Long Terawan Berawan phonology: Questions on diphthongs and syllabicity

by Jürgen M. Burkhardt
Language Development SIL (M) Bhd., Malaysia
Johann Wolfgang von Goethe Universität Frankfurt a.M., Germany
juergen-jey_burkhardt@kastanet.org

Abstract

The paper takes a second look at some aspects of the phonology of Long Terawan Berawan (LTB), a language variety spoken on the Tutoh River in North-Sarawak, Malaysia. Of special interest in this language variety is the ultimate syllable. Both Robert Blust (1992) and Beatrice Clayre (1996) identify a phonemic contrast for long versus short consonants in its onset. Moreover, Clayre proves the existence of a phonemic contrast between short and long vowels in the nucleus of this syllable.

Building on the findings above and providing new field data, the present paper examines ambivalent LTB sound combinations in fuller detail, especially the notion of diphthong with respect to syllabicity.

Diphthongs are identified in terms of stress patterns, i.e. a stressed vowel carrying the syllable peak followed by an unstressed non-syllabic semivowel reinterpreted as approximant. Vowel combinations that do not show this stress pattern are identified as constituting the peak of two different syllables. On this basis, some of Clayre's monosyllabic words are reinterpreted as disyllabic and modifications of certain cases of Clayre's ultimate (nuclear) LTB syllable are proposed.

1. Introduction

The Long Terawan variety of Berawan (henceforth LTB) has received considerable attention in the last three decades. Blust's (1974) dissertation contains a 100-item wordlist of the language variety in which some of the items exhibit long consonants. Asmah (1983) provides a first preliminary phonological sketch of the language. In passing, she mentions consonant lengthening as a phonetic process. Her article doesn't record contrastive vowel length. Proctor (1979) published a glossary of about 1700 LTB words based on Asmah's phoneme system. Blust (1992:413) shows the phonemic status of long consonants and mentions a contrast of long versus short vowels. Clayre's (1996) phonological analysis of LTB provides a full inventory of LTB vowel and consonant phonemes and convincingly demonstrates the phonemicity of long vowels and long consonants based on acoustic phonetic evidence. In the same article, she provides a generalization about the nature of the LTB syllable. As an area that needs further investigation, she mentions the notion of diphthong which will be, in combination with the question of syllabicity, the focus of the subsequent investigation. García-Bellido & Clayre (1997) employs the concept of prosodic constraints to explain gaps in the combination of segments in the Berawan word. The latter article is, except for some occasional references, not relevant for the scope of our investigation which doesn't employ a framework of prosodic weight distinctions.

Sections 2 and 3 give a summary of Clayre's findings with respect to consonant and vowel phonemes and their distributional restrictions a well as discuss the phonemic status of schwa and the half-open central vowel phone [ɐ]. Section 4 establishes unambiguous LTB syllable patterns and then introduces Clayre's notion of the LTB syllable. Section 5 investigates ambiguous unlike vowel sequences and reinterprets them. The concluding section offers a revised notion of the LTB syllable and lists the different types of vowel-approximant sequences found in LTB.

2. Consonant Phonemes

Blust (1992:412-413) and (1995:126) as well as Clayre (1996:218) list 19 consonant phonemes of which 14 appear in short as well as long form.

Table 1: LTB consonant phonemes[1]

Plosives	p(:) b(:)	t(:) d(:)			k(:) g(:)	ʔ
Affricates			c(:) j(:)			
Fricatives			s			h
Nasals	m(:)	n(:)		ɲ(:)	ŋ(:)	
Vibrants		r(:)				
Laterals		l(:)				
Approximants	w			y		

All simple consonant phonemes appear word-initially and word-medially. The exceptions are the glottal stop, which is a phoneme word-medially but a mere phonetic vowel onset word-initially, and the glottal fricative /h/, whose occurrence is restricted to the word-final position. The labio-velar approximant /w/, I recorded word-initially only for proper names.

Long consonants, on the other hand, appear only in word-medial position. They have phonemic status since they contrast with simple, that is short, consonants[2]:

Table 2: Contrasts between short and long consonants[3]

	Contrast	**LTB**	**English**	**LTB**	**English**
1	p – p:	/na**p**a:n/	to winnow	/na**p:**a:n/	to slap
2	b – b:	/la**b**ih/	dirty	/la**b:**eh/	end
3	t – t:	/lu**t**oh/	soggy	/lu**t:**oʔ/	to float
4	d – d:	/a**d**i:ng/	ear	/a**d:**ing/	earwax
5	c – c:	/di**c**i:ŋ/	wall	/ka**c:**i:ŋ/	button
6	j – j:	/pa**j**u:/	to scold	/ka**j:**uh/	wood
7	r – r:	/ma**r**eh/	eight	/ta**r:**eh/	younger sibling

[1] Reproduced from Clayre (1996:218). For notational simplicity, I am using /c/ for /tʃ/ and /j/ for /dʒ/. Another difference between the above table and Clayre's is that /h/ appears as an approximant in her table, but as a fricative here. Analogously to Clayre, /y/ is used for the palatal approximant [j]. All other phonological consonant symbols used in this paper have the same phonetic value as that symbol in IPA.

[2] The contrast is neutralized after penultimate schwa, where all consonants occur automatically geminated (Blust 1995:124). Thus, they are phonemically represented with a singular consonant symbol throughout this paper.

[3] All LTB examples are taken from Clayre 1996:218-221 except for examples 5, 7, 13 and 14 which are taken from Blust 1992:413. In example 10, I recorded /agu:ŋ/ for *gong* instead of Clayre's /agooŋ/.

8	l – l:	/ku**l**ah/	to turn	/ku**l:**ah/	thin
9	k – k:	/pəla**k**eʔ/	horsefly	/pəla**k:**eh/	omen bird
10	g – g:	/sa**g**um/	fast	/a**g:**uːŋ/	gong
11	m – m:	/di**m**ah/	rubbish	/di**m:**ah/	five
12	n – n:	/sa**n**ayʔ/	sun heat	/sa**n:**ayʔ/	insect species
13	ɲ - ɲ:	/paɲ in/	commoners	/maɲːin/	to drown
14	ŋ – ŋ:	/liŋan/	out of view	/liŋ**:**an/	self

Word-finally, only voiceless plosives (including the glottal stop)[4], the glottal fricative /h/ and nasals (with the exception of the palatal nasal) occur. As a result of her phonological analysis, Clayre doesn't posit a word-final occurrence of the approximants y and w. In section 5, we will reexamine the notion of approximants with respect to the final syllable.

3. Vowel Phonemes

Clayre (1996:223-225) identifies eleven vowel phonemes[5] of which all except schwa appear short as well as long. She lists the following phonetic realizations for them:

Table 3: LTB vowel phonemes with phonetic realizations

/iː/	**[iː]**			**/uː/**	**[ʊː]**
/i/	**[ɪ]**			**/u/**	**[ʊ]**
/eː/	**[eː]**	**/ə/**	**[ə]**	**/oː/**	**[oː]**
/e/	**[ɛ]**			**/o/**	**[ɔ]**
		/a/	**[ɐ]**		
		/aː/	**[ɑː]**		

As we see in table 4, there is contrast between short vowels and their long counterparts:

Table 4: Contrasts between short vowels and their long counterparts in LTB[6]

	Contrast	**LTB**		**English**	**LTB**		**English**
1	i – iː	/us**i**n/	[ʔʊsɪn]	money	/us**i:**n/	[ʔʊsiːn]	rain
2	e – eː	/mat:**e**ʔ/	[mɐtːɛʔ]	throw	/kat:**e:**ʔ/	[kɐtːeːʔ]	throw away
3	a – aː	/nak**a**n/	[nɐkɐn]	climb	/nak**a:**n/	[nɐkɑːn]	fed (perfect)
4	u – uː	/p**u**ʔ/	[pʊʔ]	hair	/b**u:**ʔ/	[bʊːʔ]	where
5	o – oː	/nip**o**ʔ/	[nɪpɔʔ]	surround	/nip**o:**ʔ/	[nɪpoːʔ]	put together

[4] Word-final plosives are always unreleased, therefore, for notational convenience, the phonetic sign for unreleasedness is not indicated.

[5] To account for the fact that long consonants and long vowels occur exclusively in the ultimate syllable, Clayre (1996:212) doesn't analyze them as "full phonemes of the language, but rather as a feature, or prosody of the nuclear [ultimate] syllable". For the purpose of my investigation, it is not necessary to make such claims and I am limiting myself to simply considering them short and long phonemes.

[6] Examples 1-4 are from Clayre 1996:223-224

Clayre's list of vowel phonemes contains three more items than Asmah's (1983:575), who identified eight vowel phonemes, that is, in her notation, /i, ĕ, ê, e, a, o, ô, u/. Asmah does not note any systematic differences in vowel length. Blust reports contrastive vowel length for /i/, /e/ as well as /o/ and mentions that it "was often recorded as a qualitative difference". He then points out that "if a qualitative analysis of vowel contrasts is adopted, the number of vowel phonemes will increase to nine" (1992:412).

3.1 Is [ɐ] the phonetic realization of /a/ in the ultima or of /ə/ instead?

Clayre assigns [ɐ][7] to her short /a/ phoneme, the counterpart to /a:/ [ɑ]. Blust (1992:411-412) hints at both possibilities, and while he doesn't commit himself explicitly to either interpretation, he seems to favor to assign it to /ə/, as is discernible from his phonological representation of LTB words, e.g. /dimeh/ 'rubbish' and /dimmeh/ 'five', and his counting of vowel phonemes, i.e. nine (He doesn't note a length contrast for /u/ - /u:/). Neither Blust (1992) nor Clayre (1996) report an occurrence of [ə] in the ultima.

However, before we continue our discussion, we have to take into account that LTB exhibits two environments in which [ə] does appear in the ultimate LTB syllable, namely, before [ɪʔ]/_# and [ʊʔ]/_# as the following examples show:

[kutəɪʔ][8] 'explode'
[pɪtəʊʔ] 'to hang'

Schwa exhibits contrast in the ultima with other vowels before an approximant:

[kʊtəɪʔ] – [kʊlɐɪʔ] 'skin' – [mɐtɑ:ɪ] 'stupid' – [pɐlʊɪ] 'stupid'– [tɐlo:ɪ] 'to stab'
[pɪtəʊʔ] – [lɪtɐʊʔ] 'murky' – [kɪle:ʊ] 'to become' – [ɪcɪʊ] 'day'

Furthermore, there is penultimate contrast of [ə] with [ɪ], [ɐ] and [ʊ] as table 5 shows:

Table 5: Evidence of contrast between schwa and /i/, /a/ and /u/[9]

	Contrast	LTB		English	LTB		English
1	ə - i	/pətəwʔ/	[pət:əʊʔ]	massage	/p**i**təwʔ/	[pɪtəʊʔ]	to hang
2	ə - a	/məla:ʔ/	[məl:ɑ:ʔ]	awake	/m**a**la: ʔ/	[mɐlɑ:ʔ]	to take
3	ə - u	/dəkih/	[dək:ɪh]	house post	/d**u**k:ih/	[dʊk:ɪh]	thorn

[7] In her 1996 article, she uses the symbol [ʌ] to denote short /a/, whereas in García-Bellido & Clayre (1997), [ɐ] is used instead. In the present investigation, the latter is used consistently as the phonetic realisation of /a/.
[8] Blust's (1974:303) LTB wordlist contains one record with this environment: /ɲəɪʔ/ [ɲəɪʔ] 'sharp'; in his notation: *ñəyq*.
[9] Example 3 is from Clayre 1996:239.

3.1.1 Assigning ultimate [ɐ] to /ə/

This option is only possible if [ə] is not assigned to /ə/ for the ultima, since [ə] and [ɐ] contrast before A?# (A = approximant).

On the other hand, [ə] could be assigned to /e/, since [ɛ] and [ə] are in complementary distribution in the ultima. Thus, it is possible to assign the two phones to the same phoneme:

/e/	[ə]	doubly closed syllable
	[ɛ]	elsewhere

Then, [ɐ] can be assigned to /ə/ for the ultima, but we still need to claim a short /a/ phoneme with [ɐ] as its phonetic realization in the penult.

We would then still reap a system with 11 vowel phonemes as table 6 shows:

Table 6: LTB vowel phoneme system with assigning ultimate [ɐ] to /ə/

/i:/	**[i:]**			**/u:/**	**[ʊ:]**
/i/	**[ɪ]**			**/u/**	**[ʊ]**
/e:/	**[e:]**	**/ə/**	**[ɐ] ultima** **[ə] elsewhere**	**/o:/**	**[o:]**
/e/	**[ə] doubly closed syllables** **[ɛ] elsewhere**			**/o/**	**[ɔ]**
		/a/	**[ɐ] non-ultima**		
		/a:/	**[ɑ:]**		

The vowel system this analysis yields is assymetrical: Two vowel phonemes are assigned allophones while all other vowels have only a singular phonetic realization. Furthermore, one and the same vowel phone, [ɐ], is assigned to two different phonemes, that is to /ə/ for the ultima and to /a/ for all other syllables.

Furthermore, [ə] could be assigned to /o/ instead:

/o/	[ə]	doubly closed syllable
	[ɔ]	elsewhere

If we assign [ə] to either /e/ or /o/, we need a strong reason to justify why we favor one over the other.

Irrespective of whether we choose /e/ or /o/, we reap the same asymmetries in the LTB vowel phoneme system.

3.1.2 Assigning ultimate [ɐ] to /a/

This option is more suitable for the following reasons:

First, [ə] can be assigned to / ə /, which allows us to make a stronger generalization about its phonemicity which is extended hereby to the ultima.

Phoneme /ə/ has then the same phonetic realization in all syllable types, that is [ə], which simplifies the analysis.

Moreover, the same reasons hold for assigning ultimate [ɐ] to /a/; phoneme /a/ with phonetic realization [ɐ] already exists in the penult, so, linking /a / and [ɐ] in the ultima too makes the analysis more consistent and simpler.

Furthermore, assigning [ɐ] to /a/ gives /a:/ a short counterpart, which creates a beautiful symmetry as all other non-neutral vowels show this contrast. This also accounts for the fact that [ɑ:] is by far more frequent than the other long vowels and it would be rather surprising if it didn't show the length contrasts that all the others do. The symmetry this approach yields is a

i. phonemic symmetry : It yields /V/ - /V:/ correspondences for all non-neutral vowels.

ii. phonemic – phonetic symmetry: /V/ [V], that means, all vowel phonemes are assigned a singular phonetic realization.

Thus, I am adopting Clayre's system of eleven vowel phonemes (as shown in table 3) with the modification that /ə/ is phonemic in the ultima too.

Based on the above conclusions, all vowel phonemes occur in the ultima, that is /i/, /i:/, /e/, /e:/, /ə/, /a/, /a:/, /u/, /u:/, /o/ and /o:/. The occurrence of schwa is limited to doubly closed syllables[10]. In closed syllables, all of the vowels excluding schwa occur short as well as long before all word-final consonants except the glottal fricative h, where they are always short. In open final syllables, they are always long neutralizing the contrast between short and long vowels.

In the penultimate syllable, only four vowel phonemes occur which are all short, that is /i/ [ɪ], /ə/ [ə], /a/ [ɐ] and /u/ [ʊ]/ (Clayre 1996:214). In the antepenult, the vowel phoneme inventory is limited to three short ones, that is /i/, /u/ and /ə/ (Blust 1992:413).

4. The Syllable

4.1 Unambiguous syllable patterns

Antepenultimate[11] syllables only occur in the shape CV as in:

/bəlira:ŋ/ 'monitor lizard'
/kəbəlin/ 'hill'
/kəlawaʔ/ 'spider'
/təlana:ʔ/ 'soul'

Penultimate syllables always have a consonantal onset followed by a single vowel. Thus, the unambiguous syllable pattern for the penultimate is CV. However, in case the consonantal onset consists of a glottal plosive, it is entirely predictable and therefore merely phonetic, as will be discussed subsequently.

[10] A more detailed discussion of this environment is given in sections 5 and 6
[11] I didn't record any LTB words consisting of four or more syllables nor did Clayre (1996:212).

As outlined above, there is contrast between short and long vowels as well as short and long consonants in the closed ultimate syllable. This yields the following unambiguous phonemic syllable pattern for the closed ultima: C(:)V(:)C. The nucleus of the final open syllable is always long. Therefore, length is merely phonetic in this syllable type, reaping a mere CV (not a CV:) as phonemic syllable type.

The unambiguous syllable patterns on which our subsequent discussion will be based are shown in table 7.

Table 7: Unambiguous syllable patterns in LTB

antepenult	penult	closed ultima	open ultima
CV	CV	C(:)V(:)C	C(:)V [V:]

4.2 Clayre's notion of the LTB syllable

Clayre distinguishes pre-nuclear from nuclear syllables. She defines the pre-nuclear syllable as a simple syllable "that contains an obligatory onset and rhyme. The onset consists of a single consonant, the rhyme of a short vowel, giving the pattern CV" (1996:213). Any syllable occurring before the ultimate (nuclear) syllable she considers pre-nuclear.

4.2.1 The nuclear syllable

Furthermore, Clayre defines the nuclear syllable (S) as a complex syllable that can only occur as the ultimate syllable of a Berawan word. In its onset, it minimally consists of a short consonant (C) occupying one segment slot and maximally of a long consonant (C:) occupying two segment slots as in:

<la**b**ih>[12] 'dirty' – CV.**C**VC pattern

<la**b:**eh> 'end' – CV.**CC**VC pattern

The rhyme of the nuclear syllable she postulates as minimally binary and maximally ternary wherein X below can be occupied either by a consonant or a vowel. In her approach, rhyme structures consisting of two segments or prosodic positions are labeled as binary and the ones consisting of three segments ternary (Clayre 1996:215-217).

Table 8: LTB Binary and ternary rhymes according to Clayre 1996

Binary rhyme (two segments)	Ternary rhyme (three segments)
Rhyme V X	Rhyme V V X

Thus, under a binary rhyme (VX), Clayre subsumes two patterns, i.e. VC and VV. As ternary rhymes, she lists VVC and VVV patterns. For rhymes that contain more than one V slot, I am using subscript indexes to indicate whether V slots are occupied by a long vowel (same index) or different vowels (different indexes). As we can deduct from Clayre's conceptualization outlined

[12] Subsequently, I am using <> brackets to exclusively refer to Clayre's (1996) phonological representations of LTB words. For my own phonological interpretations, which are also used to cite Clayre or Blust data in sections 2,3, and 4.1, I use /../ (forward slash).

above, the notions of nucleus and margin as an intermediate level between rhyme and segment slots are not employed.

Clayre's analysis yields the following nuclear rhyme patterns:

a) binary rhymes

VC	as in <l**um**> while, in
V_iV_j	as in <m**ai**> rattan
V_iV_i	as in <b**i:**> lip

b) ternary rhymes

V_iV_jC	as in <g**ium**> 'cloud' and <l**aiʔ**> 'arm'
V_iV_iC	as in <k**i:ŋ**> 'downriver'
$V_iV_jV_k$	as in <bə**liau**> 'shaman'
$V_iV_iV_j$	as in <sap**a:u**> 'roof'
$V_iV_jV_j$	as in <m**ui:**> 'wash' and in <m**ai:**> 'rapids'

She mentions that the notion of diphthong in LTB needs further investigation.

The patterns V_iV_jC as in <g**ium**> or <l**aiʔ**>, $V_iV_iV_j$ as in <sap**a:u**> and $V_iV_jV_j$ as in <m**ui:**> look like potential candidates for diphthongs. The $V_iV_jV_k$ pattern as in <bə**liau**> appears as a likely candidate for triphthongs.

A further question to be examined is whether all of the segments of these vowel sequences are part of the ultimate syllable or whether there are vowel sequences across the syllable break that separates the ultima from the penult. Thus, all rhyme patterns listed above, except for VC and V_iV_i, are ambiguous and have to be checked against unambiguous ones.

Clayre's V_iV_i as in <b**i:**> "lip" is unambiguous and with respect to the phonological framework of prosodic weight Clayre (1996) and Garcia-Bellido & Clayre (1997) are using, it is justified to assign two vowel slots for that purpose. For the scope of my investigation, however, it suffices to consider the rhyme of an open ultima phonologically a mere V, since word-final vowel length, as noted above and indicated in Garcia-Bellido & Clayre (1997:23), is predictably long.

Since prosodic weight is not relevant for this paper's investigation, I am employing a rather simple approach to the notion of syllable, subdividing it into onset and rhyme and the rhyme into nucleus and margin, whereas the onset and margin can only be represented by consonants and/or approximants and the nucleus only by vowels[13]. When referring to Clayre's notion of LTB syllable, I am using her terminology as outlined above.

5. Examination of ambiguous vowel sequences

5.1 Word Stress and Clayre's notion of the nuclear rhyme

Clayre (1996:212) states that stress in LTB falls on the ultimate syllable, an observation that I share. On the other hand, Clayre's notion of the nuclear rhyme doesn't account for differences in stress placement like the following examples show (I am underlining stressed segment slots):

[13] or diphthongs, if an alternative approach is adopted (see section 5.4.1 and appendix).

$\underline{V_iV_i}V_j$	as in <sap**a:u**>[sɐpɑ:ʊ] ‘roof’
$V_i\underline{V_jV_j}$	as in <m**ui:**> [mui:] ‘wash’
$V_i\underline{V_j}C$	as in <g**iu**m> [gɪʊm] ‘cloud’ (I recorded: [gi.ʊ:m])
$\underline{V_iV_j}C$	as in <l**ai**ʔ> [lɐɪʔ] ‘arm’
$V_i\underline{V_jV_k}$	as in <bəl**iau**> [bəlɪɐʊ] ‘shaman’ (I recorded [bəliɑ:ʊ])

Thus, her notion of nuclear syllable is underspecified for the prediction of word stress.

5.2 $V_iV_iV_j$ pattern reinterpreted as vowel-approximant (V:A#)

$\underline{V_iV_i}V_j$ as in <sap**a:u**> [sɐpɑ:ʊ] ‘roof’ behaves like a base vowel [ɑ:] with an offglide [ʊ]. If it were interpreted as a long diphthong, it would occupy three rhyme slots in her framework and not match any unambiguous LTB syllable pattern, whose nucleus is maximally represented by two vowel slots. If, on the other hand, we, interpret it as a long vowel followed by an approximant, that is /sap**a:w**/,

- it matches the unambiguous nuclear syllable pattern CV:C
- it predicts stress placement correctly, that is on V:, which solely forms the nucleus in the proposed reinterpretation.
- LTB words that fit this pattern are typically retentions of PAN word-final vowel – approximant sequences:

Table 9: Proto forms of LTB -V:A#

My reinterpretation		English	Proto form	Source
/pat$\underline{a:}$y/	[pɐtɑ:ɪ]	corpse	PAN *patay ‘dead’	Wurm & Wilson (1983:56)
/at$\underline{a:}$y/	[ɐtɑ:ɪ]	liver	PAN *atay	Wurm & Wilson (1983:123)
/man$\underline{a:}$y/	[mɐnɑ:ɪ]	male (animals)	PAN *manay	Wurm & Wilson (1983:126)
/lak$\underline{a:}$w/	[lɐkɑ:ʊ]	walk	PMP *lakaw	Blust (1992:418)
/kas$\underline{a:}$w/	[kɐsɑ:ʊ]	rafters	PAN/PMP *kasaw	Blust (1992:420)
/keluba:w/	[kəlʊbɑ:ʊ]	water buffalo	PPH *kaRabaw	Wurm & Wilson (1983:27)

5.3 $V_iV_jV_j$ pattern reinterpreted as a V.V# sequence

LTB rhymes that fit into Clayre’s $V_i\underline{V_jV_j}$ pattern as <m**ui:**> [mʊi:] ‘wash’ or <b**iu:>** [bɪʊ:] ‘wind’ are reinterpreted as V.V: sequences for the following reasons:

- The second (long) vowel behaves like a word-final monophthong in an unambiguous syllable pattern, e.g. /mubi/ [mʊbi:] ‘often’ and /niru/ [nɪrʊ:] ‘see’
- The reinterpretation above accounts for the placement of stress since it predictably falls on the entire nucleus of the ultima, that is [i:] or [ʊ:].
- The first vowel behaves like a penultimate nucleus, which is always short.
- Words like these are perceived as disyllabic by my LTB native speakers informants, who tend to write them with an intervening approximant, that is <<muwi>> or <<biyu>>.

- Proto forms associated with LTB words that conform to this pattern are typically disyllabic:

Table 10: Proto forms of LTB -V.V#

My reinterpretation	English	Proto form	Source
/mu.i/ [mʊ.i:]	wash	PPH *quRis	Wurm & Wilson (1983:36)
/ti.u/ [tɪ.ʊ:]	egg	PAN *təluR	Wurm & Wilson (1983:66)
/bi.u/ [bɪ.ʊ:]	wind	PMP *baRiw	Blust (2000:315)
/bəli.o/ [bəlɪ.o:]	rat	PMP *bəlabaw	Blust (2000:315)
/di.o/ [dɪ.o:]	far	PMP *zauq	Blust (1992:419)

This reinterpretation requires the recognition of ultimate syllables without an onset, that is V(C) syllables.

Thus, the question arises: Is there an obligatory syllable onset in LTB as Clayre (1996:213) postulates? On phonological grounds, I would answer in the negative. Phonetically, on the other hand, every word-initial vowel has a glottalic onset in LTB as in the following forms:

/aka:ng/	[ʔɐkɑ:ŋ]	'ghost'
/ina:ʔ/	[ʔɪnɑ:ʔ]	'mother'
/ulloh/	[ʔʊllɔh]	'head'

Being entirely predictable, however, a glottalic vowel onset at the beginning of a word is thus phonologically irrelevant. Therefore, it is feasible to postulate a V syllable pattern for the penultimate syllable, making its syllable onset optional.

As the ultimate syllable allows for the whole range of syllable patterns, from simple to complex, it would be rather surprising if syllables without an onset did not occur in the ultima as well.

Thus, I posit V as a possible syllable type for both the ultimate and penultimate syllable.

5.4 V_iV_jC# pattern

5.4.1 Reinterpreted as a VAʔ# pattern

$\underline{V_i}V_jC$ as in <kul**a**i̲ʔ> [kʊlɐɪʔ] 'skin' or <mur**a**u̲ʔ> [mʊrɐʊʔ] 'to make' represent the ultimate rhyme in the words above. The status of the offglides [ɪ] and [ʊ] is potentially ambiguous since on the one hand, each one could be an approximant forming a CC pattern with the following glottal stop (/yʔ/ and /wʔ/). On the other hand, [ɪ] or [ʊ] could be part of the ultimate nucleus, an offglide to the low base vowel /a/ forming a diphthong with the latter (/ai/ or /au/). LTB doesn't have any unambiguous nuclei that consist of a combination of unlike vowels nor does it have unambiguous margins with CC clusters. Thus, either interpretation is possible.

If we consider the high vowels [ɪ] and [ʊ] as approximants, we have to introduce word-final Aʔ clusters, a restricted form of a CC cluster which allows only for the combination of an

approximant followed by a glottal stop. Examples like the ones above would then be reinterpreted as:

/kulayʔ/ [kʊlɐɪʔ] ‘skin’	CVC**VAʔ**
/pələyʔ/ [pəl:əɪʔ] ‘to put on’	CVC**VAʔ**
/murawʔ/ [mʊrɐʊʔ] ‘to make’	CVC**VAʔ**
/kucəwʔ/ [kʊcəʊʔ] ‘to turn around’	CVC**VAʔ**

This interpretation, which I have already implied in my discussion of the phonemic status of schwa in section 3, has the advantage that it limits nuclei to monophthongs and doesn’t require the notion of diphthong at all. Thus, it makes it possible to treat glides uniformly as approximants. This approach is adopted in the remaining sections of the paper.

In a diphthongal interpretation, on the other hand, [kʊlɐɪʔ] ‘skin’ etc. would be interpreted as /kulaiʔ/ CVC**Dʔ**. Whereas this alternative interpretation avoids the introduction of a doubly-closed rhyme, it would, on the other hand, require the introduction of four short diphthong phones, that is [əɪ], [əʊ], [ɐɪ], [ɐʊ], as well as two long ones, that is [ɑ:ɪ] and [ɑ:ʊ] (the occurrence of the latter two is addressed in subsection 5.7). Their phonemic/allophonic status would then have to be examined. This would make the analysis more complex. However, the diphthongal approach may, at least with respect to short diphthongs, reflect phonetic reality more accurately than the VAʔ approach described above, since the phone sequences [ɐɪ], [ɐʊ], [əɪ] and [əʊ] in the examples above have about the same length as the monophtong [ɐ] in [sulɐʔ] ‘to recover’, but are perceptually shorter than the long monophthong [ɑ:] as in [kʊlɑ:ʔ] ‘fungus’ or the vowel approximant sequence /ɐw/ [ɐʊ][14] as in /buraw/ [bʊrɐʊ] ‘partially sighted’. Furthermore, the diphthongal interpretation may reflect historical sound changes more accurately, that is the diphthongization (LTB /ai/ and /au/) of monophthongs *i and *u (see table 14 below). The appendix will outline the diphthongal interpretation and the generalization about LTB syllable patterns this alternative approach yields.

5.4.2 Reinterpreted as a V.V(:)C# sequence

Analogously to section 5.3, the pattern $V_i\underline{V_j}C$ as in /g**iu:m**/[15] [gɪʊ:m] ‘cloud’ or <b**ua**ŋ> [bʊɐŋ] ‘beetle’ is reinterpreted as a disyllabic V.V(:)C# sequence for the following reasons:

- It accounts for the placement of stress since it falls predictably on the entire nucleus of the nuclear syllable, that is [ʊ:] or [ɐ], respectively above.
- The first vowel in the sequence, that is [ɪ] or [ʊ], is short like a typical penultimate nucleus.
- The second vowel in the sequence, that is [ʊ:] or [ɐ], exhibits the range of vowel length only found in the nucleus of the closed ultimate syllable, that is V: vs. V.
- Native speaker perception tends to be disyllabic with the tendency to insert an approximant, e.g. <<giyum>> or <<giyuum>> and <<buwang>>.

[14] see section 5.5
[15] Clayre records /gium/ [giʊm]

- Proto forms associated with LTB words that conform to this pattern are typically disyllabic:

Table 11: Proto forms of LTB -V.V(:)C#

My reinterpretation		English	Proto form	Source
/gi.u:m/	[gɪ.ʊ:m]	clouds	PPH *GaD/qum 'cloudy'	Wurm & Wilson (1983:38)
/mi.aŋ/	[mɪ.ɐŋ]	steep	PAN *t'i[dd̥]aŋ	Wurm & Wilson (1983:203)
/bu.aŋ/	[bʊ.ɐŋ]	beetle	PAN *tabuh/an 'bee'	Wurm & Wilson (1983:16)
/ti.uŋ/	[tɪ.ʊŋ]	egg plant	PMP *təRuŋ	Wurm & Wilson (1983:66)
/di.o:n/	[dɪ.o:n]	leaf	PAN *Dahun	Wurm & Wilson (1983:118)
/ta.o:n/	[tɐ.o:n]	needle	PAN *zaRum	Wurm & Wilson (1983:137)

There are also LTB words ending on a glottal stop that fit this V.V(:)C # pattern:

/si.aʔ/ [sɪ.ɐʔ] 'ceremonial skull'
/si.a:ʔ/ [sɪ.ɑ:ʔ] 'to lean on'

5.5 V_iV_j Pattern reinterpreted as vowel - approximant (VA#)

V_iV_j as in <m**ai**> "rattan", <par**ai**> "rice plant" or <pay**au**> "sambar deer". This pattern is not very common in LTB. Whereas I recorded [mɑ:ɪ], [pɐrɑ:ɪ] and [pɐɪɑ:ʊ] for the above examples, I nevertheless found a few short vowels followed by a word-final approximant:

/pəlaway/ 'fishing method'
/daway/ 'wire' (Malay loan)
/kələday/ 'donkey' (Malay loan)
/ngar:aw/ 'to disturb'
/tutaw/ 'type of baby clothing'
/paluy/ 'stupid' (Brunei Malay loan[16])
/buraw/ 'partially sighted'

The endings of these words are reinterpreted as a short vowel with an approximant as off-glide.

- This way, stress placement is predicted accurately, for the ultimate nucleus consist now of only one vowel.
- The reinterpretation conforms to the unambiguous nuclear syllable pattern CVC#
- Proto forms of LTB words that conform to this pattern may have ended on a vowel followed by an approximant, but so far, the only clearly matching proto form I have found and listed below refers to a Malay loanword[17]:

Table 12: Proto form of LTB –VA#

My reinterpretation	English	Proto form	Source
/daway/	wire	PAN *daway	Wurm & Wilson (1983:241)

[16] from Brunei-Malay *paloi* 'stupid' (orthographic spelling), Kamus Bahasa Melayu Brunei (1991:55)
[17] Moreover, PAN **kacaw* 'cause disturbance' (Wurm & Wilson 1983:32) may be the proto form for LTB /ngar:aw/ 'to disturb'.

5.6 $V_iV_jV_k$ pattern reinterpreted as a V.V:A# sequence

Clayre's $V_i\underline{V_j}V_k$ as in <bəl**i<u>a</u>u**> 'shaman', the singular example she recorded for this pattern, looks like a triphthong at first glance. Irrespective of the fact that I recorded it [bəliɑ:ʊ] instead, the two LTB speakers I consulted perceive this word as a trisyllabic one and tend to insert an approximant if they attempt to write it, that is <<beliyaw>> or <<beliyaaw>>. I have found only four more examples that conform to this pattern:

/di.a:y/ ~ /ji.a:y/	[d~jɪ.ɑ:ɪ]	'face'
/du.a:y/	[dʊ.ɑ:ɪ]	'in-laws of a sibling'
/bu.a:w/	[bʊ.ɑ:ʊ]	'to migrate'
/pu.a:w/	[pʊ.ɑ:ʊ]	'not having slept enough'

The reinterpretation of $V_iV_jV_k$ as a V.V:C# sequence

- rules out a triphthongal interpretation which wouldn't conform to any of the unambiguous syllable patterns nor to the ones without syllable onset discussed above.
- predicts word stress correctly, that is on the nucleus of the ultimate syllable.
- conforms to unambiguous rhyme patterns established above, that is V for the penultimate syllable and V:C for the ultimate one.
- The proto reconstructions that I have found for two of the above examples exhibit a V.CVC# sequence:

Table 13: Proto forms of LTB –V.V:A#

My reinterpretation	English	Proto form	Source
/beli.<u>a:</u>w/ [bəlɪ.ɑ:ʊ]	shaman	PAN *bali(y)an	Wurm & Wilson (1983:184)
/d~ji.<u>a:</u>y/ [d~jɪ.ɑ:ɪ]	face	PMP *daqey	Wurm & Wilson (1983:71)

5.7 Clayre's notion of a floating glottal - reinterpreted as a word-final consonant

Clayre mentions that a "V:V sequence can have an additional glottal stop, at the end of the rhyme" (1996:217). She lists the monosyllabic words [mɑ:ʊʔ] 'drunk' and [pɑ:ɪʔ] 'bitter' as examples. In García-Bellido & Clayre (1997:37), a glottal stop following a V:V sequence is associated with the short vowel in the sequence, forming a complex segment with the latter: V -> V ʔ. Thus, García-Bellido & Clayre's interpretation of the two examples above would be $C\underline{V_i}\underline{V_i}V_j$ (my underlining of stress).

This assumption avoids the introduction of a 4-place rhyme structure in the framework of the two authors, which would otherwise be necessary since the rhyme in words like <auʔ>[18] 'anus' and <laiʔ> 'arm' is already classified as ternary and assigned the rhyme structure VVC by Clayre (1996:216).

On the other hand, the introduction of the floating glottal notion results in two different interpretations of the word-final glottal stop. While it is considered a consonant in <auʔ> and

[18] I recorded [ɑ:ʊʔ].

<lai?>, it is assumed to be a component of the last vowel in <ma:u?> and <pa:i?>. This variable treatment of [ʔ] requires further scrutiny.

Clayre (1996:217) mentions that the glottal stop in [mɑ:ʊʔ] and [pɑ:ɪʔ] reflects a stop in earlier forms of the language, that is PMP *ma-buhek and PMP *paqit. These sound correspondences are taken in the present paper as indications in favor of treating the word-final glottal stop in these LTB forms as a full-fledged consonant. Not surprisingly, ultimate rhymes that conform to the pattern exhibited by /-ayʔ/ and /-awʔ/, such as /kulayʔ/, /sakayʔ/ and /gimawʔ/ also correspond to proto forms ending on a plosive:

Table 14: Proto forms of LTB –VAʔ#

LTB entry		English	Proto form	Source
/kulayʔ/	[kʊlɐɪʔ]	skin	PAN *kulit	Wurm & Wilson (1983:190)
/sakayʔ/	[sɐkɐɪʔ]	painful	PAN *sakit	Wurm & Wilson (1983:146)
/gimawʔ/	[gɪmɐʊʔ]	root	PMP *Ramut	Blust (2000:315)

Therefore, I opt for treating the word-final glottal stop uniformly as a full-fledged consonant. Since I am interpreting a pattern like /-ayʔ/ in /layʔ/ as VAʔ, LTB entries like /paayʔ/ and /maayʔ/ would therefore be interpreted as CV:Aʔ. Since the nucleus is a mere V: in my interpretation, stress is entirely predictable, that is on the long ultimate low vowel (/p**a:**yʔ/, m**a:**wʔ). The problem of a four-place rhyme pattern doesn't arise in this reinterpretation[19].

6. Conclusion: The notion of the LTB syllable revised

The goal of the investigation undertaken in the previous sections has been twofold. Firstly, we were aiming at a generalization of the LTB syllable pattern that adequately accounts for a consistent syllabic representation all of possible word forms of the language and that makes accurate predictions about stress placement. To achieve that goal, we listed the LTB consonant and vowel phonemes as identified in previous studies undertaken by Blust and Clayre (section 2 and 3). From there, we proceeded to the notion of the LTB syllable, identifying unambiguous syllable patterns first before exploring Clayre's notion of the LTB syllable which makes a distinction between nuclear and pre-nuclear syllables (section 4). In the course of section 5, we investigated Clayre's binary and ternary rhymes with respect to ambiguous vowel sequences.

In subsection 4.1, table 7, we identified as unambiguous syllable patterns:

CV for the antepenult and penult

C(:)V for the open ultima

C(:)V(:)C for the closed ultima

In section 5, we argued for the optionality of the penultimate and ultimate syllable onsets (section 5.3) as well as for the existence of doubly-closed ultimate syllables (section 5.4).

[19] It also woudn't arise in a dipthongal interpretation, in which [ɑ:ɪ]/_ʔ# and [ɑ:ʊ]/_ʔ# could simply be regarded as long diphthongs, yielding D:ʔ as the ultimate rhyme pattern.

Based on our conclusions above, we are getting the following syllable patterns:

Table 15: LTB syllable patterns based on conclusions abovementioned

antepenult	**penult**	**open ultima**	**closed ultima**	**doubly-closed ultima**
CV	(C)V	(C)(:)V	(C)(:)V(:)C	(C)(:)V(:)Aʔ

The vowel-approximant sequence interpretations adopted above match the unambiguous LTB ultimate rhyme patterns:

Table 16: LTB rhyme patterns for the closed and doubly-closed ultima

unambiguous rhyme pattern	VC	/bur**aʔ**/	wasteful
matching ambiguous rhyme patterns (with respect to the nucleus)	VA	/bur**aw**/	partially sighted
	VAʔ	/kul**ayʔ**/	skin
unambiguous rhyme pattern	V:C	/ak**a:n**/	knowledge
matching ambiguous rhyme pattern	V:A	/lak**a:w**/	to walk
matching ambiguous rhyme pattern (with respect to the nucleus)	V:Aʔ	/m**a:wʔ**/	drunk

In this analysis, glottal stops are uniformly treated as consonants. Second, high front and back vowels are uniformly treated as approximants (A) if they appear in the onset or margin of a syllable (e.g. /w/ [ʊ] in /pa**w**ayʔ/ 'wing', /mura**w**ʔ 'do, make', and bura**w** 'partially sighted'), but as vowels, if they appear in its nucleus. (e.g. /u/ [ʊ] in /y**u:**n/ 'sarong').

Thus, we arrive at the following phonological generalization[20] for the LTB syllable:

Syllable	=>	Onset	Rhyme
Onset	=>	(C)(:)	ultima
		(C)	penult
		C	antepenult
Rhyme	=>	V(:)C	closed ultima
		V(:)Aʔ	doubly-closed ultima
		V	all other syllable types

The above generalization makes stress placement in LTB entirely predictable: it always falls on the nucleus of the ultima, which is either a short vowel (V) or a long one (V:).

[20] Principally, the length mark (:) is not needed for the generalization, since it can be deducted that a C position can be occupied either by a short consonant, that is C, or by a long one, C: . The same is true for vowels with respect to the V position. Nevertheless, the length mark has been added here to indicate that only the non-open ultima permits a contrast of short vs. long segments. An alternative approach to the one employed in this paper would be to regard length merely as a phonological element added to simple segments, that is /C/ + /:/ and /V/ + /:/. That approach would limit the number of vowel phonemes to six and the number of consonant phonemes to nineteen.

Furthermore, it accurately predicts the range of rhyme patterns that follow from the generalization[21], as shown below in table 17 and 18 for the ultima:

Table 17: Range of LTB syllable patterns for the open ultima

onset	**rhyme**		
C	V[:]	/ni**ru**/	to see
C:	V[:]	/u**p:o**/	news
Ø	V[:]	/ti.**u**/	egg

Table 18: Range of LTB syllable patterns for the closed and doubly-closed ultima

onset	**rhyme**					
	rhyme with V nucleus					
C	VC	/ka**toh**/	always	VAʔ	/ku**layʔ**/	skin
C:	VC	/bi**t:oh**/	batu	VAʔ	/ma**p:ayʔ**/	to stop on a journey
Ø	VC	/bu.**aŋ**/	beetle	VAʔ	/ji.**əwʔ**/	to spit on things that are placed for a sacrifice
	rhyme with V: nucleus					
C	V:C	/ku**ma:n**/	to eat	V:Aʔ	**/pa:yʔ/**	bitter
		/mi**te:n**/	split		/sə**ra:yʔ**/	bad smell of cooking oil
C:	V:C	/mi**t:e:n**/	stand	V:Aʔ	---	---
Ø	V:C	/gi.**u:m**/	clouds	V:Aʔ	**/a:wʔ/**	anus
		/e:ŋ/	waist			

The revised generalization we arrived at mainly differs from Clayre's notion of the LTB syllable insofar as it

- makes stress placement predictable by narrowing it down to the nucleus of the ultimate syllable.
- makes the onset for the ultimate and penultimate syllables optional whereas Clayre's notion stipulates an obligatory onset.
- rules out the notion of triphthongs, which are principally possible (although not explicitly labeled so) in Clayre's approach.
- offers an interpretation to avoid the notion of diphthong.

To round up our discussion, let us look at the whole range of vowel-approximant sequences that LTB exhibits in the rhyme of the ultimate syllable.

6.1 Vowel – Approximant Sequences

Blust (1992:412) lists –uy, -oy, -ay, -iw, -éw[22] and –aw as the "diphthongs" occurring in LTB. The dash in front on them indicates that their position is meant to be word-final. In my interpretation adopted above, these are all considered vowel – approximant sequences, just as implied in Blust's transcription.

[21] With the exception of C:V:Aʔ, as I do not have any language data demonstrating this syllable pattern.

[22] in my notation /-ew/

6.1.1 Vowel –approximant as a V:A# sequence

All of the sequences below occur as V:A# sequences in LTB:

/-u:y/ as in /kucu:y/ ‘to sit with stretched legs’

/-o:y/ as in /talo:y/ ‘to stab with a spear’

/-a:y/ as in /ala:y/ ‘normality’

/-i:w/ as in /pari:w/ ‘to stagger’

/-e:w/ as in /male:w/ ‘to change’

/-a:w/ as in /mala:w/ ‘weather’

As these examples show, the whole spectrum of long vowels appears before the approximants y and w, just as they occur before unambiguous word final consonants. This is another indication that word-final approximants behave like word-final consonants.

6.1.2 Vowel – approximant as a VA# sequence

Only a limited set of patterns was found that exhibits a short vowel followed by a word-final approximant:

/-uy/ as in /paluy/ ‘stupid’ (Brunei Malay loan)

/-ay/ as in /pəlaway/ ‘fishing method’

/-aw/ as in /buraw/ ‘partially sighted’

6.1.3 Vowel-approximant before word-final glottal stop

The only vowels that appear before Aʔ in LTB are schwa and the short low vowel:

/-əyʔ/ as in /pələyʔ/ ‘to put on’
/-ayʔ/ as in /kulayʔ/ ‘skin’
/-əwʔ/ as in /kucəwʔ/ ‘to turn around’
/-awʔ/ as in /murawʔ/ ‘to do, make’

In sum, LTB exhibits the following vowel–approximant sequences in the rhyme of the ultima:

Table 19: LTB vowel-approximant sequences in the ultimate rhyme

u(:)y	i:w
əyʔ	əwʔ
o:y	e:w
a(:)y(ʔ)	a(:)w(ʔ)

Appendix

Diphthongal interpretation of a vowel-offglide sequence before final glottal stop

If we choose the diphthongal interpretation as briefly outlined in section 5.4.1, we need to clarify the phonemic/allophonic status of the six diphthong phones this analysis yields: four short diphthongs, [əɪ], [əʊ], [ɐɪ], [ɐʊ], as in

[kʊl**ɐɪ**ʔ] 'skin' CVC**D**ʔ
[pəl:**əɪ**ʔ] 'to put on' CVC**D**ʔ
[mʊr**ɐʊ**ʔ] 'to make' CVC**D**ʔ
[kʊc**əʊ**ʔ] 'to turn around' CVC**D**ʔ

and two long ones, [ɑ:ɪ] and [ɑ:ʊ],, as in

[p**ɑ:ɪ**ʔ] 'bitter' C**D:**ʔ

[m**ɑ:ʊ**ʔ] 'drunk' C**D:**ʔ

The table below shows that all of the six diphthong phones have phonemic status in this alternative analysis since they are in contrast with each other as well as with monophthongs:

Table (i): Contrasts among LTB diphthongs and of diphthongs with monophthongs

Contrast	LTB		English	LTB		English
ai - əi	/sipaiʔ/	[sɪpɐɪʔ]	to reach opposite river bank	/nip:əiʔ/	[nɪp:əɪʔ]	being held up
	/lucaiʔ/	[lʊcɐɪʔ]	exit, go out	/lacəiʔ/	[lɐcəɪʔ]	to frighten
ai – a	/buraiʔ/	[bʊrɐɪʔ]	mottle	/buraʔ/	[bʊrɐʔ]	wasteful
ai – i	/map:aiʔ/	[mɐp:ɐɪʔ]	to stop by	/map:iʔ/	[mɐp:ɪʔ]	thick
əi – e	/lacəiʔ/	[lɐcəɪʔ]	to frighten	/laceʔ/	[lɐcɛʔ]	to disappear
əi – i	/lacəiʔ/	[lɐcəɪʔ]	to frighten	/naciʔ/	[nɐcɪʔ]	to stick something. in
au - əu	/litauʔ/	[lɪtɐʊʔ]	murky	/pitəuʔ/	[pɪtəʊʔ]	to hang
	/nucauʔ/	[nʊcɐʊʔ]	to wash	/kucəuʔ/	[kʊcəʊʔ]	turn around
au – a	/məpauʔ/	[məp:ɐʊʔ]	lazy	/məpaʔ/	[məp:ɐʔ]	to cut
au – u	/litauʔ/	[lɪtɐʊʔ]	murky	/lisuʔ/	[lɪsʊʔ]	room
	/nurauʔ/	[nʊrɐʊʔ]	made, done	/niruʔ/	[nɪrʊʔ]	to visit
əu – o	/pitəuʔ/	[pɪtəʊʔ]	to hang	/bitoʔ/	[bɪtɔʔ]	neck
əu – u	/ŋajəuʔ/	[ŋɐjəʊʔ]	to tap (on someone's arm)	/tajuʔ/	[tɐjʊʔ]	roof (of boat)
a:i - a:	/la:iʔ/	[lɑ:ɪʔ]	disappointed	/la:ʔ/	[lɑ:ʔ]	loincloth
a:i – i:	/pa:iʔ/	[pɑ:ɪʔ]	bitter	/bi:ʔ/	[bi:ʔ]	load (N.)
a:i – ai	/pa:iʔ/	[pɑ:ɪʔ]	bitter	/baiʔ/	[bɐɪʔ]	river bank

a:u – a:	/pa:uʔ/	[pɑ:ʊʔ]	to make drunk	/pa:ʔ/	[pɑ:ʔ]	four
a:u – u:	/pa:uʔ/	[pɑ:ʊʔ]	to make drunk	/bu:ʔ/	[bʊ:ʔ]	where
a:u – au	/ma:uʔ/	[mɑ:ʊʔ]	drunk	/gimauʔ/	[gɪmɐʊʔ]	root

Thus, we get the following diphthong phonemes:

- 4 short diphthongs (/D/), that is /əi/ [əɪ], /əu/ [əʊ], /ai/ [ɐɪ] and /au/ [ɐʊ]
- 2 long diphthongs (/D:/), that is /a:i/ [ɑ:ɪ] and /a:u/ [ɑ:ʊ].

In this interpretation, I regard the short diphthongs as equivalent to a V segment and the long ones as equivalent to a V: segment.

In the diphthongal interpretation, the ambiguous LTB ultimate rhyme patterns also match the unambiguous ones:

Table (ii): LTB rhyme patterns for the closed ultima with the dipthongal interpretation applied

unambiguous rhyme pattern	VC	/bur**aʔ**/	wasteful
matching ambiguous rhyme patterns	DC	/kul**aiʔ**/	skin
	VA	/bur**aw**/	partially sighted
unambiguous rhyme pattern	V:C	/ak**a:n**/	knowledge
matching ambiguous rhyme pattern	V:A	/lak**a:w**/	to walk
matching ambiguous rhyme pattern	D:C	/p**a:iʔ**/	bitter
		/m**a:uʔ**/	drunk

In contrast to the VAʔ analysis, the glides [ɪ] and [ʊ] are not treated uniformly as approximants here, but only as such if they occur in the onset of a syllable or in word-final position. When they occur in the second last position of a word and are preceded by a non-high vowel, they are considered semivowels and an inseparable part of a diphthong that consists of a base vowel and an offglide and constitutes a short or long complex nuclear segment. The length of a short (long) LTB diphthong is perceptually equivalent to the length of an ultimate short (long) vowel nucleus. While this analysis introduces complex nuclei, it avoids the notion of complex margins and doubly-closed syllables.

If we adopt the diphthongal analysis, we get the following generalization about the LTB syllable:

Syllable ->	Onset	Rhyme
Onset: ->	(C)(:)	ultima
	(C)	penult
	C	antepenult
Rhyme ->	V(:)C or D(:)ʔ	ultimate closed syllable
	V	all other syllable types

This generalization also correctly predict the range of ultimate rhyme patterns in LTB (except for the non-occurrence of C:D:C) as shown below:

Table (iii): Range of LTB syllable patterns for the closed ultima with the diphthongal interpretation applied

onset	**rhyme**					
	rhyme with V or D nucleus					
C	VC	/ka**toh**/	always	DC	/ku**lai**ʔ/	skin
C:	VC	/bi**t:oh**/	batu	DC	/ma**p:ai**ʔ/	to stop on a journey
Ø	VC	/bu.**aŋ**/	beetle	DC	/ji.**əu**ʔ/	to spit on things that are placed for a sacrifice
	rhyme with V: or D: nucleus					
C	V:C	/ku**ma:n**/	to eat	D:C	**/pa:i**ʔ/	bitter
		/mi**te:n**/	split		/sə**ra:i**ʔ/	bad smell of cooking oil
C:	V:C	/mi**t:e:n**/	stand	D:C	---	---
Ø	V:C	/gi.**u:m**/	clouds	D:C	**/a:u**ʔ/	anus
		/e:ŋ/	waist			

Symbols and Abbreviations

C	consonant
V	vowel
A	approximant
D	diphthong
PAN	Proto-Austronesian
PMP	Proto-Malayo-Polynesian
PPH	Proto-Philippine
[ ]	encloses phonetic data
/ /	encloses phonemic data in the author's notation
( )	optional item
< >	encloses phonemic data in Clayre's (1996) notation
<< >>	encloses data in orthographic native speaker perception
:	indicates length in phonetic and phonemic data
.	indicates a syllable boundary
*	indicates a proto form

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