PHONOLOGY ESSENTIALS
ABAU LANGUAGE

March 2007
SIL International
Ukarumpa, Papua New Guinea

Arjen Lock

ABAU PHONOLOGY

SECTION 1
INTRODUCTION

1.0 Introduction

This paper is a description of the phonemic system of the Abau language. Abau is the main language spoken in the Green River census division of Sandaun (West Sepik) Province, Papua New Guinea. There are over 7000 speakers of this language, living in approximately 25 villages along the Sepik River and some of its tributaries; a long area stretching from immediately west of Yellow River to just west of the border with the Indonesian province of (West) Papua.

The Abau people recognise only general speech differences between some villages and have no names of dialect areas. The sociolinguistic survey by Bill Martin (1981) resulted in a division into three dialects. My own survey in 1985 confirmed his findings with the exception that the three villages Senou, Beimaf and Wagu form a dialect of their own and should not be grouped with the Down-River dialect villages Baiwai, Bifro and Baio.

The papers by Laycock (1965), Laycock and Z'graggen (1975) and Bailey (1975) have provided valuable insights during this study, which are gratefully acknowledged.

Under the auspices of the Summer Institute of Linguistics, my wife and I started our field work in 1982. Informants from Abaru, Dioru, Yabru and Buna villages had a major part in analysing the sound system of the Abau language.

1.1 Technical terms and abbreviations used[1]

Throughout this paper the word *'non-consonantal'* will be used to refer to all vowels and glides (i.e. /i/ /e/ /a/ /o/ /u/ /y/ and /w/). The term *'high non-consonantal'* will be used to refer to the four phonemes /i/, /u/, /y/ and /w/.[2]

The latter group forms a class in that they often trigger the same morphophonemic changes as will be outlined below. The term *'high non-consonantal'* was chosen to label this class of four phonemes. The feature [SYLLABIC] will be used to distinguish between /i/ and /u/ on the one hand and the glides /y/ and /w/ on the other hand.

Symbolisation in formulas is as follows:

V for	*Vowel*	(i.e. /i/ /e/ /a/ /o/ /u/)
G for	*Glide*	(i.e. /y/ and /w/)
H for	*High non-consonantals*	(i.e. /i/ /y/ /u/ /w/)
C for	*Consonant*	(i.e. /p/ /r/ /k/ /m/ /n/ /h/ /s/)

[1] The following abbreviations will be used for grammatical terms: 1: first person; 2: second person; 3: third person; GEN: genitive; IMP: imperative; M: masculine; NEG: negative; OBJ: Grammatical object; PL: plural; SG: singular; TOP: topic.

[2] Pike's (1947) phonetic symbols have been used rather than the current IPA.

SECTION 2
DESCRIPTION OF THE PHONEMES

2.1 Consonant feature chart

(See introduction for the meaning of abbreviations)

Chart 1 - Consonant feature chart.

	p	r	k	s	h	m	n	w	y
Consonantal	+	+	+	+	+	+	+	-	-
Nasal	-	-	-	-	-	+	+	-	-
Sonorant	-	+	-	-	-	+	+	+	+
Anterior	+	+	-	+	-	+	+	-	-
Coronal	-	+	-	+	-	-	+	-	-
Back	-	-	+	-	-	-	-	+	-

2.2 Contoids

Chart 2 – Contoid Workchart

	LABIAL	ALVEOLAR	VELAR
OBSTRUENT	/p/ [p] [p^h] [b]	/ɾ/ [t] [ɻ] [d] [ɾ]	/k/ [k] [k^h]
FRICATIVE	/h/ [h] [m̊] [ɸ] [n̊]	/s/ [s]	
NASAL	/m/ [m]	/n/ [n] [ŋ]	
GLIDE	/w/ [^{u}]	/y/ [^{i}]	

2.2.1 Generalisations on contoid occurrence

a. Voiceless aspirated stops occur word except when preceded by a VH sequence.

Velarised and palatalised stops occur word finally preceding all VH sequences.
Word final [d] alternates with [ɾ]. Word final [ɸ] alternates with [h].

b. For consonants preceding other consonants within the syllable or across morpheme boundaries the following statements can be made:
/h/ is only represented by [ɸ], except before nasals.
/r/ is represented by [d], except before [s] and [k].
/p/ is represented by [b] although [b] fluctuates with [p] before [s] and [k].
/n/ is represented by [n], except before [k].

c. Word initial [p], [d] and [ɸ] only occur before the high front non-consonantals (i.e. [i], [^{i}] and [ɪ]), with the only exception that [b] tends to precede [^{i}]. (See chart 3)
Word initial [b] and [h] are found elsewhere.
Word initial [ɾ] is found before all non-consonantals with the feature [-FRONT].
Word initial [ɻ] is found before all vowels with the feature [-BACK].

2.2.1.1 Phonetic contoid changes in different vowel environments.

The following consonant charts do not reflect the fluctuation of phones in certain environments. (e.g. [p] fluctuates with [b] preceding [i])
In cases of two fluctuating phones the more frequently occurring phone has been chosen as the representative in the chart.

Chart 3 - Phonetic changes in contoids preceding vocoids.

	[i]	[ɪ]	[^{i}]	[e]	[ɛ]	[ʌ]	[a]	[ɔ]	[o]	[ʊ]	[u]	[^{u}]
/h/	ɸ	ɸ	ɸ	h	h	h	h	h	h	h	h	h
/r/	d	d	d	ɻ	ɻ	ɾ	ɾ	ɾ	ɾ	ɾ	ɾ	ɾ
/p/	p	p	b	b	b	b	b	b	b	b	b	b

Chart 4 - Phonetic changes in contoids before other contoids. (within the syllable but also over syllable boundaries)

	/n/	/m/	/r/	/b/	/h/	/s/	/k/
/h/	n̊	m̊	ɸ	ɸ	ɸ	ɸ	
/p/	b	b	b	b	b	b	
/n/	n	n	n	n	n	n	ŋ
/r/	d	d	d	d	d	t	ɾ

2.2.2 Contoid Description

/ p /

[p^h] voiceless aspirated bilabial stop

Occurs word finally, following all vowels, except VH sequences. Alternates with [b].

[p] voiceless bilabial stop

Occurs preceding or following high front vowel. Occurs across syllable boundaries following [k]. Alternates with [b].

[b] voiced bilabial stop

Occurs in all positions. Alternates with [p], and [p^h] as described above.

/ k /

[k^h] voiceless aspirated velar stop

Occurs only word finally, preceding all vowels except VH sequences. Alternates with [k].

[k] voiceless velar stop

occurs in all positions. Alternates with [k^h] as described above.

/ ompok /	[ɔmbɔk^h]~[ɔmbɔk]	*middle*
/ Siok /	[siɔk^h]~[siɔk]	*man's name*
/ iawk /	[iʌuk]	*cup*
/ kwor /	[kuɔɾ]	*cane bangle*
/ konkon /	[kɔnkɔn]	*scabies*
/ kyor /	[kiɔɾ]	*downwards*
/ pokon /	[bɔkɔn]	*today*
/ omku /	[ɔmku]	*tree(sp.)*
/ ankin /	[aŋkin]	*if*

/ r /

[d] voiced alveolar stop

Occurs following and preceding the high front non-consonantals. (i.e. [i] and [^{i}]) Occurs across

syllable boundaries before all non-velar and non-fricative consonants.
[d] alternates with [ɻ] before all non-consonantals with the feature [-BACK].
[d] alternates with [ɾ] before [a].

[t] voiceless alveolar stop: Occurs across syllable boundaries before voiceless alveolar fricative [s] only.

[ɻ] voiced alveolar flapped lateral: occurs before V[-BACK]. [ɻ] alternates with [d] as described above. When not part of a consonant cluster [ɻ] alternates with [ɾ] before non-consonantals that do not have the feature [+BACK].

[ɾ] voiced alveolar flapped vibrant: occurs preceding all back non-consonantals, intervocalically, and as second member of a consonant cluster. Occurs across syllable boundaries before velar consonant. Alternates with [d] and [ɻ] as described above.

/ri/	[di]~[ɻi]	*spear*
/riy/	[dɪ]~[ɻɪ]	*able to*
/ryan/	[dʲan]	*swell up*
/hir/	[ɸid]	*fence*
/yowr-me/	[ʲoʷdmɛ]	*areca palm (obj.)*
/kar rey/	[kaddeʲ]	*be glad*
/orpey/	[ɔdbeʲ]	*black*
/re/	[dɛ]~[ɻɛ]	*come*
/ra/	[da]~[ɾa]~[ɻa]	*eat*
/ro/	[ɻɔ]~[ɾɔ]	*shoot*
/ara/	[aɾa]~[aɻa]	*man, listen*
/uwrsa/	[ʊtsa]	*people*
/hawr/	[hʌʷɾ]	*wash*
/eir/	[eid]	*python*
/ru/	[ɾu]	*copulate*
/rwak/	[ɾʷak]	*to stay*
/rak/	[ɾak]~[dak]~[ɻak]	*would not be good*
/orih/	[ɔɾiɸ]~[ɔɻiɸ]	*father*
/uwru/	[ʊɾu]	*name*
/uwrku/	[ʊɾku]	*clan*
/krey/	[kɾeʲ]	*ladder*
/pra/	[bɾa]	*lame*
/hror/	[ɸɾɔɾ]	*the two of us*

/ or /	[ɔɾ]	*black*
/ kar /	[kaɾ]	*glad*

/ m /

[m̥] voiced bilabial nasal

occurs word initially, intervocalically and word finally. Occurs before other consonants over syllable boundaries.

Occurs in non-glide consonant clusters as the second member. Occurs in glide clusters as the first member.

/ roum /	[ɾoum]	*burn*
/ neim /	[neim]	*tree (sp.)*
/ kamwon /	[kamʷɔn]	*sister's child*
/ kamon /	[kamɔn]	*one*
/ mays /	[mʌⁱs]	*cane*
/ om /	[ɔm]	*place, village*
/ ompiy /	[ɔmbɪ]	*grass for skirts*
/ hme /	[m̊mɛ]	*them (obj.)*

/ n /

[ŋ] voiced velar nasal

Occurs across syllable boundaries preceding velar consonant [k].

[n] voiced alveolar nasal

Occurs word initially, intervocalically and finally. Occurs in non-glide consonant cluster as the second member. Occurs preceding a consonant other than a velar consonant, but only over syllable boundaries.

/ kaun /	[kʌun]	*break*
/ nayn /	[nʌⁱn]	*think*
/ nyo /	[nⁱɔ]	*child*
/ hano /	[hanɔ]	*my*
/ penkin /	[bɛŋkin]	*what kind of*
/ konkon /	[kɔŋkɔn]	*scabies*
/ kansen /	[kansɛn]	*to loosen*
/ hne /	[n̊nɛ]	*you*

/ h /

[h̥] voiceless fricative
Occurs preceding all non-consonantals, except for these having the feature [+ HIGH, -BACK]. Occurs word finally and alternates in this position with [ɸ].

[ɸ] voiceless bilabial fricative
Occurs word finally and as first member of a consonant cluster, when the second member has the feature [-BACK]. Preceding or following high front non-consonantals. (i.e. [i], [y] and [ɪ])
Occurs across syllable boundaries preceding consonants other than nasals.

[m̥] voiceless bilabial nasal
Occurs preceding the voiced bilabial nasal

[n̥] voiceless alveolar nasal
Occurs preceding the voiced alveolar nasal

/ huok /	[huɔk]	*pig*
/ hwon /	[hʷɔn]	*you*
/ hom /	[hɔm]	*they*
/ hu /	[hu]	*water*
/ hreme /	[ɸɾɛmɛ]	*us*
/ hye /	[ɸʲɛ]	*him*
/ hehe /	[hɛhɛ]	*the two of you*
/ hiykwe /	[ɸɪkʷɛ]	*he*
/ yoh /	[ʲɔɸ]~[ʲɔh]	*banana*
/ yoh-se /	[ʲɔɸsɛ]	*banana (obj.)*
/ ahney /	[an̥neʲ]	*bird*
/ hme /	[m̥mɛ]	*them (obj.)*
/ hne /	[n̥nɛ]	*you*
/ ohma /	[ɔm̥ma]	*hair*

/s/

[s] voiceless alveolar grooved fricative
occurs word initially and finally. Occurs following a consonant only syllable initially.

/reis/	[ɻeis]	*tomorrow*
/rows/	[ɾo^{u}s]	*get water*
/sok/	[sɔk]	*snake*
/uwrsa/	[ʊtsa]	*people*
/siop/	[siɔp]	*foot print*
/syo/	[s^{i}ɔ]	*bird's whistle*

/w/

[^{u}] voiced bilabial closed back non-syllabic glide
Occurs preceding and following all consonants.
Occurs preceding all vowels, except V[+HIGH,+BACK]. Occurs following all vowels, except V[+HIGH] and V[-BACK]

/wen/	[^{u}ɛn]	*trait*
/saw/	[sʌ^{u}]	*hole*
/pow/	[po^{u}]	*female animal*
/kwor/	[k^{u}ɔɾ]	*cane bangle*
/swaw/	[s^{u}ʌ^{u}]	*stomach*
/win/	[^{u}in]	*widow*

/y/

[^{i}] voiced palatal closed front non-syllabic glide
Occurs preceding and following all consonants.
Occurs preceding all vowels, except V[+HIGH,-BACK]
Occurs following all vowels, except V[+HIGH] and V[+BACK]

/kyor/	[k^{i}ɔɾ]	*downwards*
/yor/	[^{i}ɔɾ]	*custom*
/sey/	[se^{i}]	*basket to dry fish*
/ay/	[ʌ^{i}]	*lime*
/ya/	[^{i}a]	*future particle*
/yu/	[^{i}u]	*mosquito*
/syaw/	[s^{i}ʌ^{u}]	*penis gourd*

2.3 Feature chart for vowels and glides.

The two glides have been included in chart 5 and 6 for two reasons:

a. The two glides and the two high vowels trigger the same morphophonemic changes. Each glide only differs from its counterpart in the feature [SYLLABIC].

b. In section 3 it is proposed that the two glides should be analysed as a category in its own right and not be included with the consonants or analysed as vowels.

Chart 5 - Glide-Vowel feature chart, features [FRONT] VS [BACK]

	y	i	e	a	o	u	w
high	+	+	-	-	-	+	+
front	+	+	+	-	-	-	-
back	-	-	-	-	+	+	+
syllabic	-	+	+	+	+	-	-

The dichotomy between the features [FRONT] and [BACK] is more distinctive to the language than the dichotomy between the features [LOW] and [HIGH]. It is not desirable for example to use the feature [LOW] instead of the feature [FRONT] which would give the following feature chart:

Chart 6 - Glide-Vowel feature chart, features [HIGH] VS [LOW]

	y	i	e	a	o	u	w
high	+	+	-	-	-	+	+
back	-	-	-	-	+	+	+
low	-	-	+	+	+	-	-
syllabic	-	+	+	+	+	+	-

In Chart 6 the feature [FRONT] has been replaced by the feature [LOW]. The resulting chart gives the incorrect impression that the vowels /a/ and /e/ are identical or have more in common than for example /a/ and /o/. The distribution of /a/ gives no grounds for grouping it with either the front vowels or the back vowels. The features [FRONT] and [BACK] are both needed to distinguish the central vowel /a/ from the front vowels (/i/ and /e/) and the back vowels (/u/ and /o/).

Similar to the other [-HIGH] vowels /e/ and /o/, the /a/ is a [-HIGH] vowel which can co-occur with the [+HIGH] vowels and glides. Its wider distribution is a result of its central position, being [-FRONT] and [-BACK].

Chart 7 – Vowel feature chart

	[+front]	**[-back] [-front]**	**[+back]**
[+high]	i		u
[-high]	e	a	o

2.4. Vocoids

Foley (1986: 52-53), citing Bailey 1975, states that Abau has a six vowel system. The current analysis only posits five vowels. A case for a seven vowel system could be built analysing [ɪ] and [ʊ] as separate vowel phonemes, but as can be seen in chart 8 they have been analysed differently in this paper: [ɪ] was analysed as the phonetic realisation of the phonemes /iy/, and [ʊ] as /uw/.

Bailey may have posited three back vowels to account for minimal pairs consisting of sequences with high vocoids. The two examples below compare his analysis with the present one. In Bailey's analysis the initial vocoid is the contrastive feature, while the current analysis suggests that the second vocoid contrasts.

Current Analysis			**Bailey's Analysis**	
[mo^{u}]	**/ mow /**	*give birth*	[mɒ^{u}]	/mɒ^{u}/
[mou]	**/ mou /**	*water insect (sp.)*	[mo^{u}]	/mo^{u}/
[po^{u}]	**/ pow /**	*female animal*	[pɒ^{u}]	/pɒ^{u}/
[pou]	**/ pou /**	*water insect (sp.)*	[po^{u}]	/po^{u}/

The minimal pairs Bailey cites (1975: 23) for the contrast between /ɒ/ and /o/ are analysed differently in this presentation. Below the first three minimal pairs as given in Bailey are contrasted with each other.

Current Analysis			**Bailey's Analysis**	
[k^{u}ɔɾ]	**/ kwor /**	*cane bangle*	[kwɒr]	/kwɒl/
[kuɔɾ]	**/ kuor /**	*sore*	[kwor]	/kwol/
[ɔɾ]	**/ or /**	*black*	[ɒr]	/ɒl/
[ʊɾ]	**/ uwr /**	*man*	[or]	/ol/
[sɔm]	**/ som /**	*dry*	[sɒm]	/sɒm/
[so^{u}m]	**/ sowm /**	*fish basket*	[som]	/som/

In summary, there does not seem to be evidence for a third back vowel. Bailey (1975: 9) states that the Abau phonemic system is basically asymmetrical. The data of this paper presented in Chart 8, however, show a very symmetrical phonemic system:

Chart 8 – Vocoids Workchart

	FRONT	CENTRAL	BACK
HIGH	/i/ [i] /iy/ [ɪ]		/u/ [u] /uw/ [ʊ]
LOW	/e/ [e] [ɛ]	/a/ [ʌ] [a]	/o/ [o] [ɔ]

2.4.1 Generalisations for vocoid occurrences

All low vowels have two phonetic representations, which differ in openess. A relatively closed allophone of the phoneme occurs before high non-consonantals. A relatively open allophone of the phoneme occurs elsewhere. This raising rule could be symbolised as follows:

[ɛ] [a] [ɔ] become [e] [ʌ] [o] before H (i.e high non-consonantals)

NOTE: [ɪ] and [ʊ] are analysed phonemically as a sequence of two high non-consonantals.

2.4.2 Vocoid description

/ i /

[i] voiced closed front vocoid

occurs word initially, intervocalically and word finally. Precedes all vowels but [u]; follows all consonants; follows all vowels with the feature [+LOW, -BACK].

/ i /	[i]	*mark on skin*
/ hir /	[ɸiɾ]	*fence*
/ ki /	[ki]	*ground*
/ hiom /	[ɸiɔm]	*brother*
/ meio /	[meiɔ]	*to work*
/ reis /	[ɻeis]	*day after tomorrow*
/ pain /	[bʌin]	*give destination*

/ e /

[e] voiced half closed front vocoid
occurs preceding non-consonantals with the feature [+HIGH, -BACK]

[ɛ] voiced half open front vocoid
occurs word initially, word finally. Occurs following all consonants and high non-consonantals. Never occurs before a vowel.

/ e /	[ɛ]	*vulva*
/ re /	[ɾɛ]	*come*
/ rey /	[ɾe^{i}]	*go*
/ yeyk /	[^{i}e^{i}k]	*canoe*
/ rei /	[ɾei]	*cut*
/ peik /	[beik]	*ill*
/ nene /	[nɛnɛ]	*eye*
/ hien /	[ɸiɛn]	*similar*
/ wer /	[^{u}ɛɾ]	*big rat*

/ a /

[ʌ] voiced half open central unrounded vocoid
occurs preceding non-consonantals with the feature [+HIGH]

[a] voiced open central unrounded vocoid
occurs word initially, word finally. Occurs following all consonants and high non-consonantals. Never occurs before a vowel.

/ a /	[a]	*house*
/ nawp /	[nʌ^{u}b]	*old*
/ kina /	[kina]	*earthquake*
/ ryau /	[ɾ^{i}ʌu]	*go up*
/ saw /	[sʌ^{u}]	*hole*
/ kuan /	[kuan]	*cross over*
/ ai /	[ʌi]	*fish*
/ ay /	[ʌ^{i}]	*lime*

/ o /

[ɔ] voiced half open back rounded vocoid
occurs word initially, word finally. Occurs following all consonants and high non-consonantals. Never occurs before a vowel.

[o] voiced half closed back rounded vocoid
occurs preceding non-consonantals with the feature [+HIGH, +BACK]

/ om /	[ɔm]	*village, place*
/ onon /	[ɔnɔn]	*centipede*
/ ro /	[ɾɔ]	*shoot*
/ kuor /	[kuɔɾ]	*sore*
/ kwor /	[k^{u}ɔɾ]	*cane bangle*
/ row /	[ɾo^{u}]	*to defecate*
/ rou /	[ɾou]	*to blow the flute*
/ roum /	[ɾoum]	*burn*

/ u /

[u] voiced closed back rounded vocoid

occurs word initially, intervocalically and word finally. Precedes all vowels but [i]; follows all consonants; follows all vowels with the feature [+LOW, -FRONT].

/ u /	[u]	*name of river*
/ su /	[su]	*coconut*
/ roum /	[ɾoum]	*burn*
/ sune /	[sunɛ]	*foot*
/ kuor /	[kuɔɾ]	*sore*
/ mou /	[mou]	*water insect (sp.)*
/ sau /	[sʌu]	*to run*

2.4.3 Portmanteau phonemes

We dealt with eight of the ten phones of the vocoid chart.(Chart 8) All vowels with the [-HIGH] feature are followed and preceded by glides that have non-opposing [BACK] features. (i.e a V[-HIGH] with the feature [+BACK], cannot be followed by a high non-consonantal with the feature [+FRONT]. The reverse is true as well.)

The two vowels with the feature [+HIGH] are not preceded or followed by glides that have non-opposing [BACK] features. These two observations led to the following statement:

The two phones [ɪ] and [ʊ] are analysed as portmanteaus in absence of the sequences /iy/, /yi/, /uw/ and /wu/.
An arbitrary choice has been made for the portmanteaus /iy/ and /uw/.

/iy/		
/riy/	[ɾɪ]	*able to*
/hiy/	[ɸɪ]	*he*
/howniy/	[ho^{u}nɪ]	*wind*
/uw/		
/uwr/	[ʊɾ]	*man*
/ropruw/	[ɾɔbɾʊ]	*to drown*
/ruw/	[ɾʊ]	*bone of a cassowary*

2.4.4 Release vowel

Bailey (1975: 7) writes that phonetic transcription has been a problem. He notes that the "phrase final vowel release in conjunction with tone forces many words to adopt an additional syllable which is often more potential than actual ..."

In broad terms we concur with those findings, but we want to add a few notes. The presence or absence of the vowel release is bound to certain rules. Firstly, vowel release can only manifest itself on words that end in a consonant. Secondly, a distinction needs to be made between vowel release that occurs phrase finally (which includes words in isolation) and vowel release that is not phrase final.

a. Non-phrase final vowel release

Any vowel release occurring other than phrase finally is bound to the following conditions: The word that manifests the vowel release must end in a vocoid-vocoid-consonant string, in which the first vocoid has the feature [LOW], and the second has the feature [HIGH]. (In a later section it will be shown that this vowel release that causes word final labialisation or palatalisation is non-phonemic.) E.g.:

/yoh o wayh o yowr o kior o/ 'bananas and yams and baskets and frogs' is phonetically [yɔh ɔ wʌ^{i}h^{i} ɔ yo^{u}ɾ^{u} ɔ k^{i}ɔɾ ɔ][3].

No release vowel will manifest itself on *yoh* because the word final consonant is not preceded by two vocoids. There is no release on *kior* because the two vocoids preceding the noun do not have the correct sequence of low-high features . But *wayh* and *yowr* do manifest the release vowel

3 Noun phrases are connected by /o/ 'and' in this example.

because the final consonant is preceded by two vocoids of which the first has the feature [low] and the second the feature [high].

b. Phrase final vowel release

The presence and absence of vowel release in the phrase final position have both been observed. Although vowel release is least likely to occur after nasals and most likely to occur after fricatives, its presence or absence does not follow absolute rules. The occurrence of vowel release has been observed on any word with a final consonant, regardless of the make-up and number of vowels preceding the word final consonant. The vowel release is more salient and occurs more frequently after vocoid sequences with low back and central vowels than after front vowels.

E.g. /yoh/ 'banana' can be: [yɔh] or [yɔhˀ]

/nwoh/ 'dog' can be: [nᵘɔh] or [nᵘɔhˀ]

/wayh/ 'yam' can be: [wʌⁱh] or [wʌⁱhⁱ]

/sowm/ 'fish basket' can be: [soᵘmᵘ] but is generally [soᵘm]

/yeih/ 'bird (sp)' can be: [yeihⁱ] but is generally [yeih]

2.4.5 Different distibution of high vocoids in the Abau Down-River dialect

Thanks to personal interaction with missionary linguists Frank and Mirjam Tertel, who have studied the Abau down-river dialect spoken in the villages Beimaf, Senou and Wagu, we discovered interesting data that gives some insights in the development of the Abau language. The down-river dialect is quite different from the central dialect in the way it treats negation and the use of its aspect markers. It is also different in the way it distributes high vocoids within a word. Where the central dialect often has one syllable containing two vocoids of which the second has the feature [high], the down-river dialect has two syllables. The high vocoid that occurs in the Central dialect before the final consonant, is found in the down-river dialect in the second syllable.

In order to compare the two dialects, I have adjusted the down-river data to fit the same phonemic represetnation made for the central dialect:

Gloss	**Central**	**Down-river**	**Comment**
few	har	har	Based on a 100 word list, Central and Down-river dialects are 97% cognate. Only 65 % of the words are identical
village/camp	om	om	
child	ney	ney	
woman	sa	sao	In Central dialect /ao/ is a non-allowed sequence

banana	yoh	yah	Down-River dialect favours /a/ over Central /o/
shoot (of plant)	yok	yak	
ironwood[4]	nop	nap	
pig	huok	huak	
canoe	yeyk	yakiy	Down-River dialect favours two syllables where Central has only one syllable with two vocoids and a final consonant. Down-River dialect favours /a/ over Central /e/ and sometimes /o/.
arrow	yeik	yaki	
sickness	peik	paki	
to bite	peyk	pakiy	
tomorrow	leis	lasi	
the couple	leys	lasiy	
stone	mein	mani	
to roll (leaves)	seyn	saniy	
paddle	youk	yoku	
string bag	owk	okuw	
limbun[5] basket	yowr	yoruw	
fish basket	sowm	samuw	
to burn down	loum	lomu	
to wash	hawr	haruw	
man	uwr	uwruw	Where Central has two high vocoids in one syllable, Down-river has two syllables with the same high vocoids in both syllables.
turtle	suwr	suwruw	

4 Tok Pisin *kwila*: one of the few woods not eaten by termites (Mihalic 1971: 117).

5 *Limbun* (Tok Pisin) is the flower sheath of the palm, used for mats, buckets, baskets, etc (Mihalic 1971: 122).

In the down-river dialect /yah/ [yah] ‘banana’ can be followed by an echo vowel in phrase final position: [yah^{a}]. This is similar to the central dialect where the echo vowel follows the back vowel: [yɔh^{ɔ}] ‘banana’.

The two dialects follow the same rule that the echo vowel does not manifest itself in a non-phrase final environment:

Central dialect:	**Down-river dialect**
[hak^{u}ɛ yɔh sɛ ɻida]	[ɸakɛ yah sɛ ɻida]
/Hakwe yoh se rira/	/hake yah se rira/
1.SG.TOP banana OBJ.M see	1.SG.TOP banana OBJ.M see
I see the banana.	I see the banana

One syllable words containing two vocoids in the central dialect can manifest a non-phonemic echo vowel, whereas the corresponding words in the down-river dialect are two syllable words that do not lose this second syllable in a non-phrase final environment. E.g. [ye^{i}k] and [ye^{i}k^{i}] ‘arrow’ in the central dialect are in free variation phrase finally, but [ye^{i}k] always appears non-prhase finally. The down-river dialect equivalent [yakɪ] ’arrow’ has only one form in all environments:

Central dialect:	**Down-river dialect**
[hak^{u}ɛ ye^{i}k sɛ ɻida]	[ɸakɛ yakɪ sɛ ɻida]
/Hakwe yeik se rira/	/hake yakiy se rira/
1.SG.TOP arrow OBJ.M see	1.SG.TOP arrow OBJ.M see
‘I see the arrow’	‘I see the arrow’

2.4.6 Tone and nouns

Bailey (1975: 33) states that “nouns exhibit lexemic tone, although relatively few examples of contrastive lexical tone pairs have been discovered so far”. We do not agree with that observation. Bailey lists four minimal pairs. The first two minimal pairs are in our observation homophones with no tone difference. The third pair is a contrast between the tone pattern of a compound noun and a regular noun. (We analysed it as /ompiy/ ‘skirt (grass)’ and /om-pi/ ‘place-ridge’). One of the words in the fourth minimal pair was not recognised as an existing word by the people we worked with. Laycock and Z’graggen (1975: 745) were also hesitant to accept Bailey’s claim that Abau was tonal, which contradicted Laycock’s previous finding (1965: 114) that Abau, Iwam and Wogamusin are not tonal. In summary, there seems to be no evidence that Abau uses tone to make lexical distinctions.

We have been baffled by the tone distinctions on nouns and verbs presented by Bailey (1975: 32-37). We have found no evidence for the complicated system he describes of tone perturbation on nouns. We have found stress to always occur word initially. Stress is not only realised by loudness but especially by the accompanying highest pitch within the word; thus the onset of each word carries the word stress which by definition implies the highest pitch within the word as well.

Words with three or more syllables have a predictable stress and pitch pattern; the first syllable will be most salient in terms of loudness and pitch, while each syllable following will be lower in pitch and volume than the preceding syllable. Duplicated words and compound nouns are exceptions to the normal stress pattern. Duplicated words separated by a marker follow their own pattern. For example, /lowp-a-lowp/ 'all' has the highest stress on the first syllable, the second syllable is lower in stress (as expected), but the third syllable is higher in pitch and volume than the second syllable, though not as high as the pitch on the first syllable. This is true for all duplicated words that are separated by a marker.

Compound nouns have a different tone pattern from regular nouns, showing a large difference in pitch between the first and the second component. For regular nouns the pitch on the second syllable never drops to the same degree as for compound nouns. For example, when one compares the pitch pattern on the compound noun /om-huok/ 'village-pig' and the regular noun /ohnok/ 'fly', one finds that the initial pitches on the first syllables /om/ and /oh/ are similar. The pitches on the second syllables, however, are noticeably different; there is a larger drop in pitch on the syllable /huok/ than on /nok/.

2.4.7 Tone and verbs

Bailey (1975: 36-37) noted that "verbs exhibit grammemic tone" and "in some constructions tone is the minimal difference that indicates past or present tense." This information is buried in a section that also talks about the intonation of imperatives and questions. The latter two categories have indeed a different intonation from the indicative but they also have grammatical markers that flag that distinction. The difference between activities in the past and in the present, however, can be solely indicated by tone on the final verb of the verb phrase. Past is indicated by a low steady final pitch on the last syllable of the final verb, whereas present is indicated by a falling pitch on the last syllable. I infer from the few examples given by Bailey that he thought present was marked by a rising pitch. I do not agree, but the falling pitch is distinctive in the fact that it ends with a final pitch which is still higher than the low non-changing pitch on the final syllable indicating past. In the following examples, only the phrase-final verb is marked for pitch:

= (high low)
=

/hakwe yeyk se rira / 'I saw the canoe'

= ╗ (high fall-to-mid)

/hakwe yeyk se rira/ 'I see the canoe'

= (low)

/hakwe yeyk se rowk / 'I cut (= worked on) the canoe'

╗ (high-to-mid)

/hakwe yeyk se rowk/ 'I am cutting (= working on) the canoe' -

It has not been conclusively established that the different tone on the final verb marks the difference between past and present tense. More research is needed to see if another description would be better.

SECTION 3
ANALYSIS OF GLIDES AS CONSONANTS OR VOWELS

3.0 General vowel and non-consonantal features

Explanation of the term '(high) non-consonantal':

The word non-consonantal is chosen to refer to all vowels and /y/ and /w/. The representation of the two glides gives the incorrect impression that both phonemes behave more like consonants than as vowels. The distribution of vowels and glides has led us to posit the two portmanteau phonemes /iy/ and /uw/ which contrast with respectively /i/ and /u/ in various positions. Educated Abau speakers describe the difference between the two pairs as a difference in vowel quality, whereby /i/ and /u/ are often labelled as “deep” sounds and /iy/ and /uw/ as “less deep” sounds.

The two glides are distinguished from both consonants and vowels by the features [CONSONANTAL] and [SYLLABIC].

As stated in the introduction, throughout this paper the word *'non-consonantal'* will be used to refer to all vowels and glides (i.e. /i/ /e/ /a/ /o/ /u/ /y/ and /w/). The term *'high non-consonantal'* will be used to refer to the four phonemes /i/, /u/, /y/ and /w/.

They form a class in that they often trigger the same morphophonemic changes as will be demonstrated below. The feature [SYLLABIC] will be used to distinguish between /i/ and /u/ on the one hand and /y/ and /w/ on the other hand.

Abbreviations in formulas are used as follows:

V for *Vowel*	(i.e. /i/ /e/ /a/ /o/ /u/)
G for *Glide*	(i.e. /y/ and /w/)
H for *High non-consonantal*	(i.e. /i/ /y/ /u/ /w/)
C for *Consonant*	(i.e. /p/ /r/ /k/ /m/ /n/ /h/ /s/)

In chart 9 the Vocoid Feature Chart is shown with the glides /y/ and /w/. The glides only differ from /i/ and /u/ in the feature [SYLLABIC]. The three horizontal features and the two vertical features divide the chart in six different 'boxes'. The boxes labelled [FRONT] do not touch the boxes labelled [BACK] and further analysis will show restrictions on the VV and VG sequences formed from phonemes coming from non-adjoining boxes.

The /y/ and /w/ will be placed in the same boxes as their syllabic counterparts.

Chart 9 – Vocoid Feature Chart

	[+front]	[-back] [-front]	[+back]
[+high]	i y		u w
[-high]	e	a	o

3.1 Analysis of non-consonantals.:

3.1.1 Vowel distribution analysis.

The analysis of /a/ as a central vowel with the features [-BACK] and [-FRONT] is supported by the distribution of this vowel as opposed to /e/ and /o/. The six boxes in the feature chart above are drawn to show that no non-adjoining V[-HIGH] H[+HIGH] sequence can occur. For example /a/ adjoins all boxes and all four V[-HIGH] H[+HIGH] combinations are possible. (i.e. /ai/, /ay/, /au/, /aw/) But for example /e/ and /u/ occur in non-adjoining boxes and /eu/ is a non-allowed sequence. And so are /ew/, /oi/ and /oy/.
(For examples see section 4 on consonant and vowel distribution).

3.1.2 Contrast between high and low non-consonantals

The analysis of /e/, /a/ and /o/ as non-high vowels versus /i/, /u/, /y/ and /w/ as high non-consonantals is supported by the distribution of all the non-consonantals. In the feature chart one should look at the two levels marked by the features [+HIGH] and [-HIGH].

Two observations are clear:

a. No sequence of two vowels having both the feature [-HIGH] is allowed.

b. All possible sequences as indicated by the adjoining boxes of the chart, going from H[+HIGH] to V[-HIGH] are possible.

3.1.3 High non-consonantal sequences.

Combining low vowels with glides allows a maximum of four different sequences. (The notation H is referring to /i/, /y/, /u/ and /w/. This notation helps to make general statements about glides and high vowels as a group.)

V[-HIGH] V[-HIGH]	- Abau does not allow this sequence.
H V[-HIGH]	- Abau allows all possible sequences.
V[-HIGH] H	- Abau allows all possible sequences within adjoining 'boxes'.
H H	- Abau does not allow most sequences. See discussion below.

However, to discuss the sequence H H it is better to differentiate between /i/, /u/ on the one hand and /y/, /w/ on the other hand. Respectively V[+HIGH] and G which by definition has the feature [+HIGH].

With this new distinction in mind the sequence H H can be differentiated as follows:

V[+HIGH] G
G V[+HIGH]
V[+HIGH] V[+HIGH]
G G

In the chart below non-allowed sequences are marked with with an asterix.

Chart 10 - Co-occurring high non-consonantals.

V[+high] G	-	iy	*iw	*uy	uw
G V[+high]	-	yi	wi	yu	wu
V[+high] V[+high]	-	*ii	*uu	*iu	*ui
G G	-	*yy	*ww	*yw	*wy

Comments:

Chart 10 only refers to the feature [HIGH] and not to the feature [BACK]. The four sequences are commented on below taking the distinction between H [-BACK] and H [+BACK] into account.

3.1.3.1 Sequences with identical members

No unambiguous double consonants or vowels occur elsewhere, so all sequences with identical members are analysed as non allowed sequences. (On the basis of this statement /ii/, /uu/, /yy/ and /ww/ are non-allowed sequences.)

3.1.3.2 Sequences with opposing [back] features.

The only occurring phonetic forms of a high vocoid sequence with an opposing [BACK] feature are [^{i}u] and [^{u}i]). No phonetic contrast was observed between /iu/ and /yu/, or between /ui/ and /wi/. The phonemic representations of respectively /yu/ and /wi/ were chosen, as they appeared the closest to the phonetic reality.

Other possible phonemic representations for these two phonetic forms are respectively /yw/, /iw/ and /uy/, /wy/. Again, /yu/ and /wi/ have been chosen over these possible sequences as they are the closest representation of the phonetic reality of the forms [^{i}u] and [^{u}i].
As a result the following sequences are analysed as non-allowed sequences: /yw/, /iw/, /uy/, /wy/, /iu/ and /ui/.

3.1.3.3 Sequences with identical [back] features.

The phones [ɪ] and [ʊ] have been analysed in the absence of any /iy/, /yi/, /wu/, /uw/ sequence as a single phone represented by two phonemes.[6] The choice between /iy/ and /yi/ and also between /wu/ and /uw/ is arbitrary and has consequences for the final analysis:

- A choice for the sequences /yi/ and /wu/, would lead to the conclusion that all possible GV sequences are allowed in Abau.
- A choice for /iy/ and /uw/, would lead to the conclusion that all vowels can be followed by all high non-consonantals, provided they are not identical or have opposing BACK or FRONT features.

6 Portmanteau phonemes are also part of the May River Iwam phonology analysis (Laszlo 1970), whereby /ae/, /ao/ and /ou/ are derived from respectively [a], [ɔ] and [u]. Abau and May River Iwam are related on stock level.

In the present analysis the latter solution has been chosen.

3.1.4 Conclusions on morphophonemic changes caused by high non-consonantals.

In the feature chart above (chart 8) /i/ and /u/ have been placed with their non-syllabic counterparts in one box.
The fact that all four non-consonantals cause the same morphophonemic changes in certain environments support this analysis. E.g. identical labialisation and palatalisation of word final consonants is triggered by both VV and VG sequences:

/reis/	[ɻeis]	*tomorrow*	When followed by /o/ [ɔ] *"and"* it becomes: [ɻeisʲɔ]
/reys/	[ɻeʲs]	*the two of them*	When followed by /o/ [ɔ] *"and"* it becomes: [ɻeʲsʲɔ]
/mour/	[mouɾ]	*small tree*	When followed by /o/ [ɔ] *"and"* it becomes: [mouɾʷɔ]
/mowr/	[moʷɾ]	*bird (sp.)*	When followed by /o/ [ɔ] *"and"* it becomes: [moʷɾʷɔ]

3.1.4.1 Word final labialisation or palatalisation on consonants is non-phonemic.

Laycock (1965) noted the labialisation and the palatalisation of nouns. E.g. note his phonemic representations:

/arahw/	*"night"*
/simarw/	*"bird of paradise"*

In the present analysis it is suggested that the labialisation and palatalisation of word final consonants is non-phonemic and a result of the vocoid sequence that precedes the word final consonant. This labialisation or palatalisation manifests itself in an echo vowel release.

/arawh/	[arʌʷhʷ] or [arʌʷɸ]	*"night"*
/simawr/	[simʌʷɾʷ] or [simʌʷɾ]	*"bird of paradise"*

When followed by the conjunction [ɔ] the vowel release is always salient. When the same nouns are followed by the objective marker [-mɛ] the final vowel release disappears.

/arawh/	[arʌʷhʷ] or [arʌʷɸ]	+ [ɔ]	[arʌʷɸʷɔ]
/simawr/	[simʌʷɾʷ] or [simʌʷɾ]	+ [ɔ]	[simʌʷɾʷɔ]
/arawh/	[arʌʷhʷ] or [arʌʷɸ]	+ [mɛ]	[arʌʷɸmɛ]
/simawr/	[simʌʷɾʷ] or [simʌʷɾ]	+ [mɛ]	[simʌʷɾmɛ]

The apparent labialisation or palatalisation of the word final consonant is the result of the preceding VH sequence. The following conclusion can be drawn:

Labialisation or palatalisation of word final consonants occurs when the consonant is immediately preceded by a V[-HIGH]HC sequence. It is manifested by an echo vowel release which features are determined by the preceding H. This echo vowel will not manifest itself when the following word starts with a consonant.

NOTE: The word final consonants of words that occur in isolation quite often do not manifest the vowel release. It has been observed that certain phonetic alternates are more likely to block the vowel release than others.
For word final consonants in V[-HIGH]HC sequences:

/h/ [ɸ] occurs word finally without release
[h] occurs word finally with release

/r/ [d] and [ɾ] occur word finally without release
[ɾ] occurs word finally with release

(The symbol ~ indicates free variation between the forms)

/wayp/	[^{u}ʌ^{i}b]~[^{u}ʌ^{i}b^{i}]	*eagle*
/peyp/	[be^{i}b]~[be^{i}b^{i}]	*weigh much*
/iawk/	[iʌ^{u}k]~[iʌ^{u}k^{u}]	*cup*
/peik/	[beik]~[beik^{i}]	*ill*
/hawr/	[hʌ^{u}ɾ]~[hʌ^{u}ɾ^{u}]	*wash*
/eir/	[eid]~[eiɾ^{i}]	*python*
/kaun/	[kʌun]~[kʌun^{u}]	*break*
/nayn/	[nʌ^{i}n]~[nʌ^{i}n^{i}]	*think*
/yeih/	[^{i}eiɸ]~[^{i}eih^{i}]	*bird(sp.)*
/rorowh/	[ɾɔɾo^{u}ɸ]~[ɾɔɾo^{u}h^{u}]	*dig with hands*
/reis/	[ɻeis]~[ɻeis^{i}]	*tomorrow*
/rows/	[ɾo^{u}s]~[ɾo^{u}s^{u}]	*get water*

3.1.4.2 Non-phonemic vowel occurring across morpheme breaks.

Words that have a V[-HIGH]HC ending, will manifest a non-phonemic vowel on the word final consonants, when roots are followed by a vowel morpheme.

Chart 11 - Non-phonemic vowel occurrence.

/root/	[phonetic]	/root + Vowel/	[phonetic]	gloss
/nayr/	[nʌ^{i}ɾ]	/nayr o/	[nʌ^{i}ɾ^{i}ɔ]	*night*
/sair/	[sʌiɾ]	/sair e/	[sʌiɾ^{i}ɛ]	*show*
/kaun/	[kʌun]	/kaun a/	[kʌun^{u}a]	*break*
/kawk/	[kʌ^{u}k]	/kawk a/	[kʌ^{u}k^{u}a]	*put into*
/sueyr/	[sue^{i}ɾ]	/sueyr o/	[sue^{i}ɾ^{i}ɔ]	*rain*
/owk/	[o^{u}k]	/owk o/	[o^{u}k^{u}ɔ]	*string bag*
/yeih/	[^{i}eiɸ]	/yeih o/	[^{i}eiɸ^{i}ɔ]	*bird (sp.)*
/iaup/	[^{i}ʌup]	/iaup e/	[^{i}ʌub^{u}ɛ]	*destine*
/roum/	[ɾoum]	/roum e/	[ɾoum^{u}ɛ]	*burn*
/yeyk/	[^{i}e^{i}k]	/yeyk o/	[^{i}e^{i}k^{i}ɔ]	*canoe*
/sous/	[sous]	/sous o/	[sous^{u}ɔ]	*stop*

Meaning of morphemes following the root words:
/o/ verb phrase finally means *'not'*;
/o/ following a noun phrase means *'and' (See note in Appendix B)*
/a/ occurring verb phrase finally indicates *future*;
/e/ occurring verb phrase finally indicates *imperative*.

The non-phonemic vowel release is predictable.
[V^{i} C] or [Vi C] is followed by a non-phonemic [^{i}].
[V^{u} C] or [Vu C] is followed by a non-phonemic [^{u}].

3.1.4.3 No labialised or palatalised consonants in the contoid chart.

We left all labialised and palatalised consonants (i.e. [b^{u}] [b^{i}] [k^{u}] [k^{i}] [ɾ^{u}] [ɾ^{i}] etc.) out of the contoid chart for the following reason.: Word final [C^{u}] or [C^{i}] are predictable. The final labialisation or palatalisation is not a property of the consonant, but of the preceding V[-HIGH]H sequence. The [BACK] feature of H (= high non-consonantal) determines whether the consonant is labialised or palatalised.

Word medial and word initial [C^{u}] and [C^{i}] are contrastive with [C], [Ci] and [Cu] and can not be explained as the result of a preceding VH sequence.

/kwor/	[k^{u}ɔɾ]	*cane bangle*
/kuor/	[kuɔɾ]	*sore*
/kor/	[kɔɾ]	*in a small way*
/ryan/	[ɾ^{i}an]	*swell up*
/yeyr/	[^{i}e^{i}d]~[^{i}e^{i}ɾ^{i}]	*broom*
/yowr/	[^{i}o^{u}ɾ]~[^{i}o^{u}ɾ^{u}]	*areca palm*

/kamwon/	[kam^{u}ɔn]	*sister's child*
/kopyo/	[kɔb^{i}ɔ]	*tree (sp.)*
/powp/	[bo^{u}b]~[bo^{u}b^{u}]	*devil*

(Non-phonemic [C^{u}] and [C^{i}] are underlined)

3.1.5 Analysis of glides as consonants or vowels

a. Consonant-like behaviour of glides.

The following arguments favour the analysis of glides as consonants:

i. All seven non-ambiguous consonants (*pkrshmn*) can occur word initially followed by any of the five vowels *(ieaou)*. The two glides *(yw)* can fill the same word initial slot and can be followed by all five vowels, as long as they do not a gree in the features [α BACK, α HIGH] (In practice this means that /yi/, /wu/ are non-allowed sequences. See charts 13A & 13B.)

ii. Since consonant clusters consisting of two non-ambiguous consonants *(e.g. kr)* occur, the analysis of consonant-glide sequences *(e.g. kw or ky)* as consonant clusters seems to fit the phonemic system.

/kreys/	[kɾe^{i}s]	*two*
/kwor/	[k^{u}ɔɾ]	*cane bangle*
/kyor/	[k^{i}ɔɾ]	*downwards*

iii. The need to differentiate between a word initial VV sequence and a word initial GV sequence seems to advocate the analysis of glides as consonants.

/ia/	[ia]	*fire*
/ya/	[^{i}a]	*FAR FUTURE*
/ueir/	[ueiɾ]	*garden*
/weir/	[^{u}eiɾ]	*fish (sp.)*

b. Vowel-like behaviour of glides.

The following arguments argue against the analysis of glides as consonants:

i. No non-ambiguous consonant clusters consisting of three members occur. Analysing glides as consonants would necessitate the addition of another consonant cluster type.

/mror/	**CCVC**	[mɾɔɾ]	*sago stalk*
/kros/	**CCVC**	[kɾɔs]	*break down*
/krwem/	**CCCVC**	[kɾ^{u}ɛm]	*argue*

ii. No word final consonant cluster occurs with two non-ambiguous members. Analysing glides as consonants would result in word final consonant clusters.

/sok/	**CVC**	[sɔk]	*snake*
/peyk/	**CVCC**	[be^{i}k]	*bite*
/owk/	**VCC**	[o^{u}k]	*string bag*

iii. When occurring in a sequence with a vowel, the two glides manifest the same distribution restrictions as the two high vowels. (See discussion in 3.1.1 & 3.1.2.)

iv. In certain environments the two glides trigger the same morphophonemic changes as the two high vowels /i/ and /u/. (See discussion in section 3.1.4.

c. Conclusion

Since there are strong arguments against analysing the glides as consonants as well as against analysing them as vowels, it seems beneficial to treat them as a separate category, referred to as glides:

- Glides are distinguished from vowels by the feature [SYLLABIC].
- Glides are distinguished from consonants by the feature [CONSONANTAL].

Chart 12 - Feature chart.

	CONSONANTS	VOWELS	GLIDES
[SYLLABIC]	-	+	-
[CONSONANTAL]	+	-	-

SECTION 4
DISTRIBUTION OF PHONEMES

4.1 Consonant distribution

4.1.1 Consonants and glides word initial.

In the four charts below (chart 13a, 13b, 14a, 14b) the phonemic representations have been given. (See appendix B for phonetic representations and glosses for all four charts.)

In chart 13A initial consonants and glides are followed by a single vowel or a V[-HIGH] H sequence. The words in italics do not have the consonant in focus on the onset of the word, but on the onset of the second syllable. Syllable breaks are marked by a period.

Chart 13A - Consonants and glides word initial – followed by V or V[-HIGH] H

	p	**k**	**m**	**n**	**s**	**r**	**h**	**w**	**y**
i	pin	ki		ni	si	ri	hin	win	*
e	*ho.pe*	ken	me	ne.ne	sen	re	he.he	wer	yen
a	pa	kan	mam	na.key	sa	rak	ha	wa	ya
o	pok	kos	mok	nop	sok	rok	hoh	won	yoh
u	pu.soup	ku	mu		su	ru	hu	*	yu
ei	peik	kei	mei	*so.nei*	sei	rei	hei	wein	yeik
ey	pey	*na.key*	mey	ney	sey	rey	hey	weyn	yeyr
ai	pain	kair	mair		sai			wai	yai
ay	pay	kay	may	nay	say	ray	hay	way	yay
au	pau	kaun			sau	raun		wau	yau
aw	paw	kawk	mawk	naw	saw	*pa.raw*	hawr	waw	yaw
ou	pou	mou		*ay.nou*	sou	rou	hou	wouk	your
ow	pow	kow	mow	now	sow	row	how	wow	yowr

Conclusions:

There are nine accidental gaps in the chart. More research will probably lead to finding nearly all, or all these nine missing sequences.

Two predictable gaps are marked by *. The sequence /wu/ and /yi/ are analysed as non-allowed sequences. (See discussion in 2.4.3 and 3.1.3)

Word initial consonants and glides are followed by a sequence of two non-consonantals, the first member having the feature [-HIGH]. Syllable breaks are marked, words in italics have the desired sequence in the second syllable.

Chart 13B, Consonants and glides word initial – followed by HH or HV

	p	**k**	**m**	**n**	**s**	**r**	**h**	**w**	**y**
iy	piy.nay			*how.niy*		riy	hiy	*	*
uw						ruw	*ro.huwn*	*	*
ie	pie	kie				rie	hien	*	*
ye	hye							*	*
ia	piar	kian		nian	sian	rian		*	*
ya	pyays			nyan	syaw	ryan	hyaw	*	*
io	pion	kior		nio	siop	riok	hiok	*	*
yo	kopyo	kyor		nyo	syo		hyo	*	*
ue		kue			sue	prueyn		*	*
we	na.pw*e*	kwekwe		nweyk	swe			*	*
ua	puar	kuan						*	*
wa		kwan			swar	rwak		*	*
uo	puon	kuor					huon	*	*
wo	pwos	kwor	*ka.mwon*	nwoh		rwon	hwon	*	*

Conclusions:

The two empty vertical columns under /w/ and /y/ are predictable. It would lead to a HHH or HHV sequence. A sequence of three non-consonantals is possible in Abau, but the middle phoneme needs to be a V[-HIGH].

No initial /myV/, /miV/, /mwV/ or /muV/ has been observed. Word medially /kamwon/ [kamʷɔn] 'sister's child' contrasts with /kamon/ [kamɔn] 'one'. It does not seem unreasonable to expect to find more missing sequences that can be listed under /m/.

The difference between the two words is hard to hear, which corresponds with the fact that the echo vowel occurs after all consonants except the /m/. (See section 6 on morphophonemics.)

4.1.2 Consonants in word final position.

a. Word final consonants preceded by only one vowel or by a *V[-HIGH]H* sequence.

Chart 14A, consonants word final – preceded by V or V[-HIGH] H

	p	**k**	**m**	**n**	**s**	**r**	**h**
i			wo.rim	hin		hir	orih
e				i-hen		wer	
a		rak	nam	kan	sas	kar	sah
o	nop	mok	som	ron	ros	yor	yoh
u		hunuk		sun		sur	kamuh
ei	reip	meik	neim	sein	peis	eir	reih
ey	neyp	meyk	eym	seyn	peys	eyr	reyh
ai	kyaip			pain		pair	
ay	nayp	nayk		nayn	nays	payr	yarayh
au	iaup			saun			
aw	nawp	pawk		sawn	naws	hawr	arawh
ou	soup	pouk	roum	youn	rous	pour	youh
ow	sowp	rowk	nowm		rows	powr	rorowh

Conclusions:

No predictable gaps in this chart. The large number of gaps in the first five horizontal lines are a little surprising. Only final /n/ and final /r/ can be preceded by all five single vowels.

b. Word final consonants preceded by a sequence of two non-consonantals, first member with the feature *[+HIGH]*.

Chart 14B, Consonants word final – preceded by HH or HV[-HIGH]

	p	**k**	**m**	**n**	**s**	**r**	**h**
iy							
uw				rohuwn		suwr	
ie				hien	nies	ier	
ye				yen			
ia	iap			nian		piar	
ya				nyan		yar	
io	siop	hiok	hiom	pion		kior	ioh
yo	yop	yok				kyor	yoh
ue				pruen			
we			krwem	wen		wer	
ua			pruam	kuan		puar	
wa		rwak		kwan		swar	
uo		huok		huon		kuor	
wo				hwon	pwos	kwor	nwoh

The horizontal column for /iy/ is empty.
/iy/ is only observed occurring word finally or syllable finally. The gap seems to be accidental as its counterpart /uw/ is observed to occur word finally and word initially.

c. Conclusions from the basis of the four preceding charts:

i. All consonants can occur word finally and word initially.

ii. The glides /w/ and /y/ can occur after all 7 consonants word initially (with the exception of /m/) and precede all 7 consonants word finally.

iii. The glides /w/ and /y/ can occur before any vowel, other than a vowel with identical [HIGH] and [BACK] features, following any vowel with an identical [BACK] or [FRONT] feature.

4.1.3 Consonant clusters

In the word lists below examples are given of the consonant clusters that occur. If the consonant cluster is followed by an asterisk, it means that the cluster is not expected to occur. If it is followed by a question mark an accidental gap in the chart is suspected.

No consonant combinations, which are formed over morpheme or syllable breaks, are given.

There are two clusters that have allophone clusters.
In both cases the consonant in second position assimilates to the first.

/hn/ a voiceless fricative and an alveolar nasal cluster
[n̊n] voiceless alveolar nasal + voiced alveolar nasal
[sn] voiceless alveolar nasal + an alveolar nasal

/mr/ bilabial nasal and alveolar flapped vibrant
[mr] vcd. bilabial nasal + vcd. alveolar flapped vibrant
[mn] vcd. bilabial nasal + vcd. alveolar nasal

NOTE: In the chart below /sn/ and /mn/ are not printed, but their phonetic representations [sn] and [mn].

Consonant cluster	**Phonemic**	**phonetic**	***gloss***
/ hw /	/hwon/	[hᵘɔn]	*you*
/ pw /	/pwospwos/	[bᵘɔsbᵘɔs]	*stiff*
/ sw /	/sway/	[sᵘʌⁱ]	*bump into*
/ kw /	/kwor/	[kᵘɔɾ]	*cane bangle*
/ mw /	/kamwon/	[kamᵘɔn]	*sister's child*
/ nw /	/nweyk/	[nᵘeⁱk]	*ear*
/ rw /	/rwak/	[ɾᵘak]	*be*
/ ww /	*		
/ yw /	*		

Consonant cluster	**Phonemic**	**Phonetic**	***Gloss***
/ hy /	/hyaw/	[ɸⁱʌᵘ]	*refuse*
/ py /	/pyays/	[bⁱʌⁱs]	*tree (sp.)*
/ sy /	/syaw/	[sⁱʌᵘ]	*penis gourd*
/ ky /	/kyorira/	[kⁱɔɾida]	*look down*
/ my /	?		
/ ny /	/nyo/	[nⁱɔ]	*young lad*
/ ry /	/ryan/	[dⁱan]	*swell up*
/ wy /	*		
/ yy / -			

Consonant cluster	Phonemic	Phonetic	*Gloss*
/ hr /	/hror/	[ɸɾɔɾ]	*the two of us*
/ pr /	/pra/	[bɾa]	*lame*
/ sr /	/sruw/	[srʊ]	*slurp*
/ kr /	/krey/	[kɾe^{i}]	*ladder*
/ mr /	/mruw/	[mrʊ]~[mnʊ]	*mountain*
/ nr /	*		
/ rr /	*		
/ wr /	*		
/ yr /	*		

Consonant cluster	Phonemic	Phonetic	*Gloss*
/ hn /	/hnar/	[n̊naɾ]~[snaɾ]	*take off skin*
/ pn /	/pno/	[pnɔ]	*muddy*
[sn]	/hnok/	[n̊nɔk]~[snɔk]	*pus*
/ kn /	/knor/	[knɔɾ]	*stale*
[mn]	/mror/	[mnɔɾ]~[mrɔɾ]	*woven blinds*
/ nn /	*		
/ rn /	*		
/ wn /	*		
/ yn /	*		

Consonant cluster	Phonemic	Phonetic	*Gloss*
/ hm /	/hme/	[m̊mɛ]	*you*
/ pm /	*		
/ sm /	*		
/ km /	*		
/ mm /	*		
/ nm /	*		
/ rm /	*		
/ wm /	*		
/ ym /	*		

General observations on the consonant occurrence in the clusters:

As the behaviour of the glides is very vowel-like, Chart 15 makes a distinction between non-glide clusters and consonant-glide clusters.

a. All the seven consonants can be followed by the two glides. (Exception for /my-/, as discussed before.)

b. The two glides can not occur in the onset of any word initial cluster.

c. The alveolars /n/ and /r/ cannot occur in the onset of any non-glide cluster.

d. The two stops /p/ and /k/, and the two fricatives /h/ and /s/ can not occur as the second member of any consonant cluster.

e. The seven consonants and two glides can form 13 non-glide consonant clusters and 9 non-glide consonant clusters as charted below.

Chart 15 – Consonant Cluster Types

	CONSONANT-GLIDE CLUSTERS	**NON-GLIDE CLUSTERS**
	/hw/ /hy/	/hr/ /hn/ /hm/
	/pw/ /py/	/pr/ /pn/
	/kw/ /ky/	/kr/ /kn/
	/sw/ /sy/	/sr/
	/mw/ /mr/	
	/mw/ /my/	
	/rw/ /ry/	

Sequences of two consonants + glide

Consonant cluster	**Phonemic**	**Phonetic**	***Gloss***
/hrw/	?		
/prw/	?		
/srw/	?		
/krw/	/krweney/	[kɾ^{u}ɛne^{i}]	*small fish*
/mrw/	?		
/hnw/	?		
/pnw/	?		
/knw/	/knwo/	[kn^{u}ɔ]	*mountain(name)*
/hmw/	?		

Only the nine non-glide consonant clusters followed by the back glide are listed here. No clusters have been observed followed by the front glide /y/.

4.2 Distribution of Vocoids

4.2.1 Distribution of high non-consonantals

Restrictions in allowed HV and VH sequences:

The distribution of the high non-consonantals shows certain restrictions in allowed sequences. Below all possible sequences with the four high non-consonantals /i/, /y/, /u/ and /w/ are shown.

The chart below shows the five vowels /i/, /e/, /a/, /o/ and /u/ and how they co-occur in first and second position with the high non-consonantals. The charts show allowed and non-allowed sequences.

Chart 16 - Sequences of the 4 high non-consonantals with the 5 vowels

	Allowed sequences	**Non-allowed sequences**
/ a /		
/ a H /	/ai/ /au/ /aw/ /ay/	
/ H a /	/ia/ /ua/ /wa/ /ya/	
/ e /		
/ e H /	/ei/ /ey/	/eu/ /ew/
/ H e /	/ie/ /ue/ /we/ /ye/	
/ o /		
/ o H /	/ou/ /ow/	/oi/ /oy/
/ H o /	/io/ /uo/ /wo/ /yo/	
/ i /		
/ i H /	/iy/	/ii/ /iu/ /iw/
/ H i /	/wi/	/ii/ /ui/ /yi/
/ u /		
/ u H /	/uw/	/ui/ /uy/ /uu/
/ H u /	/yu/	/iu/ /wu/ /uu/

Observations about the five vowels in sequences with the four high non-consonantals:

1. /a/ forms 8 different sequences with high non-consonantals.
/a/ can be preceded or followed by all high non-consonantals.

2. /e/ and /o/ can each form 6 different sequences with high non-consonantals
/e/ and /o/ can co-occur with all high non-consonantals, except that they cannot precede high non-consonantals with an opposing [BACK] feature.

3. /u/ and /i/ can each form 2 different sequence with high non-consonatals
/u/ and /i/ cannot co-occur with high vowels and they cannot be followed by a high non-consonantal with an opposing [BACK] feature.

The present choice of /iy/ is arbitrary (see discussion in 2.4.3) but the difference between -iy- and -yi- is probably neutralised. Likewise the difference between -uw- and -wu- does not exist phonologically in Abau.

4.2.2 Distribution of the Non-High Vowels

The distribution of the non-high vowels /e/, /a/ and /o/ is charted below.

Chart 17 - Sequences of VV[-HIGH] and V[-HIGH]V

	Allowed sequences	**Not allowed sequences**
/ a /		
/a V[-HIGH]/		/ae//aa//ao/
/V[-HIGH] a/		/ea//aa//oa/
/ e /		
/e V[-HIGH]/		/ee//ea//eo/
/V[-HIGH] e/		/ee//ae//oe/
/ o /		
/o V[-HIGH]/		/oe//oa//oo/
/V[-HIGH] o/		/eo//ao//oo/
/ i /		
/i V[-HIGH]/	/ie//ia//io/	
/V[-HIGH] i/	/ei//ai/	/oi/
/ u /		
/u V[-HIGH]/	/ue//ua//uo/	
/V[-HIGH] u/	/au//ou/	/eu/

Observations:

- In non-consonantal sequences, Abau does not allow two low vowels: V[-HIGH] V[-HIGH]*
- All low vowels can be preceded by high non-consonantals: H V[-HIGH]
- Low vowels occur sequence initially, if the following high non-consonantal agrees for [BACK]:
  V[αBACK, -HIGH] [αBACK]

4.2.3 Distribution of all vowellike sounds

In the chart below all possible sequences of two non-consonantals have been given that are allowed word final or before a consonant. (See appendix B for word glosses.)

Chart 18 - All possible sequences of two non-consonantals.

	i	**y**	**e**	**a**	**o**	**w**	**u**
i	*	riy	rie	kian	ion	*	*
	*	hiy	ier	ia	kior	*	*
	*	piynay	hien	ria	nio	*	*
y	*	*	yen	ya	yop	*	yu
	*	*	hye	ryan	syo	*	ryuk
	*	*		yar	kyor	*	
e	rei	rey	*	*	*	*	*
	eir	eyr	*	*	*	*	*
	peik	meyk	*	*	*	*	*
a	wai	way	*	*	*	waw	wau
	ai	ay	*	*	*	aw	kaun
	kair	mayr	*	*	*	yawk	iaup
o	*	*	*	*	*	row	rou
	*	*	*	*	*	ow	ou
	*	*	*	*	*	sowp	sous
w	win	*	wen	wa	won	*	*
	awia	*	swe	kwa	hwon	*	*
		*	kweyr	swar	kwor	*	*
u	*	*	sue	kuan	kuor	ruw	*
	*	*	ueir	puay	huok	uwr	*
	*	*	pruen	puan	hruo	suwr	*

Conclusions on the distribution chart of the non-consonantals.

A clear pattern can be seen in chart 18. The chart above shows 24 allowed sequences of two non-consonantals, that can occur word finally or before a consonant. 8 sequences of the 24 have a non-consonantal in first position with the feature [-HIGH] 16 sequences of the 24 have a non-consonantal in first position with the feature [+HIGH].

The occurence of the 7 non-consonantals in the 24 sequences is as follows:

/ a / occurs in 8 sequences	(1^{st} pos. 4 times, 2^{nd} pos. 4 times)
/ o / occurs in 6 sequences	(1^{st} pos. 2 times, 2^{nd} pos. 4 times)
/ e / occurs in 6 sequences	(1^{st} pos. 2 times, 2^{nd} pos. 4 times)
/ i / occurs in 7 sequences	(1^{st} pos. 4 times, 2^{nd} pos. 3 times)
/ u / occurs in 7 sequences	(1^{st} pos. 4 times, 2^{nd} pos. 3 times)
/ y / occurs in 7 sequences	(1^{st} pos. 4 times, 2^{nd} pos. 3 times)
/ w / occurs in 7 sequences	(1^{st} pos. 4 times, 2^{nd} pos. 3 times)

Note: The choice of sequences /iy/ and /uw/ rather than /yi/ and /wu/ is arbitrary. If the latter analysis had been chosen, it would have resulted in the following table:

/ i / occurs in 7 sequences	(1^{st} pos. 3 times, 2^{nd} pos. 4 times)
/ u / occurs in 7 sequences	(1^{st} pos. 3 times, 2^{nd} pos. 4 times)
/ y / occurs in 7 sequences	(1^{st} pos. 5 times, 2^{nd} pos. 2 times)
/ w / occurs in 7 sequences	(1^{st} pos. 5 times, 2^{nd} pos. 2 times)

SECTION 5
WORD AND SYLLABLE BOUDARIES

5.1 Stress in Abau.

Stress in Abau occurs word initially. Stress corresponds with relatively higher pitch, which means that the onset of a word has the highest pitch within that word.

Since many phrases (especially NPs) carry phrase final marking it is relatively simple to determine phrase boundaries. These phrase final markings never carry any prominent stress, instead these markers are easily identified by a low or falling tone which is typical for phrase final intonation. The most salient stress within the phrase is not necessarily on the first word of the phrase, but is rather on the head of phrase. E.g. possessive pronouns precede the head noun in Abau NPs. However, the most prominent stress within the NP is not on the preceding possessive pronoun but on the head noun.

The most salient stress (marked by raise in pitch) within any sentence is on the onset of the head of the verb phrase. The verb phrase occurs clause finally. An average sentence in Abau carries easily three, but mostly more than three phrases. As a general rule we find that the saliency of

phrase stress increases for each following phrase, having its peak on the head of the sentence final Verb Phrase.

In the next example the beginning of phrases are indicated by raised numbers. The onset of the heads of the phrases are bolded to indicate the most prominent stress with the phrase. The phrase final markers (which carry no emphasis) are underlined.

Example					(1)
/[1]**uwr**	har	homkwe	[2]**on**kioh	kokwe	
man	some	2/3PL.TOP	yesterday	TOPIC	
[3a]hano	**ai**o	so	[3b]**a**	se	[4]**mei**o./
1.SG.GEN	father	GEN	house	OBJ	build

"Yesterday some men built my father's house."

The most prominent stress in the sentence is on the verb /meio/ *'build'*. We have one embedded NP marked by 3a and 3b. The most salient stress within this embedded NP is on the head of the noun phrase /a/ *"house"*.

5.2 Marking of word boundaries.

Two criteria are used to mark word boundaries.

1. A stress unit with a relatively higher pitch than the preceding stress unit should be marked as the onset of a word.

2. If a unit with the same semantic meaning occurs with a word distinctive stress in one environment, it should be regarded as a separate word in all environments.

The second criterion allows comparisons between the various environments a word can occur in. When applying only the first criterion not all word breaks will be found as can be seen from the examples below.

In example (2) all the word boundaries are captured by only applying the first criterion, leading to the conclusion that the example sentence exists of three words.

Notation: ['] *means a higher stress than the preceding stress unit, where by a stress unit is defined as having at least one vowel.*

Example			(2)
['hakᵘɛ	'a	'meiɔ]	
/hakwe	a	meio/	
1.SG.TOP	house	build	

"I am house building."

In example (3) the first criterion is applied as indicated by the stress markings. If restricted to the first criterion, one would have to conclude that /a mon/ is one word. When the same criterion is applied to example (4), it seems that /a ouon/ is one word. Example (4) helps to see that the tone or stress on the locative marker /mon/ is higher than the stress/tone on the last part of /ouon/ *"under"*. This observation makes the locative marker /mon/ a separate word.

Example (3)

['hak^{u}ɛ	'hanɔ	'a	mɔn	'ɻe^{i}]
/hakwe	hano	a	mon	rey/
1.SG.TOP	1.SG.GEN	house	to	go

"I am going to my house."

Example (4)

['hak^{u}ɛ	'hanɔ	'a	ouɔn	'mɔn	'ɻe^{i}]
/hakwe	hano	a	ouon	mon	rey/
1.SG.TOP	1.SG.GEN	house	under	to (LOC)	go

"I go under my house."

The question whether /a-ouon/ in example (4) is one or two words still needs to be answered. In example (5) we inserted the word /yaprue/ *"good"*. The stress pattern over example (5) shows that /ouon/ *"under"* has a higher initial stress than the preceding two syllable word /yaprue/. Based on criterion 2 one can conclude that /ouon/ and /mon/ should be viewed as separate words in all examples where they occur.

Example (5)

['hak^{u}ɛ'	'a	^{i}aprue	'ouɔn	'mon	'ɻe^{i}]
/hakwe	a	yaprue	ouon	mon	rey/
1.SG.TOP	house	good	under	to	go

"I go under the good house."

5.3 Marking of syllable breaks

In attempting to define syllable boundaries, the following four analysis steps will be taken:

5.3.1 Initial and final sequential constraints.
5.3.2 Sonority hierarchy in the syllable.
5.3.3 Non-consonantals and their place in the syllable.
5.3.4 Application

5.3.1 Initial and final sequential constraints.

In defining the syllable we will rely on a basic phonological assumption, that there is an intimate relationship between word structure and syllable structure.

It means that the same sequential constraints which operate at the beginning of a word should be operative at the beginning of a syllable, even if this syllable does not occur word initially. Similarly, the same sequential constraints, which operate at the end of a word should be operative at the end of a syllable.

Consonant clusters have already been dealt with. A distinction was made between glide and non-glide consonant clusters. In view of the assumption made above, the following findings on sequential constraints are relevant to define the syllable breaks.

a. All seven consonants followed by one of the two glides occur in word initial clusters. (Except /my/ and /mw/)

b. The two glides and the alveolars /n/ and /r/ cannot occur in the onset of any non-glide cluster.

c. The four obstruents /p/, /k/, /h/ and /s/ can not occur as the second member of any consonant cluster.

d. The seven consonants and two glides can form 13 glide consonant clusters and 9 non-glide consonant clusters as charted below:

Chart 19 – Clusters formed with glides and consonants

GLIDE CLUSTERS	**NON-GLIDE CLUSTERS**
/hw/ /hy/	/hr/ /hn/ /hm/
/pw/ /py/	/pr/ /pn/
/kw/ /ky/	/kr/ /kn/
/sw/ /sy/	/sr/
/mw/	/mr/
/mw/ /my/	
/rw/ /ry/	

e. None of the consonant clusters that are observed word initially, can occur word finally.

f. A sequence of three non-consonantals within a syllable can only occur when the second non-consonantal has the feature [-HIGH].

5.3.2 Sonority hierarchy in syllable structure.

In general the syllable structure tends to follow the universal 'sonority hierarchy'model. Firstly we will show this universal model. Secondly we will adjust the model for the Abau language and leave out the non-distinctive labels.

Universal Model (After Hooper 1976: 199)

MARGIN				NUCLEUS				**MARGIN**
Obstr	Nasal	Liquid	Glide	**Vowel**	Glide	Liquid	Nasal	Obstr
Least V-like			<<<		**Most V-like**			>>>
	Least V-like							

Language specific model

MARGIN				**NUCLEUS**		**MARGIN**
obstr	nasal	liquid	glide	**vowel**	glide	consonant
kphs	mn	r	yw	aieuo	yw	kpshmnr

For the Abau-specific model we can combine the final Liquid, Nasal, Obstruent to one group of Consonants. The seven positions and the sound classes they represent are all relevant for the Abau phonology. The following observations can be made.

Restrictions:

a. The relative order of the 7 positions is never reversed in any syllable. (e.g. no liquid-nasal order possible)

b. None of the seven positions is represented by two members in one syllable. (e.g. no sequence of 2 obstruents or 2 nasals)

c. No obstruent-nasal-liquid sequence is allowed, which means that a syllable cannot have more that 6 sounds. (No syllables though are found to have 6 sounds, although theoretically it seems to be possible to have an ONGVGC or an OLGVGC or an NLGVGC sequence.)

Some examples of possible sequences:

V	/a/	*house*
V C	/om/	*place*
V G	/ey/	*sun*
G V	/wa/	*soul*
G V G	/waw/	*cloud*
N G V C	/nwoh/	*dog*
L G V G	/rway/	*to carry*
O G V G	/sway/	*bump into*
O G V G C	/swawr/	*brother in law*
N G V G C	/nweyk/	*ear*
O N G V	/knwo/	*name of mountain*
N L V C	/mror/	*blind*
O L G V C	/krwem/	*argue*

5.3.3 Non-consonantals and their place in the syllable.

a. Vowel[-high] G sequence.

In the two sections above we have not tried to analyse the segments of the syllable in terms of either consonant or vowel.

This two-way contrast would present a problem with the interpretation of the glides. In the conventional analysis the glide is regarded as a consonant, so words like

[nʌ^{i}ɾ] /nayr/ *'nightly'*

[ɾo^{u}s] /rows/' *'gather water'*

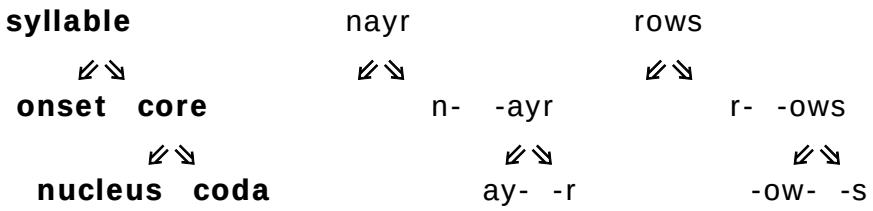
would be analysed as having a CVCC pattern. In other words these two forms would be analysed

as having a final consonant cluster. This analysis is not desirable. The glide is raising the preceding vowel and is more part of the nucleus than of the final consonant.

The syllable can be divided into three phonetic parts (Pike 1947): (1) the onset, (2) the nucleus, and (3) the coda.

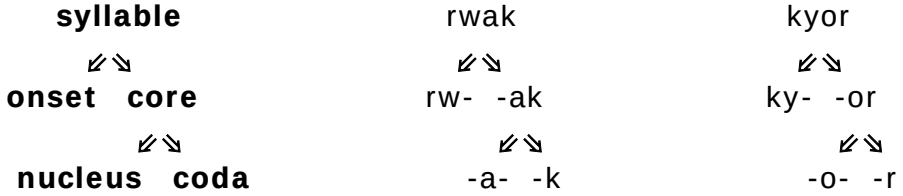
Represented as:

In the two Abau words above we like to analyse the low vowel -glide sequence as forming the nucleus, followed by a single consonant in the coda.



b. G V sequence

In the glide vowel sequences the glide does not affect the vowel following. The glide is regarded as the onset of the syllable or as part of the onset of the syllable.



c. V V sequence

All vowel - vowel sequences will be analysed as not belonging to one syllable.

This generalisation is made with hesitation as there is a clear difference between
higher vowel - lower vowel sequences, and
lower vowel - higher vowel sequences.
The vowels in the first sequence type do not affect each other and they behave like being part of different syllables.
The vowels in the second sequence type do affect each other in that the latter vowel raises the first. This phonetic change does not take place in the first sequence type.

V[+high] V[-high]	/piar/	[piaɾ]	*to shut*
V[-high] V[high]	/pair/	[pʌiɾ]	*inner part of sago*

But in order to distinguish between
lower vowel - glide sequences, and
lower vowel - higher vowel sequences,
We have analysed all vowel - vowel sequences as not belonging to one syllable.

5.3.4 Application

a. Sequential constraints in consonant clusters will be helpful to determine syllable breaks:

/ankin/	an.kin	- no initial or final /nk/ possible
/senpro/	sen.pro	- no final /np/ possible
/ronriy/	ron.riy	- no final or initial /nr/ possible
/heywayr/	hey.wayr	- no final or initial /yw/ possible

b. Non-allowed word final vowel - glide sequences are indicators of syllable breaks:

/poya/	po.ya	- no final /oy/ possible
/rwoyow/	rwo.yow	- no final /oy/ possible
/mewayr/	me.wayr	- no final /ew/ possible

c. A sequence of a low vowel - glide (with no opposing [BACK] feature) should be treated as the peak of one syllable.

/meyo/	mey.o	- /ey/ more intimate relationship than /yo/
/kaye/	kay.e	- /ay/ more intimate relationship than /ye/
/powey/	pow.ey	- /ow/ more intimate relationship than /we/

d. It is universally true that CV syllables are more stable and more regular than VC syllables. Whenever we have a word medial single true consonant it will be the onset of the next syllable. Also word medial consonant sequences will be analysed as the onset of the next syllable whenever possible.

/aran/	a.ran	- final /r/ would create 2 VC syllables
/youhwan/	yo.u.hwan	- Existing cluster /hw/ should not be split
/apuayr/	a.pu.ayr	- final /p/ would create VC syllable

SECTION 6
MORPHOPHONEMICS

Other than the non-phonemic vowel release previously described, Abau has relatively few morphophonemic phenomena to report. Where morphophonemic changes occur, examples are often limited as they tend to be part of a short, exhaustive list. Some limited vowel harmony has been observed for the TERM OF REFERENCE suffix and also for various pronouns and demonstratives. It is felt that the value of these observations is limited as conclusions needed to be drawn from a small number of possible examples. Nevertheless, for the sake of completeness it was felt valuable to record the morphophonemic processes that take place.

6.1 Partial vowel harmony in Reference suffix

To change a term of address into a term of reference a suffix is added that changes its form based on the vocoid sequence in the root. The first column in Chart 20 shows the terms of address. The *reference suffix* has the following alternations /uh ¸ oh ¸ ih/

The following observations have been made:
/uh/ occurs following high back non-consonantals and
/oh/ occurs following low non-front non-consonantals and
/ih/ occurs following front non-consonantals.

Chart 20 - Terms of address and terms of reference

Term of Address	Suffix	Term of Reference	Gloss
1a. /swawr/	**-uh**	/swawr-uh/	*brother-in-law*
1b. /uwr/		/uwr-uh/	*husband*
1c. /apaw/		/apaw-uh/	*grandparent*
2a. /hiom/	**-oh**	/hiom-oh/	*female's brother*
2b. /mam/		/mam-oh/	*aunt's husband*
2c. /kamwon/		/kamwon-oh/	*sister's child*
3a. /ine/	**-ih**	/ine-ih/	*sister*
3b. /wein/		/wein-ih/	*female grandchild*
3c. /apuayr/		/apuayr-ih/	*in-law's husband*
3d. /nay/		/nay-ih/	*younger brother*

As the base form, the /ih/ alternate, as it can occur in combination with all front non-consonantals, thus having the widest distribution.

The rule then is as follows:

REFERENCE (REF)
V [+HIGH, +FRONT] > V [+BACK, α HIGH] / [-CONS, α HIGH, -FRONT] (C) + _____

If the last non-consonantal in the root has the feature [-FRONT], the reference morpheme will take on the features [+BACK] and [α HIGH].

Sample derivation

UF	**#uwr+ih#**	**#man+ih#**	**#nay+ih#**	**#hiom+ih#**
Ref	uwr+uh	man+oh	___	hiom+oh
SF	/uwruh/	/manoh/	/nayih/	/hiomoh/

4a. /rorowh/	[ɾɔɾo^{u}ɸ]	*to dig (without tools)*
4b. /rouh/	[ɾouɸ]	*to take a handful*
4c. /heyh/	[he^{i}ɸ]	*swim*
4d. /yeih/	[^{i}eiɸ]	*bird (sp.)*

As can be seen in column one /owh/, /ouh/, /eih/ and /eyh/ are all possible sequences within one morpheme. Abau allows a sequence of two non-consonantals with identical [back] feature, but not a sequence of three as we can see in the following data.

_____#	**Term of reference**	**Gloss**
5a. apaw	apawuh	*grandfather*
5b. nay	nayih	*younger brother*
5c. yow	youh	*paternal aunt*
5d. pow	pouh	*mother*[7]

In column one the roots are given. In column 2 in **5a-b** the *reference morpheme* follows the (Ref) rule given above. In **5c-d** we see that the expected non-consonantal sequence *owu did not occur.
The language does not allow a sequence of three non-consonantals with the features [-LOW, α BACK]. The deletion of the /w/ might be arbitrary. No other data available to compare.
The feature [α BACK] *is needed as the language allows /awu/ in 5a. And also /wie/ as in 11b. (See next section.)*

The rule then is as follows:
Glide deletion (GD)
G [+HIGH, A BACK] > Ø / V [α BACK] _____ + V [α BACK]

A word final glide will be deleted when suffixed by a vowel, causing a string of three non-consonantals with the feature [α BACK].

[7] The term of address for mother is /ipey/, while the term of reference is /pouh/. The latter seems to be a contraction of /pow/ + /uh/. A change in meaning must have taken place, since the word /pow/ only refers to female animals and not to female humans.

Sample derivation

UF	**#uwr+ih#**	**#abaw+ih#**	**#nay+ih#**	**#yow+ih#**
Ref	uwr+uh	abaw+uh	-ih	yow+uh
GD				yo+uh
UF	/uwruh/	/abawuh/	/nayih/	/youh/

6.2 Limited vowel harmony in pronouns and demonstratives

6.2.1 Vowel change in pronouns

Members of pronoun and demonstratives classes are likely candidates to display some irregular forms that are hard to account for. Some morphophonenic processes are easier to explain, like the vowel change caused by the object marker.

Chart 21 Vowel harmony in words with an /oCe/ pattern.

PERSONAL PRONOUNS PARADIGM			
	neutral marking Ø	**genitive marking +/-o/**	**object marker +/-e/**
7a. 1.s	ha	han-o	han-e
7b. 3.s.fem.	hok	hok-o	hek-e ~ (hok-e)
7c. 1.pl	hrom	hrom-o	hrem-e ~ (hrom-e)
7d. 1.dual	hror	hror-o	hrer-e ~ (hror-e)
7e. 2.dual	hoh	hoh-o	heh-e ~ (hoh-e)

The second column shows the basic pronoun forms. In the third column basic form is suffixed by the genitive marker /-o/, while the last column shows the occurring vowel harmony (o becomes e), as caused by the object marker /-e/.

Observations: In **7a** (last column) the vowel harmony rule does not apply on the central vowel /a/. There seem to be no obvious phonological reason why /-n-/ is inserted in the genitive and object forms, though one might posit that the language wants to avoid sequences of two low vowels. An alternative analysis would be that *ha* was previously *han* (not unlikely as *hwon* '2 SG' ends in an *n*) and that the letter *n* was deleted in the nominative, but not in the genitive and objective forms. This is consistent with the proposal by Foley (2005: 132) that **n* was the first pronoun formative in Proto Sepik[8]. As indicated in the last column, the forms /hok-e/, /hrom-e/, /hror-e/ and /hoh-e/ are less frequently used.

6.2.1 Vowel change in demonstratives

A similar vowel change occurs in demonstratives. The forms (s)oho and (s)omo are the basic forms of the demonstrative. (Note: The topic marker 'kwe' always occurs obligatory with these topical demonstratives) The demonstratives marked with the object marker (last two columns) show the same vowel changes as the pronouns discussed above.

---

[8] With thanks to Ian Tupper who pointed Foley's findings out to me. A more detailed overview of Abau pronouns will be given in the forthcoming Abau Grammar write-up.

Chart 22 – Demonstratives – topic and object form

		Demonstrative topic		*Demonstrative objective*	
		NEAR	**FAR**	**NEAR**	**FAR**
8a.	**MASC.sg.**	oho kwe	soho kwe	ehe ohe	sehe sohe
		[ɔhɔ $k^{u}ɛ$]	[sɔhɔ $k^{u}ɛ$]	[ɛhɛ] or [ɔhɛ]	[sɛhɛ] or [sɔhɛ]
8b.	**PL.**	omo kwe	somo kwe	eme ome	seme some
		[ɔmɔ $k^{u}ɛ$]	[sɔmɔ $k^{u}ɛ$]	[ɛmɛ] or [ɔmɛ]	[sɛmɛ] or [sɔmɛ]

When the demonstrative is suffixed with the object marker the vowel change takes place. The forms /ohe/, /sohe/, /ome/ and /some/ are used as well, though less frequently.

Vowel harmony also occurs in nouns. The non-inflected noun /none/ *'eye'* has /nene/ as its more frequent alternative. Its occurrence points in the direction that the vowel harmony rule is gaining influence. The form /nene/ occurs more frequently and it is easier to argue that /nene/ originated from /none/ that the other way around.

The rule then is as follows:

Vowel harmony (VH)

V [+ LOW, +BACK] > [+ FRONT] / ___ C V [+LOW, + FRONT]

The low back vowel will change to the low front vowel if the final consonant it is preceding is suffixed by a low front vowel.

6.3 Non-phonemic vowels.

6.3.1 Non-phonemic vowels showing up over morpheme boundaries.

In the next section the occurrence of non-phonemic vowels is displayed.

Chart 23: Non-phonemic vowel release:

	/root/	**[root]**	**/root + o/**	**[root + ɔ]**	**non-phon. vowel**	**gloss**
14a	/hawr/	[hʌ^{u}ɾ]	/hawr o/	[hʌ^{u}ɾ^{u}ɔ]	YES	*to wash*
14b	/har/	[haɾ]	/har o/	[haɾɔ]	NO	*some*
14c	/sair/	[sʌiɾ]	/sair o/	[sʌiɾ^{i}ɔ]	YES	*show*
14d	/kaun/	[kʌun]	/kaun o/	[kʌ^{u}n^{u}ɔ]	YES	*break*
14e	/kan/	[kan]	/kan o/	[kanɔ]	NO	*vine*

14f	/sein/	[sein]	/sein o/	[seinʲɔ]	YES	*scratch*
14g	/seyn/	[seʲn]	/seyn o/	[seʲnʲɔ]	YES	*roll*
14h	/sen/	[sɛn]	/sen o/	[sɛnɔ]	NO	*also*
14i	/yeih/	[ʲeiɸ]	/yeih o/	[ʲeiɸʲɔ]	YES	*bird (sp.)*
14j	/nays/	[nʌʲs]	/nays o/	[nʌʲsʲɔ]	YES	*tooth*
14k	/roum/	[ɾoum]	/roum o/	[ɾoumᵘɔ]	YES	*burn*

All nouns and verbs can be followed by /o/. (See appendix B for meaning of morpheme.)

In the first column the root has been given. The fourth column gives the phonetic representation of the non-phonemic vowel. Note the difference between example 14(a) and 14(b), the unaffixed forms being /hawr/ and /har/. No non-phonemic vowel is heard when /har/ is followed by /o/, because the last consonant is not preceded by a VH sequence. The words without a VH sequence have no non-phonemic vowel as indicated in the second last column.

The non-phonemic vowel agrees in the feature [α BACK] with the last high non-consonantal. (i.e [ʲ] co-occurs with /i/ and /y/ in the root and [ᵘ] co-occurs with /u/ and /w/ in the root.

COMMENTS:
The release is the hardest to hear after the two labials -m- and -p-. It is easier to hear the non-phonemic vocoids after the other five consonants -k-, -h-, -r-, -s-, and -n-.

The rule then is as follows:
Non-phonemic vowel release rule (NVR)
Ø > V [α BACK, + HIGH] / V [+ LOW] H [α BACK] C ____ + V

(H stands for high non-consonantals, V stands for vowels)

A high non-phonemic vowel will follow a word final consonant, when suffixed by a vowel and preceded by a sequence of a low vowel and a high non-consonantal. The non-phonemic vowel will agree with the last non-consonantal in the feature [α BACK]

6.3.2 Blockage of the non-phonemic vowel

Chart 24: Non-phonemic vowel blockage

	/root/	**[root]**	**/root + pa/ /root + me/**	**[root + ba] [root + mɛ]**	**Gloss**
15a	/sair/	[sʌiɾ]	/sair-pa/	[sʌidba]	*show*
15b	/kaun/	[kʌun]	/kaun-pa/	[kʌunba]	*break*

15c	/yeih/	[^{i}eiɸ]	/yeih-me/	[^{i}eiɸmɛ]	*bird (sp.)*
15d	/nays/	[nʌ^{i}s]	/nays-me/	[nʌ^{i}smɛ]	*tooth*
15e	/roum/	[roum]	/roum-pa/	[roumba]	*burn*

In column 1 unaffixed words are given ending in a consonant preceded by a sequence of a low vowel and a high non-consonantal. No non-phonemic vowel occurs in the fourth column, when suffixed by a CV morpheme. The vowel release on the final consonant is blocked by the initial consonant of the suffix. Compare 14(i-k) with 15(c-d). No modification of the (NVR) rule needed to account for the data 15(a-e).

6.3.3 Distinction between H V[-HIGH] and V[-HIGH] H

Chart 25: Environments allowing or disallowing occurrence of non-phonemic vowel

	/root/	[root]	/root + o/	[root + ɔ]	gloss
16a	/hawr/	[hʌ^{u}ɾ]	/hawr o/	[hʌ^{u}ɾ^{u}ɔ]	*to wash*
16b	/kaun/	[kʌun]	/kaun o/	[kʌ^{u}n^{u}ɔ]	*break*
16c	/sein/	[sein]	/sein o/	[sein^{i}ɔ]	*scratch*
16d	/mour/	[mouɾ]	/mour o/	[mouɾ^{u}ɔ]	*small tree*
16e	/swar/	[s^{u}aɾ]	/swar o/	[s^{u}aɾɔ]	*grow*
16f	/kior/	[kiɔɾ]	/kior o/	[kiɔɾɔ]	*frog (sp.)*
16g	/wer/	[^{u}ɛɾ]	/wer o/	[^{u}ɛɾɔ]	*rat*
16h	/riwak/	[di^{u}ak]	/riwak o/	[di^{u}akɔ]	*sit*
16i	/pin/	[bin]	/pin o/	[binɔ]	*sago (sp.)*
16j	/ur/	[uɾ]	/ur o/	[uɾɔ]	*vine*
16k	/ihen/	[iɸɛn]	/ihen o/	[iɸɛnɔ]	*shield*
16l	/pan/	[ban]	/pan o/	[banɔ]	*grass*
16m	/ryuk/	[d^{i}uk]	/ryuk o/	[d^{i}ukɔ]	*cry*
16n	/win/	[^{u}in]	/win o/	[^{u}inɔ]	*widow*
16o	/uwr/	[ʊɾ]	/uwr o/	[ʊɾɔ]	*man*

(H stands for high non-consonantals, V stands for vowels)

The non-phonemic vowel occurs after the word final consonant in examples 16(a-d). The non-consonantal sequence preceding the consonant is V[+LOW] H.

The non-phonemic vowel does not occur after the word final consonant in 16(e-h). The non-consonantal sequence preceding the consonant is H V[+LOW].

The non-phonemic vowel does not occur after the word final consonant in 16(i-l). A single vowel precedes the consonant.

The non-phonemic vowel does not occur after the word final consonant in 16(m-o). The non-consonantal sequence preceding the consonant is H H.

The distinction between H V[-HIGH] sequences and V[-HIGH] H sequences is relevant in Abau. The non-phonemic vowel does not occur after H V[-HIGH] sequences and does occur after V[-HIGH] H sequences.

6.3.4 Summary: For words ending in a consonant and suffixed by a vowel morpheme.

Wordfinal sequence	Non-phonemic vowel occurrence
V[-high] H C	Yes
H V[-high] C	No
C V C or **V C**	No
H H C	No

The Non-phonemic vowel release rule (NVR) does not need to be adjusted as it accounts for all examples given in 14-16. So it remains:

Ø > V [α BACK, + HIGH] / V [+ LOW] H [α BACK] C ____ + V

BIBLIOGRAPHY

Bailey, David A. 1975. The phonology of the Abau Language. *Workpapers in Papua New Guinea Languages* 9: 5-58. Ukarumpa: SIL.

Foley, William A. 1986. *The Papuan languages of New Guinea.* Cambridge: Cambridge University Press.

Foley, William A. 2005. Linguistic prehistory in the Sepik – Ramu basin. In Andrew Pawley, Robert Attenborough, Jack Golson and Robin Hide, eds. *Papuan pasts: cultural, linguistic and biological histories of Papuan-speaking peoples* (Pacific Linguistics 572). 109-144. Canberra: Australian National University.

Hooper, Joan B. 1976. *An introduction to natural generative phonology.* New York: Academic Press.

Hyman, Larry M. 1975. *Phonology, theory and analysis.*

Laszlo, Marilyn. 1970. Tentative phonology, Sepik-Iwam. Unpublished Manuscript. Ukarumpa: SIL.

Laycock, Donald C. 1965. Three upper Sepik Phonologies. *Oceanic Linguistics* 4: 113-118.

Laycock, Donald C. and John Z'Graggen. 1975. The Sepik-Ramu phylum. In Stephen A. Wurm, ed. *Papuan languages and the New Guinea linguistic scene: New Guinea area languages and language study 1* (Pacific Linguistics C-38). 731-763. Canberra: Australian National University.

Lock, Arjen. Forthcoming. Abau Grammar Essentials. Ukarumpa: SIL.

Martin, William.H. 1981. A sociolinguistic survey of Abau. *Workpapers in Papua New Guinea languages.* 29: 207-232. Ukarumpa: SIL.

Mihalic, Francis. 1971. *The Jacaranda dictionary and grammar of Melanesian Pidgin.* Milton, Qld: Jacaranda Press.

Pike, Kenneth L. 1947. *Phonemics: a technique for reducing languages to writing.* Ann Arbor: University of Michigan Press.

APPENDIX A

Contoid contrasts

/py/, /pw/ and /p/ contrast in the following identical and analogous environments.

/ho.pe/	[hɔpɛ]	*tabacco*
/na.pwe/	[napʷɛ]	*maternal cousin*
/po.po/	[pɔpɔ]	*papaya (loan word)*
/ko.pyo/	[kɔpʲɔ]	*blind*

/ky/, /kw/ and /k/ contrast in the following identical and analogous environments.

/kyor/	[kʲɔɾ]	*downwards*
/kwor/	[kʷɔɾ]	*cane bangle*
/kor/	[kɔɾ]	*little way (adv.)*

/hy/, /hw/ and /h/ contrast in the following identical and analogous environments.

/hwok/	[hʷɔk]	*pig*
/hok/	[hɔk]	*to be afraid*
/hyaw/	[ɸʲʌʷ]	*unwilling*
/hawr/	[hʌʷɾ]	*to wash, bathe*

/ny/, /nw/ and /n/ contrast in the following identical and analogous environments.

/nyo/	[nʲɔ]	*young boy or girl*
/nwoh/	[nʷɔɸ]	*dog*
/non/	[nɔn]	*with*
/hano/	[hanɔ]	*my*

/ry/, /rw/ and /r/ contrast in the following identical and analogous environments.

/ryan/	[ɖʲan]	*to swell*
/ran/	[ɾan]	*tree (sp.)*
/rwak/	[ɾʷak]	*to stay*
/rak/	[ɾak]	*it would not be good*

/sy/, /sw/ and /s/ contrast in the following identical environments.

/saw/	[sʌʷ]	*hole (in tree)*
/swaw/	[sʷʌʷ]	*stomach*

/ syaw /	[$s^{i}\Lambda^{u}$]	*penis gourd*

/mw/ and /m/ contrast in the following identical environments.

/ kamwon /	[kam^{u}ɔn]	*sister's child*
/ kamon /	[kamɔn]	*one*

/h/ and /p/ contrast in the following identical environments.

/ ha /	[ha]	*I*
/ pa /	[ba]	*not*
/ yoh /	[^{i}ɔɸ]	*banana*
/ yop /	[^{i}ɔb]	*position*
/ ipey /	[ibe^{i}]	*mother*
/ ihey /	[iɸe^{i}]	*excellent*

/m/, /n/ and /r/ contrast in the following identical environments.

/ on /	[ɔn]	*penis*
/ om /	[ɔm]	*place*
/ or /	[ɔɾ]	*black*
/ ama /	[ama]	*ADDR.(pl)*
/ ara /	[aɾa]	*ADDR.(sg)*
/ ana /	[ana]	*girl's name*
/ hro /	[ɸɾɔ]	*shoot*
/ hmo /	[m̊mɔ]	*theirs*
/ hno /	[n̊nɔ]	*your*

/h/, /r/ and /s/ contrast in the following identical and analogous environments.

/ ra /	[ɾa]	*eat*
/ sa /	[sa]	*woman*
/ ha /	[ha]	*I*
/ sor /	[sɔɾ]	*count*
/ sos /	[sɔs]	*start string bag*
/ yoh /	[^{i}ɔɸ]	*banana*
/ pese /	[bɛsɛ]	*NEG.IMP*
/ perey /	[bɛɾe^{i}]	*where*
/ sehe /	[sɛhɛ]	*that (obj.)*

/m/. /w/, and /p/ contrast in the following identical and anologous environments

/won/	[^{u}ɔn]	*fat*
/mon/	[mɔn]	*to*
/poni/	[bɔni]	*current*
/som/	[sɔm]	*dry*
/nop/	[nɔb]	*iron wood*
/now/	[no^{u}]	*tree*

Vocoid contrasts

/i/, /e/ and /a/ contrast in the following identical and anologous environments.

/i/	[i]	*mark on skin*
/e/	[ɛ]	*vulva*
/a/	[a]	*house*
/ri/	[di]	*spear*
/re/	[dɛ]	*come*
/ra/	[da]	*eat*
/hir/	[ɸid]	*fence*
/har/	[haɾ]	*some*
/wer/	[^{u}ɛɾ]	*rat*
/swar/	[swaɾ]	*grow*

/u/. /o/ and /a/ contrast in the following analogous environments.

/ur/	[uɾ]	*vine*
/or/	[ɔɾ]	*black*
/ar/	[aɾ]	*tree (sp.)*
/mu/	[mu]	*crocodile*
/mo/	[mɔ]	*GENITIVE(pl)*
/ma/	[ma]	*leaf*
/sun/	[sun]	*tool to wash sago*
/son/	[sɔn]	*line up*
/pok/	[bɔk]	*to dig*
/pak/	[bak]	*DUBITATIVE*

/e/, /ey/ and /ei/ contrast in the following analogous environments.

/ re /	[ɻɛ]	*come*
/ rey /	[ɻe^{i}]	*go*
/ rei /	[ɻei]	*cut*
/ wer /	[^{u}ɛɾ]	*rat*
/ weyr /	[^{u}e^{i}ɾ]	*pair of thongs (flip-flops)*
/ weir /	[^{u}eiɾ]	*fish (sp.)*
/ sen /	[sɛn]	*too, also*
/ seyn /	[se^{i}n]	*grind on hand*
/ sein /	[sein]	*scratch when itching*
/ reys /	[ɻe^{i}s]	*the two*
/ reis /	[ɻeis]	*day after tomorrow*

/o/, /ow/ and /ou/ contrast in the following analogous and identical environments.

/ mo /	[mɔ]	*GENITIVE (pl.)*
/ mow /	[mo^{u}]	*give birth*
/ mou /	[mou]	*water insect (sp.)*
/ ros /	[ɾɔs]	*mold (stove)*
/ rows /	[ɾo^{u}s]	*fill up (water)*
/ rous /	[ɾous]	*chase*
/ som /	[sɔm]	*dry*
/ sowm /	[so^{u}m]	*fish basket*
/ oum /	[oum]	*sago (sp.)*

/a/, /aw/ and /au/ contrast in the following analogous environments.

/ pa /	[pa]	*NEGATION*
/ paw /	[pʌ^{u}]	*tree (sp.)*
/ pau /	[pʌu]	*remove tree bark*
/ san /	[san]	*chewed food*
/ sawn /	[sʌ^{u}n]	*lung*
/ saun /	[sʌun]	*to dig*
/ har /	[haɾ]	*some*
/ hawr /	[hʌ^{u}ɾ]	*to wash*
/ a /	[a]	*house*
/ ay /	[ʌ^{i}]	*lime*
/ ai /	[ʌi]	*food, fish*

/ sa /	[sa]	*woman*
/ say /	[sʌ^{i}]	*throw*
/ sai /	[sʌi]	*planting stick*
/ mar /	[maɾ]	*feel shame*
/ mayr /	[mʌ^{i}ɾ]	*scrape*
/ mair /	[mʌiɾ]	*adze*

/u/, /uw/, /ou/, /ow/ /uo/ and /wo/ contrast in the following analogous and identical environments.

/ ur /	[uɾ]	*vine*
/ uwr /	[ʊɾ]	*man*
/ mour /	[mouɾ]	*small tree w. yellow flower*
/ mowr /	[mo^{u}ɾ]	*bird (sp.)*
/ kuor /	[kuɔɾ]	*sore, wound*
/ kwor /	[k^{u}ɔɾ]	*cane bangle*
/ howk /	[ho^{u}k]	*lake*
/ huok /	[huɔk]	*pig*
/ rwon /	[ɾ^{u}ɔn]	*heart*
/ youn /	[^{i}oun]	*mushroom (sp.)*
/ sun /	[sun]	*tool to wash sago*

/i/,/iy/, /ei/, /ey/, /ie/ and /ye/ contrast in the following analogous and identical environments.

/ ri /	[di]	*spear*
/ riy /	[dɪ]	*able to*
/ rei /	[ɻei]	*cut*
/ rey /	[ɻe^{i}]	*go*
/ rie /	[d'ɛ]	*climb*
/ hin /	[ɸin]	*shoot*
/ hiy /	[ɸɪ]	*he*
/ hey /	[he^{i}]	*play*
/ hye /	[ɸ^{i}ɛ]	*him (obj.)*
/ hien /	[ɸiɛn]	*similar*

APPENDIX B

Phonetic & phonemic representations and glosses for Chart 13A, 13B, 14A, 14C

Chart B1, See chart 13A Consonants + glides word initial

/Ci/					
/pin/	[bin]	*sago tree (sp.)*	**/ki/**	[ki]	*ground*
/ni/	[ni]	*urinate*	**/si/**	[si]	*defecate*
/ri/	[di]	*spear*	**/hin/**	[ᵘin]	*widow*
/Ce/					
/hope/	[hɔbɛ]	*tobacco*	**/ken/**	[kɛn]	*into the water*
/me/	[mɛ]	*objective marker*	**/nene/**	[nɛnɛ]	*eye*
/sen/	[sɛn]	*also*	**/re/**	[ɾɛ]	*come*
/hehe/	[hɛhɛ]	*the two of you (obj.)*	**/wer/**	[ᵘɛɾ]	*rat*
/yen/	[ⁱɛn]	*moon*			
/Ca/					
/pa/	[pa]	*not*	**/kan/**	[kan]	*vine to climb tree*
/mam/	[mam]	*aunt's husband*	**/nakey/**	[nakeⁱ]	*go*
/sa/	[sa]	*woman*	**/rak/**	[ɾak]	*would not be good*
/ha/	[ha]	*1.SG*	**/wa/**	[ᵘa]	*soul*
/ya/	[ⁱa]	*FUTURE MARKER*			
/Co/					
/pok/	[bɔk]	*to dig*	**/kos/**	[kɔs]	*male's name*
/mok/	[mɔk]	*break off(ground)*	**/nop/**	[nɔb]	*ironwood*
/sok/	[sɔk]	*snake*	**/rok/**	[ɾɔk]	*cane(sp.)*
/hoh/	[hɔh]	*the two of you*	**/won/**	[ᵘɔn]	*fat,grease*
/yoh/	['ɔɸ]	*banana*			

/Cu/					
/pusoup/	[pusoup]	*splashing of water*	**/ku/**	[ku]	*axe*
/mu/	[mu]	*crocodile*	**/su/**	[su]	*coconut*
/ru/	[ɾu]	*copulate*	**/hu/**	[hu]	*water*
/yu/	[ⁱu]	*mosquito*			
/Cei/					
/peik	[beik]	*ill*	**/kei/**	[kei]	*break*
/mei/	[mei]	*long*	**/sonei/**	[sɔnei]	*sugarcane(sp.)*
/sei/	[sei]	*thatching the roof*	**/rei/**	[ɻei]	*cut(meat)*
/hei/	[hei]	*play*	**/wein/**	[ᵘein]	*female grandchild*
/yeik/	[ⁱeik]	*arrow*			
/Cey/					
/pey/	[beⁱ]	*sugarcane*	**/nakey/**	[nakeⁱ]	*go*
/mey/	[meⁱ]	*work*	**/ney/**	[neⁱ]	*child*
/sey/	[seⁱ]	*mat to dry fish on*	**/rey/**	[ɻeⁱ]	*go*
/hey/	[heⁱ]	*VERBAL PREFIX*	**/weyn/**	[ᵘeⁱn]	*red flower vine*
/yeyr/	[ⁱeⁱɾ]	*broom*			
/Cai/					
/pain/	[bʌin]	*to destine*	**/kair/**	[kʌiɾ]	*to take out/remove*
/mair/	[mʌiɾ]	*adze*	**/sai/**	[sʌi]	*planting stick*
/wai/	[ᵘʌi]	*front/back of house*	**/yai/**	[ⁱʌi]	*edible insect*
/Cay/					
/pay/	[bʌⁱ]	*piece of something*	**/kay/**	[kʌⁱ]	*female's name*
/may/	[mʌⁱ]	*lower part of tool*	**/nay/**	[nʌⁱ]	*younger sibling*
/say/	[sʌⁱ]	*to throw*	**/ray/**	[ɾʌⁱ]	*maniok root*
/hay/	[hʌⁱ]	*FOCUS*	**/way/**	[ᵘʌⁱ]	*to carry*
/yay/	[ⁱʌⁱ]	*drain*			

/Cau/					
/pau/	[bʌu]	*already*	**/kaun/**	[kʌun]	*to break*
/sau/	[sʌu]	*to run*	**/raun/**	[rʌun]	*to shout/burst out*
/wau/	[ᵘʌu]	*name of river*	**/yau/**	[ⁱʌu]	*go up*
/Caw/					
/paw/	[bʌᵘ]	*tree (sp.)*	**/kawk/**	[kʌᵘk]	*to put inside*
/mawk/	[mʌᵘk]	*blunt*	**/naw/**	[nʌᵘ]	*sago*
/saw/	[sʌᵘ]	*hole*	**/paraw/**	[barʌᵘ]	*in the past*
/hawr/	[hʌᵘɾ]	*to wash/bathe*	**/waw/**	[ᵘʌᵘ]	*cloud*
/yaw/	[ⁱʌᵘ]	*tomorrow*			
/Cou/					
/pou/	[bou]	*swelling in the groin*	**/mou/**	[mou]	*insect (sp.)*
/aynou/	[ʌⁱnou]	*verandah*	**/sou/**	[sou]	*multitude/group*
/rou/	[ɾou]	*play flute*	**/hou/**	[hou]	*poison*
/wouk/	[ᵘouk]	*vomit*	**/your/**	[ⁱouɾ]	*different*
/Cow/					
/pow/	[boᵘ]	*female animal*	**/kow/**	[koᵘ]	*give*
/mow/	[moᵘ]	*give birth*	**/now/**	[noᵘ]	*tree*
/sow/	[soᵘ]	*backside of garden*	**/row/**	[ɾoᵘ]	*to defecate*
/how/	[hoᵘ]	*taro*	**/wow/**	[ᵘoᵘ]	*traditional drum*
/yowr/	[ⁱoᵘɾ]	*areca palm*			

Chart B2 - See chart 13B - Consonants/glides word initial

/Ciy/					
/piynay/	[bɪnʌ^{i}]	*to tie*	**/howniy/**	[ho^{u}nɪ]	*wind*
/riy/	[rɪ]	*able to*	**/hiy/**	[ɸɪ]	*he*
/Cuw/					
/ruw/	[ɾʊ]	*bone of a cassowary*	**/rohuwn/**	[ɾɔhʊn]	*water level rises*
/Cie/					
/pie/	[biɛ]	*firstly*	**/kie/**	[kiɛ]	*goanna*
/rie/	[ɾiɛ]	*climb*	**/hien/**	[ɸiɛn]	*similar to*
/Cye/					
/hye/	[ɸ^{i}ɛ]	*him*			
/Cia/					
/piar/	[biar]	*fence in*	**/kian/**	[kian]	*poisonous vine*
/nian/	[nian]	*own*	**/sian/**	[sian]	*fly up*
/rian/	[dian]	*to sleep*			
/Cya/					
/pyays/	[b^{i}ʌ^{i}s]	*tree (sp.)*	**/nyan/**	[n^{i}an]	*see vaguely*
/syaw/	[s^{i}ʌ^{u}]	*penis gourd*	**/ryan/**	[d^{i}an]	*to swell up*
/hyaw/	[ɸ^{i}ʌ^{u}]	*unwilling*			
/Cio/					
/pion/	[biɔn]	*meat*	**/kior/**	[kiɔɾ]	*frog (sp.)*
/nio/	[niɔ]	*to and fro*	**/siop/**	[siɔp]	*footprint*
/riok/	[diɔk]	*devil*	**/hiok/**	[ɸiɔk]	*paddle upstream*
/Cyo/					
/kopyo/	[kɔb^{i}ɔ]	*blind*	**/kyor/**	[k^{i}ɔɾ]	*downwards*
/nyo/	[n^{i}ɔ]	*young girl or boy*	**/syo/**	[s^{i}ɔ]	*bird whistling*
/hyo/	[ɸ^{i}ɔ]	*his*			

/Cue/					
/kue/	[kuɛ]	*edible ant*	**/sue/**	[suɛ]	*secretly*
/pruen/	[bɾuɛn]	*one*			
/Cwe/					
/napwe/	[nab^{u}ɛ]	*maternal cousin*	**/kwekwe/**	[k^{u}ɛk^{u}ɛ]	*lizard (sp.)*
/nweyk/	[n^{u}ɛ^{i}k]	*ear*	**/swe/**	[s^{u}ɛ]	*whistling*
/Cua/					
/puar/	[buaɾ]	*refuse/stop*	**/kuan/**	[kuan]	*cross over*
/Cwa/					
/kwan/	[k^{u}an]	*flattery*	**/swar/**	[s^{u}aɾ]	*to grow*
/rwak/	[r^{u}ak]	*stay/be*			
/Cuo/					
/puon/	[buɔn]	*make knots*	**/kuor/**	[kuɔɾ]	*sore*
/kamwon/	[kam^{u}ɔn]	*sister's child*	**/nwoh/**	[n^{u}ɔɸ]	*dog*
/rwon/	[r^{u}ɔn]	*heart*	**/hwon/**	[h^{u}ɔn]	*you*

Chart B3 - See chart 14A - Consonants word final

/iC/					
/worim/	[^{u}ɔɾim]	*bat*	**/hin/**	[ɸin]	*shoot*
/hir/	[ɸid]	*fence*	**/orih/**	[ɔɾiɸ]	*father*
/eC/					
/ihen/	[iɸɛn]	*shield*	**/wer/**	[^{u}ɛɾ]	*rat*
/aC/					
/rak/	[ɾak]	*would not be good*	**/nam/**	[nam]	*husk of coconut*
/kan/	[kan]	*vine to climb trees*	**/sas/**	[sas]	*start of weaving*
/kar/	[kaɾ]	*gladness*	**/sah/**	[saɸ]	*wife*

/oC/					
/nop/	[nɔp]	*ironwood tree*	**/mok/**	[mɔk]	*breaks away*
/som/	[sɔm]	*dry*	**/ron/**	[ɾɔn]	*do*
/ros/	[ɾɔs]	*mould*	**/yor/**	[^{i}ɔɾ]	*custom*
/yoh/	[^{i}ɔɸ]	*banana*			
/uC/					
/Hunuk/	[hunuk]	*male's name*	**/sun/**	[sun]	*tool to wash sago*
/sur/	[suɾ]	*banana (sp.)*	**/kamuh/**	[kamuɸ]	*maternal uncle*

/eiC/					
/reip/	[ɾeib]	*bear fruit*	**/meik/**	[meik]	*in three days*
/neim/	[neim]	*vine (sp.)*	**/sein/**	[sein]	*scratch skin*
/peis/	[beis]	*muddy ground*	**/eir/**	[eiɾ]	*above*
/reih/	[ɻeiɸ]	*take away and eat*			
/eyC/					
/neyp/	[ne^{i}b]	*tree (sp.)*	**/meyk/**	[me^{i}k]	*root*
/eym/	[e^{i}m]	*darkness*	**/seyn/**	[se^{i}n]	*grind/roll*
/peys/	[be^{i}s]	*sore gets worse*	**/eyr/**	[e^{i}ɾ]	*male animal*
/reyh/	[ɻe^{i}ɸ]	*go up (smoke)*			
/aiC/					
/kyaip/	[k^{i}ʌib]	*cousin's husband*	**/pain/**	[bʌin]	*to destine*
/pair/	[bʌiɾ]	*inner part of sago*			
/ayC/					
/nayp/	[nʌ^{i}b]	*ginger (sp.)*	**/nayk/**	[nʌ^{i}k]	*owner of animal*
/nayn/	[nʌ^{i}n]	*think*	**/nays/**	[nʌ^{i}s]	*tooth*
/payr/	[bʌ^{i}ɾ]	*fish*	**/yarayh/**	[^{i}aɾʌ^{i}ɸ]	*left*

/auC/					
/iaup/	[iʌub]	*to mark*	**/saun/**	[sʌun]	*to dig*
/awC/					
/nawp/	[nʌ^{u}b]	*old*	**/pawk/**	[bʌ^{u}k]	*to look for*
/sawn/	[sʌ^{u}n]	*lung*	**/naws/**	[nʌ^{u}s]	*to cook*
/hawr/	[hʌ^{u}ɾ]	*to wash/bathe*	**/arawh/**	[aɾʌ^{u}ɸ]	*night*
/ouC/					
/soup/	[soub]	*splashing of water*	**/pouk/**	[bouk]	*bird (sp.)*
/roum/	[ɾoum]	*burn*	**/youn/**	[^{i}oun]	*mushroom*
/rous/	[ɾous]	*chase*	**/pour/**	[bouɾ]	*tree (sp.)*
/youh/	[^{i}ouɸ]	*aunt*			
/owC/					
/sowp/	[so^{u}b]	*having a cold*	**/rowk/**	[ɾo^{u}k]	*cut*
/nowm/	[no^{u}m]	*tree (sp.)*	**/rows/**	[ɾo^{u}s]	*collect water*
/powr/	[bo^{u}ɾ]	*make flooring*	**/rorowh/**	[ɾɔɾo^{u}ɸ]	*to dig with hands*

Chart B4 - See chart 14B - Consonants word final.

/uwC/					
/rohuwn/	[ɾɔhʊn]	*water level rises*	**/suwr/**	[sʊɾ]	*tortoise*
/ieC/					
/hien/	[ɸiɛn]	*similar to*	**/nies/**	[niɛs]	*rest*
/ier/	[iɛɾ]	*village*			
/yeC/					
/yen/	[^{i}ɛn]	*moon*			
/iaC/					
/iap/	[iab]	*caused illness*	**/nian/**	[nian]	*own*
/piar/	[biaɾ]	*fence in*			

/yaC/					
/nyan/	[nʲan]	*see vaguely*	**/yar/**	[ʲaɾ]	*shine*
/ioC/					
/siop/	[siɔb]	*footprint*	**/hiok/**	[ɸiɔk]	*paddle upstream*
/hiom/	[ɸiɔm]	*brother*	**/pion/**	[biɔn]	*meat*
/kior/	[kiɔɾ]	*frog*	**/ioh/**	[iɔɸ]	*mix*
/yoC/					
/yop/	[ʲɔb]	*place, position*	**/yok/**	[ʲɔk]	*plant shoot*
/kyor/	[kʲɔɾ]	*downwards*	**/yoh/**	[ʲɔɸ]	*banana*
/ueC/					
/pruen/	[bɾuɛn]	*one*			
/weC/					
/krwem/	[kɾʷɛm]	*argue*	**/wen/**	[ʷɛn]	*habit*
/wer/	[ʷɛɾ]	*rat*			
/uaC/					
/pruam/	[bɾuam]	*cassowary*	**/kuan/**	[kuan]	*cross over*
/puar/	[buaɾ]	*refuse/stop*			
/waC/					
/rwak/	[ɾʷak]	*be/stay*	**/kwan/**	[kʷan]	*flattery*
/swar/	[sʷaɾ]	*grow*			
/uoC/					
/huok/	[huɔk]	*pig*	**/huon/**	[huɔn]	*marry*
/kuor/	[kuɔɾ]	*sore*			
/woC/					
/hwon/	[hʷɔn]	*you*	**/pwos/**	[pʷɔs]	*stiff*
/kwor/	[kʷɔɾ]	*sore*	**/nwoh/**	[nʷɔɸ]	*dog*

Chart B5 –Glosses for the words used in chart 18

/riy/	*able to*	/rie/	*climb*
/hiy/	*he*	/ier/	*village*
/piynay/	*tie*	/hien/	*like, similar*
/kian/	*poisonous vine*	/ion/	*go upstream*
/ia/	*fire*	/kior/	*frog*
/ria/	*water level drops*	/nio/	*to and fro*
/yen/	*moon*	/ya/	*FUTURE*
/hye/	*him*	/ryan/	*swell up*
/yar/	*shine*		
/yop/	*position*	/yu/	*mosquito*
/syo/	*bird's whistle sp.*	/ryuk/	*cry*
/kyor/	*down*		
/rei/	*cut*	/rey/	*go*
/eir/	*python*	/eyr/	*male animal*
/peik/	*ill*	/meyk/	*root*
/wai/	*front of house*	/way/	*carry*
/ai/	*food, fish*	/ay/	*lime*
/kair/	*to remove*	/mayr/	*scrape*
/waw/	*cloud/*	/wau/	*name of river*
/aw/	*fight*	/kaun/	*break*
/yawk/	*net*	/iaup/	*give destination*
/row/	*to rub*	/rou/	*play bamboo flute*
/ow/	*tree bud*	/ou/	*red, ripe*
/sowp/	*having a cold*	/sous/	*prevent*
/win/	*widow*	/wen/	*behaviour*
/awia/	*enemy*	/swe/	*bird's whistle*
/kweyr/	*laugh*		
/wa/	*soul*	/won/	*fat*
/kwa/	*permissive*	/hwon/	*you*
/swar/	*grow*	/kwor/	*sore*
/sue/	*secretly*	/kuan/	*cross*
/ueir/	*garden*	/puay/	*older sister*
/pruen/	*one*	/puan/	*wipe off*
/kuor/	*sore*	/ruw/	*copulate*
/huok/	*pig*	/uwr/	*man*
/hruo/	*contact spirits*	/rohuwn/	*flood*

Use of the morpheme /o/ in chart 23.

/o/ can occur noun phrase final and verb phrase final. When it occurs noun phrase final, it means 'and' and cojoins NPs.

E.g.	/yoh	o,	naw	iwon	o,	naw	porih	o/
	banana	and	sago	new	and	sago	old	and

"bananas and new sago and old sago"

/o/ can also occur verb phrase final as part of the discontinued morpheme /pese ... o/ 'do not'.

e.g.	/pese	rira	o/
	NEG.IMP	look	NEG

Don't look"