

## CHAPTER 6

### NORTHWEST KAREN AND KAYAH PHONOLOGY

This chapter presents the phonological analysis of the word list data from the Northwest Karenic dialects collected by the author. The analysis will include the syllable structure, consonant and vowel inventories, phoneme distribution, and suprasegmental features.

#### 6.1 Daylo East Bwe (Bwe 1) phonology

“Bwe 1” below represents Bwe as spoken east of Daylo stream. ‘Bwe 2’ Bwe to the west of Daylo stream.

##### 6.1.1 Bwe 1 syllable structure:

The onset of a major syllable in Bwe 1 is composed of an initial consonant ( $C_1$ ), an optional medial consonant ( $C_2$ ) (most commonly the labial approximant /w/, or the lateral /l/, or rarely the voiced velar fricative /ɣ/ or alveolar approximant /r/). The nucleus is composed of a vowel (V). The final aspect in the syllable structure is tone, represented by the symbol T. Every major syllable carries a tone. The syllable is always open. Although some syllables appear phonetically to have a coda glottal stop, this creaky voice quality is better viewed phonologically as a characteristic of two particular tones (transcribed below as [ʔ. ʔ]). The syllable structure is therefore,

$$C_1(C_2)V T$$

Syllable types in the data include CVT and CCVT.

Minor syllables are always stressless, and never bear a distinctive tone. Minor syllables are composed of an initial consonant and mid central vowel /ə/. The initial consonant of a minor syllable is generally a fortis unaspirated stop /p t k/, though initial /l/, /s/ and /ɖʒ/ are also found. Minor syllables are phonologically bound to a following major syllable. Some examples are given below.

- (8) pədeɪ 'rabbit' (78)  
 tʰəbwe 'one person' (322)  
 kəloɪ 'water leech' (413)  
 tʰəbaɪ 'yellow' (366)  
 ɖʒaɪ ləgweɪ 'all' (335)  
 səmɯɪ? 'sand' (30)

### 6.1.2 Bwe 1 consonants

The inventory of Bwe 1 consonant is shown in table 8. Phones which occur so rarely in the data that their phonological status is uncertain are included, but enclosed in parenthesis.

	Labial	Dental	Alveolar	Postalv	Velar	Glottal
Plosive fortis vl	p	t̪	t		k	ʔ
fortis asp	p <sup>h</sup>		t <sup>h</sup>		k <sup>h</sup>	
lenis vd	b		d		g	
Implosive lenis vd	ɓ		ɗ			
Affricates fortis vl				tʃ		
lenis vl				ɖʒ		
Fricative fortis vl			s s <sup>h</sup>	s <sup>j</sup>	(x)	h
lenis vd			(z)		(ɣ)	
Nasal voiced	m		n		(ŋ)	
voiceless	(m̥)		(n̥)			
Lateral			l			
Lateral Fricative			ɬ			
Trill			(r)			
Approximant	w			j		

Table 8. Bwe 1 Consonant inventory

Selected contrasts between phonetically similar segments are illustrated with minimal pairs in (9).

(9a-f) illustrate major phonological contrast of manner. (9a) demonstrates a contrast between fortis voiceless stops and aspirated stops, (9b) between fortis voiceless stops and implosives; (9c) between bilabial implosive and voiced bilabial stop, and alveolar implosive with voiced alveolar stop; (9d) between alveolar implosive and lateral and alveolar nasal; (9e) between voiceless fortis affricate and voiceless lenis affricate.

- |        |                         |   |   |
|--------|-------------------------|---|---|
| (9) a. | [p] - [p <sup>h</sup> ] | ṭaʎʎ dʒɛʎʎ poʎʎ 'disgusting'(431)         | t <sup>h</sup> uʎ ɓaʎ p <sup>h</sup> oʎʎ 'bird'(93) |
|        | [t] - [t <sup>h</sup> ] | tɔʎ k <sup>h</sup> ɔʎʎ ʎɛʎʎ 'mango'(59)   | xuʎ t <sup>h</sup> ɔʎ pweʎ 'mushroom'(50)           |
|        | [k] - [k <sup>h</sup> ] | ḵoʎ 'hot'(382)                            | laʎ k <sup>h</sup> oʎ ʎəhiʎ weʎ 'earth'(26)         |
| b.     | [p] - [ɓ]               | ḵoʎ p <sup>h</sup> uʎ 'belly'(139)        | ɓuʎ 'thin'(346)                                     |
|        | [t] - [d]               | tiʎ k <sup>h</sup> ɛʎʎ 'bad'(399)         | diʎ 'thick'(345)                                    |
| c.     | [ɓ] - [b]               | ɓɛʎʎ 'correct'(100)                       | ʎəwiʎ ɓɛʎʎ 'rib'(160)                               |
|        | [d] - [d]               | daʎʎ k <sup>h</sup> leʎʎ 'sugar cane'(53) | ʎəbuʎʎ daʎʎ tiʎ 'full'(354)                         |
| d.     | [d] - [l]               | daʎʎ k <sup>h</sup> leʎʎ 'sugar cane'(53) | xweʎ laʎʎ 'rain'(7)                                 |
|        | [d] - [n]               | deʎ kwaʎʎ 'frog'(106)                     | neʎ dədʒɔʎ nuʎ 'they'(421) <sup>1</sup>             |
| e.     | [tʃ] - [dʒ]             | tʃiʎʎ 'water'(23)                         | dʒiʎʎ kɔʎ 'hand'(145)                               |
| f.     | [tʃ] - [t]              | tʃiʎ ɓloʎʎ 'ladel'(206)                   | tiʎ ʎiʎ p <sup>h</sup> oʎ 'to be narrow'(350)       |
|        | [tʃ] - [k]              | ḵiʎ tʃiʎ 'Kapok'(52)                      |   |

A noteworthy fact in this language is that /tʃ/ occur only before /i/. However, /tʃ/ cannot be analyzed as an allophone of /t/ or /k/ as (9f) shows.

The voiceless fortis stops [p t k] becomes voiced fortis stops [ɓ ɗ ɠ] when preceding any vowel accompanied by a mid or low tone (10).

- |      |                                  |                            |                                    |
|------|----------------------------------|----------------------------|------------------------------------|
| (10) | piʎʎ paʎ leʎ 'armpit'(147);      | paʎ ʎoʎ 'difficult' (434); | piʎ jaʎ 'person' (171)             |
|      | tɔʎ ɓəleʎ ʎɛʎʎ 'jackfruit' (60); | ʎəʎ suʎ 'rainbow' (8);     | ʎaʎ p <sup>h</sup> oʎ 'fish' (101) |
|      | koʎ 'head' (119);                | ḵoʎ 'hot' (382)            |                                    |

<sup>1</sup> [d] and [n] contrast in analogous environment. [d] never precede /ɛ/, nor [n] precedes /e/.

## Consonant clusters

Initial clusters ( $C_1C_2$ ) attested in the Bwe 1 data are shown in Table 9.

pw	p <sup>h</sup> w	bw	ɸw	mw	tw	ɽw	tʃw	dʷ	lw	sw	s <sup>h</sup> w	kw	gw	k <sup>h</sup> w	hw
pl	p <sup>h</sup> l	bl	ɸl									kl		k <sup>h</sup> l	
pr	p <sup>h</sup> r				tr					sr					
pʏ										sʏ					

Table 9. Bwe 1 consonant clusters

The labial-velar approximant /w/ forms a cluster with every consonant shown in the table but not with /v/, /w/, /dʒ/, /j/, /ɣ/, /n/, /ɬ/ or /ʔ/. The lateral approximant /l/ does not occur following coronals or laryngeals, but only after the bilabial and velar consonants. The alveolar trill /r/ occurs only after the voiceless bilabial stops /p, p<sup>h</sup>/, the voiceless alveolar stop /t/, and voiceless alveolar fricative /s/. The velar fricative /ɣ/ occurs in the data as a medial consonant only after /p/ and /s/.

### 6.1.3 Bwe 1 vowels

The inventory of Bwe 1 vowels is shown in the following table<sup>1</sup>.

	Front	Central	Back
	unround	unrounded	rounded
Close	i	ɯ	u
mid	e ɛ	ə	o ɔ
Open		a	

Table 10. Bwe 1 vowel inventory

<sup>1</sup> [ɪ] and [ɜ] rarely occur in the data and therefore not included in the vowel inventory.

The vowel may be a monophthong  $V_1$  or a diphthong  $V_1(V_2)$ . All vowels are allowed in the  $V_1$  position, while ( $V_2$ ) is very rare and found only in borrowed words. The selected contrasts of the vowel phonemes are illustrated in (11).

(11) [i] - [e]	s'oj kəla] dī]	'easy'(435)	k'ha] de] se]?	'calf' (155)	
[e] - [ə]	t'ha]?	le] earth	'worm'(415)	ke] dʒa] lə] kwe]?	'we' (419)
[ə] - [ɛ]	ke] dʒa] lə] kwe]?	'we'(419)	ʃa]?	də] le]	'I' (416)
[a] - [ɔ]	mɔ] d'a] le]?	'lizard'(103)	k'hε]?	dɔ] le]?	'Chin' (135)
[ɔ] - [o]	k'hε]?	dɔ] le]?	'Chin'(135)	do] me:] mu]	'yesterday'(16)
[o] - [u]	tɔ] də]lo]?	ko]	'naked'(397)	ne] ku] tə?]o]?	'deaf' (395)
[u] - [ʉ]	k'ho] nu]?	'brain'(121)	do] nu]?	'that' (361)	

Diphthongs are rare in Bwe 1. However, the data contains several words borrowed from Burmese, which contain diphthongs: [bēi] 'opium' (55); [m<sup>j</sup>e] bē] 'peanut' (63); [ŋəjɜw\ kəu'] 'red pepper' (67); [p<sup>h</sup>əjɔ] dai] 'candle'(215).<sup>2</sup> Some Sgaw elements are also found in the data in words such as [ʃa] p<sup>h</sup>o] xa] 'insect' (107) and [dʉwε] 'to burn' (308).

The high back unrounded vowel / ʉ / may be a sign of the influence of Sgaw literature upon Bwe 1. /ʉ/ tend to be a more regular element of the Bwe vowel system; see the discussion of /ʉ/ and /u/ under § 6.2.3, Bwe 2. The vowel quality fluctuates between these two vowels.

#### 6.1.4 Bwe 1 tones

Bwe 1 has five different pitches in the data: (55, 44, 33, 22, 11). There are also high falling and low falling tones (ʎ?, ʎ?), which co-occur with creaky voice quality. Tone in minor syllables is non-contrastive and realized as mid (33) tone.

<sup>2</sup> Other words borrowed from Burmese and transliterated are [ʎu] ʃε]?' 'duck'(100), [lo] dʒi] ' sarong' (198), [pɔ] pi] p<sup>h</sup>o] 'trouse (199).

Regarding the co-occurrence between initial consonants and tones, Henderson (1979) analyzed Bwe with the voicing of the initial consonants conditioning the tone. However, voiced fortis plosives co-occur only with the low and mid tones and voiceless aspirated plosives co-occur with high, low, and checked tones. Some examples are given in (12a) and (12b).

- (12a) **piʔ pa** | lɛ | 'armpit'(147); **pi** | **ja** | 'person'(171); **pa** | ʔo | 'difficult' (434)  
**tɔ** | bəne | ɛ | 'jackfruit'(60); **ʔe** | ʔo | 'cloud' (5); **ʔe** | kəmu | 'dust' (28)  
**ko** | 'head'(119); **kə** | ne | 'bee' (115); **ka** | du | se | 'eggplant' (62)  
 b **tʰo** | ɓa | **pʰo** | 'bird'(93); **pʰa** | de | 'boil'(307); **gɔ** | la | **pʰi** | 'butterfly'(117)  
**tʰo** | ɓa | **pʰo** | 'bird'(93); ɛ | **tʰa** | 'breath'(239); **tʰu** | wi | ke | 'spit' (235)

(12a) demonstrates voiced fortis plosives co-occur only with the low and mid tones, and (12b) voiceless aspirated plosives co-occur with low, checked and high tones.

## 6.2 Daylo West Bwe (Bwe 2) phonology

In this section, the major and minor syllable structure, vowels, the co-occurrence of the syllables and vowels, and the co-occurrence relationship of the tones and onsets of Daylo West Bwe language are presented.

### 6.2.1 Bwe 2 Syllable structure:

The syllable of Bwe 2 is composed of an initial consonant  $C_1$  and an optional medial consonant ( $C_2$ ), (most commonly the labial approximant /w/, the lateral /l/ or rarely the alveopalatal /r/ or alveolar approximant /j/. When clusters are present, the initial consonant is usually a stop. The nucleus is composed of a vowel  $V_1$  or

diphthong  $V_1V_2$ . The syllable is always open, i.e.  $C(C)V$ . Although some syllables appear to have a coda glottal stop, this creaky voice quality is phonologically a characteristic of two tones transcribed as  $[ʔ]$  and  $[ʔʔ]$ . Every major syllable carries a tone  $T$ . Thus the syllable structure is:

$$C_1(C_2)V_1(V_2)T$$

Syllable types in the data include CVT, CCVT, CCVVT.

Minor syllables are always stressless, and never bear a distinctive tone. Minor syllables are composed of an initial consonant  $C$  and mid central vowel  $/ə/$ . The initial consonant of a minor syllable is generally a stop, though initial  $/l/$  and  $/dʒ/$  are also found. Minor syllables are phonologically bound to a following major syllable. Some examples are given below.

- (13)  $pəʔeɪ$  'rabbit'(78)       $təɪ bəneɪ ʔeɪʔ$  'jack fruit'(60)  
 $ʔəweɪ nəʔ$  'hate'(256)       $dʒuɪ dənəɪ kəl$  'elbow' (146)  
 $kəkweɪ$  'rainbow'(8)       $k^həʔ ləbəʔ$  'shin'(156)  
 $dʒəs^eɪʔ$  'sneeze'(237)       $ʔəmiʔ$  'name'(182)

## 6.2.2 Bwe 2 consonants

The inventory of consonants is shown in Table 11.

	Labial	Dental	Alveolar	Postalv	Velar	Glottal
Plosive fortisvl asp	$p^h$		$t^h$		$k^h$	
fortis vl	$p$	$t$	$t$		$k$	$ʔ$
lenis vd	$b$		$d$		$g$	
lenis vd impl	$β$		$d'$			
Affricate fortis vl				$tʃ$		
lenis vl				$dʒ$		
Fricative fortis vl			(s)	$s^j$	$x$	$h$
lenis vd			(z)		$y$	
Nasal	$m$		$n$		(ŋ)	
Lateral			$l$			
Approximant	$w$		(r)	$j$		

Table 11. Bwe 2 consonant inventory

The consonants of Bwe 2 are similar to those of Bwe 1. However, Bwe 2 lacks the voiceless nasal consonants /m̥/, /n̥/ and the lateral fricative /ɬ/.

(14) illustrates selected consonant manner contrasts. (14a) demonstrates contrast between fortis voiceless stops and aspirated stops, (14b) between fortis voiceless stops and implosives; (14c) between implosives and voiced stops, (14d) between the alveolar implosive [ɖ] the alveolar lateral [ɭ] and the alveolar nasal /n/; and (14e) between the voiceless lenis affricate [ɖʒ] and voiceless fortis affricate [tʃ].

(14) a.	[p] - [p <sup>h</sup> ]	ʈaʎ? ɖʒɛʎ? poʎ?	'disgusting' (431)	t <sup>h</sup> uʎ ɓaʎ p <sup>h</sup> oʎ?	'bird' (93)
	[t] - [t <sup>h</sup> ]	tɔʎ k <sup>h</sup> ɔʎ? tɛʎ?	'mango' (59)	xuʎ t <sup>h</sup> ɔʎ pwe+	'mushroom' (50)
	[k] - [k <sup>h</sup> ]	kiʎ bwe+	'two person' (323)	kəli+ k <sup>h</sup> iʎ	'south' (24)
b.	[p] - [ɓ]	ʈaʎ? ɖʒɛʎ? poʎ?	'disgusting' (431)	ɓoʎ?	'fat' (347)
	[t] - [ɖ]	tiʎ kɛʎ?	'bad' (399)	ɖiʎ	'thick' (345)
c.	[ɓ] - [b]	ɓɛʎ?	'correct' (100)	ʔəwi+ bɛʎ?	'rib' (160)
	[ɖ] - [d]	ɖaʎ?	'shallow' (352)	ʈaʎ? s <sup>h</sup> ɔʎ miʎ ɖaʎ?	'forget' (253)
d.	[ɖ] - [ɭ]	ɖiʎ?	'year' (18)	ʈaʎ pwiʎ liʎ?	'tiger' (73)
	[ɖ] - [n]	la+ ɖaʎ?	'short' (344)	naʎ?	'grass' (47)
e.	[ɖʒ] - [tʃ]	ɖʒa+ tʃiʎ	'to see' (224)		(Contrast in analogous environment)

Regarding the co-occurrence between initial consonants and tones, the analyzed data show that in Bwe 2, as in Bwe 1, its voiced fortis plosives [p, t, k] co-occur only with the low and mid tones. Aspirated plosives co-occur with low, checked and high tones.

(15)	ʈaʎ? ɖʒɛʎ? poʎ?	'disgusting' (431)	poʎ	'cow' (86)
	tiʎ kɛʎ?	'bad' (399)	tɛʎ ʔoʎ?	'cloud' (5)
	kɔʎ leʎ?	'when' (402b)	ʔo+ k <sup>h</sup> aʎ?	'slow' (390)



## Consonant clusters

Initial clusters ( $C_1C_2$ ) attested in the Bwe 2 data are shown in Table 12.

pw		bw	ɸw	ɬw	d̪w	tʰw	mw	nw	lw	jw	sʷ	xw	kw	kʰw	gw
pl	pʰl	bl	ɸl										kl	kʰl	gl
				ɾ, tr										kr	
pj		bj													

Table 12. Bwe 2 consonant clusters

The labial-velar approximant /w/ is found with every consonant shown in the table above. The data do not include any example of /pʰ/, /t/, d/, /s/, /r/, /ɣ/, /ŋ/, /tʃ/, /dʒ/, /z/, /ʔ/, or /h/ as the first element of a cluster. The lateral approximant /l/ appears as a medial consonant only following labial and velar stops, while /r/ appears as a medial consonant only after dental /t/, alveolar /t/, and velar /k/. The palatal /j/ appears after labial stops only.

### 6.2.3 Bwe 2 vowels

The Daylo west Bwe (Bwe 2) vowel inventory is shown in Table 13.

	Front unrounded	Central unrounded	Back rounded
High	i		u ʊ
Mid	e ɛ	ə	o ɔ
Low		a	

Table 13. Bwe 2 vowel inventory

Bwe 2 has 10 vowel phonemes. All vowels are allowed in the  $V_1$  position. Diphthongs ( $V_1V_2$ ) are rare: in the data  $V_2$  is found only in the borrowed word

/ŋəjou\ k̄au/ ‘red pepper’(67). The mid-central vowel /ə/ is present predominantly in minor syllables. Selected contrasts of the vowels are shown below.

(16) [ɛ] - [ə] ɓa- lɛ\ lɔ\ de\? ‘exchange’(319) lə\ mu\ he\ ni\ ‘yesterday’(16)

[e] - [ɛ] mɛ\ kwa\? ‘eye brow’(124) mɛ\ we\ ‘to dry’(304)

[ɔ] - [o] ʔɔ\ tʃi\ ‘drink’(232) ʔo\ ʔo\ ‘lung’(142)

[o] - [u] xo\ ‘silver’(33) xu\ bwe ‘sixperson’(327)

[u] - [ʉ] ʔəhi\ nu\? ‘to swallow’(228) li\ nu\? ‘to enter’(277)

/u/ and /ʉ/ rarely occur in the data. /ʉ/ is restricted to environments following /ɣ/. /u/ may be in phonemic free variation with /ʉ/, due to influence of Sgaw on Bwe 2: cf. Bwe 2 [li\ nu\?] “enter”, ʔəhi\ nu\? “swallow”, where [nu\?] and [nu\?] may represent the same morpheme (note the similar meanings) with Sgaw [nu\?] “enter” ).

#### 6.2.4 Bwe 2 Tones

There are five level tones in the data: (55, 44, 33, 22, 11). Additionally, there are a few cases of 31 and 51 tones in the data. In addition, there are high falling and low falling checked tones marked by creaky voice quality (transcribed as [ʔ], [ʋ]). The low and mid tones co-occur only with voiced fortis plosives. Some examples are given below.

(17)	t <sup>h</sup> ɛ\	‘bear’	[55]
	mi\ ʔəkɔ\?	‘cat’ (84)	[44]
	we\	‘throw’ (282)	[33]
	so\	‘louse’ (110)	[22]
	ja\ ʃɛ\?	‘banana fruit’ (57)	[11]
	bu\?	‘paddy rice’ (68)	[53]
	ʃɛ\ p <sup>h</sup> o\ ʃɛ\ we\?	‘animal’ (72)	[31]

### 6.3 Gebah phonology

In this section the major and minor syllable structure; vowels; the co-occurrence of the syllables and vowels; and the co-occurrence relationship of the tones and onsets of Gebah language are presented.

#### 6.3.1 Syllable structure:

The syllable of Gebah is composed of an obligatory consonant  $C_1$  followed by an optional medial consonant ( $C_2$ ). The nucleus can be any vowel. As for diphthongs, they are rare and occur in borrowed words only. Tone T maps over vocalic elements. Thus the syllable structure appears as follows:

$$C_1(C_2) V_1(V_2) T$$

Syllable types in the data include CVT, CCVT, and CCVVT.

Minor syllables are composed of an initial consonant and a central mid open vowel /ə/. /ə/ is present only in minor syllables. The initial consonant is typically a stop; however, the lateral /l/, and the voiceless lenis affricate /tʃ/ also appear as the initial consonant of minor syllables. [ŋ] appear as the initial consonant of a minor syllable in one borrowed form, [ŋəjokāu] ‘black pepper’. These minor syllables are phonologically bound to a following major syllable. Some examples given below.

- (18) pəneʔ                    ‘bufflo’ (88)  
 təbweɪ                    ‘one person’ (322)  
 kəliɪ ʔəsoʔ                ‘north’ (21)  
 pəpweɪ ləpweɪ pweɪ    ‘who’ (404)

### 6.3.2 Gebah consonants

The inventory of consonants for Gebah is shown in the following table.

		labial	dental	Alveolar	postalv	velar	glottal
Plosive	fortis vl asp	p <sup>h</sup>		t <sup>h</sup>		k <sup>h</sup>	
	fortis vl	p	t̪	t		k	ʔ
	lenis vd	b		d		(g)	
Implosive	lenis vd	ɓ		d̪			
Affricate	fortis vl				tʃ		
	Lenis vl				(dʒ)		
Fricative	fortis vl asp			s <sup>h</sup>			
	fortis vl			s	ʃ	(x)	h
	lenis vd					ɣ	(ɦ)
Nasal voiced		m		n		(ŋ)	
Voiceless		(m̥)		(n̥)			
Trill				(r)			
Approximant		w		l	j		
Lateral Fricative				ɬ			

Table 14. Gebah consonant inventory

Selected contrasts between phonetically similar segments are illustrated with minimal pairs in (19a-d).

(19a) illustrates a contrast between fortis voiceless stops and aspirated stops, (19b) between fortis voiceless stops and implosives; (19c) between bilabial implosives and voiced bilabial stop, and alveolar implosive with voiced alveolar stop; (19d) between the alveolar implosive and the alveolar lateral and nasal.

- (19) a. [p] - [p<sup>h</sup>] paʔ 'father' (172)      ɬoɬ p<sup>h</sup>aʔ 'branch' (39)  
 [t] - [t<sup>h</sup>] tɛɪ ʔəkələɛɪ 'ghost' (270)      t<sup>h</sup>ɛɪ 'gold' (32)  
 [k] - [k<sup>h</sup>] koʔ kaɪ 'spider' (108)      moɬ k<sup>h</sup>oʔ 'sky' (1)
- b. [p] - [ɓ] paʔ 'father' (172)      ɓaʔ 'bamboo shoot' (49)  
 [t] - [d] tɛɪ ʔəkələɛɪ 'ghost' (270)      dɛɪ tɛɪʔ 'rabbit' (78)
- c. [ɓ] - [b] ɓoʔ 'fat' (162)      ʃiɬ ʔaɪ ʔiɪ boʔ 'smile' (243)  
 [d] - [d̪] ɲaɪ dɛɪʔ 'needle' (201)      joɬ dɛɪʔ 'suck' (241)
- d. [d̪] - [l] ɲaɪ dɛɪʔ 'needle' (201)      k<sup>h</sup>ɛɪ dɔɪ lɛʔ 'chin' (135)  
 [d̪] - [n] ɲaɪ dɛɪʔ 'needle' (201)      s<sup>h</sup>ɔɪ kəɪ moɬ nɛʔ 'forget' (253)

Like Bwe, voiced fortis plosives in Gebah co-occur only with the low and mid tones, while voiceless aspirated plosives co-occur with low, checked and high tones. Some examples are given below.

- (20)a. **po**† 'cow (86)  
**ʈa**† **p<sup>h</sup>o**† 'fish (101)  
**ka**† **du**† **ʈε**ʔ? 'egg plant (62)
- b. **p<sup>h</sup>o**† 'flower (44)  
**t<sup>h</sup>o**† **ʈo**† 'wipe (290)  
**t<sup>h</sup>o**ʔ? **p<sup>h</sup>o**† 'bird (93)  
**k<sup>h</sup>o**† 'deer (75)

(20a) illustrates voiced fortis plosives co-occur with low and mid tones; and (20b) voiceless aspirated plosives co-occur both with low, checked and high tones.

### Consonant clusters

Initial clusters (C<sub>1</sub>C<sub>2</sub>) attested in the Gebah data are shown in Table 15.

pw		bw	ɓw	tw	t <sup>h</sup> w	ʈw	mw	nw	lw	sw		xw	kw	k <sup>h</sup> w		hw
pl	p <sup>h</sup> l	bl	ɓl										kl	k <sup>h</sup> l	gl	
pr				tr	t <sup>h</sup> r					sr			kr			
										s <sup>h</sup> y						

Table 15. Gebah consonant clusters

The voiced labial-velar approximant /w/ has the widest distribution; The lateral approximant /l/ is restricted to following the bilabial and velar stops. The alveolar trill /r/ is found after initial consonants of all places of articulation. The voiced velar fricative /ɣ/ follows the voiceless aspirated alveolar fricative /s<sup>h</sup>/ only.

### 6.3.3 Gebah vowels

The Gebah vowel inventory is shown in Table 16.

	Front unrounded	Central unrounded	Back rounded
High	i	ɯ	u
Mid	e ɛ	ə	o ɔ
Low		a	

Table 16. Gebah vowel inventory

Selected contrasts among the vowel phonemes are illustrated in (19).

- (21)
- |           |                        |                       |  |                 |
|-----------|------------------------|-----------------------|--|-----------------|
| [i] - [e] | s <sup>h</sup> iŋʔ     | 'urine' (168)         | tɛɹ p <sup>h</sup> eiŋʔ tɛɹ s <sup>h</sup> eŋʔ | 'flesh' (161)   |
| [ə] - [ɛ] | təɹ bweɹ               | 'three persons' (324) | tɛɹ k <sup>h</sup> wɛŋʔ                        | 'corn' (66)     |
| [ɔ] - [o] | mɔɹ k <sup>h</sup> oŋʔ | 'sky' (1)             | mɔɹ tɔɹ tɔɹɔɹ                                  | 'tomorrow' (17) |
| [u] - [ɯ] | luɹ muɹ                | 'sun' (2)             | muɹ kəmɛɹ                                      | 'widow' (178)   |

Diphthongs are rare in Gebah. There is only one native word found /tɛɹ p<sup>h</sup>ɛiŋʔ tɛɹ ʃeŋʔ/ 'flesh/ skin'(161). However, the data contains words borrowed from Burmese<sup>1</sup> which have diphthongs:[bɛi] 'opium'(55);[ʔɛɔ̄ ʃiɹ] 'coconut' (61); [m<sup>h</sup>eɹ bɛɹ] 'peanut'(63);[ʔəjaɔ̄ɹ] 'dye'(197); [p<sup>h</sup>əjɔɹ dai] 'candle'(215); [kəɹʔɛiŋʔ] 'grind' (299). Borrowed Sgaw element are not found in the data.

### 6.3.4 Gebah Tones

There are three level pitches in the data: high, mid, and low (44, 33, 22). Tone in minor syllables is non-contrastive and realized as mid (33) tone. There is a high falling tone which occurs with creaky voice quality, transcribed as /ʔʔ/.

<sup>1</sup> Other words borrowed from Burmese and transliterated are [ʔoɹ ʃɛɹ] 'duck' (100), [loɹ giŋʔ] 'sarong', [pɔɹ piɹ] 'trouser'(199), [kaŋʔ] 'dance'(312), pəgaɹ 'plate'(210), [ʔək<sup>h</sup>oɹ ʃoɹ ʔəʔaɹ ʃoɹ] 'strong' (391), [ʔək<sup>h</sup>oɹ seɹ ʔəʔaɹ seɹ] 'weak' (392).

## 6.4 Geker phonology

In this section the major and minor syllable structure; vowels; the syllables and vowels co-occurrence; and the co-occurrence relationship of the tones and onsets of Geker is presented.

### 6.4.1 Geker syllable structure:

The syllable structure of Geker is composed of an initial consonant  $C_1$  and an optional medial consonant ( $C_2$ ) (most commonly the labial approximant /w/, the voiced velar fricative or alveolar trill /ɣ, r/, or rarely the lateral /l/). The nucleus is composed of a vowel  $V_1$  or diphthong  $V_1V_2$ . Tone  $T$  is obligatory and maps over vocalic elements. The syllable structure appears as follows:

$$C_1 (C_2) V_1 (V_2) T$$

Syllable types in the data include: CVT, CCVT, CVVT, and CCVVT.

Minor syllables are always stressless, and never bear a distinctive tone. Minor syllables are composed of an initial consonant  $C$  and mid central vowel /ə/. The initial consonant of a minor syllable is generally a stop, but initial /l, m, n, j, r/ are also found. Minor syllables are phonologically bound to a following major syllable. Some examples are given in (22).

- (22) **pəna**l            'water buffalo' (88)  
**lə**ɖzəwɪ?        'deep' (360)  
**mə**plə<sup>1</sup> kəw-ɪ    'forehead' (123)

### 6.4.2 Geker Consonants

Geker consonant inventory is shown in the following table.

		Labial	Dental	Alveolar	Postalv	Palatal	Velar	Glottal
Plosive	fortis vl asp	p <sup>h</sup>		t <sup>h</sup>			k <sup>h</sup>	
	fortis vl	p	t̪	t			k	ʔ
	lenis vd	b		(d)				
Implosive	lenis vd	ɓ		ɗ				
Affricate	fortis vl				(tʃ)			
	lenis vl				ɟʒ			
Fricative	fortis vl			s s <sup>h</sup>	ʃ		x	h
	lenis vd						(y)	
Nasal		m		n		(ɲ)	(ŋ)	
Lateral				l				
Trill				r				
Approximant		w			j			

Table 17. Geker consonant inventory

Selected contrasts between phonetically similar segments are illustrated with minimal pairs in (23).

(23a) demonstrates a contrast between fortis voiceless stops and aspirated stops, (23b) between fortis voiceless stops and implosives; (23c) between bilabial implosives and voiced stops; (23d) between alveolar implosive and lateral and alveolar nasal. Note that the voiceless fortis affricate and voiceless lenis affricate contrast in analogous environment. In the present data the voiceless lenis affricate /ɟʒ/ is not followed by the near open back rounded vowel /ɔ/, whereas the voiceless fortis affricate /tʃ/ is restricted to environments preceding /tʃ/. While it thus appears that [tʃ] may be an allophone of /ɟʒ/, the present data are not, in my opinion, enough to warrant such an unusual rule.

- (23)a [p] - [p<sup>h</sup>] t<sup>h</sup>uʔ muɪ paiʔ 'duck' (100)      t̪uɪ p<sup>h</sup>aiʔ 'tree bark' (40)  
 [t] - [t<sup>h</sup>] taʔ 'fish' (101)      t<sup>h</sup>aʔ 'iron' (34)  
 [k] - [k<sup>h</sup>] kaʔ kreɪ 'shout' (247)      k<sup>h</sup>aʔ ɓoʔ 'cheek' (128)  
 b [p] - [ɓ] s<sup>h</sup>aʔ p̪uʔ 'winnow' (303)      ɓuʔ s<sup>h</sup>wiɪ m̪uʔ 'rice seedling' (410)



	[t] - [d]	taʔ	'fish' (101)	lɔʔ	ɗaʔ	'sink' (286)	
c	[β] - [b]	siʔ	'paper' (204)	ɗʒwʔ	məʔ	beiʔ	'finger nail' (150)
	[d] - [d]	niʔ	'knife' (221)	ʔaʔ	duʔ		'strong' (391)
d.	[d] - [l]	ɗʒoʔ	'shallow' (352)	lʒoʔ			'stone' (29)
	[d] - [n]	ɗuʔ	'cloud' (5)	lɔʔ	nuʔ		'all' (335)
e.	[tʃ] - [dʒ]	tʃoʔ	'deer' (75)	ɗʒoʔ			'wet' (381)

## Consonant clusters

Initial clusters (C<sub>1</sub>C<sub>2</sub>) attested in the Geker data are shown in Table 18.

pw	p <sup>h</sup> w	βw	tw	tʃw	ɗʒw	rw	lw	nw	ŋw	jw	sw	s <sup>h</sup> w	fw	xw	kw	k <sup>h</sup> w
pl	p <sup>h</sup> l	βl	dl												kl	k <sup>h</sup> l
pr	p <sup>h</sup> r														kr	k <sup>h</sup> r
pj	p <sup>h</sup> j														kj	k <sup>h</sup> j
pʏ	p <sup>h</sup> ʏ	βʏ									sʏ	s <sup>h</sup> ʏ	fʏ			

Table 18. Geker consonant clusters

The labial-velar approximant /w/ is the most widely distributed consonant. /l/ occurs as a medial consonant following the bilabial, velar, and voiced alveolar stops while /r/ and /j/ must follow the voiceless bilabial and velar stops. The voiced velar fricative /ɣ/ follows bilabial stops and sibilants.

### 6.4.3 Geker vowels

The Geker vowel inventory is shown in Table 19.

	Front unrounded	Central unrounded	Back rounded	Diphthongs	
High	i	ɯ	u		ɯi
Mid	e	ə	o	ei	ɯo
	ɛ		ɔ	ai	
Low		a			

Table 19. Geker vowel inventory

The vowel may be a simple vowel  $V_1$  or a diphthong  $V_1 V_2$ . There are four widely occur diphthongs: /ai/, /ei/, /ɜu/ and Selected monophthong contrasts are illustrated below.

(24)	[i] - [e]	diɪ	'navel' (140)	deɪ ɪaɪ	'rabbit' (78)
	[ə] - [a]	soɪ məɪ roɪ	'tomorrow' (17)	maɪ	'wife' (177)
	[ə] - [ɛ]	dʒəɪ riɪ	'dirty' (367)	dʒɛɪ	'skinny' (348)
	[o] - [ɔ]	kʰaɪʔ ɸoɪʔ	'cheek' (128)	ɸɔɪʔ	'bamboo shoot' (49)

A few examples of diphthongs are given below.

(25)	mɜuɪʔ	'sun' (2)
	lɜoɪʔ	'stone' (29)
	neiɪ	'year' (18)
	lɜoɪʔ maiɪʔ	'sand' (30)

#### 6.4.4 Geker Tones

There are five phonetic level pitches in the data: [(55), 44, 33, 22, 11]. The high pitch [55], is probably a stylistic variant or allophone of the mid-high [44].

(26a).

(26a)	sʰyɪɪɪ	'water' (23)	[44]
	sʰyɪɪɪ lɔɪʔ	'river' (24)	[55]

There are rare cases of high falling [53] tone in the data. There are also high falling tones, which co-occur with creaky voice quality [ɪʔ]. Tone in minor syllables is non-contrastive and tends to be a mid [33] tone. Examples of the five phonetic level pitches are shown in (26b)

(26b)	laɪ	'moon' (3)	[55]
	laɪ məhaɪʔ	'yesterday' (16)	[44]
	miɪ	'name' (182)	[33]
	laɪ	'warm' (432)	[22]
	laɪʔ	'leaf' (43)	[53ʔ]
	plaj	'arrow' (219)	[11]
	ʔoɪ	'to bark' (82)	[53]

## 6.5 Paku-Kathokhi ( Paku 1) phonology

In this section the major and minor syllable structure; vowels; the co-occurrence of the syllables and vowels; and the co-occurrence relationship of the tones and onsets of Paku 1 is presented. “Paku 1” represents Paku Kathokhi and “Paku 2” represents Paku Shokho.

### 6.5.1 Paku 1 syllable structure:

The syllable structure of Paku-Katho is composed of an initial consonant  $C_1$  and an optional medial consonant ( $C_2$ ), which is most commonly the labial approximant /w/, the lateral /l/, the alveolar approximant /j/ or the voiced velar fricative /ɣ/. The nucleus is composed of a vowel  $V_1$  or diphthong  $V_1(V_2)$ . Thus the syllable structure appears as follows:

$$C_1(C_2)V_1(V_2)T$$

Syllable types in the data include: CVT, CCVT, CVVT, and CCVVT.

Minor syllables are composed of an initial consonant and a mid-central vowel /ə/. The mid-central vowel /ə/ is present only in minor syllables. The initial consonant of a minor syllable is generally a stop, but /l/, /s/, /j/, and /ŋ/ are also found. These minor syllables are phonologically bound to a following major syllable. Some examples are provided in (27).

- |      |              |                    |
|------|--------------|--------------------|
| (27) | səkaɬ        | ‘eggplant’ (62)    |
|      | jəmiɬ        | ‘wife’ (177)       |
|      | ɣc:ɪ nələsiɪ | ‘good’ (398)       |
|      | tʰaɪ ləkʰɔʔ  | ‘earth worm’ (415) |

## 6.5.2 Paku 1 consonants inventory

The Paku-Kathokhi consonant inventory is shown in Table 20.

	labial	alveolar	postalv	velar	glottal
Plosive fortis vl asp	p <sup>h</sup>	t <sup>h</sup>		k <sup>h</sup>	
fortis vl	p	t		k	ʔ
lenis vd	(b)	(d)		(g)	
Implosive lenis vd	ɓ	ɗ			
Affricate fortis vl			tʃ		
Lenis vl			dʒ		
Fricative fortis vl		s		x	h
fortis vl asp		s <sup>h</sup>			
fortis vd		(ʃ)			
lenis vd		z		ɣ	
Nasal	m	n (ŋ)			
Trill		(r)			
Approximant	w	l	j		

Table 20. Paku-Kathokhi (Paku 1) consonant inventory

The inventory of Paku1 consonants as shown in Table 20 includes some segments (shown in parentheses) which rarely occur in the data, so that their phonological status is uncertain. In particular, the status of voiced lenis stops /b d g/ and voiced fortis fricative /ʒ/ is unclear. Selected contrasts between phonetically similar segments are illustrated with minimal pairs below. (28a) demonstrates a contrast between fortis voiceless stops and aspirated stops, (28b) between fortis voiceless stops and implosives; (28c) between bilabial implosives and voiced bilabial stop, and alveolar implosive with voiced alveolar stop; (28d) between alveolar implosive and lateral and alveolar nasal; and (28e), voiceless fortis affricate and voiceless lenis affricate.

- (28) a. [p] - [p<sup>h</sup>] miɪ laɪ peiʔ? 'extinguish'(309) p<sup>h</sup>eiʔ? kəɓiɪ 'mud'(27)  
 [t] - [t<sup>h</sup>] tɔɪ kyeɪ 'rainbow'(8) xwɪ t<sup>h</sup>ɔɪ 'choose'(254)  
 [k] - [k<sup>h</sup>] ne kəwʔ? 'ear'(129) k<sup>h</sup>əwʔ? laɪ k<sup>h</sup>əwʔ? s<sup>h</sup>iɪ 'smoke'(214)
- b. [p] - [ɓ] ɓoɪ piʔ? 'cheek' (128) mɛɪ dɔɪ ɓiʔ? 'eyelid'(126)  
 [t] - [ɗ] taʔ? 'thick' (345) dɪʔ? 'short'(344)
- c. [ɓ] - [b] ɓaɪ nəɓaɪ siɪ 'correct'(400) ɓaɪ ləɓaɪ siɪ 'fat'(162)

	[d] - [d]	deʔ 'navel'(140)	miʔ deʔ 'work'(310)
d.	[d] - [l]	daʔ 'short'(344)	laʔ 'lightening'
	[d] - [n]	daʔ 'short'(344)	kaʔ pwiʔ naʔ 'tomorrow'(17)
e.	[tʃ] - [dʒ]	tʃeʔ 'sour'(375)	dʒeʔ 'silver'(33)

## Consonant clusters

Initial clusters (C<sub>1</sub>C<sub>2</sub>) attested in the Paku 1 data are shown in table Table 21.

pw			mw	dʷ	nw	lw				jw	kw	k <sup>h</sup> w
pl		ɸl									kl	
pj		ɸj										
pʏ	p <sup>h</sup> ʏ	ɸʏ	mʏ				dʒʏ	sʏ	s <sup>h</sup> ʏ		kʏ	k <sup>h</sup> ʏ

Table 21. Paku 1 consonant clusters

The voiced labial-velar approximant /w/ follows the voiceless bilabial stop /p/ labial nasal /m/, alveolar lateral approximant /l/, nasal /n/, alveolar implosive /ɸ/; and voiceless velar stops /k/ and /k<sup>h</sup>/. The lateral approximant /l/ follows the voiceless bilabial stop /p/, bilabial implosive /ɸ/ and voiceless velar plosive /k/. The postalveolar approximant /j/ follows voiceless bilabial stop /p/ and bilabial implosive /ɸ/. The voiced velar fricative /ɣ/ occurs as a medial consonant in the data only after the voiceless bilabial stop /p/, bilabial implosive /ɸ/, bilabial nasal /m/, voiceless lenis affricate /dʒ/, the voiceless velar stops /k/ and /k<sup>h</sup>/, and voiceless alveolar fricatives /s/ and /s<sup>h</sup>/.

### 6.5.3 Paku 1 vowels

The inventory of Paku Kathokhi vowels is shown in Table 22.

	Front	Central	Back	Diphthongs
	unrounded	unrounded	rounded	
High	i	ɯ	u	ɜu
Mid	e	ə	o	ei
	ɛ	[ɜ]	ɔ	ɜo
Low		a		

Table 22. Paku-Kathokhi (Paku 1) vowels

The syllable nucleus may be a monophthong  $V_1$  or a diphthong  $V_1 (V_2)$ .

Selected vowel contrasts of the phonemes are illustrated below.

- (29) [e] - [ɛ] neiʔʔ tʃeʔʔ 'clothing'(195) tʃeʔʔ 'sour'(375)  
 [ɛ] - [ə] dʃeʔʔ 'frog'(106) naʔ dʃeʔʔ 'nose'(127)  
 [u] - [ɯ] buʔ tʃeʔʔ leʔ 'near'(359) buʔ meʔ tʃaʔʔ saʔʔ 'rice seedling'(410)  
 [o] - [ɔ] tʃoʔ 'pig'(85) xuʔ tʃɔʔ 'choose'(254)

Some examples of the diphthongs are illustrated below.

- (30) muʔ neiʔʔ 'day'(13); xeʔʔ 'boat'(185); saʔʔ weiʔ 'hungry'(229); meiʔ 'sleep'(261)  
 tʃɔʔʔ 'gold'(32); loʔ ʔoʔ pʃoʔ 'cave'(36); sɜoʔ 'louse'(110)  
 hɜu ʔ 'pounded rice'(70); neʔ kɜuʔʔ 'ear'(129); koʔ pɜuʔ 'mouth'(130)

### 6.5.4 Tones

There are three well attested level tones in the data: (44, 33, 22). There are rare cases low (11) level tones. There is a high falling tone, which co-occur with creaky voice quality (ʔʔ). Tone in minor syllables is non-contrastive and tends to be a mid (33) tone. See examples in (31)

- (31) xeʔʔ 'boat'(185) [44]  
 loʔ ʔoʔ pʃoʔ 'cave'(36) [33]  
 sɜoʔ 'louse'(110) [22]  
 liʔ kəpweʔ 'paper' (204) [11]  
 muʔ neiʔʔ 'day'(13) [53]

## 6.6 Paku Shokho (Paku 2) phonology

In this section the major and minor syllable structure; vowels; the co-occurrence of the syllables and vowels; and the co-occurrence relationship of the tones and onsets of Paku Shokho are presented.

### 6.6.1 Paku 2 syllable structure:

The syllable structure of Paku Shokho is composed of an initial consonant  $C_1$  and a medial consonant ( $C_2$ ), which is most commonly the labial approximant /w/, the lateral /l/, the alveolar approximant /j/ or the voiced velar fricative /ɣ/. The nucleus is composed of a vowel  $V_1$  or diphthong  $V_1 V_2$ . Thus the syllable structure appears as follows:

$$C_1 (C_2) V_1 (V_2) T$$

Syllable types in the data included: CVT, CVVT, and CCVT.

Minor syllables are composed of an initial consonant and a mid-central vowel /ə/. The mid-central vowel /ə/ is present only in open syllables with mid tone. The initial consonant of a minor syllable is generally a stop, but alveodental /t/ and approximant /j/ are also found. These minor syllables are phonologically bound to a following major syllable. Some examples of Paku 2 minor syllables are provided below.

- (32) t̪əwɔ̃t̪ 'village'(183);  
 jənãt̪ 'I, first person'(416);  
 tɛ̃t̪ ʔəd̪ĩt̪ 'egg'(98)





Regarding the co-occurrence between initial consonants and tone, voiceless fortis plosives co-occur with the low, mid, high, and checked tones (34a), while voiceless aspirated plosives never co-occur with mid tone. In addition, fortis aspirated velar /k<sup>h</sup>/ does not co-occur with low tone (34b).

- (34) a **pu**↓ 'cow'(86);                    **te**↓ p<sup>h</sup>eiŋ? te↓ jiŋ? 'flesh'(161);    **ka**↓ k<sup>h</sup>eiŋ? 'sweat'(165);  
       lo↓ ʔo↓ **po**↓ 'cave'(36);            **ta**↓ hu↓ 'fish'(101);                    **ka**↓ pwi↓ t<sup>h</sup>aŋ? 'morning'(14)  
       b **p<sup>h</sup>o**↓ 'flower'(44);                mi↓ pɔ↓ **p<sup>h</sup>a**↓ 'split'(296);            **p<sup>h</sup>a**ŋ? me↓ 'gibbon'(306)  
       pu↓ nɜuŋ? **t<sup>h</sup>ei**↓ 'milk'(87);      **t<sup>h</sup>a**↓ de↓ 'rub, scrub'(291);        **t<sup>h</sup>u**ŋ? 'tall'(343)  
       **k<sup>h</sup>a**↓ de↓ 'shoot'(313);          mo↓ **k<sup>h</sup>u**ŋ? 'sky'(1)

### Consonant clusters

Initial clusters (C<sub>1</sub>C<sub>2</sub>) attested in the Paku 2 data are shown in Table 24.

pw	p <sup>h</sup> w	ɸw	mw	ɬw	tw	t <sup>h</sup> w	sw	s <sup>h</sup> w	dʷ	nw	l w	tʃw	ɟʒw	jw	kw	k <sup>h</sup> w	xw
pl	p <sup>h</sup> l	ɸl													kl		
pr					tr												
pj																	
pʏ	p <sup>h</sup> ʏ											tʃʏ			ky		

Table 24. Paku 2 consonant clusters

The voiced labial-velar approximant /w/ follows all the consonants except /b, g, d, m, r, ʔ, fi, h/. The lateral /l/ is restricted to environments following the voiceless bilabial stop, bilabial implosive and voiceless velar stop. Trill /r/ is restricted to environments voiceless bilabial stop /p/ and voiceless alveolar stop /t/. The voiced velar fricative /ɣ/ is restricted to following voiceless bilabial stops /p, p<sup>h</sup>/, voiceless fortis affricate /tʃ/, and the voiceless fortis velar stop /k/.



## 6.7 Palachi Phonology

In this section the major and minor syllable structure; vowels; the co-occurrence of the syllables and vowels; and the co-occurrence relationship of the tones and onsets of Palachi is presented.

### 6.7.1 Palachi syllable structure:

The syllable structure of Palachi is composed of an obligatory consonant  $C_1$ , followed by an optional medial consonant ( $C_2$ ), most commonly the labial-velar approximant /w/, the alveolar lateral /l/, the voiced velar fricative /ɣ/ or rarely the alveolar trill /r/. The nucleus is composed of a vowel  $V_1$ , which can be any vowel. Thus the two syllable structures appear as follows:

$$C_1(C_2)V_1T$$

Syllable types in the data include: CVT, and CCVT.

Minor syllables are composed of an initial consonant and a central mid open vowel /ə/. The initial consonant of a minor syllable is generally a stop, but lateral /l/, voiceless alveolar fricative /s/, voiced fricative /v/, and bilabial nasal /m/ are also found. These minor syllables are phonologically bound to a following major syllable. Some examples are illustrated in the following page.

- (37)
- |                         |               |
|-------------------------|---------------|
| ləma1                   | 'wrong'(401)  |
| səka1 ʈa1               | 'to tie'(289) |
| vəs <sup>h</sup> iʔ     | 'near' 259)   |
| məna1 k <sup>h</sup> a1 | 'night'(12)   |

### 6.7.2 Palachi consonants

The Palachi consonant inventory is shown in Table 26.

		labial	dental	alveolar	postalve	velar	glottal
Plosive	fortis vl asp	p <sup>h</sup>	t̪	t <sup>h</sup>		k <sup>h</sup>	ʔ
	fortis vl	p		t		k	
	lenis vd	b		d			
Implosives	lenis vd	ɓ		d̪			
Affricate	fortis vl				(tʃ)		
	lenis vl				(dʒ)		
Fricative	fortis vl		f	s s <sup>h</sup>	s <sup>j</sup>	x	h
	lenis vd		v	z	ʒ	ɣ	ɦ
Nasal		m		n		ŋ	
Syllabic nasal		m̩		n̩			
Trill				r			
Approximant		w		l	j		

Table 26. The Palachi consonant inventory

Table 26 differs at several points from Jones's (1961) consonant inventory for Palachi (which he spells "Palaychi"). Jones's consonant inventory is reproduced in table 27.

p		t		c	k	s	ʔ
p <sup>h</sup>		t <sup>h</sup>		c <sup>h</sup>	k <sup>h</sup>	s <sup>h</sup>	(q)
b		d		ʃ		z	
	f	θ			x	ʒ	h
w	v			j			
m		n					
	l		r				

Table 27. Palaychi consonant inventory (Jones 1961:75)

Jones has a lenis glottal stop (q), which only appears in syllable final position. This seems likely to be a feature of particular tonal categories, rather than a separate phoneme. Jones regards [ɦ] and [ɣ] as allophones of /ʔ/. As he notes, "these sounds present obvious problems of phonemicizations", but I have chosen to leave them as

phonemes pending further research. Jones did not record velar nasal /ŋ/ and failed to distinguish the implosives /ɓ/, /ɗ/ from voiced lenis /b/, /d/.

The Palaychi data include syllabic nasals, [m̩] and [ŋ̩]. The syllabic nucleus may contain a syllabic nasal in which case there is no initial consonant. (In his analysis, Jones also includes two syllabic nasals /m̩/ and /ŋ̩/.

Voiceless fortis plosives become voiced when co-occur with mid or low tone. See (38) below.

- (38) m̩ poɫ loɫ koɫ? 'friend' (181) loɫ ɓoɫ loɫ 'thunder' (10)  
 ʈaɫ m̩ ʈaɫ taɫ 'name' (182)  
 koɫ leɫ? 'when' (402) loɫ k̩oɫ 'loose' (436)

Selected consonant contrasts exists between phonetically similar segments are illustrated with minimal pairs in (39). (39a) demonstrates that a contrast between fortis voiceless stops and aspirated stops; (39b) between fortis voiceless stops and implosives; (39c) between voiced stops and bilabial implosives; (39d) between the alveolar implosive and the alveolar lateral and nasal; (39e) between voiceless labiodental fricative and voiced labiodental fricative; (39f) between voiceless fortis alveolar fricative and voiceless fortis aspirated alveolar fricative and voiced fortis alveolar fricative.

- (39) a. [p] - [pʰ] ɓoɫ paɫ? 'cheek'(128) maɫ tʰeɫ pʰaɫ? taɫ? 'split'(296)  
 [t] - [tʰ] tiɫ? 'comb'(202) tʰiɫ? 'water'(23)  
 [k] - [kʰ] koɫ? 'fire wood' (211) ʔoɫ kʰoɫ? ʈaɫ 'wait'(257)  
 b. [p] - [ɓ] piɫ? 'opium'(55) xoɫ ɓiɫ? 'cockroach'(112)  
 [t] - [ɗ] teɫ taɫ m̩ɫ? 'ripe'(409) ʔoɫ ɗeɫ boɫ? 'navel'(140)  
 c. [ɓ] - [b] ləɫ ɓeɫ? 'kapok'(52) ʔəsʰiɫ? ɓeɫ? 'skin'(163)  
 [d] - [d̩] teɫ ɗeɫ? 'branch'(39) naɫ ɗeɫ? 'nose'(127)  
 d. [d] - [l] ləɫ ɗoɫ? 'knife'(221) ʔoɫ taɫ loɫ? 'breathe'(239)  
 [d̩] - [n] teɫ ɗeɫ? 'branch'(39) neɫ? 'year'(18)  
 e. [f] - [v] fuɫ? 'louse'(110) leɫ? vuɫ? 'shive'(268)  
 [f] - [pʰ] xeɫ fəɫ 'rain'(7) ʔoɫ pʰəɫ 'belly'(139)  
 f. [s] - [z] siɫ yaɫ 'two person'(323) taɫ ziɫ ʈaɫ 'afraid'(259)

Regarding the co-occurrence between initial consonants and tones, Palaychi voiced fortis plosives co-occur only with the low and mid tones, while voiceless aspirated plosives co-occur with low, checked and high tones. Some examples are given in (40). (40a) demonstrates voiced fortis plosives co-occur with the low and mid tones, (40b) demonstrates voiceless aspirated plosives co-occur both with low, checked and high tones. (40c) demonstrates lateral, voiceless fricative, voiced labiodental fricative, and bilabial nasal with mid tone. Note that (40a) and (40c) have the initial consonant in a minor syllable, but the tone is on the major syllable.

- (40) a. p̄əɗɛ1 'rabbit'(78); t̄əye1 'one person'(322); k̄əbe1 'mud'(27)  
 b. p̄hɔ1 'flower'(44); t̄hɪŋ 'water'(23); t̄uŋ? k̄hɛ1 'corn'(66)  
 c. l̄əma1 'wrong'(401); səka1 t̄a1 'to tie'(289); m̄əna1 k̄h'a1 'night'(12);  
 v̄əshɪŋ? 'near'(259)

## Consonant clusters

Initial clusters (C<sub>1</sub>C<sub>2</sub>) attested in the Palaychi data are shown in Table 28.

p̄w		b̄w	ɓ̄w	t̄w	ɗ̄w	k̄w	k̄ <sup>h</sup> w	ḡw	ɗ̄ɓ̄w	n̄w	l̄w	s̄ <sup>h</sup> w	j̄w
p̄l	p̄ <sup>h</sup> l		ɓ̄l			kl	k̄ <sup>h</sup> l	fl					
p̄r													
p̄y													

Table 28. Palaychi consonant clusters

The consonant cluster '/gw/' appears only once in the data and therefore /g/ is not counted in the consonant list. Jones (1961:75) also considers /g/ to be an allophone of voiceless velar stop /k/

All the consonants are allowed in the initial consonant (C<sub>1</sub>) position. All obstruents, as well as /j, l, n/ occur preceding /w/. Lateral /l/ follows voiceless velar

consonants and voiceless fricative /f/. Voiceless bilabial stop and labial implosive occur preceding /l,y/ and /r/.

### 6.7.3 Palaychi vowels

The Palaychi vowel inventory is shown in Table 29.

	Front unrounded	Central unrounded	Back rounded
High	i	ɯ	u (ʊ)
Mid	e ɛ	ə	o ɔ
Low		a	

Table 29. Palaychi vowel inventory

The unrounded close-mid central vowel [ə] is predominantly present in open syllables with mid tone (i.e. minor syllables), but it occurs rarely with high tone, and in syllables with the high-falling creaky tone. It seems to be the nucleus of a reduced syllable. The syllabic bilabial nasal [m̩], which seems to have fully merged with the original vowel, also carries mid tone only. Selected vowel contrasts are given below.

- (41) [ɯ] - [u] fuɿ lɔɿ ʈaɿ 'to plant'(300)      ʈaɿ fuɿ liɿʔ 'tiger'(73)  
 [ə] - [ɛ] ləɿʔ 'stone'(29)      lɛɿʔ 'broad'(349)  
 [o] - [ɔ] ʔoɿ ʈaɿ loɿʔ 'breathe'(239)      pwiɿ ləɿʔ 'full'(230)  
 [ɔ] - [ə] xeɿ fəɿ 'rain'(7)      fɔɿ lətiɿʔ 'to dye'(197)

Note that Jones (1961) gives a simple nine-vowel inventory for Palaychi, /i, y, u, e, ə, o, ɛ, a, ɔ/; that is, he did not include /ʊ/.

### 6.7.4 Palaychi tones

There are three well attested tones in the data: mid-high, mid, and mid-low (44, 33, 22)<sup>1</sup>. The high-falling and low falling tones /ʔ, ʋ/ co-occur only with creaky voice quality. There are some cases of low (11) tones with breathy voice quality in the data too. The examples are given below.

(42)	laʔ	'moon' (3)	[44]	heʔʔ	'hot,spicy' (377)	[53]
	s <sup>h</sup> aʔ	'star' (4)	[33]	xəʔʔ	'heavy' (386)	[31]
	məʔ	'sun' (2)	[22]			

### 6.8 Kayah Phonology

In this section the major and minor syllable structure; vowels; the co-occurrence of the syllables and vowels; and the co-occurrence relationship of the tones and onsets of Kayah is presented.

The dialect describes here is much like that described by Solnit (1999), but there are some differences in tones and initial consonants.

#### 6.8.1 Kayah syllable structure:

The syllable structure of Kayah is composed of an obligatory consonant C<sub>1</sub> where all consonants are allowed, and followed by a medial consonant (C<sub>2</sub>), which is most commonly the alveolar trill /r/, the alveolar lateral /l/, the labial-velar

<sup>1</sup> According to Jones, Palaychi has two tones: high and low, with three allophonic pitch levels in each tone, conditioned by the presence of final /ʔ/ and /q/. The final /ʔ/ and /q/ are considered as part of the tone marks, and usually co-occur along with the falling tones with creaky voice quality. Therefore, what Jones described as final /ʔ/ and /q/ probably mean the checked tones.



approximant /w/. The nucleus is composed of a vowel  $V_1$ , which can be any vowel or  $V_1 V_2$ . Thus the syllable structures appear as follows:

$$C_1(C_2) V_1 (V_2)T$$

Syllable types in the data include: CVT, CCVT, and CCVVT.

Minor syllables are composed of an initial consonant and a central mid open vowel /ə/. The central mid open vowel [ə] is present only in open syllables with mid tone. The initial consonant of a minor syllable is generally a stop. These minor syllables are phonologically bound to a following major syllable. Some examples are illustrated below.

- (43) pəne:ʔ 'waterbufflo'(88);  
 təmoʔ 'sun'(2);  
 kəs<sup>h</sup>əʔ 'pestle'(208); ʔəbuʔ 'white' (363); k<sup>h</sup>ənoʔ 'finger'(149).

### 6.8.2 Kayah consonants

The Kayah consonant inventory is shown in the following table.

		labial	dental	alveolar	postalv	velar	glottal
Plosive	fortis vl asp	p <sup>h</sup>	t̚	t <sup>h</sup>		k <sup>h</sup>	
	fortis vl	p		t		k	ʔ
	lenis vd	b		d			
Affricate	fortis vl				tʃ		
	lenis vl				dʒ		
Fricative	fortis vl			(s) s <sup>h</sup>	s <sup>j</sup>	(x)	h
	lenis vd	v		z			
Nasal		m		n		ŋ	
Trill				r			
Approximant		w		l	j		

Table 30. The Kayah consonant inventory

Selected contrasts between phonetically similar segments are illustrated with minimal pairs in (44). (44a) demonstrates a contrast between fortis voiceless stops

and aspirated voiceless stops, (44b) between voiceless fortis plosives and voiced lenis plosives; (44c) between voiced lenis plosives and voiced fricatives; (44d) between voiced lenis alveolar /d/ and alveolar nasal /n/; (44e) between the voiceless alveolar fricative /s/ and the voiceless aspirated fricative /s<sup>h</sup>/ on the other hand and voiced alveolar fricative on the other.

(44) a. [p] - [p <sup>h</sup> ]	<b>pu</b> ʔ 'cow'(86)	ʔədaʔ <b>p<sup>h</sup>u</b> ʔ 'widow'(188)
. [t] - [t <sup>h</sup> ]	beʔ <b>tɛ</b> ʔ paʔ 'where'(403)	<b>t<sup>h</sup>ɛ</b> ʔ 'bear'(74)
[k] - [k <sup>h</sup> ]	<b>ka</b> ʔ kloʔ 'naked'(397)	<b>k<sup>h</sup>a</b> ʔ duəʔ 'leg'(152)
b. [p] - [b]	diʔ <b>pɔ</b> ʔ 'cooking pot'(205)	<b>bɔ</b> ʔ 'weave'(196)
[t] - [d]	<b>tɔ</b> ʔ t <sup>h</sup> ɛʔ 'iron'(34)	<b>dɔ</b> ʔ 'wall of house'(190)
c. [b] - [v]	kaʔ <b>bi</b> ʔ tuʔ 'peanut'(63)	viʔ 'throw'(282)
d. [d] - [n]	<b>di</b> ʔ boʔ 'navel'(140)	<b>ni</b> ʔ xuəʔ 'hear'(222)
e. [s] - [s <sup>h</sup> ]	<b>su</b> ʔ 'land leech'(414)	<b>s<sup>h</sup>u</b> ʔ 'feather'(414)
[s] - [z]	<b>sɔ</b> ʔ siʔ 'left side'(356)	<b>zɔ</b> ʔ təkaʔ 'bend'(426)

Regarding the co-occurrence between initial consonants and tones, Kayah voiceless fortis plosives /p t k/ change to voiced fortis plosives /p̣ ṭ ḳ/ when followed by low or mid tones. Nevertheless, voiced fortis plosives co-occur only with the low and mid tones and voiceless aspirated plosives co-occur with high, low, and checked tones. Some examples are given below.

- (45) a. **pa**ʔ p<sup>h</sup>ɛʔ 'split with knife'(425); **tɛ**ʔ 'fish'(101); k<sup>h</sup>ɔʔ **ku**ʔ 'cave'(36)  
 b. **p<sup>h</sup>i**ʔ 'opium'(55); **ʔɔ**ʔ **p<sup>h</sup>a**ʔ 'tree bark'(40); beʔ **p<sup>h</sup>ɛ**ʔ 'tosplit'(296)

(45a) illustrates voiced fortis plosives co-occurring only with the low and mid tones; (45b) illustrates that voiceless aspirated plosives co-occur with mid, checked and high tones.

## Consonant clusters

Initial clusters ( $C_1C_2$ ) attested in the Kayah data are shown in Table 31.

		tʷ	kʰrʷ		klw	dʒw	rw	mw
pl					kl			
	pʰr		kʰr	kr		dʒrʷ		

Table 31. Kayah consonant clusters

The consonants /p, t, k, dʒ, r, m/ are allowed in the initial consonant ( $C_1$ ) position. /r, l/ precede /w/, and follow stop consonants. Lateral /l/ follows voiceless labial and voiceless velar stops. Voiceless aspirated labial, voiceless aspirated velar stop and voiceless velar stop occur preceding /r/. A rare case is that there is a triplet consonant /klw/, /kʰrʷ/. See the examples in (46).

- (46) diʰ klwiʰ ŋeʰ 'banana fruit' (57)  
 kʰrwiʰ? 'bone' (159)

### 6.8.3 Kayah vowels

The inventory of vowels is shown in the following table.

	Front unrounded	Central unrounded	Back rounded	Diphthongs
High	i	ɯ	u	ie io ia ɯə
Mid	e ɛ	ə	o ɔ	ɛa
Low		a		

Table 32. Kayah vowel inventory

The unrounded close-mid central vowel /ə/ is predominately present in open syllables with mid tone, high tone, and obligatory high-falling tone. It is the nucleus of the minor syllables. Diphthongs such as /ɯə/, /ie/, /io/, /ɛa/ and /ia/ occur

frequently in Kayah language. Selected contrasts between phonetically similar segments of the vowels are illustrated with minimal pairs in (47).

(47)	[ɯ] - [u]	sʰiɿ <b>duɿʔ</b> 'knife'(221)	kliaɿ <b>duɿʔ</b> 'road'(184)
	[ə] - [ɛ]	pʰəɿʔ 'short'(342)	kəɿ <b>pʰɛɿʔ</b> 'ashes'(213)
	[o] - [ɔ]	pəliaɿ <b>koɿ</b> 'house lizard'(103)	<b>koɿ</b> ɿieɿʔ 'comb'(202)
	[ɔ] - [ə]	kʰuɿ <b>kləɿʔ</b> 'head'(119)	<b>kləɿʔ</b> 'crossbow'(218)

#### 6.8.4 Kayah tones

There are three well attested tones in the data: mid-high, mid, and mid-low (44, 33, 22). The high-falling and low falling tones /ɿʔ, ʔʔ/ co-occur only with creaky voice quality.

(48)	məɿ	'sky' (1)	[44]
	ruɿ	'silver' (33)	[33]
	ʔiɿ	'excrement' (167)	[22]
	ruɿʔ	'snake' (102)	[53]
	vəɿʔ	'husband' (176)	[31]