

Chapter 4

Phonological Description of Bang Deng Plang

This chapter will give a description of the phonology found in the Bang Deng village of the Bulang Mountain district. As with the Man Noi description this description will begin with a discussion on what constitutes a word in this variety. Working at progressively smaller units of the sound system, a description of the syllable will follow the word and then a discussion on the phonemes. Finally the suprasegmental aspects will be covered.

4.1 Words

As in the Man Noi variety there are two main types of words, the monosyllabic word and the polysyllabic word. Each will be discussed below with examples.

4.1.1 Monosyllabic Words

Bang Deng monosyllabic words are identical to the Man Noi variety. The typical monosyllabic word begins with a consonant followed by a nucleus, which is a vowel, and then a final consonant. The largest syllable structure for the monosyllabic words is #CVC#.

#CVC#

/péh/	'fat'	/ŋàj/	'eye'
/kɛ̀p/	'father'	/muíh/	'nose'
/hák/	'skin'	/kán/	'eagle'

4.1.2 Polysyllabic Words

As discussed before there are two main types of polysyllabic words in Plang, sesquisyllabic words and compound words. The maximum structure for a presyllable is #CV. When combined with the syllable the resulting word structure is #CV.CVC#.

#CV.CVC#

/ka.kʻɨn/ 'dragon'

/ra.páj/ 'medicine'

/rə.waj/ 'tiger'

/k^hu.tíʔ/ 'ring'

The second type of polysyllabic words are those made from combining two monosyllabic words, two sesquisyllabic words, a monosyllabic word with a sesquisyllabic word, or three monosyllabic words to form a compound word. The resulting word structures are #CVC.CVC#, #CVC.CV.CVC#, #CV.CVC.CVC#, and #CVC.CVC.CVC#.

#CVC.CVC#

/ʔúm/ + /náʔ¹¹/ = /ʔúm.náʔ/
'water' 'field' 'wet field'

/hʻk/ + /ŋáj/ = /hʻk.ŋáj/
'hair' 'eye' 'eye brow'

#CVC.CV.CVC#

/túj/ + /ra.p^hóm/ = [túj.rá.p^hóm]
'****' 'lung' 'to breathe'

#CV.CVC.CVC#

/tə/ + /kʻɨn/ + /tíʔ/ = [tə.kʻɨn.tíʔ]
'presyllable/'****' 'hand' 'palm'

#CVC.CVC.CVC#

/tím/ + /k^háj/ + /páj/ = /tím.k^háj.páj/
'electricity' 'on'¹² '****' 'candle'

4.2 Syllables

The two syllable types in the Bang Deng variety are the main syllable and the presyllable.

¹¹ /náʔ/ 'field' is a loan word from Tai.

¹² /k^háj/ is a loan word from Chinese.

4.2.1 Main Syllables

Bang Deng syllable structure is represented in the following formula: #CVC#. All twenty-one phonemic consonants can fill the syllable initial consonant position.

There are however only thirteen consonants which can fill the syllable final position, see Table 12 below. Plosives in the coda position are unreleased.

	Bilabial		Alveolar		Palatal		Velar		Glottal	
Plosives	p		t		c		k		ʔ	
Nasals		m		n		ɲ		ŋ		
Fricatives									h	
Approximants	w					j				
Laterals				l						

Table 12 Bang Deng Final Consonants

4.2.2 Presyllables, Prefixes, and Particles

There are three types of minor syllables, presyllables, prefixes, and particles.

Presyllables and particles can be represented by the structure #CV, however prefixes can be represented as #C^v. Presyllables are a phonological unit, while prefixes and particles are morphological (and semantic) units (Svantesson 1983:35).

There are nine consonants that can occupy the onset position, /t, p^h, m, r, s, l, k, k^h, ʔ/. Vowels that can occur in the presyllable are restricted to /a, u, o/. However, /o/ in the presyllable is very suspicious due to the fact that it only occurs once in entire elicited wordlist. In fast speech and relaxed speech /a/ can be reduced to /ə/.

While /a/ can occur with all presyllable consonants, /u/ has a more restricted occurrence in that it only occurs with /p^h, l, k^h/.

There are two classes of presyllables in Bang Deng. There is a non-specified class as well as a class of presyllables that have either a grammatical function or a semantic domain. These will be listed below with examples.

/ta/ as a presyllables has a non-specified use.

(60) /ta/ non-specified use

- /ta.ʔáw/ 'sky'
- /ta.póŋ/ 'window'
- /ta.púh/ 'mushroom'

/tá/ as a prefix functions as a classifier for time.

(61) /tá/ prefix 'Time Domain'

/tá.sà.ɲìʔ/	'daytime'
/tá.ɲúp/	'morning'
/tá.páj/	'noon'

/ta/ also occurs as a particle. As a particle it serves as a causative grammatical marker.

(62) /ta/ particle 'Causative Particle'

/ta/	+	/j̀̀m/	=	/ta.j̀̀m/
/Causative/		'dead'		'to kill'

/ta/	+	/tʰóp/	=	/ta.tʰóp/
/Causative/		'a slap'		'to slap'

(63) /p^hu/ non-specified use

/p ^h u.mɻ́/	'angry'
/p ^h u.mòʔ/	'lung'

(64) /p^ha/ non-specified use

/p ^h a.sáh/	'lightening'
/p ^h a.luún/	'dust'
/p ^h a.jón/	'pepper'

(65) /p^ho/ non-specified use

/p ^h o.mèn/	'cotton'
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As stated above this is the only occurrence of /p^ho/ as a presyllable, thus this presyllable is not well attested.

(66) /ma/ non-specified use

/ma.c ^h éŋ/	'wok'
/ma.k ^h ʔ/	'eggplant'

There are only two occurrences of /ma/ as a presyllable. One occurrence is a loan word from Tai, /ma.k^hʔ/ 'egg plant.' It is suspected from these two examples that these words are both loan words from Tai.

(67) /ra/ non-specified use

/ra.làh/	'market'
/ra.páj/	'medicine'
/ra.hàʔ/	'to play'

(68) /sa/ non-specified use

/sa.táp/	'snow'
/sa.kóʔ/	'wet'
/sa.táʔ/	'tail'

(69) /lu/ non-specified use

/lu.líl/	'to be round'
/lu.láj/	'deer'

The presyllable /lu/ is not well attested, only occurs twice in the wordlist.

(70) /la/ non-specified use

/la.p ^h ʔ/	'leaf'
/la.tʔ/	'pestle'
/la.ʔih/	'to fight'

/la/ as a particle functions as a possessive marker.

(71) /la/ possessive grammatical particle

/la/	+	/ʔɣʔ/	=	/la.ʔɣʔ/
/Possessive/		'1 st singular'		'mine'
/la/	+	/míʔ/	=	/la.míʔ/
[Possessive]		'2 nd singular'		'yours'
/la/	+	/ʔɣn/	=	/la.ʔɣn/
[Possessive]		'3 rd singular'		'his, hers'

(72) /ka/ non-specified use

/ka.núʔ/	'ashes'
/ka.nàh/	'to smile'
/ka.sáj/	'elephant'

(73) /k^hu/ non-specified use

/k ^h u.píʔ/	'fruit'
/k ^h u.túʔ/	'animal'
/k ^h u.jók/	'ear ring'

/k^há/ is a prefix that functions as a locative marker.

(74) /k^há/ prefix 'Locative'¹³

/k ^h á.k ^h ùʔ/	'behind'
/k ^h á.nèj/	'inside'
/k ^h á.níʔ/	'beside'

(75) /ʔa/ non-specified use

/ʔa.c ^h íh/	'to sneeze'
/ʔa.rúk/	'wolf'
/ʔa.póŋ/	'waist'

Prefixes and particles both contain a semantic meaning that modify the meaning of the syllable. They differ in that prefixes have an inherent tone, while particles do not. The prefixes for time and location both have inherent tone and do not assimilate

¹³ Words beginning with /k^há/ are loan words from Tai.

to the tone of the following syllable. Particles, such as the causative particle, do not have an inherent tone and therefore assimilate to syllable they precede.

As with Man Noi Plang prefixes in Bang Deng also differ from particles and presyllables in that they can precede sesquisyllabic words which expands the word structure to #CV.CV.CVC#.

#CV.CV.CVC#

/tá/ + /sa.ŋì?/ = [tá.sà.ŋì?]

/time prefix/ 'sun' 'daytime'

4.3 Interpretation of Ambiguities

There are ambiguous segments with what could be interpreted as final diphthongs. There are seventy words in which a vowel glides either to [i] or [u] as diphthongs or to [j] or [w] as final semivowel consonants. These environment, if interpreted as diphthongs, would be the only place where there is an open syllable as the main syllable. Therefore, these semivowels are being interpreted as final consonants, /j/ and /w/.

4.4 Phonemes

In this section an inventory of the consonant and vowel phonemes will be presented. The distribution of each phoneme will also be shown.

4.4.1 Consonants

There were twenty-five consonantal sound segments found in the Bang Deng variety. Twenty-one of the sound segments were found to be phonemic. The phonemic sound segments are represented in Table 13 below.

	Bilabial	Labio-Dental	Alveolar	Palatal	Velar	Glottal
Plosives	p		t	c	k	ʔ
	p ^h		t ^h	c ^h	k ^h	
Nasals	m		n	ɲ	ŋ	
Fricatives		f v	s			h
Approximants	w		r	j		
Lateral App.			l			

Table 13 Bang Deng Consonant Phoneme

4.4.1.1 Consonant Contrast

Phonemes are shown to contrast in identical environments (CIE) or contrast in non-influencing environments (CNE). Contrast are shown below.

/p/ – /p ^h /:	/pók/	'to ride'	/p ^h ók/	'to hang out'	CIE
/t/ – /t ^h /:	/túʔ/	'smoke'	/t ^h ùʔ/	'chopsticks'	CNE
/c/ – /c ^h /:	/cʔ/	'to believe'	/c ^h ʔ/	'blanket'	CNE
/k/ – /k ^h /:	/kúʔ/	'to wake up'	/k ^h úʔ/	'tree'	CIE
/c/ – /k/:	/cʔ/	'to believe'	/kʔ/	'to swell'	CIE
/ɾ/ – /l/:	/ɾét/	'word, speech'	/lét/	'to lick'	CIE
/l/ – /n/:	/lój/	'three'	/nój/	'pit, stone'	CIE
/m/ – /n/:	/mút/	'cloud'	/núʔ/	'to suck'	CIE
	/hým/	'to bathe'	/hýn/	'much, many'	CIE
/t/ – /n/:	/ká.téʔ/	'earth, soil'	/kà.nèʔ/	'monkey'	CNE
/n/ – /p/:	/nòk/	'to look'	/pók/	'brain'	CNE
	/pýn/	'year'	/pýp/	'to shoot'	CIE
/p/ – /p/:	/pýp/	'to shoot'	/pýp/	'to blow'	CIE
/s/ – /h/:	/sýt/	'to receive'	/hýt/	'flesh'	CIE
/f/ – /v/:	/fáj/	'deity, spirit'	/vák/	'bug, insect'	CNE
/ʔ/ – /h/:	/ʔúl/	'to shout'	/húl/	'to vomit'	CIE
	/tóʔ/	'buttocks'	/tóh/	'to open'	CIE
/j/ – /w/:	/máj/	'to write'	/màw/	'to be drunk'	CNE
	/jám/	'to cry'	/wát/	'temple'	CNE
/w/ – /v/:	/wát/	'temple'	/vák/	'bug, insect'	CNE

There are only two contrast in non influencing environment pairs between /f/ and /v/, therefore this contrast is not well attested. The contrast between /w/ and /v/ is not well attested in the data, there are few words with /w/ in the initial position. Also /w/ in the initial position can be produced in free variation as [v].

4.4.1.2 Plosives

There are nine plosives occurring at five points of articulation, bilabial, alveolar, palatal, velar and glottal. As stated above there are four plosive allophones [p̣, ṭ, c̣, ḳ]. These are predictable in that they only occur in word final position. The glottal stop occurs phonemically in both the syllable initial and final position. The plosive phonemes are listed with examples below.

(76) /p/ voiceless bilabial unaspirated plosive:	/píl/	'to forget'
	/pʰɛŋ/	'to blow'
	/júŋ.pón/	'stairs'

(77) /p ^h / voiceless bilabial aspirated plosive:	/p ^h íh/	'to sweep'
	/p ^h áw/	'to scatter seeds'
	/lé.p ^h íl/	'hail'

When in the syllable final position /p/ is realized as a voiceless bilabial unreleased plosive [p̣] as in [kíp̣] 'to cut with scissors'.

(78) /t/ voiceless alveolar unaspirated plosive:	/túíʔ/	'vegetable'
	/tím/	'low'
	/tà.tòm/	'to pile up'

(79) /t ^h / voiceless alveolar aspirated plosive:	/t ^h ól/	'to be shallow'
	/t ^h ùʔ/	'chopsticks'
	/tá.t ^h óp/	'to slap'

When in the syllable final position /t/ is realized as a voiceless alveolar unreleased plosive [ṭ] as in [léṭ] 'to lick'.

(80) /c/ voiceless palatal unaspirated plosive:	/cúíʔ/	'to know'
	/cén/	'light, bright'
	/sá.cáʔ/	'ghost'

/nón/	'just now'
/ɲén/	'short'

(87) /ɲ/ voiced palatal nasal:

/ɲók/	'brain'
/ɲáʔ/	'house'
/páɲ/	'to sell'
/sá.móɲ/	'star'

(88) /ŋ/ voiced velar nasal:

/ŋúʔ/	'to smell'
/ŋáp/	'to yawn'
/sá.júŋ/	'light'
/rʔŋ/	'horn'

Paulsen (1992) states that Proto Plang contains a clustering of the nasal + [h], which is produced as a voiceless nasal in other dialects. In the Bang Deng variety, as in the Samtao and Man Noi varieties, this cluster is now produced as a voiced nasal.

(89) *Nh₁ → N

*nham¹ 'blood' → /nám/

*mhVI¹ 'heart' → /múl/

4.4.1.4 Fricatives

There are four fricatives occurring at the labiodental, alveolar, and glottal points of articulation. Fricatives produced at the labiodental and alveolar points can only occupy the onset position. However, the fricative produced at the glottal point of articulation can occupy both onset and coda positions. The fricative phonemes are listed below with examples.

(90) /f/ voiceless labiodental fricative:

/fɪl/	'trousers'
/fáj/	'deity, spirit'

Like the proto reconstruction of Plang, the /f/ is not well attested appearing only twice in the entire wordlist. However, there is no free variation between /f/ and /v/. There is also contrast in non-influencing environments (CNE) between /fáj/ 'to worship' and /vák/ 'bug, insect'.

(91) /v/ voiced labiodental fricative:	/vák/	'insect, bug'
	/vóc/	'to cut, reap'
	/vúk/	'bent, crooked'

(92) /s/ voiceless alveolar fricative:	/sóʔ/	'dog'
	/súʔ/	'new'
	/sáj/	'milk'

(93) /h/ voiceless glottal nasal:	/húl/	'to vomit'
	/hʔk/	'hair'
	/rá.hàʔ/	'to play'
	/kà.nàh/	'to smile'

Bang Deng fricatives do not differ from the proto language. As with the proto language and Man Noi the /f/ is not well attested.

4.4.1.5 Approximants

There are three approximants in the Bang Deng variety and they occur at the bilabial, palatal, and alveolar positions. There is also a lateral approximant occurring at the alveolar point of articulation. Both /w/ and /j/ can fill both onset and coda positions. However, in the coda position they create off-glides of the vowel. This will be discussed further under the vowel section. The lateral approximant, /l/, like the Man Noi variety can fill the onset position, however unlike the Man Noi variety it can also fill the coda. These phonemes are listed below with examples.

(94) /w/ voiced labial-velar approximant:	/wát/	'temple'
	/rá.wáj/	'tiger'
	/jàw/	'to be cheap'
	/ʔéw/	'to look for'

There is free variation between /w/ and [v]. For example, /wàt/ can be pronounced as [vət].

(95) /j/ voiced palatal approximant:	/jén/	'to grasp, hold'
	/jók/	'ear'

/pój/	'to pasture'
/rá.púj/	'shadow'

(96) /r/ voiced alveolar approximant:

/rúk/	'frog'
/ráŋ/	'tooth'
/rá.rýt/	'to snore'

The alveolar tap /r/ in the onset can occur in free variation with the lateral approximant [l]. For instance /ra.píl/ 'sieve' can be produced as [la.píl].

(97) /l/ voiced alveolar lateral approximant:

/lík/	'pig'
/lɛp/	'blunt'
/ʔúl/	'to shout'
/lú.líl/	'to be round'

Proto-plang has a clustering of *lh in both the initial and final position. However, in Bang Deng this cluster in the initial position has been reduced to /l/. In the final position it has been reduced to /h/.

lh → h

*prvlh ¹	'to carry on back'	→	/pʰh/
*rilh ²	'root'	→	/rèh/
*kìlh ²	'salt'	→	/kìh/

lh → l

*lhek ¹	'iron'	→	/lék/
*lhVŋ ¹	'tall'	→	/lúnj/

Also in proto-plang *r and *l are contrastive in final position. This contrast has been lost in Bang Deng because *r becomes /l/ in final position.

r → l

*phyr ¹	'to fly'	→	/pʰl/
*mùr ²	'to crawl'	→	/mùl/
*Cir ¹	'bee'	→	/pʰél/

Proto-plang has clusters of *p, *k with *l and *p^h, *k^h with *r. These clusters have been lost in Bang Deng.

4.4.2 Vowels

There are ten vowel phonemes in the Bang Deng variety. The phonemic sound segments are represented in Table 14 below. There are four front vowels, five back vowels, and one central vowel. All vowels are produced with clear or breathy phonation.

	Front		Central		Back	
Close	i				u	u
		ɪ				
Close-mid	e				ɤ	o
Open-mid	ɛ					ɔ
Open			a			

Table 14 Bang Deng Vowel Phonemes

4.4.2.1 Monophthongs

Vowel phonemes are listed below with examples.

- (98) /i/ close front unround: /ra.tiʔ/ 'to ask'
 /lín/ 'old'
 /kíh/ 'salt'
- (99) /ɪ/ near-close near-front unrounded: /sín/ 'to count'
 /híl/ 'thin, flimsy'
 /ʔit/ 'to sleep'
- (100) /e/ close-mid front unrounded: /réh/ 'root'
 /téʔ/ 'near'
 /léj/ 'to flow'
- (101) /ɛ/ open-mid front unrounded: /p^héi/ 'bee'
 /lɛp/ 'few'
 /ʔéi/ 'chicken'

As with Man Noi vowels both /e/ and /ɛ/ are both phonemic vowels contrasting in non-influencing environments. Shown here:

/e/ – /ɛ/:	/tɛʔ/	'near'	/tɛʔ/	'arrow'	CNE
	/lɛh/	'six'	/pɛh/	'fat'	CNE

However, as seen from Table 15 below, the same correlation between /e/ and /ɛ/ that exist in Man Noi also appears in Bang Deng. It may be that as the language changes in Bang Deng that /e/ could become an allophone of /ɛ/, but so far this is uncertain.

	e [*]	ɛ [*]
m	-	-
n	-	+
ɲ	-	+
ŋ	+	-
p'	-	+
t'	-	+
c'	+	-
k'	-	+
ʔ	+	+
h	+	+
w	-	+
j	+	-

Table 15 Correlation between /e/ and /ɛ/

- (102) /u/ close back unrounded: /ɲúʔ/ 'to smell'
 /cúʔ/ 'to know'
 /muʔh/ 'nose'
- (103) /u/ close back rounded: /múl/ 'heart'
 /júk/ 'to lift'
 /lún/ 'high, tall'
- (104) /ɤ/ close-mid back unrounded: /lʔt/ 'deaf'
 /pʔj/ 'person'
 /sʔʔ/ 'straight'
- (105) /o/ close-mid back rounded: /mók/ 'to sit'
 /ʔót/ 'to wipe'
 /sót/ 'dog'

(106) /ɔ/ open-mid back rounded: /mɔ̃p/ 'mouth'
 /cɔ̃p/ 'to guess'
 /lɔ̃j/ 'three'

(107) /a/ open central unrounded: /pám/ 'often'
 /kán/ 'eagle'
 /páj/ 'alcohol'

As seen in Table 16 below there are restriction on the vowels according to the consonant they precede.

	i_	ɪ_	e_	ɛ_	u_	ʊ_	ɹ_	o_	ɔ_	a_
m	-	+	-	-	-	+	+	+	+	+
n	+	+	-	+	+	+	+	-	+	+
p	-	-	-	+	-	-	+	-	+	+
ŋ	+	-	+	-	+	+	+	+	+	+
p'	+	+	-	+	-	+	+	+	+	+
t'	-	+	-	+	+	+	+	+	+	+
c'	-	-	+	-	-	-	+	-	+	+
k'	+	-	-	+	-	+	+	+	+	+
ʔ	+	-	+	+	+	+	+	+	+	+
h	+	-	+	+	+	+	+	+	+	+
w	-	-	-	+	-	-	-	-	-	+
j	-	-	+	-	-	+	+	-	+	+

Table 16 Vowels preceding final consonants

Predictably, back vowels do not occur before /w/. The only front vowel to occur before /j/ is /e/. The back vowels /u, ʊ, o/ are restricted in that they do not occur before the palatal nasal or palatal plosive. /a/ is the most unrestricted vowel occurring in every position.

4.5 Register Complex

As with Man Noi “register” in Bang Deng is better described as a register complex because there are two interrelated features. The first of these features is phonation type, i.e. breathy and modal voicing. The second feature is tone. Each will be discussed below.

4.5.1 Phonation

Bang Deng vowels are produced in a modal or breathy phonation. The modal phonation is produced with no laxing to slight tensing of the glottis. The breathy phonation is produced by a laxing of the glottis. As with the Man Noi variety phonation is not a contrastive feature of the language. See Section 3.4.2.3 above.

These phonations can be seen more clearly from the F1 and F2 formants that they produced, as seen in Table 17 below. From Thurgood (2000), it is expected that vowels produced in a breathy phonation should have a lowered F1. However, only /i, ɪ, e, u, ɔ/ have a lower F1. These vowels do tend to be longer and have an association with final /h/.

Modal Vowel	Mean		Breathy Vowel	Mean	
	Standard Deviation			Standard Deviation	
	F1	F2		F1	F2
i	329.7 27	1921.8 65.9	ɨ	334.9 18.1	1717.4 56.9
ɪ	422.8 15.8	1784.3 45.9	ɨ	423.2 18	1682.9 64.4
e	493.9 45.9	1797.1 73.3	ɛ	506.8 34.2	1665.2 23.2
ɛ	566.4 43.6	1700.7 63.5	ɛ	546.6 33.7	1583.2 88.9
a	812.9 54.2	1389.9 54.4	ɶ	789.7 39.9	1224.8 35.2
ɯ	350.4 38.8	1490.2 38.8	ɯ	348.2 43.5	1359.8 59.6
u	384.9 40	883.4 42	ɯ	409 48.7	1062.8 75.4
ɤ	502.1 52.1	1437.6 18.1	ɤ	501.7 61.8	1358.1 54.2
o	497.1 39.4	883.1 46.9	ɔ	493.6 37.3	1055.9 16.9
ɔ	604.8 70.1	1053.1 33.7	ɔ	628.4 37.5	922.8 47.9

Table 17 Bang Deng Vowels mean F1 and F2

Using the mean value of the formants the following figure graphically displays the modal vowels.

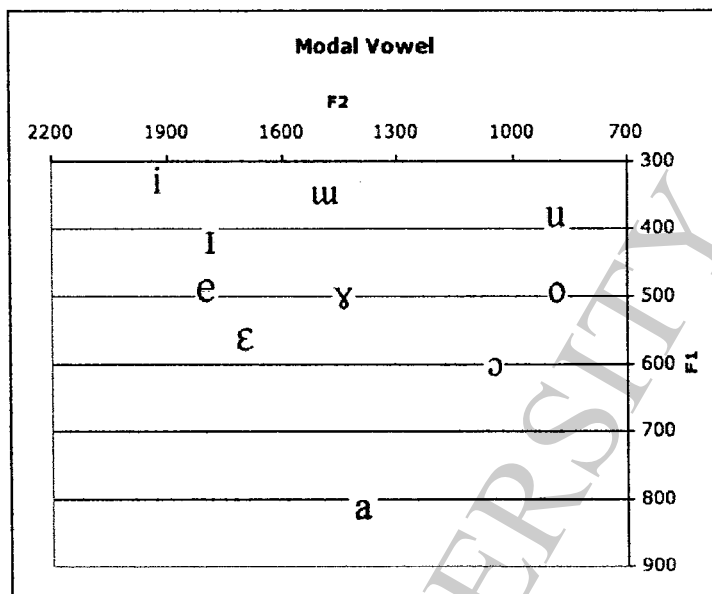


Figure 17 Bang Deng Modal Vowels

Using the mean value of the formants the following figure graphically displays the breathy vowels.

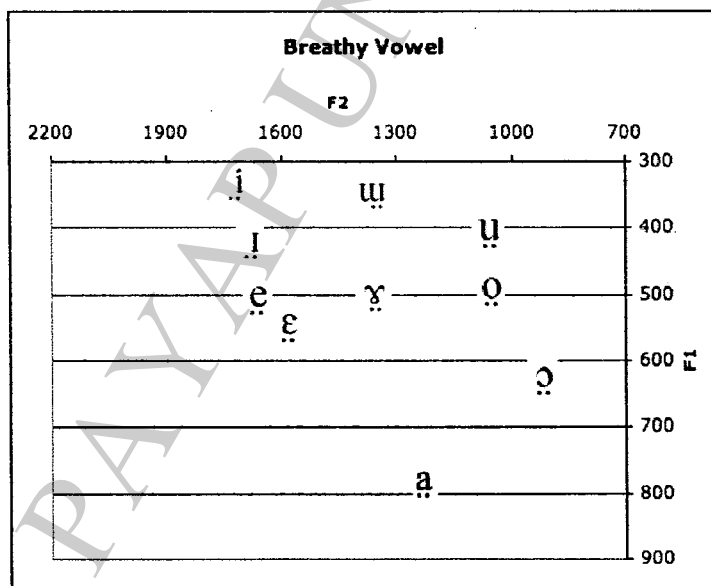


Figure 18 Bang Deng Breathy Vowels

In summary there are two phonation types in Bang Deng Plang, breathy and modal. Using Watkins phonation continuum, see Section 2.4, Bang Deng phonation types

can be described as such: breathy phonation is modal tending towards breathy, modal phonation is modal tending toward creaky as seen in below.

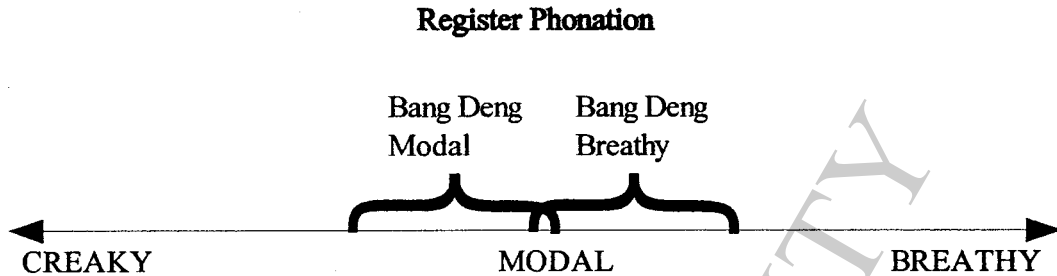


Figure 19 Bang Deng Phonation

4.5.1.1 Phonation Contrast

Phonation is shown to contrast in identical environments (CIE) or contrast in non-influencing environments (CNE). Contrasts are shown below.

/i/ – /ḭ/:	/k ^h ɪh/ 'bear'	/l̩ɪh/ 'to go down'	CNE
/ɪ/ – /ɪ̰/:	/fɪl/ 'trousers'	/ɬɪm/ 'low'	CNE
/e/ – /ḛ/:	/léj/ 'to flow'	/r̩ɛh/ 'root'	CNE
/ɛ/ – /ɛ̰/:	/ʔét/ 'small'	/l̩ɛj/ 'few'	CNE
/a/ – /a̰/:	/láʔ/ 'to tell'	/làʔ/ 'tea'	CIE
/u/ – /ṵ/:	/cúʔ/ 'to know'	/k ^h à.k ^h ṵʔ/ 'behind'	CNE
/u/ – /ṵ/:	/múl/ 'heart'	/mùl/ 'to crawl'	CIE
/ɤ/ – /ɤ̰/:	/kɤh/ 'to boil'	/pɤh/ 'to carry on back'	CNE
/o/ – /o̰/:	/kók/ 'mortar'	/tóh/ 'to open'	CNE
/ɔ/ – /ɔ̰/:	/sój/ 'bitter'	/mɔ̰ŋ/ 'net'	CNE

4.5.1.2 Close Back and Close-Central Vowels

As with the Man Noi [u] and [ɤ] vowels there is a question of whether these vowels are close back or close-central vowels, as seen in Figure 17 above. The determining factor of whether they are close back or close-central is the F3 formant, as explained in Section 3.4.2.4 above.

	F2	F3
u	859.4	1544.8
ʊ	1087.7	1586.6
o	896.4	1630.9
ɤ	1371.3	1639.5

Table 18 Bang Deng Back Vowel F2 and F3 Average

From Table 18 above it can be seen that the F3 of [u] and [ɤ] differ only slightly from the back rounded vowels, but differ greatly in F2. Therefore, it is better therefore to describe these vowels as back vowels rather than central vowels.

4.5.2 Tone

The second feature of the register complex is tone. There are two tonemes in the Bang Deng variety and two allotones. The allotones are based on a positional variation. The two level tones are classified as a high and low tone. See Figure 20 below. Each tone will be discussed further below.

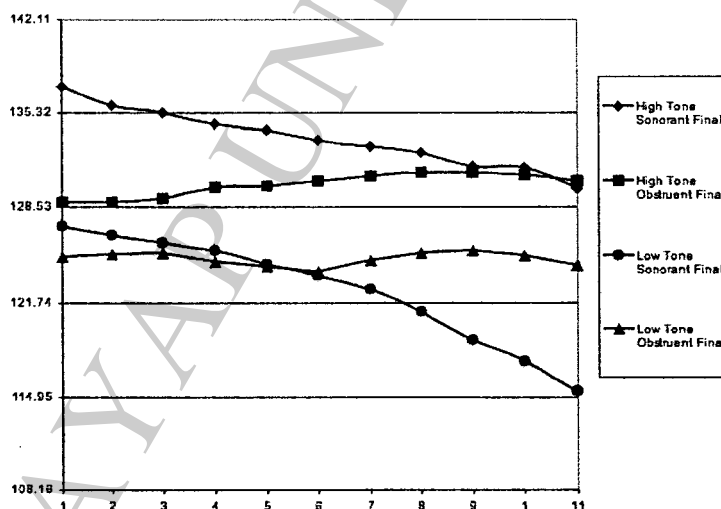


Figure 20 Bang Deng Tone

4.5.2.1 Tone Contrast

Tonemes are shown to contrast in identical environments (CIE) or contrast in non-influencing environments (CNE). Contrasts are shown below.

/i/ – ɿ/: /ʔiŋ/ 'to come' /ciŋ/ 'to sew' CNE

/ɿ/ – /ʅ/:	/tʃɪm/ 'to chop'	/tʃɪm/ 'low'	CIE
/é/ – /è/:	/léj/ 'to flow'	/vèj/ 'quick, fast'	CNE
/é/ – /è/:	/cèʔ/ 'money'	/tèʔ/ 'arrow'	CNE
/á/ – /à/:	/páj/ 'table'	/pàŋ/ 'Plang'	CIE
/ú/ – /ù/:	/cúʔ/ 'to know'	/k ^h à.k ^h ùʔ/ 'behind'	CNE
/ú/ – /ù/:	/múl/ 'heart'	/mùl/ 'to crawl'	CIE
/ɹ/ – /ɻ/:	/nɹm/ 'urine'	/nɻm/ 'thunder'	CIE
/ó/ – /ò/:	/kón/ 'to dig'	/lòn/ 'black'	CNE
/ɔ/ – /ɔ̃/:	/k ^h ɔʔ/ 'hoe'	/k ^h ɔ̃ʔ/ 'to wait'	CIE

4.5.2.2 High Tone

The high tone is a level tone of /44/ beginning at 128 Hz and ending at 130 Hz as seen in Figure 20 above. There is one high allotone which is influenced by the final consonants. The high tone occurring with an obstruent final is a normal tone. This tone begins around 128.8 Hz and rises to 130.3 as seen in Figure 21 and Figure 22 below.

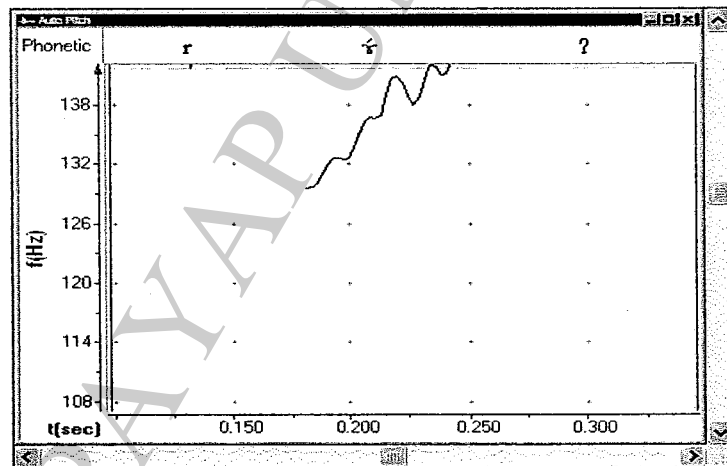


Figure 21 'to be deep'

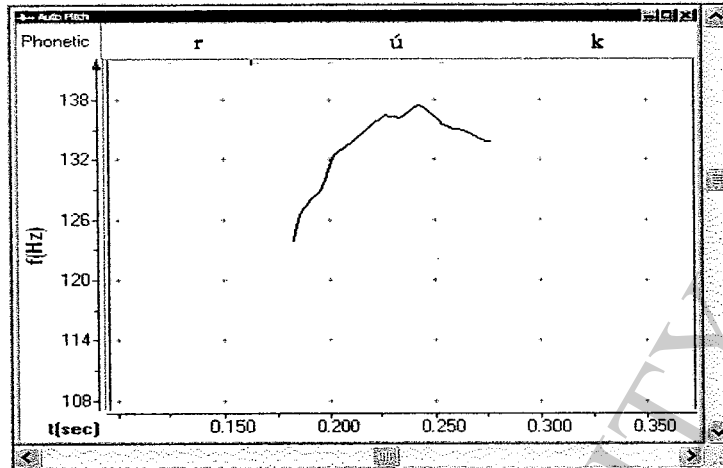


Figure 22 'frog'

When the high tone occurs before a sonorant final the resulting allotone is a falling tone of [43]. The tone begins around 137.7 Hz and falls to 129.9 Hz. As seen in Figure 23 and Figure 24 below.

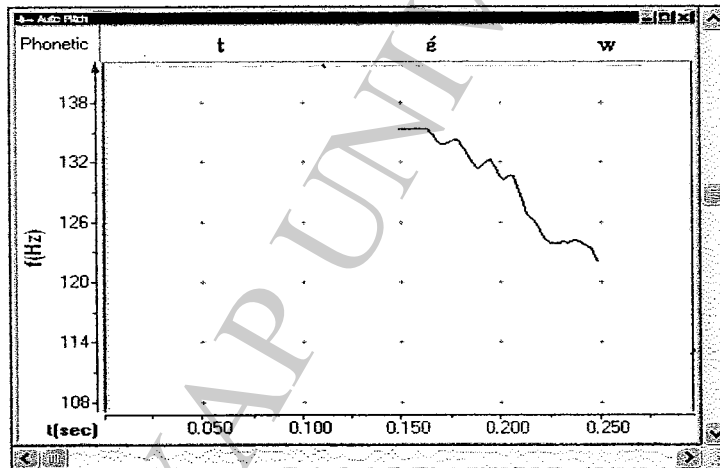


Figure 23 'to walk'

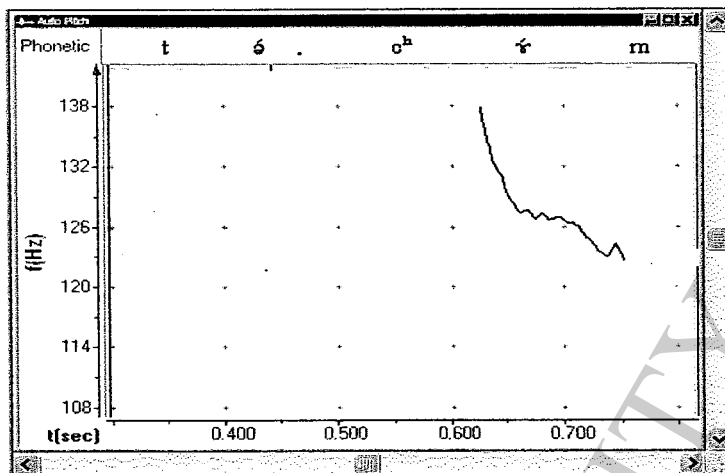


Figure 24 'religion'

4.5.2.3 Low Tone

The low tone is tone of /33/ the tone begins at 124.9 Hz and ends at 124.3 Hz as seen in Figure 20 above. As with the high tone there is one allotone which is the result of influencing from the syllable final consonant. The normal tone occurs when the low tone ends with an obstruent final it is a level tone. This can be seen in Figure 25 and Figure 26 below.

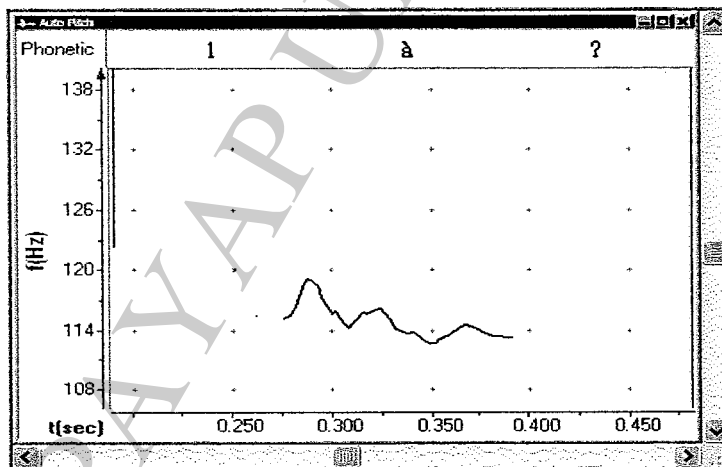


Figure 25 'tea'

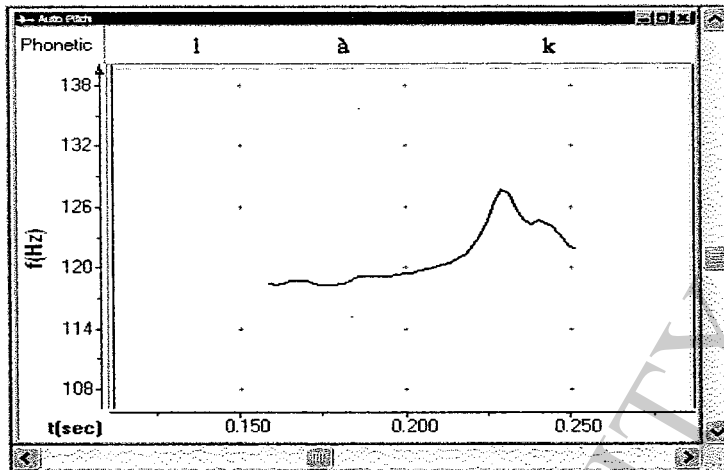


Figure 26 'late'

The allotone occurs when the low tone ends in a sonorant final causing the tone to fall resulting in an allotone of [32]. It generally begins at 127 Hz falls to 115 Hz. As seen in Figure 27 and Figure 28 below.

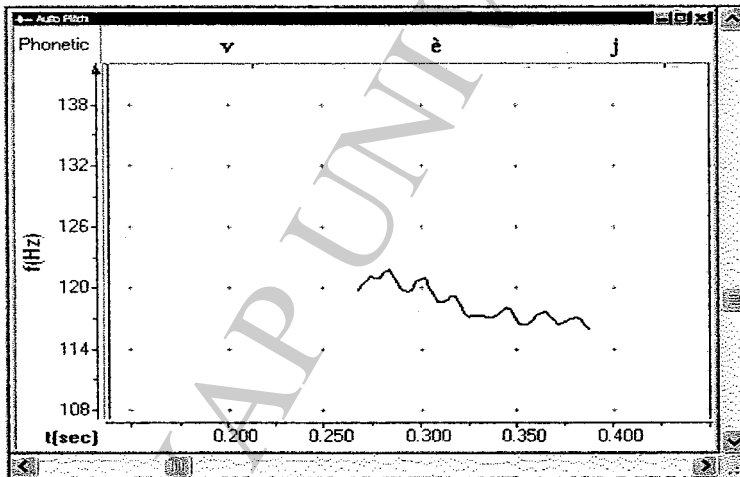


Figure 27 'to be fast'

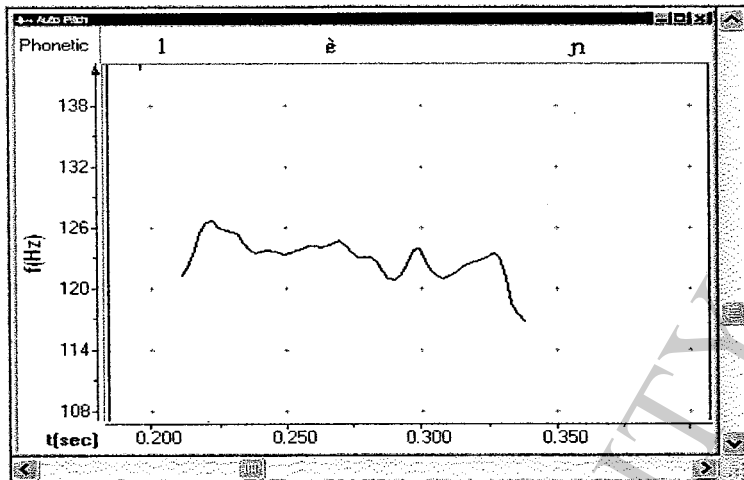


Figure 28 'to be blunt'

In summary in Bang Deng there are two contrastive tones, high and low. Each tone has one allotone which is the result of influencing from the final consonant.

4.5.3 Phonation and Tone

From the limited number of words that occur with breathy phonation it is hard to determine which of these features is more dominant. However, during elicitation when asked to explain the difference between words containing breathy phonation the language consultant would always state that the words differed in tone, not in phonation.

4.6 Phonological Processes

This section provides a description of the phonetic features of the Bang Deng variety.

4.6.1 Word

4.6.1.1 Voice Assimilation

As with the Man Noi voicing assimilation the Bang Dang variety also follows the same rule. Voiceless plosives when following a voiced nasal after a syllable break the voiceless plosive is produced as voiced:

$$[-\text{cont}] \rightarrow [+ \text{voiced}] / [+ \text{nasal}]_ _$$

(108) Underlying Form: /ʔúm.páh/ 'weak'

Surface Form: [ʔúm.báh] 'weak'

- (109) Underlying Form: /kỳn.tàʔ/ 'ancestor'
 Surface Form: [kỳn.dàʔ] 'ancestor'
- (110) Underlying Form: /tán.kàw/ 'butterfly'
 Surface Form: [tán.gàw] 'butterfly'

4.6.1.2 Final Plosives

The plosives /p, t, c, k/ when in final position are realized as unreleased. This is written by the rule:

[-cont] → unreleased / _#

- (111) Underlying Form: /ríp/ 'grass'
 Surface Form: [ríp̚] 'grass'
- (112) Underlying Form: /mút/ 'could'
 Surface Form: [mút̚] 'cloud'
- (113) Underlying Form: /týc/ 'to stab'
 Surface Form: [týc̚] 'to stab'
- (114) Underlying Form: /húk/ 'to go up'
 Surface Form: [húk̚] 'to go up'

4.6.1.3 Tone Assimilation

Bang Deng presyllables have no inherent tone. Therefore presyllables assimilate to the tone of the syllable that they precede.

- (115) Underlying Form: /ka.mỳc/ 'ant'
 Surface Form: /kà.mỳc/ 'ant'

4.6.1.4 Glottal Deletion

If the first word in a compound word ends in a glottal stop it is deleted when combined with the second word. The deletion rule can be written as:

/?/ → ∅ / _σ

- (116) /lòʔ/ + /kʰúʔ/ = /lól.kʰúʔ/
 'peel, husk' 'tree' 'tree bark'

Underlying Form: /lòʔ.k^húʔ/ 'tree bark'

Surface Form: [lò.k^húʔ] 'tree bark'

4.6.1.5 Allotone

As stated above there are two tonemes, high and low, as well as two allotones. These can be understood by the rules stated below.

High Tone → Falling Onset / __[+son]

Low Tone → Falling Coda / __[+son]

4.6.2 Consonants

4.6.2.1 Off-glides

Vowels that occur before the palatal plosive and the palatal nasal have a high front off-glide. However, as seen in Table 19 below, this off-glide is limited to the vowels /ε, a, ɣ, ɔ/. This can be written by the rule:

/V/ → [Vⁱ] / __[+cor,-ant]

	i*	ɪ*	e*	ɛ*	a*	ɨ*	u*	ɤ*	o*	ɔ*
c'	-	-	-	+	+	-	-	+	-	+
ɲ	-	-	-	+	+	-	-	+	-	+

Table 19 Bang Deng Vowels before the Palatal Plosive and Palatal Nasal

(117) ε → εⁱ/__c, ɲ /lèɲ/ → [lèⁱɲ] 'blunt'
 /p^héɛc/ → [p^héⁱc'] 'to spit'

(118) a → aⁱ/__c, ɲ /pàɲ/ → [pàⁱɲ] 'white'
 /pác/ → [páⁱc'] 'to scratch'

(119) ɣ → ɣⁱ/__c, ɲ /tɣc/ → [tɣⁱc'] 'to stab'
 /kɣɲ/ → [kɣⁱɲ] 'father'

(120) ɔ	→	ɔ ¹ /_c, ɲ	/hóc/	→	[hó ¹ c ¹]	'to finish'
			/mójɲ/	→	[mó ¹ ɲ]	'mouth'

4.7 Summary

The phonological summary of the Bang Deng variety is that words are either monosyllabic or sesquisyllabic. Monosyllabic words can be written with the structure #CVC#. Sesquisyllabic words can be written with the maximum structure #CV.CVC#. Compound words can also be formed from combining these two types of words. There are twenty-one phonemic consonants, ten phonemic vowels, and two phonemic tones. Register, while phonemic, is not as dominant in the register complex as tone.