

MIRIAM PHONEMES

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1. INTRODUCTION

1.1 MURRAY ISLAND

Miriam is spoken on the Murray Island Group (Mer, Dauar and Waier), Darnley Island (Erub) and Stephen's Island (Ugar). All these islands belong to the Eastern Islands group of the Torres Strait Islands which are situated at the northern tip of Australia, between Cape York Peninsula and Papua, and are part of the State of Queensland, Australia.

The Eastern Islands are of volcanic origin and, for the most part, are covered by lush tropical vegetation.

The largest of the Miriam speaking islands is Mer of the Murray Island Group and it is this island which is commonly referred to as Murray Island. It is situated approximately on longitude 144 E. and latitude 10 S. and is about five miles in circumference, roughly oval in outline, with its long axis running roughly north-east to south-west.

According to the informant the present population of Murray Island is about 200 people, although Wurm (1975) estimated the number of Miriam speakers to be 700.

1.2 PREVIOUS DESCRIPTIONS

Miriam phonology has previously been investigated by S.H. Ray and A.C. Haddon during the Cambridge Anthropological Expedition to Torres Straits (Ray and Haddon, 1891-3 : 463-616). As this work was carried out in the 1890's the account given of Miriam phonology is not based on a phonemic analysis. Therefore, the account presented here significantly supplements the report of Ray and Haddon.

1.3 GENETIC CLASSIFICATION OF MIRIAM

Wurm (1975) states that Miriam "appears to be structurally a typical Papuan language" (918) and assigns it to the Eastern Trans-Fly Family of the Trans-Fly Stock of the Trans-New Guinea Phylum. The Eastern Trans-Fly Family occupies the area of the Binaturi and Oriomo Rivers and most of the country between them, as well as the eastern islands of Torres Strait (327). The member languages are Bine, Gidra, Gizra and Miriam. The major division within the group seems to be between Miriam and Gizra on the one hand and Bine and Gidra on the other (329).

1.4 POSSIBLE LANGUAGE CONTACTS ACROSS TORRES STRAIT WHICH MAY BE RELEVANT TO MIRIAM

Wurm (1975 : 915) writes that 'it had long been believed that Torres Strait constituted a clear linguistic boundary between the Australian and Papuan language areas, with the western islands of Torres Strait containing an Australian language, Mabuiaq, and the eastern ones a Papuan language, Miriam.'

However, from the mid-fifties onwards attention has been drawn to the possibility of un-Australian influences on the phonologies not only of Mabuiaq but also of some Cape York Peninsula languages. More recently, Wurm investigated the possible influence of Australian languages upon Papuan languages of the south coast and thus the possible mutual influences and connections of Papuan and Australian languages.

Wurm states that 'Mabuiaq is unquestionably basically Australian in much of its structure and a part of its basic vocabulary' (Ibid : 915). However, some features of its phonology are un-Australian to the extent that they make 'the Mabuiaq phoneme inventory look quite similar to that of a phonologically simple Papuan language - in fact, it is very close to that of the neighbouring Papuan Miriam' (Ibid : 916-7).

'Apart from the statistically rare and low-productive phonological contrast between t and t , and d and d in Mabuiaq, the only difference between the two inventories is the presence of η in Mabuiaq which is absent from Miriam. The presence of an η phoneme is, at the same time, a universal feature of Australian languages. However, the appearance of an η phoneme and of three or four linear distinctions with both stops and nasals is not unknown in Papuan languages: in fact it is characteristic of the majority of the languages of the (sub-phylum-level) Trans-Fly Stock of the Trans-New Guinea Phylum which occupies the part of the New Guinea mainland closest to Torres Strait and Cape York Peninsula, and to which Miriam also

belongs. It is of course, conceivable that this characteristic of these Papuan languages may be due to Australian influence: some Trans-Fly Stock languages, e.g. Gidra of the Eastern Trans-Fly Family in it, have phoneme inventories which show some Australian characteristics along with un-Australian features. The absence of such Australian-type features from Miriam, which is also a member of the Eastern Trans-Fly Family, is notable and its phonology is quite simple in contrast to that of Gidra and other members of the Family. This may well have resulted from Miriam having been exposed to the influence of the phonologically quite simple Southern Kivai language, its geographical neighbour, which has influenced it very strongly on the lexical level. This Kivai influence appears to have led to a partial breakdown and simplification of its phonological system, resulting in one which is largely shared by the structurally and lexically predominantly Australian Mabuiag, whose phonology may well have been originally that of Miriam' (Ibid : 917).

Wurm sums up his investigations by saying that 'it seems the influences have gone in both directions, with a northward Australian linguistic influence antedating a scattered southward Papuan linguistic influence. At the same time, speakers of a Papuan language immigrating to the western islands of Torres Strait seem to have adopted an Australian language while maintaining much of their Papuan phonological habits and some of their Papuan basic vocabulary' (Ibid : 922).

1.5 INFORMANT AND CORPUS

This analysis of the Miriam phonology was carried out during 1973 as part of the requirements of the Honours course in Linguistics at the Department of Anthropology, University of Sydney. Acknowledgement is due to Mr D.S. Walsh, lecturer in Linguistics at the Department of Anthropology, University of Sydney, whose guidance and supervision made this paper possible.

This study is expressly based on a corpus of data obtained from Mr Marriott Mabo, aged 29, a native speaker of Miriam then residing in Sydney. He had been away from Murray Island for about 15 months at the time the sessions commenced. I would like to record my appreciation to Mr Mabo for his generous co-operation throughout the year. The corpus consists of nearly 500 single word utterances, the majority of which are monomorphemic. The tape recording of the corpus is lodged at the Anthropology Department, University of Sydney.

2. THE PHONEMES

2.11 SEGMENTAL PHONEMIC NORMS

These are given in Table I.

2.12 SCHEDULE OF SEGMENTAL PHONEMIC NORMS SEPARATED BY MINIMAL PAIRS

See Table II.

Table II:

Schedule of segmental phonemic norms separated by minimal pairs

	p	b	t	d	k	g	s	z	m	n	r	l	i	e	a	u	o
p	0	+	+	-	+	-	+	-	+	-	+	-					
b	+	0	+	+	+	+	-	+	+	+	+	+					
t	+	+	0	+	+	+	-	-	+	+	+	+					
d	-	+	+	0	+	+	-	+	+	+	+	+					
k	+	+	+	+	0	+	+	+	+	+	-	-					
g	-	+	+	+	+	0	+	+	+	+	+	+					
s	+	-	-	-	+	+	0	+	+	+	+	-					
z	-	+	-	+	+	+	+	0	-	+	-	-					
m	+	+	+	+	+	+	+	-	0	+	+	+					
n	-	+	+	+	+	+	+	+	+	0	-	+					
r	+	+	+	+	-	+	+	-	+	-	0	-					
l	-	+	+	+	-	+	-	-	+	+	-	0					
i													0	+	+	+	-
e													+	0	+	-	+
a													+	+	0	+	+
u													+	-	+	0	+
o													-	+	+	+	0

For a complete list of minimal pairs, supporting the above schedule, see Appendix.

Table I. Chart of segmental phonemic norms

Table I: Chart of segmental phonemic norms

		Labial		Apico-		Dorso-		
		Bilabial		Dental/ Alveolar		Palatal / Velar / Back Velar		
C O N S O N A N T S	Stops	Vl	p	t		k		
		Vd	b	d		g		
	Frica- tives	Vl		s				
		Vd		z				
	Reso- nants	Nasal	m	n				
		Flap/ Trill		r				
		Lateral		l				
	V O W E L S	High - Lower High	Unrounded		Rounded			
			Front	Back Central/ Central				
		Higher Mid - Mean Mid - Lower Mid		i			u	
			e			o		
Lower Mid - Higher Low					a			

2.2 ALLOPHONIC RANGES

This Section comprises three parts which are concerned with consonants, vowels, and supra-segmental phonemes respectively. Each part begins with a phonetic chart, followed by any general statements that can be made. The individual phonemes are then listed together with their chief allophones, description of environments in which these allophones occur and examples of such occurrences. The examples are given in phonemic transcription, followed by English glosses and phonetic transcription.

2.21 CONSONANTS

2.21.1 PHONETIC CHART OF CONSONANTS

See Table III.

2.21.2 STOPS

2.21.21 GENERAL STATEMENTS

- (1) All stops are strongly aspirated when in word-final position.
- (2) All voiceless stops are weakly aspirated (i) when in word-initial position, except /p/ before /u/ and /o/, and (ii), when in word-medial position before /i/, except /k/ when following /s/; moreover, (iii) /t/ is also weakly aspirated word-medially when preceded and followed by /e/, and (iv), /k/ is also weakly aspirated word-medially (iva) before /e/ except when after /s/, and (ivb), before /a/, except when preceded by /a/ or /o/. Concerning (iii), the possibility of /t/ being also weakly aspirated word-medially before /e/ when preceded by /i/ rather than /e/ could not be resolved.
- (3) The stop /t/ is fronted before /i/. The velar stops /k/ and /g/ are fronted before /i/ and /e/, (i) when in word-initial position, and (ii), when in word-medial position following /i/ or /e/.
- (4) The velar stops /k/ and /g/ are backed when in word-final position following /a/, /u/, and /o/. Moreover, /k/ is backed before /a/ and /o/, (i) when in word-initial position, and (ii), when in word-medial position following /a/ or /o/. However, /g/ is backed only in word-initial position before /o/. The lack of symmetry in backing between /k/ and /g/ could not be eliminated.

Table III: Phonetic chart of consonants

		Labial		Apico-		Dorso-		
		Bilabial	Dental	Alveolar	Palatal	Velar	Back Velar	
C	Simple	Vl		t	k̃	k	ḳ	
		Vd		d	g̃	g	g̣	
O	Weakly Aspirated	Vl	t̃	t'	k̃'	k'	ḳ'	
		Vd						
S	Strongly Aspirated	Vl		t''		k''	ḳ''	
		Vd		d''		g''	g̣''	
N	Groove	Vl	ṣ	s				
		Vd		z				
N	Nasal	Vd		m ⁽¹⁾				
		Vd		m ⁰⁽¹⁾				
S	Flap	Vd		f̣				
		Trill	Vd		ṛ			
	Weakly Aspirated		Vd		ṛ'			
		Lateral	Vd		l			

(1) The distinction between [m] and [m⁰] may be described as a tense-lax distinction. For a detailed description of [m⁰] see 2.21.41.

2.21.22 PHONEMES AND ALLOPHONES

/p/	[p']	Word-initial when followed by /i/, /e/, and /a/:	
		/pit/	'nose' [p'it"]
		/péo/	'wing' [p'éo]
		/pá.gei/	'sea snake' [p'ágei]
		Word-medial when followed by /i/:	
		/pí.ri.pī.ri/	'long' [p'ířip'íři]
[p"]		Only word-final:	
		/ma.rép/	'bamboo, very thick' [mařép"]
[p]		Word-initial and word-medial except environments in which [p'] occurs:	
		/po.ní/	'eye' [pOní]
		/mí.pud/	'bamboo, thin' [mípUd"]
/b/	[b"]	Only word-final:	
		/á.bob/	'blow fly' [ábOb"]
[b]		Word-initial and word-medial:	
		/bu.rár/	'native flute' [bUřár']
		/tá.bu/	'come down' [t'ábU]
/t/	[t']	Only before /i/:	
		/ti.bí/	'ashes' [t'ibí]
		/i.ti.tí/	'burn, present tense' [it'it'í]
[t']		Word-initial when followed by /e/, /a/, /u/ and /o/:	
		/te.tér/	'foot' [t'et'éř']
		/tá.bi/	'came down' [t'ábI]
		/tú.ba/	'palm toddy' [t'Úbα]
		/to.bó/	'place name' [t'obÓ]
		Word-medial when preceded and followed by /e/:	
		/e.tép/	'blow' [et'ép"]
[t"]		Only word-final:	
		/go.tát/	'flow' [gɔtát"]
[t]		Only word-medial except environments in which [t']	

	and [t'] occur:		
	/pa.tér/	'bamboo, medium'	[p'atér']
	/mit.kár/	'many', 'hundred'	[mitkár']
/d/	[d'']	Only word-final:	
	/ta.mád/	'bread fruit'	[t'amád'']
[d]		Word-initial and word-medial:	
	/a.dúd/	'bad'	[adÚd'']
	/dób.dob/	'fat', 'thick'	[dÓbdOb'']
/k/	[ḳ']	Word-initial before /i/ and /e/:	
	/kir.gír/	'teenage girl'	[ḳ'ířgír']
	/ké.bi.le/	'very small'	[ḳ'ébile]
[ḳ']		Word-medial when preceded and followed by /i/ or /e/:	
	/i.kí.mir/	'rub'	[iḳ'ímir']
	/dí.ker/	'persist'	[dí:ḳ'eř']
	/e.kí.mer/	'move along, shift (imp)'	[eḳ'ímeř']
	/e.kés.mè.da/	'fall (of a person)'	[eḳ'ésmÈda]
[k']		Word-initial when followed by /u/:	
	/ku.rúp/	'fruit'	[k'UřÚp'']
		Word-medial when preceded by any phoneme other than /i/, /e/ and /s/ and followed by /i/ or /e/; and when preceded by any phoneme other than /a/ and /o/ and followed by /a/:	
	/it.kír/	'wipe'	[itk'ír']
	/aú.kes.kes/	'wide'	[aúk'eskes]
	/dí.ká.sir/	'walk', 'cook'	[dík'ásir']
[k'']		Only word-final when preceded by /i/ or /e/:	
	/sá.rik/	'bow'	[sářik'']
	/kéí.mer.pèk/	'left (side)'	[ḳ'éímeřpèk'']
[k']		Only word-initial when followed by /a/ or /o/:	
	/kab/	'dance'	[k'ab'']
	/ko.ló/	'knee'	[k'Ωló]
[ḳ]		Only word-medial when preceded by /a/ or /o/ and followed by /a/ or /o/:	

	/mo.ká.kà.lam/	'because'	[móká̀kà̀lam]
	/ná.ko/	'how'	[ná̀kə̀]
	/í.no.ko/	'over there'	[í̀nəkə̀]
[k ^h]	Only word-final when preceded by /a/, /u/ or /o/:		
	/gâr.gér.kak/	'blunt'	[gầr̥gềrk'ak ^h]
	/i.rúk/	'build (fence)'	[i̥r̥úk ^h]
	/tá.kok/	'elbow'	[t'á̀kək ^h]
[k]	Only word-medial except in environments specified for any of the preceding allophones of /k/:		
	/i.kós/	'spear'	[IkÓs]
	/kos.kír/	'wife'	[k'Óskír']
/g/	[g̥]	Word-initial when followed by /i/ or /e/:	
	/gi.líd/	'shoulder'	[gilíd ^h]
	/ger.gér/	'day'	[gềr̥gềr']
	Word-medial when preceded by /i/ or /e/ and followed by /i/ or /e/:		
	/géí.gi/	'trevally fish'	[géígi]
	/di.gém/	'walk'	[d̥igềm]
	/me.gí/	'vomit'	[me̥gí]
	/le.gé/	'use on or apply to a person'	[legé]
[g ^h]	Only word-final when preceded by /i/ or /e/:		
	/ti.ríg/	'tooth'	[t'ií̥ríg ^h]
	/ná.gég/	'trigger fish'	[ná̀gég ^h]
[g̥]	Word-initial when followed by /o/:		
	/go.lí/	'cuttlefish'	[g̥olí]
	Word-medial when preceded and followed by /o/:		
	/o.góg/	'dirty'	[ŋg̥ŋg ^h]
[g ^h]	Only word-final when preceded by /a/, /u/ or /o/:		
	/lag/	'mosquito', 'smell'	[lax ^h]
	/lug.lúg/	'solve (puzzle)'	[lUglúg ^h]
	/o.góg/	'dirty'	[ŋg̥ŋg ^h]
[g]	Word-initial and word-medial except in environments specified for any of the preceding allophones of /g/:		
	/gu.rím/	'swim'	[guřím]
	/pa.gás/	'upper arm'	[p'agás]

2.21.3 FRICATIVES

2.21.31 PHONEMES AND ALLOPHONES

/s/	[s̥]	Word-initial and word-medial when followed by /i/:		
		/siu.síú/	'orange'	[s̥iuʃiú]
		/i.sím/	'cut'	[isím]
	[s]	In all positions except before /i/:		
		/se.gúr/	'play'	[segÚř']
		/ge.sép/	'the earth'	[gesép"]
		/i.kés/	'split'	[ik'és]
/z/	[z]	In all positions:		
		/zi.rú/	'cold feeling'	[ziřÚ]
		/ně.re.zi/	'breathe'	[něřezi]
		/baaz/	'cloud'	[ba:z]

2.21.4 RESONANTS

2.21.41 PHONEMES AND ALLOPHONES

/m/ [m⁰] Word-initial and word-medial when followed by:

- (1) /ai/, /au/ or /am/
- (2) word final /a/.

This allophone differs from [m] as follows:

- (1) At the moment of release there is no pressure exerted by the lips upon one another - the lips merely part;
- (2) Upon release there is little movement of the lips other than the lower lip's downward movement which lags fractionally behind the jaw's movement so that the jaw moves in a slightly longer arc than the lower lip.

It must be noted that the absence of movement of the lips other than that described above precludes the possibility of labialization as a feature of this release.

/máf.ke/	'near'	[m ⁰ áfík'e]
/ó.mai/	'dog'	[Óm ⁰ ai]

	/au.máúm/	'half dry leaf'	[aum ⁰ áúm]
	/má.ma/	'you (singular)'	[m ⁰ ám ⁰ á]
	/ta.má/	'market'	[t'am ⁰ á]
[m]	In all positions other than those specified for [m ⁰]:		
	/ma.rép/	'bamboo, very thick'	[ma ^h rép"]
	/su.més/	'bush'	[sumés]
	/lu.tám/	'branch of tree'	[lUtám]
/n/ [n]	In all positions:		
	/nam/	'turtle'	[nam]
	/ú.ni/	'coconut water'	[únI]
	/u.mén/	'sea snake, striped'	[umÉn]
/r/ [r̥']	Only word-final:		
	/ger.gér/	'day'	[ge ^h rgér']
[r̥] and			
[r̥]	Only word-medial in free fluctuation:		
	/dik.rí/	'sing'	[dikr̥í]
	/dim.rí/	'tie'	[dimr̥í] or [dimr̥í]
	/ik.rís/	'scratch'	[ikr̥ís]
	/bu.rár/	'native flute'	[bUr̥ár']
	/ka.róp/	'pan-pipes'	[k'ar̥Óp"]
/l/ [l]	In all positions:		
	/lám/	'leaf'	[lam]
	/ko.ló/	'knee'	[k'ΩlÓ]
	/mel.pál/	'sea snake, black'	[melpál]

2.22 VOWELS

2.22.1 PHONETIC CHART OF VOWELS

See Table IV.

2.22.2 GENERAL STATEMENTS

(1) Phonemically short vowels¹ show non-phonemic lengthening:-

Table IV: Phonetic chart of vowels

		Front	Front Central	Central	Back Central	Back
		Unrounded				Rounded
V	High	i				u
	Lower High	I				U
O	Higher Mid	e				o
	Mean Mid	E				0
E	Lower Mid			a ^		Ω
	Higher Low				α	
L						
	Low					

(i) when stressed, and (ii) in monosyllabic words of the CVC structure in all environments other than the following:

In all words ending on /s/:

[k'es]	'span'
[b ^h as]	'burst open'
[sus]	'milk'
[mos]	'lung'

In all words beginning and ending with a voiceless stop:

[k'ep'']	'arrow'
[k'Ωk'']	'ankle'
[t'ut'']	'small stick'

(2) The limitations of the corpus do not allow more effective presentation or description of the allophonic ranges of vowel phonemes than that which follows.

2.22.3 PHONEMES AND ALLOPHONES

/i/ [I] Occurs only in unstressed syllables:

Word-final in the following environments:

(1)

$$/a/ \left\{ \begin{array}{l} /b/ \\ /d/ \\ /m/ \\ /r/ \\ /l/ \end{array} \right\} [I]$$

/tá.bi/	'came down'	[t'ábI]
/bá.di/	'kind of vegetable'	[bádI]
/kù.be.tá.mi/	'mass of cloud'	[k'ùbEtámI]
/báf.da.ri/	'became, has become'	[báfdaŕI]
/ná.li/	'live'	[náI]

(2)

$$/u/ \left\{ \begin{array}{l} /d/ \\ /z/ \\ /m/ \\ /n/ \\ /r/ \\ /l/ \end{array} \right\} [I]$$

/eú.di/	'and then'	[EÚdI]
/áú.zi/	'caterpillar'	[áúzI]
/éu.mi/	'die'	[EÚmI]
/ú.ni/	'coconut water'	[únI]
/uà.ú.ri/	'cone shell'	[uàúŕI]
/á.bu.li/	'falling rain'	[ábulI]

(3)

$$/o/ \left\{ \begin{array}{l} /n/ \\ /l/ \end{array} \right\} [I]$$

/nó.ni/	'it's only water'	[nónI]
/e.ró.li/	'am eating away'	[EŕÓI]

Environments (1), (2) and (3) can be summarized as follows:

$$\begin{array}{l} /a/ \\ /u/ \\ /o/ \end{array} \left\{ \begin{array}{l} /b/ \\ /d/ \\ /m/ \\ /r/ \\ /l/ \\ /n/ \\ /z/ \end{array} \right\} [I]$$

Word-initial in the following environments:

[I]	{ /k/	{ /u/	
	{ /g/	{ /a/	
		{ /o/	
/i.kuár/	'give'		[Ikuáɾ̃']
/i.gár/	'cut'		[Igáɾ̃']
/i.gór/	'take out'		[Igôɾ̃']

Word-medial in the following environments:

(1)

/b/	[I]	/z/	/a/	
/giz.gú.bi.zàr/		'scorpion fish'		[gizgúɓIzàɾ̃']

(2)

/d/	[I]	{ /d/	{ /a/	
		{ /k/	{ /u/	
		{ /m/	{ /r/	
/éi.di.da/		'lie down (past tense)'		[éidIda]
/di.ká.sîr/		'cook', 'walk'		[dIk'ásîɾ̃']
/di.kú.pà.mar/		'scrub'		[dIkúpàmaɾ̃']
/dik.rí/		'sing', 'throw'		[dIkɾ̃í]
/dim.rí/		'tie'		[dImɾ̃í]

(3)

/z/	[I]	/r/	/u/	
/zi.rú/		'cold feeling'		[zIɾ̃ú]

(4)

/m/	[I]	/d/	/a/	
/mí.mi.dà.li/		'we (dual incl.)'		[mímIdàlI]

From the above evidence a tentative prediction for the occurrences of [I] is suggested,² as shown in Figure 1.

[i] May be stressed or unstressed and occurs in all positions except in environments specified for [I].

/po.ní/	'eye'	[pOní]
/í.guat/	'drag'	[íguat"]
/ep.kí.da/	'dry'	[Epk'ída]
/ó.mai/	'dog'	[Ómai]
/ir.mír/	'rain'	[iɾ̃míɾ̃']
/mó.sik/	'spit (verb)'	[mósik"]

/e/ [E] The syllable in which it occurs carries primary stress only in:

Figure 1: Occurrences of [I]

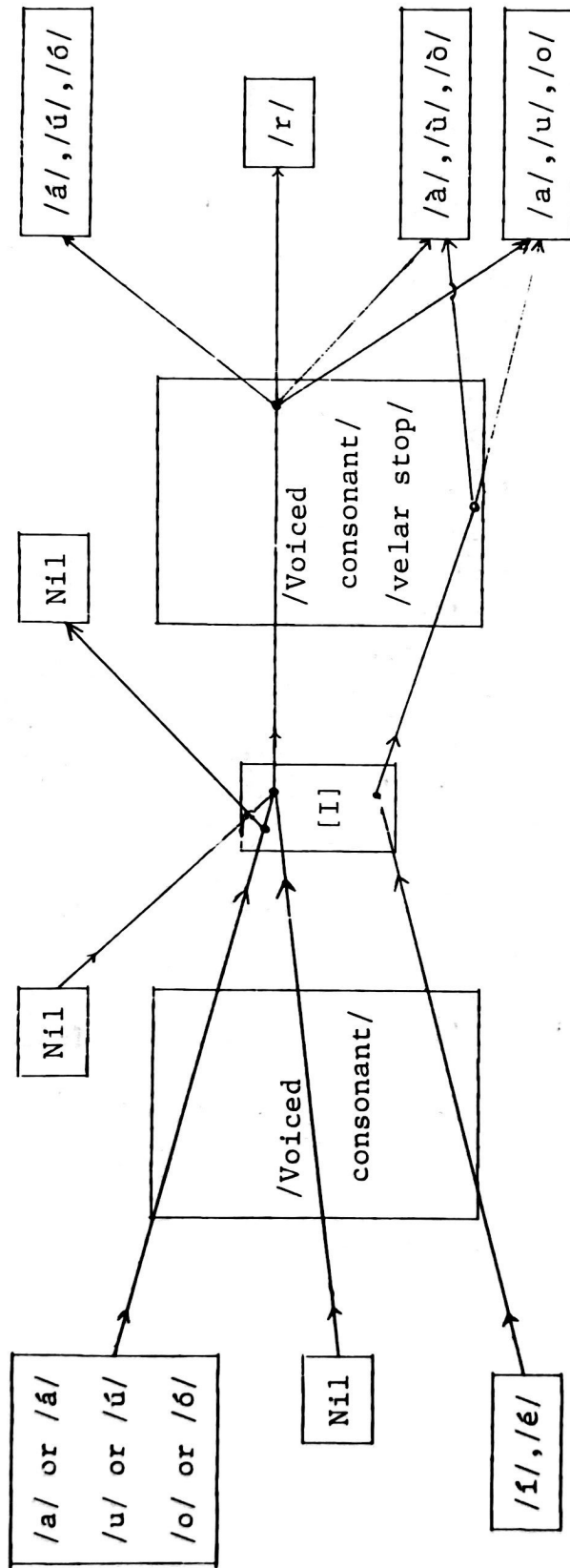


Figure 1 (also Figures 2, 3, 4, and 5 below) are attempts to represent what I believe the environments of the allophones in question would in fact turn out to be, if a wider range of data were available. A careful perusal will reveal that each chart is a summary of the complex descriptions of environments for each of the allophones, to which were added the 'links' that are presumed missing due to insufficient data.

/u.mén/	'sea snake, striped/	[umÉn]
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Word-final: Only two examples occur in the corpus:

/ná.de/	'where'	[nádE]
/mu.ríz.ge/	'far'	[muřízgE]

Word-initial in the following environments providing the initial syllable carries *no* stress:

(1)

[E]	{	/b/	/ú/
		/p/	
		/t/	
	{	/d/	/ó/
		/s/	
		/m/	
		/r/	

/e.búr/	'animal'	[EbÚr']
/e.pár.sir/	'hit'	[Epářsĩr']
/e.tág/	'count'	[Etág"]
/e.dó.mer/	'pull'	[EdÓmeř']
/e.só.med/	'suck'	[EsÓmEd"]
/e.mór/	'plant it'	[Emóř']
/e.ró/	'eat'	[EřÓ]

(2)

[E]	{	/p/	/k/
		/t/	
		/r/	
	{	/m/	/r/
		/ú/	{ /d/ /m/

/ep.kí.da/	'dry'	[Epk'ída]
/et.két/	'sew'	[Etk'ét"]
/et.péi/	'spout of water from dugong'	[Etpéi]
/er.kép/	'eye' (old usage)	[Eřk'ép"]
/er.péi/	'hold'	[Eřpéi]
/em.rí/	'sit (down)'	[Emří]
/eú.di/	'and then'	[EÚdI]
/eú.mi/	'die'	[EÚmI]

Word-medial in the following environments providing the syllable in which [E] occurs does not carry primary stress:

(1)

/b/	}	[E]	/t/	/á/		
/d/						
/m/						
/n/						
/kù.be.tá.mi/					'mass of cloud'	[k'ÛbEtámI]
/de.táút/					'speak (imp.)'	[dEtáút ^h]
/me.tá/					'house'	[mEtá]
/ne.tát/					'one'	[nEtát ^h]

(2)

/m/	[E]	/d/	/a/		
/e.kés.mè.da/				'fall (of a person)'	
					[ek'és ^h mÈd ^h a]

(3)

/d/	}	[E]	/r/	}	/a/	
/m/					/o/	
/n/					/u/	
/de.rái.mer/					'hunt'	[dE ^h rái ^h meř']
/me.ród/					'calf'	[mE ^h rÓd ^h]
/ne.rút/					'other'	[nE ^h rÚt ^h]

(4)

/n/	[E]	/u/	}	/d/		
				/r/		
/neúd/					'parrot fish'	[nEÚd ^h]
/neúr/					'woman, unmarried'	[nÉUř']

(5)

/o/	/m/	[E]	/d/		
/e.só.med/				'suck'	
					[EsÓmEd ^h]

From this evidence a tentative prediction for the occurrences of [E] is suggested, as shown in Figure 2.

[e] May be stressed or unstressed and occurs in all positions except in environments specified for [E]:

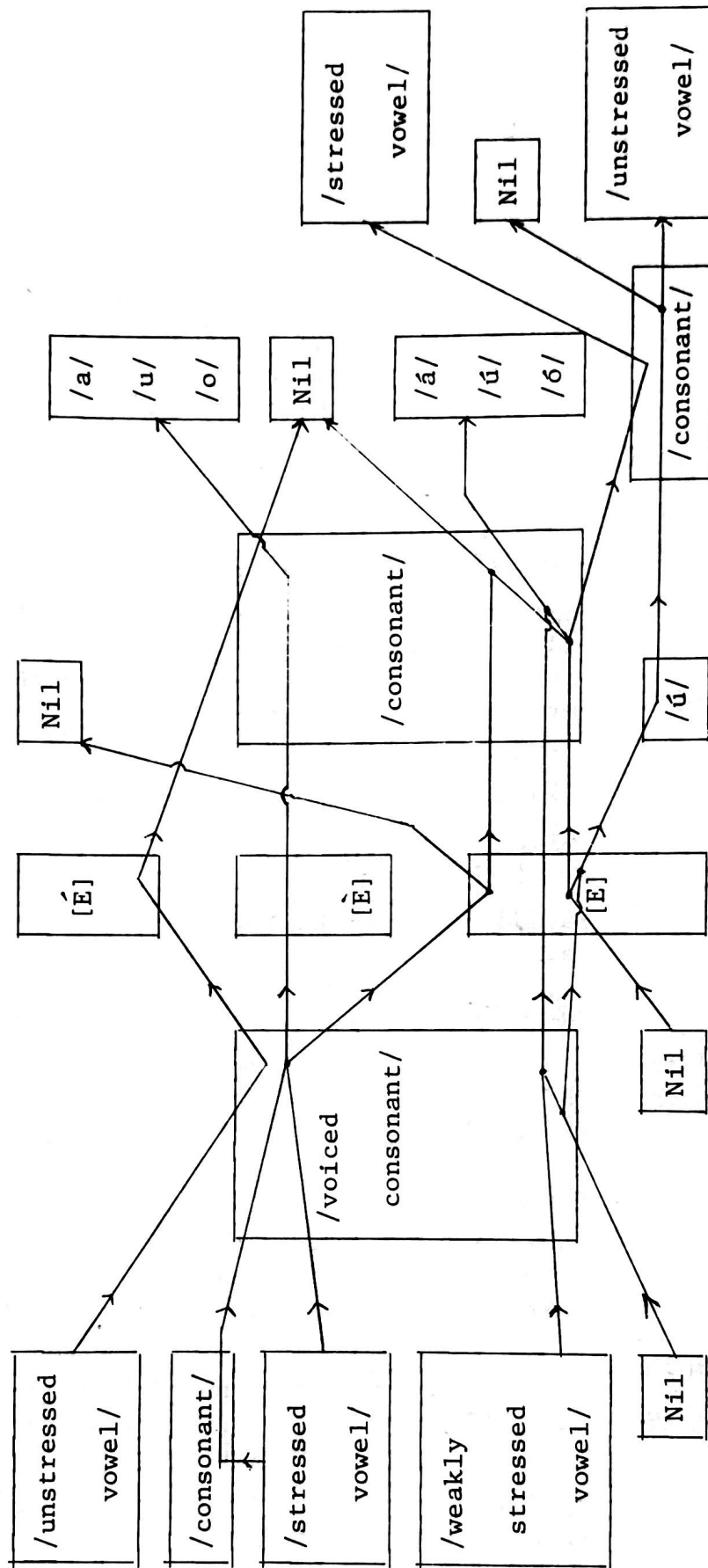
/né.te/	'who'	[nét'e]
/é.mè.ret/	'old'	[émèřet ^h]
/ner.kép/	'heart'	[nêrk'ép ^h]

/a/ [a] May be stressed or unstressed and occurs:

In the word:

/aa/	'and'	[a:]
------	-------	------

Figure 2: Occurrences of [E]



Word-final in the following environments:

/ú/	/b/	}	}	[α]
/á/	/k/			
/ó/		}	}	[á]
/a/	/b/			
/o/	/k/	}	}	[α:]
/φ/				
/tú.ba/	'palm toddy'			[t'Úba]
/bá.ka/	'go (imp.)'			[báka]
/kó.ka/	'will (do some- thing) again'			[k'Óka]
/ta.bá/	'come'			[t'ábá]
/o.ká/	'memory'			[Oká]
/kaa/	'I'			[k'α:]

Word-initial in the following two-phoneme words:

/ab/	'father'	[αb ^{''}]
/ad/	'god', 'outside'	[αd ^{''}]
/at/	'stingray'	[αt ^{''}]
/ar/	'kind of fruit'	[αr̄ ^{''}]
/a.ú/	'big'	[αÚ ^{''}]

and in the following environments:

[α]	{ /d/ }	/ú/
	{ /k/ }	
/a.dúd/	'bad'	[αdÚd ^{''}]
/a.kúb/	'village name'	[αkÚb ^{''}]

Word-medial in the following environments:

(1)				
/b/	}	}	/z/	
/k/				
/t/	[α:]		/b/	
/baaz/			'cloud'	[ba:z]
/kaaz/			'coil up'	[k'α:z]
/táá.bo/			'snake'	[t'á:b0]

(2)				
/u/	[á]	{ /k/ }	{ not /i/ or /í/ }	
		{ /g/ }	{ not /e/ or /é/ }	
			{ not /r/ }	
/puá.ka/			'pig (new usage)'	[puáka]
/uág/			'wind'	[uág ^{''}]

(3)

/b/	} [α] or [á]	} /k/	} { not /i/ or /í/ not /e/ or /é/ not /r/
/k/			
/n/			

/bá.ka/	'go (imp.)'	[báka]
/bà.kú.pà.mar/	'wash and rub'	[bàkúpàmar̃']
/zur.kák/	'(smooth) ocean'	[zufk'ák'']
/gàr.gér.kak/	'blunt'	[gàrger̃k'ak'']
/ná.ko/	'how'	[nákΩ]

(4)

/p/	} [α]	} /g/	} { not /i/ or /í/ not /e/ or /é/ not /r/
/g/			
/t/			
/l/	} [á]		

/pa.gás/	'upper arm'	[pagás]
/né.ga.gar/	'laugh'	[négagar̃']
/e.tág/	'count'	[Etág'']
/lag/	'mosquito'	[lag'']

(5)

not /i/ or /í/	} /k/	} [α] or [á]	} { /k/ /b/
not /e/ or /é/			

/ká.kei.kà.kei/	'white'	[k'ák'eik'ək'eii]
/kab/	'dance'	[k'ab'']
/ka.bá/	'banana'	[k'abá]

(6)

not /i/ or /í/	} /g/	} { [á] /s/ [α] /b/ /r/ (not word final)
not /e/ or /é/		

/gab/	'road (path)'	[gab'']
/pa.gás/	'upper arm'	[pagás]
/gàr.gér.kak/	'blunt'	[gàrger̃k'ak'']

From this evidence a tentative prediction for the occurrences of [α] is suggested, as shown in Figure 3.

[ạ] May be stressed or unstressed and occurs in all positions except in environments specified for [α]:

/bá.la/	'brother'	[bála]
/á.pu/	'mother'	[ápu]
/di.ká.sir/	'cook', 'walk'	[dik'ásir̃']

/u/ [U] May be stressed or unstressed and occurs:

In the word:

/u/ 'coconut' [U]

Word-final in the following words:

/lu/ 'tree', 'plant' [lU]
 /a.ú/ 'big' [aÚ]
 /zi.rú/ 'cold feeling' [zIfÚ]

and in the following environments:

/á/ } /b/ }
 /ú/ } /g/ } [U]

/tá.bu/ 'come down' [t'ábU]
 /bú.bu/ 'using the chest' [bÚbU]
 /lú.gu/ 'using a stick' [lÚgU]

Word initial in the following environments:

(1)

[Ú] { /p/ /e/
 { /t/ /φ/
 { /r/ /u/

/ú.peo/ 'branch of coconut tree' [Úpeo]
 /ut/ 'sleep' [Ut"]
 /ur/ 'fire' [Ur']
 /ú.ru.e.rĩ/ 'hot' [Úrueĩ]

(2)

[U] { /t/ /é/
 { /r/ /ú/

/u.tém/ 'sleep (verb)' [Utém]
 /u.rút/ 'year' [UrÚt"]

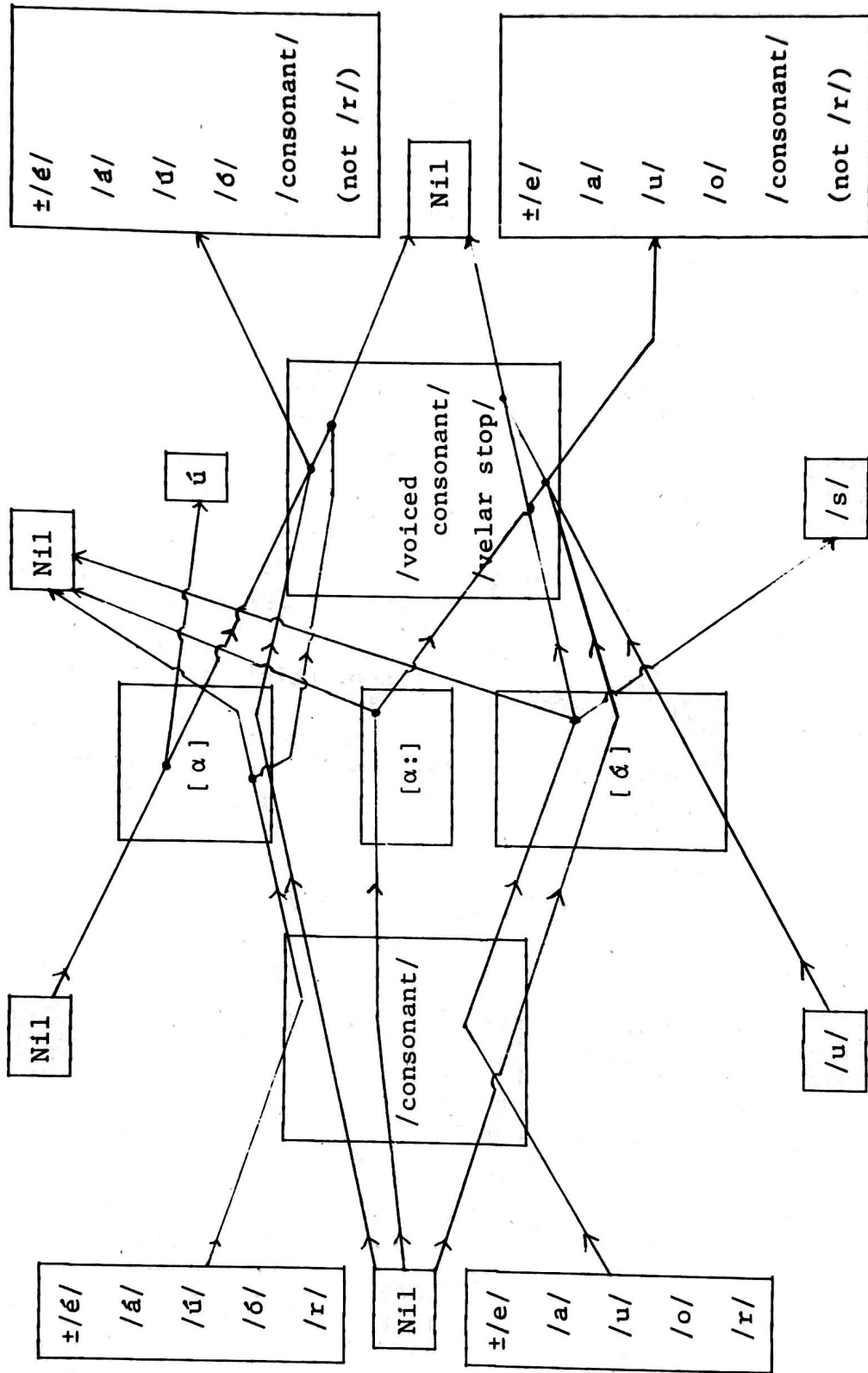
Word-medial in the following environments:

(1)

/g/ } /b/
 { [Ú] }
 /b/ } /d/
 /d/ }

/giz.gú.bi.zàr/ 'scorpion fish' [gizgÚbIzàr']
 /bub/ 'chest' [bÚb"]
 /dub/ 'swelling' [dÚb"]
 /bud/ 'mourning place' [bÚd"]
 /a.dúd/ 'bad' [adÚd"]

Figure 3: Occurrences of [α]



(2)

/d/	}	[U]	/g/		
/g/			/d/		
/du.géí/			'kind of fish'	[dUgéí]	
/a.ú-gud/			'a cult'	[aú-gUd"]	

(3)

/t/	}	[Ú]	/b/	}	}	not /i/
/g/			/r/			not /í/
/l/			/g/			not /k/
/tú.ba/			'palm toddy'	[t'Úba]		
/ge.gúr/			'skin', 'bark'	[gegÚr']		
/lug.lúg/			'solve (puzzle)'	[lUglÚg"]		

(4)

/p/	}	[U]	/d/	}	}	not /i/
/b/			/r/			not /í/
/k/			/b/			not /k/
/l/			/g/			
/mí.pud/			'bamboo, thin'	[mípUd"]		
/téí.bur/			'guts'	[t'éíbUř']		
/kù.be.tá.mi/			'mass of cloud'	[k'ÛbEtámI]		
/ué.lub/			'feather'	[uélUb"]		
/lug.lúg/			'solve (puzzle)'	[lUglÚg"]		

(5)

not /i/	}	}	}	[Ú]	}	}	not /i/
not /í/							/k/
		/r/	/t/				not /k/
/bà.kú.pà.mar/							'wash and rub'
/ku.rúp/							'fruit'
/ne.rút/							'other'

(6)

not /i/	}	}	}	[U]	}	}	not /i/		
not /í/							/k/	/r/	not /í/
							/s/	/t/	not /k/
		/l/	/l/						
/ku.rúp/							'fruit'		
/lág.da.sur/							'smell (verb)'		
/lu.tám/							'branch (of tree)'		
/lu.lám/							'leaf (of tree)'		

The general pattern of word medial environments (1) through (6) may be summarized as follows:

	/voiced stop/	[U] or [Ú]	/voiced stop/	
and				
	/voiced stop/	[U] or [Ú]	/C/	not /i/ not /í/ not /k/
and				
	/C/ except /z/ or /m/	[U] or [Ú]	/voiced stop/	not /i/ not /í/ not /k/
and				
	not /i/ not /í/	/C/ except /z/ or /m/	[U] or [Ú]	/C/
				not /i/ not /í/ not /k/

(7)

/n/	}	[E]	[Ú]	{	/d/	
/nil/					/r/	
/neúd/					'parrot fish'	[nEÚd"]
/neúr/					'woman, unmarried'	[nEÚř']
/eú.mi/					'die'	[eÚmI]

[u] May be stressed or unstressed, and occurs in all positions except in environments specified for [U]:

/ná.lu/	'what'	[nálu]
/uá.kei/	'thigh'	[uá̂k'ei]
/zub/	'smoke (verb)'	[zub"]

Concerning the suspicious sequences [ue] and [ua], which in some words appear phonetically close to *[we] and *[w̄a], it was decided to use the former interpretation rather than the latter for the following reasons:

(1) Both sequences appear in syllables of the following pattern: VV, VVC as in

[uélUb"] 'feather', [uá̂deř'] 'some'; [ueřsOř'] or [námueř'] 'turtle egg' and [uó̂g"] 'wind'.

[ue] also appears split as between two syllables in the word [Uřueřl] 'hot'; the informant's pronunciation of this word is such as to render

it non-suspicious in favour of [ue].

[ua] also appears in syllables of the following pattern: CVV, CVVC as in:

[gúái] 'frog', [ímuãr̃] 'push and [Ikuãr̃] 'give'.

There are relatively non-suspicious vowel sequences which are structurally analogous, e.g.:

[ia] in CVV, CVVC as in:

[m⁰ám̃iapul] 'paw-paw'; [k'imíãr̃] 'husband';

[ai] in CVV, CVVC as in:

[m⁰áike] 'near'; [lãip"] 'ear';

[eo] in CVV as in:

[p'eo] 'wing', and;

[au] in VV, CVV, CVVC as in:

[áule] 'big'; [batáúfik"] 'turn'; [baũr̃] 'spear' and [aúk'ei] 'thumb'.

There is thus evidence of structural pressure exerted upon the suspicious sequences in favour of the adopted interpretation for the syllabic patterns VV, CVV and CVVC, but no clear evidence for the syllabic pattern VVC. The only other vowel sequence which appears in that syllabic pattern is [ei] in the word [éipk'ei] 'middle finger'. According to Pike (1947:131b) [ei] is itself a suspicious vowel sequence, although the informant's pronunciation of it in all instances is such as to leave no doubt that the second vowel is [i] and not *[y]. However, even if this evidence were accepted it would be, on its own, rather tenuous, as it consists of only one word. But together with the already described other evidence it strongly favours the adopted interpretation.

- (2) Another reason was economy, because interpreting the first segment as the vowel phoneme /u/ obviated the necessity to include the semi-vowel */w/.

/o/ [o] Does not occur word-initial, may be stressed or unstressed and occurs:

Word-final in only one word:

/ú.peo/ 'branch of coconut tree' [Úpeo]

Word-medial in the following environments:

(1)

not /o/ } not /ó/ }	{ /m/ } { /n/ }	[ó]	/s/
			/r/

/mó.sik/	'spit (verb)'	[mósik']
/nor/	'coral reef'	[noř']

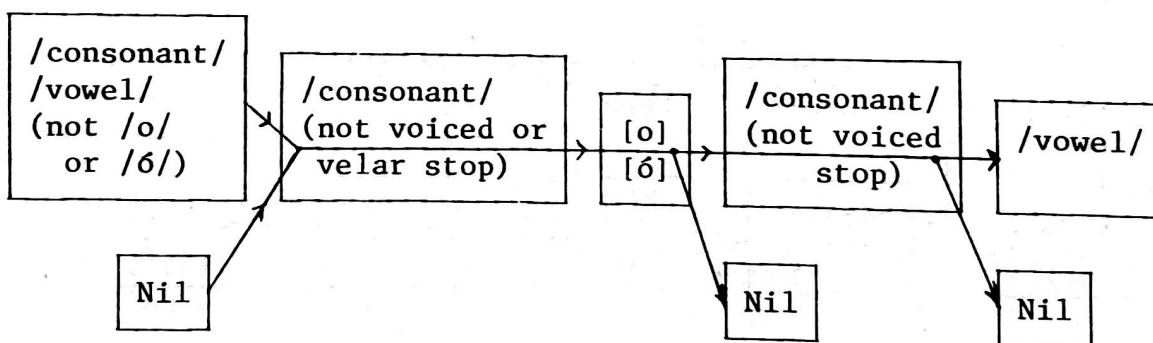
(2)

not /o/ } not /ó/ }	{ /p/ } { /t/ } { /n/ } { /m/ }	[o]	{ /n/ } { /r/ } { /l/ } { } { /k/ }
------------------------	--	-----	---

/po.ní/	'eye'	[poní]
/di.kíá.por/	'think'	[dik'íápoř']
/to.lí/	'bird species'	[tolí]
/no.lé/	'not'	[nolé]
/í.no.ko/	'over there'	[ínokΩ]
/mo.ká.kà.lam/	'because'	[mo ^ó kà ^ó lam]

From this evidence a tentative prediction for the occurrence of [o] is suggested, as shown in Figure 4.

Figure 4: Occurrence of [o]



[Ω] May be stressed or unstressed and occurs:

Word final in the following environments:

/á/ } /o/ }	/k/	[Ω]
----------------	-----	-----

/ná.ko/	'how'	[nákΩ]
/f.no.ko/	'over there'	[fnokΩ]

Word-initial in only two words:

/o/	'liver'	[Ω]
/o.góg/	'dirty'	[ΩgΩg"]

Word-medial in the following environments:

(1)

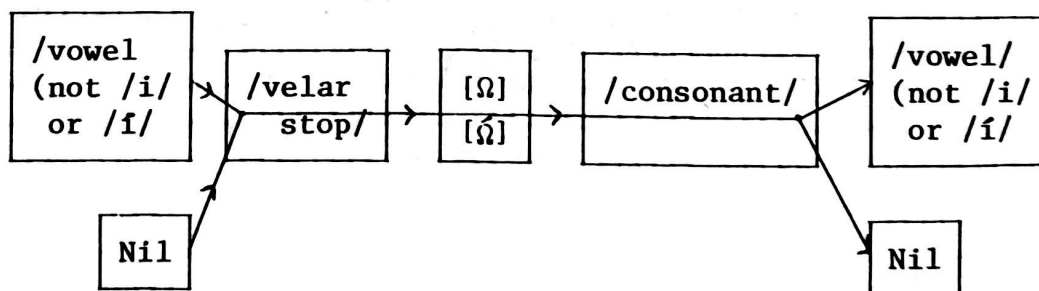
not /i/	}	{ /k/ }	}	[Ω]	{ /b/ }	}	not /i/			
not /í/								{ /r/ }	}	not /í/
not /C/										
/kob/		'cotton (wild)'				[k'Ωb"]				
/kok/		'ankle'				[k'Ωk"]				
/kor/		'kapok'				[k'Ωr"]				
/gor/		'rattle'				[gΩr"]				
/o.góg/		'dirty'				[ΩgΩg"]				

(2)

not /i/	}	{ /k/ }	}	[Ω]	{ /l/ }	}	not /i/			
not /í/								{ /t/ }	}	not /í/
not /C/										
/ko.ló/		'knee'				[k'ΩlÓ]				
/ko.tór/		'sky'				[k'ΩtÓr"]				
/go.tát/		'flow'				[gΩtát"]				

From this evidence a tentative prediction for the occurrences of [Ω] is suggested, as shown in Figure 5.

Figure 5: Occurrences of [Ω]



[0] May be stressed or unstressed, but not phonetically long, and occurs in all positions except in environments specified for [o] and [Ω]:

/ta.bó/	'neck'	[t'ábÓ]
/ó.mai/	'dog'	[Óm̩ai]
/go.lí/	'cuttlefish'	[gÓlí]

2.23 SUPRA-SEGMENTAL PHONEMES

2.23.1 LIST OF SUPRA-SEGMENTAL PHONEMES

Length: (:)
Primary Stress: (^)
Secondary Stress: (˘)

2.23.2 LENGTH

The vowel phonemes /i/, /a/ occur both phonetically short and phonetically long. As both varieties of these vowel phonemes contrast in analogous environments, length is phonemic. E.g.:

[mi:]	'clam-shell', 'sky'	[ni]	'water'
[i:z]	'groper'	[is]	'pull', 'take on'
[bi:ř']	'side of trunk'	[pim]	'fingers', 'toes'
[k'i:d"]	'rope'	[pit"]	'nose'
[si:p"]	'root'	[gib"]	'stone fish'
[bɑ:z]	'cloud'	[bɑs]	'burst open'
[k'ɑ:z]	'coil up'	[k'ɑb"]	'dance'
[t'ɑ:b0]	'snake'	[k'es]	'span'
		[t'ɑb0]	'neck'
		[t'ɑbU]	'come down'
[dɪ:k'eř']	'persist'	[dik'ér']	'shoot'

Length thus appears unpredictable except for the following possibility: it may be hypothesized that in any two-syllable minimal pair distinguished by only stress placement, that word whose first syllable is stressed will also have a phonetically long vowel in its first syllable.

However, the converse hypothesis may also be offered, namely, that in any two-syllable minimal pair distinguished by only length, that word whose first syllable vowel is phonetically long will also have stress placed on it.

Therefore, in the absence of further evidence, it must be concluded that except for the possibility that the first of the two above hypotheses may be applicable, length is completely unpredictable and hence phonemic.

The same conclusion will have to be drawn for stress which, except for the possibility that the second of the two above hypotheses may be applicable, will also be shown to be completely unpredictable and hence phonemic. This latter conclusion is born out by the evidence presented in the following Sub-section (2.23.3).

As will be seen in the Distribution Statement below, all syllables that contain phonetically long vowels are structurally analogous to syllables containing clusters of diverse vowels. Consequently, all phonetically long vowels are considered as sequences of two identical vowel phonemes.

2.23.3 STRESS

Stress patterns are in contrast in analogous phonetic environments, hence stress is phonemic. E.g.:

[ǎb0b"]	'blow fly'	[ǎsÓř']	'hear'
[t'ǎbI]	'came down'	[t'ǎbá]	'come'
[ísměř']	'take out'	[ířmír']	'rain'
[ít'it'í]	'burn (present tense)'	[ét'it'ì]	'burn (past tense)'
[náǎgeg"]	'trigger fish'	[náǎgem]	'walk'
[dásměř']	'see'	[gǎřǎǎgér']	'sharp'
[dÓbd0b"]	'fat', 'thick'	[t'ebtéb"]	'loan'

In terms of the single-word utterances which constitute the corpus:

- / / primary stress may occur once within a given utterance and this occurrence may be on any vowel in any position;
- / ^ / secondary stress may occur only once within an utterance that has three or more syllables and this occurrence may be on any vowel in any position.

3. DISTRIBUTIONAL STATEMENT OF THE PHONEMES

The phonemes occur according to the following pattern:

3.1 THE SYLLABLE

Since one or two short vowels may constitute the nucleus of a single chest pulse (phonetic syllable), a single short vowel does not necessarily correspond to a phonetic syllable length; nor does permitted stress placement correspond to units of vowel length since stress can occur on either or both of the consecutive short vowels. The unit of potential stress placement is the phonetic syllable. It appears therefore that the basic structural unit which serves best as a point of reference for describing the distribution of phonemes is the phonetic syllable, which is thus here equivalent to a phonemic syllable.

The syllable is the minimum unit of word structure. Every word consists of one or more syllables. Every syllable contains a vowel (phonetically short or long, phonemically single or geminate; if phonemically single it may be stressed or unstressed, if geminate it is always stressed), or a vowel cluster (in which the first alone, the second alone, both, or neither of the component vowels may be stressed). The vowel or cluster of vowels may be preceded in the same syllable by only one consonant. The vowel or cluster may also be followed in the same syllable by only one consonant. The following types of syllable-structure therefore occur in the words contained in the corpus (V = vowel; C = consonant):

V	/u/	'coconut'		
VV	/aa/	'and'	/áu.le/	'big'
VC	/ep/	'float'		
CV	/ge/	'at'		
VVC	/iid/	'grease'	/uág/	'wind'
CVV	/kaa/	'I'	/péo/	'wing'
CVC	/lar/	'animal'		
CVVC	/baaz/	'cloud'	/neis/	'two'

3.2 SPECIFIC DISTRIBUTION IN RELATION TO THE SYLLABLE

3.2.1 VOWELS

Single vowels: There is no limitation on the occurrences of the single vowel phonemes within the above syllable shapes.

Geminate vowels: Only /ii/, /ee/, and /aa/ occur as geminate clusters. /ee/ occurs in only one word: /ee/ 'he', 'she'. There is no limitation on the other two within the above syllable shapes.

Vowel-clusters: There are the following vowel-clusters:

/ei/, /iu/, /ui/, /eu/, /ue/, /ia/, /ai/, /eo/, /au/, and /ua/.

/ei/: No limitations within the above syllable shapes: /éí.di/ 'lie down (present tense)'; /éíp.kei/ 'middle finger'; /kei/ 'ring finger'; /neis/ 'two'.

/iu/: In VV and CVV:
/dá.iu/ 'dig'; /siu.siú/ 'orange'.

- /ui/: Only in VV:
/uĩ.dig.mé.da/ 'they are walking'.
- /eu/: In VV, CVV, and CVVC:
/eú.mi/ 'die'; /teú.pai/ 'short'; /neúr/ 'woman, unmarried'.
- /ue/: In VV and VVC:
/ué/ 'sand'; /ué.r/ 'egg', 'star'.
- /ia/: In CVV and CVVC:
/má.mia.pul/ 'paw-paw'; /ki.míár/ 'husband'.
- /ai/: In CVV and CVVC:
/máí.ke/ 'near'; /laip/ 'ear'.
- /eo/: Only in CVV:
/péo/ 'wing'.
- /au/: In VV, CVV and CVVC:
/áu.le/ 'big'; /ba.táú.rik/ 'turn'; /baur/ 'spear'
- /ua/: No limitation within the above syllable shapes:
/uá.der/ 'some'; /uág/ 'wind'; /gúá.i/ 'frog';
/i.kuár/ 'give'.

3.22 CONSONANTS

Single consonants: Occur as in Table IV.

Table IV: Occurrence of single consonants

		p	b	t	d	k	g	s	z	m	n	r	l
VC		+	+	+	-	+	+	+	-	+	-	+	-
CV		+	+	+	+	+	+	+	+	+	+	+	+
VVC		+	-	-	+	+	+	-	+	-	+	+	-
CVV		+	+	+	+	+	+	+	-	+	+	+	-
CVVC	+ -	+	+	+	+	+	+	+	+	+	+	+	+
	- +	+	+	+	+	+	+	+	+	+	+	+	+
	+ +	-	+	+	+	+	+	+	-	+	-	+	-
	+ -	-	+	-	+	+	+	-	-	+	+	-	-
CVVC	- +	-	+	+	-	-	-	+	-	-	-	+	-
	+ +	-	-	+	-	-	-	-	-	+	-	-	-

3.31 VOWELS

Single vowels: There is no limitation on the occurrences of any of the single vowel phonemes.

Geminate vowels: As noted (in Section 3.21) only /ii/, /ee/, and /aa/ occur as geminate clusters, /ee/ occurring in only one word: /ee/ 'he', 'she'. There is no limitation on the occurrence of the other two.

Vowel clusters:

Word-initial:

/ei/: /éip.kei/ 'middle finger';
/ui/: /uĩ.dig.mé.da/ 'they are walking';
/eu/: /eú.mi/ 'die';
/ue/: /ué.r/ 'sand';
/au/: /áu.le/ 'big';
/ua/: /uá.der/ 'some'.

Word medial:

/ei/: /neis/ 'two';
/iu/: /siu.siú/ 'orange';
/eu/: /neúr/ 'woman, unmarried';
/ue/: /nám.uer/ 'turtle egg';
/ia/: /ki.míár/ 'husband';
/ai/: /laip/ 'ear';
/au/: /baur/ 'spear';
/ua/: /i.kuár/ 'give'.

Word final:

/ei/: /éip.kei/ 'middle finger';
/iu/: /siu.siú/ 'orange';
/ai/: /ó.mai/ 'dog';
/eo/: /péo/ 'wing'.

3.32 CONSONANTS

Single consonants

Word final: All consonants occur.

Word initial: All consonants occur, except /r/.

Word medial: All consonants occur.

Clusters of Two

Word final: No clusters occur.

Word initial: No clusters occur.

Word medial:

Stop plus stop:

/pk/: /ep.kí.da/ 'dry';
/bt/: /teb.téb/ 'loan';
/bd/: /dób.dob/ 'fat (adj.)', 'thick';
/bg/: /ab.gér.ger.gè/ 'yesterday';
/tp/: /nàr.bít.pek/ 'right';
/tk/: /mit.kár/ 'husband';
/gb/: /bu.zíg.bu.zìg/ 'rotten';
/gd/: /lág.da.sur/ 'smell (verb)'.

Stop plus resonant:

/bl/: /ab.lé/ 'this', 'that';
/tl/: /de.táút.li/ 'speaking';
/kr/: /ik.rís/ 'scratch';
/gm/: /íg.mè.sir/ 'squeeze'.

Fricative plus stop:

/sk/: /sùs.ké.pu/ 'gallbladder';
/zg/: /mu.ríz.ge/ 'far/ (new usage).

Resonant plus stop:

/mb/: /bam.bám/ 'yellow';
/mk/: /gèm.kí.rar/ 'thin';
/ng/: /gí.rin.gì.rin/ 'green' (new usage);
/rp/: /er.péí.da/ '(got) hold of it';
/rb/: /ber.bét/ 'sister' (old usage);
/rd/: /ber.dér/ 'mud';
/rk/: /ner.kép/ 'heart';
/rg/: /nar.gér/ 'fly (insect)';
/lp/: /mel.pál/ 'sea snake, black'.

Fricative plus resonant:

/sm/: /ís.mer/ 'take out';
/sn/: /néís.neis/ 'four', 'few';
/sl/: /beslé/ 'liar'.

Resonant plus fricative:

/rs/: /ué.r.sor/ 'turtle egg' (new usage);
/rz/: /zar.zér.zar.zèr/ 'white'.

Resonant plus resonant:

/mr/: /dám.rik/ 'flog';
/rm/: /ir.mír/ 'rain'.

APPENDIX

MINIMAL PAIRS

/p/	/pii/	'dust'	/bii/	'light'
			/kii/	'night'
			/mii/	'clamshell'
	/kep/	'arrow'	/kes/	'span'
		/kem/	'belly'	
		/ker/	'roe'	
	/siip/	'root'	/siik/	'flower'
	/te.pér/	'to fly'	/te.tér/	'foot', 'leg'
/b/	/bii/	'light'	/pii/	'dust'
			/kii/	'night'
			/mii/	'clamshell'
	/bam/	'vomit'	/tam/	'branch (of tree)'
			/dam/	'sea grass'
			/mam/	'blood'
			/nam/	'turtle'
			/lam/	'leaf'
	/bes/	'lie'	/kes/	'span'
	/bub/	'chest'	/dub/	'swelling'
			/zub/	'smoke (verb)'
			/bud/	'mourning place'
	/ab/	'father'	/at/	'sting-ray'
			/ad/	'god', 'outside'
		/ar/	'kind of fruit'	
/baaz/	'cloud'	/kaaz/	'coil up'	
/meb/	'moon'	/med/	'flesh'	
		/meg/	'sea'	
/gib/	'stone fish'	/gim/	'sick'	
/geb/	'cold object'	/gem/	'body'	
/kob/	'wild cotton'	/kor/	'kapok'	
/ta.bá/	'come'	/ta.má/	'market'	
/t/	/tam/	'branch'	/bam/	'vomit'
			/mam/	'blood'
			/nam/	'turtle'
			/lam/	'leaf'
	/ter/	'home reef'	/ker/	'roe'
	/te.pér/	'to fly'	/ke.pér/	'pool of rainwater'
		/dam/	'sea grass'	

	/ta.bá/	'come'	/ka.bá/	'banana'
	/to.lí/	'bird species'	/go.lí/	'squid'
	/teúr/	'bamboo, medium heavy'	/neúr/	'woman, unmarried'
	/tag/	'hand'	/lag/	'mosquito'
	/at/	'stingray'	/ad/	'god', 'outside'
			/ab/	'father'
			/ar/	'kind of fruit'
	/ut/	'sleep'	/ur/	'fire'
	/pit/	'nose'	/pim/	'fingers', 'toes'
	/te.tér/	'foot', 'leg'	/te.pér/	'to fly'
/d/	/dam/	'sea grass'	/bam/	'vomit'
			/tam/	'branch'
			/mam/	'blood'
			/nam/	'turtle'
			/lam/	'leaf'
	/dub/	'swelling'	/bub/	'chest'
			/zub/	'smoke (verb)'
	/ad/	'god', 'outside'	/ab/	'father'
			/at/	'sting-ray'
			/ar/	'kind of fruit'
	/iid/	'grease'	/iik/	'fog'
			/iiz/	'groper'
			/iin/	'heel'
	/med/	'flesh'	/meb/	'moon'
			/meg/	'sea'
	/bud/	'mourning place'	/bub/	'chest'
	/uéd/	'song'	/uér/	'egg'
	/neúd/	'parrot-fish'	/neúr/	'woman, unmarried'
/k/	/kii/	'night'	/pii/	'dust'
			/bii/	'light'
			/mii/	'clamshell'
	/kes/	'span'	/bes/	'lie'
	/kaaz/	'coil up'	/baaz/	'cloud'
	/ker/	'roe'	/ter/	'home reef'

	/ke.pér/	'pool of rainwater'	/te.pér/	'to fly'
	/ka.bá/	'banana'	/ta.bá/	'come'
	/kem/	'belly'	/gem/	'body'
			/nem/	'louse'
	/kab/	'dance'	/gab/	'road', 'path'
				'rattle'
	/kor/	'kapok'	/gor/	'back, of body'
			/sor/	
			/zor/	'pumice'
			/nor/	'reef, coral'
	/kep/	'arrow'	/sep/	'ground'
	/iik/	'fog'	/iid/	'grease'
			/iiz/	'groper'
			/iin/	'heel'
	/siik/	'flower'	/siip/	'root'
	/dik.rí/	'throw'	/dim.rí/	'tie'
/g/	/go.lí/	'squid'	/to.lí/	'bird species'
				'belly'
	/gem/	'body'	/kem/	
			/nem/	'louse'
	/gab/	'road', 'path'	/kab/	'dance'
	/gor/	'rattle'	/kor/	'kapok'
			/sor/	'back, of body'
				'pumice'
			/zor/	'reef, coral'
			/nor/	
	/ge.gúr/	'skin'	/se.gúr/	'play'
	/gim/	'sick'	/lim/	'sun'
	/meg/	'sea'	/meb/	'moon'
			/med/	'flesh'
	/lag/	'mosquito'	/lam/	'leaf'
			/lar/	'animal'
	/tag/	'hand'	/tam/	'branch'
	/pa.gás/	'arm, upper'	/pa.más/	'shop'
/s/	/sep/	'ground'	/kep/	'arrow'
	/sor/	'back, of body'		
			/kor/	'kapok'
			/gor/	'rattle'
			/zor/	'pumice'
			/nor/	'reef, coral'
	/se.gúr/	'play'	/ge.gúr/	'skin'
	/sus/	'milk'	/mus/	'hair'

	/kes/	'span'	/kep/ /kem/ /ker/	'arrow' 'belly' 'roe'
/z/	/zor/	'pumice'	/kor/ /gor/ /sor/ /nor/	'kapok' 'rattle' 'back, of body' 'reef, coral'
	/zub/	'smoke (verb)'	/bub/ /dub/	'chest' 'swelling'
	/iiz/	'groper'	/iid/ /iik/ /iin/	'grease' 'fog' 'heel'
/m/	/mii/	'clamshell'	/bii/ /pii/ /kii/	'light' 'dust' 'night'
	/mam/	'blood'	/bam/ /tam/ /dam/ /nam/ /lam/	'vomit' 'branch' 'sea grass' 'turtle' 'leaf'
	/mus/	'hair'	/sus/	'milk'
	/mar/	'shadow'	/lar/	'animal'
	/gim/	'sick'	/gib/	'stone fish'
	/gem/	'body'	/geb/	'cold object'
	/kem/	'belly'	/kep/ /kes/ /ker/	'arrow' 'span' 'roe'
	/pim/	'fingers', 'toes'	/pit/	'nose'
	/tam/	'branch'	/tag/	'hand'
	/lam/	'leaf'	/lag/ /lar/	'mosquito' 'animal'
	/ta.má/	'market'	/ta.bá/	'come'
	/dim.rí/	'tie'	/dik.rí/	'throw'
	/pa.más/	'shop'	/pa.gás/	'arm, upper'
/n/	/nam/	'turtle'	/bam/ /tam/ /dam/ /mam/ /lam/	'vomit' 'branch' 'sea grass' 'blood' 'leaf'
	/neúr/	'woman, unmarried'	/teúr/	'bamboo, medium heavy'

	/nem/	'louse'	/kem/	'belly'
	/nor/	'reef, coral'	/gem/	'body'
			/kor/	'kapok'
			/gor/	'rattle'
			/sor/	'back, of body'
	/iin/	'heel'	/zor/	'pumice'
			/iid/	'grease'
			/iik/	'fog'
			/iiz/	'groper'
/r/	/ar/	'kind of fruit'	/ab/	'father'
			/at/	'sting-ray'
			/ad/	'god', 'outside'
	/ker/	'roe'	/kep/	'arrow'
			/kem/	'belly'
			/kes/	'span'
	/ur/	'fire'	/ut/	'sleep'
	/neúr/	'woman, unmarried'	/neúd/	'parrot fish'
	/ué/	'egg'	/uéd/	'song'
	/lar/	'animal'	/lag/	'mosquito'
			/lam/	'leaf'
/l/	/lam/	'leaf'	/bam/	'vomit'
			/tam/	'branch'
			/dam/	'sea grass'
			/mam/	'blood'
			/nam/	'turtle'
	/lag/	'mosquito'	/tag/	'hand'
	/lim/	'sun'	/gim/	'sick'
	/lar/	'animal'	/mar/	'shadow'
/i/	/ii/	'cry'	/ee/	'he', 'she'
			/aa/	'and'
	/uĩ.da.rá.li/	'they (dual)'	/uĩ.da.rá.le/	'they (trial)'
	/kii/	'night'	/kaa/	'I'
	/tá.bi/	'came down'	/tá.bu/	'come down'
	/gib/	'stone fish'	/geb/	'cold object'
			/gab/	'road', 'path'
	/gim/	'sick'	/gem/	'body'
	/lim/	'sun'	/lam/	'leaf'

/e/	/ee/	'he', 'she'	/ii/	'cry'
			/aa/	'and'
	/geb/	'cold object'	/gib/	'stone fish'
			/gab/	'road', 'path'
	/gem/	'body'	/gim/	'sick'
	/nem/	'louse'	/nam/	'turtle'
	/ker/	'roe'	/kor/	'bird species'
	/i.kés/	'to split'	/i.kós/	'stab'
	/uĩ.da.rá.le/	'they (trial)'	/uĩ.da.rá.li/	'they (dual)'
/a/	/aa/	'and'	/ii/	'cry'
			/ee/	'he', 'she'
	/ar/	'kind of fruit'	/ur/	'fire'
	/ta.bá/	'come'	/ta.bó/	'neck'
	/ta.bó/	'neck'	/to.bó/	'place name'
	/kaa/	'I'	/kii/	'night'
	/gab/	'road', 'path'	/gib/	'stone fish'
			/geb/	'cold object'
	/nam/	'turtle'	/nem/	'louse'
/u/	/u/	'coconut'	/o/	'liver'
	/ur/	'fire'	/ar/	'kind of fruit'
	/tá.bu/	'come down'	/tá.bi/	'came down'
	/gur/	'sea'	/gor/	'rattle'
	/mus/	'hair'	/mos/	'lung'
/o/	/o/	'liver'	/u/	'coconut'
	/ta.bó/	'neck'	/ta.bá/	'come'
			/to.bó/	'place name'
	/i.kós/	'stab'	/i.kés/	'to split'
	/kor/	'bird species'	/ker/	'roe'
	/gor/	'rattle'	/gur/	'sea'
	/mos/	'lung'	/mos/	'hair'

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NOTES

- 1 Phonemic vowel-length is discussed in Sub-section 2.23.2.
- 2 All statements of tentative prediction in the description of the vowels will require testing against a wider range of data.