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VOWEL LENGTH IN DA-ANG DIALECT OF PALAUNG SPOKEN IN SHAN STATE, MYANMAR

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Abstract

Da-ang is a dialect of the Palaung language which belongs to Palaungic branch of Mon-Khmer of Austro-Asiatic language family. This paper aims to examine central vowel length contrast in Da-ang dialect of Palaung from acoustic perspective. The vowel duration measurement shows that the duration of long vowels were twice as long as short vowels. For the mid central vowels, the short vowel has higher F1 and F2 values than the long counterpart. For the low central vowels, on the other hand, the first two formants (F1, F2) are lower in the short vowels. The results of the experiment confirm the phonological analysis of this study. Da-ang vowel length is contrastive for non-high central vowels. Although the differing in duration is accompanied by vowel quality differences, the vowel duration is the main cue for distinguishing between short and long vowels in Da-ang.

Keywords

Mon-Khmer, Palaung dialect, Da-ang, phonetics/phonology, vowel length

LONGITUD DE LAS VOCALES EN EL DIALECTO DA-ANG DEL PALAUNG-WA HABLADO EN EL ESTADO DE SHAN, MYANMAR

Resumen

El Da-ang es un dialecto de la lengua palaung-wa que pertenece a la rama Paláunguica de Mon-Khmer de la familia de lenguas austro-asiática. Este trabajo tiene como objetivo examinar el contraste, con relación a la longitud, de las vocales centrales en el dialecto Da-ang del palaung-wa desde la perspectiva

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acústica. La medición de la duración vocálica muestra que la duración de las vocales largas es dos veces la de las vocales breves. En cuanto a las vocales mediales centrales, la vocal breve adopta unos valores F1 y F2 mayores que sus correspondientes largas. En cuanto a las vocales centrales bajas, por otro lado, los dos primeros formantes (F1, F2) son más bajos en las vocales breves. Los resultados del experimento confirman el análisis fonológico de este estudio. La longitud vocálica del Da-ang es contrastiva para las vocales centrales no altas. Aunque la divergencia en la duración se acompaña de diferencias en la calidad de las vocales, la duración vocálica es la señal principal que distingue, en Da-ang, entre vocales breves y largas.

Palabras clave

Mon-Khmer, dialecto palaung-wa, Da-ang, fonética/fonología, longitud vocálica

1. Introduction

The Palaung language speaking area covers three countries in Southeast Asia: Thailand, Myanmar, and China. Palaung is a northern Mon-Khmer language which belongs to Palaungic branch of Mon-Khmer of Austro-Asiatic language family (Diffloth 1974, Diffloth & Zide 2003). The Palaung language consists of three main Palaung dialects: Ta-ang, Rumai and Darang group of dialects. The Darang group of dialects includes Na-ang, Darang, Da-ang and Dara-ang. Based on phonological innovation among Palaung dialects, Ostapirat (2009) suggests that the primary split is between the Ta-ang and the Rumai-Darang groups. Later, the Rumai-Darang group was split into Rumai and Darang groups. The Darang group includes Na-ang, Darang, Da-ang, and Dara-ang, as shown in Figure 1.

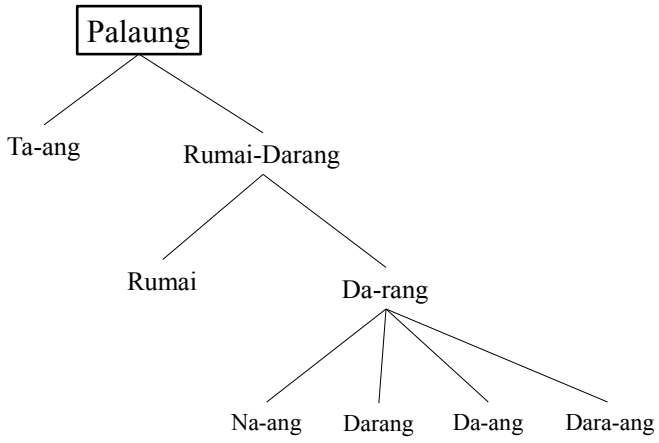


Figure 1. Ostapirat's (2009) classification of Palaung dialects

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Da-ang is a dialect of the Palaung spoken by Palaung speakers living in and around Kalaw city, Shan State, Myanmar. "Da-ang" is the name used by this group of Palaung to identify themselves, though this group of Palaung is called Pale or Silver Palaung in the previous literature (e.g., Janzen 1978; Howard & Wattanapun 2001). Janzen (1978) describes the phonological system of Da-ang dialect of Palaung in comparison with Rumai and Gold Palaung. He has reported that the Da-ang vowel system comprises of 10 monophthongs: /i, e, ɛ, u, o, ɔ, ɯ, ə, ʌ, a/ and two diphthongs: /iʌ, uʌ/. Da-ang vowel length is not contrastive. Low central vowels are opposed by a quality difference /ʌ/-/a/.

The Proto-Palaung (PP) vowel system which was proposed by Mitani (1977, 1979) and Diffloth (1991), however, comprises of three front vowels /*i, *e, *ɛ (*iə)/,[1] three back vowels /*u, *o, *ɔ/, and four short and long central vowels /*ă, *ə, *ǎ, *a/. Besides, in Palaung dialect spoken in Thailand,[2] it has been also reported on the existence of contrastive vowel length. As mentioned in Kasisopa (2003) and Chaichompoo (2010), Dara-ang dialect of Palaung spoken in No-Lae Village, Fang District of Chiang Mai Province has phonemic length for low central vowels /a, aː/.

To answer the question: whether the Da-ang vowel length is completely lost, the objective of this paper is to examine central vowel length contrast in Da-ang dialect of Palaung from acoustic perspective. Since instrumental phonetic study on the vowel length of Da-ang is never conducted, the proposal of Janzen (1978) is speculative. The present study will provide acoustic evidence to support the existence of phonological vowel length in Da-ang dialect of Palaung spoken in Shan State, Myanmar.

[1] Mitani (1977: 202) noted that it might be better to reconstruct the proto-vowel *iə for Proto-Palaung instead of *ɛ, since the correspondences of proto-vowel *ɛ in closed syllables have not been established clearly.

[2] The Palaung dialect spoken in Thailand is the variety spoken by Palaung speakers who live in No-Lae Village, Mon Pin sub-district of Fang district, Chiang Mai Province, Thailand. This dialect of Palaung is the only dialect spoken in Thailand, and is also known as Dara-ang or Red Palaung.

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2. Da-ang vowel phonology

The phonemic analysis of Da-ang vowel system presented here is based on my fieldwork on Da-ang dialect of Palaung. In February 2010, I carried out fieldwork on the Palaung dialect spoken in Shan State, Myanmar. I worked in Kalaw city,[3] in southern Shan State, as shown in Figure 2.

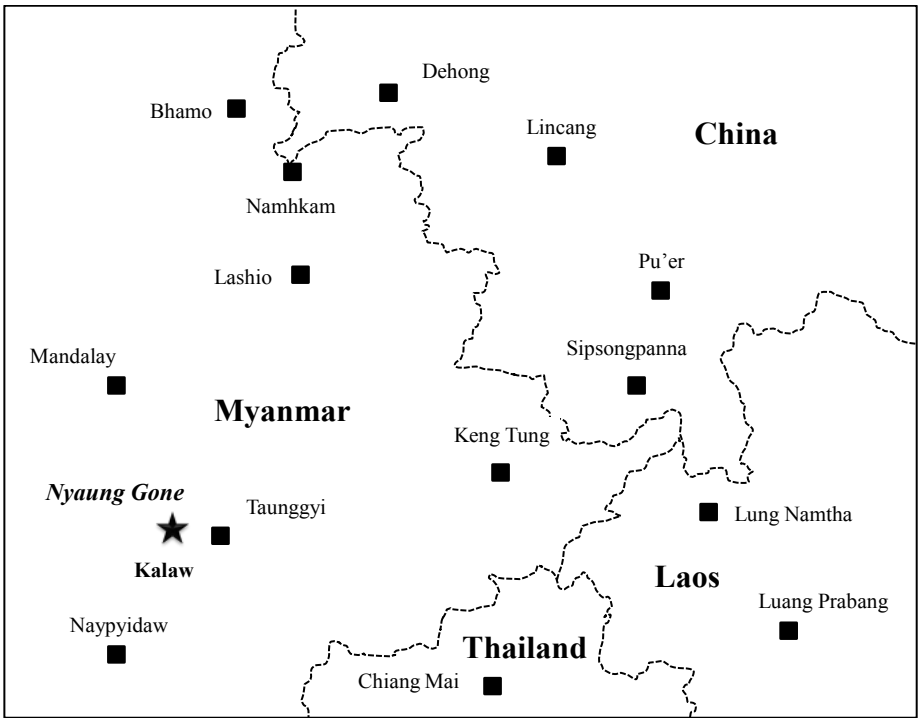


Figure 2. Map showing locations of Nyaung Gone Village, Kalaw, southern Shan State of Myanmar

The phonological description presented in this study is based on words elicited by a 1,000-item wordlist. The lexical items in the wordlist were categorized by semantic domain to ease elicitation. The main informant for elicitation data in the wordlist is a male native speaker of Da-ang living in Nyaung Gone Village of Kalaw city, in Myanmar's Shan State. He is designated as Speaker 1. At the time of recording, Speaker 1 was 30 years old.

[3] There was some difficulty accessing the village since in Myanmar tourists are not permitted to stay overnight in the village. Therefore, my fieldwork was mostly conducted at a hotel in Kalaw city. I invited the Da-ang Palaung speakers to come to my place for linguistic data elicitations and recordings.

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2.1 Vowel inventory of Da-ang Palaung

In the Southeast Asian linguistic area, based on vowel system, languages can be classified into three types: (1) languages having phonemic vowel length, (2) languages having no phonemic vowel length, and (3) languages having mixed vowel system (Phalipat 2009). This study found that Da-ang belongs to type (3), i.e. some Da-ang vowels have phonemic length whereas others do not. That is, the Da-ang vowel system consists of three front vowels /i, e, ɛ/, five central vowels /ɨ, ə̆, ə, ă, a/, and three back vowels /u, o, ɔ/.

	front	central		back
high	i	ɨ		u
mid	e	ə̆	ə	o
low	ɛ	ă	a	ɔ

Table 1. Da-ang vowel phoneme inventory

Diphthongs			
ia			ua
ei			ou
	ai	au	

Table 2. Da-ang diphthong phonemes

As given in Table 1, there are nine vowel qualities. Two of these nine vowel qualities have a length contrast: /ə̆, ə, ă, a/. This contrast is not found in front and back vowels, and high central vowel /ɨ/. Note that, phonemically, short vowels were marked, since they occur in a more restricted environment than long vowels. In Da-ang, there are also two vowel sequences that would be called diphthongs. The inventory of diphthong phonemes is listed in Table 2.

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2.2 Vowel length

Contrary to previous studies, I propose in this paper that vowel length in the Da-ang dialect of Kalaw city is indeed phonemic, but only for non-high central vowels /ə̆, ə/ and /ă, a/. My proposal is supported by minimal pairs and near-minimal pairs listed (1) below and an acoustic study of vowel length conducted in the next section, although these minimal pairs of contrastive length are overlooked by Janzen (1978).

	/ə̆/			/ə/		
a	/tə̆n/	[tən]	'to lead by hand'	/tən/	[təː n]	'that'
b.	/sapə̆n/	[saˈpən]	'lips'	/pən/	[pəː n]	'eggs, get, be able'
c.	/bə̆n/	[bən]	'fly'	/mən/	[məː n]	'crawl'
	/ă/			/a/		
d.	/hăp/	[hapˉ]	'put into'	/hap/	[haː pˉ]	'curry'
e.	/jăm/	[jam]	'die'	/jam/	[jaː m]	'weep, cry'
f.	/ŗ̥ăk/	[ŗ̥akˉ]	'bamboo'	/ŗ̥ak/	[ŗ̥aː kˉ]	'tooth'
g.	/lăʔ/	[laʔ]	'ladle'	/laʔ/	[laːʔ]	'sharpen'
h.	/ʔăʔ/	[ʔaʔ]	'crossbow'	/ʔaʔ/	[ʔaːʔ]	'spicy'
i.	/sanăʔ/	[saˈnaʔ]	'tender'	/sanaʔ/	[saˈnaːʔ]	'gun'
j.	/sadăʔ/	[saˈdaʔ]	'tongue'	/sɔdaʔ/	[sɔˈdaːʔ]	'hot'

(1) Minimal pairs and near-minimal pairs of vowel length in Da-ang

Note that, as shown in (1g-j), there are minimal pairs of low central vowels /ă, a/ which are restricted to the occurrence before glottal stop /-ʔ/. The emergence of vowel length contrasts before a glottal stop is due to the diachronic development of final consonants. This phonological innovation is shared among Palaung dialects: Da-ang spoken in Myanmar, Dara-ang spoken in Thailand, and Na-ang spoken in Yunnan, China (see Buakaw 2012).

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2.3 The phonological process evolving phonemic vowel length in Da-ang

In Da-ang, there are two phonological processes evolving phonemic vowel length synchronically or diachronically: diphthongization and vowel merger, which are described as follows.

2.3.1 Diphthongization

It is important to note that, as listed in (1), the phonemic vowel length of Da-ang is found only in closed syllables CVC. This means that there is no short and long vowel contrast occurring in open syllables, since in major open syllables vowels are always pronounced as long vowels, as exemplified in (2):

(2)	a.	/dɛ/	→ [dɛː]	‘hand’
	b.	/katɛ/	→ [kaˈtɛː]	‘center’
	c.	/sɔ/	→ [sɔː]	‘sick, hurt, pain’
	d.	/kapɔ/	→ [kaˈpɔː]	‘bottle, gourd’

Mid vowels /e, o, ə/ in major open syllables, moreover, are phonetically diphthongized, as illustrated in (3):

(3)	a.	/ʔase/	→ [ʔaˈsei]	‘who’
	b.	/kave/	→ [kaˈvei]	‘pity’
	c.	/mano/	→ [maˈnou]	‘teach’
	d.	/kalo/	→ [kaˈlou]	‘cheat, lie’
	e.	/ʔatə/	→ [ʔaˈtəɯ]	‘today’
	f.	/ʔaṃə/	→ [ʔaˈṃəɯ]	‘yesterday’

Furthermore, comparing with Dara-ang dialect of Palaung spoken in Thailand (Buakaw 2012), we see that open syllables diphthongization in Da-ang is more productive. As shown in (4) and (5), in major open syllables, the low central vowel /a/ of Da-ang is

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phonetically diphthongized to [əa], as in (4), while the vowel /a/ of Dara-ang in major open syllables is not phonetically glided and realized as long vowel [aː], as in (5).

(4) Da-ang /a/ → [əa] / ____ #

a.	/l̥a/	→ [l̥əa]	'leaf'
b.	/sada/	→ [saˈdəa]	'tail'
c.	/mafa/	→ [maˈfəa]	'monkey'

(5) Dara-ang /a/ → [aː] / ____ #

a.	/l̥a/	→ [l̥aː]	'leaf'
b.	/sada/	→ [saˈdaː]	'tail'
c.	/mafa/	→ [maˈfaː]	'monkey'

2.3.2 Vowel merger

The vowel merger is another phonological process that evolved phonemic vowel length diachronically. As shown in Table 3, in the Da-ang dialect of Palaung spoken in Myanmar, the contrast of the short and long mid central vowel /ă, ə/ is restricted only before the alveolar nasal /-n/. There is, however, the long vowel /ə/ [əː] that occurs before /-p/ and /-m/.

	/-p/	**/-t/**	**/-m/**	**/-n/**
/ă/		[-ətˀ]		[-ən]
/ə/	[-əːpˀ]		[-əːm]	[-əːn]
/ă/	[-apˀ]	[-atˀ]	[-am]	[-an]
/a/	[-aːpˀ]		[-aːm]	[-aːn]

Table 3. The co-occurrence of /ă/ and /ə/ with final labial and alveolar stops /-p, -t/ and final labial and alveolar nasals /-m, -n/

Comparing with Proto-Palaung reconstructed by Mitani (1979) and the Dara-ang dialect of Palaung spoken in Thailand, we know that the process of vowel merger results in these structural gaps. That is, the short mid central vowel *ă becomes the low central

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vowel /ă/ before final labial consonants /-m, -p/. Thus, *ə̆ and *ă preceding labial consonants have merged (*ə̆m > ăm) in the Da-ang dialect of Palaung, as exemplified in (6). Although short and long vowels are lost before labial consonants due to diachronic development, the phonemic vowel length of /ə̆, ə/ before final alveolar, is preserved in Da-ang, as shown in (1).

(6) *ə̆ > ă / _____C [labial]

Proto-Palaung	**Dara-ang**	**Da-ang**	
*sə̆m	sə̆m	săm	'plant (v.)'
*phəm	phəm	phəm	'breath'
*jă̆m	jă̆m	jă̆m	'die'
*jam	jam	jam	'weep, cry'

In summary, I have concluded that vowel length in Da-ang is phonemic, but only the non-high central vowel /ə̆, ə/ and /ă, a/. I have also shown that there are phonological processes (e.g., diphthongization and vowel merger) evolving phonemic vowel length diachronically and synchronically. Although vowel length is restricted to a handful of minimal pairs, contrary to Janzen (1978), I would like to propose in this study that vowel length is phonologically contrastive. My proposal will also be supported by the measurements of acoustic realization of vowel length, namely vowel duration and the first two formant frequencies (F1 and F2) in the next section.

3. Acoustic analysis of vowel length in Da-ang

In this section, an acoustic realization of phonemic vowel length in the Da-ang dialect of Palaung spoken in Myanmar will also be explored. After describing the methodology used in this acoustic analysis, the results will be presented.

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3.1 Methods

3.1.1 Speakers

Two male native speakers (Speaker 1 and Speaker 2) of Da-ang living in Nyaung Gone Village of Kalaw city, Shan State of Myanmar participated in this study. At the time of recording, Speaker 1 was 30 years old and Speaker 2 was 53 years old. These two native speakers were born and grew up in Nyaung Gone Village.

3.1.2 Wordlist

Wordlist consisted of eight minimal pairs and four near-minimal pairs of meaningful words differing in vowel length (see Appendix). The target words were the form CVC and CV:C, where the initial consonant C was /t, p, b, m, ph, ʔ, k, s, m̥, h, l, j, r̥/; V was short vowels /ə̆, ă/; V: was long vowels /ə, a/, and final consonants C was a nasal or a voiceless stop consonant: /-m, -n, -k, -p, -ʔ/. Since the selection of target words based primarily on minimal pairs and the minimal pairs were quite limited, the consonantal context of the vowels could not be controlled.

3.1.3 Recordings

The speakers were instructed to produce the target words at a normal speaking rate. Five repetitions of 24 target words in wordlist, pronounced in isolation, were recorded (24 words x 2 speakers x 5 repetitions = 240 tokens). All tokens were recorded using a Sony DAT recorder and an Aiwa microphone. The recordings were digitized on Cool Edit Pro (version 2.00) at a sample rate of 44.1 kHz.

3.1.4 Acoustic measurements

The measurements of vowel duration and formant frequency were taken using the Praat (version 5.1.02) program (Boersma & Weenink 2009). Duration of mid- and low-

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central vowels was measured. The beginning and end of the target vowel were marked by examining both waveforms and wide-band spectrograms. Formant frequencies (F1, F2) were obtained at the midpoint from the steady-state region of the vowels, as illustrated in Figure 3. A plot of F1vs. F2 then was made by JPlotFormants v1.4, the formant-plotting computer software created by Billerey-Mosier (2001). The plot of F1 represents vowel height, while the plot of F2 characterizes vowel backness (Ladefoged 2003).

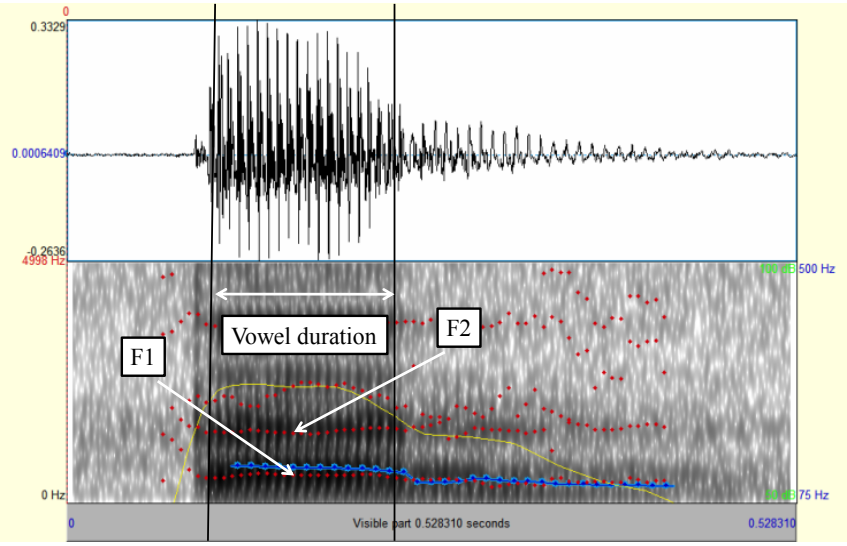


Figure 3. Wideband spectrogram (bottom panel) and waveform display (top panel) of the word /tăn/ [tən] 'to lead by hand' produced by a Da-ang male speaker

3.1.5 Statistical design

A two-tail paired t-test was performed for vowel duration, F1 and F2 of phonemic short /ă, ă/ and long /ə, a/ vowels in order to investigate the difference between phonemic short and long vowels in the Da-ang dialect of Palaung spoken in Myanmar. The t-test was run for mean values ($\bar{x}$) of vowel duration, F1, and F2 from 240 tokens, pooled from the two native speakers. The results of the statistical analysis are discussed in the following sections.

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3.2 Results

The results are divided into four sections. In the first section (§3.2.1), I will present the results for vowel duration of Da-ang central vowels. The second section (§3.2.2) presents the results for acoustic correlate of vowel height and backness, formant frequency (F1, F2). Finally, in the third section (§3.2.3), I will discuss the short vowel preceding final labial.

3.2.1 Vowel duration

Table 4 and Figure 4 show the results of the average duration of four central vowels, two short /ə̆, ă/ and two long vowels /ə, a/ of two male native speakers. The vowel duration measurement shows that the duration of long vowels were twice longer than short vowels.

Vowels	**Short**		**Long**		**Mean Diff.**	**Short/Long Ratio**
	$\bar{x}$	**S.D.**	**$\bar{x}$**	**S.D.**		
/ə̆/, /ə/	101.07	19.82	239.00	26.83	137.93	2.36
/ă/, /a/	120.65	19.48	235.75	48.63	115.10	1.95

Table 4. The average duration (in ms) and the duration ratio of /ə̆/, /ə/, /ă/, and /a/ in Da-ang (two male speakers)

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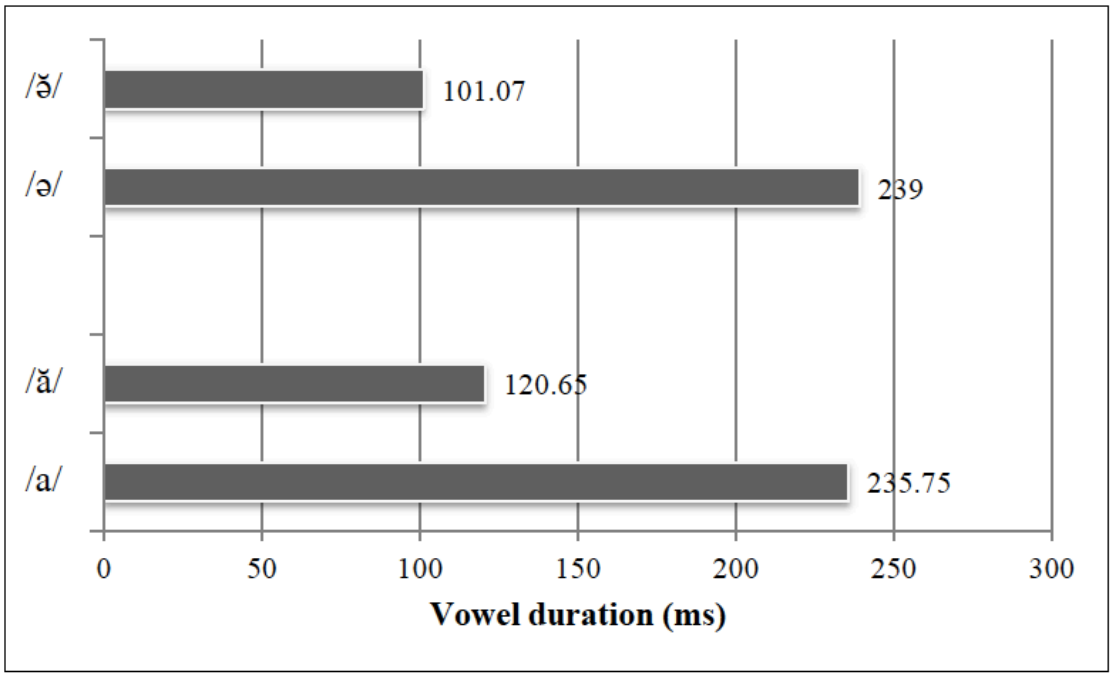


Figure 4. The average duration (in ms) of /ə̆/, /ə/, /ă/, and /a/ in Da-ang (two male speakers)

The statistical analysis (a two-tail paired t-test) also shows that the vowel duration of phonemic long vowels are significantly longer than phonemic long vowels for every pair of vowels (/ə̆, ə/ and /ă, a/). That is, the duration of the long mid central vowel /ə/ is significantly longer than the short mid central vowel /ə̆/ [t(29) = -28.894, $p< 0.01$]. As shown in Table 4, the average duration of /ə̆/ and /ə/, which represents short and long vowels in Da-ang, is 101.07 ms and 239.00 ms, respectively, with a ratio of 2.36.

Statistical results for the low central vowel /ă, a/ are similar to those for the mid central vowels /ə̆, ə/ (i.e., the duration of the low central vowel /a/ is significantly longer than the short vowel /ă/ [t(29) = -18.739, $p< 0.01$]). As given in Table 4, the average duration of the Da-ang /ă/ is 120.65 ms and of the /a/ is 235.75 ms. The ratio of long-to-short vowels is 1.95.

In addition to average duration, regarding vowel quality, Figure 4 also illustrates that the short mid central vowel /ə̆/ is shorter than the short central low vowel /ă/. But, the long mid central vowel /ə/ is longer than the long low central vowel /a/. This finding is also consistent with Dara-ang dialect of Palaung spoken in Thailand reported in Buakaw (2012).

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3.2.2 First and second formants (F1, F2)

First and second formants (F1, F2) are the acoustic correlates of vowel height and frontness-backness, respectively. According to Pickett (1980: 50-51), there are two rules correlating oral constriction and F1, F2:

• *Oral constriction/ F1 Rule*: the frequency of F1 is lowered by any constriction of the front half of the oral part of the vocal tract, and the greater the constriction, the more F1 is lowered.

• *Back Tongue Constriction/ F2 Rule*: the frequency of F2 tends to be lowered by a back tongue constriction, and the greater the constriction, the more F2 is lowered.

Average values of the first and second formants (F1, F2) of four short and long central vowels in Da-ang are summarized in Table 5.

Vowels	**F1**		**F2**	
	$\bar{x}$	**S.D.**	**$\bar{x}$**	**S.D.**
/ə̆/	615.80	22.56	1410.58	60.86
/ə/	553.36	37.10	1294.33	123.38
/ă/	776.94	52.79	1365.22	82.56
/a/	926.35	100.75	1474.94	77.89

Table 5. Mean F1 and F2 values (in Hz) of /ə̆/, /ə/, /ă/, and /a/ in Da-ang (two male speakers)

As shown in Table 5, the average values of F1 and F2 of the short mid central vowels /ə̆/ are 615.80 Hz and 1410.58 Hz, while the average values of F1 and F2 of long mid central vowels /ə/ are 553.36 Hz and 1294.33 Hz. As for central low vowels, the average F1 and F2 of /ă/ are 776.94 Hz and 1365.22 Hz. The average F1 and F2 of /a/ are 926.35 Hz and 1474.94 Hz.

Generally, it is found that the short mid central vowel /ə̆/ has significantly higher F1 values than the long counterpart [t(29) = -8.459, $p< 0.01$]. Similar to the finding for F2 values of mid central, the short vowels /ə̆/ has significantly higher F2 values than the long vowel [t(29) = 5.831, $p< 0.01$]. The short low central vowel /ă/, on the other hand, has lower first two formant (F1, F2) values than the long vowel /a/. Statistical results, in

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addition, show the significant difference between short and long vowels (/ă/ and /a/) of F1 and F2 values. That is, F1 of the short vowel /ă/ is significantly lower than the F1 of long vowel /a/ [t(29) = -16.210, *p< 0.01*]. F2 of short vowel /ă/ is significantly lower than F2 of long vowel /a/ [t(29) = -8.516, *p< 0.01*].

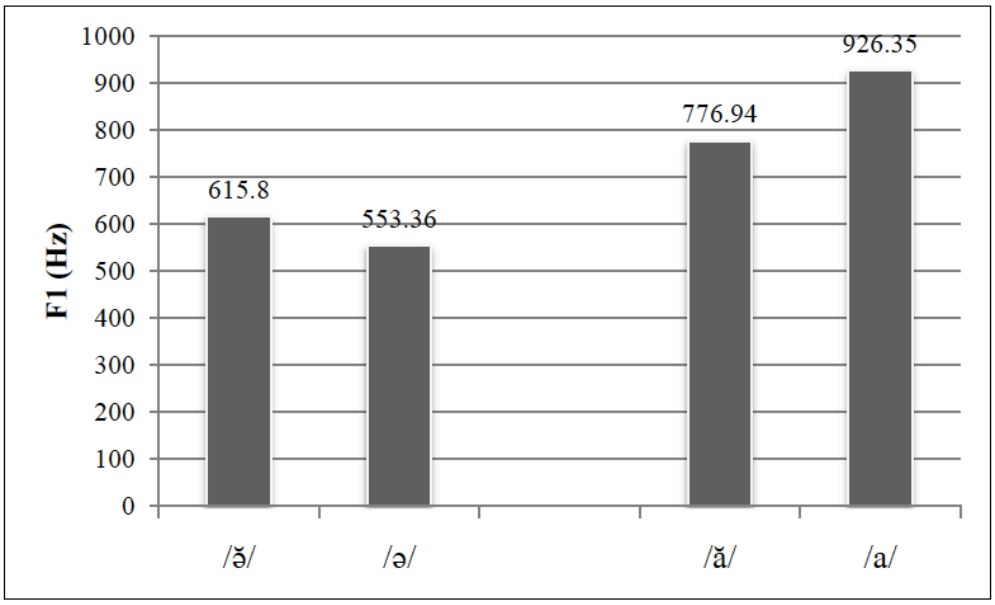


Figure 5. Average first formant frequency (F1) values of /ə̆/, /ə/, /ă/, and /a/ in Da-ang (two male speakers)

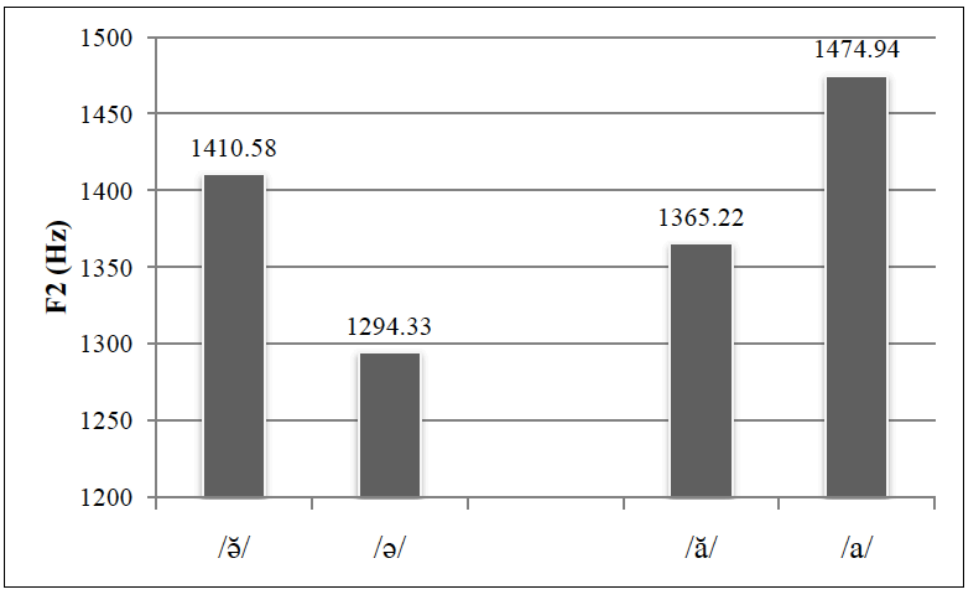


Figure 6. Average second formant frequency (F2) values of /ə̆/, /ə/, /ă/, and /a/ in Da-ang (two male speakers)

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Figure 5 presents the results of F1values. According to Pickett's (1980) *Oral constriction/ F1 Rule*, F1 of the short mid central vowel /ă/ is higher than F1 of the long mid central vowel /ə/. This means that, as for mid central vowels /ă, ə/, a short vowel is lower in quality than its long counterpart. F1 of the short low central vowel /ă/ is lower than F1 of the long low central vowel /a/, which suggests that the short vowel /ă/ is higher in quality than the long vowel /a/.

F2 results are presented in Figure 6. According to Pickett's (1980) *Back Tongue Constriction/ F2 Rule*, F2 of the short mid central vowel /ă/ is higher than F2 of the long mid central vowel /ə/. F2 of the short low central vowel /ă/ is lower than F2 of the long low central vowel /a/. In terms of frontness and backness, as indicated by F2 values, it appears that the long mid central vowel /ə/ is more back than the short /ă/ counterpart. The average of F2 of the long low central vowel /a/, however, shows that it is more front than the short vowel /ă/. The plot of F1 and F2 of short and long vowels showing the vowel position is presented in Figure 7.

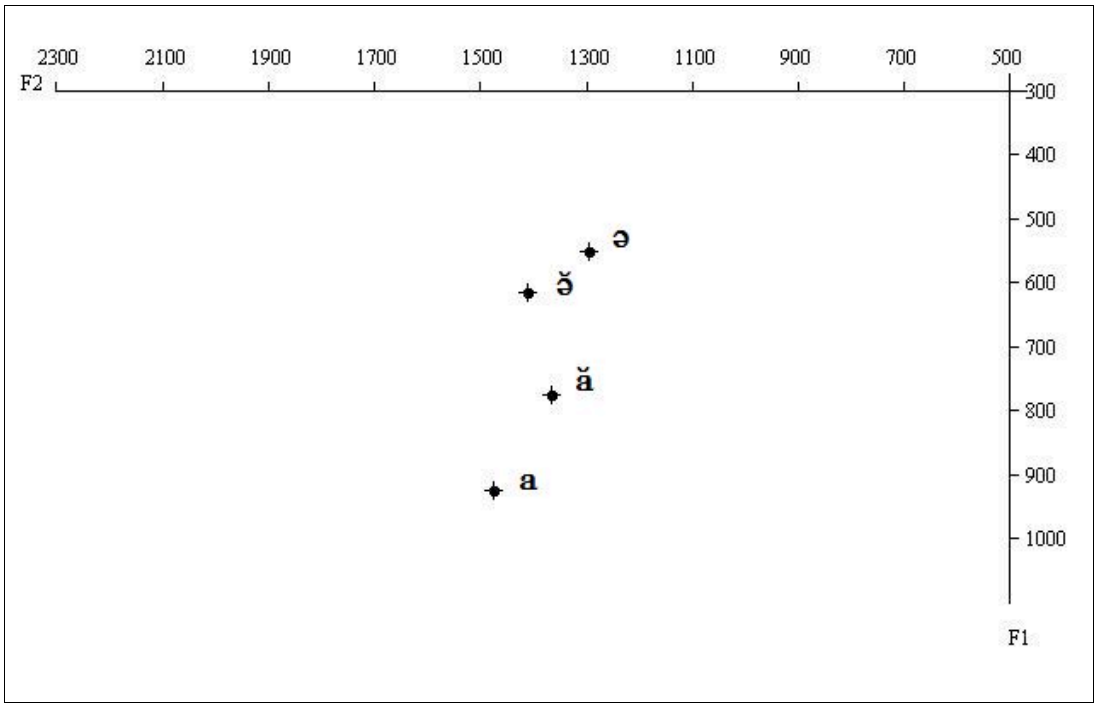


Figure 7. The plot of average values F1 vs. F2 of short and long vowels, /ă/, /ə/, /ă/, and /a/ in Da-ang (two male speakers)

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3.2.3 Short vowel preceding final labial /*-ə̆m/ > /-ă̆m/

As discussed in the previous section, *ə̆ before the final labial nasal /-m/ have merged with /ă̆/ (/*-ə̆m/ > /-ă̆m/). It is worthwhile to see that whether /*-ə̆m/ and /-ă̆m/ [-am] are completely merged. Thus, I measured the first formant (F1) value of the words that /*-ə̆m/ have been merged to /-ă̆m/ [-am]. Note that in Figure 8 /*-ə̆m/ in Da-ang is symbolized as /-ă̆m/*. As shown in Figure 8, as expected, it is found that the F1 value of /-ă̆m/* is a greater difference from the F1 value of /ə̆/ and is almost identical to the F1 value of /ă̆/. It is suggested that in terms of vowel height, /*-ə̆m/ completely merged to /-ă̆m/ [-am].

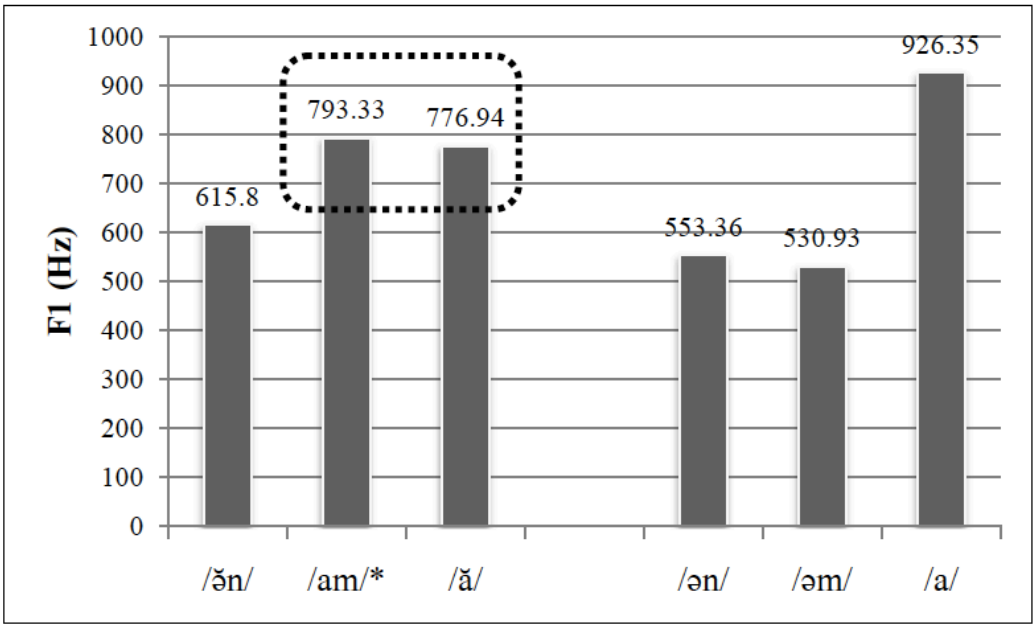


Figure 8. Average first formant frequency (F1) values of short vowel preceding final labial /*-ə̆m/ > /-ă̆m/ [-am] (two male speakers)

In summary, the results of the acoustic study show that in Da-ang, the vowel duration of phonemic long vowels are significantly longer than short vowels. Phonemic short vowel and phonemic long vowels also differ in terms of vowel quality, however, and it is evident that vowel duration is a dominant acoustic cue to distinguish phonemic vowel length in Da-ang. As for the variation of vowel duration according to vowel quality, the

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lower vowel is longer than the higher vowel only for phonemic short vowels. This finding in Da-ang (Myanmar) is consistent with Dara-ang (Thailand). Diachronically, the formant structures of short vowels (F1, F2) have also provided more understanding about short mid and low vowel mergers. It can be concluded that acoustic findings confirm the phonological analysis of the Da-ang presented in previous section.

4. Discussion

Referring to the Da-ang dialect of Palaung spoken in Myanmar, Janzen (1978) describes the vowel system as having no phonemic vowel length, suggesting that vowel length from Proto-Palaung has been lost in this dialect. Meanwhile, in Dara-ang, which spoken in Thailand, Kasisopa (2003) proposed a vowel system with phonemic short and long vowels, which implies that vowel length from Proto-Palaung is preserved in Dara-ang. Contrary to previous descriptions, in this study, the vowel lengths of the Palaung dialect spoken in Myanmar (Da-ang) is phonemic only for non-high central vowels, namely /ă, ə, ă, a/. That is, central vowel length in Da-ang did not lost, while vowel length in Dara-ang is preserved only for central vowels. This result confirms the Proto-Palaung vowel system reconstructed by Mitani (1977, 1979) and Diffloth (1991), which showed the 10 vowel system has three front vowels: /*i, *e, *ɛ/, three back vowels: /*u, *o, *ɔ/, and four central vowels: /*ă, *ə, *ă, *a/. From doing fieldwork on the Palaung dialects spoken in Thailand and Myanmar (Buakaw 2012), and five dialects of Palaung spoken in Dehong Dai-Jingpho Autonomous Prefecture, Yunnan Province, China,[4] I agree with Diffloth (1991) that vowel length in Palaung dialects is still operating, but with a small function load. Note that, the emergence of the high central vowel /ɨ/ in the vowel system of Da-ang is due to the diachronic development of the high back vowel /u/. As suggested in Ostapirat (2009: 66-67), *-um and *-uŋ were delabialized to /-ɨm/ and /-ɨŋ/, respectively. I also found that a set of words having the high central vowel /ɨ/ in open syllable were Tai loanwords.

[4] The field study carried out in Yunnan, China was made possible by grants from Thailand Research Fund under the project entitled: A preliminary ethnolinguistic study of the Palaung people in Kengtung, Myanmar and in Yunnan, China.

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In considering why vowels in Da-ang lost vowel length (except for non-high central vowels), I believe that the reason is probably due to intrinsic vowel duration. As mentioned in Maddieson (1997), other things being equal, higher vowels are shorter than lower vowels. However, as demonstrated in Teeranon (2007), the intrinsic length is a tendency. It is not universal as an intrinsic pitch and it should be a language-specific phenomenon rather than phonetic universal. Consistent partly with the results found in Mon-Khmer languages by Teeranon (2007), acoustic measurements of vowel duration of phonemic long and short vowels in this study showed that low vowels are not always longer than high vowels (i.e., in Da-ang low vowels are longer than high vowels only in the case of short vowels but not long vowels).

The phonological structure of the language may have influence on phonetic variation as hypothesized by Gordon (2002), who suggested that languages without phonemic length have greater durational differences between different vowels qualities than languages with phonemic vowel length. By investigating the duration differences between low and high vowels in languages with and without phonemic vowel length, Gordon (2002: 72-73) concluded that a language without phonemic vowel length displays greater durational differences between vowels of different qualities. He further suggests that "in languages with phonemic length contrast there is less room for the intrinsically longer low vowels to enhance their inherent length by undergoing additional lengthening." Since Da-ang has a mixed vowel system (i.e., some vowels have phonemic length whereas others do not as noted in Diffloth (1991: 25)) the Palaung vowel system appears to be half-way between a full vowel system and a language in which a vowel has been lost. Diffolth, moreover, suggests that "this vowel-system contraction seems typical of the Burma-Yunnan linguistic sub-area." Therefore, perhaps the vowel system of Da-ang may influence the phonetic variation of vowels.

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APPENDIX

Minimal pairs or near minimal pairs used for recordings in the acoustic study of vowel length in Da-ang

	/-ăn/		/-ən/	
1.	tăn	‘to lead by hand’	tən	‘that’
2.	sapăn	‘lips’	pən	‘eggs’
3.	băn	‘fly’	mən	‘crawl’
	/*-ăm/>/-am/		/*-əm/>/-əm/	
4.	phăm	‘fart’	phəm	‘breath’
5.	ʔăm	‘rotten’	makəm	‘pillow’
6.	săm	‘plant’	m̥əm	‘good’
	/ă/		/a/	
7.	hăp	‘put into’	hap	‘curry’
8.	lăʔ	‘ladle’	laʔ	‘sharpen’
9.	ʔăʔ	‘crossbow’	ʔaʔ	‘spicy’
10.	jăm	‘die’	jam	‘weep, cry’
11.	lăm	‘sharp’	lam	‘guess’
12.	r̥ăk	‘bamboo’	r̥ak	‘tooth’

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