8* (pp. 77–116). Canberra, ACT, Australia: Australian National University.

Thurgood, G. (2000). Voice quality differences and the origin of diphthongs. *Annual Meeting of the Berkeley Linguistics Society, 26*(1), 295–303.

Trudgill, P. (1986). *Dialect in contact*. New York, NY: Basil Blackwell.

VƯƠNG, H. L. (1999). A new interpretation of the Bru Van Kieu vowel system. *The Mon Khmer Studies Journal, 29*, 97–106.

Wayland, R. (1998). An acoustic study of Battambang Khmer vowels. *The Mon Khmer Studies Journal, 28*, 43–62.

Wayland, R., & Jongman, A. (2002). Registronesis in Khmer: A phonetic account. *The Mon Khmer Studies Journal, 32*, 101–115.

Wayland, R., & Jongman, A. (2003). Acoustic correlates of breathy and clear vowels: The case of Khmer. *Journal of Phonetics, 31*, 181–201.

Weinreich, U. (1953). *Languages in contact: Findings and problems*. New York, NY: Linguistic Circle of New York.