PHONOLOGICAL SKETCH OF HELONG,
AN AUSTRONESIAN LANGUAGE OF TIMOR[1]

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Abstract

Helong is an Austronesian language spoken in Indonesia with three dialects: Pulau, Bolok and Funai. Helong Pulau has 17 possible vowel sequences and a simple phoneme inventory of fourteen consonants and five vowels. The glottal stop /ʔ/ has a limited distribution, primarily occuring in word-final codas. Several morphophonemic changes, including metathesis, indicate that /ʔ/ is like other consonants. There is also a morphophonological process where the nominalizing prefix /h-/, a voiceless glottal fricative, causes a number of consonants to assimilate to the voiceless phonation of the preceding consonant, seen in *muki* 'have (v.)' → /hm/ [m̥] *m̥uki* 'wealth (n.)', and spirantization as seen in *kokon* 'sweep (v.)' → /hk/ [χ] *χokon* 'broom (n.)'. The /h-/ prefix has no assimilatory influence when it precedes voiced stops, as seen in ˈ*butu* 'tie (v.)' → ˈ*hbutu* 'bundle (n.)', ˈ*dula* 'write (v.)' → ˈ*hdulat* 'picture (n.)'.
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1 A brief introduction to the language

Helong [ISO: heg] is a little studied Austronesian language spoken in Eastern Indonesia. Therefore, this paper will present new information based on the author's own work on the language over the past nine years, discussions with linguists working in neighbouring languages and her involvement in two language documentation projects[2] involving Helong. The author is also a native speaker of Helong Pulau born into a Helong family on Semau Island.

The total number of speakers for all Helong dialects is unknown but is estimated to be around 14,000-17,000 (Grimes et al. 1997). The language is Central-Eastern Malayo-Polynesian and belongs to the Nuclear Timor group (Lewis at al. 2015). The three dialects, Helong Pulau, Helong Bolok and Helong Funai differ in phonology, lexicon, grammar and intonation. Intonation is the most striking difference, with easy identification of the dialect by intonation alone. Grammatically, Bolok and Pulau are quite close. However, Funai is quite divergent from the other two dialects having been influenced by Uab Meto and Malay structures and morphology.

This paper will provide a description of consonants and vowels, vowel sequences, syllable structure and the phonological processes relating to metathesis, /h/, and /ʔ/. It is based on an analysis of data collected by the author, and is discussed in the light of the few previous studies on Helong and related Austronesian languages.

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[2] Endangered Language Alliance http://www.endangeredlanguages.com/lang/1747 and an Australian NGO 'Agape Indah Foundation' in Kupang, western Timor.

2 Helong consonants and vowels

This section features the Helong consonant and vowel inventories. The argument and evidence for each phoneme will be shown by contrastive sounds presented in minimal sets. Vowel sequences and their interaction with metathesis will also be documented.

2.1 Consonant chart

There are 14 consonant phonemes in the Helong language, as shown in Table 1. The phonemes in the consonant inventory are symmetrical except there is no voiced velar stop /g/. There are three rare consonant phonemes; the palatal stops /c/, /ɟ/ phonetically [ʧ] and [ʤ] and the bilabial approximant /w/. These are not included in the consonant inventory because they only occur in loanwords and do not seem to have affected Helong phonology in a major way. The bilabial approximant /w/ only occurs in Helong interjections borrowed from Malay and other languages of western Timor.

Table 1. Helong Consonants

	Bilabial		Alveolar		Velar	Glottal
Stop	p	b	t	d	k	ʔ
Nasal		m		n	ŋ	
Fricative	f		s			h
Lateral				l		
Trill				r		

2.1.1 Minimal sets

Table 2 shows the contrast between bilabial sounds preceding the low-central vowel /a/. Table 3 shows the contrast between alveolar sounds preceding a low-central vowel /a/, Table 4 shows the contrast between the velar sounds preceding the low-central vowel /a/, mid-back vowel /o/ and high-back vowel /u/, and Table 5 shows the contrastive sounds to initial /h-/ preceding a high-back vowel /u/. In the Helong data, these consonant phonemes can be preceded or followed by /i/, /e/, /a/, /o/, or /u/.

Table 2. Bilabial contrasts

Bilabial	Gloss
pa.ha	'fence'
ba.ha	'voice'
ma.la	'warm self'
fa.la	'voice'

Table 3. Alveolar contrasts

Alveolar	Gloss
ta.la	'answer'
da.la	'blood'
na.la	'able'
sa.la	'net'
la.lan	'road'
ra.sa	'feel'

Table 4. Velar contrast

Velar	Gloss
bli.**ŋ**a	'when'
bli.**k**a	'a kind of basket for fish'
bo.**k**o	'hill'
bo.**ŋ**o	'a traditional container'
ku.lu	'quick cook'
ŋu.lun	'clean field'

Table 5. Contrast with initial voiceless glottal fricative /h/.

Glottal fricative	Gloss
hu.li	'select'
u.lin	'stern'
fu.li	'a kind of basket for grounded corn'
su.li	'loose bowels'

2.2 Vowel chart

There are five vowel monophthongs in Helong. These monophthong vowels have five contrastive long vowels. In Helong orthography, long vowels are written by doubling the vowels, e.g. a long /a/ is represented as 'aa'. Underlyingly these long vowels are a realization of a two-identical vowel sequence. The short vowels are presented in Table 6a and 6b. The long vowels are presented with the vowel sequences in Table 8.

Table 6a. Helong short vowels | Table 6b. Helong short vowels
(phonemic transcription) | *(phonetic transcription)*

	Front	Central	Back
High	i		u
Mid	e		o
Low		a	

	Front	Central	Back
High	i		u
Mid	ɛ		ɔ
Low		a	

2.2.1 Minimal sets

Table 7 shows the minimal sets of short vowels and long vowels in Helong. Contrasts between short and long vowels are found in monosyllabic and disyllabic words, as in Table 7. As stated previously, monophthongs have distinctive vowel length. Native speakers notice the length and are aware of meaning differences indicated by short and long vowels. If a long vowel occurs in a disyllabic word, it will be on the second syllable e.g. *di.daan* 'defile'. In a base word containing a long vowel that has three-vowel sequences, e.g. *luii* 'loosen', the long vowel /ii/ is pronounced more prominently than the short vowel /u/.

Table 7. Contrast between long and short vowels

Base (V)	Gloss	Base (VV)	Gloss
did**a**n	'use mirror'	did**aa**n	'defile'
k**o**n	'comb'	k**oo**n	'snore'
b**u**s	'to'	b**uu**s	'inflate'
l**e**	'in order to'	l**ee**	'squeeze'
lu**i**	'boat'	lu**ii**	'loosen'

2.3 Vowel Sequences

In Helong, vowel sequences usually only allow two vowels to occur together in the root words. However, there are some base words with three-vowel sequences such as *koaok* 'boast', *maiokoŋ* 'whining', *luii* 'loosen', *tuii* 'split', and so on, and in a metathesized form, two Malay loanwords can also morph into three-vowel sequences, e.g. *kuasa → kuaas* 'power', *biasa → biaas* 'usually'. Anecdotally, three-vowel sequences are not typical in the languages surrounding Helong. For instance, Amarasi, the closest neighbouring language, only allows two-vowel sequences (Edwards 2016:86-88). There are 17 two-vowel sequences in Helong, as seen in Table 8.

Table 8. Two-vowel sequences in Helong[3]

V→	i	e	a	o	u
i	ii	-	ia	-	iu
e	-	ee	ea	eo	-
a	ai	ae	aa	ao	au
o	-	oe	oa	oo	-
u	ui	-	ua	-	uu

When the lengths of vowel sequences in ten simple sentences from a single speaker were compared, one of the vowels had more prominence than the other. Similarly, when vowel sequences produced by metathesis were examined, the second vowel was more prominent than the first. It seems that the vowel sequences of the two different sounds are off-gliding and on-gliding (e.g. /luwan/ 'cut.open', /mija/ 'you.PL', etc.), and that the underlying structure of the two phonemic syllables can be realized as two phonetic syllables (e.g. [la.en] 'goat', [ko.et] 'create', [la.ot] 'deep sea', [li.aŋ] 'cave'). The coalescence of two vowels into a single phonetic syllable is more frequent in rapid speech. In Table 9 below some root words examples with two vowel sequences are listed. These vowel sequences are root words and not a result of metathesis.

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[3] Phonetically the vowel sequences of two identical sounds are pronounced as [iː], [ɛː], [aː], [ɔː], [uː].

Table 9. Examples of root words with two-vowel sequences

ia		**ea**		**ua**		**oa**		**iu**	
mia	'you'	mea	'red'	luan	'cut.open'	loat	'untie'	liun	'twist'
kian	'shout'	keaŋ	'open.wide'	bua	'banana'	boa	'naked'	diu	'bath'
sia	'here'	sea	'break off'	pua	'betel'	poa	'chase out'	kiu	'deaf'
eo		**ao**		**ao**		**au**		**ui**	
heon	'swing'	haoʔ	'agree'	ŋao	'meow'	ŋau	'angry'	luis	'cat'
keoʔ	'kill'	kaoʔ	'tickled'	sao	'let go'	sau	'bite'	dui	'more'
deo	'gnaw'	tao	'do'	baos	'ghost'	bauʔ	'frequently'	kui	'bed'
oe		**oa**		**ai**		**ae**			
koet	'create'	doan	'pour'	pait	'return'	paeʔ	'challenge'		
boe	'wash'	loat	'untie'	kai	'wood'	kae	'tired'		
loen	'hang'	koa	'peel'	lain	'fillet'	laen	'goat'		

2.4 Interaction between metathesis and vowel sequences

Metathesis is a common Helong phonological process by which two adjacent or near-adjacent sounds switch places, e.g. $C_1V_1C_2V_2 \rightarrow C_1V_1V_2C_2$, seen in *lako* 'go' → *laok* 'going'. Table 8 lists all the possible two-vowel sequences including those formed during metathesis. Note however, there are 8 non-legitimate vowel sequences /ie/, /io/, /ue/, /uo/, /ei/, /eu/, /oi/, /ou/ that do not occur in root words or produced during metathesis, nor do they appear if a loanword undergoes metathesis. Edwards (2016:62) noted this and concluded that "Helong does not have words in which the penultimate vowel is high and the final vowel is mid, or in which the final vowel is high and the penultimate vowel is mid."

In disyllabic words that have the same V1 and V2 sounds, these sounds during metathesis become long vowels, e.g. *ana* 'child' → *aan* 'the child' or *dada* 'sit' → *daad* 'sitting'. However, with disyllabic words ending with /a/ in the V2 position following a different V1 vowel, the /a/ V2 weakens. There are four possible sequences that can undergo /a/ weakening during metathesis, as shown in Table 10 below.

Table 10. Metathesis and /a/ weakening

	Root	**Metathesis**	**Gloss**
i	dida	did	'gravel'
e	deŋa	deŋ	'carry on the back'
o	doha	doh	'guard'
u	dula	dul	'write'

3 Syllable structure

The canonical Helong phonemic syllable is (C1)(C2)V1(V2)(C3), with V as the simplest and CCVVC as the most complex. The following statements characterize phonotactic constraints of Helong syllables and words.

- **Initial consonants**: All consonant phonemes, including clusters, can occur at the onset of a syllable, except for the glottal stop /ʔ/.
- **Final consonants**: Twelve consonant phonemes /-p,-t, -k, -m, -n, -ŋ, -r, -f, -s, -h, -l, -ʔ/ can occur at the coda of a syllable. Phoneme /b/ and /d/ can occur at the coda only in a metathesized form, for example, *babi* 'carry' → *baib* 'carrying' and *dadi* 'become' → *daid* 'becoming'.
- **Clusters**: There are five clusters in Helong: bl-, kl-, kr- and the loans pr- and br-. These clusters occur at onsets only. Examples are shown in Table 11.
- **Consonant sequences with /h-/**: The two-consonant sequences of /hb-/, /hd-/, /hk-/, /hm-/, /hn-/, /hŋ-/ and /hl-/ only occur at the onset position. These consonant sequences are different from other consonant clusters as in the grammar they have a nominalizing function. Phonologically this prefix /h-/ causes certain consonants to assimilate to the voiceless phonation of /h/ and causes a back stop to become a fricative. These consonant sequences will be examined further in § 4.1.
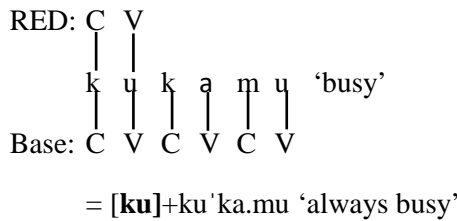
Table 11. Syllable breaks

word	C₁	C₂	V₁	V₂	C₃	Gloss	word	C₁	C₂	V₁	V₂	C₃	Gloss
pren.toŋ	p	r	e		n		for.ta.in	f		o		r	
	t		o		ŋ	'preening'		t		a			
brain	b	r	a	i	n	'bold'				i		n	'wicked conduct'
kla.put	k	l	a				ŋaeŋ	ŋ		a	e	ŋ	'yawn'
	p		u		t	'root'	koaok	k		o			
hduan	h	d	u	a	n	'twins'				a			
hla.ŋat	h	l	a							o		k	'boast'
	ŋ		a		t	'visible'	ka.kaat	k		a			
hkiun	h	k	i	u	n	'stunned'		k		a	a	t	'food'
is.pri			i		s		un.deŋ			u		n	
	p	r	i			'sheet'		d		e		ŋ	'because'
na.fo.an	n		a										
	f		o										
			a		n	'exotic'							

The data in Table 11 exemplifies the phonotactics and syllable breaks in Helong. Notice that the word *koaok* has a three-vowel sequence that can be realized phonetically as two or three syllables. The first syllable could be a two-vowel sequence [koa], essentially a diphthong, and the second syllable [ok] a nucleus and a coda. This kind of syllable break is acceptable in the language as it allows VC sequences, as in *un.deŋ* 'because'. However, breaking up /koaok/ in this way is questionable and therefore some ambiguity exists. We can determine the syllable break up of /koaok/ by looking how it undergoes reduplication. Basically, unambiguous polysyllabic words in Helong can have two CV- reduplicated forms. In the following diagram featuring the base *ku.ka.mu* 'busy', the first form has CV- reduplication of the left-most word base (i) or CV- reduplication of the right-most foot base (ii).
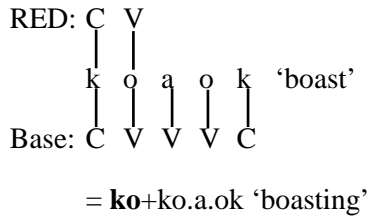
(i) **CV- RED word base**

RED: C V
k u k a m u 'busy'
Base: C V C V C V

= [**ku**]+kuˈka.mu 'always busy'

(ii) **CV- RED foot base**

W
LF   RF
σ   σ   σ
μ   μ   σ
ku   **ka**   ka   mu
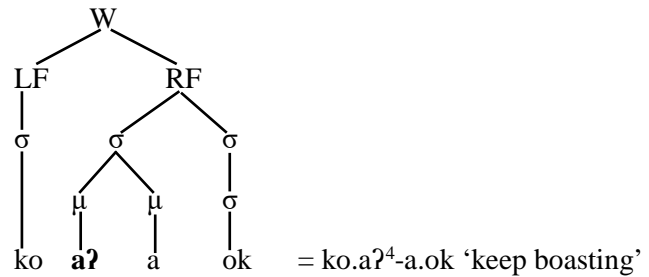
= ku[**ka**]+ˈkamu 'very busy'
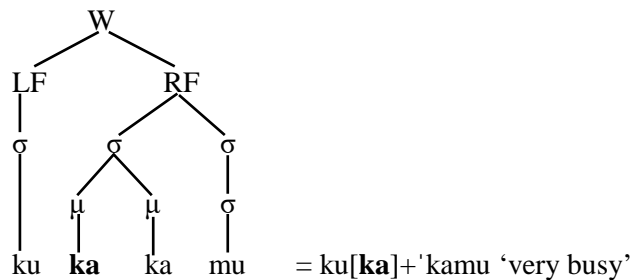
The base word /koaok/ can undergo these two processes of reduplication also as seen below, seen in (iii) and (iv). Assuming this is the same process as reduplication on unambiguous polysyllabic words, we can state that this word has three syllables /ko.a.ok/ and that there are no diphthongs.

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(iii) **CV- RED word base**

RED: C V
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      |  |
      k  o   a  o  k    'boast'
      |  |   |  |  |
Base: C  V   V  V  C
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= **ko**+ko.a.ok 'boasting'

(iv) **CV- RED foot base**

= ko.aʔ⁴-a.ok 'keep boasting'

All consonants in initial, medial and final position in Helong syllables are listed in Table 12. From the total data set, it is evident that not every C1 can be combined with C2. The possible combinations for the clusters are /pr/, /bl/, /br/, /kl/, /kr/, there is no /pl/ and the possible combination for consonant sequences are /hb/, /hd/, /hk/, /hm/, /hn/, /hŋ/ and /hl/. There is no combination of /hp/, /ht/, /hʔ/, /hf/, /hs/ or /hr/ in Helong. /hC/ consonant sequences are generally formed by using /h-/ as a nominalizer. However, it only attaches to the segments above which exclude voiceless segments except for /k/.

Table 12. Initial, medial and final consonants

C1 (initial): p, b, d, t, k, m, n, ŋ, r, f, s, h, l
C2 (medial): r, l, b, d, k, m, n, ŋ
C3 (coda): p, t, k, m, n, ŋ, r, f, s, h, l, ʔ

3.1 Differences of consonant clusters and consonant sequences

The difference between consonant clusters and consonant sequences can be shown through reduplication. When the process of CV- reduplication applies to a consonant cluster, it only copies the left-most consonant and the vowel, e.g. [kle.hen] 'leaf' → [ke-[klehen]] 'specific leafs'. However, when CV- reduplication applies to a consonant sequence, it copies the second consonant and the vowel, seen in [hdidan] 'mirror' → [di-[hdidan]] 'specific mirrors'. Since /h/ + stop sequences only occurs word-initially and the /h/ in these sequences does not participate in reduplication, it may be that the preceding /h/ is an extrametrical segment.

An analysis of initial /h/ before another consonant as extrametrical is also suggested by the fact that non-stopped /hC/ consonant sequences assimilate into a single C when the voiced sonorant and the front stop assimilate to the phonation of the prefix /h-/, e.g. /hm/ → [m̥] and /hk/ → [χ]. In these cases of assimilation, CV- reduplication process proceeds normally with copying the left-most consonant and the vowel, seen in /hmukit/ → [m̥ukit] 'animal'→ [m̥u-[m̥ukit]] 'specific animals' and /hkaen/ → [χaen] 'locker'→ [χa-[χaen]] 'specific lockers'. Prefix /h-/ will be discussed in more detail in section 4.1.

4 Phonological descriptions of glottal fricative /h/ and glottal stop /ʔ/

The voiceless glottal fricative /h-/ and the glottal stop /-ʔ/ have particular morphophonological characteristics and functions in Helong. In Helong, when /h/ is a nominalizer it only occurs word-initially while the glottal stop /ʔ/ occurs word-finally and word-medially as a result of reduplication in polysyllabic words to distinguish long vowels or vowel sequences from a reduplicated form.

4.1 Prefix /h-/

The glottal fricative /h/ can precede seven consonants to form the consonant sequences /hb/, /hd/, /hk/, /hm/, /hn/, /hŋ/ and /hl/. Consonant sequences of /hp/, /ht/, /hʔ/, /hf/, /hs/, /hr/ are not possible. The prefix /h-/ often changes verbs into nouns and thus morphologically functions as a nominalizer, as seen in Table 13.

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4   The excrescent glottal stop /ʔ/ is inserted into the morpheme boundary to distinguish the reduplicated form from a long vowel.

Table 13. Examples of /h-/ nominalization

Verb	Gloss	Noun	Gloss
butu	'tie'	h-butu	'bundle'
didan	'to use mirror'	h-didan	'mirror'
kokon	'sweep'	h-kokon	'broom'
mate	'die'	h-mate	'death', 'corpse'
tode	'lay', 'stack'	h-node	'layer'
ŋuduʔ	'to catch (liquids)'	h-ŋuduʔ	'area under eaves'
lulu	'to roll'	h-lulu	'a roll'

These consonant sequences undergo a phonological process in which the voiceless glottal fricative precedes either (1) a voiced sonorant, resulting in a devoiced sound, (2) a back stop, resulting in a fricative, or (3) a front stop, resulting in the consonant sequences <hb> and <hd>. These are detailed below. The subscript symbols (n.), (v.), and (adj.) indicate that the words are nouns, verbs and adjectives respectively.

1) h + sonorant → C̥ (devoiced), e.g.

lat 'step (v.)'	[h+lat → l̥at]	'stride (n.)'
marat 'mark (v.)'	[h+marat → m̥arat]	'stamp (n.)'
nita (no meaning)	[h+nita → n̥ita]	'door (n.)'
ŋila (no meaning)	[h+ŋila → ŋ̥ila]	'ear (n.)'

2) h + k → χ ~ hk, e.g.

kokon 'sweep (v.)'	[h+kokon → χokon]	'broom (n.)'
kidin 'medium (adj.)'	[h+kidin → χidin]	'medium size (n.)'
kola 'strip (v.)'	[h+kola → χola]	'school (n.)'
kulaŋ 'wrinkle (v.)'	[h+kulaŋ → χulaŋ]	'scorpion (n.)'

It can be argued that the phones generated by the processes above (i.e. as the result of voiced sounds becoming voiceless and stops becoming a fricative) occupy a single timing slot based on the reduplication facts presented in 3.1.

The data in 3) does not show the same assimilation, but the related reduplication data 3.1 suggests that /h-/ in these examples is extrametrical.

3) h + b, d → hb, hd, e.g.

babut (no meaning)	[h+babut → hbabut]	'dawn (n.)'
bubut 'sheath (v.)'	[h+bubut → hbubut]	'scabbard (n.)'
didan 'to use mirror (v.)'	[h+didan → hdidan]	'mirror (n.)'
dula 'dula (v.)'	[h+dulat → hdulat]	'picture (n.)'

A spectrographic analysis comparing words with and without prefix /h-/ in the labial set /p/, /b/, and /hb/ follows. Considering energy release into the vowel, Figure 1 shows no pre-vowel energy release after /p/. Figure 2 shows periodic energy release after /b/, and Figure 3 shows aperiodic then periodic release after /b/ into the vowel. From Figure 3, it is clear that the fricative /h-/ precedes the stop sound /-b/ and is not aspiration of the /b/ itself. In Figure 3, the spectrogram shows that /hb/ in Helong acoustically occurs without nasality before the stop. Perceptually, some people do hear a nasal after the /h/, but based on the evidence from the spectrogram in Figure 3, we can state that any perceived nasality is not found in the formant pattern.
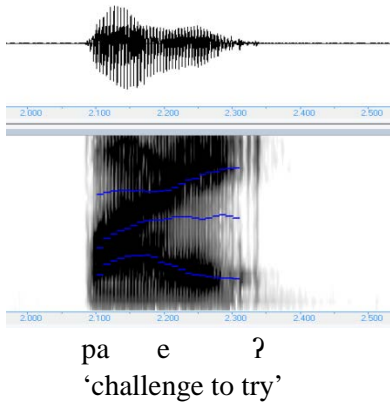
Figure 1. /p/

pa   e   ʔ
'challenge to try'

Figure 2. /b/

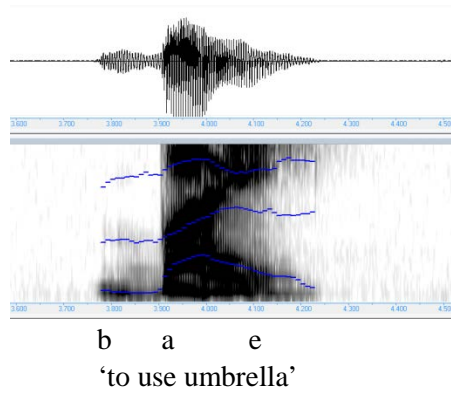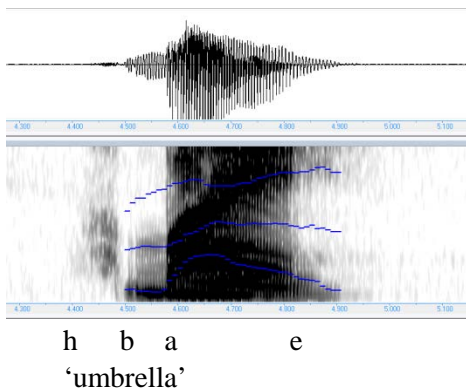b   a   e
'to use umbrella'

Figure 3. /hb/

h   b   a   e
'umbrella'

The following spectrographic analysis compares words with and without the prefix /h-/ in the alveolar set /n/ and /hn/. Considering the energy release into the vowel, Figure 4 shows periodic energy release and Figure 5 shows aperiodicity extending into the nasal with the consonant sequence <h+n> *hnaŋa*.
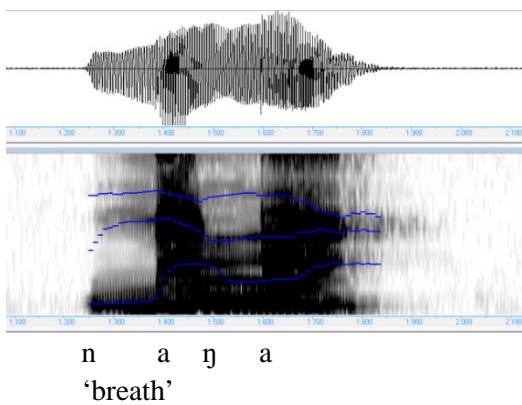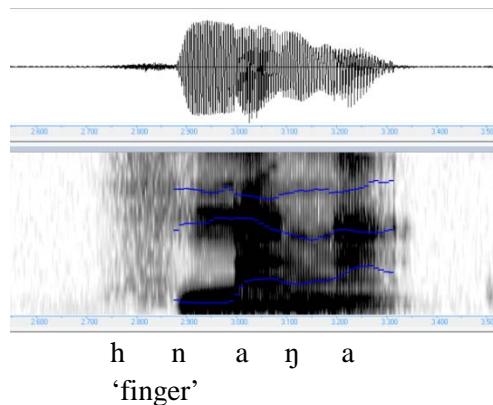
Figure 4. /n/   *Figure 5. /hn/*

n   a   ŋ   a   h   n   a   ŋ   a
'breath'   'finger'

4.2 Glottal stop /ʔ/

This section examines the various morphophonological features and functions of the glottal stop /ʔ/. First, the phonemic status of /ʔ/ is proven with three proofs which show that /ʔ/ is a consonant phoneme. Second, some of its phonological properties are explored, such as its interaction with other morphophonological processes.

4.2.1 Proof of phonemic status of /ʔ/

In order to prove that glottal stop /ʔ/ is a phoneme, Table 14 contrasts /ʔ/ and /h/ with words with, and without a coda. It is clear that /ʔ/ contrasts with /h/ and zero (ø) in the coda.

Table 14. Contrast of glottal sounds at the coda

Root	Gloss	Root	Gloss
lo.lo	'crawl, 'to separate string', 'since'	ba.ha	'reef channel'
lo.loh	'walk around to check the farm'	ba.hah	'carry in sling'
lo.loʔ	'straight'	ba.haʔ	'mouth'
boe	'wash', 'float'	buu	'counter'
boeh	'floating bottle'	buuh	'yam'
boeʔ	'castrate'	buuʔ	'dull'
i.na	'mother'		
i.nah	'wow!'		
i.naʔ	'heavy (use for rain)'		

4.2.2 Blocking Metathesis

Words with final CV and CVh can be metathesized with final CV being more productive than final CVh[5]. A noun or verb or adjective in Helong that ends with final CV or CVh can be metathesized when used in a noun phrase, a verb phrase, or an adjective phrase, as in sentences (1) and (2).[6] However, words ending in the glottal stop /ʔ/ cannot metathesize as having the glottal in this position blocks metathesis from occurring as in (3). Metathesis is also blocked with words ending in CVC as in (5). This indicates that /ʔ/ patterns with other consonants.

(1) Ula   la   **lolo.** ⟶ Ula   la   **lool**   deŋ   na.
     snake   that   crawl   snake   that   crawling   from   that
     'The snake crawls.'   'The snake is crawling from there.'

(2) Un   lako   **loloh.** ⟶ Un   **lool**   klapa   nabale.
     3s   go   check the farm   3s   checking the farm   field   still
     'She went to check the farm.'   'He is still checking the farm.'

When there is a consonant in the coda, including /ʔ/, metathesis does not occur, as in (3) to (5).

(3) Un dait   kai   **loloʔ.** ⟶   *Un dait kai loolʔ
     3s cutting   wood   straight   *Un dait kai looʔ
     'He cuts straight logs.'

(4) Un papa   la   **lukit.** ⟶   *Un papa la luikt
     3s wound   that   painful   *Un papa la luik
     'His wound is painful.'

(5) Oen le   tao   **fesat.** ⟶   *Oen le tao feast
     3p about   do   party   *Oen le tao feas
     'They want to put on a party.'

From these example sentences, we can argue from a phonological standpoint that metathesis only exists if a word ends in a CV syllable (/h/ being an exception) and that /ʔ/ functions like other consonants.

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[5]   In the data set, more than 3000 words end in CV while only 13 end in CVh.

[6]   Bowden, 2010 has made a preliminary attempt to analyse and describe metathesis in the Funai dialect of Helong. Edwards (2016:62-67) also describes briefly Helong metathesis in his discussion of metathesis in Amarasi, a neighbouring language to Helong.

4.2.3 Blocking the -n suffix

There are four functions of the suffix **-n** in Helong: (1) **-n** attaches to a noun that is a body part or kinship to mark possession; (2) **-n** attaches to a verb, a noun or an adverb to mark a perfective aspect; (3) **-n** is the short form of *na* 'distal' and can attach to a verb or a noun with final CV; and (4) **-n** attaches to a verb with final CV, as pronominal clitic *una* 'him/her/it'. However, the suffix **-n** cannot attach to a word with final CVC or CVʔ. Again it is evident from Table 15, that /ʔ/ patterns with other consonants.

Table 15: Examples of glottal stop /ʔ/ blocking suffix -n

	Gloss	Root	Root + n	Free translation
1.	'fill'	sena	sena-n	'fill it'
2.	'break.up'	sedah	seda-n	'break him up'/'defend him'
3.	'change'	sedaʔ	*sedaʔ-n	*change it
4.	'lower'	senet	*senet-n	* lower it

There are five other properties of /ʔ/ in Helong, as described in the following subsections.

4.2.3.1 Glottal Stop in Coda Position

Although the glottal stop /ʔ/ can occur word medially as a result of reduplication in polysyllabic words (§ 4.2.3.5), normally it almost always occurs at the coda as in Table 16. This makes it different from other consonants as its range is much more restricted.

Table 16. Glottal stop /ʔ/ in coda position

Monosyllabic words	Gloss
piiʔ	'erect'
loʔ	'no'
buuʔ	'dull'
koaʔ	'crow'
tuuʔ	'dry (adj.)'
huiʔ	'dry (v.)'

Disyllabic words	Gloss
ma.liʔ	'bitter'
ke.leʔ	'block'
ki.laʔ	'stingy'
no.toʔ	'peck.up'
na.tuʔ	'roe'
ŋu.luʔ	'finger nail'

In the polysyllabic reduplicated form when the glottal is inserted, there are two possible analyses. It could be analysed as occuring in the onset, (e.g. i-[ʔi]kan) or in the coda (e.g. [iʔ]-ikan). Intuitively, as a native Helong speaker, I favour the coda analysis (see § 4.2.3.5). This excrescent glottal stop /ʔ/ in this Helong reduplicated from is more audible.

4.2.3.2 Glottal stop followed by an initial [+continuant]

The glottal stop /ʔ/ is pronounced with particular phonetic prominence and clarity when followed by an initial [+continuant]. When example (6) and the words in Table 17 are spoken out loud, the glottal is quite audible and is pronounced with the same strength as other consonants in the word.

(6) Un piiʔ aken   na   ne nua.
    3s erect floating wooden log that at   there
    'He erects the floating log over there.'

Table 17. Glottal stop followed by an initial [+continuant]

Example	Free translation
piiʔ fuli	'erect basket'
piiʔ saŋa	'erect post'
piiʔ hbae	'erect umbrella'
piiʔ isuŋ	'erect mortar'

4.2.3.3 Loss of glottal stop after [-continuant]

The glottal stop /ʔ/ disappears phrase-medial if followed by a word beginning with a [-continuant]. In example 7 and Table 18, we cannot say *piiʔ pode* or *piiʔ bese* as the next word begins with a [-continuant]. A glottal stop must be deleted when followed by a [-continuant].

(7) Un pii   pode   ka   ne   likun   nua.
    3s erect rudder that at   outside there
    'He erects the rudder outside there.'

Table 18. Glottal stop /ʔ/ disappears when followed by a [-continuant]

Example	Free translation
pii bese	'erect paddle'
pii tudi	'erect knife'
pii kai	'erect wood'
pii mamasu	'still erect (it)'
pii ne likun nia	'erect (it) outside there'
pii ŋae la	'erect the corn (sack)'

4.2.3.4 Glottal prominence in sentence final position

The glottal stop /ʔ/ is highly audible and stressed in the sentence final position. In sentences (8) and (9), there is a distinct emphasis on the glottal when the sentences are uttered and is often a focal point in the intonation.

(8) Kaa-n   nam   un **maliʔ.**   (9) Un   hala-n   laok **piiʔ.**
    eat -it thus 3s bitter   3s   carry -it   walk stand.up
    'It is bitter to eat.'   'He carried (it) and stood it up.'

Similarly, in a relative clause construction, a glottal stop /ʔ/ is pronounced and stressed distinctly and audibly at the end of an independent clause, as in sentence (10).

(10) Kaat   beel   auk **taaʔ**, **m**an   in   ne   nua   ka.
      take   give   1s   axe   which that at   there that
      'Give me the axe, that (was put) over there.'

4.2.3.5 Glottal Insertion

The Helong Glottal stop /ʔ/ appears intervocalically in reduplication as in Table 19. In reduplication, a glottal stop is inserted in the morpheme boundary to distinguish the reduplicated form from a long vowel coming after the initial vowel, for example, *a.ken* 'floating log' → *aʔ-a.ken* 'specific floating log'. In the reduplicated form, the linking lines from the C-slot and V-slot to the C-V skeleton never cross and each slot in the skeleton is linked to one phoneme only. Therefore only the vowel is copied into the C-V skeleton and the excrescent glottal stop is inserted in the morpheme boundary to distinguish the reduplicated form from the long vowel.

Table 19: Glottal insertion

Initial.V	Example	Free translation
ikan	Un kaa iʔ-ikan tuun.	'She always likes to eat fish.'
eeŋ	Asii eʔ-eeŋ tuun nias sa?	'Whose lobsters' are these?'
ana	Dati-n aʔ-ana.	'Cut it shorter.'
ohkaoŋ	Ku laok oʔ-ohkaoŋ.	'You should go early in the morning.'
ulan	Lahin uʔ-ulan naal le.	'Yesterday was raining too much.'

In Figures 6 and 7, the spectrographic analyses show the contrast between short and long vowels, glottal stop insertion and two-vowel sequences. From these spectrograms, several things are seen. In Figure 7, the

long vowel is double the length of the short vowel in Figure 6. In Figure 8, rather than lengthening the vowel to a long vowel, a glottal stop is inserted intervocalically in the process of reduplication. In Figure 9, there is no glottal insertion into two-vowel sequences as this process only occurs in reduplication.
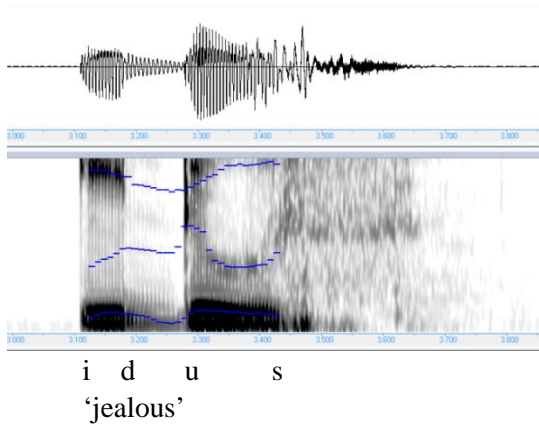
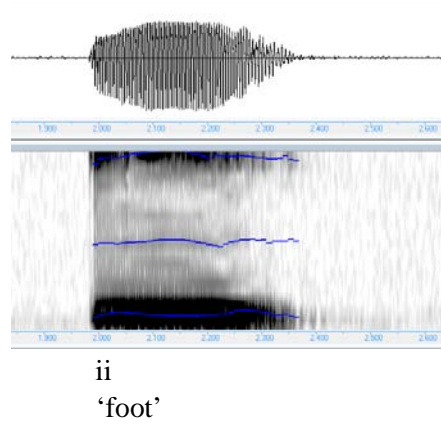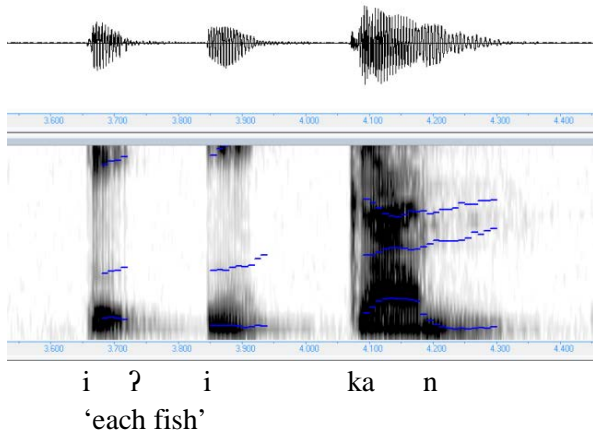*Figure 6. VV (short vowel)*   *Figure 7. VV (long vowel)*

i   d   u   s   ii

'jealous'   'foot'

Figure 8. VʔV (Reduplication)   *Figure 9. Two-vowel sequence*

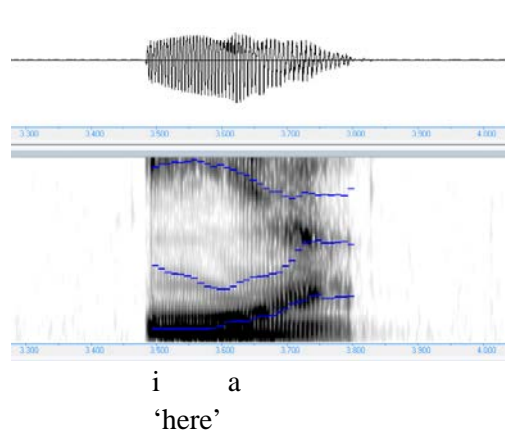i   ʔ   i   ka   n   i   a

'each fish'   'here'

There is little evidence to argue for a glottal stop at the beginning of a word-initial vowel. Since there is no contrast between glottal and non-glottal sounds in the onset of vowel initial words, it can be argued that the glottal sound in the onset of reduplication is a phonetic artefact only.

5 Conclusion and Further Study

In conclusion, the Helong Pulau dialect has simple consonant and vowel inventories, but some of its morphophonemic processes are quite complex. The consonant /h/ can precede certain consonants, thereby phonologically influencing the following sounds to assimilate to the preceding phonation of /h/ while morphologically functioning as a nominalizer. Moreover, the glottal stop /ʔ/ can assist or block certain phonological processes but in general is found to favour the coda position even in polysyllabic words created by reduplication processes. From the spectrographic data, it is clear that in reduplication, the glottal stop is inserted intervocalically and therefore should be analysed as occurring in the coda e.g. iʔ-ikan rather than lengthening *i-ikan.

The vowel system in Helong has many two-vowel sequences but can allow a three-vowel sequence in root words. It is probable that these vowel sequences are not diphthongs, nor glottal insertion or hiatus. It is currently unclear why different prominence indicated by stress and intonation is given to certain vowels in a vowel sequence. For further work, detailed analysis should include examination of stress patterns to decide whether these vowel sequences are simple sequences or diphthongs and triphthongs or something else.

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