

WORKPAPERS IN INDONESIAN LANGUAGES AND CULTURES

Volume 12



THE SUMMER INSTITUTE OF LINGUISTICS
IN COOPERATION WITH
THE DEPARTMENT OF EDUCATION AND CULTURE

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LANGUAGES AND CULTURES**

Volume 12

SULAWESI PHONOLOGIES

**René van den Berg
Editor**

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SULAWESI PHONOLOGIES

René van den Berg, Editor

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FOREWORD

Earlier issues of *Workpapers in Indonesian Languages and Cultures* that focused on Sulawesi have dealt with survey results (see volumes 5 and 11). This is the first to be exclusively devoted to the results of phonological analysis in Sulawesi, following the pattern set by the volumes dealing with phonologies of Maluku and Irian Jaya languages.

The phonologies of five languages are presented, three of which belong to the lesser known languages of the South Sulawesi group. PUS (Pitu Ulunna Salu) is described by Philip Campbell, Mamasa by David Matti, and Aralle-Tabulahan by Robin McKenzie. Although the phonology of Mamasa appears to be very similar to that of Sa'dan Toraja, the other two languages show remarkable divergences, such as the presence of a sixth vowel, constraints on final nasals (only *m* in PUS) and the development of geminate consonants into *hp*, *ht*, etc. in Tabulahan. Most worthy of attention, however, is the complex morphophonemics of all three languages. The authors have done an excellent job in trying to account for all processes that occur, formulating them in a generative framework. This joint publication will also facilitate comparison between these closely related languages.

The other two phonologies are from what I have begun to call the 'Celebic' group (a supergroup encompassing Kaili-Pamona, Bungku-Mori-Tolaki, and the putative Muna-Buton group). Napu, described by Roger and Leanne Hanna, is a member of the Kaili-Pamona group. In striking contrast to the South Sulawesi languages, the phonology of this language is relatively straightforward with hardly any morphophonemics. An interesting aspect of Hannas' description is their treatment of co-occurrence restrictions in Napu, allowing for further comparisons with other Austronesian languages.

The last contribution to this volume is Marjo Karhunen's description of the phonology of Padoe, formerly considered a Mori dialect, and a member of the Bungku-Mori-Tolaki group. Just as Napu, this language offers few complexities in its sound structure, although morphophonemic processes, which are only succinctly treated here, show more variety. The alternation between long and short (or single and double) vowels, for instance, is remarkable and asks for an explanation.

Finally, we wish to thank our sponsors, the Department of Education and Culture, Hasanuddin University in Ujung Pandang, and Tadulako University in Palu. Joanne Newell and Waris Pribadi have done an excellent job in preparing this volume for publication. As usual, the authors and the editor welcome any comments or suggestions regarding the findings presented here.

René van den Berg
Ujung Pandang
December 1991

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PHONOLOGY OF PITU ULUNNA SALU

Philip J. Campbell
UNHAS-SIL

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ABBREVIATIONS AND SYMBOLS

C	–	consonant
CAUS	–	causative
EMP	–	emphatic
IMPF	–	imperfective
LOC	–	locative
PRF	–	perfective
PRT	–	particle
Q	–	question
S	–	syllable
UN	–	uncertainty
V	–	vowel
1	–	first person
2	–	second person
3	–	third person
du	–	dual
ex	–	exclusive
in	–	inclusive
s	–	singular
pl	–	plural
#	–	word boundary
–	–	morpheme boundary
*	–	disallowed form
//	–	(morpho–)phonemic transcription
[]	–	phonetic transcription
{ }	–	one of two or more alternates
()	–	optional

1. INTRODUCTION

Pitu Ulunna Salu (PUS), an Austronesian language, is a member of the Pitu Ulunna Salu subfamily in the Northern South Sulawesi language family. PUS (alternately known as Bambam or Bambang) is spoken by some 22,000 speakers in South Sulawesi. Most speakers of PUS live in the district of Mambi of the regency Polewali-Mamasa. This study reflects the phonology of the Salumokanam dialect of PUS. Salumokanam is the dialect spoken in the eastern part of sub-district Rantebulahan. The field work leading to this paper was done in the village of Tanete.

2. SEGMENTALS

2.1 Phones and Phonemes

In this section I will list the PUS phones and underlying phonemes.

2.1.1 Phone Chart

The following phones are present in PUS:

Table 1.—PUS Phones

Contoids:

		labial	alveo- alveolar	palatal	velar	glottal
stops						
	vl	p	t		k	ʔ, ¹
	vd	b	d		g	
affricate				dʒ		
fricative						
	vl		s			h
	vd	ɸ ²				
nasal		m	n		ŋ	
lateral			l			

¹The symbol [^] is used to indicate a rearticulation of a vowel sound. In such cases the vowel is not a lengthened vowel, nor are the two vowels separated by a full glottal stop, e.g., /oo/ —> [o[^]o] 'again'.

²While the bilabial fricative is found in the Salumokanam dialect, other dialects of PUS have a corresponding [b] or [w]. (See discussion of dialects in Strømme.)

Vocoids:

		front	central	back
high		i		u
mid	tense	e		o
	lax	ɛ	ə	
low		æ		a

2.1.2 Chart Of Phonemes

Underlying the aforementioned phones are fourteen consonant phonemes and six vowel phonemes:

Table 2.—PUS Phonemes

Consonants:

	labial	alveolar	back
stops			
voiceless	p	t	k
voiced	b	d	g
affricate		j ³	
fricatives	ɸ	s	h
nasals	m	n	ŋ
lateral		l	

Vowels:

	front	back
high	i	u
mid	e	o
low	æ	a

One of the unusual features of PUS phonology is the presence of the phoneme /æ/. To my knowledge, this phoneme is not found in South Sulawesi outside of the Pitu Ulunna Salu subfamily. Refer to the appendix for a presentation on the phoneme /æ/.

³In this paper the consonant dʒ is symbolized as 'j'.

2.1.3 Feature Matrix

Following are the fully specified feature matrices for PUS segments:

Table 3.—Feature Matrices

Consonants:	p	t	k	b	d	g	j	m	n	ɲ	l	ʎ	s	h
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	-
continuant	-	-	-	-	-	-	-	-	-	-	+	+	+	+
nasal	-	-	-	-	-	-	+	+	+	-	-	-	-	-
anterior	+	+	-	+	+	-	-	+	+	-	+	+	+	-
coronal	-	+	-	-	+	-	+	-	+	-	+	-	+	-
voiced	-	-	-	+	+	+	+	+	+	+	+	+	+	-
Vowels:	i	e	æ	a	o	u								
syllabic	+	+	+	+	+	+								
high	+	-	-	-	-	+								
low	-	-	+	+	-	-								
back	-	-	-	+	+	+								

2.2 Interpretation

2.2.1 Consonant vs. Vowel

The high vowels *i* and *u* are always interpreted as vowels, not semivowels. There are no phonemic semivowels in PUS. The only semivowels present are allophones of /i/ and /u/. These allophones occur when preceding a stressed vowel. In this environment /i/ → [y] and /u/ → [w]. For example: /iolo/ → [yólo] 'first'; /uase/ → [wáse] 'axe'. This process only occurs in a few words.

2.2.2 Sequence vs. Unit

There are no ambiguous CC patterns found within the syllable in PUS words. The consonant *dʒ* is interpreted as a unit, not as a stop-fricative sequence. This consonant is symbolized by 'j'.

2.3 Description of Phonemes

2.3.1 Consonant Phonemes

In the following list the consonant phonemes are shown word initially, medially and finally.

Table 4.—Positions of Consonant Phonemes

/p/	initial	/pahe/	[páhe]	'rice plant'
	medial	/api/	[ápi]	'fire'
/t/	initial	/tedom/	[tédom]	'water buffalo'
	medial	/pitu/	[pítu]	'seven'
/k/	initial	/kaluku/	[kalúku]	'coconut'
	medial	/iko/	[íko]	'you'
	final	/ulak/	[úlaʔ]	'snake'
/b/	initial	/babi/	[bábi]	'pig'
	medial	/tibak/	[tíbaʔ]	'kitchen knife'
/d/	initial	/daham/	[dáham]	'horse'
	medial	/buda/	[búda]	'many'
/g/	initial	/gabum/	[gábum]	'fog'
	medial	/sahigam/	[sahígam]	'bed'
/j/	initial	/joŋa/	[jóŋa]	'deer'
	medial	/kaŋu/	[káŋu]	'wood'
/s/	initial	/sola/	[sóla]	'friend', 'with'
	medial	/isi/	[ísi]	'tooth'
/ɸ/	medial	/ube/	[úbe]	'rattan'
		/babi/	[bábi]	'pig'
/h/	initial	/hibuk/	[híbuʔ]	'wind'
	medial	/uham/	[úham]	'rain'
/m/	initial	/makalek/	[makáleʔ]	'tomorrow'
	medial	/temo/	[témo]	'now'
	final	/tedom/	[tédom]	'water buffalo'
/n/	initial	/nene/	[néne]	'grandparent'
	medial	/mænek/	[máneʔ]	'chicken'
/ŋ/	initial	/ŋahaŋaha/	[ŋahaŋáha]	'lie on back'
	medial	/beŋi/	[béŋi]	'night'
/l/	initial	/lante/	[lánte]	'mat'
	medial	/sule/	[súle]	'come'

2.3.2 Vowel Phonemes

The following list shows the vowel phonemes and demonstrates each in positions noncontiguous with other vowel phonemes.

Table 5.—Positions of Vowel Phonemes

/i/	1st syll	/ihuk/	[íhuʔ]	'to drink'
		/illæ/	[íllæ]	'nose'
		/piham/	[píham]	'when'
	2nd syll	/moni/	[móni]	'noise'
		/benji/	[béŋi]	'night'
/e/	1st syll	/melok/	[méloʔ]	'want'
		/belak/	[bélaʔ]	'garden'
		/tettek/	[tétteʔ]	'hour'
	2nd syll	/kessi/	[késsi]	'with contents'
		/lante/	[lánte]	'mat'
		/sule/	[súle]	'come'
		/kabem/	[kábem]	'married'
/æ/	1st syll	/sædæ/	[sádæ]	'mouth'
		/hættuk/	[háttuʔ]	'popcorn'
		/mænek/	[máneʔ]	'chicken'
	2nd syll	/tontæm/	[tóntæm]	'same'
		/lempæ/	[lémpæ]	'turn'
		/issæ/	[íssæ]	'rice mortar'
/u/	1st syll	/ulak/	[úlaʔ]	'snake'
		/ube/	[úbe]	'rattan'
		/tubo/	[túbo]	'to live'
	2nd syll	/asu/	[ásu]	'dog'
		/pitu/	[pítu]	'seven'
/o/	1st syll	/tondæk/	[tóndæʔ]	'village'
		/bosi/	[bósi]	'rotten'
		/golla/	[gólla]	'sugar'
	2nd syll	/temo/	[témo]	'now'
		/ampo/	[ámpo]	'grandchild'
/a/	1st syll	/mane/	[máne]	'before'
		/dakok/	[dákoʔ]	'later'
		/hambu/	[hámbu]	'smoke'
	2nd syll	/biŋa/	[bíŋa]	'deaf'
		/umba/	[úmba]	'which'

2.4 Phoneme Contrast

In the following sections I will present examples of contrasts between phonetically similar phonemes.

2.4.1 Contrast of Consonant Phonemes

/p/ vs. /b/	/paha/	[páha]	'rack'
	/baham/	[báham]	'thing'
	/ampak/	[ámpaʔ]	'mat'
	/ambek/	[ámbeʔ]	'father'
/p/ vs. /ɸ/	/sapok/	[sápoʔ]	'except'
	/iaɸo/	[yáɸo]	'above'
/b/ vs. /ɸ/	/habu/	[hábu]	'Wednesday'
	/taiabu/	[taiábu]	'dust, ashes'
/t/ vs. /d/	/daum/	[dáum]	'leaf'
	/taum/	[táum]	'year'
	/buda/	[búda]	'many'
	/buta/	[búta]	'blind'
/t/ vs. /j/	/tumak/	[túmaʔ]	'louse'
	/jumak/	[júmaʔ]	'Friday'
	/batu/	[bátu]	'rock'
	/baju/	[báju]	'shirt'
/d/ vs. /j/	/dukak/	[dúkaʔ]	'also'
	/jumak/	[júmaʔ]	'Friday'
	/pada/	[páda]	'same size'
	/dibaja/	[dibája]	'to weed'
/j/ vs. /s/	/kaju/	[káju]	'wood'
	/asu/	[ásu]	'dog'
/k/ vs. /g/	/kahapa/	[kahápa]	'almost'
	/gahaktak/	[gaháttaʔ]	'paper'
	/lako/	[láko]	'to over there'
	/lago/	[lágo]	'spouse of ego's spouse's sibling'
/m/ vs. /n/	/menna/	[ménna]	'who'
	/nene/	[néne]	'grandparent'
	/tene/	[téne]	'urine'
	/temo/	[témo]	'now'

/m/ vs. /ŋ/	/mahomaho/	[mahomáho]	'naughty'
	/ŋahaŋaha/	[ŋahaŋáha]	'lie on back'
	/tama/	[táma]	'enter'
	/saŋa/	[sáŋa]	'name'
/n/ vs /ŋ/	/nek/	[né [^] e?]	'down'
	/ŋei/	[ŋéi]	'place'
	/denak/	[déna?]	'sparrow'
	/seŋak/	[séŋa?]	'different'
/n/ vs /l/	/mane/	[máne]	'just, before'
	/bale/	[bále]	'meat'

2.4.2 Contrast of Vowel Phonemes

/i/ vs /e/	/ita/	[íta]	'see'
	/eta/	[éta]	'here'
	/tidom/	[tídom]	'irreversible deed'
	/tedom/	[tédom]	'water buffalo'
	/adi/	[ádi]	'younger sibling'
	/ate/	[áte]	'liver'
/e/ vs /æ/	/melok/	[mélo?]	'desire'
	/mænek/	[mæne?]	'chicken'
	/tille/	[tílle]	'a type of grass'
	/illæ/	[íllæ]	'nose'
/æ/ vs /a/	/kadok/	[kádo?]	'I'
	/kædok/	[kædo?]	'to latch'
	/assa/	[ássa]	'it depends on'
	/issæ/	[íssæ]	'rice mortar'
/o/ vs /u/	/olo/	[ólo]	'in front'
	/ulu/	[úlu]	'head'
	/ponto/	[pónto]	'bracelet'
	/punti/	[púnti]	'banana'
	/aso/	[áso]	'young boy'
	/asu/	[ásu]	'dog'

3. SUPRA SEGMENTAL CONSIDERATIONS

3.1 Stress

Stress in PUS is not phonemic. It normally occurs on the penultimate syllable of words or on the nucleus of the rare one-syllable roots.⁴ The addition of any suffixes to the word (thus making a new word) affects the placement of stress; that is, it causes the stress to shift to the right. The suffixes are: the possessive suffixes on nouns (-ku, 1s; -mu, 2s; -na, 3s,3pl; -ki, 1 dual exclusive; -ta, 1 dual inclusive) and the derivational suffixes -am and -i. The exception to the regular stress rule is in the case of vocatives. Vocatives are always stressed on the last syllable as in /ati/ → [atí] (girl's name). The vocative stress rule occurs before the regular stress rule. The stress placement rule applies only if the last syllable is unstressed. Therefore, a word which receives vocative stress will not undergo stress placement.

(1) Vocative stress:

$$S \rightarrow [+stress] / \text{---} \boxed{\text{---}} \#$$

vocative word

(2) Stress placement:

$$S \rightarrow [+stress] / \text{---} \boxed{\begin{matrix} S \\ [-stress] \end{matrix}} \#$$

word

The stress placement rule is not iterative. Therefore, it will first look for the penultimate syllable and stress it.

- (3) a. /daham-ku/ → [daháŋku] 'my horse'
 b. /piso-mu/ → [pisómu] 'your machete'

Only if there is not a penultimate syllable, i.e., when the word has only one syllable, will the shorter version of the rule apply.

- (4) a. /to/ → [tó] 'which, that'
 b. /le/ → [lé] 'OK'

In contrast to penultimate stress I find that there are several clitics in PUS which, when following a word, do not affect the stress placement on the word. Two factors identify morphemes as clitics in PUS. First of all, clitics, unlike suffixes, are mobile. Verbal clitics, for example, can attach to the end of a verb or to the end of a verb modifier, be it pre-verbal or post-verbal. Clitics are attached in a particular order. For example, the plural clitic -ak attaches to a stem after all

⁴PUS syllable structure will be discussed in 4.1.

other suffixes and clitics are attached. Therefore, other constituents can come between -ak and the stem to which it normally attaches. The second defining feature of clitics is that they do not affect the stress of the stem to which they attach.

The most common of these clitics are the pronominal clitics which follow the predicate. These are the absolutive pronominal clitics in an ergative pronominal system. These absolutive clitics function as subject person markers in intransitive or antipassive clauses, object person markers in transitive clauses, or indirect objects in bitransitive clauses.

- (5) a. /um-tibe-æk/ --> [untibeæʔ] 'I throw (it).'
 b. /ku-dəŋguk-ko/ --> [kudəŋguʔko] 'I hit you.'

The clitic -e is a noun phrase particle (PRT) which possibly indicates referentiality of the noun.

- (6) /lao-ko bawa inde dokko banua-mu -e/
 go-you carry this down house-your-PRT
 [láoko báwa inde dókko banuámmue]
 'Go take this down to your house.'

The clitic -o is also a noun phrase particle (PRT).

- (7) /aka illauk ampek bakba-o/
 what downstream next to door -PRT
 [áka illáuʔ ámpeʔ báʔbao]
 What is next to the door?

The clitic -i is an emphasis marker.

- (8) /pa- elak-i/ ----> [paélaʔi] 'go slowly!'
 CAUS-slow-EMP

Perfective -mi and imperfective -pi are also clitics.

- (9) /uham-mi/ ----> [úhammi] 'already raining'
 rain-PRF
 /taum pole-pi/ ----> [táum pólepi] 'next year'
 year next-IMPF

The uncertainty clitic -hi is used in declaratives and interrogatives.

- (10) /ma- aka-hi anna susi-i/
INT-why-UN-CONT-like-LOC
[ma^hákahi áнна súsi:]
'Why is it like that?'

The clitic -ka is used with yes-no questions (here used in conjunction with -hi).

- (11) /allo sattú -hi-ka temo/
day Saturday-UN-Q now
[álla sáttuhaka témo]
'Is today Saturday?'

The plural clitic -ak appears after verbs and possessed nouns.

- (12) /ta- tuhuk -ak/
1pln-follow-pl
[tatúhu?a?]
'let's all go together'
- /mænek -mu-ak/
chicken-2s-pl
[mæné?mua?]
'your (pl) chicken'

3.2 Intonation

3.2.1 Sentence Level Intonation

Generally, PUS questions end with rising intonation which begins on the stressed syllable of the last word. This applies both to content questions and yes-no questions. Statements and imperatives have falling intonation. The exceptions to these are imperatives ending with tags or vocatives. In these cases, after falling, the intonation rises sharply on the final word. A request has the same syntactic structure as an imperative but with rising intonation at the end.

Statements:

[nakéke? ehoého etáŋku inde] A wasp stung me here.

[laláoæ? mekáju] I'm going to get firewood.

[napáke láko pásæ?]

They use it at the market.

[makále?pi mebénŋi?]

Tomorrow morning.

[laláoæ? muállí tédom méšæ]

I'm going to buy a water buffalo.

Imperatives:

[láoko baséi limámmu]

Go wash your hands.

[poniánkia? itih hadíoo]

Play that radio for us.

Imperatives with vocatives or tags:

[petúa?i dássi lé guná?]

Look at the bird, Guna'!

[puháí inde pakúli lé]

Finish off this medicine, OK!

Requests:

[peámpæ? mátim]

Would you look for it there?

[bémmæ? kuállí tállu sá?bu]

How about if I buy it from you for three thousand?

Yes-no questions:

[ladékkehokoka salulémo]

Will you go to Salulemo?

[indómuhaka dío^o]

Is that your mother?

[dém mokoka íko keænæ?]

Do you already have children?

Content questions:

[méenna muállí díó dáhanno]

Who bought that horse?

[pihampoko me?gúhu]

When will you study?

[umbaŋéi belá?mu]

Where is your garden?

[áka ítim muánde]

What are you eating?

3.2.2 Higher Level Intonation

In texts there are three phonological levels. The first level, P1, is defined by slight falling intonation and a short pause. The next higher level, P2, is defined by rising intonation following the word stress on the final word, and a short pause. The highest level, P3, is defined by sharp falling intonation following the word stress on the final word, and a long pause. The following text demonstrates all three levels. The text below consists of four phonological sentences (P3) as shown by ///. The P2 and P1 levels are indicated by // and / respectively.

[máne na^ájo lanabátta// táhhu? nakéke?
just plan to cut right away it bit

leŋoleŋónna/// púhai nakéke? leŋoleŋónna//
his wrist after it bit his wrist

nakéke? póle bó^o lambé?na/// bása///
it bit again his calf injured

pissanánna/ kihakíha/ sapúlopi méte?
now about ten more meter

takulambi?na// ía sía lakubunóna//
not reach it for sure I will kill it

lé?ba? ó'o lumúmpa? indo bábi//
go again run that pig

ia tæ? mála kubúno///]
well not able I kill

Just when he intended to stab (it)// it immediately bit his wrist/// After biting his wrist// it bit him again on his calf/// (He was) injured/// Now/ about/ ten meters before I could reach it// after I'd decided to kill it// that pig ran off again// well I wasn't able to kill (it)///

4. DISTRIBUTION

4.1 Syllables and Phonological Words

In PUS each vowel constitutes the nucleus of a syllable. No consonant clusters occur within the syllable. The following structure formula expresses the possible syllable configurations:

(13) ([-syllabic]) [+syllabic] ([-syllabic])

The above formula states that a syllable may begin with a consonant or a vowel and may also end with a consonant or a vowel, making possible the four following structures: V, CV, VC, and CVC. There are four possible syllable divisions within word bases in PUS: V/V, V/CV, VC/CV, and VC/V. These divisions conform to the possible juxtaposed syllable patterns within phonological words:

(14)	a. V.V	/u.a.se/	'axe'
	b. V.CV	/a.ka/	'what'
	c. V.CVC	/a.dek/	'say'
	d. VC.CV	/um-.ba.luk/	'sell'
	e. VC.CVC	/al.lak/	'difference'
	f. CV.V	/la.o/	'go'
	g. CV.VC	/ka.lu.ak/	'broad'
	h. CV.CV	/ma.te/	'dead'
	i. CV.CVC	/to.bam/	'coop'
	j. CVC.V	/mak-.o.to/	'go by car'
	k. CVC.VC	/mak-.al.lak/	'different'
	l. CVC.CV	/um-.si-.pak-.tu.lak-.am/	'talk with'
	m. CVC.CVC	/bah.hak/	'hulled rice'

So we see that while there exist no consonant clusters within the syllable, we do encounter them at syllable boundaries. Generally, within words, a closed syllable can precede another syllable only if the following syllable opens with a consonant. This means that single consonants are syllable onsets or word final. The exception to this (see examples 14j and 14k) is morpheme final /k/ which is pronounced [ʔ]. The phoneme /k/ remains as the coda of the syllable regardless of whether a vowel

or consonant follows. This applies equally to prefixes and to words which precede a vowel-initial suffix or a clitic. In the case of the latter there are also two additional pairs of juxtaposed syllable patterns not found elsewhere:

- (15) a. V.VC /am.pa.-i.-æk/ 'Wait for me.'
 b. VC.V /mak.ba.se.-æk.-i/ 'I'm dish-washing.'

One-syllable words are seldom encountered. The words /bu/ 'smell', /tæk/ 'no, not' (which in isolation is pronounced [tæ æʔ]) and the tag word /e/ 'OK' are rare exceptions. While *words* of up to 7 syllables have been observed (/la.ku.peŋ.ki.la.la.i/ 'I will remember it'), I have yet to find a *morpheme* consisting of more than 4 syllables. By far, the majority of PUS root or free morphemes consist of 2 syllables as shown below:⁵

(16)	1 syllable morphemes	1%
	2 syllable morphemes	77%
	3 syllable morphemes	19%
	4 syllable morphemes	3%

4.2 Consonants

All consonant phonemes can fill the onset position of the syllable. While all consonants can fill the syllable initial position, morpheme initial /j/, /n/, /ŋ/ and /θ/ rarely occur. Over 85% of PUS morphemes begin with consonants. Almost 85% of these consonant-initial morphemes start with (in order of number of occurrences) /b/, /t/, /s/, /k/, /p/, or /l/.

All consonant phonemes with the exception of /j/ (which rarely occurs anywhere in the language) can also fill the coda position of the syllable. While all syllables can fill these positions, there are co-occurrence restrictions. The only consonant clusters within morphemes consist of voiceless stop, continuant, and nasal geminates; combinations of a nasal and a following stop; and /k/ followed by a voiced stop or /l/. Therefore, only the following intramorphemic clusters occur: pp, tt, kk, ll, ss, hh, ɸɸ, mm, nn, ŋŋ, mp, nt, ŋk, mb, nd, ŋg, kb, kd, kg, and kl.

⁵These figures are approximates only, as they are based on a limited random word list of about 300 entries.

Intramorphemic consonant clusters:

/pp/	/appak/	[áppaʔ]	'four'
/tt/	/patti/	[pátti]	'box'
/kk/	/tikkala/	[tikkála]	'pineapple'
/ll/	/dalle/	[dálle]	'corn'
/ss/	/bossik/	[bóssiʔ]	'wet'
/hh/	/tahhuk/	[táhhuʔ]	'continue'
/bb/	/labba/	[lábba]	'sky'
/mm/	/mammak/	[mámmaʔ]	'sleep'
/nn/	/ponno/	[pónno]	'full'
/ŋŋ/	/dihinggi/	[dihinggi]	'hear'
/mp/	/ampo/	[ámpo]	'grandchild'
/nt/	/punti/	[púnti]	'banana'
/ŋk/	/singkum/	[singkum]	'cubit'
/mb/	/tambim/	[támbim]	'room'
/nd/	/tanduk/	[tánduʔ]	'horn'
/ŋg/	/sidəŋguk/	[sidəŋguʔ]	'to box'
/kb/	/bakba/	[báʔba]	'door'
/kd/	/sakde/	[sáʔde]	'side'
/kg/	/ditakgak/	[dítáʔgaʔ]	'trade for field use'
/kl/	/laklam/	[láʔlam]	'umbrella'

Phonemes /k/ and /m/ are the only word-final consonant phonemes. On the surface level these word-final phonemes become [ʔ] and [m] respectively. In section 5 I will show that /k/, /m/ and /ŋ/ are the only morpheme-final consonants in PUS. The phoneme /ŋ/ occurs morpheme final in some prefixes.⁶ I will argue, for example, that there are rules which generate various forms of the morpheme maŋ- so that we encounter surface manifestations such as [mam], [maŋ], [maɪ], [mas], and [mah] as determined by the following consonant.

Just as we encounter intermorphemic alternations such as /um-lappak/ → [ulláppaʔ] 'to let go', we also encounter similar phonological changes between words. Thus we find /læŋæm#ləntæ/ → [læŋælləntæ] 'go up to the garden house'. Note that both intermorphemically and inter-word we find /m/ → [l] when followed by /l/. Based on these observations, one could extrapolate the findings and make claims about phonological processes within the morpheme. Within a morpheme I have never found, for example, a consonant cluster of *[ml]. However, the cluster of [ll] as in [dálle] 'corn' does occur. Therefore, one could posit an underlying form of */damle/ and argue that the same process of /m/ → [l] when followed by /l/ also occurs within the morpheme. Following this line of reasoning, one could then state that the only syllable final consonant phonemes in PUS are /k/, /m/ and /ŋ/ and that there are rules which occur within and between morphemes to change the underlying forms to their surface counterparts. However, there is no proof that words such as [dálle] have an underlying form */damle/. Paul Kiparsky (1968:12) writes, "morphemes which are always phonetically identical must have the same underlying representations." Kiparsky argues against overly abstract representations which never occur on the surface. Following his argument

⁶I consider the final nasal in the prefixes maN-, meN-, peN-, paN-, and saN- to be /ŋ/, based on the form they take when preceding a vowel initial root. As will be shown under the rule ŋ-gemination, in such an environment the final nasal in each of these prefixes geminates to [ŋŋ].

I will refrain from positing intramorphemic processes when there is no internal evidence for such changes. That is why I stated above that all consonant phonemes can occur syllable final, while only /k/, /m/ and /ŋ/ occur morpheme final.

Intermorphemically, /k/ can be followed by any consonant, save /b/. The absence of */kb/ co-occurrences is due to the fact that /b/ rarely is found morpheme initial. Likewise, there are no */mb/ or */ŋb/ intermorphemic sequences. The only other exceptions to intermorphemic consonant sequences involving /m/ or /ŋ/ are that no combinations of */mj/, */ŋj/, */mŋ/, or */ŋŋ/ have been observed.⁷ Again, these gaps are probably due more to the rarity of the phonemes /j/ and /ŋ/ than to any phonological limitations.

Intermorphemic consonant clusters:

	p	t	k	b	d	g	l	j	s	h	ʔ	m	n	ŋ
k	kp	kt	kk	kb	kd	kg	kl	kj	ks	kh	--	km	kn	kŋ
m	mp	mt	mk	mb	md	mg	ml	--	ms	mh	--	mm	mn	--
ŋ	ŋp	ŋt	ŋk	ŋb	ŋd	ŋg	ŋl	--	ŋs	ŋh	--	--	--	--

/kp/	/mak-papia/	[maʔpapia]	'make'
/kt/	/mak-tappak/	[maʔtappaʔ]	'wash clothes'
/kk/	/mak-katapi/	[maʔkatápi]	'play guitar'
/kb/	/mak-basa/	[maʔbása]	'speak'
/kd/	/mak-doik/	[maʔdóiʔ]	'have money'
/kg/	/mek-guhu/	[meʔgúhu]	'study'
/kl/	/mak-lebak/	[maʔlébaʔ]	'throw'
/kj/	/mak-jama/	[maʔjáma]	'repair a road'
/ks/	/mak-saleoleo/	[maʔsaleoló]	'relax'
/kh/	/mak-hogok/	[maʔhógoʔ]	'to smoke'
/km/	/mak-mahomaho/	[maʔmahomáho]	'fuss'
/kn/	/mak-nasu/	[maʔnásu]	'cook'
/kŋ/	/mak-ŋoæk/	[maʔŋóæʔ]	'moo'
/mp/	/um-petuak/	[umpetúaʔ]	'to watch'
/mt/	/um-tutuk-i/	[untútuʔi]	'close'
/mk/	/um-kekek/	[uŋkékeʔ]	'bite'
/mb/	/um-bata/	[umbáta]	'read'
/md/	/um-dæŋguk/	[undæŋguʔ]	'hit'
/mg/	/um-gahhik-i/	[uŋgáhiʔi]	'to free'
/ml/	/um-lappak/	[ulláppaʔ]	'let go'
/ms/	/um-sakka/	[ussákka]	'catch'
/mh/	/um-hutuk/	[uhhútuʔ]	'look for'
/mm/	/daham-mu/	[dahámmu]	'your horse'
/mn/	/um-nennek-i/	[unnénneʔi]	'look at'

⁷Consonant sequences of /ŋŋ/ occur when ŋ-final prefixes attach to vowel initial roots as shown in (30). This is an example of ŋ-gemination which creates a sequence of [ŋŋ].

/ŋp/	/maŋ-paju/	[mampáju]	'measure'
/ŋt/	/maŋ-tulik/	[mantúliʔ]	'write'
/ŋk/	/meŋ-kəhə/	[meŋkəhə]	'to work'
/ŋb/	/maŋ-baja/	[mambája]	'to weed'
/ŋd/	/maŋ-dasik/	[mandásiʔ]	'sew'
/ŋg/	/maŋ-gahusuk/	[meŋgahúsuʔ]	'to iron'
/ŋl/	/maŋ-lulum/	[mallúlum]	'roll up'
/ŋs/	/maŋ-suhak/	[massúhaʔ]	'write'
/ŋh/	/maŋ-hekem/	[mahhékem]	'count'

4.3 Vowels

Any vowel can fill the nucleus of any of the four syllable patterns. Less than 15% of all PUS morphemes begin with a vowel. Over 80% of these vowel-initial morphemes begin with the phonemes (in order of frequency) /a/, /i/ or /u/. The six vowel phonemes can co-occur (without the intervention of a consonant) as follows:

Intramorphemically:

	<u>i</u>	<u>e</u>	<u>æ</u>	<u>u</u>	<u>o</u>	<u>a</u>
i	--	--	iæ	iu	io	ia
e	ei	--	eæ	eu	eo	ea
æ	æi	æe	--	--	--	--
u	ui	ue	uæ	--	--	ua
o	oi	oe	--	--	oo	--
a	ai	--	--	au	ao	aa

/iæ/	/piæk/	[piæʔ]	'break'
/iu/	/liu/	[liu]	'continual'
/io/	/dio/	[dio]	'below'
/ia/	/hombia/	[hombía]	'sago'
/ei/	/sendehei/	[sendehéi]	'celery'
/eæ/	/ta-deæk/	[tadéæʔ]	'hungry'
/eu/	/leutam/	[leútam]	'island'
/eo/	/me-teo/	[metéo]	'to sting'
/ea/	/hea/	[héa]	'tall grass'
/æi/	/səpæik/	[səpáiʔ]	'short duration'
/æe/	/mæsæe/	[mæsæe]	'long time'
/ui/	/mui/	[muí]	'let, allow'
/ue/	/bue/	[búe]	'beans'
/uæ/	/kalimbua/	[kalimbúæ]	'spring'
/ua/	/muane/	[muáne]	'man'
/oi/	/doik/	[dóiʔ]	'money'
/oe/	/kaloek/	[kalóeʔ]	'parrot'
/oo/	/took/	[tó^oʔ]	'base'
/ai/	/saidik/	[saidiʔ]	'a little'
/au/	/bau/	[báu]	'fish'
/ao/	/kao/	[káo]	'I'
/aa/	/sa-paa/	[sapá^a]	'a bunch (bananas)'

The intramorphemic geminates /oo/ and /aa/ and the pair /ei/ are extremely rare, each occurring only once or twice. However, when vowel geminates do occur (intramorphemically or intermorphemically) one of two things happens. Generally there is a weak glottalization (ʔ) between the two vowels, making clear rearticulation: /sapaa/ → [sapáʔa]. In these cases penultimate stress on words such as the example above further verifies that these are true geminates, i.e., sequences of two syllables. More rarely, or in fast speech, the two vowels coalesce into one lengthened vowel. Even in these cases, however, the stress pattern acts as if there are still two distinct syllables; /illaam/ → [illá.m] (not *[ílla.m]) 'in'.

Intermorphemically:

	<u>i</u>	<u>e</u>	<u>æ</u>	<u>u</u>	<u>o</u>	<u>a</u>
i	ii	--	iæ	iu	io	ia
e	ei	ee	eæ	eu	eo	ea
æ	æi	--	ææ	--	--	--
u	ui	ue	uæ	uu	uo	ua
o	oi	--	oæ	--	oo	oa
a	ai	ae	aæ	au	ao	aa

**	/ii/	/di-issam/	[diʔissam]	'known'
**	/iæ/	/na-hambu-i-æk/	[nahambúiaʔ]	'smoke is coming at me'
	/iu/	/di-uduk/	[diúduʔ]	'to smell'
**	/io/	/mai-o/	[máio]	'here'
	/ia/	/sule-i-am/	[suleíam]	'repeat'
	/ei/	/ka-mase-i-æk/	[kamaséiaʔ]	'pity me'
	/ee/	/ke-ejkok/	[keéjkoʔ]	'have a tail'
	/eæ/	/ke-ænæk/	[keænæʔ]	'have children'
	/eu/	/me-uham-i/	[meuhánni]	'rain on'
**	/eo/	/sule-o-i/	[súleoí]	'it comes again'
	/ea/	/me-ampa/	[meámpa]	'watch over'
	/æi/	/um-ælæ-i/	[muælái]	'remove it'
**	/ææ/	/maj-peæ-æk/	[maméæʔæʔ]	'I search'
	/ui/	/um-tammu-i/	[untammúi]	'to meet'
**	/ue/	/taŋkihik-ku-e/	[taŋkihíʔkue]	'my cup'
**	/uæ/	/liu-æk/	[líuæʔ]	'I continue'
	/uu/	/ku-uduk/	[kuʔúduʔ]	'I smell (it)'
	/uo/	/mu-oŋei-ak/	[muoŋéiaʔ]	'you all stay'
	/ua/	/mu-anna/	[muánna]	'you store'
**	/oi/	/um-sahho-i/	[ussáhhoi]	'you cry about'
**	/oæ/	/lao-æk/	[láoaʔ]	'I go'
**	/oo/	/iabo-o/	[yáboʔo]	'up there'
	/oa/	/ka-maho-am/	[kamahóam]	'stupidity'
	/ai/	/di-papia-i/	[dipapiái]	'to be made'
	/ae/	/ma-elak/	[maélaʔ]	'slow'
**	/aæ/	/ke-mesa-æk/	[kemésæʔ]	'if just me'
	/au/	/na-uham-i-æk/	[nauhánniaʔ]	'I'm rained on'
**	/ao/	/bakba-o/	[báʔbao]	'that door'
	/aa/	/um-baba-am/	[umbabáʔam]	'you take for'

**The second vowel in the pair is a clitic.

As /u/ and /o/ are close phonetically, it is not surprising to find they seldom co-occur. In fact, when they do co-occur intermorphemically, generally the /u/ is deleted so that a word such as mu-okkok 'to sit' is pronounced [mókkoʔ].

Sequences of three vowels are also very common intermorphemically. Sequences of four vowels are more rare but do occur. Sequences of more than two vowels generally involve the suffixes -am or -i or one of the vowel-initial clitics. In regular speech, however, I do find that in certain cases a vowel will be deleted. One commonly heard case is with /ua/ as heard in the words /ku-ua/ 'I say' and /mu-ua/ 'you say' which come out as [kúa] and [múa] respectively. Example (17) presents occurrences of three or more juxtaposed vowels.

(17)

/um-papia-i/	[umpapiái]	'to make (it)'
/ku-peŋ-soe-am/	[kupessoéam]	'I throw underhand'
/lao-æk/	[láoaʔ]	'I go'
/ke-di-ua-i/	[kediuái]	'if to say'

4.4 Consonants and Vowels

There are no co-occurrence restrictions between consonants and vowels in PUS words. The only gaps noted are /ag/, /og/, /ej/, /ij/, /jæ/, /je/, and /ji/. These omissions are undoubtedly due to the infrequency of the phonemes /g/ and /j/ rather than any phonological restrictions.

5. PHONOLOGICAL PROCESSES

In this section I will present the various phonological processes which occur in PUS. The full meanings and usages of PUS morphemes are dealt with elsewhere (see Campbell 1989). For the present I am concerned only with phonological aspects of the language.

It was stated earlier that only the phonemes /k/, /m/, and /ŋ/ can occur morpheme final in PUS. It stands to reason then that some of the most frequent phonological processes involve these three phonemes.

When /k/ occurs syllable final the following process holds:

(18) k-weakening:

$$/k/ \quad \rightarrow \quad [ʔ] \quad / \quad _ \quad \left\{ \begin{array}{l} c \\ - \end{array} \right\}$$

(19)	a.	/ulik/	[úliʔ]	'rope'
	b.	/bojok/	[bójoʔ]	'squash'
	c.	/bakba/	[báʔba]	'door'
	d.	/mak-tulak/	[maʔtúlaʔ]	'speak'
	e.	/mak-oto/	[maʔóto]	'go by car'

Only such a change in the rules will account for the presence of /r/ or /s/ in the doublets, and for the fact that these inserted consonants for the most part have little relationship with the reconstructible PSS [Proto South Sulawesi] or PAN [Proto Austronesian] final, and thus must be the result of analogy.⁹

PUS has taken the analogy one step further and regularized the process so that all (historically) non-nasal final consonants are now realized as [ʔ] word final and [s] before the derivational suffix -am.

It is significant to note here (cf. 4.1) that in addition to /k/ changing to [s] the consonant also changes from being the coda of the word final syllable (before the addition of -am) to taking the onset position of the -am syllable. Thus /ba.luk.am/ becomes [ba.lú.sam]. K-sibilantization applies before k-weakening in a bleeding order relationship. The following derivation demonstrates both of the preceding 'k- rules':

(22)	Underlying form	/la-ku-pak-tappak-am-ko/
	k-sibilantization	la-ku-pak-tappas-am-ko
	k-weakening	la-ku-paʔ-tappas-am-ko
	stress	la-ku-paʔ-tappás-am-ko
	new syllabification	la-ku-paʔ-tappá.s-am-ko
	other	la-ku-paʔ-tappá.s-aŋ-ko
	Surface form:	[lakupaʔtappásəŋko]
		'I'll wash-clothes for you.'

As earlier noted, several major processes of PUS also involve the phonemes /m/ and /ŋ/. The general rules for morpheme final /m/ and /ŋ/ follow.

First, I will look at what occurs when a nasal is followed by a non-syllabic phoneme.

When a nasal is followed by a stop (p,t,k,b,d,g) or another nasal (m, n, ŋ), the nasal assimilates to the same point of articulation as the following stop.

(23) Nasal assimilation:

$$[+nasal] \text{ ---> } \left[\begin{array}{l} \alpha \text{ anterior} \\ \beta \text{ coronal} \end{array} \right] / \text{ --- } \left[\begin{array}{l} \text{-syllabic} \\ \alpha \text{ anterior} \\ \beta \text{ coronal} \end{array} \right]$$

This rule applies intermorphemically and inter-word within phonological levels P1 and P2 (see 3.2.2).

⁹Mills posits the set of final consonants in Proto South Sulawesi as (pʔ), t, k, m, n, ng, r, h, l, and s (1975:334-5). The fact that Toraja Sa'dan only produces 'r' and 's' before derivational -an, and PUS only produces 's' before derivational -am, leads to Mills' conclusion that a neutralization of consonants before the derivational suffixes is a result of analogy.

- (24)
- | | | |
|---------------------|---------------------|-----------------|
| a. /um-tibe-æk/ | --> [untíbeæʔ] | 'I throw away' |
| b. /daham-ku/ | --> [daháŋku] | 'my horse' |
| c. /tedom-na/ | --> [tedónna] | 'his buffalo' |
| d. /maŋ-bata/ | --> [mambáta] | 'to read' |
| e. /pissam di-ande/ | --> [pissan diánde] | 'eaten at once' |
| f. /asam kale-ku/ | --> [ásaŋ kaléku] | 'my whole body' |

There are two further processes closely related to nasal assimilation. Continuantization produces a continuant geminate, and consonant deletion retains the nasal and deletes the following consonant. Both of these processes are ordered after nasal assimilation. First we look at what generally occurs when a nasal is followed by a continuant, i.e., /l, b, s, h/. When this occurs, the nasal undergoes total assimilation in all features thus resulting in a geminate so that /N-l, N-b, N-s, N-h/ —> [ll, bb, ss, hh].

(25) Continuantization:

$$[+nasal] \text{ --> } \left[\begin{array}{c} +continuant \\ \alpha \text{ voice} \end{array} \right] / \text{ — } \left[\begin{array}{c} -syllabic \\ +continuant \\ \alpha \text{ voice} \end{array} \right]$$

This rule also applies intermorphemically and inter-word within phonological levels P1 and P2 (see 3.2.2). The following examples show the underlying form and the surface form after nasal assimilation and continuantization occur.

- (26)
- | | | |
|---------------------|---------------------|------------------|
| a. /um-sakka/ | -> [ussákka] | 'catch (fish)' |
| b. /um-haɓik/ | -> [uhhábiʔ] | 'hit w/ device' |
| c. /meŋ-lao/ | -> [melláo] | 'to travel' |
| d. /læŋæm hante/ | -> [læŋæh hánte] | 'go up to Hante' |
| e. /itim lima-mu-o/ | -> [ítill limámmuo] | 'your hands' |

The two processes nasal assimilation and continuantization similarly function in English with the prefix in-. Note the assimilation of the nasal in the words 'intolerable' and 'impossible' and the process of continuantization in the words 'illogical' and 'irresponsible' (however in these cases [ll] and [rr] reduce to [l] and [r]).

If possible, it would be better to combine nasal assimilation and continuantization into one rule. As will be shown in consonant deletion, however, they are really two separate but related processes.

Before going on to consonant deletion we will look at a process involving the prefix saŋ- 'a, one'. When saŋ- is followed by a vowel initial morpheme the /ŋ/ geminates according to ŋ-gemination, e.g., /saŋ-ampak/ —> [saŋŋámpaʔ] 'a mat'. When, however, the prefix saŋ- is followed by a non-syllabic word initial phoneme, the final /ŋ/ of the prefix is deleted in a process unique to this prefix.

(27) Nasal deletion:

$\eta \rightarrow \phi / -s a ___ - [-\text{syllabic}]$

/saŋ-buli/	-->	[sabūli]	'a stalk' (bananas)
/saŋ-kæju/	-->	[sækæju]	'a stick' (corn, fish)
/saŋ-lampu/	-->	[salámpu]	'a section of bamboo'

Nasal deletion occurs before continuization in a bleeding order relationship. If the order were reversed then saŋ- plus a continuant-initial word would result in the final /ŋ/ becoming a continuant such as /saŋ-sóppe/ --> *[sassóppe] when it is actually [sasóppe] 'a bunch (of bananas)'. One notable exception to this rule is /saŋ-hupa/ which is a commonly used word meaning 'a kind of'. In this case the surface form is [sahhúpa] which means that /hupa/ is marked [-nasal deletion] in the lexicon which leaves the nasal intact to be affected by continuization resulting in geminate [hh].

In a few rare cases involving /ŋ/-final prefixes followed by word initial /p/, /b/, /t/, or /s/, the word initial consonant is deleted, leaving only the nasal. The fact that the nasal is at the point of articulation of the deleted stop bears out that nasal assimilation must be ordered before consonant deletion, which is ordered before continuization. Note also that nasal deletion occurs before consonant deletion in a bleeding order relationship.

(28) Consonant deletion:

$\left[\begin{array}{l} +\text{consonant} \\ +\text{anterior} \\ -\text{nasal} \end{array} \right] \text{ ---> } \phi / [+nasal] - \left[\text{prefix} \right] ___$

It must be noted that in order to form a natural class for this rule I have used [+anterior] which also includes /d/ and /l/ (as well as /b/, but it rarely appears word initial). To date, no cases of this process have actually been found involving /d/ and /l/. At this writing I do not know whether the fact that both /d/ and /l/ are voiced alveolars eliminates them from the consonant deletion rule or whether it is just a matter of infrequency of occurrences of the application of this rule. In any case, because of the randomness of the occurrences, the roots involved will have to be marked in the lexicon as [+consonant deletion]. Following are examples from the roots /soʔe/ 'to burn', /suhak/ 'write', /tottæk/ 'pierce', and /bisæk/ 'split wood with axe'.

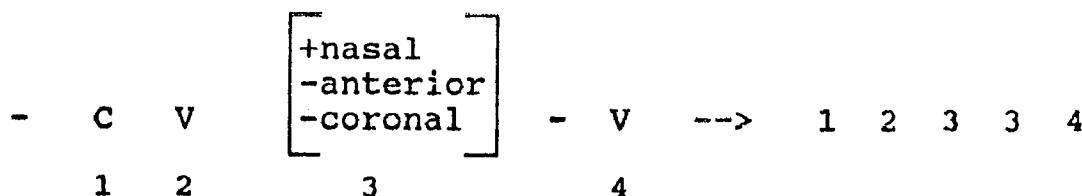
(29)

U. form	/maŋ-sobe/	/maŋ-suhak/	/maŋ-tottæk/	/maŋ-bisæk/
Nas Assim	maŋ-sobe	maŋ-suhak	maŋ-tottæk	mam-bisæk
Cons. del	man_obe	-----	man_ottæk	mam_isæk
Con'z'tion	-----	maŋ-suhak	-----	-----
k-weak	-----	mas-suha?	man-ottæk?	mam-isæk?
Stress	man-óbe	mas-súha?	man-óttæk?	mam-isæk?
Surface	[manóbe]	[massúha?]	[manóttæk?]	[mamísæk?]

So we see that while /suhak/ is unaffected by consonant deletion, /sobe/ /tottæk/ and /bisæk/ must be labeled [+consonant deletion].

Next we will examine the processes which take place when a vowel follows /ŋ/ intermorphemically. When the prefixes maŋ-, meŋ-, peŋ-, paŋ-, and saŋ- occur before a vowel-initial word, /ŋ/ becomes geminate [ŋŋ]

(30) ŋ-gemination:

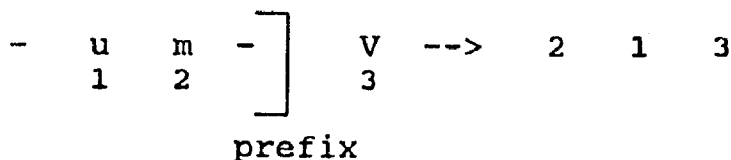


(31)

a. /maŋ-allo/	[məŋŋálla]	'to sun'
b. /meŋ-olokolok/	[meŋŋolo?ólo?]	'animal-like'
c. /di-po-pak-paŋ-ohhok/	[dipopa?pəŋŋóhho?]	'to land-fill'
d. /peŋ-andak-am/	[pəŋŋandásam]	'handle'
e. /saŋ-ampim/	[səŋŋámpim]	'a section (of a mat)'

When the transitive prefix um- occurs before a vowel-initial word, /u/ metathesizes with /m/ resulting in the prefix [mu] (not to be confused with second person pronominal prefix mu-). For examples of um- before a consonant-initial word, refer to nasal assimilation and continuantization.

(32) um-mu metathesis:



- (33) a. /um-alli-æk/ [muállia?] 'I buy (bananas)'
 b. /um-ita-ko/ [muítako] 'you see (the bird)'
 c. /um-ələ-i-kik/ [muələiki?] 'we remove (it)'

As stated earlier, both the benefactive suffix on verbs and the nominalizing suffix have the form -am. When stem final /m/ is followed by -am, /m/ becomes /ŋ/.

(34) Nasal velarization:

[+nasal] --> $\left[\begin{array}{c} \text{-anterior} \\ \text{-coronal} \end{array} \right] / \text{ ______ } - V [+nasal] -$

Note how /m/ --> [ŋ] when the suffix -am is added to the roots /hapam/ 'example', /eham/ 'ladder' and /tanam/ 'to plant'.

- (35) a. /pe-hapam-am/ --> [pehapaŋam] 'moral story'
 b. /po-eham-am/ --> [poehaŋam] 'ladder materials'
 c. /ku-tanam-am/ --> [kutaŋam] 'I plant for (him)'

Nasal velarization is iterative as shown below:

- (36) Underlying form /baŋom-am-am-æk/
 k-weakening baŋom-am-am-æ?
 nasal velarization baŋoŋ-am-am-æ?
 nasal velarization baŋoŋ-aŋ-am-æ?
 stress baŋoŋ-áŋ-am-æ?
 other...
 Surface form [baŋoŋáŋənnə?]
 'Raise (him) for me.'

When word final /æ/ is followed by the derivational suffix -am, the phone [ŋ] is inserted. This process is undoubtedly related to the /æ/-aŋ relationship I will briefly discuss in section 8.¹⁰

(37) ŋ-insertion:

ϕ --> ŋ / æ ______ - am -

- | | | |
|-----------------|---------------|-------------------------|
| Underlying form | /peŋ-kəhæ-am/ | /pe-ləntæ-am/ |
| ŋ-insertion | peŋ-kəhəŋ-am | pe-ləntəŋ-am |
| stress | peŋ-kəhəŋ-am | pe-ləntəŋ-am |
| Surface form | [peŋkəhəŋam] | [peləntəŋam] |
| | 'task' | 'garden house location' |

¹⁰See the appendix for a presentation of neighboring language correspondences to the PUS [æ].

I showed above in nasal velarization that [m] becomes [ŋ] when followed by a suffix -am. In other cases of word final /m/ followed by a vowel, whether across morpheme, clitic or word boundary, /m/ becomes [nn]. The rule m:n-gemination will demonstrate this occurrence.

(38) m:n-gemination:

$$\begin{array}{ccccc} m & \left\{ \begin{array}{c} - \\ \# \end{array} \right\} & v & \longrightarrow & n \quad n \quad 2 \quad 3 \\ 1 & 2 & 3 & & \end{array}$$

m:n-gemination states that whenever /m/ is followed by an affix, clitic, or word boundary which is in turn followed by a vowel; the /m/ geminates becoming [nn] as is illustrated in the following examples:

- (39)
- | | | | |
|------------------|-----|---------------|-----------------|
| a. /ku-issam-i/ | --> | [kuissanni] | 'I know it' |
| b. /daham-o/ | --> | [dáhanno] | '(that) horse' |
| c. /maŋ-anam-æk/ | --> | [məŋŋánannæ?] | 'I am weaving.' |
| d. /asam#aka/ | --> | [ásan náka] | 'all of them?' |
| e. /di-kuhəm-i/ | --> | [dikuhánni] | 'to decrease' |

Contrary to expectation, m:n-gemination does not take place in the case of the perfective clitics followed by the first person clitic -æk.

The perfective clitic occurs in three forms. I will present these forms and the environments in which they occur without attempting to identify one particular underlying form.

(40)

a. When following a vowel, the form is -m:

lakbi-m	-->	[lá?bim]	'already more'
pitu-m	-->	[pítum]	'already seven'

b. When following a /k/, the form is -um:

mammak-um	-->	[mámma?um]	'already asleep'
lekbak-um	-->	[lé?ba?um]	'already left'

c. When following a /m/, the form is -mi:

uham-mi	-->	[úhammi]	'already raining'
asam-mi	-->	[ásammi]	'already all of them'

The following example demonstrates how perfective clitic -m does not become [nn] when followed by -æk.

(41)	Underlying form	/maŋ-ande-m-æk/	
	ŋ-gemination	maŋŋ-ande-m-æk	
	k-weakening	maŋŋ-ande-m-æ?	
	m:n-gemination	-----	Not *maŋŋ-ande-nn-æ?
	stress	maŋŋ-ánde-m-æ?	
	other...		
	Surface form	[məŋŋándemæ?] Not *[məŋŋándennæ?]	
		'I've eaten.'	

The derivation above shows how, contrary to expectation, the perfective clitic -m does not undergo m:n-gemination. The same is true when the perfective clitic form -um precedes the first person clitic -æk.

Possessiveness in PUS is shown by the addition of the appropriate possessive pronoun suffix to the possessed nominal word. While this is more fully discussed elsewhere (see Campbell 1989), there is a particular phonological pattern which warrants mention in this study. When the nominal word ends in the vowels /i/, /u/, and in many cases, /a/, then a nasal excrescent 'N' is inserted before the possessive suffix. However, when a nominal word ends in /e/, /æ/, or /o/ there is no insertion of N. In his studies of Toraja Saqdan, (a language closely related to PUS), Van der Veen (1924) found that nasals are inserted after possessed nouns which end in /i/ or /u/ and after some nouns which end in /a/. More recently, Sirk (1988) has studied the presence of such nasal segments in several South Sulawesi languages. Sirk presents an historical explanation showing that the nouns which take a nasal insertion before a possessive suffix are those nouns which are derived from proto-forms ending in vowels. Those nouns which cannot take nasal insertion are those which derived from proto-forms which ended with consonants.

While acknowledging the historical developments of South Sulawesi languages, I here present rules which capture synchronic characteristics of the phonology of PUS. In order to capture this nasal insertion process it would be preferable to use one rule (which would be the more economical presentation). However, as only about 30% of the /a/-final nominal words are affected, it would be less accurate to include /a/ in the same rule as /i/ and /u/ even if we in turn marked the excluded cases in the lexicon. So, instead I will present two almost identical rules which describe how words are affected by N-insertion.

(42) N-insertion:i,u

$$\phi \text{ ---> } [+nasal] / \left[\begin{array}{c} v \\ +high \end{array} \right] \text{ --- } - \left[\begin{array}{c} \text{ } \\ c \end{array} \right]$$

possessive suffix

(43)	Underlying form	/punti-mu/	/asu-ku/
	nasal insertion	puntiN-mu	asuN-ku
	nasal assimilation	punti \bar{m} -mu	asuŋ-ku
	stress	punti \bar{m} -mu	asuŋ-ku
	Surface form	[punti \bar{m} mu]	[asuŋku]
		'your banana'	'my dog'

Note that the nasal insertion rules must come before nasal assimilation.

(44) N-insertion:a

$$\phi \text{ ---> } [+nasal] / \text{ a } \text{ --- } \boxed{\text{c}}$$

possessive suffix

This rule is limited in applicability. Check the lexicon for affected words. Below are the derivations of two /a/-final nominal words. Note that /banua/ is affected and would need to be so marked in the lexicon.

(45)	Underlying form	/banua-na/	/sola-na/
	nasal insertion	banua _N -na	----
	nasal assimilation	banua _n -na	----
	stress	banuán-na	solá-na
	Surface form	[banuánna]	[solána]
		'his house'	'his friend'

In certain closed syllables the phoneme /e/ undergoes a change which laxes it to the allophone [ɛ].

(46) e-laxing:

$$e \text{ ---> } \epsilon / \text{ --- } \left\{ \begin{array}{c} \boxed{\begin{array}{c} \text{c} \\ +\text{anterior} \end{array}} \\ \boxed{\begin{array}{c} \text{c} \\ +\text{coronal} \end{array}} \end{array} \right\} \left\{ \begin{array}{c} \# \\ \text{c} \end{array} \right\}$$

E-laxing laxes the phoneme /e/ in the environment of a closed syllable except when the following consonant is a back consonant, i.e., [k], [ŋ], [ʔ] and [h].

Underlying form	/tettek/	/meŋ-diok/	/meŋ-kəhə/
nasal assimilation	---	me _n -diok	-----
k-weakening	tette _?	men-dio _?	-----
e-laxing	t _ɛ tte _?	m _ɛ n-dio _?	-----
stress	tétte _?	men-dío _?	meŋ-kəhá
Surface form	[tétte _?]	[mendío _?]	[meŋkəhá]
	'hour'	'to bathe'	'to work'

Nasal assimilation must be ordered before e-laxing. Since the allophone [ɛ] appears in closed syllables which are closed by non-back consonants, any rule which would change the point of articulation of a consonant from back to non-back or vice versa must occur before e-laxing.

I mentioned earlier that one-syllable words are rare in PUS. When one-syllable words are spoken in isolation, generally the vowel nucleus is repeated after a weak glottal stop.

(47) vowel repetition:

#	C	V	C	#	-->	1	2	3		-cons			
1	2	3	4	5						-cont			
										-anterior	3	4	5
										-coronal			
										-voice			
										+weak			

Vowel repetition applies to words spoken in isolation

Underlying form	/dem/	/tæk/
vowel repetition	de^em	tæ^æk
k-weakening	----	tæ^æ?
e-laxing	de^em	----
stress placement	dé^em	tá^æ?
surface form	[dé^em]	[tá^æ?]
	'there is'	'no'

We see in the example above that vowel repetition must occur before e-laxing and the stress rules.

In another rule involving vowel weakening, unstressed /a/ raises to [ə] before a sequence of /n/ followed by a non-syllabic phoneme.

(48) a-raising:

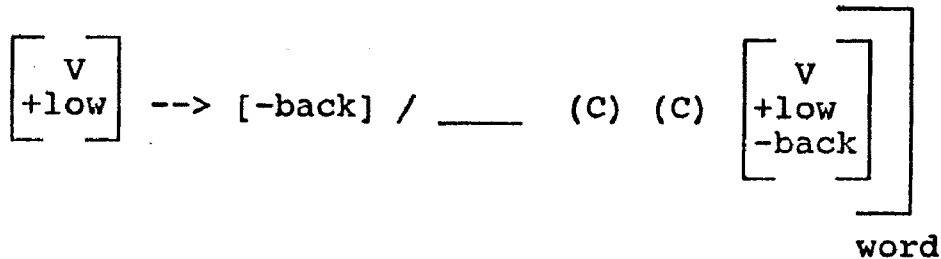
a --> ə / _____ ŋ [-syllabic]
[-stress]

(49)	U. form	/maŋ-allo/	/maŋ-baja/	/maŋ-kekek/
	nasal assim.	-----	mam-baja	maŋ-kekek
	ŋ-gem.	maŋŋ-allo	----	-----
	stress	maŋŋ-álla	mam-bája	maŋ-kékek
	a-raising	məŋŋ-álla	----	məŋ-kékek
	k-weakening	-----	----	məŋ-kéke?
	Surface form	[məŋŋálla]	[mam-bája]	[məŋkéke?]
		'to sun'	'all'	'to bite'

Before a-raising can occur any rule involving the generation of [ŋ] must occur. Therefore, as shown above, nasal assimilation and n-gemination precede a-raising. Also, stress placement must precede this rule since stressed /a/ is not affected.

We saw in 4.3 that phonemes /a/ and /æ/ never co-occur intramorphemically, and intermorphemically only co-occur between word and clitic. Even when there are intervening consonants within the word we never find [a] and [æ] within the same word unless there is also an intervening vowel. This is due to vowel harmony.

(50) vowel harmony/æ:



/ma-ləppuk/	-->	[mæləppuʔ]	'tired'
/mak-kəlluk-ək/	-->	[mæʔkəlluʔək]	'I'm shaving'
/na-ægək-i/	-->	[næægəʔi]	'he's lying'

As the rule reads, vowel harmony only occurs right to left. Thus we find the following forms in PUS:

/ænək-na/	-->	[ænəʔna]	'his child'
/bəbək-kam/	-->	[bəbəkam]	'just (gave it to) us'

I stated above that vowel harmony/æ only occurs within words. It does not occur across clitic or word boundaries. Note the absence of vowel harmony when the clitic /ək/ follows a word.

/mak-tekək-ək/	-->	[maʔtékaʔəʔ]	'I'm tree-climbing'
/mammək-ək/	-->	[mámmaʔəʔ]	'I'm sleeping'

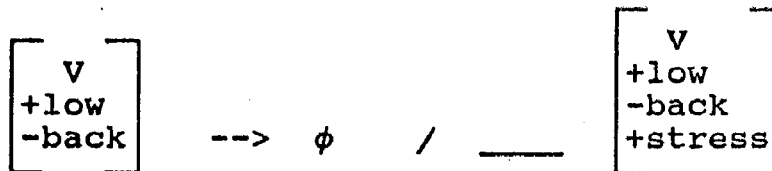
Vowel harmony/æ occurs across clitic boundaries only when the benefactive suffix -am is followed by the first person clitic -ək as shown below.

/huntu-i-am-ək/	-->	[huntuiaénnəʔ]	'pull for me'
-----------------	-----	----------------	---------------

Vowel harmony/æ presents an enigma. There are many roots in PUS which have more than one /æ/. In light of vowel harmony/æ do we then consider the underlying form of [láentæ] 'garden house', for example, as /lantæ/? Or is it /læntæ/ independent of vowel harmony/æ? The argument regarding positing underlying forms which never exist on the surface (see 4.2) must apply here. Although there are indications that vowel harmony may play a role within the root, there is no proof that the first /æ/ in, for example, /læntæ/ is actually /a/, since that alternant never exists phonetically. Therefore, I cannot justify positing such an underlying form.

The pronominal affix -æk is most often found as a clitic, but is also found to fill the slot of a suffix when marking the benefactee in a transitive verb clause. In such cases vowel harmony takes place along with another process, i.e., vowel deletion/æ. In PUS we only find the geminate /ææ/ intermorphemically, and only then if both vowels are unstressed. When the second /æ/ in the pair is stressed, as we find after vowel harmony (as found in benefactive verb constructions—first person as benefactee), the unstressed /æ/ is deleted.

(51) vowel deletion/æ:



Underlying Form	/ala-am-æk/	/ua-am-æk/
vowel harmony/æ	æla-æm-æk	uæ-æm-æk
m:n-gemination	æla-æn-næk	uæ-æn-næk
stress placement	æla-én-næk	uæ-én-næk
vowel deletion/æ	æl -én-næk	u -én-næk
k-weakening	æl -én-næ?	u -én-næ?
Surface form	[ælénnæ?]	[uén-næ?]
	'get (it) for me'	'tell me'

Note that in addition to coming after vowel harmony/æ, this deletion rule must be preceded by stress placement.

One way in which a question is formed in PUS is by the addition of the clitic -ka after the verb. Frequently in addition to -ka we find the uncertainty clitic -hi preceding -ka and helping to form the question. While the exact role of -hi is not yet clear it seems to carry the meaning of contra-expectation/surprise/uncertainty. Here I will discuss what happens phonologically when -hi and -ka are juxtaposed with certain pronominal clitics and/or the plural clitic -ak.

Table 6.—Question Clitics with Juxtaposed Pronouns

Following a vowel-final stem:

Underlying form		Surface form
-hi-ka	-->	haka
-hi-ka-æk	-->	hækæ?
-hi-ko-ka	-->	hokoka/hakoka
-hi-kik-ka	-->	hakika
-hi-ki-ka-ak	-->	hakika?
-hi-ko-ka-ak	-->	hokoka?/hakoka?

Following a consonant final stem:

Underlying form		Surface form
-di-ka	-->	daka
-di-ka-æk	-->	dækæ?
-di-ko-ka	-->	dokoka/dakoka
-di-kik-ka	-->	dakika
-di-ki-ka-ak	-->	dakika?
-di-ko-ka-ak	-->	dokoka?/dakoka?

- (52) /la-sola-hi-ki-ka-ak adi-mu læŋæm hante dakok/
 [lasólahikika? adimmu læŋæh hánte dáko?]
 'Will your younger brother go with us (incl) up to Hante later?'
- (53) /la-sola-hi-ko-ka-ak adi-mu læŋæm hante dakok/
 [lasólahokoka? adimmu læŋæh hánte dáko?]
 'Will your younger brother go with you up to Hante later?'
- (54) /la-sola-hi-ka-kam adi-mu læŋæm hante dakok/
 [lasólahakakan nadimmu læŋæh hánte dáko?]
 'Will your younger brother go with us (excl) up to Hante later?'

Example (52) above is given as an example of no phonological alteration for hi-ki-ka. In forming the question with the second person pronominal clitic -ko (example (53)) we see vowel harmony which results in hi-ko-ka —> [hokoka]. Observe also the vowel harmony in example (54) where hi-ka —> [haka].

Similarly, vowel harmony occurs when perfective -mi or imperfective -pi are juxtaposed with pronominal clitics and/or the question clitic -ka. Tables 7 and 8 demonstrate the surface realizations of juxtaposed pronominal clitics and the aspect clitics -mi and -pi. Examples (55), (56), and (57) illustrate vowel harmony in questions which are modified by one of the aspect clitics.

Table 7.—Perfective -mi with the Absolutive Pronouns

Following Vowel Final Stems: -m

sule- <u>m</u> -æk	-->	-mæ?	'I've come.'
-ko		-ŋko	'You've come.'
-koak		-ŋkoa?	'Have you all come?'
si-tammu- <u>m</u> -kik		-ŋki?	'We(du in) have met.'
-kiak		-ŋkia?	'We all (in) have met.'
sule- <u>m</u> -kam		-ŋkam	'We(ex) have come.'

Following Nasal Final Stems: -mi

bulim- <u>mi</u> -æk	-->	-mæ?	'I'm lost.'
mak-tedom- <u>mi</u> -ko		-moko	'You have buffalo.'
kasalle asam- <u>mi</u> -koak		-moko?	'You all are big.'
bulim- <u>mi</u> -kik		-miki?/-maki?	'We're(2in) lost.'
bulim- <u>mi</u> -kiak		-mikia?	'We're(in) all lost.'
mak-sambajam- <u>mi</u> -kam		-makam	'We(ex) prayed.'

Following Glottal Final Stems: -um

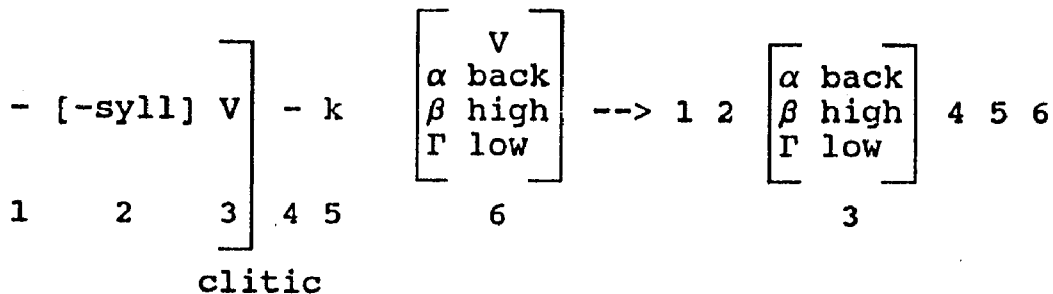
tahhuk- <u>um</u> -æk lao	-->	tahhu?-mæ? lao	'I'm going on'
tæk- <u>um</u> -ko la landak	-->	tæk-ŋko la landa?	'You won't' land'
tæk- <u>um</u> -koak mala	-->	tæk-ŋkoa? mala	'You(pl) can't'
tæk- <u>um</u> -kik	-->	tæk-ŋki?	'We(du in) won't'
saidik- <u>um</u> -kiak	-->	saidi?-ŋkia?	'We(in) almost'
meŋ-tuelik- <u>um</u> -kam	-->	mentueli?-ŋkam	'We moved'

Table 8.—Forms of Imperfective -pi

sule- <u>pi</u> -æk	-->	pæ?	'later when I come'
-ko		poko	'later when you come'
-koak		poko?	'later when you all come'
-kik		piki?/paki?	'later when we(2 in) come'
-kiak		pikia?	'later when we all come'
-kam		pakam	'later when we(ex) come'

- (55) /mala-pi-ko-ka sule makalek/
 [málapokoka súle makále?]
 'Can you come again tomorrow?'
- (56) /dem-mi-ka/
 [démmaka]
 'Are there already?'
- (57) /dem-mi-ko-ka læŋəm makkasak/
 [démmokoka læŋəm mákkasa?]
 'Have you been to Makassar?'

(58) vowel harmony/clitic:



This rule states that when the clitics -hi, -pi, or -mi precede either the pronominal clitics or the question clitic -ka, the vowels in the former clitics will harmonize with the first vowel of the following clitic.¹¹

Let me now return to example (53) above. In addition to vowel harmony note that hi-ko-ka-ak becomes [hokoka?] with the deletion of an [a]. Example (52) shows this same deletion. There is a similar occurrence with the first person clitic -æk.

- (59) /na-ita-i-hi-ka-æk/
 [naitáihækæ?]
 'Did they see me?'

¹¹An exception to this involves the pronominal clitic -kik as illustrated in the example /bulim-mi-kik/ 'we're (2in) lost' in which we would expect the vowel of the perfective clitic -mi to harmonize with the following i forming [miki?]. That indeed is one of the possible surface forms, but the surface form can also optionally be [maki?]. Similarly, -pi-kik can have the surface form [piki?] or [paki?].

In example (59) *hi-ka-æk* is pronounced [hækæʔ]. Two processes are at work here. First, the vowel [a] preceding /æk/ is deleted. According to vowel deletion/clitic (see (61)) when a clitic followed by a morpheme results in two juxtaposed vowels, then the first of this pair is deleted. Secondly, after vowel deletion is complete, vowel harmonization take place.

Another example of vowel deletion involves perfective *-um* which we looked at earlier. Note what happens when *-um* is in turn followed by a vowel-initial clitic:

- (60) /lekbak-um-æk/
 [léʔbaʔmæʔ] (not *[léʔbaʔumæʔ])
 'I went'

Note that in this case the deleted vowel is not juxtaposed with another vowel, but rather a vowel initial clitic follows a consonant final clitic. The vowel of the first clitic is deleted when the second clitic is vowel initial.

Underlying form	/na-lambik-um-æk/
k-weakening	na-lambiʔ-um-æʔ
v-del/clitic	na-lambiʔ- <u>m</u> -æʔ
stress	na-lámbiʔ-m -æʔ
Surface form	[nalámbiʔmæʔ] '(it) already got me'

One other example of vowel deletion involves the clitic *-hi* when followed by the free pronoun *ia* '3p'. When this occurs *-hi* attaches to the following pronoun and vowel deletion/clitic takes place as shown below.

/ku-saŋa posa anna asu hi ia/
 [kusáŋa pósa áнна ásu hía]

'I thought it was a cat, but it's a dog.'

Vowel deletion/clitic states that the vowel of a clitic which is followed by a vowel initial clitic will delete.

(61) vowel deletion/clitic:

$$V \rightarrow \phi / (C) \text{ ______ } (C) \text{ ______ } - V$$

clitic

Underlying form	hi-ka-æk
v-del/clitic	hi-k_ -æk
vowel harmony/clitic	hæ-k_ -æk
k-weakening	hæ-k -æ?
Surface form	[hækæ?]

When syllable final /a/ of an antepenultimate syllable is followed by a vowel initial penultimate syllable, /a/ coalesces with that following vowel forming a diphthong. The diphthong then takes the stress.

(62) diphthongisation:

a V --> á^v / _____ (C) (C) V (C) #

- (63) a. /baine/ --> [báⁱne] 'woman'
 b. /tau-mu/ --> [tá^ummu] 'your guests'
 c. /pao-ku/ --> [pá^oku] 'my mango'

In the process h-replacement/d the phoneme /h/ in the clitic -hi is replaced by [d] when preceded by a consonant.

(64) h-replacement/d:

h ----> d / c { # } _____ v] -
 clitic

- (65) /ta-tuŋkak-i-hi-ka bakba-na/
 [tatúŋka?ihaka ba?bána]
 'Shall we open his door?'

- (66) /ti-tuŋkak-hi-ka bakba-na/
 [titúŋka?daka ba?bána]
 'Is his door open?'

- (67) /tæk ku-issam battu la-məsæe-hi battu la-tæk-hi/
 [tæ? kuissam báttu laməsæehi báttu latæ?di]
 'I don't know if it'll be a long time or not.'

(68) /la-mak-tappak-hi-ko-ka la-mak-base-hi-ko-ka/

h-rep/d	la-mak-tappak- <u>di</u> -ko-ka	la-mak-base-hi-ko-ka
v har/clit	la-mak-tappak- <u>do</u> -ko-ka	la-mak-base- <u>ho</u> -ko-ka
k-weak	la-ma?-tappa?-do-ko-ka	la-ma?-base-ho-ko-ka
stress	la-ma?-táppa?-do-ko-ka	la-ma?-báse-ho-ko-ka

Surface [lama?táppa?dokoka lama?básehokoka]

'Are you going to wash clothes or do dishes?'

(69) /ku-saŋa tedom anna daham hi ia/

h-replace/d	ku-saŋa tedom anna daham <u>di</u> ia
v-del/clitic	ku-saŋa tedom anna daham <u>d</u> ia
nasal assim.	ku-saŋa tedom anna dahan <u>d</u> ia
m:n gemin.	ku-saŋa tedon <u>n</u> anna dahan d ia
stress	ku-sáŋa tédon nánná dáhan d ia

Surface form [kusáŋa tédon nánná dáhan díá]

'I thought it was a water buffalo but it's a horse'

In example (65) above -hi follows a vowel and retains the phone [h]. In example (66) a consonant precedes -hi and because of h-replacement/d and vowel harmony/clitic, the resultant surface form is [da]. In example (67) -hi becomes [di] when following a consonant but remains [hi] after a vowel. This -hi → [di] occurrence seems odd at first glance as it is difficult to perceive any phonological motivation. Note, however, that the PUS phoneme /h/ corresponds to /r/ in the neighboring Mamasa language. In Mamasa /r/ → [d] in the same environment as /h/ → [d] in PUS. The Mamasa phonological process, in which /r/ → [d] when following consonants, is phonologically motivated and helps account for the corresponding process in PUS.

In example (69) h-replacement/d must precede nasal assimilation.

Table 9 presents the rules we have covered in this paper. While not all rules in PUS are ordered there are, as we have seen, several sets of rules which must be ordered. Only the rules shown connected A-B(-C) are actually ordered with respect to each other. The remaining rules are placed arbitrarily on the chart.

Table 9.—Ordered Rules

1.	v.del/clitic	A B
2.	v.har/clitic	B
3.	h-repl/d	A B
4.	N-insert:i,u	A B
5.	N-insert:a	A B
6.	nasal assim.	B B B A A A
<hr/>		
7.	nasal del.	A A
8.	cons.del.	B B
9.	cont'tion	C B
10.	ŋ-gem.	A
<hr/>		
11.	v.repetition	B A A
12.	e-laxing	B B
13.	voc.stress	B A
14.	diphthongisation	C B A
15.	stress place	B B C B A
16.	a-raising	B B C
17.	v.harmony/æ	B A
18.	v. del/æ	B B
19.	k-sib'tion	A B
20.	k-weakening	A B
21.	nasal velar.	A B
22.	m:n-gem.	A B
23.	ŋ-insertion	
24.	um-mu metathesis	
25.	k-deletion	

6. FREE VARIATION

As with speakers of all languages, PUS speakers do not always adhere to the phonological rules used to describe the language. We find variation between speakers as well as variation in the speech of individuals. In the following cases of speech variation I have not been able to identify groups by gender, age, social status or any other category which would explain patterns of variation. Perhaps more time in the location of research will enable me to begin identifying speech groups, if there are indeed specific groups. I will now outline some of the common variations.

A common alternation in Austronesian languages is between the phones [u] and [o]. PUS is no exception to this. Thus we find variations as follow.

- (70) /poheba/ --> [pohéba]
'clothes' [puhéba]

- (71) /muheam/ --> [muhéam]
'common cold' [mohéam]

In the case of [u]/[o] variation I find that the same speaker will always pronounce the word the same way. So this is an alternation between speakers.

The causative prefix /pa/ is pronounced by some speakers as [po]. This alternation is also speaker specific.

- (72) /di-pa-bahinnik/ --> [dipabahinni?]
'to make smaller' [dipobahinni?]

- (73) /di-pa-ma-hempo/ --> [dipamahémpo]
'to shorten' [dipomahémpo]

Earlier I presented the prefix um-. Most speakers use the form [uN] before consonant-initial transitive words (in the case of continuant-initial words the /m/ is replaced by the following continuant, resulting in a continuant geminate—see continuantization and example (74)). The form [mu] is optionally used for um- and is considered an acceptable speech form.

- (74) /menna um-si-pak-tulak-am/ --> [ménna ussipa?tulásam]
'With whom did you speak?' [ménna musipa?tulásam]

I showed in η-insertion that when word final /æ/ is followed by -am, then the phone [ŋ] is inserted. Also acceptable, but less common, is the formation of /æ/-final -am forms without the insertion of /ŋ/.

(75) /pe-læntæ-am/ --> [pelæntɛŋam]

'garden house location' [pelæntɛam]

(76) /ka-lempæ-am/ --> [kalɛmpɛŋam]

'path to house' [kalɛmpɛam]

The same speaker may use both forms, but the /ŋ/ form is generally spoken.

According to k-sibilantization the phoneme /k/ is replaced by [s] when immediately followed by the suffix -am. While the use of /s/ in this environment is considered by local speakers as the standard form, it is not uncommon to hear /k/ instead. When questioned, local speakers will invariably say that both forms are fine. Some will add, however, that the /k/ form is an influence from 'outside'. I have yet to identify the source of this form as I receive varying opinions.

(77) /peŋ-diok-am/ ---> [pendiósam]

'bathing area' [pendiókam]

(78) /pak-petuak-am/ ---> [paʔpetuásam]

'view' [paʔpetuákam]

When the clitic -hi undergoes vowel harmony/clitic the surface vowel harmonizes to the vowel of the following pronominal clitic. Alternately, and just as acceptable (though less common), is for the surface form to be [ha]; probably due to harmonizing with the [a] in the question clitic [ka].

(79) /si-biasa-hi-ko-ka ma-saki susi/ 'Is he usually sick like this?'

[sibiásahokoka masáki súsi]

or [sibiásahakoka masáki súsi]

In particular words there optionally occur nasalized vowels. This nasalization is not present in every occurrence of these words, even when spoken by the same person. Perhaps the phonemes /m/ and /h/ affect the nasality of following vowels.

(80) [mahɪhiɪ] / [mahihi] 'yellow'
[suməhhɔ] / [sumahho] 'cry'

When the prefix di- (passive) is preceded by la- (irrealis), frequently the d is dropped so that /la-di/ --> [lai]; e.g. /la-di-tanam/ 'will be planted' becomes [laitanam].

7. FEATURES OF FAST SPEECH

In previous sections I have referred to several features of fast speech. The most common features appear at morpheme and word boundaries where vowels juxtapose or word final [ʔ] is followed by a vowel.

Final vowels on prefixes followed by vowel-initial words are occasionally deleted in fast speech.

(81)

- | | | | | |
|----|---------------|-----|------------|-----------------|
| a. | /di-pa-okkok/ | --> | [dipókkoʔ] | 'to seat' |
| b. | /ku-ola/ | --> | [kóla] | 'I travel over' |
| c. | /mu-ua/ | --> | [múa] | 'you say' |
| d. | /di-pa-ande/ | --> | [dipánde] | 'to be fed' |

In each of the cases above the juxtaposed vowels are back vowels which are either the same vowel or differ only by one degree of vowel height. In each case the stressed vowel is retained. Example (81d) is unique in that it has become the regular speech form to the point that, to the PUS speaker, the form *[paánde] is not recognizable as the same word. (This may have developed to differentiate from the similar word /pak-ande/ --> [paʔánde] 'to eat a lot'.) I cannot make a general statement about deletion of juxtaposed /a/, as even in fast speech there are forms such as /ta-ande/ --> [ta ánde], 'let's eat'.

In fast speech word final /k/ ([ʔ]) is weakened and sometimes eliminated before vowel-initial suffixes or clitics.

(82)

- | | | | |
|-------------------|-----|---------------|----------------------|
| /um-tuŋkak-i-kam/ | --> | [untuŋkáikam] | 'we open (the door)' |
| /um-tutuk-i-æk/ | --> | [untutúiaʔ] | 'I close (the book)' |

I showed in vowel harmony/a that within words the phoneme /a/ will harmonize to [æ] when /æ/ is the nucleus of the adjoining syllable to the right. In fast speech I find that harmonization occurs across clitic and even (rarely) word boundaries.

(83)

- | | | | | |
|----|------------------------|-----|----------------------|-------------------------------------|
| a. | /mesa-æk/ | --> | [mésæ^æʔ] | 'by myself' |
| b. | /sia-m-æk/ | --> | [síæmæʔ] | 'I already...truly' |
| c. | /lekbak-æk/ | --> | [léʔbæ^æʔ] | 'I go' |
| d. | /mu-ampa-i-am#ænæk-na/ | --> | [muampáiaen nænéʔna] | 'she looks after her child for her' |

Of particular interest is example (83c) where we see not only vowel harmony but weakening of the glottal stop at the end of the word, before the clitic.

8. ADAPTATION OF LOAN WORDS

I will now present a brief overview of what occurs when words are borrowed into PUS and adapted to the phonology of PUS. The following presentation is not meant to be the final word on the subject but rather a quick peek at some of the things which occur when PUS speakers borrow words from Indonesian.

The first thing one notices concerning loan words is that there are various stages of adaptation. Some are fully altered to fit the acceptor phonology while others are not yet completely changed and still retain aspects of the source language. Often I find differences in pronunciation of the loan words among speakers of the acceptor language depending on the degree of exposure to the source language.

The above points are true concerning loan words in PUS. In this section on loan words I will present several rules for word adaptation. These 'rules' are to be taken as 'rules of thumb' to help summarize the statements here but not as hard and fast rules. A further, more in depth, study may enable firm up or alter these findings.

The following is a sampling of loan words from Indonesian. All PUS examples are written phonetically, while Indonesian examples are written orthographically (note, Indonesian c —> [tʃ]; ng —> [ŋ]).

Table 10.—Loan Words

INDONESIAN	PUS	
1. layang-layang	lajal-lájam	'kite'
2. (ber)sembahyang	(ma?)sambájam	'pray'
3. celana	talána	'pants'
4. (mem) baca	(mam)báta	'read'
5. sepatu	sapátu	'shoes'
6. selimut	salímu?	'blanket'
7. obeng	óbem	'screwdriver'
8. cakalan	takálam	'tuna'
9. piring	píhim	'plate'
10. barang	báham	'goods'
11. roti	hóti	'bread'
12. langsung	læssæ	'type of fruit'
13. benang	bénnae	'thread'
14. cangkir	taŋkihi?	'cup'
15. asal	asála?	'provided that'
16. tanggal	taŋgála?	'date'
17. kikir	kíkki?	'file'
18. perkakas	pəŋkákka?	'tools'
19. sekerup	sikúhu?	'screw'
20. gergaji	gahagáji	'saw'
21. kursi	kahósi	'chair'
22. tuan dokter	tondóttö?	'physician'
23. bensin	béssim	'gasoline'

Examples 1 and 2 demonstrate what occurs when words with medial 'y' are borrowed into PUS i.e., y—>j. This also occurs in place names such as Salu Mayang —> [salumæjæ] (name of village).

(84) loan rule y/j:

y --> j / v ____ v

From examples 3, 4, 8, and 14 we see that since there is no phoneme */c/ in PUS, all 'c' sounds in loan words change to the alveolar stop /t/.

(85) loan rule c/t:

c ----> t

In examples 3, 5, 6, and 20 the Indonesian sound 'e' ([ə]) becomes [a] in PUS. While the e --> [a] change often occurs, there are also examples such as 19 in which 'e' becomes 'i'.

I have shown that the only word-final nasal in PUS is /m/. Examples 1, 2, 7, 8, 9, 10, and 23 show that any other word-final nasal becomes [m] in PUS.

(86) loan rule final m:

[nasal] --> m / ____ #

There is no [r] phone in PUS. All 'r' sounds in loan words are replaced by [h], as shown in examples 9, 10, 11, 14, 19, 20, and 21 above.

(87) loan rule r/h:

r ----> h

The sound combination [aŋ] in Indonesian words generally results in the phoneme /æ/ in PUS. Examples 12 and 13 show this occurring. I also find that Indonesian place names which end in 'ang' are pronounced with the corresponding PUS [æ], e.g., Salu Tabang is pronounced [salutæbæ] (name of village). I have encountered examples of other words which may or may not be loan words but which show the same kind of correlations such as jarang --> [mædæhæ] 'seldom'. This word is interesting because we can see that the root [dæhæ] shows (in addition to the aŋ --> [æ] correspondence) both the j --> [d] and the r --> [h] correspondences.

There are also a number of words yet to be totally PUS-ized such as examples 1, 2, and 10 above. It is not known whether these words will one day further change so that, for instance, 'barang' becomes *[bárhæ] or whether the current pronunciation [báham] will remain as the accepted form. We saw in ŋ-insertion that [ŋ] is inserted after /æ/ and before the suffix am. It may be that an historical study will show [am] to be underlying /æ/. In the neighboring languages of Toraja-Saqdan and Mamasa we frequently encounter [aŋ] corresponding to [æ] in PUS words.¹² An example of this is the word [bábaŋ] in Mamasa which is [bæbæ] 'merely' in PUS.

¹²See the appendix for further examples.

(88) loan rule aŋ/æ:

aŋ # ---> æ #

Loan words of similar structure may not always be altered in the same way. An example of this is the pronunciation of an Indonesian word which ends in a non-nasal consonant. Example 7, selimut —> [salimuʔ] shows what often happens, i.e., the final consonant becomes [ʔ]. The same occurrence is found in examples 17, 18, 19, and 22. (Note that in examples 17 and 18 the word medial consonant geminates.)

(89) loan rule final consonant/[ʔ]:

$$\begin{array}{ccccc} & & \left[\begin{array}{c} c \\ -nasal \end{array} \right] & \# & \text{---> } 1 \ (1) \ 2 \ ? \ 4 \\ c \quad v & & & & \\ 1 \quad 2 & & 3 & 4 & \end{array}$$

Not all non-nasal consonant final Indonesian loan words are changed in this way. Another type of alternation is illustrated in examples 14, 15 and 16 where instead of just the replacement of the final consonant with [ʔ] an echo vowel is inserted after the final consonant, before the glottal stop.

(90) loan rule final consonant/echo vowel:

$$\begin{array}{ccccc} & & \left[\begin{array}{c} c \\ -nasal \end{array} \right] & \# & \text{---> } 1 \ 2 \ 1 \ ? \ 3 \\ v & & & & \\ 1 & 2 & 3 & & \end{array}$$

At this point it is not clear why both of the above processes exist nor when each comes into effect.

Examples 20 and 21 demonstrate what happens when the loan word has a non-PUS consonant cluster. In each case a vowel is inserted between the consonants. Presently I do not know what factors determine which vowel is to be inserted.

In example 22 the consonant cluster kt in 'tuan dokter' becomes the geminate [tt]. There is no [kt] cluster within the morpheme in PUS. Example 23 demonstrates the process of continuization as the Indonesian cluster ns becomes [ss] in PUS. However, in this case continuization takes place within the morpheme, not across a morpheme boundary.

APPENDIX

THE PHONEME /æ/

In this appendix some PUS words which have the phoneme /æ/ are presented along with corresponding words in neighboring languages. Patterns are noted but no historical-comparative conclusions are drawn.

PUS	Tabulahan	Mamasa	Toraja	Gloss
ækæ?		aŋka?	aŋka?	raise
ænæ?	ænæ?	anak	anak	child
ane		ane	ane	termite
æwæ		awaŋ	awaŋ	bran
balintotæ?	balintohte?	balintotok		woodpecker
bæbæ		babaŋ		merely
bækæ	bækæŋ	buaŋ	buaŋ	molar
bækkæ	bika	bakka		crack open
bælæ		balan	balan	lungs
bænnæ	bænnæŋ	bannaŋ	bannaŋ	thread
bætæ	bætæŋ	batan	batan	stem
beluæ?	beluha?	beluak	beluak	hair
biha?	bihaŋ	biran		female
binta?	bintaŋ	bintoen	bintoen	star
bisæ?		bissak	bissak	split w/ axe
bokæ?	boŋa?	moŋŋa?		rowdy
bo?bæ?	bombaŋ	bo?bok	bo?bok	dig hole
bolæ?		bolok	bolok	nasal mucus
bombæ	bombaŋ ¹³			crevice
boŋkæ		bunŋon	bukkaŋ	crab
bulintæ	bulintaŋ	bulintoŋ	bulittaŋ	tadpole
bundæ		bundaŋ	bundaŋ	boil
(sa) dækæm		daŋkan	daŋkan	span
dæŋgu?	daŋku?	daŋguru?	daŋguru?	hit
gæjæ		gayaŋ	gayaŋ	stab
haŋæm	dihæŋæŋi	raŋanni	raŋanni	add
hoæ	huaŋ	ruaŋ ¹⁴		inside
hossæ?	hehsæ?			mud
illæ		illoŋ	illoŋ	nose
issæ	iŋseŋ	issoŋ	issoŋ	mortar
kaledæ?	kaleræ?			armpit
kalibæmbæ		kalibambaŋ	kalibambaŋ	butterfly
kalimbua?	timbu	kalimbuaŋ	kalimbuaŋ	spring
kasia?	kaseŋ	sia-siaŋ		fish gills
kædo?	pekaro?	kado?		to latch
kæha?	kæhaŋ	karaŋ	karaŋ	to work
mækæti?	mækætiŋ	makatti?	makati?	to itch
kebættæ	kehæhtaŋ	kebattaŋ	keba?taŋ	pregnant
kohha?	kohhe?	korrok	kumorrok	to snore

¹³The Tabulahan gloss for this form is 'a dug hole'. While differing in gloss from PUS, the form is clearly related.

¹⁴The Mamasa form is restricted to the meaning 'stomach'.

PUS	Tabulahan	Mamasa	Toraja	Gloss
kollæ-kollæ kumondæ	kado-kado lumumpa?	garro-garro kumondon	ma?dondo	esophagus to run
læŋæm læntæ læppæ? leæ lembæ lempæ limbæ lippæ? litæ? lolæ lolæ? londæ lo?bæ	lantæŋ ¹⁵ læhpæ? leæŋ lembæŋ lempæŋ le?be? lihpe? lolen lolo london ¹⁶ lo?baŋ	lanŋan lantæŋ mellopa lembæŋ lempæŋ limboŋ lippak litak lolok london lo?baŋ	lanŋan lattæŋ tikaloppak lembæŋ lempæŋ limboŋ litak lolon lolo london lo?baŋ	to go up garden house blister cave valley turn pond explode ground to flow treetop male empty
malotæ mæne? ma-pæi?	maloteŋ mane? mapæi?	maloton manuk mapai?	maloton manuk mapai?	black chicken bitter
pæppæ? pæso? poppæ?	pahse paso? pohpe?	pappak pasok poppok	pa?pak paku po?pok	tree bark to nail ghoul
sædæ masæ sægæ sehæ sæke? ma-sække? sæmbæ?i sændæ? sæpæi? ma-siæ?	sua masæe sæŋkæŋ sehæŋ sæŋke? masakke? mambamba sændæ? sæmpæi? mabaya	sadaŋ masæe seraŋ sakke? masakka? sambakki sandak sappalli? masiaŋ	sadaŋ masæe seraŋ masakka? sambakki masiaŋ	mouth long time injure nest to tie cold hit with twig try a moment bright
tææ? tæi tæke tællæ tæmpæ? ma-tæsæ? tondæ? tontæm tuæ?	daih tæi taŋke tæmpæ? tuæ?	tæe? tai taŋke tallaŋ tampak matasak tondok tonton tuak	tæe? tai taŋke tallaŋ tampak matasak tondok tonton tuak	no, not excrement branch k.o.bamboo end ripe village same palm wine
mæ-wæhham	mæhæhæŋ		ma?raŋ	thirsty

¹⁵The Tabulahan gloss for this form is 'raised platform below house'.

¹⁶The Tabulahan gloss for this form is limited to male chickens, i.e., roosters.

Correspondences of PUS [æ] found in Tabulahan:

	PUS		Tabulahan	Syllable
æ/a	mæne?	/	mane?	1
	pæso?	/	paso?	1
	masæe	/	masae	2
	dængu?	/	dan̄ku?	1
æ/aŋ	hoæ	/	huaŋ	f ¹⁷
	læntæ	/	lantæŋ	f
	leæ	/	leaŋ	f
	loʔbæ	/	loʔbaŋ	f
	sæke?	/	saŋke?	1
æ/æŋ	bænnæ	/	bænnæŋ	f
	bætæ	/	bætæŋ	f
	bi hæ	/	bi hæŋ	f
	bintæ	/	bintæŋ	f
	kasiaæ	/	kaseæŋ	f
	kæ hæ	/	kæ hæŋ	f
	kebættæ	/	kehættæŋ	f
	læmbæ	/	læmbæŋ	f
	læmpæ	/	læmpæŋ	f
	sægæ	/	sæŋkæŋ	1, f
	sehæ	/	sehæŋ	f
	tæke	/	taŋko	1
æ/e	balintotæ?	/	balintohte?	f
	koh hæ?	/	koh he?	f
	poppæ?	/	poh pe?	f
æ/eŋ	bombæ	/	bombeŋ	f
	bulintæ	/	bulinteŋ	f
	issæ	/	iŋseŋ	f
	lolæ	/	lolenŋ	f
	malotæ	/	maloteŋ	f
æ/eʔ	limbæ	/	leʔbe?	f
æ/oŋ	londæ	/	londoŋ	f
æʔ/o	lolæ?	/	lolo	f
kæ/ŋa	bokæ?	/	boŋa?	f

¹⁷The abbreviation 'f' stands for 'final syllable'

Correspondences of PUS [æ] found in Mamasa and Toraja:

	PUS	Mamasa	Toraja	Syllable
æ/a	bækkæ	bakka		1, f
	dæŋgu?	dangguru?	dangguru?	1
	hæŋæm	raŋanni	raŋanni	1, 2
æ?/ak	ænæ?	anak	anak	f ¹⁸
	beluæ?	beluak	beluak	f
	bisæ?	bissak		f
æ/aŋ	ækæ?	aŋka?	aŋka?	1
	æwæ	awaŋ	awaŋ	f
	bæbæ	babaŋ		f
	bælæ	balan	balan	f
	bænnæ	bannaŋ	bannaŋ	f
	bætæ	bataŋ	bataŋ	f
	bi hæ	bi raŋ		f
	bundæ	bundaŋ	bundaŋ	f
	dækæm	daŋkan	daŋka	1
	gæjæ	gayaŋ	gayaŋ	f
	hoæ	ruaŋ		f
æ/oen	bintæ	bintoen	bintoen	f
æ?/ok	balintotæ?	balintotok		f
	bolæ?	bolok	bolok	f
	bo?bæ?	bo?bok	bo?bok	f
æ/oŋ	boŋkæ	buŋkoŋ	bukkaŋ	f
	bulintæ	bulintoŋ	bulittoŋ	f
	illæ	illoŋ	illoŋ	f

¹⁸The Mamasa form [ak] at the end of the word corresponds to [æ?] at the end of the PUS form. The [æ] form in the first syllable of the PUS form is expected as the phonemes /a/ and /æ/ never co-occur intramorphemically in PUS (see (50)).

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PHONOLOGY OF MAMASA

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ABBREVIATIONS AND SYMBOLS

C	-	consonant
V	-	vowel
:	-	length
1	-	first person
2	-	second person
3	-	third person
s	-	singular
p	-	plural
in	-	inclusive
ex	-	exclusive
#	-	word boundary
-	-	morpheme boundary (affix or clitic)
=	-	clitic boundary
.	-	syllable boundary
*	-	unattested (either a historical reconstruction or a disallowed form or sequence)
//	-	(morpho-)phonemic transcription
[]	-	phonetic transcription
{ }	-	one of two or more alternates
()	-	optional
< >	-	angled bracket notation expressing discontinuous dependency
~	-	free variation

1. INTRODUCTION

The Mamasa language is an Austronesian language on the island of Sulawesi. It is often considered a dialect of Toraja (Sa'dan).¹ Most of the approximately 100,000 speakers of Mamasa live in the eastern part of Kabupaten Polewali-Mamasa, although the language area does extend into the Kabupatens of Tana Toraja and Pinrang. The Mamasa language is comprised of at least three dialects: northern (Kecamatan Mamasa), middle (Kecamatans Sumarorong, and Pana'), and southern or Pattue' (Kecamatan Polewali). This study reflects the phonology of the northern dialect. The field work that is the basis for this paper was conducted in the village of Tatale, Desa Tawalian, Kecamatan Mamasa.²

2. PREVIOUS STUDIES

Not much has been published about the Mamasa people and language. There are three articles in Dutch by A. Bikker, who was a missionary living in Mamasa during the 1930's. The first of Bikker's articles is about marriage and rice ceremonies. It has a number of short texts which, as Mills has guessed, contain many old forms. The second article by Bikker is just a short description of the travels of the children of Pongka Padang, who was the common ancestor for all the *Pitu Ulunna Salu*³ (PUS) area (some of Pongka Padang's children settled in the Mamasa area as its first inhabitants). There is no text material in the article outside of the explanation of place names. Bikker's third article contains 70 Mamasa riddles. There is also one article in French by Jeannine Koubi, who did research in the greater Toraja area in the 1970's. Koubi's article contains a long text about the ancestor Ambe' Susu. Unfortunately her informant, who was born in Toraja, used a mixture of Toraja and Mamasa. In checking the first paragraph of the text with a Mamasa speaker a number of differences in lexicon and phonology were discovered.⁴ There is a small book in Indonesian by Arianus Mandadung about the Mamasa area and culture. His book was written with the purpose of revealing the potential for tourism in the Mamasa area. The only article in English about the Mamasa language is Valkama's survey report on the Toraja sub-family of languages.

¹ Valkama (1987:124) considers the language of Mamasa to be a member of the Toraja subfamily, which consists of: Toraja, Mamasa, Kalumpang, Luwu/Rongkong, and Talondo'.

² Research for this paper was carried out under the auspices of the Cooperative Program between Hasanuddin University and the Summer Institute of Linguistics.

³ *Pitu Ulunna Salu*, literally the 'seven heads of the river', refers to the ancient confederation of seven kingdoms centered around the headwaters of the Mambi River in Kecamatan Mambi. Each of these kingdoms was headed by one of Pongka Padang's children.

⁴ Koubi's other two works were recently brought to my attention but I have yet to see a copy of them.

3. SEGMENTALS

3.1 Phones and phonemes

This section is a description of the phones and underlying phonemes of the Mamasa language.

3.1.1 Chart of phones

The following phones are present in Mamasa:

Table 1: Mamasa Phones

CONTOIDS ⁵						
	labial	alveolar	alveo-palatal	palatal	velar	glottal
stops						
vl	p p:	t t:			k k: k̥	ʔ ^
vd	b	d			g	
affricate			č			
fricative		s s:				
nasal	m m:	n n:			ŋ ŋ:	
lateral		l l:				
trill		ʀ ʀ:				
semivowel	w			y		
VOCOIDS						
			front	central	back	
high			i		u	
mid		tense	e		o	
		lax	ɛ			
low				a		
		diphthong		a ⁱ a ^e a ^o a ^u		

3.1.2 Chart of phonemes

Underlying the previously mentioned phones are fifteen consonant phonemes and five vowel phonemes.

⁵ [ʔ] symbolizes a weak (lenis) glottal stop which occurs when a vowel sound is rearticulated. In words such as [muba^a] 'you bring' the two vowel sequence is not separated by a strong glottal stop, nor is the vowel the long vowel [a:]. [k̥] symbolizes an unreleased voiceless velar stop. The symbol [:] is used to indicate length on the consonants.

Table 2: Mamasa Phonemes

CONSONANTS					
	labial	alveolar	palatal	velar	glottal
stops					
vl	p	t		k	ʔ
vd	b	d		g	
fricative		s			
nasal	m	n		ŋ	
lateral		l			
trill		r			
semivowel	w		y		

VOWELS				
	front	central	back	
high	i		u	
mid	e		o	
low		a		

In comparing the phoneme chart with the phone chart there are several sounds that are not considered phonemic: [ʔ], [č], [ɛ], the diphthongs, and the long consonants. The weak glottal stop [ʔ] occurs only between 'double' vowels, the [č] is in free variation with [t] before the high vowel [i], [ɛ] is an allophone of /e/ which occurs in closed syllables, the diphthongs are phonemically /a/ followed by another vowel in a penultimate syllable, and the long consonants are reinterpreted as geminate clusters.

3.1.3 Feature matrix

The following are the feature matrices for the Mamasa phonemes listed above.

Table 3: Feature Matrices

CONSONANTS														
	p	t	k	ʔ	b	d	g	m	n	ŋ	l	r	s	w y
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
consonantal	+	+	+	-	+	+	+	+	+	+	+	+	+	-
continuant	-	-	-	-	-	-	-	-	-	-	+	+	+	+
nasal	-	-	-	-	-	-	-	+	+	+	-	-	-	-
anterior	+	+	-	-	+	+	-	+	+	-	+	+	+	-
coronal	-	+	-	-	-	+	-	-	+	-	+	+	+	-
voiced	-	-	-	-	+	+	+	+	+	+	+	+	+	+
back	-	-	+	-	-	-	+	-	-	+	-	-	-	+
lateral	-	-	-	-	-	-	-	-	-	-	+	-	-	-

VOWELS					
	i	e	a	o	u
syllabic	+	+	+	+	+
high	+	-	-	-	+
low	-	-	+	-	-
back	-	-	+	+	+

3.2 Interpretation

3.2.1 Consonant vs. vowel

Mamasa, like many other languages, presents a problem in the interpretation of the segments [u] and [i]. In the following positions they are ambiguous: 1) between two vowels, 2) word initially before a vowel, and 3) word finally following a vowel.

The easiest of these three environments to deal with is the intervocalic. In that environment these segments are interpreted as [w] and [y]. This is supported by the lack of unambiguous three vowel sequences intramorphemically in Mamasa. It is further supported by historical and comparative evidence. Consider the following words from Mamasa, PUS (Pitu Ulunna Salu), Toraja, and the Proto-South Sulawesi (PSS) reconstructions of Mills (1975).

Mamasa	PUS	Toraja	PSS ⁶	
/awan/	/æβæ/	/aan/	*a(b)ang	'hull'
/awak/	/æβæʔ/	/aak/	*awak	'waist'
/bulawan/	/bulaβam/	/bulaan/	*bulawan	'gold'
/kayu/	/kaju/	/kayu/	*kayu	'wood'
/gayan/	/gæjæ/	/gayan/	*gayang	'stab'
/boyoʔ/	/bojoʔ/	/boyo/	*boyo(k)	'squash'

The second environment in question, that of word initially before a vowel, is not as easily dealt with. I will attempt to show that they are best interpreted as [w] and [y]. For our discussion here we will consider the following words:

Mamasa	PUS	Toraja ⁷	PSS	
[uáse]	/uase/	/wase/	*wase	'axe'
[uáni]	/uani/	/wani/	*wani	'bee'
[uái]	/uβai/	/wai/	*wai	'water'
[iáo]	/iaβo/	/dao/	----	'above'
[iáya]	----	/da(y)a/	*daya	'upstream'
[iólo]	/iolo/	/dolo/	*olo	'earlier'

A few notes need to be added to the above:

- 1) In the Toraja dictionary the forms *uase*, *uani*, *uai* are also found.
- 2) There is a rule in PUS that allows for the allophones [w] and [y] before stressed vowels (Campbell (this volume:6)).
- 3) While Mills reconstructs a PSS initial *w he does not reconstruct a PSS initial *y.

⁶ Parentheses in the Proto-South Sulawesi data indicates that the consonant in question cannot be reconstructed.

⁷ Parentheses in the Toraja data indicates that both forms containing the sound and forms without the sound were found in the Toraja dictionary.

4) Older Mamasa speakers tend to write words such as [uái] as *uai* while younger speakers tend to use the *w* to symbolize the first sound.

5) Some speakers of Mamasa will write the last three words of the above list as *iyao*, *iyaya*, and *iyolo*, others will write them as *yao*, *yaya*, and *yolo*, while others write them as *iao*, *iaya*, and *iolo*.

6) There is a PSS (and PAN - Proto Austronesian) locative marker *di which may have a reflex *i-* in the Toraja languages (the Toraja dictionary lists both *i-* and *di-*, but it is found only in frozen forms in Mamasa, that is, native speakers view words such as *illau*? 'downstream' as single morphemes and not as /i - lau?/)

7) there are word initial vowel sequences in Mamasa that are unambiguous such as *ao*? 'bamboo'.

Considering the above factors word initial [w] is posited for the following reasons:

1) since there are no three vowel sequences in Mamasa [uái] 'water' must be interpreted as [wai], and

2) the existence of word initial *w in PSS.

Although Mills does not posit word initial *y for PSS it appears that speakers of Mamasa have begun to interpret word initial [i] as [y] when it is found in forms involving the now frozen locative marker *i-*. Thus we conclude that Mamasa does have word initial [y] in a limited number of words.

In the third environment, word finally following a vowel, the segments /u/ and /i/ are interpreted as [u] and [i]. This interpretation is based on native speaker intuition and stress placement.

In words that end with a vocoid sequence containing the segments [u] and [i] word finally native speakers make the following syllable divisions:

ta.u	'person'
li.u	'continuous'
re.u	'sword grass'
ba.i	'pig'
ru.i	'move soil in rice field'
ŋe.i	'to place'

Stress in Mamasa falls on the penultima of a word (see section 4.1). Stress placement is affected by the addition of a suffix to a word: that is, stress is placed on the penultima of the word inclusive of any suffixes.

[réu]	'sword grass'
[reúŋku]	'my sword grass'

3.2.2 Sequence vs. unit

There are three sets of sequences that warrant discussion: nasals followed by homorganic stops, geminate consonants, and two-vocoid sequences.

All nasals followed by homorganic stops are interpreted as sequences, and not prenasalized stops for two reasons: 1) they never occur word initially or word finally and 2) both members of the sequence are established as separate phonemes.

/am.pa/	'mat'
/am.beʔ/	'father'
/ben.to.en/	'star'
/in.doʔ/	'mother'
/sam.po/	'cousin'
/saŋ.go.reŋ/	'peanut'

'Double' consonants are interpreted as geminates on the phonemic level which are realized as long consonants on the phonetic level. They occur only at syllable boundaries, where native speakers consider the first stop as the coda of the first syllable while the other stop is the onset of the second syllable.

/ap.paʔ/	'four'
/an.na/	'and'
/bit.tiʔ/	'calf (of leg)'
/il.loŋ/	'nose'
/sok.koʔ/	'corn rice'

Two-vocoid sequences are interpreted as sequences and not as diphthongs for the following reasons:

1) In all cases both parts of the sequence have been established as separate phonemes in other environments,

2) When the stress shifting possessive suffixes are added to words containing vowel sequences the stress moves to the second vowel of the sequences except in the case of /a/ initial sequences:

/bue/	--->	[búe]	'beans'
/bue-ku/	--->	[buéku]	'my beans'
/puaŋ/	--->	[púaŋ]	'lord'
/puaŋ-ku/	--->	[puáŋku]	'my lord'
/peo/	--->	[péo]	'loincloth'
/peo-na/	--->	[peóna]	'his loincloth'

but:

/bai/	--->	[bái]	'pig'
/bai-ku/	--->	[báiŋku]	'my pig'

From this it seems sequences of vowels are best thought of as sequences since stress shifts to the second member of the sequence in the above environment. The diphthongs that do exist are really sequences on the phonological level. See the diphthongisation rule discussed in section 6.1.2.

3) Native speaker intuition. When Mamasa is written two-vocoid sequences are always written as a sequence of two vowels.

3.3 Description of phonemes

3.3.1 Consonant phonemes

The Mamasa consonant phonemes are shown word initially, medially, and finally in the following list.

Table 4: Positions of Consonant Phonemes

/p/	initial medial	/pare/ /api/	[páɾe] [ápi]	'rice plant' 'fire'
/t/	initial medial	/tedoŋ/ /pitu/	[tédoŋ] [pítu]	'water buffalo' 'seven'
/k/	initial medial final	/kaluku/ /iko/ /manuk/	[kalúku] [íko] [mánuk]	'coconut' 'you' 'chicken'
/ʔ/	medial ⁸ final	/boʔboʔ/ /kuliʔ/	[bóʔboʔ] [kúliʔ]	'cooked rice' 'skin'
/b/	initial medial	/bai/ /tibe/	[bái] [tíbe]	'pig' 'throw away'
/d/	initial medial	/daraŋ/ /buda/	[dáɾaŋ] [búda]	'horse' 'many'
/g/	initial medial	/gaun/ /raga/	[gáun] [rága]	'cloud' 'ball'
/s/	initial medial	/sola/ /isi/	[sóla] [ísi]	'friend', 'with' 'tooth'
/r/	initial medial	/rura/ /baraʔ/	[rúɾa] [báɾaʔ]	'mud' 'wind'
/m/	initial medial	/makaleʔ/ /temo/	[makáleʔ] [témo]	'tomorrow' 'now'
/n/	initial medial final	/nipa/ /manuk/ /uran/	[nípa] [mánuk] [úɾan]	'type of palm' 'chicken' 'rain'
/ŋ/	initial medial final	/ŋei/ /boŋi/ /tedoŋ/	[ŋéi] [bóŋi] [tédoŋ]	'place' 'night' 'water buffalo'
/l/	initial medial	/lila/ /sule/	[líla] [súle]	'tongue' 'return'
/y/	initial medial	/yao/ /kayu/	[yáo] [káyu]	'on', 'above' 'tree', 'wood'
/w/	initial medial	/wani/ /kawa/	[wáni] [káwa]	'bee' 'coffee'

⁸ Word medially /ʔ/ occurs only before voiced consonants. A weak glottal stop [ʔ] is inserted between identical vowels (see weak glottal insertion rule).

3.3.2 Vowel phonemes

In the list below the vowel phonemes are shown in a noncontiguous relationship with the other vowel phonemes.

Table 5: Position of Vowel Phonemes

/i/	1st syll	/iruʔ/	[ĩruʔ]	'to drink'
		/illoŋ/	[ĩlloŋ]	'nose'
		/piran/	[pĩran]	'when'
	2nd syll	/inde/	[inde]	'this'
		/moni/	[móni]	'noise'
		/kannin/	[kánnin]	'eyebrow'
	both	/buŋin/	[búŋin]	'sand'
		/rindiŋ/	[řindiŋ]	'wall'
/e/	1st syll	/belaʔ/	[bélaʔ]	'garden'
		/tedoŋ/	[tédoŋ]	'water buffalo'
		/lendoŋ/	[léndoŋ]	'eel'
	2nd syll	/pole/	[póle]	'next'
		/rante/	[ránte]	'flat land'
		/kide/	[kíde]	'forehead'
	both	/sule/	[súle]	'return'
		/tettek/	[téttek]	'hour'
/u/	1st syll	/ulaʔ/	[úlaʔ]	'snake'
		/punti/	[púnti]	'banana'
		/pune/	[púne]	'tree fern'
	2nd syll	/bulo/	[búlo]	'type of bamboo'
		/asu/	[ásu]	'dog'
		/pitu/	[pítu]	'seven'
	both	/buntu/	[búntu]	'hill'
/o/	1st syll	/bosi/	[bósi]	'rotten'
		/golla/	[gólla]	'sugar'
		/temo/	[témo]	'now'
	2nd syll	/ampo/	[ámpo]	'grandchild'
		/piso/	[píso]	'knife'
		/bulo/	[búlo]	'type of bamboo'
	both	/tondok/	[tóndok]	'village'
/a/	1st syll	/mane/	[máne]	'before'
		/dakoʔ/	[dákoʔ]	'later'
		/rambu/	[rámbu]	'smoke'
	2nd syll	/rapiʔ/	[rápiʔ]	'twin'
		/buta/	[búta]	'blind'
		/dada/	[dáda]	'chest'
		/indan/	[índan]	'loan'
		/posa/	[pósa]	'cat'
	both	/rara/	[rára]	'blood'

3.4 Phoneme contrast

In the following sections we will look at examples of contrast between phonetically similar phonemes in minimal or near minimal pairs.

3.4.1 Contrast of consonant phonemes

/p/ vs. /b/	/pasaʔ/	[pásaʔ]	'market'
	/basa/	[bása]	'injury'
	/ampaʔ/	[ámpaʔ]	'mat'
	/ambeʔ/	[ámbeʔ]	'father'
/t/ vs. /d/	/tau/	[táu]	'person'
	/dau/	[dáu]	'don't'
	/buta/	[búta]	'blind'
	/buda/	[búda]	'many'
/k/ vs. /g/	/rakaʔ/	[rákaʔ]	'hug'
	/raga/	[rága]	'ball'
	/kao/	[káo]	'I'
	/gauʔ/	[gáuʔ]	'deed'
/k/ vs. /ʔ/	/di-barrak/	[di-bárrak]	'poured'
	/barraʔ/	[bárraʔ]	'hulled rice'
/m/ vs. /n/	/mani/	[máni]	'later'
	/nani/	[náni]	'sing'
	/temo/	[témo]	'now'
	/tene/	[téne]	'urine'
/m/ vs. /ŋ/	/tama/	[táma]	'enter'
	/saŋa/	[sáŋa]	'name'
/n/ vs. /ŋ/	/denaʔ/	[dénaʔ]	'sparrow'
	/seŋaʔ/	[séŋaʔ]	'other'
	/kamban/	[kámban]	'thick'
	/kambaŋ/	[kámbaŋ]	'swell'
/n/ vs. /ŋ/	/nawa/	[náwa]	'breathe'
	/lawá/	[láwa]	'to block'
	/mane/	[máne]	'just, before'
	/bale/	[bále]	'meat'
/l/ vs. /r/	/lambuk/	[lámbuk]	'pound'
	/rambu/	[rámbu]	'smoke'
	/bale/	[bále]	'meat'
	/pare/	[páre]	'field rice'
/r/ vs. /d/	/rambu/	[rámbu]	'smoke'
	/dambu/	[dámbu]	'kind of fruit'
	/uruʔ/	[úruʔ]	'rub'
	/uduk/	[úduk]	'smell'

/w/ vs. /b/	/wai/	[wái]	'water'
	/bai/	[bái]	'pig'
	/bawan/	[báwan]	'parrot'
	/babak/	[bábak]	'taro'

With regards to geminate consonants the following pairs of words have been noted to date:

/isi/	'tooth'
/issi/	'contents/meat'
/bisik/	'whisper'
/bissik/	'drizzle'
/bolo/	'mix'
/bollo/	'spill'
/kutu/	'louse'
/kuttu/	'lazy'
/toro/	'strong'
/torro/	'dwell'

3.4.2 Contrast of vowel phonemes

/i/ vs. /e/	/kilaʔ/	[kílaʔ]	'lightning'
	/kelaʔ/	[kélaʔ]	'bite'
	/batiʔ/	[bátiʔ]	'relative'
	/bateʔ/	[báteʔ]	'batik'
/i/ vs. /u/	/pira/	[píra]	'how many'
	/pura/	[púra]	'all gone'
	/rambi/	[rámbi]	'hit'
	/rambu/	[rámbu]	'smoke'
/o/ vs. /u/	/polo/	[pólo]	'section'
	/pulo/	[púlo]	'ten'
	/bulo/	[búlo]	'type of bamboo'
	/bulu/	[búlu]	'hair, feather'

4. SUPRASEGMENTAL CONSIDERATIONS

In this section we will first examine word stress and then intonation.

4.1 Stress

Stress in Mamasa is not phonemic. Normally the penultimate syllable of a word is stressed (except in the case of the rather rare one-syllable word).

/le/	[lé]	'OK'
/aka/	[áka]	'what'
/dua/	[dúa]	'two'
/indan/	[índan]	'loan'
/mala/	[mála]	'able'
/benna/	[béнна]	'who'
/banua/	[banúa]	'house'
/kalibambay/	[kalibámbay]	'butterfly'

Stress shifts one syllable to the right when a suffix is added to a word, that is, the penultimate syllable of the resulting new word is stressed. The suffixes that affect stress placement are the following:

- (1) Nominals with possessive suffixes:

/kide-mu/	[kidému]	'your forehead'
/beluak-ku/	[beluákkú]	'my hair'

- (2) Verbs with the transitive (locative) suffix *-i*:

/teka [?] -i/	[teká [?] i]	'to climb something'
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- (3) Verbs with the benefactive suffix *-an*:

/na-dasi [?] -an-na [?] /	---> [nadasísanna [?]]	'she sews for me'
/an-ku-kayo-an-ko/	---> [aŋkukayóaŋko]	'so that I clean for you'

- (4) The nominalizing suffix *-an*:

/iru [?] -an/	---> [irúsan]	'thing used for drinking'
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- (5) The nominalizing confix *peŋ-* *-an*:

/peŋ-karaŋ-an/	---> [peŋkaráŋan]	'a task'
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There is one exception to this stress rule. Vocatives are always stressed on the final syllable of the word. Therefore the following two stress rules are ordered with the vocative stress rule occurring before the regular stress rule in a bleeding order.

vocative stress placement:

V ---> [+ stress] / _____ (C)] #
vocative word

stress placement:

V ---> [+ stress] / _____ (C) (C) (V) (C)] #
[-stress] word

Notice that vocatives such as /ani/ (girl's name) are stressed according to the vocative stress rule on the last syllable, that is [ani], and hence do not undergo the stress placement rule since the stress placement rule applies only to words with unstressed final syllables. Notice also that the stress placement rule must be considered non-iterative, that is, it will first stress the penultimate syllable if there is one and the shorter version of the rule will apply only if there is no penultimate syllable to stress.

In contrast to the above examples regarding suffixes the addition of a clitic to a word will not move the stress from the penultimate syllable of that word. Therefore, the following clitics have no effect on stress placement:

- (1) The clitics marking person on verbs: *-na?* 1s, *-ko* 2s, *-i* 3s, *-kan* 1p-exclusive, *-ki?* 1p-inclusive. These clitics mark the subject in intransitive or antipassive clauses and the object in transitive clauses.

/meŋ-karaŋ-ko/	--->	[meŋkárangko]	'you work'
/um-ande-na?/	--->	[ummándena?]	'I eat (a banana)'
/ku-ita-ko/	--->	[kuítako]	'I see you'

- (2) The plural clitic *-a?*:

/um-ande-ko-a?/	--->	[ummándekoa?]	'you (pl) are eating'
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- (3) The perfective (or completive) clitic *-mo*:

/kadake-mo-i/	--->	[kadákemi]	'it is already dirty'
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- (4) The imperfective (or continuative) clitic *-pa*:

/buda-pa-i/	--->	[búdapi]	'there still is a lot'
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- (5) The clitic *-i* used as an emphasis marker:

/paelaʔi/ ---> [paélaʔi] 'go slowly'

- (6) The deictic clitic *-o*:

/itin-o/ ---> [ítinno] 'that'

- (7) The deictic clitic *-e*:

/manuk-e/ ---> [mánukke] 'chicken'

- (8) The clitic *-ka* used with yes-no questions:

/buda-ka bua-na/ [búdaka buána] 'Is there a lot of fruit?'

- (9) The clitic *-ra*:⁹

/deen-ra-ka sia/ [déndaka sia] 'Is there any salt?'

4.2 Intonation

To date only three sentence level intonational patterns have been encountered: falling, for statements and imperatives; rising, for questions (both yes-no and content); and sharply rising, for any sentence ending with the tag question marker *le*.

statements:

[laláokan láko belak] 'We are going to the garden.'

[máŋkamoʔ ummánde] 'I have already eaten.'

imperatives:

[láomokoi] 'Go!'

yes-no questions:

[málaka ditánanni loʔbána belak] 'Can it be planted in the garden?'

[masáekoka yáo maŋgássaʔ] 'Were you in Makassar long?'

content questions:

[áka túo illá'an beláʔmu] 'What grows in your garden?'

[áka mupáke] 'What did you wear?'

⁹ The exact meaning of the clitic *-ra* is not clear yet, but it seems to indicate contra-expectation, uncertainty, or surprise.

tag question:

[paélaʔi lé]

'Go slowly, OK?'

5. DISTRIBUTION

5.1 Syllables and phonological words

The basic syllable pattern in Mamasa can be expressed with the following formula:

([-syllabic]) [+syllabic] ([-syllabic])

or (C) V (C)

The above formula allows the following syllable types: V, VC, CV, and CVC. The following chart shows the frequency of occurrence of each of these syllable types based on a list of over a thousand morphemes:

Table 6: Syllable Frequency

Type	Percent
V	6.7%
VC	4.7%
CV	49.4%
CVC	39.2%

The majority of Mamasa morphemes consist of two syllables. Whereas the largest number of syllables found in a single morpheme is four (e.g. [ka.lim.bu.aŋ] 'spring'). From a list of over a thousand morphemes the following percentages were found:

One syllable morphemes	5.6%
Two syllable morphemes	75.9%
Three syllable morphemes	16.4%
Four syllable morphemes	2.1%

One syllable words are rare in Mamasa, but they do occur. The word *bu* 'smell', and the tag question marker *le* are examples. Phonological words up to seven syllables have been observed ([di.pak.ka.lun.te.ba.san] 'to put up a propeller for').

Theoretically the aforementioned four syllable types yield sixteen possible combinations of juxtaposed syllables. Within the word all of these combinations occur except VC.V and VC.VC as the following list shows:

Table 7: Juxtaposed Syllables

V.V	/u.e/	'rattan'
V.VC	/a.oʔ/	'bamboo'
V.CV	/a.ka/	'what'
V.CVC	/a.luk/	'religion'
*VC.V	not found	
*VC.VC	not found	
VC.CV	/am.po/	'grandchild'
VC.CVC	/am.bun/	'fog'
CV.V	/la.o/	'go'
CV.VC	/da.un/	'leaf'
CV.CV	/ma.te/	'dead'
CV.CVC	/la.lan/	'path'
CVC.V	/maʔ-.o.to/	'go by car' ¹⁰
CVC.VC	/paʔ-.an.de/	'an animal that likes to eat'
CVC.CV	/lin.do/	'face'
CVC.CVC	/laʔ.boʔ/	'machete'

Although consonant clusters are not found within the syllable, they do occur at syllable boundaries as is shown by the above list. Generally, a closed syllable can precede another syllable only if the following syllable is consonant initial.¹¹ This restriction triggers resyllabification of stems that end with a consonant when vowel initial suffixes are added. The consonant moves from the coda of one syllable to the onset of the following syllable:

/baluk/	--->	[bá.luk]	'sell'
/mu-baluk-an-i/	--->	[mu.ba.lú.kan.ni]	'you sell it'

Morpheme final /ʔ/ occurring before a morpheme initial vowel does not trigger this resyllabification, rather the glottal stop remains as the coda of the syllable regardless of whether a vowel or consonant follows (see the examples for V.VC, VC.V CVC.C, and CVC.VC above).¹²

5.2 Consonants

There are 15 consonant phonemes in Mamasa: /p/, /t/, /k/, /ʔ/, /b/, /d/, /g/, /m/, /n/, /ŋ/, /l/, /r/, /s/, /w/, and /y/. Of these, all but /ʔ/ can fill the onset position of the syllable. The same is true for morpheme initial consonants although /ŋ/, /w/, /y/ are rather rare.

¹⁰ The only occurrence of the syllable type CVC before a syllable beginning with a vowel is when the CVC syllable is a morpheme ending with a glottal stop.

¹¹ Notice the absence of VC.V and VC.VC in the above list of juxtaposed syllables.

¹² Except if the following morpheme is *-an* in which case the glottal stop sibilantization rule of section 6.2.9 applies.

Only four consonant phonemes can occur word finally in Mamasa: /k/, /ʔ/, /n/, and /ŋ/. Morpheme finally these same four consonants are found with the addition of /m/ which is found in the prefix *um-* and the infix *-um-*.

The consonant phonemes can occur in sequence intramorphemically as illustrated in the following chart.

Table 8: Intramorphemic Consonant Sequences

	p	t	k	ʔ	b	d	g	m	n	ŋ	l	r	s	w	y
p	pp														
t		tt													
k			kk												
ʔ					ʔb	ʔd	ʔg				ʔl				
b															
d															
g															
m	mp				mb		mm								
n		nt				nd		nn							
ŋ			ŋk				ŋg		ŋŋ						
l										ll					
r											rr				
s												ss			
w															
y															

/pp/	/appaʔ/	[appaʔ]	'four'
/tt/	/tettek/	[tettek]	'hour'
/kk/	/basikkiʔ/	[basikkiʔ]	'narrow'
/ʔb/	/laʔboʔ/	[láʔboʔ]	'machete'
/ʔd/	/paʔde/	[páʔde]	'lost'
/ʔg/	/taʔgaʔ/	[táʔgaʔ]	'take in pawn'
/ʔl/	/laʔlaŋ/	[láʔlaŋ]	'umbrella'
/mp/	/ampo/	[ámpo]	'grandchild'
/mb/	/ambun/	[ámbun]	'fog'
/mm/	/mammiʔ/	[mámmiʔ]	'delicious'
/nt/	/guntuʔ/	[gúntuʔ]	'thunder'
/nd/	/inde/	[inde]	'this'
/nn/	/kannin/	[kánnin]	'eyebrow'
/ŋk/	/daŋkan/	[dánkan]	'hand span'
/ŋg/	/aŋga/	[áŋga]	'only'
/ŋŋ/	/paŋŋalaʔ/	[paŋŋálaʔ]	'forest'
/ll/	/illon/	[illon]	'nose'
/rr/	/torro/	[tórrō]	'dwell'
/ss/	/isson/	[isson]	'mortar'

From the above chart and list of examples we see a rather uneven distribution of co-occurring consonant phonemes. We see that nasals occur only with homorganic stops or as geminate clusters. The same is generally true for non-nasal consonants as well, that is, they co-occur only as geminate clusters or as the second segment in a nasal homorganic stop sequence. The one exception to this is the glottal stop /ʔ/, which occurs before a few voiced consonants.

The distribution of the consonant phonemes within the morpheme are summarized in the following chart:

Table 9: Consonant Phoneme Distribution

	word initial	word medial	gemin. clust.	nasal stop cl	follow glottal	word final
	#_	V_V	C.C	N.C	?C	_#
/p/	+	+	+	+	-	-
/t/	+	+	+	+	-	-
/k/	+	+	+	+	-	+
/ʔ/	-	-	-	-	-	+
/b/	+	+	-	+	+	-
/d/	+	+	-	+	+	-
/g/	+	+	-	+	+	-
/m/	+	+	+	+	-	-
/n/	+	+	+	+	-	+
/ŋ/	+	+	+	+	-	+
/l/	+	+	+	-	+	-
/r/	+	+	+	-	-	-
/s/	+	+	+	-	-	-
/w/	+	+	-	-	-	-
/y/	+	+	-	-	-	-

The consonant phonemes can occur in sequence intermorphemically as illustrated in the chart below.

Table 10: Intermorphemic Consonant Sequences

	p	t	k	ʔ	b	d	g	m	n	ŋ	l	r	s	w	y
p															
t															
k	kp	kt	kk					km	kn						
ʔ	ʔp	ʔt	ʔk		ʔb	ʔd		ʔm	ʔn		ʔl	ʔr	ʔs	ʔw	
b															
d															
g															
m	mp	mt	mk		mb	md	mg				ml	mr	ms		
n	np	nt	nk		nb	nd		nm	nn		nl	nr	ns		
ŋ	ŋp	ŋt	ŋk		ŋb	ŋd	ŋg	ŋm	ŋn		ŋl	ŋr	ŋs		
l															
r															
s															
w															
y															

The above phonemic sequences are affected by several phonological processes: k-weakening, glottal strengthening, nasal assimilation, ŋ-deletion (saŋ-), and /r/ replacement of /d/. Below is a list of the affected sequences and their phonetic realizations:

/kp/	--->	[ʔp]
/kt/	--->	[ʔt]
/km/	--->	[ʔm]
/kn/	--->	[ʔn]
/ʔk/	--->	[kk]
/mt/	--->	[nt]
/mk/	--->	[ŋk]
/md/	--->	[nd]
/mg/	--->	[ŋg]
/ml/	--->	[ll]
/mr/	--->	[rr]
/ms/	--->	[ss]
/np/	--->	[mp]
/nk/	--->	[ŋk]
/nb/	--->	[mb]
/nm/	--->	[mm]
/nl/	--->	[ll]
/nr/	--->	[rr]
/ns/	--->	[ss]
/ŋp/	--->	[mp], [p]
/ŋt/	--->	[nt], [t]
/ŋb/	--->	[mb], [b]
/ŋd/	--->	[nd], [d]
/ŋm/	--->	[m]
/ŋn/	--->	[n]
/ŋl/	--->	[ll], [l]
/ŋr/	--->	[rr], [r]
/ŋs/	--->	[ss], [s]

The following examples illustrate the above co-occurrences. Where two phonetic realizations exist two examples are given.

/kp/	/bossik-pa-i/	[bóssiʔpi]	'still wet'
/kt/	/manuk-ta/	[manúʔta]	'your chicken'
/kk/	/beluak-ku/	[beluákku]	'my hair'
/km/	/millik-mo-i/	[mílliʔmi]	'already awake'
/kn/	/manuk-na/	[manúʔna]	'his chicken'
/ʔp/	/maʔ-pikki/	[maʔpíkki]	'to think'
/ʔt/	/maʔ-tappi/	[maʔtáppi]	'to winnow'
/ʔk/	/maʔ-kada/	[makkáda]	'to speak'
/ʔb/	/maʔ-baluk/	[maʔbáluʔ]	'to sell'
/ʔd/	/maʔ-dama/	[maʔdáma]	'to work'
/ʔm/	/boyoʔ-mo-i/	[bóyoʔmi]	'already tired'
/ʔn/	/maʔ-nasu/	[maʔnásu]	'to cook'
/ʔl/	/maʔ-lambuk/	[maʔlámbuʔ]	'to pound (rice)'
/ʔr/	/maʔ-rusun/	[maʔrúsun]	'to push'
/ʔs/	/maʔ-surruʔ/	[maʔsúrruʔ]	'to suck'

/ʔw/	/maʔ-wai-wai/	[maʔwaiwái]	'to play with water'
/mp/	/um-peaŋ/	[umpéaŋ]	'to look for'
/mt/	/um-tekaʔ-i-naʔ/	[untekáʔinaʔ]	'I climb something'
/mk/	/um-kelaʔ/	[uŋkélaʔ]	'to bite something'
/mb/	/um-base-i/	[umbásei]	'to wash it'
/md/	/um-dasiʔ-i/	[undásiʔi]	'to sew it'
/mg/	/um-garaga/	[uŋgaŋága]	'to make something'
/np/	/uran-pa-i/	[úrampi]	'still raining'
/nt/	/pen-tallu/	[pentállu]	'third'
/nk/	/pen-karua/	[peŋkaŋúa]	'eighth'
/nb/	/pen-buda/	[pembúda]	'many times'
/nd/	/pen-dua/	[pendúan]	'twice'
/nm/	/bulawan-mu/	[bulawámmu]	'your gold'
/nn/	/kurin-na/	[kuŋinna]	'his/her pot'
/nl/	/pen-lima/	[penlíma]	'fifth'
/nr/	/den-ra-ka/	[déndaka]	'is there'
/ns/	/pen-sa-pulo/	[pessapúlo]	'tenth'
/ŋp/	/maŋ-pori/	[mampóri]	'to tie'
	/saŋ-piak/	[sapíak]	'a piece'
/ŋt/	/meŋ-tekaʔ/	[mentékaʔ]	'to climb'
	/tedong-ta/	[tedóta]	'our buffalo'
/ŋk/	/meŋ-kaya/	[meŋkáya]	'to swim'
/ŋb/	/meŋ-buni/	[membuni]	'to hide'
	/saŋ-bulan/	[sabúlan]	'one month'
/ŋd/	/meŋ-dioʔ/	[mendíoʔ]	'to bathe'
	/saŋ-danŋkan/	[sadanŋkan]	'one handspan'
/ŋg/	/meŋ-gayaŋ/	[meŋgáyaŋ]	'to stab'
/ŋm/	/loʔbaŋ-mo-i/	[lóʔbami]	'already empty'
/ŋn/	/alaŋ-na/	[alána]	'his/her rice barn'
/ŋl/	/maŋ-lamun/	[mallámun]	'to inter'
	/saŋ-lolo/	[salólo]	'one log'
/ŋr/	/maŋ-reken/	[marréken]	'to count'
	/saŋ-raku/	[saráku]	'one handful'
/ŋs/	/paŋ-sikola/	[passikóla]	'student'
	/saŋ-sii/	[sasiʔi]	'one bunch'

5.3 Vowels

Mamasa has five vowels any of which can fill the nucleus of any of the four syllable patterns. Therefore vowels can occur in sequences representing segments from two syllables. There are no three vowel sequences within a single morpheme in Mamasa. The five vowels can occur in the sequences listed in the following charts (the gaps in the charts are probably accidental due to lack of data). Notice that sequences of identical vowels are realized phonetically with a weak (lenis) glottal stop inserted between them.

Table 11: Intramorphemic Vowel Sequences

	i	e	u	o	a
i	---	---	iu	io	ia
e	ei	ee	eu	eo	ea
u	ui	ue	uu	uo	ua
o	oi	oe	---	---	oa
a	ai	ae	au	ao	aa

/iu/	/liu/	[líu]	'continual'
/io/	/dio/	[díó]	'there'
/ia/	/sia/	[sía]	'salt'
/ei/	/nei/	[néi]	'place'
/ee/	/deen/	[dé^en]	'there is'
/eu/	/reu/	[réu]	'type of grass'
/eo/	/peo/	[péo]	'loincloth'
/ea/	/keara?/	[keáŕa?]	'angry'
/ui/	/mui/	[múi]	'although'
/ue/	/bue/	[búe]	'bean'
/uu/	/suun/	[sú^un]	'to come out'
/uo/	/tuo/	[túo]	'to live'
/ua/	/banua/	[banúa]	'house'
/oi/	/doi?/	[dói?]	'money'
/oe/	/bentoen/	[bentóen]	'star'
/oa/	/laŋoa?/	[laŋóa?]	'to yawn'
/ai/	/baine/	[báine]	'woman'
/ae/	/tae?/	[táe?]	'no'
/au/	/daun/	[dáun]	'leaf'
/ao/	/balao/	[baláo]	'rat'
/aa/	/illaan/	[illa^an]	'inside'

Table 12: Intermorphemic Vowel Sequences¹³

	i	e	u	o	a
i	ii	<u>ie</u>	iu	io	ia
e	ei	<u>ee</u>	---	<u>eo</u>	ea
u	ui	<u>ue</u>	uu	uo	ua
o	oi	<u>oe</u>	---	oo	oa
a	ai	ae	au	ao	aa

/ii/	/di-ira?/	[di^ĩra?]	'to be sliced'
/ie/	/inde#doti = e/	[inde#dótie]	'this spotted buffalo'
/iu/	/di-ui?/	[diúi?]	'to be put under'
/io/	/di-ola/	[dióla]	'to be made to go'

¹³ Underlined sequences in the chart indicate sequences that occur at clitic boundaries which are marked by = in the examples given.

/ia/	/di-anna/	[diánna]	'to be stored'
/ei/	/ka-mase-i/	[kamasei]	'to pity'
/ee/	/inde = e/	[inde^e]	'this'
/eo/	/pole = o/	[póleo]	'once again'
/ea/	/ke-anak/	[keának]	'to have children'
/ui/	/mu-issan/	[muíssan]	'you understand'
/ue/	/inde#tau = e/	[inde#táue]	'this person'
/uu/	/ku-uduk/	[ku^úduk]	'I smell (something)'
/uo/	/mu-ola/	[muóla]	'you go'
/ua/	/ku-alli/	[kuállì]	'I buy'
/oi/	/di-allo-i/	[diallóì]	'it is dried in the sun'
/oe/	/ampo = e/	[ámpoe]	'this grandchild'
/oo/	/dio = o/	[díó^o]	'that there'
/oa/	/na-pa-torro-an/	[napatoĩróan]	'they left (it) for (them)'
/ai/	/na-ita/	[naita]	'he/she sees'
/ae/	/ma-ela?/	[maéla?]	'slowly'
/au/	/na-uran-i-na?/	[nauránnina?]	'I got rained on'
/ao/	/ta-ola/	[taóla]	'you (honor.) go'
/aa/	/na-ande/	[na^ánde]	'he/she eats'

5.4 Consonant and vowel co-occurrence restrictions

Glottal stop never occurs before a vowel within a root since it is never found syllable initial in Mamasa. Besides this one restriction there do not seem to be co-occurrence restrictions relating to vowels and consonants. The only gaps in the data are /eg/, /ug/, /wo/, /ow/, /wu/, /we/, /ew/, /yi/, /ey/, and /ye/. Each of these pairs involves a /g/, /w/, or /y/ all of which are relatively rare.

6. PHONOLOGICAL PROCESSES

To facilitate our discussion of Mamasa phonological processes we will consider these processes in three groups: those which occur within individual morphemes, those which involve prefixes, and those which involve suffixes and enclitics.

6.1 Processes that occur within individual morphemes

There are five phonological processes in Mamasa that don't involve segments interacting across morpheme boundaries.

6.1.1 Unreleased word final k

Word final /k/ is realized as the unreleased voiceless velar stop [k̚]. Thus the following rule can be written:

k-unreleased:

/k/ ---> [- release] / _____ #

/beluak/	--->	[belúak̚]	'hair'
/bossik/	--->	[bóssik̚]	'wet'

6.1.2 Diphthongisation

If the phoneme /a/ occurs syllable finally in the antepenult before a vowel initial penult the /a/ and the following vowel will coalesce producing a diphthong.

diphthongisation:

$$/aV/ \rightarrow [a^V] / ___ (C)(-)(C)V$$

Diphthongisation is ordered before stress placement.

	/baine/	/tosae-ku/	/bue-ku/
Diphth	ba'ine	tosa ^c -ku	-----
stress	bá'ine	tosá ^c -ku	bué-ku
SF	[bá'ine]	[tosá ^c ku]	[buéku]
	'woman'	'my guest'	'my beans'

Notice in the above examples the sequence /ai/ diphthongizes while the sequence /ue/ does not since the initial vowel is not /a/ as required by the rule.

6.1.3 E-laxing

The phoneme /e/ is lax to [ɛ] in closed syllables except before the consonants [k], [g], [ŋ], and [ʔ].

e-laxing:

$$/e/ \text{ ----} \rightarrow [-\text{tense}] \text{ / } \text{ ______ } [+ \text{anterior}] \left\{ \begin{array}{c} \# \\ c \end{array} \right\}$$

Note that the consonants [w] and [y] are also [-anterior] but do not occur syllable final in Mamasa.

/benna/	--->	[bénna]	'who'
/sesse?/	--->	[sésse?]	'torn'
/karuen/	--->	[karúen]	'afternoon'
/meŋ-keppe?/	--->	[meŋképpe?]	'to stick'

6.1.4 Vowel deletion

When two identical vowels occur in a sequence within a word the second vowel of the pair will be deleted if the word is not phonological phrase final. This process can be seen in the following alternations:

- 1) /suun/ 'come out':

[tá?pa#sú^un]	'hasn't come out yet'
[sún#illám#mái#dápo?]	'came out from the kitchen'

2) /deen/ 'there is':

[táeʔ#déʔen]	'there isn't any'
[déndaka#sía]	'is there any salt?'

3) /illaan/ 'inside':

[dénan#illáʔan]	'is inside'
[sún#illám#mái#dápoʔ]	'came out from the kitchen'

4) /baa/ 'bring':

[áka mubáʔa]	'what are you bringing?'
[umbánaʔ#páre]	'I am bringing field rice'

vowel deletion:

$$[\alpha \text{ feature}] \xrightarrow{V} \emptyset / [\alpha \text{ feature}] \xrightarrow{V} (C) \left\{ \begin{array}{c} \# \\ - \end{array} \right\}$$

Vowel deletion applies to words that are non-phonological phrase final.

underlying form	/suun#illaan#mai/	/um-baa-naʔ/
nasal assimilation	suun#illaam#mai	um-baa-naʔ
stress	súun#illáam#mái	um-báa-naʔ
vowel deletion	sún#illám#mái	um-bá-naʔ
surface form	[sún#illám#mái]	[umbánaʔ]
	'come out from inside'	'I bring'

Note that vowel deletion must follow stress placement.

There is another approach that could be taken instead of vowel deletion to account for this alternation. Campbell (this volume:32) notes in his study of PUS that one syllable words are rare in PUS and that when spoken in isolation generally undergo a process of vowel repetition and the insertion of a weak glottal stop between the repeated vowels. He posits the following rule:

vowel repetition:

# C V C #	---	1 2 3	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> - cons - cont - anterior - coronal - voice + weak </div>	3 4 5
1 2 3 4 5				

Vowel repetition applies to words spoken in isolation.

A similar vowel repetition rule could be posited for Mamasa with the restriction that it operates only on phonological phrase final words. If such a rule

were posited it would have to be ordered before e-laxing and the stress rule as the following examples show:

underlying form	*/den/	*/sun/
vowel repetition	de [^] en	su [^] un
e-laxing	de [^] ɛn	-----
stress	dé [^] ɛn	sú [^] un
surface form	[dé [^] ɛn]	[sú [^] un]

Here we do not posit a rule like the above but instead argue for the longer form of the words being the underlying form. The alternation between [illán] and [illá[^]an] is revealing: 1) if the underlying form is */illan/ the vowel repetition rule as stated above would have no effect on it since it is a two syllable word; and 2) the stress on the surface form [illán] is on the final syllable, which is a violation of the stress rule, therefore the deletion of at least the nucleus of the final syllable must have taken place. From this we can conclude that the underlying form for the pair is /illaan/. This conclusion seems to be further supported by the existence of the forms [illálan] and [dé[^]an] which alternate with [illá[^]an] and [dé[^]ɛn] in the data. It seems more likely that these variations would occur if the underlying forms were those with the double vowels.

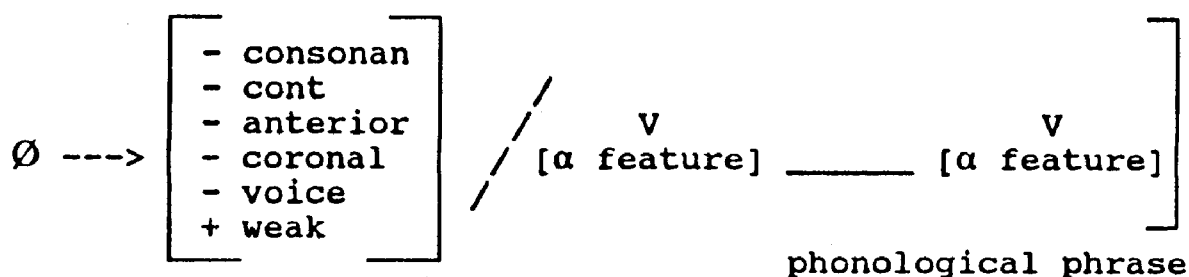
Also when the intramorphemic co-occurrence of vowels is considered we are led to believe that any of the vowels may occur in a two vowel sequence in Mamasa (assuming for the moment that those sequences not found to date are just gaps in the data). To posit the above rule would eliminate all sequences of like vowels from the list of possible co-occurring vowels. To do so does not seem to be justified since another way to account for the data exists.

One further item of interest is that the cognates of Mamasa /baβa/ and /suβun/ are /baβa/ and /suβun/ in PUS which would seem to indicate that the longer version of these words, that is not */ba/ and */sun/, existed in the proto language from which both Mamasa and PUS have descended (proto-Sa'dan?). Mills (1975) lists the forms *(b)a(b)a 'carry', *su(b)un 'to come out, emerge', as well as *dia(n) 'there is', and *(dr)alim 'inside' as the reconstructions of these words in Proto South Sulawesi.

6.1.5 Weak glottal insertion

This rule is closely related to the previous rule, in that, it too operates on identical vowel sequences within the word, but it only operates on those sequences found in phonological phrase final words.

weak glottal insertion:



underlying form	/deen/	/suun/
e-laxing	deen	-----
weak glottal	de [^] en	su [^] un
stress	dé [^] en	sú [^] un
surface form	[dé [^] en]	[sú [^] un]
	'there is'	'come out'

6.2 Processes involving morpheme boundaries

Before we can posit any rules that operate at the morpheme boundary between prefix and stem we must make some decisions regarding the underlying form of various prefixes. Consider the following data:

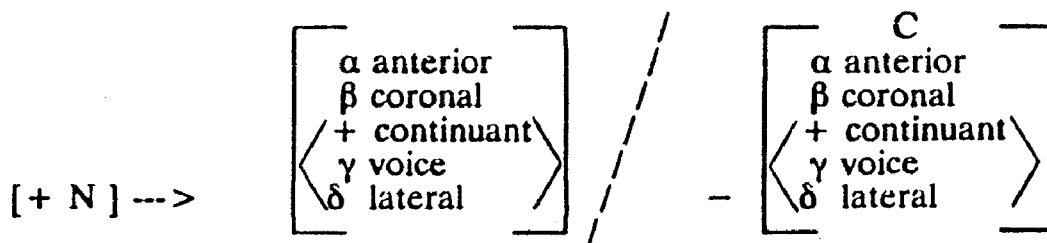
[búsuk]	-	[mambúsuk]	'wash clothes'
[pána]	-	[mampána]	'shoot an arrow'
[dio]	-	[mandío]	'bathe'
[túnu]	-	[mantúnu]	'burn'
[gáyang]	-	[mangáyang]	'stab'
[káli]	-	[mankáli]	'dig'
[réken]	-	[maṛréken]	'count'
[lámun]	-	[mallámun]	'inter (bury)'
[sápu]	-	[massápu]	'sweep'
[áli]	-	[manḡáli]	'buy'

From this data we conclude that the underlying form of the verbal prefix is /maŋ-/. The final /ŋ/ assimilates to the point of articulation of the following consonant except in the case of continuants, in which case it completely assimilates to the following consonant. When *maŋ-* is followed by a stem that begins with a vowel the final /ŋ/ of the prefix geminates. This same process occurs with the other nasal final prefixes: *meŋ-*, *paŋ-*, *peŋ-*, *pen-*, *um-*, *saŋ-*, and *an-* (although the prefix *saŋ-* does not fully follow this general pattern). This set of changes is by no means rare in the world's languages. A similar process is found in English regarding the prefix *in-*, which yields words such as *impossible*, *indeterminate*, *incongruous*, *inability*, *irregular*, and *illegal* (Hyman (1975:90)). We posit two rules to capture the above process: nasal assimilation, and nasal gemination.

6.2.1 Nasal assimilation

Morpheme final nasals assimilate to the point of articulation of following stops and nasals. If the following consonant is a continuant then the nasal totally assimilates to that continuant.

nasal assimilation:



This rule applies intermorphemically as well as across word boundaries within the phrase.

/maŋ-busuk/	[mambúsuk]	'to wash clothes'
/maŋ-reken/	[mařřéken]	'to count'
/um-teka-i-na?/	[untekáina?]	'I climb'
/kurin-mu/	[kurímmu]	'your pot'
/turun sia-mo-i/	[túřus síami]	'he really came down'
/kayu randan ma-laŋka?-na/	[káyu řándam maláŋka?na]	'the tallest tree'

Nasal assimilation is ordered before e-laxing in a feeding relationship.

under. form	/meŋ-teka?-na?/
nasal assim.	men-teka?-na?
e-laxing	mēn-teka?-na?
stress	mēn-téka?-na?
surface form	[mentéka?na?]
	'I am climbing'

6.2.2 Nasal gemination

When a prefix ending with a nasal is followed by a stem beginning with a vowel the nasal geminates.

nasal gemination:

[+ nasal]	-	V	---->	1	1	2	3
1	2	3					

where 2 = morpheme boundary between prefix and stem

/um-ande-na?/	--->	[ummándena?]	'I eat (a banana)'
/um-iru?-na?/	--->	[ummiřu?na?]	'I drink (coffee)'
/maŋ-alli/	--->	[maŋgálli]	'to buy'
/maŋ-ula?/	--->	[maŋgúla?]	'to follow'
/meŋ-amma?/	--->	[meŋgámma?]	'to swallow'
/paŋ-allo-na/	--->	[paŋgallóna]	'her/his laundry'
/paŋ-iru?-an/	--->	[paŋgiřúsan]	'food served with drink'
/pen-appa?/	--->	[pennáppa?]	'fourth time'
/saŋ-allo/	--->	[saŋgálla]	'a day'
/saŋ-issi?/	--->	[saŋgiřsi?]	'a slice'

6.2.3 η -deletion (*saŋ*-):

The prefix *saŋ*- 'one' is consistent with the established pattern for prefixes ending in a nasal when it precedes a vowel initial or [+back] consonant initial stem:

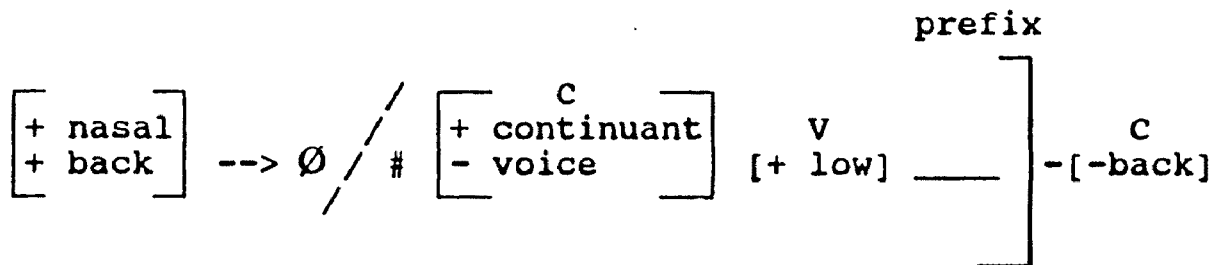
- | | | |
|----|-------------|--------------------------|
| 1. | [saŋǰálo] | 'one day' |
| 2. | [saŋǰissiʔ] | 'one slice' |
| 3. | [saŋkílo] | 'one kilogram/kilometer' |
| 4. | [saŋkalébu] | 'one whole round thing' |

When the prefix *saŋ*- precedes a [-back] consonant initial stem the / η / is deleted as the following examples show:

- | | | |
|----|------------|--------------------------|
| 1. | [sapíak] | 'on piece' |
| 2. | [sabúlan] | 'one month' |
| 3. | [satáun] | 'one year' |
| 4. | [sadaŋkan] | 'one hand span' |
| 5. | [sasiʔi] | 'one bunch (of bananas)' |
| 6. | [salólo] | 'one log' |
| 7. | [saráku] | 'one handful' |

Therefore the following rule must be posited in a bleeding order relationship with nasal assimilation.

η -deletion (*saŋ*-):



/saŋ-mingu/	--->	[samíngu]	'a week'
/saŋ-piak/	--->	[sapiak]	'a piece'
/saŋ-bonji/	--->	[sabónji]	'one night'
/saŋ-taun/	--->	[satáun]	'one year'
/saŋ-daŋkan/	--->	[sadaŋkan]	'one handspan'
/saŋ-rakuʔ/	--->	[sařákuʔ]	'one handful'
/saŋ-lolo/	--->	[salólo]	'one log'

The need for rule ordering can be seen if the following words are considered:

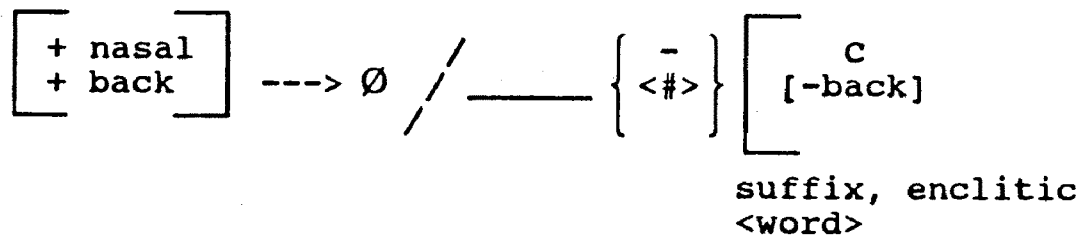
U. form	/saŋ-taun/	/meŋ-tiaʔ/	/saŋ-lolo/	/maŋ-lamun/
η -del.	sa-taun	-----	sa-lolo	-----
N. assim.	-----	men-tiaʔ	-----	mal-lamun
e-laxing	-----	men-tiaʔ	-----	-----
stress	sa-táun	men-tíaʔ	sa-lólo	mal-lámun
surface	[satáun]	[mentíaʔ]	[salólo]	[mallámun]
	'one year'	'to fly'	'one log'	'to bury'

Another solution to this alternation between [sa-] and [saŋ-] would be to posit /sa-/ as the underlying form of the morpheme with a velar nasal insertion rule that operates before both vowel initial and back consonant initial words. This solution does not seem to be well motivated with regards to the latter group. Also, the positing of /saŋ-/ as the underlying form is further supported by the existence of forms such as [saŋbúa] 'one fruit' and [saŋpatti] 'one case' in Toraja.

6.2.4 Final /ŋ/ deletion

Word final /ŋ/ is deleted when followed by a suffix, clitic, or word that begins with a [-back] consonant. This rule is very similar to the /ŋ/ deletion rule for the prefix saŋ-.

final-ŋ deletion:



The effects of this rule are most often seen with the addition of the possessive suffixes and the enclitics *-mo* and *-pa*. Here we choose as an example several possessed nouns.

U. form	/tedoŋ-ku/	/tedoŋ-mu/	/tedoŋ-na/
final-ŋ del.	-----	tedo-mu	tedo-na
stress	tedóŋ-ku	tedó-mu	tedó-na
surface form	[tedóŋku]	[tedómu]	[tedóna]
	'my buffalo'	'your buffalo'	'his/her buffalo'

This rule is also observed across word boundaries as the following example shows.

/deŋan#di-kua#boŋa#saroŋ#manik/
[deŋan#dikúa#bóŋa#sáro#mánik]
'there is (another) called bonga sarong manik (a type of water buffalo)'

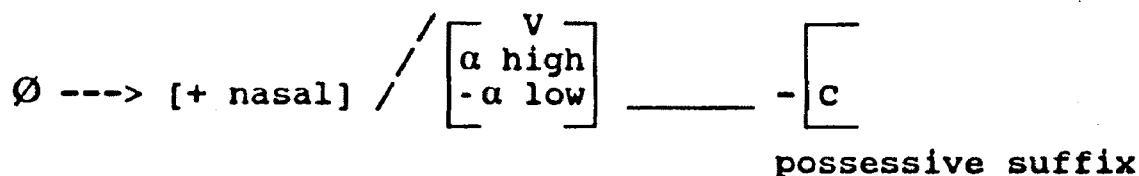
6.2.5 Nasal insertion before possessives

Possession in Mamasa is marked by the addition of one of the following possessive pronoun suffixes to the possessed nominal word:

- ku first person singular possessive
- mu second person singular possessive
- na third person (singular and plural) possessive
- ki first person plural exclusive possessive
- ta first person plural inclusive possessive

When the nominal word ends in /i/ or /u/ a nasal is added. This nasal corresponds in point of articulation with the initial consonant of the possessive suffix. Some of the stems that end in /a/ also are affected by this rule. Stems that end in /e/ or /o/ are never affected.

N-insertion: i, u, a



NOTE: Some words ending with /a/ are not affected by this rule and will have to be marked as exceptions in the lexicon.

This rule must be ordered before nasal assimilation as the following derivations show.

U. form	/punti-mu/	/asu-ku/
N-insertion:	puntiN-mu	asuN-ku
nasal assim.	puntim-mu	asun-ku
stress	puntim-mu	asún-ku
surface form	[puntimmu]	[asúnku]
	'your banana'	'my dog'

Below are the derivations of two /a/-final nominal words. One word, *banua* 'house' is affected, while the other *sola* 'friend' is not affected and will have to be marked in the lexicon.

underlying form	/banua-na/	/sola-na/
N-insertion: a	banuaN-na	-----
nasal assim.	banuan-na	-----
stress	banuán-na	solá-na
surface form	[banuánna]	[solána]
	'his/her house'	'his/her friend'

For comparative purposes the following two lists of common /a/ final words are provided:

1) Words undergoing nasal insertion before possessive suffixes:

/banua/	'house'
/lima/	'hand'
/saŋa/	'name'
/taliŋa/	'ear'
/to-ma-tua/	'parents'

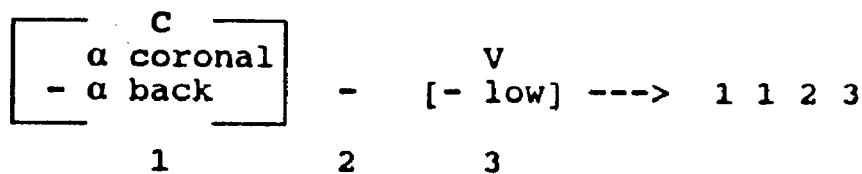
2) Words not undergoing nasal insertion before possessive suffixes:

/bala/	'fence'
/bua/	'fruit'
/posa/	'cat'
/raga/	'ball'
/rara/	'blood'
/sola/	'friend'
/talana/	'pants'

6.2.6 Consonant gemination

Above we discussed nasal gemination of prefix final nasals before vowel-initial words. A similar process takes place at the boundary between consonant final stems/words and vowel initial suffixes and clitics. Remember that the only consonants found word final in Mamasa are: /n/, /ŋ/, /k/, and /ʔ/. All of these but /ʔ/ will geminate when occurring before suffix or clitic initial /i/, /e/, or /o/. Regarding the vowels /a/ and /u/ two things must be noted: /n/, /ŋ/, and /k/ do not geminate before the suffix *-an* (which is the only /a/-initial suffix or clitic in Mamasa), and there are no /u/-initial suffixes or clitics in Mamasa.

consonant gemination:



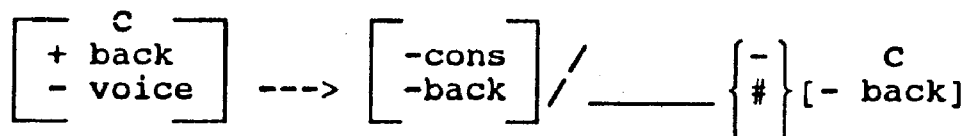
where 2 = boundary between either stem and suffix, or word and enclitic

/intin-o/	--->	[ítinno]	'that'
/inde#manuk-e/	--->	[inde#mánukke]	'this chicken'
/inde#tedoŋ-e/	--->	[inde#tédoŋe]	'this buffalo'
/pa-indan-i-naʔ/	--->	[paíndánninaʔ]	'loan me'
/pa-randuk-i/	--->	[pařándukki]	'it began'

6.2.7 /k/ weakening

If a stem final /k/ is followed by a suffix, clitic, or word (within the phrase) that has an initial non-back consonant, then the /k/ is weakened to a glottal stop.

k-weakening:



/manuk-mu/	--->	[manú [?] mu]	'my chicken'
/beluak-na/	--->	[beluá [?] na]	'her hair'
/millik-mo-i/	--->	[mílli [?] mi]	'he is already awake'
/anak#dara/	--->	[ána [?] #dára]	'young woman'

6.2.8 Glottal stop strengthening

This rule is the reverse of the previous rule, in that, a glottal stop is 'strengthened' to [k] when it occurs before a suffix, clitic, or word initial /k/.

glottal stop strengthening:

$$\left[\begin{array}{c} -\text{cons} \\ -\text{back} \end{array} \right] \text{ ---> } \left[\begin{array}{c} \text{+ back} \\ -\text{voice} \end{array} \right] / \text{ --- } \left\{ \begin{array}{c} - \\ \# \end{array} \right\} \left[\begin{array}{c} \text{+ back} \\ -\text{voice} \end{array} \right]$$

or

$$/?/ \text{ ---> } [k] / \text{ --- } \left\{ \begin{array}{c} - \\ \# \end{array} \right\} /k/$$

/di-pa [?] -kaluntepa [?] -an/	--->	[dipakkaluntebásan]	'to put up a propeller for'
/ben-na [?] #kao/	--->	[bénnak#káo]	'give (it) to me'

6.2.9 Glottal stop sibilantization

When the benefactive suffix *-an*, the nominalizing suffix *-an*, or the nominalizing confix *paŋ-* *-an* is added to a word ending in a glottal stop the glottal stop is replaced with /s/. The following rather unnatural rule is posited:

glottal sibilantization:

$$/?/ \text{ ---> } [s] / \text{ --- } - \left[\begin{array}{c} /an/ \\ \text{suffix} \end{array} \right]$$

/na-dasi [?] -an-na [?] /	--->	[nadasísanna [?]]	'she sewed for me'
/na-baya [?] -an-na [?] /	--->	[nabayásanna [?]]	'she pays for me'
/iru [?] -an/	--->	[ĩrúsan]	'glass, cup'
/paŋ-iru [?] -an/	--->	[paŋĩrúsan]	'food served with drink'

Of course another possible solution would be to treat the [s] as the underlying form and posit the following rule:¹⁴

$$/s/ \text{ ---> } [?] / \text{ --- } \#$$

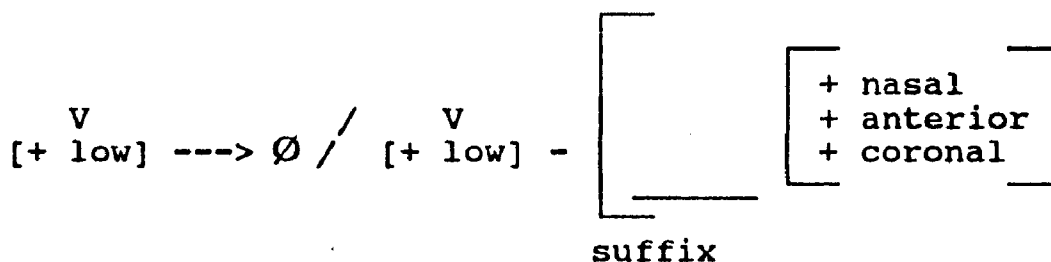
¹⁴ Mills (1975:97) notes that in Sa'dan (Toraja) a similar rule probably depicts what happened historically by analogy.

But this is to be rejected for two reasons: 1) another rule would have to be added to account for the 'appearance' of the glottal before suffixes and clitics beginning with consonants or vowels other than /a/, and 2) native speakers view the glottal as the underlying form.

6.2.10 /a/ deletion

When the benefactive suffix *-an* is preceded by a stem final /a/ then the vowel of the suffix is deleted.

a-deletion:



U. form	/na-ala-an-naʔ/	/na-po-pe-baa-an-i/
a-deletion	na-ala-n-naʔ	na-po-pe-baa-n-i
consonant gem.	-----	na-po-pe-baa-n-ni
stress	na-alá-n-naʔ	na-po-pe-báa-n-ni
vowel deletion	-----	na-po-pe-bá-n-ni
surface form	[na^alánnaʔ]	[napopebánni]
	'he got. (it) for me'	'she sent it to her'

6.2.11 Modifications to the clitics *-mo*, *-pa* and *-ra*

The form of the aspectual clitics *-mo*, *-pa*, and *-ra* are modified when followed by the person marking clitics *-naʔ*, *-kan*, *-kiʔ*, *-ko*, and *-i* as illustrated in the following table:

Table 13: Aspectual and Person Marking Clitics

	1s naʔ	1p.ex kan	1p.in kiʔ	2s ko	3s/pl i
mo	moʔ	mokan	mikiʔ	moko	mi
pa	paʔ	pakan	pikiʔ	poko	pi
ra	raʔ	rakan	rikiʔ	roko	ri

From this table three generalizations can be made:

- 1) The segments /n/ and /a/ are deleted from the clitic *-naʔ* when it follows the aspectual clitics *-mo*, *-pa*, and *-ra*.

underlying form	/um-ande-mo-naʔ/	/sae-pa-naʔ/
nasal gemination	umm-ande-mo-naʔ	-----
na-deletion	umm-ande-mo-ʔ	sae-pa-ʔ
stress	umm-ánde-mo-ʔ	sáe-pa-ʔ
surface form	[ummándemoʔ]	[sáepaʔ]
	'I already ate'	'I came and am still here'

- 2) The vowels /a/ and /o/ in the aspect clitic harmonize with the vowels in the person marker clitic. Note that these vowels don't harmonize with /a/, as evidenced by the form [mokaŋ] in the above table.

Underlying form	/la-lao-ra-ko-ka/	/la-lao-mo-kiʔ-ka/
vowel harmony	la-lao-ro-ko-ka	la-lao-mi-kiʔ-ka
stress	la-láo-ro-ko-ka	la-láo-mi-kiʔ-ka
surface form	[laláorokoka]	[laláomikiʔka]
	'are you going?'	'do we already want to leave?'

- 3) The vowel of the aspect clitic is deleted when followed by the third person marking clitic.

underlying form	/dadi-mo-i/	/maŋka-pa-i/
vowel del. clitic	dadi-m-i	maŋka-p-i
stress	dádi-m-i	máŋka-p-i
surface form	[dádimi]	[máŋkapi]
	'it's already done'	'later when it is finished'

6.3 Rule ordering

In the above discussion of Mamasa phonological processes we have made reference to rule ordering a number of times. The following chart shows which rules are ordered rules. Only those rules shown connected by A-B are actually ordered with respect to each other. All other rules are placed on the chart arbitrarily.

Table 14: Ordered Rules

- | | |
|--------------------------------|------------|
| 1. η -del:saŋ | A |
| 2. N-insertion | A |
| 3. final η -del: | A |
| 4. nasal assim. | B B B A |
| 5. e-laxing | B |
| 6. diphthongisation | A |
| 7. a-deletion | A |
| 8. stress placement | B B A |
| 9. vowel deletion | B |
| 10. weak glottal insert | |
| 11. ?-sibilantization | |
| 12. k-weakening | |
| 13. ?-strengthening | |
| 14. nasal gemination | |
| 15. final consonant gemination | |
| 16. k-unrelease | |

7. FREE VARIATION

Some speakers of Mamasa will pronounce the phoneme /t/ as [č] when it occurs before /i/.

$$\left[\begin{array}{c} \text{C} \\ - \text{contin} \\ + \text{coronal} \\ - \text{voice} \end{array} \right] \longrightarrow \left[\begin{array}{c} + \text{delayed release} \\ + \text{high} \end{array} \right] / \text{---} \left[\begin{array}{c} \text{V} \\ + \text{high} \\ - \text{back} \end{array} \right]$$

/punti/	--->	[púnti] ~ [púnči]	'banana'
/andora? tina/	--->	[andóra? tína] ~ [andóra? čína]	'potato'

8. FEATURES OF FAST SPEECH

To date only two features of fast speech have been detected. Above we formulated a rule that stated that the /m/ in the prefix *um-* would geminate before vowel initial words. In fast speech this sequence of /um-/ plus vowel initial word is sometimes realized as [m] plus the word. For example, instead of /um-ande/ becoming [ummánde] we occasionally find [mánde] in fast speech. Apparently this is what Van der Veen had reference to when he stated that Mamasa regularly has the prefix *m-* corresponding to Sa'dan *un-* (Mills (1975:104)).

The other feature of fast speech is that the first person singular pronoun *kao* is often reduced to [kó].

9. ADAPTATION OF LOAN WORDS

Mamasa, like most languages, has borrowed a segment of its lexicon from other languages. Almost exclusively these borrowings have been channeled through Malay/Indonesian although their origin is Sanskrit, Arabic, Dravidian, Dutch, and other languages. The education of the young seems to have affected the borrowing process. As more people became educated in the national language there was less adaptation done to the Malay/Indonesian loan words. An example of this is the Indonesian word *gereja* 'church'. It has been reported that the older generation said [garéda], but now everyone uses the Indonesian pronunciation. The tendency to keep the Malay/Indonesian pronunciation of a borrowed word has been applied rather unevenly, therefore the adaptation of loan words from Malay/Indonesian into Mamasa does not follow a rigid set of rules, but nevertheless a few generalizations can be made.

9.1 Replacement of Malay/Indonesian *e* (schwa)

Generally first syllable Malay/Indonesian *e* (schwa) is replaced by /a/:

Indonesian	Mamasa	
celana	[talána]	'pants'
geréja	[gařéda~geřéja]	'church'
pendéta	[pandíta]	'minister'
selimut	[salímu?]	'blanket'
sembahyang	[sambáyan]	'pray'
sepatu	[sapátu]	'shoe'
terigu	[tarígu]	'flour'

The one exception to the above is when the Malay/Indonesian *e* (schwa) occurs between /s/ and /k/, in which case it is replaced by /i/:

Indonesian	Mamasa	
sekolah	[(pas)sikolá(an)]	'school'
sekop	[sikúpan]	'shovel'

9.2 Replacement of final consonants

Generally word final stops that do not conform to the Mamasa constraint regarding word final consonants are changed to a glottal stop.

Indonesian	Mamasa	
adat	[ádaʔ]	'customary law'
duit	[dóɪʔ]	'money'
Kamis	[kámiʔ]	'Thursday'
langsát	[lásaʔ]	'kind of fruit'
liter	[líteʔ]	'liter'
méter	[méteʔ]	'meter'
pikir	[píkiʔ]	'think'
selimut	[salímuʔ]	'blanket'
tamat	[támmaʔ]	'graduate'

There are some exceptions to this rule:

Indonesian	Mamasa	
kapal	[kappálaʔ]	'ship'
sekop	[sikúpaŋ]	'shovel'
tomat	[tammáte]	'tomato'

9.3 Replacement of Malay/Indonesian *j*

Indonesian /j/ is replaced by /d/ in Mamasa:

Indonesian	Mamasa	
geréja	[garéda~geréja]	'church'
jambu	[dámбу]	'kind of fruit'
Jumat	[dúmaʔ]	'Friday'
puji	[púdi]	'praise'

9.4 Other loan words

Beside the above regular changes there are a number of idiosyncratic changes such as the following:

Indonesian	Mamasa	
baju	[báyu]	'clothes'
sapi	[sápiŋ]	'cow'
gula	[gólla]	'sugar'
waktu	[áttu]	'time'
kacang goreng	[sangóreŋ]	'peanut' ('fried peanut')
reken	[réken]	'count' (Dutch reken 'count')

10. COMPARISONS WITH NEIGHBORING DIALECTS AND LANGUAGES

As stated in the introduction this paper reflects the phonology of the northern dialect of the Mamasa language. In this section an attempt will be made at comparing the phonology of this northern dialect with the other dialects and language areas that surround it.

10.1 Other dialects of Mamasa

I have yet to make a detailed study of the dialectical variations within the Mamasa language. Any comments here must be taken as preliminary. As mentioned in the introduction to this paper, Mamasa consists of three dialects based on lexico-statistics. The most striking phonological difference between the northern dialect (Kecamatan Mamasa) and the southern two dialects is the absence of the homorganic nasal-stop sequences /mp/, /nt/, and /ŋk/ in the latter. In their stead are found the geminates /pp/, /tt/, and /kk/. Most likely related to this is the absence of the N-insertion before possessives rule (also called Veen's rule by Sirk (1988:285)) in those areas that lack the homorganic nasal-stop sequence.

Other aspects of the phonology that are known to vary throughout the Mamasa language area are: 1) in some areas stem final /ŋ/ is not deleted before suffix or clitic initial [- back] consonants, 2) the replacement of the phoneme /y/ with /dʒ/, 3) the use of the form *-makan* (clitic: perfective first person plural exclusive) in the middle and southern dialects whereas the northern dialect uses the form *-mokan*, and 4) the lack of deletion of /ŋ/ in the prefix *saŋ-* (one) before [- back] consonants.

10.2 Toraja and PUS

The Mamasa language area is bounded on the east by the Toraja language area. Sande and Stokhof (1977:21) mention in their article on the phonology of the Kesu' dialect that there are ten Toraja dialects which vary in (sub)phonemic variation and lexicon. Valkama on the other hand lists only five Toraja dialects but his conclusions are based on differences in the lexicon alone. According to Valkama (1987:125) the northern and middle dialects of Mamasa relate to Toraja as a whole with an average of 84.9% lexical similarity. He also notes that the Toraja areas geographically closest to Mamasa relate to Mamasa with a higher percentage (for example their Balla word list related to the northern and middle Mamasa dialects with an average of 90% lexical similarity), whereas those areas geographically further away from Mamasa (such as the prestigious Kesu' dialect) relate to Mamasa with a lower percentage (Kesu' being 80.6% on average with wordlists collected from the northern and middle Mamasa dialects). Of all the Toraja dialects the Kesu' dialect has received the most linguistic attention. Therefore the comparisons made in this section will be between the northern dialect of Mamasa and the Kesu' dialect of Toraja unless otherwise noted (data from Salombe (1982) and Sande and Stokhof (1977)).

To the west of the Mamasa language area is the Pitu Ulunna Salu (PUS) subfamily of languages consisting of PUS (also known as Bambam), Aralle-Tabulahan, Ulumanda', and Pannai. Of these languages PUS is the most closely related linguistically. It is also the closest geographically. According to Strømme (1987:25) the PUS language has on average a 79% lexical similarity with the Mamasa language. The comparisons in this section will be between the PUS

language and the northern dialect of Mamasa. Campbell's study of the phonology of the Salu Mekanam dialect of PUS will be the basis for these comparisons.

10.2.1 Phonemic inventories

Recall that the Mamasa has the following 15 consonant phonemes: /p/, /b/, /w/, /m/, /t/, /d/, /l/, /r/, /n/, /s/, /y/, /k/, /g/, /ŋ/, and /ʔ/. The consonant phonemes in Toraja are: /p/, /b/, /m/, /t/, /d/, /l/, /r/, /n/, /s/, /y/, /k/, /g/, /ŋ/, and /ʔ/. The consonant phonemes in PUS are: /p/, /b/, /β/, /m/, /t/, /d/, /j/ (that is /dʒ/), /s/, /n/, /l/, /k/, /g/, /h/, and /ŋ/. We see that Toraja lacks the extra bilabial phoneme found in both Mamasa (/w/) and PUS (/β/), Toraja and Mamasa have /r/ whereas PUS has /h/, Toraja and Mamasa have /y/ whereas PUS has /j/, also PUS lacks /ʔ/ which is found in both Mamasa and Toraja (note however that [ʔ] does exist in PUS as an allophone of /k/).

The vowel phonemes in Toraja are the same five found in Mamasa (/i/, /e/, /u/, /o/, /a/). PUS has these five plus /æ/.

10.2.2 Distribution

As noted above only four consonant phonemes occur word finally in Mamasa: /k/, /ʔ/, /n/, and /ŋ/. This same restriction holds for Toraja as well, but in PUS only /k/ and /m/ can occur word finally. The following list is illustrative of the comparisons that can be made across languages (phonetic transcription has been provided where it differs significantly from the phonemic transcription):

Toraja	Mamasa	PUS	
/beluak/ [belúak]	/beluak/ [belúak]	/beluæk/ [belúæʔ]	'hair'
/manuk/ [mánuk]	/manuk/ [mánuk]	/mænek/ [mæneʔ]	'chicken'
/boʔboʔ/	/boʔboʔ/	/bokbok/ [bóʔboʔ]	'cooked rice'
/asan/	/asan/	/asam/	'all'
/annan/	/annan/	/annam/	'six'
/tedon/	/tedon/	/tedom/	'water buffalo'
/illon/	/illon/	/illæ/	'nose'
/baŋkaan/	/baŋkawan/	/baŋkaβam/	'grass roof panel'
/uran/	/uran/	/uham/	'rain'

10.2.3 Phonological processes

10.2.3.1 E-laxing

In Mamasa the phoneme /e/ is laxed to [ɛ] in closed syllables except before the consonants [k], [g], [ŋ], and [ʔ]. There is an similar rule in PUS that laxes /e/ to [ɛ] except before a nearly identical set of consonants: [k], [ŋ], [ʔ], and [h] (Campbell (this volume:31). Sande and Stokhof (1977:32) claim that /e/ is always realized as [ɛ] in the Kesu' dialect of Toraja.

10.2.3.2 Vowel deletion

Perhaps the Mamasa vowel deletion rule and the PUS vowel insertion rule are two ways of looking at the same phenomenon (refer back to section (6.1.4) for a full discussion).

10.2.3.3 Weak glottal insertion

The Mamasa weak glottal insertion rule is contained in the PUS vowel repetition rule (see sections 6.1.5 and 6.1.4).

10.2.3.4 Nasal assimilation

Generally in Mamasa, Toraja, and PUS, when a morpheme final nasal is followed by another consonant (excluding glottal stop), the nasal assimilates in one of the following manners: 1) if the morpheme that contains the nasal is a prefix and the following consonant is a continuant then the nasal totally assimilates to that continuant, 2) if the following consonant is a stop or a nasal than the preceding nasal will assimilate to the same point of articulation of the following consonant. This is true for prefix final nasals as well as for nasals that occur before suffixes and enclitics. There are some exceptions to this general rule: 1) morpheme final /ŋ/ does not assimilate before any consonants in Toraja,¹⁵ 2) stem final /ŋ/ is deleted before non-back consonants in Mamasa, and 3) there is a deletion rule involving the nasal in the prefix meaning 'a, one' in both Mamasa and PUS (*saŋ-* in Mamasa and *sam-* in PUS). In Mamasa the /ŋ/ is deleted before non-back consonants, while in PUS the /m/ is deleted before non-syllabic phonemes.

Mamasa	/tedoŋ-na/	--->	[tedóna]	'his/her buffalo'
Toraja	/tedoŋ-na/	--->	[tedóŋna]	'his/her buffalo'
PUS	/tedom-na/	--->	[tedónna]	'his/her buffalo'
Mamasa	/saŋ-boŋi/	--->	[sabóni]	'one night'
Toraja	/saŋ-boŋi/	--->	[saŋbóni]	'one night'
PUS	/sam-beŋi/	--->	[sabéŋi]	'one night'
Mamasa	/saŋ-kayu/	--->	[saŋkáyu]	'one log'
Toraja	/saŋ-kayu/	--->	[saŋkáyu]	'one log'
PUS	/sam-kæju/	--->	[sakæju]	'one log'

¹⁵ Mills incorrectly makes the generalization that all final consonants do not show assimilation to suffix initial consonants in Toraja. He bases his conclusions on a text recorded by van der Veen. What Mills apparently was unaware of was van der Veen's decision not to show the assimilation of the phoneme /n/ in the orthography for this enviroment (Tammu and van der Veen 1972:xv).

10.2.3.5 Consonant deletion (PUS)

The above phonological process works on the underlying form of prefixes such as the Mamasa /um-/ to bring about the surface realizations: [um], [un], [uŋ], [us], [ur], and [ul]. This process as applied to prefixes works identically in Mamasa and Toraja. But in PUS there is an anomaly which gives rise to an extra rule. This extra rule is a consonant deletion rule that applies only to roots that are marked in the lexicon (Campbell (this volume:26)). The following is an example of this process in PUS:

	Mamasa	PUS
U. form	/maŋ-bisak/	/mam-bisæk/
nasal assim.	mam-bisak	mam-bisæk
cons. del.	N.A.	mam- isæk
k-weakening	mam-bisak	mam- isæ?
stress	mam-bisak	mam- ísæ?
surface	[mambísak]	[mamísæ?]
	'split wood'	'split wood'

10.2.3.6 N-insertion before possessive suffixes

This seems to be a widespread rule, in that it is found in both PUS (Campbell (this volume:30)) and Toraja (Salombe (1982:27)), as well as in many other languages of South Sulawesi (Sirk (1988)).

10.2.3.7 Consonant gemination

It will be recalled that in Mamasa the consonants /k/, /n/, and /ŋ/ geminate before suffixes or clitics with an initial /i/, /e/, or /o/. This process is also found in Toraja, but Salombe does not mention if it occurs with anything other than the suffix /i/. Salombe (1982:29) states: "Konsonan final (suatu morfem asal) /k/, /n/, /ŋ/, yang diikuti oleh sufiks -i (sufiks fungsional atau sufiks derivasional), masing-masing menjadi konsonan /kk/, /nn/, /ŋŋ/."

There seems to be a counterpart to this rule in PUS, Campbell's 'm:n-gemination' (this volume:29). His rule states that: "whenever /m/ is followed by an affix, clitic, or word boundary which is in turn followed by a vowel; the /m/ geminates becoming [nn]."

10.2.3.8 /K/ weakening

In Mamasa when a /k/ is followed by a suffix or clitic that begins with a non-back consonant the /k/ is 'weakened' to a glottal stop /ʔ/. There is a generalized version of this rule in PUS, where it includes all syllable final /k/ (Campbell (this volume:22)).

10.2.3.9 Glottal stop sibilantization

When /ʔ/ occurs before the suffix -an the glottal is replaced with [s]. This may seem like a rather strange rule but there are similar rules in the same environment in both PUS and Toraja. In PUS /k/ changes to [s] (Campbell (this volume:23)), while in Toraja /ʔ/ changes to [r̥] except if /r/ occurs previously in the word, in which case it changes to [s] (Salombe (1982:30)).

10.2.3.10 /a/-deletion

Salombe (1982:30) includes this same process in his list of rules that operate at stem and suffix boundaries in Toraja. He writes: "Sufiks derivasional -an kehilangan vokal /a/, di belakang satu morfem asal yang berfonem final vokal /a/." There is also a similar rule in PUS that deletes one of the members of the geminate [ææ] (Campbell (this volume:34)).

10.2.3.11 Replacement of /h/ or /r/ with [d]

Campbell (this volume:39) notes that when the PUS clitic contra-expectation/surprise/uncertainty clitic /hi/ is preceded by a consonant the /h/ of the clitic is replaced with /d/. There is a similar process in Toraja that replaces the /r/ in -ra with a [d] when preceded by /n/ and followed by the question clitic -ka (Tammu and van der Veen (1972:xiv)). The process appears to be even more limited in Mamasa since it only takes place after the word *den* 'there is' and before the question clitic -ka.

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PHONOLOGY OF ARALLE-TABULAHAN

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ABBREVIATIONS AND SYMBOLIC CONVENTIONS

A.....	absolute	var.....	variant
A.....	Aralle	vd.....	voiced
ACT.....	actuate	vl.....	voiceless
A-T.....	Aralle-Tabulahan	YNQ.....	yes/no question
ATR.....	advanced tongue root		
C.....	consonant	1.....	first person
CMP.....	completive	2.....	second person
conj.....	conjunction	3.....	third person
E.....	ergative	s.....	singular
EMPH.....	emphatic	d.....	dual
FUT.....	future	p.....	plural
GPRO.....	general pronoun	n.....	inclusive
IC.....	intonation contour	x.....	exclusive
INT.....	intransitive	#.....	word boundary
LOC.....	locative	-.....	morpheme boundary (ex.s)
NCMP.....	incompletive	+.....	morpheme boundary (rules)
nom.....	with nominals	\$.....	syllable boundary (rules)
NZR.....	nominalizer	V.V.....	syllable boundary (ex.s)
PASS.....	passive		
POS.....	possessive	V.....	lengthened segment
PRT.....	particle	Ŵ.....	stressed syllable
PSS.....	Proto South Sulawesi	~.....	is in variation with
PUS.....	Pitu Ulunna Salu	*.....	disallowed form
REC.....	reciprocal		
REF.....	referential	//.....	(morpho)phonemic script
s/t.....	something	[].....	phonetic script
T.....	Tabulahan	{ }.....	English gloss
TAGQ.....	tag question	().....	optional
UCT.....	uncertainty		
UF.....	underlying form	{.....}	one of two or more
V.....	vowel	{.....}	alternates

1 INTRODUCTION

Aralle-Tabulahan (A-T), an Austronesian language, is a member of the northern South Sulawesi language family. Most of its 7,000 speakers live in the subdistricts of Aralle, Ralle Anak, Tabulahan and Mambi in the northern and western parts of Mambi district in South Sulawesi's Polewali-Mamasa subprovince. Linguistic surveys have variously categorised A-T as: a dialect/dialects of the Pitu Ulunna Salu language (PUS) (Grimes & Grimes 1987); a probably separate language, comprising what may be a single dialect (Friberg 1987); a separate language and member of the proposed Pitu Ulunna Salu subfamily (Strømme 1987). I concur with Strømme's conclusion that A-T is a separate language, sharing enough common features with languages to the south to be considered part of a common subfamily, and sufficiently few similarities with languages to the east to be considered part of the Toraja-Sa'dan subfamily. Strømme lists three dialects for A-T, including Mambi. However since Mambi is as close lexically to PUS as it is to A-T, and on the surface at least appears phonologically closer to PUS than to A-T, I do not consider it a dialect of A-T and have made no attempt at this point to analyse its phonology.

To the best of our knowledge no previous linguistic work has been carried out in the A-T language. Linguistic research is currently being undertaken in the neighbouring PUS language, known locally as Bambam/Bambang. Written work on PUS includes an unpublished manuscript on the phonology of that language (Campbell, this volume). A-T shares a number of common phonological features and processes with PUS, but also differs on a number of points.

The field work on which this study is based was conducted under the UNHAS-SIL cooperative working agreement and mostly in the villages of Salu Leang and Tabulahan in the Tabulahan subdistrict. Accordingly this paper deals principally with the Tabulahan dialect of the language, although the major points of divergence from this as evident in the Aralle dialect have been noted as well. I have based the analysis on the generative approach, but have reserved the right to depart from this where it seemed helpful to do so.

2 SEGMENTALS

2.1 Phones and Phonemes

There is little allophonic variation among A-T consonant phonemes, but most A-T vowel phonemes have more than one phonetic form. The charts in this section present the phones found in A-T and their underlying phonemes.

2.1.1 Phones

Of the 25 phones found in this dialect, 15 are contoids and 10 are vocoids.

Table 1 - Contoids

	bilabial	dental	alveolar	palatal	velar	glottal
stop (vl)	p	t			k	ʔ
(vd)	b		d			
fricative			s			h
nasal	m		n		ŋ	
lateral			l			
flap			ɾ			
semivowel				y		

Two glottal stops have been posited. In addition to 'regular' glottal stop [ʔ] which occurs in syllable final position, a second weaker glottal [ʔ̤], differing only in this respect, is found occurring between identical vowels. Section 2.4.1 discusses its status more fully. (See also section 5.3 Rule 15.)

Table 2 - Vocoids

	front	central	back
high tense	i		u
lax	ɪ		ʊ
mid tense	e		o
lax	ɛ		ɔ
low	æ	a	

2.1.2 Phonemes

From the 25 phones tabulated above, 18 are to be considered phonemes. These 12 consonants and 6 vowels are listed below.

Table 3 - Consonants

	labial	coronal	back
stop (vl)	p	t	k
(vd)	b	d	
fricative		s	h
nasal	m	n	ŋ
lateral		l	
semivowel		y	

It can be seen from Table 3 that the phones [ʔ], [ʌ] and [ř] have not been assigned phoneme status. It will be shown in section 5.1 that /k/ and /d/ are subject to strength changing processes in certain environments (Rules 3 and 4), producing the allophones [ʔ] and [ř] respectively. Section 5.3 also shows the process deriving the phone [ʌ] (Rule 15).

Table 4 - Vowels

	front	back
high	i	u
mid	e	o
low	æ	a

The 10 vocoids presented in Table 2 are thus reduced to six vowel phonemes. Each of the non low vowels has two allophones, one tense (+ ATR) and one lax (− ATR). The processes describing these allophonic changes are found in Section 5.1 (Rules 5 & 6).

2.1.3 Distinctive Features

Table 5 - Consonant Feature Matrix (including allophones)

	p	t	k	b	d	s	h	m	n	ŋ	l	y	ʔ	ř
syllabic	−	−	−	−	−	−	−	−	−	−	−	−	−	−
consonantal	+	+	+	+	+	+	−	+	+	+	+	−	−	+
continuant	−	−	−	−	−	+	+	−	−	−	+	+	−	−
nasal	−	−	−	−	−	−	−	+	+	+	−	−	−	−
anterior	+	+	−	+	+	+	−	+	+	−	+	−	−	+
coronal	−	+	−	−	+	+	−	−	+	−	+	+	−	+
voiced	−	−	−	+	+	−	−	+	+	+	+	+	−	−
flap	−	−	−	−	−	−	−	−	−	−	−	−	−	+

Table 6 - Vowel Feature Matrix (including allophones)

	i	ɪ	u	ʊ	e	ɛ	o	ɔ	æ	a
syllabic	+	+	+	+	+	+	+	+	+	+
high	+	+	+	+	-	-	-	-	-	-
low	-	-	-	-	-	-	-	-	+	+
back	-	-	+	+	-	-	+	+	-	+
ATR	+	-	+	-	+	-	+	-		

2.2 Interpretation

2.2.1 Consonant versus Vowel

When occurring in a syllable peak /i/ is interpreted as a vowel:

- (1) [hí.pe] /hipe/ 'across'
[í.o] /io/ 'yes'

When occurring in syllable onset or coda position /i/ is interpreted as a consonant:

- (2) [té.ye] /teye/ 'hand'
[káey.yæŋ] /kæyyæŋ/ 'big'
[yá.liŋ] /yaliŋ/ 'inside'

If the word */teie/ existed, it would be distinguishable from /teye/ on the grounds of stress. Compare *[te.í.e] with [té.ye]. When /i/ occurs in word final position, stress cannot always be the basis of proof that /i/ is either vowel or consonant.

- (3) [má.i] /mai/ 'to here'

In example 3, [mói] would be stressed as shown, whether a one or a two syllable word. It could then be interpreted as either /mai/ or /may/. However, since monosyllabic words are quite infrequent in A-T, an interpretation of vowel is more likely to be correct. I am interpreting all cases of word final /i/ as vowel then, until there is evidence to the contrary.

The other high vowel /u/, is always interpreted as a vowel. It only occurs in syllable peaks.

- (4) [u.há.ti] /uhati/ 'grub'
[léh.su?] /lehsuk/ 'egg'
[tá.u] /tau/ GPRO

2.2.2 Segment versus Sequence

The Tabulahan dialect of A-T displays no affricates/ stop + homorganic fricative combinations other than in a few Indonesian loan words.

Four sets of potentially ambivalent sequences occur in A-T and therefore need to be addressed:

- a) nasal + homorganic stop
- b) double segments (geminate)
- c) glottal stop + other stop
- d) vowel clusters

a) Nasal + homorganic stop combinations abound but only word medially and across a syllable boundary. They are interpreted then as sequence; never as prenasalised stop.

(5)	[lám.bu]	/lambu/	'to pound'
	[pan.tú.he]	/pantuhe/	'tube for blowing fire'
	[tán.ke]	/tanke/	'branch'

b) Double consonants often occur at morpheme boundaries and only across syllable boundaries. They are rather less frequent than in many other South Sulawesi languages, generally corresponding to the form [hC]. That is, where cognates in related languages (or dialects viz. Aralle) have a geminate consonant cluster ([CC]), the Tabulahan dialect of A-T frequently has the form [hC]. Thus:

(6)	/bittik/ (Aralle)	=	/bihtik/	(Tabulahan)	'foot'
	/hessæk/ (")	=	/hehsæk/	(")	'mud'.

This sequence of fricative + fricative/stop is itself univalent and grounds to interpret its geminate counterparts as sequence.

c) Glottal stop + other stop is a combination again interpreted as sequence. Besides occurring across syllable boundaries in certain roots,

(7)	[úʔ.da]	/ukda/	'no' (Aralle/Mambi),
-----	---------	--------	----------------------

This combination frequently occurs across morpheme boundaries and is also generated by a morphophonemic process affecting stative verbs (see section 5.3, Rule 21)

(8)	[malimbɛŋ]	/malimbɛŋ/	'deep'
becomes	[maliʔbɛʔ]	/malikbek/	'very deep'

d) Vowel clusters generally have reversed counterparts and all vowels occur in combination with at least four of the other vowels. Accordingly I am interpreting all such clusters as sequences, not as diphthongs or long vowels.

2.3 Description of Phonemes

2.3.1 Consonant Phonemes

All A-T consonant phonemes occur in word initial and medial positions. In addition to initial and medial positions, /k/ and /ŋ/ are also found word-finally. In this position /k/ is realised as [ʔ]. As word-initial phonemes the functional load of /y/ and of /ŋ/ is extremely low; only a few examples of either exist in this position.

Consonant Phoneme Positions

/p/ Voiceless bilabial plosive, occurs word initially and medially.

(9)	initial	/puha/	[púha]	'already'
	medial	/pepahi/	[pepáhi]	'wind'

/t/ Voiceless dental plosive, occurs word initially and medially.

(10)	initial	/tuho/	[túho]	'to live'
	medial	/mate/	[máte]	'to die'

/k/ Voiceless velar plosive, realised by the following variants:

[ʔ] Voiceless glottal stop, occurs syllable finally in word medial and final positions.

(11)	medial	/sikda/	[síʔda]	'truly'
	final	/dakek/	[dákeʔ]	'not yet'

[k] Voiceless velar plosive, occurs syllable initially in word initial and medial positions.

(12)	initial	/kaba/	[kába]	'coffee'
	medial	/haka/	[háka]	'ball'

/b/ Voiced bilabial plosive, occurs word initially and medially.

(13)	initial	/bohto/	[bóhto]	'village'
	medial	/kaheba/	[kahéba]	'news'

/d/ Voiced alveolar plosive, realised by the following variants:

[ɾ] Voiced alveolar flap, optionally occurs in intervocalic position.

(14)		/tadia/	- [tadía] [taíia]	'not' (nom)
------	--	---------	----------------------	-------------

[d] Voiced alveolar plosive, occurs word initially and medially.

(15)	initial	/dio/	[díio]	'2s'
	medial	/kundan/	[kúndaŋ]	'thunder'

/s/ Voiceless alveolar fricative, occurs word initially and medially.

(16)	initial	/sua/	[súa]	'mouth'
	medial	/dasan/	[dásan]	'house'

/h/ Voiceless glottal fricative, occurs word initially and medially.

(17)	initial	/hapu/	[hápu]	'kitchen'
	medial	/peheŋi/	[pehéŋi]	'yesterday'

/m/ Voiced bilabial nasal, occurs word initially and medially.

(18)	initial	/madondon/	[maʔóndon]	'tomorrow'
	medial	/kamehsa/	[kaméhsa]	'nine'

/n/ Voiced alveolar nasal, occurs word initially and medially.

(19)	initial	/næik/	[næiʔ]	'young girl'
	medial	/kenek/	[kéneʔ]	'rain'

/ŋ/ Voiced velar nasal, occurs word initially, medially and finally.

(20)	initial	/ŋaŋŋak/	[ŋáŋŋaʔ]	'bridle'
	medial	/seŋak/	[séŋaʔ]	'different'
	final	/puɖuŋ/	[púɖuŋ]	'nose'

/l/ Voiced alveolar lateral, occurs word initially and medially.

(21)	initial	/lalan/	[lálalan/	'road'
	medial	/ile/	[íle]	'snake'

/y/ Voiced palatal semivowel, occurs word initially and medially.

(22)	initial	/yaho/	[yáho]	'up'
	medial	/teye/	[téye]	'hand'

2.3.2 Vowel Phonemes

All six A-T vowel phonemes occur in both stressed and unstressed open syllables and both stressed and unstressed closed syllables as the following examples show.

Vowel Phoneme Positions

/i/ Voiced high front unrounded vowel phoneme, realised by the following variants:

[ɪ] Voiced high open front unrounded vocoid, occurs in closed syllables before anterior consonants.

(23)	/dinne/	[dɪnne]	'here'
------	---------	---------	--------

- [i] Voiced high close front unrounded vocoid, occurs in open syllables and syllables closed by back consonants.

(24)	open	/hipe/	[hípe]	‘across’
	closed	/bihtiʔ/	[bíhtiʔ]	‘leg’

/e/ Voiced mid front unrounded vowel phoneme, realised by the following variants:

- [ɛ] Voiced mid open front unrounded vocoid, occurs in closed syllables.

(25)		/betek/	[béteʔ]	‘to go across’
------	--	---------	---------	----------------

- [e] Voiced mid close front unrounded vocoid, occurs in open syllables.

(26)		/behin/	[béhin]	‘edge’
------	--	---------	---------	--------

/æ/ Voiced low front unrounded vowel phoneme, occurs in open and closed syllables.

(27)	open	/bælæbæk/	[bæláebæʔ]	‘woven bamboo’
	closed	/tæmpæk/	[táempæʔ]	‘youngest’

/u/ Voiced high back rounded vowel phoneme, realised by the following variants:

- [ú] Voiced high open back rounded vocoid, occurs in closed syllables before anterior consonants.

(28)		/sumbana/	[sumbána]	‘before’
------	--	-----------	-----------	----------

- [u] Voiced high close back rounded vocoid, occurs in open syllables and syllables closed by back consonants.

(29)	open	/supu/	[súpu]	‘only’
	closed	/uhpak/	[úhpaʔ]	‘four’

/o/ Voiced mid back rounded vowel phoneme, realised by the following variants:

- [ɔ] Voiced mid open back rounded vocoid, occurs in closed syllables.

(30)		/saohkok/	[saóhkoʔ]	‘small’
------	--	-----------	-----------	---------

- [o] Voiced mid close back rounded vocoid, occurs in open syllables.

(31)		/pano/	[páno]	‘go level’
------	--	--------	--------	------------

/a/ Voiced low back unrounded vowel phoneme, occurs in open and closed syllables.

(32)	open	/aha/	[áha]	‘there is/are’
	closed	/ampok/	[ámpoʔ]	‘but’

2.4 Contrast of Phonemes

2.4.1 Contrast of Consonant Phonemes

Two possible conclusions can be reached in analysing the phones [k], [ʔ] and [ʰ].

Firstly, [ʔ] appears word finally and medially before other contoids and so complements [ʰ] which only occurs intervocalically. It would seem then that they are allophones of the one phoneme. Pairs can be found to illustrate contrast between [k] and /ʔ/ intervocalically, leading to the conclusion that they are separate phonemes.

(33)	/k/ʔ/	/haka/	[háka]	'ball'
		/haʔa/	[háʰa]	'top plate (of house frame)'
		/dakaŋ/	[dákaŋ]	'basket (man's)'
		/daʔa/	[dáʰa]	'don't!'

However [ʔ] also occurs intervocalically at morpheme boundaries.

(34)	/pa-elaʔ-i/	[paélaʔi]	'go carefully!'
	/maʔ-oto/	[maʔóto]	'to go by car'

Alternatively if we examine [ʰ] in context we find it not only occurs intervocalically, but also always between identical vowels.

(35)	[undóʰo]	'that'
	[undéʰe]	'this'
	[maníʰi]	'soon'

There are no geminate vowels in A-T, so it would not be unreasonable to posit an epenthetical process by which [ʰ] is inserted to break up the vowel cluster present in the underlying structure of words such as [háʰa]. This being the case, we are left without intervocalic contrast between pairs like /haka/ and /háa/. [k] occurs word initially and intervocalically (ie always syllable-initially); [ʔ] occurs only syllable finally. Since the environment governs the selection of either one or the other and does so completely predictably, we can conclude that [ʔ] and [k] are allophones of a single phoneme, which we will call /k/.

I have adopted this second analysis as being the more reasonable and elegant, because the glottals are completely predictable and the net result is one less phoneme. There remain only four other pairs of consonants close enough to need contrasting.

(36) - Consonant Contrasts

/p/,/b/	/pahe/ /bahi/	[páhe] [báhi]	'rice (plant)' 'pig'
/t/,/d/	/tontɔŋ/ /tondɔŋ/	[tóntɔŋ] [tóndɔŋ]	'to remain' 'top'
/k/,/h/	/kenek/ /henek/	[kéneʔ] [héneʔ]	'rain' 'sago glue'
/n/,/ŋ/	/naoa/ /ŋao/	[náoa] [ŋáo^o]	'he said' 'you're lying!'

2.4.2 Contrast of Vowel Phonemes

(37) - Vowel Contrasts

/i/,/e/	/kalumpini/ /kalumpeni/	[kalumpíni] [kalumpéni]	'sideburns' 'swift (bird)'
/e/,/æ/	/heŋkæŋ/ /hæŋkæŋ/	[héŋkæŋ] [hæŋkæŋ]	'to laugh-cry' 'twig'
/æ/,/a/	/ləmpæŋ/ /ləmpaŋ/	[lémpæŋ] [lémpaŋ]	'to stop and visit' 'to overflow a cup'
/a/,/o/	/lekbak/ /lekbok/	[léʔbaʔ] [léʔboʔ]	'to leave' 'sea'
/o/,/u/	/poaŋ/ /puaŋ/	[póaŋ] [púaŋ]	'tree' 'lord'

3 SUPRASEGMENTAL FEATURES

3.1 Stress

Stress in A-T is regular and predictable. Apart from three conditions which place stress on other syllables, stress in this language always falls on the penultimate.¹

(38)	[táma]	'to enter'
	[patáma]	'to cause to enter'
	[kupatáma]	'I cause to enter'
	[lakupatáma]	'I will cause to enter'

Rule 1 - Stress placement

$$S \rightarrow [+stress] / \text{---} \begin{matrix} S \\ [-stress] \end{matrix} \Bigg] \#$$

word

The three conditions overriding this general pattern are:

- a) distal vocative stress placement
- b) enclitics
- c) certain off-glides

a) Vocatives will follow one of two patterns. When addressing someone at close range, stress placement on the name or term of address is on the penultimate syllable in accordance with the general pattern of the language. But if the addressee is at some distance from the speaker the stress placement is altered such that stress now falls on the final syllable. With this there is usually an increase in volume or force of delivery commensurate with the distance involved.

- (39) close range [o só'yan] 'Oh Sofian'
 distance [so'yán] 'Sofian' (called)

This process can be handled by the following rule:

Rule 2 - Distal Vocative Stress Placement

$$S \rightarrow [+stress] / \text{---} \Bigg] \#$$

distal vocative word

Rule 2 needs to precede Rule 1 in rule ordering, so that the the final syllable of a distal vocative will already be stressed and therefore not undergo Stress Placement.

b) As stress placement is measured from the right end of the word, prefixes and proclitics can have no bearing on it. Suffixes and enclitics on the other hand do affect the positioning of stress. Any suffix attached to a root in A-T will cause the stress on that root to shift to the right so that it remains on the penultimate syllable.

- (40) [dásan] 'house'
 [dasánku] 'my house'

With suffixes then, stress remains on the penultimate syllable.

Enclitics, however, by definition cannot be stressed and neither do they cause the stress to shift from its position on a root or stem. They merely 'lean' on the tail end of a word and in so doing add extra syllables to the right of the stressed syllable. Thus with one enclitic attached stress will be on the antepenultimate

syllable; with two it will be found on the preantepenultimate syllable. Both frequently occur.

- (41) $\begin{bmatrix} \text{ma}^{\text{h}}\text{óndəŋ} \\ \text{'tomorrow'} \end{bmatrix} + \begin{bmatrix} \text{-kə}^{\text{h}} \\ \text{(NCMP)} \end{bmatrix} \rightarrow \begin{bmatrix} \text{ma}^{\text{h}}\text{óndəŋkə}^{\text{h}} \\ \text{'tomorrow'} \text{ (NCMP)} \end{bmatrix}$
- $\begin{bmatrix} \text{uŋk}^{\text{h}}\text{óhti}^{\text{h}} \\ \text{'you pick'} \end{bmatrix} + \begin{bmatrix} \text{-}^{\text{h}}\text{a} \\ \text{(UCT)} \end{bmatrix} + \begin{bmatrix} \text{-ka} \\ \text{(YNQ)} \end{bmatrix} \rightarrow \begin{bmatrix} \text{uŋk}^{\text{h}}\text{óhti}^{\text{h}}\text{a}^{\text{h}}\text{ka} \\ \text{'Did you pick?'} \end{bmatrix}$

c) Certain vowel sequences, notably those beginning with /a/ can in rapid speech skew the expected stress pattern. Where stress should occur on the second vowel of the sequence, it is sometimes thus left-shifted one place. A closer examination of the same word at a slower speed reveals that in fact stress does fall on the second of the sequence as expected.

- (42) $\begin{bmatrix} \text{ma}^{\text{h}}\text{i}^{\text{h}}\text{di} \\ \text{'sa}^{\text{h}}\text{óhk}^{\text{h}}\text{ó}^{\text{h}} \\ \text{'pa}^{\text{h}}\text{éla}^{\text{h}}\text{i} \end{bmatrix} \sim \begin{bmatrix} \text{ma}^{\text{h}}\text{i}^{\text{h}}\text{di} \\ \text{'sá}^{\text{h}}\text{óhk}^{\text{h}}\text{ó}^{\text{h}} \\ \text{'pá}^{\text{h}}\text{éla}^{\text{h}}\text{i} \end{bmatrix} \begin{matrix} \text{'many'} \\ \text{'small'} \\ \text{'go carefully'} \end{matrix}$

3.2 Vowel Length

Consonantal length has been handled at the segmental level, above. We have seen that lengthened consonants are phonemically determined and are interpreted as geminate sequences.

A-T has no phonemically lengthened vowels. However vowel length is present phonetically to a predictable pattern. In stressed open syllables there is a slight lengthening of the syllable nucleus, not present in other syllables.²

- (43) $\begin{bmatrix} \text{i}^{\text{h}}\text{si} \\ \text{'ihs}^{\text{h}}\text{i} \end{bmatrix} \begin{matrix} /i^{\text{h}}si/ \\ /i^{\text{h}}si/ \end{matrix} \begin{matrix} \text{'tooth'} \\ \text{'to fill'} \end{matrix}$

3.3 Intonation

Speakers of surrounding languages sometimes refer to the speech of their Tabulahan neighbours as being like Chinese or like 'bird talk'. A-T is certainly not a tonal language; neither is its intonation system radically different from those of neighbouring languages. There are however some interesting differences.

3.3.1 Sentence Level


The major difference so far encountered is with content questions at the sentence level. Where PUS for example has a rise in intonation at the last stressed syllable of the sentence with both yes/no and content questions, A-T content questions would generally have a sharp fall followed by a rise to the initial level.


For most sentence types the intonation is level until a nucleus at the last stressed syllable. Here the pitch level changes either up or down and either remains at that level until the end, or changes again on the following syllable.

Below is a list of sentence level intonation patterns frequently encountered. This is neither an exhaustive list, nor are the intonation patterns described

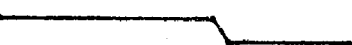
completely definitive. Rather these are patterns we have observed, which are subject to a certain amount of variation due to subtle meaning differences.

Statements typically have a level intonation falling at the nucleus and remaining at the lower pitch level until the end. The fall often seems to be equivalent to a fall of a major third in music.

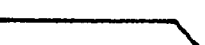
- IC1
- (44)  [maŋsihuanɔ dille]
'We are frying corn.'

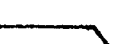
- IC1
-  [láʔbi sambúlanɔ]
'More than a month.'

This is also the pattern for hortatives, though the fall is not necessarily so pronounced.


- IC1
- (45)  [máimo ánnna móhkoɪŋke]
'Come let's sit down.'

Imperatives are also signalled by a falling intonation, but the nucleus is the last syllable.

- IC2
- (46)  [lémpæŋkaŋko]
'Stop and visit!'

- IC2
-  [ɛmpéi^i]
'Wait!'

Vocatives can have one of two intonation patterns. Close range is identical with the pattern for hortative intonation.

- IC1
- (47)  [o mámaʔ óndɔŋ]
'O, Ondong's mother...'

When people are being called, that is the range is somewhat further, the intonation pattern for vocatives is sharply rising on the last syllable which is also stressed and lengthened, then falling slightly as it trails off.

IC3



- (48) [púaʔ handé:]
'Uncle of Hande...'

Yes/no questions rise at the last stressed syllable, sometimes remaining high for the rest of the sentence,

1C4



- (49) [laolalánaŋřaka]
'Are you going to weave a herringbone pattern?'

but more commonly falling for the remaining syllables.

1C5



- (50) [lamasáeo di yáho]
'Will you be up there long?'

1C5



- [áha pakulímmu]
'Have you any medicine?'

Content questions can follow this latter pattern also.

IC5



- (51) [umbanóa uŋsáʔdĩŋ]
'How do you feel?'

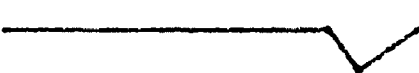
However the general pattern for content questions is usually a fall equivalent to a perfect fourth in music (but may be anywhere between a major third and a perfect fifth), at the last stressed syllable followed by a rise to the previous pitch level for the remaining syllables.

IC6




- (52) [i píhhaŋ lamáo bóa dáiʔ di maŋkásaʔ]
'When are you going to Ujung Pandang again?'


IC6



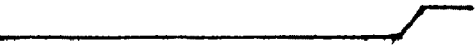
- [saŋgáka taúmmu mepáhe]
'How many people do you have harvesting rice?'

Tag questions follow statement intonation, but with a sharp rise on the final syllable.


IC7 
 (53) [dákoʔkɛʔ máne kukutúi tóuo dío né]
 'Later I'll delouse you too ok?'

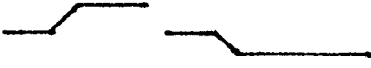
IC7 
 [dáun dʊŋkúʔi indóʔo né]
 'Don't you go near that, will you?'

Request intonation is typically a rise on the last stressed syllable maintained to the end of the sentence. This is the same pattern as for some yes/no questions (IC4). Requests are in fact a subset of yes/no questions. While expecting a positive answer, there is always the possibility that the request will be denied.


IC4 
 (54) [lamálaʔaka uŋáliʔiŋkæʔ uháse]
 'Can you buy me an axe?'

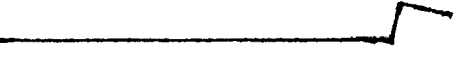
The Either/Or construction is signalled by a rise on the stressed syllable of the 'either' and a fall for the stressed and following syllables of the 'or'.

IC8 
 (55) [uŋsábiʔʔaka báhtuʔ uŋkóhtiʔʔaka]
 'Did they sickle-cut or did they pick?'

IC8 
 [dinóʔaka maʔóndʊŋʔaka]
 'either today or tomorrow'

Surprise/contraexpectation intonation consists of a sharp rise on the last stressed syllable falling slightly for subsequent syllables.

IC9 
 (56) [o makórɔŋ lólo keaʔahámmu]
 'Oh, is your horse continually sick?!'

IC9 
 [kulámbiʔ ɪndóku namesamésa]
 'I found my mother by herself!'

3.3.2 Higher Level

Discourse level intonation can be defined in terms of three levels: P1, P2 and P3. These are separated and also distinguished by pauses the length of which increases with an increase in level. The first, P1, is marked by a slight falling intonation on the final syllable and a slight pause. The second, P2, is signaled by a

rise after the last stressed syllable and a short pause. A longer pause and a sharply falling intonation on the last stressed syllable marks P3.

The following textual excerpt illustrates these three levels, using \, \/, \/\ to indicate the close of P1, P2 and P3 respectively.

(57)

[indé^e téřŋ \dikámbi? \alloálo \disáŋke? \\
 this buffalo tended daily tied
 dipatáma di kandánna kebéŋiⁱ \pihsanáŋna \tállu pahiamánna dikámbi?
 made to enter at corral at night then three years tended
 \indé^e téřŋ káeyæmmi \dialámiŋ téřŋ lakinna púa[?] lénŋ
 this buffalo already big fetched buffalo male uncle Lenong
 áŋna dipandalúiⁱ \i yáho di tanéte béhtŋ \pihsanáŋna \púha
 and mated it up on mount Behteng then already
 mopandálu \kehæhtæŋ póle[?] diáto téřŋ \/\]
 mated 'pregnant indeed that buffalo

This buffalo \ was tended \ daily \ tied \ and fenced in at night \/\ Then \ after three years of being cared for \ it was fully grown \/\ Lenong's uncle's male buffalo was brought to mate with it \ up on mount Behteng \/\ Then \ having mated \ the buffalo was pregnant indeed \/\

4 DISTRIBUTION

In this section we shall look at the distribution of consonants and vowels within phonological words; how they pattern and restrictions to further patterning. In order to examine these patterns of distribution, it is necessary firstly to understand the components that constitute the phonological word, namely syllables.

4.1 The Syllable

Syllables in A-T are simple in structure, consisting obligatorily of a vowel nucleus, which may be preceded by a single consonant as a syllable onset and may be followed by a single consonant as a coda. There are then, four possible syllable types in A-T: two open, V and CV; and two closed, VC and CVC.

Divisions between syllables are also of four possible configurations, since there are two open syllable types and two closed. Any syllable may be preceded by an open syllable: (C)V.V(C) or (C)V.CV(C) or by a closed syllable: (C)VC.V(C) or (C)VC.CV(C). In practice the third of these configurations is rare, intervocalic consonants generally being interpreted as fitting a V.CV pattern in accordance with the 'maximise onset principle' of CV-phonology, leading to resyllabification. VC.V syllable divisions do occur, but only where C = [ʔ]. In such a case no resyllabification takes place.

It follows that there are sixteen potential permutations of two syllables, illustrated in (58). Of these, four could be predicted to be unlikely to occur, (i), j), m) and n)), in that they contain the combination C.V, which would be usually interpreted as CV occurring within a syllable. That any of these do occur is due only to the fact that [ʔ] occurs syllable finally, but never syllable initially. Words such as those illustrated in m) and n) can therefore be formed with one of the glottal-final morphemes prefixed to vowel-initial roots. Some of the following examples then are polymorphemic, while others are single morphemes.

The two permutations not illustrated below are unlikely to occur. If either should, we could predict the contour [ʔ] to constitute the first of the two consonant positions. Any other consonant, including the allophone [k], would resyllabify to maximise onset. Morpheme final /ŋ/ would generate an accrescent [ŋ] in this position for the same reason.

(58)

a)	V.V	/o.a/	[ó.a]	'to say'
b)	V.VC	/li.u.-æk/	[lí.u.æʔ]	'very' (1sA)
c)	V.CV	/u.he/	[ú.he]	'rattan'
d)	V.CVC	/a.saŋ/	[á.saŋ]	'all'
e)	CV.V	/da.i/	[dá.i]	'no'
f)	CV.VC	/be.ak/	[bé.aʔ]	'rice' (unhulled)
g)	CV.CV	/ha.he/	[há.he]	'to sleep'
h)	CV.CVC	/ke.nek/	[ké.neʔ]	'rain'
i)	*VC.V			
j)	*VC.VC			
k)	VC.CV	/an.na/	[án.na]	'and'
l)	VC.CVC	/am.pok/	[ám.pɔʔ]	'but'
m)	CVC.V	/mak-.o.to/	[maʔ.ó.to]	'to go by car'
n)	CVC.VC	/mak-.al.lo/	[maʔ.ál.lo]	'to go to church'
o)	CVC.CV	/tam.po/	[tám.po]	'ground'
p)	CVC.CVC	/lem.pæŋ/	[lém.pæŋ]	'to stop and visit'

The above list of syllable permutations also shows that both consonant clusters (k), l), o), p)) and vowel clusters (a), b), e), f)) occur, but only across syllable boundaries.

Words may be any length from one syllable to at least eight syllables, the larger words usually composed of several morphemes.

(59)	/ta/	[tá]	name particle
	/ne/	[né]	TAGQ
	/yak/	[yáʔ]	'then' (conj)
	/ka.si.po.ba.hi.ne.aŋ.na/		[kasipobahineáŋna]
	(ka-si-po-bahine-aŋ-na)		'their marriage'
	NZR REC ACT female NZR 3POS		

Single syllable words occur infrequently in A-T. Those there are cannot stand alone. Some are contractions, products of rapid speech.

(60)	[káʔ]	<--	[á.kaʔ]	'because'
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4.1.1 Syllable distribution in monomorphemes

Within a single morpheme permissible permutations of syllables are more limited than in polymorphemic words. The sequences C.V, and (C)V.V.V(C) are unacceptable within the monomorphemic word, while able to occur in polymorphemic words; and the sequence #V.V is not found in monomorphemic words of more than two syllables.

With monomorphemes of up to three syllables only 44 of the 84 permutations are thus acceptable. Table 7 shows the acceptable syllabic types with examples for single morpheme words of up to three syllables. The five acceptable syllable patterns not exemplified may exist but present data has yet to yield examples. It is unlikely that there are constraints against the unillustrated patterns. V.CVC., for example, though not yet illustrated in a three syllable monomorpheme, occurs in disyllabic examples.

All four possible monosyllabic types exist but as already mentioned, occur infrequently. Disyllabic roots form the majority of monomorphemic words, though roots with three syllables also frequently occur. Roots containing more than three syllables are rarer, but still are greater in number than monosyllabic words.

Table 7 - Syllable Types in Monomorphemic Words

1	V	/i/	[í]	TAGQ
	VC	/aŋ/	[aŋ]	REL
	CV	/to/	[tó]	'person'
	CVC	/yak/	[yáʔ]	'then' (conj)
2	V.V	/io/	[ío]	'yes'
	V.VC	/aik/	[áiʔ]	'girl' (endearment)
	V.CV	/upe/	[úpe]	'taro'
	V.CVC	/eheŋ/	[éheŋ]	'ladder'
	VC.CV	/ambe/	[ámbe]	'father'
	VC.CVC	/uhpak/	[úhpaʔ]	'four'
	CV.V	/noa/	[nóa]	'like'
	CV.VC	/beaŋ/	[béaŋ]	'goitre'
	CV.CV	/lopi/	[lópi]	'boat'
	CV.CVC	/kenek/	[kéneʔ]	'rain'
	CVC.CV	/sikda/	[síʔda]	'truly'
	CVC.CVC	/lembæŋ/	[lémbæŋ]	'valley'
3	CV.V	/uhai/	[uhái]	'water'
	V.CV.VC	/anean/	[anéaŋ]	'outside'
	V.CV.CV	/uhani/	[uháni]	'bee'
	V.CV.CVC	/uhakak/	[uhákaʔ]	'root'
	V.CVC.CV			
	V.CVC.CVC			
	VC.CV.V	/umbai/	[umbái]	'maybe'
	VC.CV.VC	/umbaik/	[umbáiʔ]	'maybe' (var)
	VC.CV.CV	/andana/	[andána]	'than'
	VC.CV.CVC	/ambataŋ/	[ambátaŋ]	'bridge'
	VC.CVC.CV	/injanna/	[injánna]	'all'

VC.CVC.CVC			
CV.V.CV	/muane/	[muáne]	'man'
CV.V.CVC	/kuæhæŋ/	[kuæhæŋ]	'monitor lizard'
CV.VC.CV	/maikdi/	[maíʔdi]	'many'
CV.VC.CVC	/saohkok/	[saóhkoʔ]	'small'
CV.CV.V	/maloe/	[malóe]	'afternoon'
CV.CV.VC	/hohiaŋ/	[hohíaŋ]	'durian'
CV.CV.CV	/pepahi/	[pepáhi]	'wind'
CV.CV.CVC	/buhotek/	[buhóteʔ]	'fly'
CV.CVC.CV	/tahakde/	[taháʔde]	'rice drying rack'
CV.CVC.CVC	/madondon/	[maʔóndon]	'tomorrow'
CVC.CV.V	/hombia/	[hombía]	'sago'
CVC.CV.VC			
CVC.CV.CV	/lahsuna/	[lahsúna]	'onion'
CVC.CV.CV	/hæmpækæŋ/	[hæmpækæŋ]	'rice cutter'
CVC.CVC.CV			
CVC.CVC.CVC	/timbuhhuk/	[tumbúhhuʔ]	'jealous'

4.2 Consonants

The twelve consonants, /p, t, k, b, d, s, h, m, n, ŋ, l, y/, can all occupy the onset position in a syllable. This has already been demonstrated in 2.3.1 above. However, only seven can occupy the coda of a syllable: /k, h, m, n, ŋ, l, y/ and of these only /k/([ʔ]) and /ŋ/ occur word finally before morphophonemic change rules have been applied.

Of course none of these seven syllable-final consonants can precede all twelve of the possible syllable-initial consonants in a cluster, neither within the morpheme nor across a morpheme boundary. We would not expect to find */ŋp/ for example. But some can cooccur with four or five of the list of syllable-initial consonants within the morpheme and with eight or more between morphemes. For clarity I have represented these consonant clusters in matrix form.

4.2.1 Consonant clusters within the morpheme

Table 8 - Consonant Clusters Occurring Intramorphemically

		2nd Consonant											
		p	t	k	b	d	s	h	m	n	ŋ	l	y
1st Consonant	k				kb	kd						kl	
	h	hp	ht	hk			hs	hh					
	m	mp			mb				mm				
	n		nt			nd	ns			nn			
	ŋ			ŋk							ŋŋ		
	l											ll	
	y												yy

In the initial position of a consonant cluster the phonetic realisation of the phoneme /k/ is [ʔ]. The voiced stops and /l/ all have the capacity to be

preglottalised. It can be seen from Table 8 that the nasals combine with their homorganic stops to produce the five clusters: /mp, mb, nt, nd, ŋk/. In addition /s/ can be preceded by the nasal /n/. Several other consonants can be preceded by /h/. The remaining clusters are geminates.

Consonant Gemination

Gemination of consonants is widespread among the languages of South Sulawesi. In the Tabulahan dialect of A-T gemination also occurs, but is limited to sonorants. Table 8 shows that each of the sonorants, /m,n,ŋ,l,y/ are found to geminate.

Obstruents in Tabulahan never pattern as geminates,³ but follow alternative clustering arrangements, depending on voice. The voiced stops, do not geminate, as they would in certain dialects of Bugis for example, (Sirk 1983:30), but can be preglottalised. This is consistent with many South Sulawesi languages, particularly those closely related to Torajan. PUS acts in the same way (Campbell, this volume).

It is with voiceless obstruents that Tabulahan stands apart from its close linguistic relatives. Where other languages, including the Aralle dialect of A-T, generally allow voiceless stops and fricatives to geminate (CC), the cognate equivalents in Tabulahan pattern hC. Thus:

(61) Toraja	PUS	Aralle	Tabulahan	
appa?	appa?	uppa?	uhpa?	'four'
-	tappa?	tappa?	tahpa?	'exact'
patti	patti	patti	pahti	'box'
bi?ti?	bitti?	bitti?	bihti?	'foot'
te?te?	tette?	tette?	tehte?	'hour'
ba?ta	batta	batta	bahta	'cut'
pikkiri?	pikki?	pikki	pihki?	'think'
masakka?	mæsække	masakke	masahke?	'cold (water)'
malassu	malussu	malussu	maluhsu	'hot'
assala?	assa	?	ahsala?	'provided that'
losso?	hossæ?	hessæ?	hehsæ?	'mud'
issi	issi	issi	ihsi	'flesh'

There are exceptions to the typical hC pattern. Certain words in related languages featuring geminate voiceless obstruents have cognates in Tabulahan which pattern NC, C being the obstruent and N being a homorganic nasal.

(62) Toraja	PUS	Tabulahan	
rakka?	-	hæŋkæ?	'finger'
Makki	Makki	Majki	'Kalumpang people/language'
dassi	dassi	dansi	'bird/kind of bird'
isson	issæ	inseŋ	'rice mortar'
issan	issam	insan	'know'

(63) Consonant clusters within the morpheme

/kb/	/lakbok/	[láʔboʔ]	'large machete'
/kd/	/sikda/	[síʔda]	'true'
/kl/	/laklaŋ/	[láʔlaŋ]	'umbrella'
/hp/	/uhpak/	[úhpaʔ]	'four'
/ht/	/bohto/	[bóhto]	'village'
/hk/	/tihku/	[tíhku]	'beak'
/hs/	/masuhsa/	[masúhsa]	'difficult'
/hh/	/tahhik/	[táhhíʔ]	'straight on'
/mp/	/ampok/	[ámpoʔ]	'but'
/mb/	/lambik/	[lámbíʔ]	'to reach'
/mm/	/mammik/	[mámmíʔ]	'delicious'
/nt/	/mintuk/	[míntuʔ]	'all'
/nd/	/indee/	[indéʔe]	'this'
/ns/	/insaŋ/	[ínsaŋ]	'to know'
/nn/	/ponna/	[pónna]	'if'
/ŋk/	/saŋkek/	[sáŋkɛʔ]	'to tie'
/ŋŋ/	/laŋŋenak/	[laŋŋénaʔ]	'earlier'
/ll/	/tollo/	[tóllo]	'to spill'

Summary of Consonant Distribution Within Morphemes

Table 9 - Distributional Properties of Consonants Within Morphemes

	p	t	k	b	d	s	h	m	n	ŋ	l	y
initially	+	+	+	+	+	+	+	+	+	+	+	+
medially single	+	+	+	+	+	+	+	+	+	+	+	+
medially geminate	-	-	-	-	-	-	-	+	+	+	+	+
medially after h	+	+	+	-	-	+	+	-	-	-	-	-
medially after /k/ ([ʔ])	-	-	-	+	+	-	-	-	-	-	+	-
medially after nasal	+	+	+	+	+	+	-	-	-	-	-	-
finally	-	-	+	-	-	-	-	-	-	+	-	-

It can be seen from the above table that medial gemination and the medial prelocation of /h/ are in complementary distribution, occurring with sonorants and voiceless obstruents respectively. A small liberty has been taken with the above table in a bid to make this point. /h/ does in fact occur as a medial geminate, but this amounts to the same thing as /h/ occurring medially after /h/. Rather than include the redundancy caused by this overlap, geminate /h/ has been marked minus. The redundancy of nasals following nasals (which amounts to the same thing as nasals in geminate clusters) has similarly been handled by marking them minus in the table.

4.2.2 Consonant clusters across morpheme breaks

Between morphemes only two consonants can appear in the first position of a consonant cluster. /h/, prolific intramorphemically, does not occur morpheme finally and so only appears as a second consonant candidate in the following table.

Table 10 - Consonant Clusters Occurring Intermorphemically

		2nd Consonant										
		p	t	k	b	d	s	h	m	n	ŋ	l
1st Consonant	/k/	[ʔ]	ʔp	ʔt	ʔk	ʔb	ʔd	ʔs	ʔh	ʔm	ʔn	ʔl
	/	[m]	mp		mb				mm			
	/ŋ/	[n]		nt		nd	ns			nn		
	/	[ŋ]		ŋk			ŋs	ŋh			ŋŋ	ll

The principal differences between Tables 8 and 10 lie with /k/([ʔ]) and /ŋ/. As shown in 2.3.1, only these two consonants occur word-finally. /m,n,l/, which are so manifested as surface forms after morphophonemic change rules have been applied, have /ŋ/ as their underlying form when appearing morpheme finally, (see 5.2 Rules 7 & 8).

Table 10 shows two apparent anomalies. Firstly, it seems /ŋ/ is the only consonant not able to be preceded by a glottal stop across a morpheme boundary. This is no doubt due to the extremely low frequency of /ŋ/-initial roots. Secondly, each of the consonants except /s/ is able to be preceded by only one of the variants of the morphophoneme /ŋ/. /ns/ is in free variation with /ŋs/ across a morpheme boundary.

(64) Consonant clusters across morpheme boundaries

/kp/	[ʔp]	/uhpak-pulo/	[uhpaʔpúlo]	'forty'
/kt/	[ʔt]	/mak-tulak/	[maʔtúlaʔ]	'to speak'
/kk/	[ʔk]	/pak-kamase/	[paʔkamáse]	'grace'
/ks/	[ʔs]	/pak-sikola/	[paʔsikóla]	'pupil'
/kh/	[ʔh]	/mak-hupa-tau/	[maʔhupatáu]	'human being'
/km/	[ʔm]	/lekbak-mi/	[léʔbaʔmi]	'already gone'
/kn/	[ʔn]	/bææk-na/	[bæ^æʔna]	'his head'
/kl/	[ʔl]	/pak-lele/	[paʔléle]	'climber'
/ŋp/	[mp]	/maŋ-pa-dende/	[mamparénde]	'to shift s.t.'
/ŋb/	[mb]	/uŋ-babe/	[umbábe]	'you are doing'
/ŋm/	[mm]	/sehuŋ-mu/	[sehúmmu]	'your spoon'
/ŋt/	[nt]	/meŋ-timbak/	[mentímbaʔ]	'to answer'
/ŋd/	[nd]	/meŋ-dahi/	[mendáhi]	'to become'
/ŋs/	[ns]	/uŋ-sakdiŋ/	[unsáʔdiŋ]	'you feel'
	[ŋs]		[uŋsáʔdiŋ]	
/ŋn/	[nn]	/dasan-na/	[dasánna]	'his house'
/ŋk/	[ŋk]	/meŋ-kæhæŋ/	[meŋkæhæŋ]	'to work'
/ŋh/	[ŋh]	/uŋ-hæŋæŋ-i/	[uŋhæŋæŋi]	'you add to'
/ŋN/	[ŋŋ]	/maŋ-alli/	[maŋŋalli]	'to buy'
/ŋl/	[ll]	/uŋ-lellen/	[ulléllēŋ]	'you fell (trees)'

4.3 Vowel Distribution

4.3.1 Vowel clusters within morphemes

Table 11 - Vowel Clusters Occurring Intramorphemically

		2nd Vowel					
		i	e	æ	u	o	a
1st Vowel	i	ii			iu	io	ia
	e	ei				eo	ea
	æ	æi		ææ			
	u	ui		uæ		uo	ua
	o	oi	oe		ou	oo	oa
	a	ai	ae		au	ao	aa

The table shows several gaps at least some of which are probably due to insufficient data at hand. Several of the gaps pertaining to the vowel /æ/ could be systematic, /æ/ only clustering with itself and with high vowels. This still would leave two nonsystematic æ cluster gaps: iæ and æu. The table also shows four apparent intramorphemic geminate vowels. While it is true that these exist as underlying forms, an epenthetic weak glottal separates them in their surface form. (See Rule 15). Sequences of three or more vowels do not occur within the morpheme.

(65) Vowel clusters within the morpheme

/ii/	/biik/	[bí ^h iʔ]	'bottom'
/iu/	/liu/	[líu]	(intensifier)
/io/	/dio/	[díio]	'2s'
/ia/	/sia/	[síia]	'salt'
/ei/	/neik/	[néiʔ]	(comparative)
/eo/	/maksaleo/	[maʔsaléo]	'to wander'
/ea/	/beak/	[béaʔ]	'rice (unhulled)'
/æi/	/sæmpæik/	[sæmpæiʔ]	'a short time'
/ææ/	/bææk/	[bæ ^h æʔ]	'head'
/ui/	/dui/	[dúi]	'thorn'
/uæ/	/tuæk/	[túæʔ]	'palm wine'
/uo/	/suo/	[súo]	'to comission'
/ua/	/sua/	[súa]	'mouth'
/oi/	/hoik/	[hóiʔ]	'below'
/oe/	/kaloek/	[kalóeʔ]	'parrot'
/ou/	/bou/	[bóu]	'again'
/oo/	/koo/	[kó ^h o]	'I'
/oa/	/dinoa/	[dinóa]	'now'
/ai/	/dai/	[dái]	'no, not'
/ae/	/masae/	[masáe]	'a long time'
/au/	/naun/	[náun]	'to descend'
/ao/	/tambao/	[tambáo]	'stork'
/aa/	/haa/	[há ^h a]	'top plate (house)'

4.3.2 Vowel clusters across morpheme breaks

Table 12 - Vowel Clusters Occurring Intermorphemically

		2nd Vowel					
		i	e	æ	u	o	a
1st Vowel	i	ii	ie	iæ	iu	io	ia
	e	ei	ee	eæ	eu	eo	ea
	æ						
	u	ui	ue	uæ	uu	uo	ua
	o	oi	oe	oæ	ou	oo	oa
	a	ai	ae	aæ	au	ao	aa

The most notable feature of vowel distribution across morpheme boundaries is the absence of /æ/-initial clusters. /æ/ is the least common of the vowel phonemes, having a limited distribution. Although it occurs in the initial position of the enclitic /æk/ [-æʔ] '1sA', and initially in some roots such as /æŋkæk/ [æŋkæʔ] 'take up', it never occurs finally in roots nor finally in prefixes. Consequently though it occurs following any of the other vowel phonemes across a morpheme boundary, it is never found as the first member of a vowel cluster in such a position. That said, it must also be noted that the phonetic realisation of the cluster /aæ/ is [ææ] in accordance with a process of assimilation (see 5.2 Rule 9).

(66) Vowel clusters across morpheme boundaries

a)	/ii/	/uŋ-alli-iŋ-k-æk/	[uŋǵállí [^] iŋkæʔ]	'you buy for me'
b)	/iæ/	/di-æŋkæk/	[diæŋkæʔ]	'taken up'
c)	/iu/	/si-ulu/	[siúlu]	'sibling'
d)	/io/	/di-oa/	[dióa]	'say' (PASS)
e)	/ia/	/di-ala/	[diála]	'fetch' (PASS)
f)	/ei/	/sule-i/	[suléi]	'come' (LOC)
g)	/ee/	/inde-e/	[indé [^] e]	'this' (EMPH)
h)	/eæ/	/sule-æk/	[súleæʔ]	'I come'
i)	/eu/	/me-uhe/	[meúhe]	'to cut rattan'
j)	/eo/	/ke-ollon/	[keóllon]	'pillow-owning'
k)	/ea/	/onge-aŋ/	[ŋgéaŋ]	'place'
l)	/ui/	/mu-insaŋ/	[muínsaŋ]	'you know'
m)	/ue/	/ku-empei/	[kuempéi]	'I wait for s.t.'
n)	/uæ/	/supu-æk/	[súpuæʔ]	'only I'
o)	/uo/	/mu-ola/	[muóla]	'you go'
p)	/ua/	/ku-ala/	[kuála]	'I fetch'
q)	/oi/	/pa-tuho-iŋ/	[patúhoiŋ]	'to shepherd'
r)	/oe/	/to-ek/	[tóeʔ]	'also' (3sA)
s)	/oa&e/	/mohko-æk/	[móhkoæʔ]	'I sit'
t)	/ou/	/mo-ulaŋ/	[moúlaŋ]	'to trap'
u)	/oo/	/indo-o/	[indó [^] o]	'that' EMPH
v)	/oa/	/-ko-ak/	[-koaʔ]	2pA (2sA + p)
w)	/ai/	/pe-puha-i/	[pepuhái]	'finish it!'
x)	/ae/	/pa-elak-i/	[paélaʔi]	'go carefully!'

y)	/aæ/	/uŋ-ala-æk/	[uŋgálæ^æʔ]	'I fetch'
z)	/au/	/la-uŋ-babe/	[laumbábe]	'you will make'
α)	/ao/	/na-oa/	[naóa]	'he said'
β)	/aa/	/ma-aka/	[ma^áka]	'to be something'

Sequences of three vowels may occur across a morpheme boundary as in (66α) above.

5 PHONOLOGICAL PROCESSES

The phonological processes occurring in A-T can be grouped into two main types: 1) Allophonic and 2) Morphophonemic. The first of these deals with strength-changing (weakening) processes. The second type, morphophonemic, can be subdivided into assimilation processes and syllable structure processes. Of course, there is interplay between these groups and rule ordering will not be restricted to keep within such boundaries, but it may be helpful to look at processes according to type where possible.

5.1 Weakening Processes

Six phonemes each have more than one allophone. The two consonants /k/ and /d/, and the nonlow vowels /i/, /u/, /e/ and /o/ are all subject to weakening processes which bring about their allophonic variants.

5.1.1 In syllable-final position /k/ has the form [ʔ].

Rule 3 - k-Weakening

$$\left[\begin{array}{c} \text{C} \\ \text{-continuant} \\ \text{-nasal} \\ \text{-anterior} \end{array} \right] \rightarrow [-\text{consonantal}] / ___\$$$

The above rule shows the weakening of /k/ in syllable final position, that is not only before other consonants or word finally, but also before any morpheme break. This means that /k/ will be manifest as [ʔ] even if in an intervocalic position, provided that a morpheme break occurs following the [ʔ].

(67)	/bahtuk/	[báhtuʔ]	'or'
	/lakbi/	[láʔbi]	'more'
	/pak-kamase/	[paʔkamáse]	'grace'
	/tuŋkak-i/	[túŋkaʔi]	'open it'

In this final example we see that no resyllabification takes place when a vowel initial enclitic (or suffix) is attached; the [ʔ] remains. This is in contrast to Indonesian.

(68)	Indonesian:	baik	[báiʔ]	'good'
	BUT	mem-per-baik-i	[məmpərbáiki]	'repair'

5.1.2 The consonant phoneme /d/ is subject to the following rule when occurring intervocalically.

Rule 4 - d-Continuantisation

$$\left[\begin{array}{c} \text{C} \\ -\text{continuant} \\ -\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \\ +\text{voice} \end{array} \right] \rightarrow \left[\begin{array}{c} \text{C} \\ +\text{continuant} \\ -\text{lateral} \end{array} \right] / \text{V} _ \text{V}$$

According to this rule, /d/ becomes the continuant [ɾ] in the specified position. While this rule holds true for most speakers of the Tabulahan dialect, there are some who seldom apply it to their speech and others who never do, retaining the [d] form in all positions.

(69)	/madondɔŋ/	[maɾɔndɔŋ]	~	[madɔndɔŋ]	'tomorrow'
	/sadiŋ/	[sáɾiŋ]	~	[sádiŋ]	'rat'
	/kodik/	[kóɾiʔ]	~	[kódiʔ]	'I'
	/dedua/	[deɾúa]	~	[dedúa]	'two'

5.1.3 Non-low vowels are laxened in certain positions.

Because the environments in which this process occurs are different with vowels of different height, two rules are necessary.

Rule 5 - Mid Vowel Laxing

$$\left[\begin{array}{c} \text{V} \\ -\text{low} \\ -\text{high} \end{array} \right] \rightarrow [-\text{tense}] / _ \text{C } \$$$

This rule states that mid vowels, /e/ and /o/ become laxened ([ɛ], [ɔ]) in closed syllables.

(70)	/maŋ-empe/	[maŋɛmpe]	'to watchguard'
	/pahenta/	[pahɛnta]	'command'
	/meŋeŋ/	[méŋeŋ]	'already (verb)-ing'
	/lekbak/	[léʔbaʔ]	'to leave'
	/lehsuk/	[léhsuʔ]	'egg'
(71)	/sompok/	[sɔmpɔʔ]	'rise in level'
	/bondek/	[bɔndeʔ]	'coast'
	/tedɔŋ/	[téɾɔŋ]	'water buffalo'
	/elok/	[éɔʔ]	'to desire'
	/bohto/	[bóhto]	'village'

Similarly the high vowels, /i/ and /u/ sometimes undergo laxing, but here the environment is a little narrower.

Rule 6 - High Vowel Laxing

$$\left[\begin{smallmatrix} \text{V} \\ +\text{high} \end{smallmatrix} \right] \rightarrow [-\text{tense}] / \text{ ______ } \left[\begin{smallmatrix} \text{C} \\ +\text{anterior} \end{smallmatrix} \right] \$$$

High vowels are laxed then, when occurring in syllables closed by non-back consonants.

(72)	/i/	/timbak/	[tímbaʔ]	'to answer'
		/dille/	[dílle]	'corn'
	but	/sikda/	[síʔda]	'true'
		/tihku/	[tíhku]	'beak'
(73)	/u/	/umba/	[úmba]	'where?'
		/unnun/	[ónnun]	'six'
	but	/lehsuk/	[léhsuʔ]	'egg'
		/masuhsa/	[masúhsa]	'difficult'

5.2 Assimilation Processes

5.2.1 Three assimilation processes occur.

Two have limited application, but the first, nasal assimilation, is ubiquitous in usage; occurring wherever heterorganic nasals and stops, or nasals and nasals juxtapose, whether across a morpheme boundary or a word boundary within phonological levels P1 and P2.

Rule 7 - Nasal Assimilation

$$[+\text{nasal}] \rightarrow \left[\begin{smallmatrix} \alpha \text{ anterior} \\ \beta \text{ coronal} \end{smallmatrix} \right] / \text{ ______ } \left[\begin{smallmatrix} - \text{syllabic} \\ \alpha \text{ anterior} \\ \beta \text{ coronal} \end{smallmatrix} \right]$$

According to this rule any nasal assimilates to the place of articulation of a following consonant. This applies within words and across word boundaries within P1 and P2 levels.

(74)	/maŋ-pa-dende/	-->	[mampařénde]	'to shift s/t'
	/uŋ-babe/	-->	[umbábe]	'you make'
	/enuk-aŋ-mu	-->	[enuʔámmu]	'your cup'
	/das-aŋ-ta/	-->	[dasánta]	'our house'
	/saŋ-dahpa/	-->	[sandáhpa]	'one armspan'
	/puđuŋ-na/	-->	[puřúnna]	'his nose'
	/aŋ doŋ-bali uhan-aŋ ma-luak-na/			
	--> [an dombáli uhánam maluáʔna]			
	'which is two armlengths wide'			

Principally the following consonant is either a stop or a nasal. /y/ is never in a position to initiate this process, since the few cases where /y/ occurs morpheme initially are conjunctions and adverbs which take no affixation. /h/ is already of the same anterior and coronal specification as the preceding nasal (/ŋ/) and so leaves the surface form the same as the underlying. /s/ initiates the process generally, but sometimes optionally ignores the rule, remaining as the sequence /ŋ-s/.

- (75) /uŋ-sakdiŋ/ --> [uŋsáʔdiŋ] ~ [únsáʔdiŋ] 'you feel'
 /maŋ-sihu/ --> [maŋsíhu] ~ [mansíhu] 'to roast'
 /aŋ handaŋ/ --> [aŋ hándaŋ] 'the most...'

5.2.2 Although /l/ following a nasal could also generate this rule, the surface form [nl] is never realised.

This is because /l/ is also the condition for the subsequent continuantisation rule (8). Nasal Continuatisation, like Nasal Assimilation, occurs across word boundaries as well as morpheme boundaries within levels P1 and P2.

Rule 8 - Nasal Continuatisation

[+nasal] --> [l] / ____ /l/

- (76) /uŋ-lellen/ --> [ulléllen] 'to fell'
 /aŋ lehsuk/ --> [al léhsuʔ] 'ago'

5.2.3 The third assimilation process involves the phoneme /æ/.

As has already been noted, /æ/ does not readily cluster with other vowels to the same extent that the five others do. Even apart from this tendency to avoid juxtaposition with other vowels, /æ/ tends to be found in syllables adjacent to other /æ/-peak syllables within roots. The combinations /a/(C)(C)/æ/ or /æ/(C)(C)/a/ never occur within a morpheme. There is then neutralised contrast between /a/ and /æ/.

- (77) /bælaebæk/ [bælaebæʔ] 'woven bamboo'
 /laemmæk/ [laemmæʔ] 'to hide'
 /bætæŋ/ [bætæŋ] 'stalk'

When two morphemes meet, the first having /a/ as its final syllable peak; the second having /æ/ as its first syllable peak, vowel assimilation occurs.

Rule 9 - Vowel Assimilation

$$\left[\begin{array}{c} \text{V} \\ +\text{low} \end{array} \right] \text{ --> } [-\text{back}] / \text{ ____ } (\text{C}) (\text{C}) \left[\begin{array}{c} \text{V} \\ +\text{low} \\ -\text{back} \end{array} \right]$$
word

This vowel assimilation occurs progressively, that is /a/ becomes [æ] whenever /a/ and /æ/ are in adjacent syllables with /æ/ to the right of /a/.

- (78) /ma-kalimpunaŋ-æk/ --> [makalumpúnæŋŋæʔ] 'I am dizzy'
 /ma-kætiŋ/ --> [mækætiŋ] 'itchy'

The reverse situation, where /æ/ is to the left of /a/, produces no such vowel assimilation.

- (79) /hæmpækæŋ-na/ --> [hæmpækænna] 'his rice-picker'
 /peŋ-kæhæŋ-aŋ/ --> [peŋkæhæŋŋaŋ] 'work'

Vowel assimilation can be applied once only to a word. The resultant syllable, once the rule has been applied, cannot then be the condition for a subsequent reapplication.

- (80) /la-uŋ-ala-æk/ --> [laŋŋálæ^æʔ] 'I will fetch'
 not *[laŋŋækæ^æʔ]

5.3 Syllable Structure Processes

We have looked at weakening processes and also at assimilation processes. We now turn to the group of processes effecting changes in syllable structure.

5.3.1 The first process, that of nasal insertion, occurs in two somewhat similar environments: before the possessive suffix with a) high vowel-final noun roots and b) certain /a/-final noun roots. The second of these is not predictable from a purely synchronic study so two rules are necessary to adequately present the full picture.

Rule 10 - Nasal Insertion:high vowels

$$\emptyset \rightarrow [+nasal] \quad / \quad \left[\begin{array}{c} V \\ +high \end{array} \right] \text{---} + \quad]$$

possessive suffix

According to this rule, the high vowels /i/ and /u/ must be followed by a nasal [N] when morpheme-final before a possessive suffix. This rule must precede Nasal Assimilation, in order that the inserted nasal can assimilate to the point of articulation of the ensuing consonant.

- | | | | |
|------|--------------------|-----------|----------------|
| (81) | underlying form | /lopi-ku/ | /hapu-mu/ |
| | Nasal Insertion | lopiN-ku | hapuN-mu |
| | Nasal Assimilation | lopiŋ-ku | hapum-mu |
| | High Vowel Laxing | - | hapum-mu |
| | Stress Placement | lopiŋ-ku | hapúm-mu |
| | surface form | [lopiŋku] | [hapúmму] |
| | | 'my boat' | 'your kitchen' |

Nasal insertion also occurs with some noun roots ending in /a/. According to Sirk (1988) a number of South Sulawesi languages have both a possessive suffix⁴ set without the nasal and one with. Though they are used differently in certain languages, particularly Makassarese, the general trend (Toraja Sa'dan, Mamasa, Duri, Mandar and various Bugis dialects) is for the nasal-included set to follow nouns ending in high vowels or /a/; and for the nasal-discluded set to follow nouns

5.3.3 The prefix /uŋ-/ is the form used to mark both actor focus and second person ergative. Besides undergoing ŋ-Gemination, /uŋ-/ is subject to two other syllable structure changing processes. The first of these optionally occurs.

Rule 13 - uŋ-Labialisation & Metathesis

$$\begin{array}{c}
 + \text{ u } \left[\begin{array}{c} +\text{nasal} \\ -\text{anterior} \\ -\text{coronal} \end{array} \right] \quad (C) \text{ V } \rightarrow \begin{array}{c} [+ \text{anterior}] \\ 2 \end{array} \quad \begin{array}{ccc} 1 & 3 & 4 \end{array} \\
 \begin{array}{ccc} 1 & 2 & \end{array} \quad \begin{array}{cc} 3 & 4 \end{array} \\
 \text{prefix}
 \end{array}$$

This rule describes two simultaneous processes. The nasal /ŋ/ is labialised to become [m], while at the same time this nasal metathesises with the preceding vowel /u/. The form [mu-] is the result. However, Rule 13 is optionally applied. Some speakers will use both forms with the same verb root in succeeding clauses.

In general, the basic form uŋ- is the one of preference. mu- is arguably a simpler underlying form to work from. Section 5.4.1 discusses an alternative analysis based on this.

(84)	/uŋ-kalehai/	-->	[mukaleháí]	~	[uŋkalehai]	'remember'
	/uŋ-hasuŋ/	-->	[muhásuŋ]	~	[uŋhásuŋ]	'poison'
	/uŋ-insaŋ/	-->	[muínsaŋ]	~	[uŋɣínsaŋ]	'to know'
	/uŋ-ala/	-->	[muála]	~	[uŋɣála]	'to fetch'
	/uŋ-tipu/	-->	[mutípu]	~	[uŋtípu]	'to cheat'

5.3.4 There is a very small closed class of vowel-initial verb roots consisting of the verbs 'to eat', 'to drink' and 'to sit'.⁵ Rule 14 is applied to members of this class in order to delete /u/ from the prefix mu-. Rule 13 feeds Rule 14 and needs to come first in rule ordering.

Rule 14 - u-Deletion

$$\begin{array}{c}
 - \quad \begin{array}{cc} m & u \\ 1 & 2 \end{array} \quad \left. \vphantom{\begin{array}{cc} m & u \\ 1 & 2 \end{array}} \right] \quad \begin{array}{c} v \\ 3 \end{array} \rightarrow \begin{array}{ccc} 1 & \emptyset & 3 \end{array} \\
 \text{prefix}
 \end{array}$$

(85)	underlying form	/uŋ-ande/	/uŋ-enuk/
	uŋ-Labialsn.& Metathesis	mu-ande	mu-enuk
	u-Deletion	m-ande	m-enuk
	Stress Placement	m-ánde	m-énuk
	surface form	[mánde]	[ménu?]
		'eat'	'drink'

Remembering that Rule 13 is optionally applied, should the speaker not apply it with any member of this closed class of verbs, then Rule 14 would also not apply. In this case the following forms would be generated.

(86)	underlying form	/uŋ-ande/	/uŋ-enuk/
	uŋ-Labialsn. & Metathesis	not applied	not applied
	Nasal Gemination	uŋ-ŋ-ande	uŋ-ŋ-enuk
	Stress Placement	uŋ-ŋ-ánde	uŋ-ŋ-énuK
	surface form	[uŋŋánde]	[uŋŋénu?]
		'eat'	'drink'

A minor rule such as this requires that the members of the class to which it applies be so marked in the lexicon.

5.3.5 A-T does not allow geminate vowels to exist in any surface representation. But since there are a number of geminate vowels in underlying form, there is a process to deal with these.

Rule 15 - Glottal Epenthesis

$$\begin{array}{ccccccc}
 & & \text{V} & & \text{V} & & \\
 \text{C (V)} & \left[\begin{array}{c} \alpha \text{ high} \\ \beta \text{ low} \\ \gamma \text{ back} \end{array} \right] & & \left[\begin{array}{c} \alpha \text{ high} \\ \beta \text{ low} \\ \gamma \text{ back} \end{array} \right] & \rightarrow & 1 & 2 & 3 & ^ & 4 \\
 1 & 2 & & 3 & & 4 & & & &
 \end{array}$$

Whenever two identical vowels are juxtaposed within a word a weak glottal is inserted between them to break the gemination. This occurs both within the morpheme and where identical vowels meet intermorphemically.

(87)	/bææk/	-->	[bæ^æ?]	'head'
	/koo/	-->	[kó^o]	'I'
	/ma- aka/ STV what	-->	[ma^áka]	'to be something'
	/di- paha -i -iŋ/ PASS shelf LOC BEN	-->	[dipahái^iŋ]	'made into shelves'

5.3.6 The need for Glottal Epenthesis further arises with the implementation of another process, vowel repetition. A-T has several deictics which can be made emphatic by employing an 'echo vowel'.

Rule 16 - Vowel Repetition

$$\begin{array}{ccc}
 \text{C} & \text{V} & \\
 1 & 2 & \left. \begin{array}{c} \# \\ 3 \end{array} \right\} \rightarrow 1 \ 2 \ 2 \ 3 \\
 & & \text{emphatic deictic}
 \end{array}$$

The above rule generates an identical vowel to 'echo' the root-final vowel of the deictic. This gemination must be broken up by Glottal Epenthesis, therefore rule ordering needs to place Vowel Repetition before Glottal Epenthesis.

(88)	underlying form	/diato/	/inde/
	Vowel Repetition	diatoo	indee
	Glottal Epenthesis	diat ^o	inde ^e
	Stress Placement	diat ^ó	inde ^é
	surface form	[diat ^ó o]	[inde ^é e]
		'the'(EMPH)	'this'(EMPH)

5.3.7 The aspectual enclitics /-mi/ (completive) and /-kek/ (incompletive) undergo certain reduction processes when contiguous to vowels. A minimum of three rules is required to deal with these reduction processes. It is perhaps simpler to handle the two clitics separately as follows than to describe rules that simultaneously affect them both. For an alternative handling of these reduction processes see section 5.4.2.

In two similar environments the completive aspect enclitic /-mi/ undergoes vowel deletion.

Rule 17 - Vowel Deletion: CMP-mi

$$mi \rightarrow m / \left(\begin{array}{c} (V + \text{---}) \\ \text{---} \end{array} \right) + v$$

completive aspect
enclitic

Rule 17 states that whenever the completive aspect enclitic /-mi/ is found contiguous to a vowel within a word the /i/ is deleted.

- (89) a) /ma- toho -mi haŋkak -na/ --> *matóhom háŋka?na
STV strong CMP finger 3POS 'his finger is already strong'
- b) /lekbak -mi -æk/ --> [lé?ba?mæ?] 'I left'
leave CMP 1sA

(89a) is marked * because as it stands it is not an acceptable surface form in A-T. A subsequent rule is necessary to bring this about.

Rule 18 Nasal Velarisation

$$[+nasal] \rightarrow [-anterior] / \text{---} \#$$

Nasal velarisation causes any nasal found in word final position to become the velar nasal [ŋ]. The relevant processes for (89a) are as follows:

underlying form	/ma-toho-mi/
Vowel Deletion: CMP-mi	ma-toho-m
Nasal Velarisation	ma-toho-ŋ
Mid Vowel Laxing	ma-tohɔ-ŋ
Stress Placement	ma-tóhɔ-ŋ
surface form	[matóhɔŋ] 'already strong'

5.3.8 A-T allows stative verbs to undergo a syllable structure changing process with a resultant meaning of 'intensified state'. There are three variant rules to express this process.

Rule 20 Stative Intensification:h

$$\begin{array}{c} \text{V (h)} \\ 1 \quad 2 \end{array} \left[\begin{array}{c} \text{C} \\ -\text{sonorant} \end{array} \right] \begin{array}{c} \text{V (C) \#} \\ 4 \quad 5 \end{array} \rightarrow 1 \text{ h } 3 \text{ 4 ? \#}$$

When a stative verb has an obstruent as the onset of its ultimate syllable and is preceded by a vowel or h, it may be intensified according to Rule 20.

(91)	[manípiʔ]	'thin'	-->	[maníhpiʔ]	'extremely thin'
	[mařótaʔ]	'nice'	-->	[mařóhtaʔ]	'extremely nice'
	[mamáta]	'unripe'	-->	[mamáhtaʔ]	'extremely unripe'
	[maléke]	'pretty'	-->	[maléhkeʔ]	'extremely pretty'
	[másiŋ]	'salty'	-->	[máhsiʔ]	'extremely salty'
	[manæhæŋ]	'clever'	-->	[manæhhæʔ]	'extremely clever'

This and the following two rules need to be ordered before Mid Vowel Laxing as they each cause syllables to be closed with non anterior consonants.

Rule 21 Stative Intensification:ʔ

$$\begin{array}{c} \text{V} \\ 1 \end{array} \left(\begin{array}{c} \text{(C)} \\ [+ \text{sonorant}] \end{array} \right) \begin{array}{c} \text{C} \\ 2 \end{array} \left(\begin{array}{c} \text{C} \\ [+ \text{sonorant}] \end{array} \right) \begin{array}{c} \text{V (C)} \\ 4 \quad 5 \end{array} \rightarrow 1 \text{ ? } 3 \text{ 4 ?}$$

Rule 21 applies to statives with either a sonorant as the onset of the ultimate syllable and/or a sonorant as the coda of the penultimate syllable.

(92)	[manóno]	'hungry'	-->	[manóʔnoʔ]	'starving'
	[masíli]	'shy'	-->	[masíʔliʔ]	'extremely shy'
	[mabáŋi]	'dry'	-->	[mabáʔŋiʔ]	'extremely dry'
	[makámbaŋ]	'thick'	-->	[makáʔbaʔ]	'extremely thick'
	[malóntiŋ]	'fat'	-->	[malóʔtiʔ]	'extremely fat'
	[kæyyæŋ]	'large'	-->	[kæʔyæʔ]	'huge'

The third stative intensification rule applies to statives without an onset to their ultimate syllable. As these are less frequent than CV(C)# in stative verbs this rule is less productive than the previous two.

Rule 22 Stative Intensification:ŋ

$$\text{V V} \rightarrow 1 \text{ ? } \eta \text{ 2 ?}$$

1 2

- (93) [makaháo] 'far' --> [makaháʔŋəʔ] 'far far away'
 [mahóa] 'laden' --> [mahóʔŋaʔ] 'overly laden'.

When the relevant intensification rule has been applied to a stative verb a new stress rule can be optionally applied also.

Rule 23 Stative Intensification Stress Placement

$$V \rightarrow [+stress] / (C) \underset{[+stress]}{V} (C) (C) \text{---} (C) \Big] \#$$
intensified stative

According to this rule any intensified stative verb may receive equal stress on the final two syllables.

- (94) [maléke] --> [maléhkéʔ] ~ [maléhkeʔ] 'extremely pretty'
 [masíli] --> [masíʔlíʔ] ~ [masíʔliʔ] 'extremely shy'
 [mahóa] --> [mahóʔŋáʔ] ~ [mahóʔŋaʔ] 'overly laden'

5.4 Alternative Analyses

5.4.1 The prefix uŋ-/mu-

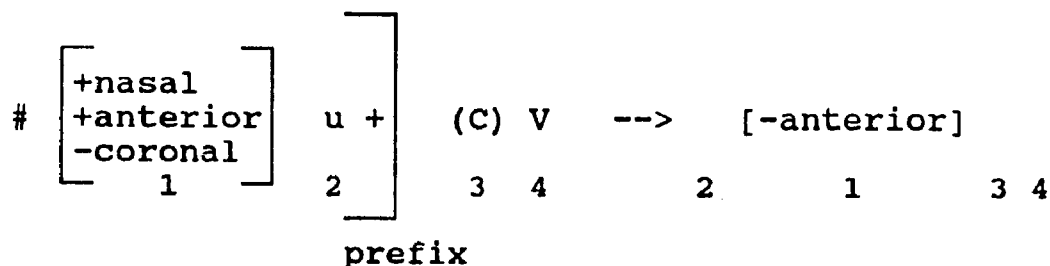
A-T most commonly uses the form [uŋ-] to mark actor focus on the verb. It is also the form most commonly used for the second person ergative prefix. However for either of these functions, the form [mu-] may be substituted. The underlying form for these verbal prefixes is debatable.

Neighbouring PUS also has two forms to mark actor focus: [um-] before consonant initial roots and [mu-] before vowel initial roots (Campbell, this volume:27). The [mu-] form is also used optionally before consonant initial roots. In his phonological analysis Campbell uses [um-] as the basic form for actor focus, possibly to avoid confusion with the 2sE prefix [mu-].

The formal distinction maintained in PUS between actor focus prefix and 2sE prefix cannot readily be made in A-T. Either form is used for either purpose. It is likely that the original underlying form for 2sE was [mu-] since the (ergative marking) pronominal prefix set is essentially the same as the possessive suffix set which has the form [-mu] to mark 2sPOS. This does not necessarily mean of course that the actor focus morpheme should have the same UF as the 2sE/POS morpheme, nor should it necessarily have a different one. It may be that 2sE/POS had mu- as its original UF while actor focus was originally signalled by uŋ-. The present use of either for both showing that the system is undergoing change.

From the perspective of natural phonology it is possibly a little simpler to posit [mu-] as the underlying form for either. The nasal velarisation part of the rule is an independently motivated process in A-T, whereas nasal labialisation is ad hoc in this case.

Rule 13A mu-Velarisation and Metathesis⁶



According to this rule, whenever the form mu- is prefixed to a word, metathesis occurs (um-) concurrent with a change in the place of articulation of the nasal such that it becomes [ŋ]. An accompanying note is needed to indicate that this rule applies optionally.

- (95) a) /mu-kalehai/ → [uŋkaleháɪ] ~ [mukaleháɪ] 'remember'
 b) /mu-insaŋ/ → [uŋŋínsaŋ] ~ [muínsaŋ] 'know'
 c) /mu-híŋi/ → [uŋhíŋi] ~ [muhíŋi] 'hear'
 d) /mu-típu/ → [utípu] ~ [mutípu] 'cheat'

Example b) shows that this rule would need to be ordered before ŋ-Gemination. Example d) shows the need to order this rule before both nasal assimilation and high vowel laxing.

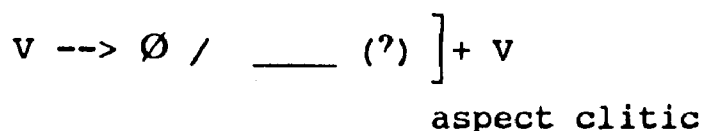
Assuming mu- as the UF, Rule 14 which reduced mu- to m- with a small closed class of verbs could be applied directly, with no ordering restrictions.

Though it would appear a little simpler to have mu- as the UF for the actor focus and 2sE morphemes than uŋ-, the latter requires the same number of rules and less ordering restrictions. It remains then that either is a plausible UF to work from. Until there are firm reasons to change we will persist in using uŋ- as the UF for both 2sE and actor focus, which is the more commonly used surface form.

5.4.2 The aspectual enclitics

Changes relating to the aspectual enclitic /-mi/ (completive) and to /-kek/ (incompletive) in section 5.3 (Rules 17-19) were handled separately. Here an attempt is made to combine the processes into more general rules. The first of these deals with the placement of vowel initial enclitics after either /-mi/ or /-kek/. For /-mi/ the process is a simple one step vowel deletion.

Rule 17A - Vowel Deletion



According to this rule the completive aspect clitic /-mi/ reduces to [-m] and the incompletive aspect clitic /-kek/ reduces to [-kʔ] before a vowel within a word. The completive clitic requires no further changes.

(96) /lekbaʔ -mi -aŋ/ --> [léʔbaʔmaŋ] 'we left'
 leave CMP 1xA

/ke- hæhtæŋ -mi -æk/ --> [kəhæhtæmmæʔ]
 POS pregnant CMP 1sA 'I was pregnant'

When completive /-mi/ neither precedes nor follows a vowel, no such deletion occurs.

(97) /lekbaʔ -mi sola -mu/ --> [léʔbaʔmi solámu]
 leave CMP friend 2sPOS 'your friend has gone'

/la- ku- pa- tahhik -mi -tek/ --> [lakupatáhhiʔmitəʔ]
 FUT 1sE CAUS continue CMP Dprx 'I must keep going'

The incomplete enclitic /-kek/ requires a further rule to reduce it to the form /-k/.

Rule 19A - Glottal Deletion

ʔ --> Ø / c ____

Glottal stop only occurs syllable finally and so must be deleted whenever immediately following another consonant within a word. The rule, Glottal Deletion, is fed by Vowel Deletion and needs to be ordered after both Vowel Deletion and k-Weakening.

(98)	underlying form	/sule-kek-aŋ/	/bea-kek-æk/
	k-Weakening	sule-keʔ-aŋ	bea-keʔ-æʔ
	Vowel Deletion	sule-kʔ-aŋ	bea-kʔ-æʔ
	Glottal Deletion	sule-k-aŋ	bea-k-æʔ
	Stress Placement	súle-k-aŋ	béa-k-æʔ
	surface form	[súlekaŋ]	[béakæʔ]
		'we are coming'	'give me'

Rule 19 deleted both the vowel and the glottal stop of incomplete -keʔ in a single step. Rule 19A only deletes the glottal as the vowel has already been deleted under the more general vowel deletion rule 17A.

There is another situation in which completive /-mi/ is reduced in form. Following a vowel final root the i of /-mi/ is deleted.

Rule 17B - i-Deletion

i --> Ø / V +m ____ +

(99)	/boho-mi-æk/	-->	[bóhomæʔ]	'I am full'
	/boho-mi tau/	-->	boho-m tau	'we are full'

If this reduced form is followed by a subsequent enclitic, no further rules are necessary; the surface form is duly generated. However, if the completive clitic marks the end of the word, the reduced form cannot stand without further modification.

Rule 18 - Nasal Velarisation

[+nasal] --> [-anterior] /___#

Nasal Velarisation has to follow i-Deletion but must precede Nasal Assimilation which can occur across word boundaries.

(100)	underlying form	/boho-mi tau/	/boho-mi-æk/
	i-Deletion	boho-m tau	boho-m-æk
	Nasal Velarisation	boho-ŋ tau	-
	Nasal Assimilation	boho-n tau	-
	Stress Placement	bóho-n táu	bóho-m-æk
	surface form	[bóhɔn táu] 'we are full'	[bóhomæʔ] 'I am full'

The above analysis generates the various surface forms of the aspectual enclitics, but requires four rules to do so. The earlier analysis, requiring only three rules is therefore the more economic.

5.5 Rule Ordering

As we have looked at the various rules which generate surface forms from their underlying layers, it has become apparent that many of them need to be ordered to bring about the correct surface manifestation. For several no such ordering is necessary; they work independantly to effect a change unrelated to other changes. The following table represents rules from sections 5.1-3 and also the two stress placement rules, showing those that must be ordered (with the sequential notation a-b-c). The remainder are listed arbitrarily. Table 14 represents the rules from section 5.4 and any other rules from earlier sections that need to be ordered with them under alternate analyses.

Table 13 - Rule Order

17	Vowel Deletion	a	a						a
18	Nasal Velarisation	b							
19	Elision:NCMP-kek		b						
16	Vowel Repetition			a					
15	Glottal Epenthesis			b					
13	uŋ-Labialisation & Metathesis				a				
14	u-Deletion				b				
20	Stative Intensification:h	a				a			
21	Stative Intensification:ʔ		a				a		
22	Stative Intensification:ŋ			a				a	
23	Stv. Intens. Stress Placement	b	b	b					
12	ŋ-Gemination	a							
5	Mid Vowel Laxing	b				b	b	b	b
11	Nasal Insertion:a					a			
10	Nasal Insertion:high vowels						a	a	
9	Vowel Assimilation								
7	Nasal Assimilation					a	b	b	
8	Nasal Continuatisation					b			
6	High Vowel Laxing							b	
4	d-Continuatisation								
3	k-Weakening								
2	Distal Voc. Stress Placemt.	a							
1	Stress Placement	b							

Table 14 - Rule Order (Alternative Analysis)

17B	i-Deletion	a
18	Nasal Velarisation	b
13A	mu-Velarisation and Metathesis	c
7	Nasal Assimilation	a
12	η-Gemination	b
6	High Vowel Laxing	a
3	k-Weakening	b
17A	Vowel Deletion	a
19A	Glottal Deletion	b

6 FREE VARIATION

Speakers of A-T distinguish the speech of Aralle and that of Tabulahan as being significantly different from each other to be separate, while remaining similar enough to be considered dialects. Within these dialectal areas, slight differences are reported between villages' usage. From my observation these differences are more commonly speaker specific than village specific. Intervillage communication and relocation between villages due to marriage for example are sufficiently strong and frequent to minimise these as areal differences, while they remain in speakers' idiolects.

We have already seen that /d/ is manifest as the phone [ɾ] intervocalically. In the main this is true, but in each of the Tabulahan dialect-speaking villages there are individual speakers who will invariably use [d] even intervocalically. This then is a speaker-specific variation.

(101)	/ma-duŋku/	[maɾuŋku]	~	[maduŋku]	'close'
	/adahaŋ/	[aɾáhaŋ]	~	[adáhaŋ]	'horse'
	/pedoka/	[peɾóka]	~	[pedóka]	'gift'

The low vowels /æ/ and /a/ have been shown to contrast meaning (2.3.2). Sometimes however there will be free variation between these sounds. This is again speaker-specific variation.

(102)	[kæyyæŋ]	~	[káyyaŋ]	'large'
	[tæhhiʔ]	~	[táhhiʔ]	'straight on'

There exist then variations between speakers. Aside from these there are sometimes variations in the speech of an individual.

Such a free variation exists between stops and nasals in word-initial position occurring in several words where the second consonant of the word is /n/.

(103)	[pónna]	~	[mónna]	'if'	
	[póni]	~	[móni]	'sound'	
	[dínne]	~	[nínne]	'here'	(general)
	[dóne]	~	[nóne]	'here'	(adjacent)
	[dóno]	~	[nóno]	'there'	(opposite)

The same individual may use either of these forms at any time.

The same speaker may fluctuate in usage between the *un* prefix and its metathesised counterpart *mu-*. He is far more likely to use *un-* at any given time however. (See (84), (95))

7 FEATURES OF FAST SPEECH

It is considered refined among speakers of this language to speak slowly. People from Aralle as well as Tabulahan have related that Tabulahan is the preferred dialect inasmuch as it is generally spoken slowly and carefully. Nevertheless there are times when any speaker delivers a faster than usual string of speech. When this occurs, there may well be features not found in slower, more controlled utterances.

It has already been noted in 3.1, that certain vowel sequences, notably those beginning with /a/ can in skew the expected stress pattern, and particularly so in rapid speech.

Fast speech can often cause elision of segments. The consonant /d/ in fast utterances is frequently left off the morphemes *di* (general preposition) and *di-* (passive).

(106)	/la- di- aka/	-->	[laiáka]	'What will it be?'
	FUT PASS what			
	/di hípe/	-->	[ihípe]	'across (the valley)'
	/di- pa- tama di loko/	-->	[ipatámai lóko]	'put in the barn'
	PASS CAUS enter GP barn			

Similarly the first segment in the morpheme *la-* (future) can be lost to rapid speech elision.

(107)	/la-l-um- ao- mi -an/	-->	[amáomaŋ]	'We are already going to leave.'
	FUT INT go CMP 1xÁ			

(107) also illustrates the frequent reduction of the intransitive infix *-um-*. The first two segments of the infixed verb are sometimes omitted leaving modified roots invariably beginning with /m/.

Nouns with an UF featuring geminate vowels and word final /k/ frequently lose the last vowel when suffixed with one of the possessives. This is especially so in fast speech.

- (108) /bææk-ku/ --> [bæʔku] 'my head'
 /biik-na/ --> [biʔna] 'its bottom'

8 ADAPTATION OF LOAN WORDS

Speakers of A-T, like speakers of all languages, have allowed new words to be accepted into general usage and to a greater or lesser degree to be adapted to suit A-T phonology. Some words having more recently entered the language than others may not be as fully adapted, given the same sequences of sounds.

I first became aware of sound adaptations being made in the language through hearing the difference in what people told me their names were from what they used in calling each other. Names originating outside the language area can be viewed as a kind of loan word and show patterns that are likely to emerge when new sounds are introduced to the language.

- (109)
- | | | | |
|-------|---------|---------|----------|
| Hardy | [háʔdi] | Simson | [sínson] |
| Herby | [éʔbi] | Johnson | [ónson] |
| Arnie | [áʔni] | Yordan | [yóʔdan] |
| Elias | [líáʔ] | Sofian | [sóʔyan] |
| Silas | [sílaʔ] | Arlene | [áʔliŋ] |

From the above examples, we can summarise frequent changes made in loan words:

- word-final nasals become [ŋ]
- word-final s (and likely other non-nasal consonants) becomes [ʔ]
- r in word-medial consonant clusters becomes [ʔ]
- assimilation of nasals to point of articulation of following consonants

Some of these observations are indeed features of loan word adaptation. d) is harder to test as combinations of heterorganic nasal plus other consonant are rare in Indonesian.

8.1 Replacement of Foreign Sounds

The Indonesian consonants /g/, /j/ and /c/ are not part of the phonology of the Tabulahan dialect of A-T. Usually loan words containing these are modified to /k/, /d/ and /t/ respectively.

- | | | | | |
|-------|-----------------------------|-----|-------------------------------------|---|
| 1. | g | --> | k | |
| (110) | tuan guru
minggu
gaji | | [tuankúhu]
[mínku]
[kařakáji] | 'teacher'
'week'
'saw' |
| 2. | j | --> | d | |
| (111) | puji
janji
gaji | | [púdi]
[dándi]
[kádi] | 'praise'
'to make agreement'
'salary' |
| 3. | c | --> | t | |
| (112) | celana
baca
cangkir | | [talána]
[báta]
[táŋki?] | 'trousers'
'to read'
'cup' |

Similarly the Indonesian vowel /ə/ has no equivalent in A-T and is adapted to /a/ in most cases and to /i/ between /s/ and /k/.

- | | | | | |
|-------|----------------------------|-----|------------------------------------|---------------------------------|
| 4. | e[ə] | --> | a | |
| (113) | celana
selamat
ketam | | [tálana]
[saláma?]
[káhtaŋ] | 'trousers'
'safe'
'plane' |
| 5. | e[ə] | --> | i | |
| (114) | sekolah
sekop
sekrup | | [sikóla]
[sikópaŋ]
[sikúru?] | 'school'
'spade'
'screw' |

[r], though it occurs in A-T, is not a phoneme. Often in loan words Indonesian /r/ becomes A-T /h/. More frequently though it is retained as [r].

- | | | | | |
|-------|-----------------------|-----|------------------------------------|-----------------------------|
| 6. | r | --> | h | |
| (115) | surat
tuan guru | | [súha?]
[tuankúhu] | 'letter, book'
'teacher' |
| 7. | r | --> | r | |
| (116) | kursi
gaji
umur | | [kuřúsi]
[kařakáji]
[umúřu?] | 'chair'
'saw'
'age' |

8.2 Treatment of Word Final Consonants

Word final consonants are dealt with in one of four ways:

1. Anterior nasals are replaced with /ŋ/.
2. Other word final consonants are generally replaced by /k/ which is weakened to [ʔ] in this position.
3. The final vowel may be repeated followed by glottal stop.
4. /aŋ/ may be added to the end of the word.

1.	N#	-->	ŋ#
(117)	ketam senin	[káhtaŋ] [séniŋ]	'plane' 'Monday'
2.	C#	-->	ʔ#
(118)	kasur pahat minyak	[kásuʔ] [pá^aʔ] [mínnaʔ]	'mattress' 'chisel' 'oil'
3.	VC#	-->	VCVʔ#
(119)	umur tanggal sandal	[umúruʔ] [taŋgálaʔ] [sandálaʔ]	'age' 'date' 'sandal'
4.	C#	-->	Caŋ#
(120)	sekop	[sikópaŋ]	'spade'

8.3 Breaking of Clusters

Illegal consonant clusters are handled by a vowel epenthesis process.

Loan Rule - Vowel Epenthesis

V C C --> 1 2 1 3

1 2 3

VCC --> VCVC

(121)	kursi surga gergaji sekrup	[kuřúsi] [suřúga] [kařakáji] [sikúruʔ]	'chair' 'heaven' 'saw' 'screw'
-------	-------------------------------------	---	---

The last example shows the epenthesis working from right to left. This is most likely because the Indonesian vowel /ə/ has no place in A-T phonology and presumably the breaking of a consonant cluster precedes replacement of illegal vowels.

8.4 Consonant Gemination

One final process warrants mentioning in connection with loan word adaptation. Sometimes in South Sulawesi languages a medial consonant is geminated in borrowed words. A-T has been shown to exhibit geminate sonorants, while voiceless obstruents pattern: hC. As expected the same pattern occurs with loan words in the event that such a process takes place.

	C	-->	hC / CC		(cf Toraja)
(122)	kapal		[kahpálaʔ]	'vessel'	(kappala)
	ketam		[káhtáŋ]	'plane'	(gattaŋ)
	Kamis		[kámmiʔ]	'Thursday'	

Despite all these adaptation processes, there remain borrowed words that have not been adapted and others only partially so, retaining features of the donor language. For example gergaji --> [kařakáji] 'saw', has retained [j], reflecting the time of borrowing, while gaji --> [kádi] 'salary' has been fully adapted to A-T phonological patterning.

9 ARALLE DIALECT - PRINCIPAL DIFFERENCES

In the short time we have been able to spend in the Aralle dialect area thus far⁷, certain patterns of phonological divergence from the dialect spoken in Tabulahan have emerged. Their treatment here will be cursory; the small amount of data available is sufficient for only some of the principal differences to be mentioned.

9.1 Segmentals

Aralle has the additional phonemes /g/ and /j/, occurring root-initially and medially.

(123)	A.		T.	
	/gangu/	[gáŋgu]	/aliali/	[aliáli]
	/lago/	[lágo]	/salalaŋ/	[salálaŋ]
				'to bother'
				'spouse of in-law'

At times /g/ corresponds with /k/ in Tabulahan, especially so in the case of loan words, which need not be adapted in this respect in Aralle.

(124)	A.		T.	
	/logo/	[lógo]	/lokok/	[lókoʔ]
	/mingu/	[mínɡu]	/mínku/	[mínku]
				'a game for children'
				'week'

Like /g/, the Aralle phoneme /j/ has a low functional load. It is only found word medially and corresponds to /y/ in Tabulahan in many cases.

(125)	A.		T.	
	/maŋ-baja/	[mambája]	/maŋ-baya/	[mambáya] 'to weed'
	/tuju/	[túju]	/tuyu/	[túyu] 'a reed'
	/kaju/	[káju]	/kayu/	[káyu] 'wood'

Another consonant correspondence, though not as consistent as either /g/-/k/ or /j/-/y/, is /b/-/h/. In certain cognate word pairs, /b/ in Aralle is equivalent to /h/ in Tabulahan.

(126)	A.		T.	
	/bala/	[bála]	/hala/	[hála] 'fence'
	/baa/	[bá^a]	/haa/	[há^a] 'top plate' (house)

We saw that intervocally Tabulahan /d/ becomes [ř], though not with 100% of the population. In Aralle, this does not occur. /d/ remains [d] in all positions, [ř] only occurring in a handful of loan words.

9.2 Suprasegmental Features

Stress patterning is the same in both Aralle and Tabulahan and for the main part so is intonation. My subjective impression, backed by reports from Aralle speakers, is that intonation contours in Aralle are somewhat flatter. That is, while mostly being the same shape as their Tabulahan counterparts, they do not reach such high peaks and low troughs.

The possibly uniquely Tabulahan content question intonation: falling a perfect fourth on the last stressed syllable and rising to the former level for remaining syllables, is not used in Aralle. Instead a rise on the final stressed syllable followed by a fall signifies a content question.

9.3 Distribution

As with other South Sulawesi languages, the Aralle dialect of A-T displays a propensity for forming geminate consonant clusters. Where in Tabulahan only sonorants are found in geminate clusters, stops and fricatives forming hC clusters, Aralle allows free formation of geminates with this latter grouping also.

(127)	A.		T.	
	/loppo/	[lóppo]	/lohpō/	[lóhpo] 'vegetation'
	/tappak/	[táppaʔ]	/tahpak/	[táhpāʔ] 'true'
	/bittik/	[bittiʔ]	/bihtik/	[bíhtiʔ] 'foot'
	/hessæk/	[héssæʔ]	/hehsæk/	[héhsæʔ] 'mud'
	/masussa/	[masússa]	/masuhsa/	[masúhsa] 'difficult'

Occasionally a geminate in Aralle will correspond to a nasal/stop cluster in Tabulahan.

(128)	A.		T.	
	/happakan/	[happákan]	/hæmpækæŋ/	[hæmpækæŋ] 'rice picker'

NOTES

¹There is a fourth condition which causes stress to be on both the penultimate and the ultimate syllables. (See section 5.3 Rule 23).

²As this stress conditioned lengthening is entirely predictable and so slight, it has not been marked apart from (43).

³I am interpreting the hh cluster as $h\left[\overset{C}{-son}\right]$ which fits the pattern for obstruents, rather than asgeminate h.

⁴Sirk terms these possessive 'enclitics', which behave like suffixes in regard to stress placement.

⁵There may be other members of this class not yet encountered.

⁶Several rules in this section have been numbered A or B (eg.13A) to indicate which rules in the previous section they are based on/most closely related to.

⁷Several days late March-early April 1990.

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PHONOLOGY OF NAPU

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0. INTRODUCTION

Napu is one of the Kaili-Pamona languages which are spoken in the western and central parts of Central Sulawesi, Indonesia. Richard Salzner classifies Napu as a member of the Austronesian Language Family, Southwest Indonesia Group, East Toraja Subgroup (Salzner, 1960). More recent publications refer to the Toraja Subgroup (West and East) as Kaili-Pamona, a term more acceptable to the local population (Masjhuddin, 1971).

This initial study is based a corpus of over 2300 Napu words. This data was gathered from May 1989 to November 1990 in the village of Wuasa, the capital of the North Lore District (Kecamatan Lore Utara) in the Poso Regency (Kabupaten Poso). There are about 5000 speakers of Napu, the majority of which live in ten villages in the Napu valley located in the central part of Central Sulawesi.

To the south of the Napu people are two closely related dialect groups - the Besoa people and the Bada people. These three groups are socially and geographically distinct. Each of these groups occupies a different valley. These three dialect groups, which are sometimes referred to as the Badaic languages, are separated lexico-statistically at about 85%. Although phonologically these three dialects are very similar, there are two differences worthy of mention. While both Besoa and Bada utilize the glottal stop and a sixth vowel (ɔ), Napu has neither (Martens, 1989).

1. SEGMENTAL PHONOLOGY

The segmental phonology of Napu is quite straightforward. In Napu, there are twenty-three consonant phonemes and five vowel phonemes. There are an equal number of phonetic values at the surface level which correspond to each of the twenty-eight phonemes.

1.1 Chart of Phonetic Values

The following chart gives the phonetic values of Napu as they appear to the researcher on early contact. (Abbreviations: vd. - voiced, vl. - voiceless)

	B		A	A		G
	i		l	l p		l
	l	D	v	v a		o
	a	e	e	e l	V	t
	b	n	o	o a	e	t
	i	t	l	- t	l	t
	a	a	a	a	a	a
CONSONANTS	l	l	r	l	r	l
	--	--	--	--	--	--
Stops						
vd.	b		d	j	g	
vl.	p	t			k	
Prenasalized Stops						
vd.	^m b		ⁿ d	ⁿ c	^ŋ g	
vl.	^m p	ⁿ t			^ŋ k	
Fricatives						
vd.	β					
vl.			s			h
Nasals	m	n			ŋ	
Lateral			l			
Flap			r			
Semivowel				y		
VOWELS	Front		Central			Back
High	i					u
Mid	e					o
Low			a			

1.2 Distinctive Feature Chart of Phonemes

The relevant distinctive features for each of the 28 phonemes of the Napu language are listed below. Three of these phonemes (/j/, /^hc/, and /y/) are considered to be marginal phonemes (see section 6).

CONSONANTS	b	p	d	t	g	k	^h b	^h p	^h d	^h t	^h g	^h k	β	s	h	j	^h c	m	n	ŋ	l	r	y
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sonorant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-
continuant	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	+	+	+	+	+
del rei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
nasal	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+	-	-	-
anterior	+	+	+	+	-	-	+	+	+	+	-	-	+	+	-	-	-	+	+	-	+	+	-
coronal	-	-	+	+	-	-	-	+	+	-	-	-	+	-	+	+	-	+	-	+	+	+	-
back	-	-	-	-	+	+	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-
voiced	+	-	+	-	+	-	+	-	+	-	+	-	+	-	-	+	-	+	+	+	+	+	+
lateral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-

VOWELS	i	e	a	o	u
syllabic	+	+	+	+	+
high	+	-	-	-	+
low	-	-	+	-	-
back	-	-	+	+	+

2. PHONEME FREQUENCY

From a database of 1,273 word bases ranging from one to five syllables, the frequency in percent is calculated below for each consonant phoneme in both word-initial and word-medial positions. A word base is a word devoid of all affixes. (Because of rounding, the totals do not add up exactly to be 100).

phoneme	initial	medial
b	10.6	3.6
p	10.7	4.1
d	4.0	4.5
t	14.4	6.3
g	2.6	1.9
k	11.7	7.2
^m b	0.5	4.4
^m p	0.7	2.3
ⁿ d	0.5	4.2
ⁿ t	0.9	1.9
^ŋ g	0.1	0.9
^ŋ k	0.8	3.6
β	6.3	5.0
s	5.3	3.5
h	9.9	5.7
j	0.4	0.3
ⁿ c	0.0	0.1
m	4.3	3.2
n	2.4	6.5
ŋ	0.9	4.3
l	7.8	14.7
r	5.0	10.9
y	0.1	1.0
	99.9	100.1

From the chart above, the following observation can be made:

1. Word initially, voiceless stops, /b/ and /h/ occur with high frequency.
2. Prenasalized stops and /ŋ/ do not frequently occur in word initial position
3. Medially, liquids occur with very high frequency.
4. Marginal phonemes /j/, /ⁿc/, and /y/ along with the voiced velar stop /^ŋg/ occur with very low frequency.

From the same data base of 1,273 word bases, the relative frequency of each vowel in percent is calculated below. Note that the vowel /a/ occurs with more than double the frequency of any other vowel.

vowel	relative frequency
i	17.5
e	12.3
a	39.6
o	14.6
u	15.9

	99.9

3. SYLLABLE PATTERNS

There are two types of syllables: V and CV. Since there are no closed syllables, there are no consonant clusters and no final consonants. Since no unambiguous CC sequences exist, prenasalized stops are interpreted as single segments.

Below is a chart showing the frequency of various syllable patterns within unaffixed words. Based on a sample of 1,273 word bases, the relative frequency of each syllable type is given.

Number of Syllables	Structure	Example	Gloss	Frequency
1	V	i	general prep.	0.2
	CV	ba	'or'	0.2
2	V.V	i.o	'yes'	0.5
	V.CV	a.he	'machete'	8.4
	CV.V	ba.u	'meat'	8.0
	CV.CV	ba.ba	'door'	45.3
3	V.V.CV	i.u. ^m ba	'where'	0.4
	V.CV.V	i.ne.e	'don't'	0.6
	V.CV.CV	a. ⁿ di.ŋo	'millipede'	2.2
	CV.V.V	b.o.e.a	'village'	0.2
	CV.V.CV	du.a.ŋa	'boat'	2.4
	CV.CV.V	ba.ho.i	'wash'	6.5
	CV.CV.CV	ba.be.hi	'make'	17.7

4	V.CV.V.CV	i.ma.i. ⁿ di	'yesterday'	0.3
	V.CV.CV.V	a.li.pa.a	'centipede'	0.4
	V.CV.CV.CV	a.li.me.ri	'bat'	0.2
	CV.V.CV.V	ka.u.pe.a	'end'	0.6
	CV.V.CV.CV	la.e.ra.wa	'scenery'	0.2
	CV.CV.V.V	ka.re.u.e	'crocodile'	0.1
	CV.CV.V.CV	ka.la.i.ha	'snare'	0.7
	CV.CV.CV.V	ba.ha.ŋki.a	'several'	2.1
5	CV.CV.CV.CV	ka.di.pu.ra	'arrange'	2.4
	CV.CV.V.CV.V	ka.tu.i.na.o	'remember'	0.2
	CV.CV.CV.V.V	ka.la.la.o.a	'increasingly'	0.1
	CV.CV.CV.V.CV	pa.ta.ni.a.ka	'alone'	0.2
	CV.CV.CV.CV.CV	pa.si.lo.lo.ŋa	'prepare'	0.2

				100.3

From the above data the following observations can be made:

1. The majority of all word bases are disyllabic (62.1%) and trisyllabic (30.0%). Four syllable word bases compromise just 7.0% of the word bases in the data base and words with one or five syllables make up for less than 1% of the total word bases.
2. CV syllables are much more common than V syllables.
3. V syllables most often occur in word final position.
4. The maximum sequence of vowels is three. The relative frequency of three vowel sequences is quite low (0.4%).

4. STRESS

Stress is not phonemic. It occurs on the penultimate syllable of the word, except when a post-clitic is attached. Below are some examples of post-clitics found in Napu:

- na '1st person singular, absolutive'
- ko '2nd person singular, absolutive'
- ŋkai '1st person plural (exclusive), absolutive'
- ke '1st person plural (inclusive), absolutive'
- kau '2nd person plural, absolutive'
- he '3rd person plural, absolutive'
- mi '3rd person singular, absolutive, completive aspect'
- mo 'completive aspect'
- to 'emphatic particle'

In the case of post-clitic suffixes, the stress remains on the penultimate syllable of the word root. For example:

mesúle	'to return home'
mesúle-mo-na	'I am going to return home now'
mái	'to come'
mái-ko	'come here'
melí ^m ba	'to move'
melí ^m ba-ŋkai	'we moved'
láo	'to go'
láo-he	'they went'
marími	'hungry'
marími-mi	'he is hungry (already)'

In the case of suffixes as opposed to clitics, the stress moves to the penultimate syllable of the entire word. For example:

ána	'child'
aná-mu	'your child'
sóu	'house'
soú- ⁿ ta	'our house'
mánu	'chicken'
manú-na	'his chicken'

Stress, in relation to post-clitics and suffixes, functions similarly in Uma, a related Kaili-Pamona language (Martens, 1988).

5. LENGTH

Length is not phonemic. What might be interpreted as vowel length is better analyzed as a sequence of two vowels of the same quality. This analysis accounts for the fact that stress falls on the penultimate syllable in the following examples:

bána	'cloth'
ham-báa jápi	'one head of cattle'
one-CLSF cow	
talú baá-na jápi	'three head of cattle'
three CLSF cow	
ma ^m péŋa	'to kiss'
ma ^m peŋáa	'many kinds'
húmpi	'mustache'
humpii	'pinched'

6. MARGINAL PHONEMES

6.1 /j/ and /ⁿc/

The phonemes /j/ and /ⁿc/ appear to be a result of more recent borrowings. This is evidenced by the fact that these two phonemes did not occur in the original Napu orthography as used by the Dutch in various publications. This instance of diachronic sound change (i.e. the addition of two new phonemes into Napu) could be attributed to the fact that all Napu children attend school taught in Indonesian, the national language. Indonesian contains the phoneme /j/ and the phonemic sequence /nc/. There are many words which have been borrowed from Indonesian into Napu. The marginal nature of these two phonemes is also evidenced by the fact that older Napu people have trouble saying words with these sounds and confirm that these two sounds are more recent introductions to Napu.

Listed below are nine instances of these two phonemes. Although this list is probably not exhaustive, the frequency in which these phonemes are found is very low. Over half appear to be borrowings from Indonesian.

Napu	Gloss	Indonesian (where borrowed)
/japi/	'cow'	sapi (borrowed via Kaili)
/jaa/	'hour'	jam
/mojagai/	'guard'	menjaga
/mopajeko/	'plow'	
/mouji/	'to take a test'	uji
/meja ⁿ guru/	'to hit'	
/li ⁿ cu/	'room'	
/more ⁿ cana/	'to plan'	rencana
/pa ⁿ ci/	'pan'	panci

6.2 /y/

The phoneme /y/ is also marginal in that it is rarely found in the word initial position. In word medial position, [y] frequently occurs, but this can be accounted for by positing /i/ as the underlying form which then becomes [y] intervocalically (see section 8.2).

Word initially iV and yV sequences are both found. Note the examples below:

[í.a]	'he, she'
[yá.lu]	'pounder for rice'
[i.ú. ^m ba]	'where'
[yú.li]	'July'

7. PHONOTACTICS

In this section the combinatory possibilities of consonants and vowels are analyzed. Uhlenbeck (1949), Adelaar (1983), and Van den Berg (1989) have already shown that such analysis can lead to insights into the word structure and patterning of phonemes in Austronesian languages.

In this section, consonant patterning is analyzed by examining possible consonant combinations between two consonants which are separated by one vowel. I restrict myself to word bases of which there are 1,273 in my data base. Marginal phonemes (/^mc/, /j/ and /y/) are not included since the infrequency of their occurrence makes it difficult to make any conclusions about their patterning with other consonants.

The following chart shows the possible consonant combinations. The following notations are used:

C1 : first consonant

C2 : second consonant

+ : consonant combination occurs more than once in the database

1 : consonant combination occurs only once in the database

- : consonant combination does not occur in the database

C2	b	p	d	t	g	k	^m b	^m p	ⁿ d	ⁿ t	ʊg	ʊk	β	s	h	m	n	ŋ	l	r	C2	
C1	b	+	-	+	+	+	+	-	+	+	+	+	-	+	+	-	+	+	+	+	b	
	p	-	+	+	+	+	-	1	+	-	1	+	1	+	+	+	+	+	+	+	p	
	d	-	+	+	+	-	+	1	1	+	-	-	+	-	1	+	-	+	+	+	d	
	t	+	+	+	+	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	t	
	g	-	-	-	-	+	-	+	+	1	1	+	-	+	+	1	+	-	-	+	g	
	k	+	+	+	+	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	k	
	^m b	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	^m b	
	^m p	-	-	+	1	-	-	-	1	-	-	-	-	1	1	-	+	1	-	+	^m p	
	ⁿ d	-	-	-	1	-	+	-	-	-	-	-	1	1	1	-	1	+	+	+	ⁿ d	
	ⁿ t	-	1	+	1	-	+	1	-	1	-	1	-	+	-	1	1	1	1	+	ⁿ t	
	ʊg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	ʊg	
	ʊk	-	-	+	-	-	1	-	-	-	-	-	-	-	+	1	+	-	+	+	ʊk	
	β	-	-	+	+	-	+	+	-	-	+	-	+	+	1	+	+	+	+	+	β	
	s	+	1	+	+	1	+	+	1	+	-	-	+	+	+	-	-	-	1	+	s	
	h	+	+	+	-	1	+	+	+	+	+	1	+	+	-	+	+	+	+	+	h	
	m	-	1	+	+	1	1	1	1	+	-	1	+	+	+	+	+	+	1	+	m	
	n	+	+	+	+	-	1	+	-	1	1	-	+	+	+	+	+	+	+	1	n	
	ŋ	-	1	-	-	-	+	-	-	1	-	1	1	-	1	-	-	+	1	+	ŋ	
	l	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	l	
	r	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	r	
C1		+	+	+	+	+	+	+	+	+	1	-	+	+	+	+	+	+	+	+	C1	
	C2	b	p	d	t	g	k	^m b	^m p	ⁿ d	ⁿ t	ʊg	ʊk	β	s	h	m	n	ŋ	l	r	C2

In analyzing this data, the main difficulty is in determining which gaps are accidental and which are systematic. Therefore in determining co-occurrence constraints, the following three considerations have been observed:

1. In analyzing the overall patterns of the data, if two phonemes co-occur in a certain order, they will generally be found to co-occur in the reverse order. Therefore gaps in which two phonemes occur in a certain order but do not occur in the reverse order are somewhat suspect.
2. Data on low-frequency phonemes such as /ŋ/ are not given as much weight in the formulation of constraints. In the case of prenasalized stops, data on higher frequency prenasalized stops is weighted more heavily in determining constraints on co-occurrence.
3. In addition to the preceding chart, morphophonemic data has been introduced in some instances when helpful to the overall analysis.

With these considerations in mind, and using a conservative approach, the following tentative phonotactic constraints can be formulated.

1. Contra-voiced homorganic stops (including prenasalized stops) do not co-occur. Contra-voiced homorganic stops refer to two stops (separated by a vowel) at the same point of articulation in which one stop is voiced and the other stop is unvoiced. Therefore the following pairs are systematic gaps.

p..b..	b..p..	^m p..b..	b.. ^m p..	p.. ^m b..	^m b..p..	^m p.. ^m b..	^m b.. ^m p..
k..g..	g..k..	^ŋ k...g..	g... ^ŋ k..	k.. ^ŋ g..	^ŋ g..k..	^ŋ k... ^ŋ g..	^ŋ g... ^ŋ k..

This constraint does not apply to /d/ and /t/ which are not homorganic (/d/ - alveolar, /t/ - dental).

2. Prenasalized stops do not occur before voiceless prenasalized stops. This constraint overlaps with the first constraint. The following pairs do not occur:

^m b.. ^m p..	^m p.. ^m p..	ⁿ d.. ^m p..	ⁿ t.. ^m p..	^ŋ g.. ^m p..	^ŋ k.. ^m p..
^m b... ⁿ d..	^m p... ⁿ d..	ⁿ d... ⁿ d..	ⁿ t... ⁿ d..	^ŋ g... ⁿ d..	^ŋ k... ⁿ d..
^m b... ⁿ k..	^m p... ⁿ k..	ⁿ d... ⁿ k..	ⁿ t... ^ŋ k..	^ŋ g... ^ŋ k..	^ŋ k... ^ŋ k..

We might have adopted an even broader constraint stating that prenasalized stops do not co-occur. However, we would be left with a number of exceptions such as:

ⁿ te ^m be	'short'
^m pa ⁿ de	'pineapple'
ⁿ ta ⁿ da	'sign'

To accept this broader constraint on prenasalized stops, we would also have to ignore morphophonemic data which indicates the acceptability of certain co-occurrences of prenasalized stops and the rejection of others at the word level. Below are several examples.

/di ^m ba + ŋku/	--->	[di ^m baku]	'my sheep'
sheep my			
/di ^m ba + ŋta/	--->	[di ^m bata]	'our(incl) sheep'
sheep our(incl)			
/di ^m ba + ⁿ da/	--->	[di ^m ba ⁿ da]	'their sheep'
sheep their			

In the first two examples, co-occurrence of prenasalized stops is prohibited based on phonotactic constraints whereas in the third example, two voiced prenasalized stops are permitted to co-occur. Please refer to section 8.3 for more examples and a description of the Prenasalized Stop Dissimilation Rule.

For these reasons, the first and more specific constraint on co-occurrence of prenasalized stops is preferred to the broader constraint. The more specific constraint not only accounts for the exceptions to the broader constraint but also accounts for word-level phenomena rather than just word bases.

3. /s/ and /h/ do not co-occur:

s..h.. h..s..

4. The velar nasal does not co-occur with voiced velar stops:

g..ŋ..	ŋ..g..
ŋ.. ^ŋ g..	^ŋ g..ŋ..

This constraint also accounts for the following morphophonemic data (see section 8.1):

/haŋ +	ogu/	-->	[ha.o.gu]	'one CLSR'	eg. haogu tulu
one	CLSR				'one egg'

Due to the infrequency of certain phonemes and the lack of data, many gaps in the chart are not accounted for by the constraints above. In the opinion of this author, the vast majority of these remaining gaps are accidental and do not reflect phonotactic constraints. Below are some likely examples of accidental gaps:

d..b.. g..d.. h..t.. ⁿd..d.. m..ⁿt.. ŋ..s..

Consonant-vowel combinations and vowel-vowel combinations are virtually unrestricted. With regard to consonant-vowel combinations, any consonant may precede any vowel with the exception of /y/. /y/ may not precede the vowel /i/ (see appendix 1C). In two vowel sequences, all vowels may occur with all other vowels (see appendix 1D).

8. PHONOLOGICAL PROCESSES

Given the simple syllable structure and the fact that there are no consonant clusters in Napu, it is not surprising that phonological processes are not a prominent feature of the language. In this section, three phonological processes are described -- nasal assimilation, vowel disyllabification, and prenasalized stop dissimilation.

8.1 Nasal Assimilation

Since the best example of nasal assimilation is found in lower numerals that are prefixed to classifiers, a brief introduction to the Napu numbering system is necessary. Napu utilizes a system of classifiers in which the numbers 'one' and 'two' are handled differently from other numbers as can be seen in the following examples:

[ha ^m báa jápi]	'one head of cattle'
[ro ^m baa jápi]	'two head of cattle'
[tálu baána jápi]	'three head of cattle'
[íba baána jápi]	'four head of cattle'
[líma baána jápi]	'five head of cattle'
[ha ⁿ tépo káu]	'one piece of wood'
[ro ⁿ tépo káu]	'two pieces of wood'
[tálu tepóna káu]	'three pieces of wood'
[íba tepóna káu]	'four pieces of wood'
[líma tepóna káu]	'five pieces of wood'
[ha ^m búla]	'one month'
[ro ^m búla]	'two months'
[tálu βulána]	'three months'
[íba βulána]	'four months'
[líma βulána]	'five months'
[hasábu]	'one thousand'
[rosábu]	'two thousand'
[tálu sabúna]	'three thousand'
[íba sabúna]	'four thousand'
[líma sabúna]	'five thousand'
[haŋálo]	'one day'
[roŋálo]	'two days'
[tálu alóna]	'three days'
[íba alóna]	'four days'
[líma alóna]	'five days'

These examples give an idea of both the regularity and the complexities of the Napu counting system. When counting objects in Napu, the prefix /haŋ-/ is used for 'one' and the prefix /roŋ-/ is used for 'two'. These prefixes are attached to the classifier word. The prefix /haŋ-/ has been selected as the underlying form over other possibilities such as /ham-/, /han-/, and /ha-/ because [haŋ-] is the surface form before classifiers which begin with a vowel. The same rationale is used in the selection of /roŋ-/ as the underlying form. Although these two morphemes /haŋ-/

and /roŋ-/ violate the syllable structure at an underlying level, they do not violate the syllable structure at the surface level after the following three phonemic rules are applied:

(1) Stop Nasal Assimilation

1	2	1	2
C	C		
[+nasal]	$\left\{ \begin{array}{l} + \text{consonantal} \\ - \text{continuant} \\ - \text{delayed release} \end{array} \right\}$	---> Ø	[+nasal]
N	b,p,d,t,g,k	--->	^m b, ^m p, ⁿ d, ⁿ t, ^ŋ g, ^ŋ k

(2) Fricative Nasal Assimilation

1	2	1	2
C	C		
[+nasal]	$\left\{ \begin{array}{l} - \text{sonorant} \\ + \text{consonantal} \\ + \text{continuant} \\ + \text{anterior} \\ - \text{coronal} \end{array} \right\}$	---> Ø	$\left\{ \begin{array}{l} - \text{continuant} \\ + \text{nasal} \end{array} \right\}$
N	β	--->	^m b

(3) Consonant Deletion

C	->	Ø	/	__	C
---	----	---	---	----	---

In rules (1) and (2), the processes of nasal assimilation and deletion of the preceding nasal occur simultaneously. In this way intermediate forms which violate both syllable structure and principles of assimilation are avoided. Rules one and two are unordered in respect to each other but must be applied before rule number three.

When a prefix ending in a nasal is added to a root form, four possibilities emerge. First, on root forms which begin with stops, the stop becomes prenasalized and the preceding nasal is dropped. Second, on root forms which begin with the voiced bilabial fricative /β/, the bilabial fricative becomes the voiced prenasalized bilabial stop /^mb/ and the preceding nasal is dropped. Third, on root forms which begin with nasals, liquids, /s/ or /h/, the preceding nasal is deleted. Fourth, on root forms which begin with a vowel, no rules apply and therefore the underlying form is the same as the surface form. Below are examples of how these phonological rules apply in each of the four cases.

Rule -----	/haŋ + bela/	/haŋ + βula/	/haŋ + sabu/	/haŋ + alo/
1. SNA	ha ^m bela			
2. FNA		ha ^m bula		
3. CD			hasabu	
	[ha ^m béla]	[ha ^m búla]	[hasábu]	[haŋálo]

From twenty-five classifier words which take these two suffixes, three exceptions were found. They are listed below:

[hadúa tobalílo]	'one boy'
[rodúa tobalílo]	'two boys'
[hakílo]	'one kilometer'
[rokílo]	'two kilometers'
[haógu gogóa]	'an ear of corn'
[roógu gogóa]	'two ears of corn'

The second exception is probably due to the fact that kilo is a recent loan from Indonesian. The third exception is due to phonotactic constraints (see section 7).

8.2 Vowel Desyllabification

Although three vowel sequences are possible they are rare and in some instances avoided by the application of the following rule.

(4) Vowel Desyllabification

$\left\{ \begin{array}{l} + \text{syllabic} \\ + \text{high} \\ - \text{low} \\ - \text{back} \end{array} \right\}$	--->	$[- \text{syllabic}] \quad / \quad V_V$
i		y

This rule is unordered with respect to the nasal assimilation rules but must precede the stress placement rule. Below are some examples of its application (NOM - nominalizer, IMP - imperative):

/bahoi + a/	---	[bahóya]	'laundry'
to wash NOM			
/li ⁿ cu peN - doi - a/	---	[lí ⁿ cu pe ⁿ dóya]	'bathroom'
room NOM bathe NOM			
/ta ^m bai + a/	---	[ta ^m báya]	'add more to'
add to IMP			

8.3 Prenasalized Stop Dissimilation

In keeping with phonotactic constraints (see section 7), certain combinations of prenasalized stops are not permitted in Napu. As seen in the rule below, voiceless prenasalized stops lose their prenasalization when preceded by a prenasalized stop.

(5) Prenasalized Stop Dissimilation

$$\left\{ \begin{array}{l} + \text{ consonantal} \\ - \text{ continuant} \\ - \text{ del rel} \\ + \text{ nasal} \\ - \text{ voice} \end{array} \right\} \text{--->} [- \text{ nasal}] \quad / \quad \left\{ \begin{array}{l} + \text{ consonantal} \\ - \text{ continuant} \\ - \text{ del rel} \\ + \text{ nasal} \end{array} \right\} \text{ V } \text{---}$$

$^m p, ^n t, ^\eta k$ p, t, k $^m p, ^m b, ^n t, ^n d, ^\eta k, ^\eta g$

Below are some examples of prenasalized stop dissimilation.

/di ^m ba sheep	+	^{\eta} ku/ my	--->	[di ^m báku]	'my sheep'
/di ^m ba sheep	+	ⁿ ta/ our(incl)	--->	[di ^m báta]	'our(incl) sheep'
/ha ^m pi clothes	+	^{\eta} ku/ my	--->	[ha ^m píku]	'my clothes'
/ha ^m pi clothes	+	ⁿ ta/ our(incl)	--->	[ha ^m píta]	'our(incl) clothing'
/paa ⁿ de food	+	^{\eta} ku/ my	--->	[paa ⁿ déku]	'my food'
/paa ⁿ de food	+	ⁿ ta/ our(incl)	--->	[paa ⁿ deta]	'our(incl) food'
/peɲa ⁿ ti parent-in-law	+	^{\eta} ku/ my	--->	[peɲa ⁿ tíku]	'my parent-in-law'
/peɲa ⁿ ti parent-in-law	+	ta/ our(incl)	--->	[peɲa ⁿ títa]	'our (incl) 'parent-in-law'
/pela ^{\eta} ka running	+	^{\eta} ku/ my	--->	[pela ^{\eta} káku]	'my running'
/pela ^{\eta} ka running	+	ⁿ ta/ our(incl)	--->	[pela ^{\eta} káta]	'our (incl) running'

Note that when the third person plural possessive suffix /-ⁿda/ is used, the prenasalized stop dissimilation rule does not apply because the prenasalized stop in this suffix is voiced.

/di ^m ba sheep	+	ⁿ da/ their	--->	[di ^m bá ⁿ da]	'their sheep'
/ha ^m pi clothes	+	ⁿ da/ their	--->	[ha ^m pí ⁿ da]	'their clothing'
/paa ⁿ de food	+	ⁿ da/ their	--->	[paa ⁿ dé ⁿ da]	'their food'
/peŋa ⁿ ti parent-in-law	+	ⁿ da/ their	--->	[peŋantí ⁿ da]	'their parent-in-law'
/pela ⁿ ka running	+	ⁿ da/ their	--->	[pela ⁿ ká ⁿ da]	'their running'

8.4 Order of Rules

This is a summary chart of how each rule is ordered with respect to the other rules. Only those sets connected by a down arrow are in fact ordered with respect to each other. The prenasalized stop dissimilation rule is not ordered with respect to any other rule.

1. Stop Nasalization Assimilation	X	
2. Fricative Nasalization Assimilation	↓	X
3. Consonant Deletion	X	X
4. Vowel Desyllabification	X	
5. Stress Placement	X	
6. Prenasalized Stop Dissimilation		

9. SENTENCE INTONATION

In Napu, statements and imperatives have falling intonation and all questions end with rising intonation which begins on the stressed syllable of the last word. However there is a difference between the intonational patterns of yes-no questions and that of content questions. In content questions there is an intonational rise over the stressed syllable of the question word. If the stressed syllable of the question word happens to be the first syllable of the utterance, the intonation will fall at the beginning of the utterance and then rise again at the end of the utterance. If the stressed syllable of the question word occurs in the middle of the utterance, the intonation will rise preceding this stressed syllable, and fall after it and then rise again at the end of the utterance.

Statements:

[ína mepalakánamona ha^mpái]

'Excuse me, I have to go now.'

[íti surána ída]

'That's Ida's book.'

[ana^okói létamohe]

'The children are asleep.'

[maβóβemona]

'I am tired.'

Imperatives:

[pesúa mái]

'Come in.'

[maénumoke]

'Please drink.'

[nupegíana ha^mpái]

'Wait for me.'

[βóli íti i lálu rápu]

'Put it in the kitchen.'

Yes-No Questions:

[peísana mesúa]


'May I enter?'

[áramoko róa maáⁿde]

'Have you eaten yet?'


[ba ía a^mpúna súra íti]

'Is that his book?'



[ba ára i wóko méja]

'Is it on the table?'


Content Questions:


[héma íde]


'Who is he?'


[iú^mbake láo]


'Where are you going?'


[ápa áu nubabéhi]


'What are you making?'


[ha^okía holóna]


'How much does it cost?'


[ápa áu rababéhi indo^obei]


'What is being done over there?'


[súra áu noú^mba ára iⁿdolóu]

'Which book is it?'


[i^mpírakau mesúle]

'When did you return?'


[há^oko iú^mbako mái]

'Where have you been?'

APPENDIX ONE

Segment Positions Within Words

The data below is phonemic. Due to the simple syllable structure of the language and the nature of this data (basic forms), the surface forms are identical to the underlying forms except for the placement of stress on the penultimate syllable.

A. Consonant segments; word initially and medially

In the list below, each consonant phoneme is described, and two examples are given, one showing the phoneme in initial position, and one showing it medially. The marginal phonemes /j/ and /ⁿc/ are not included (refer to section 6 for examples).

/b/	Voiced bilabial stop			
	/baba/	'door'	/ibo/	'monkey'
/p/	Voiceless unaspirated bilabial stop			
	/popi/	'doll'	/api/	'fire'
/d/	Voiced alveolar stop			
	/dike/	'dog'	/haodi/	'a little bit'
/t/	Voiceless unaspirated dental stop			
	/ta ^m po/	'land, earth'	/mata/	'eye'
/g/	Voiced velar stop			
	/gogoa/	'corn'	/bago/	'work'
/k/	Voiceless unaspirated velar stop			
	/kae/	'dig'	/iko/	'I'
/ ^m b/	Voiced prenasalized bilabial stop			
	/ ^m buli/	'again'	/kalu ^m ba/	'afternoon'
/ ^m p/	Voiceless prenasalized bilabial stop			
	/ ^m poragia/	'rainbow'	/se ^m pa/	'kick'
/ ⁿ d/	Voiced prenasalized alveolar stop			
	/ ⁿ dope/	'gong'	/li ⁿ do/	'face'
/ ⁿ t/	Voiceless prenasalized dental stop			
	/ ⁿ tepuu/	'very'	/ana ⁿ ta/	'our children'
/ ^ŋ g/	Voiced prenasalized velar stop			
	/ ^ŋ gereco/	'spider'	/mi ^ŋ gu/	'week'
/ ^ŋ k/	Voiceless prenasalized velar stop			
	/ ^ŋ kaya/	'many'	/ha ^ŋ ko/	'only, from'

/b/	Voiced bilabial fricative			
	/βou/	'new'	/toβaβine/	'female'
/s/	Voiceless alveolar fricative			
	/sou/	'house'	/susu/	'milk'
/h/	Voiceless glottal fricative			
	/halo/	'vegetables'	/bahi/	'to hoe'
/m/	Voiced bilabial nasal			
	/mata/	'eye'	/ikami/	'we (exclusive)'
/n/	Voiced alveolar nasal			
	/nodo/	'like that'	/tauna/	'person'
/ŋ/	Voiced velar nasal			
	/ŋihi/	'gigi'	/oŋe/	'nose'
/l/	Voiced alveolar lateral			
	/lao/	'to go'	/alo/	'day'
/r/	Voiced alveolar flap or trill (free variation)			
	/rara/	'road, path'	/bara/	'no, not'
/y/	Voiced palatal semi-vowel			
	/yalu/	'rice pounder'	/agayana/	'but'

B. Vowel segments; word initially, medially, and finally

In the list below, each vowel phoneme is described, and two examples are given showing the phoneme in word-initial, word medial, and word-final positions.

/i/	voiced high front unrounded vowel			
	/ide/	'this'	/biti/	'foot'
/e/	voiced mid front unrounded vowel			
	/ene/	'you'	/le ^m po/	'meaning'
/a/	voiced low central unrounded vowel			
	/ara/	'to be'	/rara/	'road'
/u/	voiced high back rounded vowel			
	/uda/	'rain'	/tulu/	'egg'
/o/	voiced mid back rounded vowel			
	/ope/	'all gone'	/nodo/	'like that'

C. Consonant - vowel sequences

Any consonant may precede any vowel, with the exception of /y/. /y/ may not precede the front high vowel /i/. Below are examples of consonant vowel combinations:

/bi/	/biti/	'foot'
/be/	/babe/hi/	'do'
/ba/	/ba/	'or'
/bo/	/boe/	'pig'
/bu/	/babuno/	'langsats' (fruit)
/pi/	/api/	'fire'
/pe/	/hepeka/	'fling'
/pa/	/alipaa/	'centipede'
/po/	/ipo/	'poisonous'
/pu/	/a ^m pu/	'grandchild'
/di/	/adi/	'younger sibling'
/de/	/dena/	'bird, sparrow'
/da/	/ada/	'customs'
/do/	/doi/	'money'
/du/	/badu/	'clothes'
/ti/	/a ⁿ ti/	'bring'
/te/	/ate/	'liver'
/ta/	/ba ⁿ takia/	'firefly'
/to/	/tou/	'correct'
/tu/	/atu/	'roof'
/gi/	/gigi/	'needle'
/ge/	/gewo/	'erase'
/ga/	/agayana/	'but'
/go/	/gogoa/	'corn'
/gu/	/gulu/	'collect'
/ki/	/ikita/	'we (inclusive)'
/ke/	/boke/	'tie'
/ka/	/ikami/	'we (exclusive)'
/ko/	/doko/	'often'
/ku/	/aku/	'confess'
/ ^m bi/	/la ^m bi/	'obtain'
/ ^m be/	/ha ^m be/	'brand'
/ ^m ba/	/ba ^m bari/	'news'
/ ^m bo/	/go ^m bo/	'meeting'
/ ^m bu/	/ga ^m bu/	'guava'
/ ^m pi/	/ha ^m pi/	'clothes'
/ ^m pe/	/ ^m perao/	'spear'
/ ^m pa/	/ ^m pa ⁿ da/	'pineapple'
/ ^m po/	/le ^m po/	'meaning'
/ ^m pu/	/a ^m pu/	'grandchild'

/ ⁿ di/	/a ⁿ dino/	'luminous millipede'
/ ⁿ de/	/a ⁿ de/	'eat'
/ ⁿ da/	/ ^m pa ⁿ da/	'pineapple'
/ ⁿ do/	/mado ⁿ do/	'morning'
/ ⁿ du/	/bu ⁿ du/	'use'
/ ⁿ ti/	/a ⁿ ti/	'carry'
/ ⁿ te/	/ ⁿ tepuu/	'very'
/ ⁿ ta/	/ba ⁿ takia/	'fire-fly'
/ ⁿ to/	/li ⁿ to/	'go back and forth'
/ ⁿ tu/	/tu ⁿ tu/	'preach'
/ŋgi/	/ŋgihi/	'teeth'
/ŋge/	/haŋge/	'fry'
/ŋga/	/taŋga/	'leprosy'
/ŋgo/	/taŋgoro/	'moo'
/ŋgu/	/miŋgu/	'week'
/ŋki/	/haŋkia/	'how many'
/ŋke/	/leŋke/	'chop'
/ŋka/	/aŋka/	'lift'
/ŋko/	/doŋko/	'deceive'
/ŋku/	/huŋku/	'near'
/βi/	/haβi/	'slave, servant'
/βe/	/haβe/	'arrive'
/βa/	/aβaha/	'a cold'
/βo/	/geβo/	'erase'
/βu/	/aβu/	'ashes'
/si/	/silanu/	'potato'
/se/	/rese/	'dull'
/sa/	/asa/	'manggo'
/so/	/riso/	'rice mortar'
/su/	/sua/	'enter'
/hi/	/babehi/	'make'
/he/	/ahe/	'machete'
/ha/	/aβaha/	'a cold'
/ho/	/bahoi/	'wash'
/hu/	/ahu/	'dog'
/mi/	/rimi/	'hungry'
/me/	/alimeri/	'bat'
/ma/	/mani/	'still'
/mo/	/komo/	'cloth'
/mu/	/amu/	'boil water'
/ni/	/mani/	'still'
/ne/	/ane/	'if'
/na/	/agayana/	'but'
/no/	/babuno/	'langsats (fruit)'
/nu/	/nuu/	'dwarf buffalo'

/ŋi/	/baŋi/	'dry'
/ŋe/	/ ^m dɔŋe/	'gong'
/ŋa/	/laŋa/	'afraid'
/ŋo/	/a ⁿ diŋo/	'luminous millipede'
/ŋu/	/naŋu/	'swim'
/li/	/alimeri/	'bat'
/le/	/ale/	'mat'
/la/	/ala/	'take'
/lo/	/alo/	'day'
/lu/	/balu/	'sell'
/ri/	/alimeri/	'bat'
/re/	/reta/	'mud'
/ra/	/ara/	'to be'
/ro/	/aro/	'wake'
/ru/	/ba ^m baru/	'shelter'
/ye/	/taye/	'hand'
/ya/	/agayana/	'but'
/yo/	/dayo/	'grave'
/yu/	/yuli/	'July'

D. Two vowel sequences

All vowels may occur with all other vowels in sequences of two vowels as illustrated in the examples below. Although the vowel sequence /uo/ never occurred in our limited data base of 1,273 word bases, this sequence does occur in affixed forms.

/ii/	/dii/	'to push'
/ie/	/pie/	'to press'
/ia/	/ia /	'he, she'
/io/	/hahio/	'nine'
/iu/	/gigiu/	'needle'
/ei/	/durei/	'help'
/ee/	/inee/	'don't'
/ea/	/pea/	'only'
/eo/	/meo/	'cat'
/eu/	/taleu/	'back'
/ai/	/hai/	'sick'
/ae/	/hae/	'long time'
/aa/	/alipaa/	'centipede'
/ao/	/lao/	'to go'
/au/	/au/	'that'

/oi/	/doi/	'money'
/oe/	/boe/	'pig'
/oa/	/gogoa/	'corn'
/oo/	/roo/	'already'
/ou/	/sou/	'house'
/ui/	/bui/	'unlucky'
/ue/	/pue/	'God'
/ua/	/tua/	'hard'
/uo/	/ku-oβaŋa/	'I carry on my shoulder'
/uu/	/ ^m tepuu/	'very'

E. Three vowel sequences

The following three vowel sequences have been found:

/aea/	/ma-ea/	'embarrassed'
/aoa/	/raoa/	'weather'
/eue/	/kareue/	'crocodile'
/oea/	/boea/	'village'

APPENDIX TWO

Contrasts Between Phonetically Similar Segments

A. Consonant segments; contrasted word initially and medially

The following examples show the contrast of phonemes that are phonetically similar.

1. /b/ vs. /p/ vs. /^mb/ vs. /m/ vs. /β/

/b/ and /p/	/badu/ /padu/	'clothes' 'leave'	/ibo/ /ipo/	'monkey' 'poison'
/b/ and / ^m b/	/bau/ / ^m bau/	'meat' 'to pound'	/iba/ / ⁱ ^m ba/	'four' 'where'
/b/ and / ^m p/	/baba/ / ^m pa ⁿ da/	'door' 'pineapple'	/tabo/ /ta ^m po/	'dishes' 'earth'
/b/ and /m/	/bai/ /mai/	'courageous' 'come'	/uba/ /uma/	'carry' 'father'
/b/ and /β/	/bala/ /βala/	'ball' 'gate'	/labi/ /laβi/	'breakfast' 'because'
/p/ and / ^m b/	/pare/ / ^m baro/	'rice' 'to fly'	/rapu/ /ra ^m bu/	'kitchen' 'smoke'
/p/ and / ^m p/	/pa ⁿ dita/ / ^m pa ⁿ da/	'pastor' 'pineapple'	/hupi/ /hu ^m pi/	'tongs' 'mustache'
/p/ and /m/	/pai/ /mai/	'bitter' 'come'	/topi/ /tomi/	'baby' 'breastfeed'
/p/ and /β/	/paa/ /βaa/	'thigh' 'head'	/api/ /aβi/	'fire' 'hold'
/ ^m b/ and / ^m p/	/ ^m baro/ / ^m pa ⁿ da/	'to fly' 'pineapple'	/ru ^m ba/ /ru ^m pa/	'thick' 'run into'
/ ^m b/ and /m/	/ ^m bau/ / ^m pa ⁿ da/	'to pound' 'pineapple'	/li ^m ba/ /lima/	'move' 'five'
/ ^m b/ and /β/	/ ^m butu/ /βutu/	'burst' 'older sibling'	/ga ^m bu/ /gaβu/	'guava' 'cloud'
/ ^m p/ and /m/	/ ^m pa ⁿ da/ /mando/	'pineapple' 'rotted wood'	/le ^m po/ /lemo/	'meaning' 'lemon'
/ ^m p/ and /β/	/ ^m perao/ /βeraka/	'spear' 'peel'	/ha ^m pi/ /haβi/	'clothes' 'servant'
/m/ and /β/	/mata/ /βata/	'eye' 'badan'	/hume/ /huβe/	'lips' 'burn'

2. /d/ vs. /t/ vs. /^md/ vs. /^mt/ vs. /n/

/d/ and /t/	/dua/ /tua/	'two' 'old'	/ida/ /ita/	'live' 'lihat'
/d/ and / ^m d/	/dii/ / ^m dii/	'push' 'diam'	/ide/ /i ⁿ de/	'this' 'here'
/d/ and / ^m t/	/dara/ / ^m tara/	'horse' 'the rest'	/tudu/ /tu ⁿ tu/	'order' 'preach'
/d/ and /n/	/dana/ /nana/	'cross-beam' 'pus'	/hadi/ /hani/	'hear' 'mosquito'
/t/ and / ^m d/	/to/ / ^m do/	'person' 'knock'	/ita/ /i ⁿ da/	'see' 'debt'
/t/ and / ^m t/	/oto/ /o ⁿ to/	'car' 'meat'	/ta ⁿ da/ / ^m tanina/	'(right) side' 'different'
/t/ and /n/	/tua/ /nua/	'guest' 'anoa'	/βata/ /βana/	'body' 'peak'
/ ^m d/ and / ^m t/	/ ^m daulu/ / ^m tanina/	'go down' 'different'	/te ⁿ de/ /te ⁿ te/	'throw out' 'repeat'
/ ^m d/ and /n/	/ ^m donge/ /nodo/	'gong' 'like that'	/i ⁿ da/ /ina/	'debt' 'will'
/ ^m t/ and /n/	/ ^m tanina/ /nani/	'different' 'song'	/la ⁿ ta/ /lana/	'floor' 'coconut oil'

3. /g/ vs. /k/ vs. /^hg/ vs. /^hk/ vs. /ŋ/

/g/ and /k/	/gola/ /kola/	'sugar' 'spoon'	/mobago/ /tobako/	'to work' 'tobacco'
/g/ and / ^h g/	/galo/ / ^h galu/	'mix' 'frown'	/igu/ /mi ^h gu/	'tight' 'week'
/g/ and / ^h k/	/galo/ / ^h kaya/	'mix' 'many'	/mobago/ /ha ^h ko/	'to work' 'from'
/g/ and /ŋ/	/gaŋa/ /ŋaŋa/	'separate' 'mouth'	/gaga/ /gaŋa/	'too' 'separate'
/k/ and / ^h g/	/ ^h galu/ /kalu/	'frown' 'carry'	/le ^h ge/ /teke/	'face' 'gambar'
/k/ and / ^h k/	/kala/ / ^h kaya/	'bracelet' 'many'	/doko/ /do ^h ko/	'often' 'deceive'

/k/ and /ŋ/	/ka ^m ba/ /ŋa ^m ba/	'machete belt' 'valley'	/haka/ /haŋa/	'to trap' 'name'
/ŋg/ and /ŋk/	/ŋgalu/ /ŋ ^k aya/	'frown' 'many'	/leŋge/ /le ^ŋ ke/	'face' 'dimple'
/ŋg/ and /ŋ/	/ŋgalu/ /ŋaŋa/	'frown' 'mouth'	/leŋge/ /ma ^ŋ eŋe/	'face' 'tired'
/ŋk/ and /ŋ/	/ŋkaro/ /ŋata/	'stop' 'proud'	/laŋka/ /laŋa/	'run' 'afraid'

4. /d/ vs. /l/ vs. /r/

/d/ and /l/	/daŋa/ /laŋa/	'hand width' 'afraid'	/ide/ /ile/	'this' 'snake'
/d/ and /r/	/badu/ /baru/	'clothes' 'wine'	/tudu/ /turu/	'order' 'lay down'
/l/ and /r/	/laŋa/ /raŋa/	'afraid' 'friend'	/βoli/ /βori/	'put away' 'also'

5. /t/ vs. /s/

/t/ and /s/	/ita/ /isa/	'see' 'know'	/tou/ /sou/	'correct' 'house'
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6. /n/ vs. /ŋ/

/n/ and /ŋ/	/nipi/ /ŋipi/	'thin' 'dream'	/lana/ /laŋa/	'coconut oil' 'afraid'
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B. Vowel segments; contrasted word initially, medially and finally

The following examples show the contrast between all five vowels in syllable initial, syllable medial, and syllable final positions:

/ale/	'mat'	/lite/	'stem'	/aha/	'sharpen'
/ele/	'laugh'	/lete/	'slice'	/ahe/	'machete'
/ile/	'snake'	/late/	'backache'	/ahi/	'alms'
/ole/	'slow'	/lote/	'glutton'	/aho/	'take down'
/ulera/	'top'	/lute/	'withered'	/ahu/	'dog'

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PHONOLOGY OF PADOE

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UNHAS-SIL

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1. INTRODUCTION

Padoe is generally considered to be one of the dialects of the Mori language which is spoken by approximately 30,000 speakers in South and Central Sulawesi. Mori is classified as a member of the Central Sulawesi stock of the Southwest Indonesian languages, and is further classified as belonging to the Bungku-Mori family (Grimes and Grimes, 1987; Barr and Barr, 1988). According to a lexicostatistical analysis made on the basis of the UNHAS-SIL sociolinguistic survey by Karhunen and Vuorinen (1989), Padoe can be considered a separate language. It is spoken by approximately 8,000 people. They live in a few villages in the subdistricts of Nuha, Malili and Mangkutana, district Luwu, South Sulawesi, and, on the other hand, in a few villages in subdistricts of Mori Atas and Pamona Utara, district Poso, Central Sulawesi, where some of the Padoes moved in the 1950's.

The data that Adriani (1914) represents as the Padoe language in fact contains material from the Mori Bawah language, seemingly from the Soroako dialect spoken in Nuha.

Data for the present study were gathered mostly in the village of Taliwan, Mori Atas, in 1989-90. Taliwan consists historically of three villages in the south, namely Tabarano, Wawondula and Lioka. Nowadays it is administratively divided into the villages of Tabarano and Wawondula. Some of the data originates from the village of Kawata, Nuha, where the writer spent five weeks during the survey in 1988 (see Karhunen and Vuorinen, UNHAS-SIL sociolinguistic survey, 1989).

2. CHART OF PHONEMES

CONSONANTS	Labial	Alveolar	Velar	Glottal
Plosives vl	p	t	k	ʔ
vd	b	d	g	
vl prenas	mp	nt	ŋk	
vd prenas	mb	nd	ŋg	
Fricatives vd	β			
vl		s		h
prenas		(ns)		
Lateral		l		
Trill		r		
Nasals	m	n	ŋ	
VOWELS	Front	Central	Back	
High	i		u	
Mid	e		o	
Low		a		

3. INTERPRETATION

Consonants. Prenasalized stops (mp, mb, nt, nd, ŋk, ŋg) are interpreted as single units, first because there are no unambiguous consonant sequences in the language. Secondly, word initially, they occupy the same position as any other single consonant. Thirdly, there are no syllable (or word) final consonants; medially the prenasalized consonants are always assigned to the next syllable by native speaker intuition; never are they broken up, e.g. /la.ŋka.i/, not */laŋ.ka.i/ 'big'.

Vowels. The only unambiguous syllable patterns in Padoe are CV and V. Phonetically long vowels are interpreted as sequences of the same vowel, and glides as two vowel segments. If, word finally, it were a question of a phonemic vowel, the stress should be on the preceding syllable. However, that is not the case (cf. 6. 'Stress' below):

[mo'dii]	'to pull'	(CV.CV.V)
[o'noo]	'six'	(V.CV.V)
[o'lai]	'far'	(V.CV.V)

In penultimate position, phonetically long vowels receive stress on the second half of the vowel, or of the vowel glide; often, however, the stress is shifted to the first part of the vowel, or vowel glide.

Whenever the stress is shifted (cf. 6. 'Stress' below) there are minimal pairs such as follows:

[βiβi]	'edge'
[βiiβi] (from [βi'iβi])	'shiver'
[sala]	'way, road'
[saala] (from [sa'ala])	'wrong'

For a fuller discussion of length see section 8.3.

4. DESCRIPTION OF CONSONANTS

/p/	[p] voiceless unaspirated bilabial plosive		
	[pau]	/pau/	'language'
	[supe]	/supe/	'needle'
/b/	[b] voiced bilabial plosive		
	[bana]	/bana/	'cloth, fabric'
	[ta'bulu]	/tabulu/	'if'

There is free variation between /b/ and its implosive counterpart /ɓ/:

[baŋe]/[ɓaŋe]	/baŋe/	'monkey'
[bele]/[ɓele]	/bele/	'tin, can'

/t/ [t] voiceless unaspirated dental plosive

['tehu]	/tehu/	'mouse, rat'
[o'pitu]	/opitu/	'seven'

/d/ [d] voiced alveolar plosive

['dahu]	/dahu/	'dog'
[ka'dera]	/kadera/	'chair'

/k/ [k] voiceless unaspirated velar plosive

[kolo'pua]	/kolopua/	'turtle'
[ma'haki]	/mahaki/	'sick'

/g/ [g] voiced velar plosive

['galu]	/galu/	'rice field'
[su'ugi]	/suugi/	'rich'

/ʔ/ [ʔ] voiceless glottal stop

['taʔi]	/taʔi/	'excrement'
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There is free variation between word initial glottal stop and its absence:

['uma]/[ʔuma]	/uma/	'father'
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/mp/ [mp] voiceless prenasalized bilabial plosive

['mpihe]	/mpihe/	'always'
[mpo'ŋgaa]	/mpongaa/	'eat' (more than two people)
[su'mpere]	/sumpere/	'pumpkin'

/mb/ [mb] voiced prenasalized bilabial plosive

['mboʔu]	/mboʔu/	'still, again'
['amba]	/amba/	'just a while ago; only then'

/nt/ [nt] voiceless prenasalized dento-alveolar plosive

[ntano'ntano]	/ntanontano/	'beetle grub'
['bunto]	/bunto/	'well'(n.)

/nd/ [nd] voiced prenasalized alveolar plosive

['ndamu]	/ndamu/	'axe'
[ka'ndau]	/kandau/	'sickle'

In the speech of some older people, [nd] is sometimes replaced by [nr], like in the word /e'ndea/ 'here' which then becomes [e'nrea]. The occurrence of [nr] is also attested in the Mori variety described by

Adriani (1914:232), but he considered it a non-native sound, having arisen as the result of Bugis and Makassar influence, where this sound occurs freely. This seems to us to be the reason why [nr] is found in some idiolects.

/ns/ The prenasalized alveolar /ns/ is somewhat disputable in Padoe. Adriani (1914:232-233) argues that there is a phoneme /ns/ in Padoe, whereas Esser (1927:6) says that Padoe is different from other Mori dialects in that it does not have /ns/. According to our data, the Padoe that is spoken in Kawata, Angkona and Pabeta in South Sulawesi, hereafter referred to as the 'western dialect' in this paper, has the phoneme /ns/ which in other Padoe areas corresponds to /s/. An example of contrast in Kawata:

/ns/ vs. /s/:	/pansu/	'ladder'
	/βasu/	'stone'

/pansu/ is /pasu/ in the speech of Padoes in other areas (e.g. Taliwan). Other examples of /ns/ are /punsi/ 'banana' and /lansa/, 'langsar' which, respectively, appear as /pusi/ and /lasa/ in Taliwan.

Also, the prenasalized alveolar fricative [ns] occurs at morpheme boundaries in the western dialect (see 8.1. 'Nasal Accretion'), but again is not found in the speech of Padoe speakers from other areas. For example, /monsou/ vs. /mosou/ 'to sow' (from /moN/ + /sou/) and /monsue/ vs. /mosue/ 'to see' (from /moN/ + /sue/).

The forms with /ns/ are recognized in Taliwan as originating from Mori Bawah or from the western dialect.

Thus, as far as Padoe is concerned, /ns/ has phoneme status in the western dialect but not in the other variants of Padoe. This is the reason /ns/ is put in brackets in the phoneme chart.

/ŋk/ [ŋk] voiceless prenasalized velar plosive

['saŋka]	/saŋka/	'enough'
[mo'ŋkeke]	/moŋkeke/	'to dig'

/ŋg/ [ŋg] voiced prenasalized velar plosive

[ŋge'ʔue]	/ŋgeʔue/	'grandparent'
['kango]	/kango/	'but'

The occurrence of the voiceless prenasalized stops in word initial position is scarce. The voiceless prenasalized bilabial stop /mp/ does occur word initially in a plural verb marker; besides in this morpheme, it is found word initially in only one word in the data. Of the voiceless prenasalized alveolar /nt/ there are three examples in our data of words which begin with this phoneme. The voiceless prenasalized glottal /ŋk/ does not occur initially. However, all these voiceless prenasalized

stops frequently appear between the constituents of compound words where they seem to function as links (see section 8.1 'Nasal accretion').

[βiβiŋko'rono] from and	/βiβiŋkorono/ /βiβi/ /korono/	'river bank' 'edge' 'river'
[βuku'mpau] from and	/βukumpau/ /βuku/ /pau/	'title, sentence' 'bone' 'speech'
[oruo'ntaʔu] from and	/oruontaʔu/ /oruo/ /taʔu/	'two years' 'two' 'year'

/β/ [β] voiced labial approximant. It has the following allophones which seem to be in free variation:

[β] voiced bilabial approximant, and
[v] voiced labio-dental approximant

['βue]/['vue]	/wue/	'fruit'
[molo'βulu]/[molo'vulu]	/molowulu/	'blue'

/s/ [s] voiceless alveolar fricative

['saru]	/saru/	'with, in the company of'
['paso]	/paso/	'nail'

/h/ [h] voiceless glottal fricative

[ho'ora]	/hoora/	'often'
[ihi'kuro]	/ihikuro/	'uncooked rice'

/r/ [r] voiced alveolar vibrant

['raha]	/raha/	'house, home'
[o'ruo]	/oruo/	'two'

/m/ [m] voiced bilabial nasal

['mete]	/mete/	'sea fish'
[pa'mutu]	/pamutu/	'frying pan'

/n/ [n] voiced alveolar nasal

[nipi'nipi]	/nipinipi/	'temple'
[la'suna]	/lasuna/	'onion'

/ŋ/ [ŋ] voiced velar nasal

[ŋisi]	/ŋisi/	'tooth'
[mo'boŋo]	/moboŋo/	'deaf'

/l/ [l] voiced alveolar lateral

[la'ŋkai]
[moma'loi]

/laŋkai/
/momaloi/

'big'
'tired'

Contrasts.

/p/ vs. /b/ vs. /β/:

/paso/
/baso/

'nail'
'k.o. basket made of sago
palm leaf'
'stone'

/βasu/

/sapi/
/sabi/
/saβi/

'cow'
'chop wood'
'ride a horse'

/p/ vs. /mp/:

/lopo/
/lompolompo/

'taro'
'full of water'

/piihe/
/mpihe/

'once'
'always'

/b/ vs. /mb/:

/sabi/
/sambi/

'spur'(n.)
'porch, veranda'

/bou/
/mbo'u/

'fish'
'also, too; again'

/mp/ vs. /mb/:

/kompo/
/kombokombo/

'stomach'
'rice that is just beginning
to ripen'

/t/ vs. /d/:

/tondo/
/dondono/

'fence'
'dam'

/tuto/
/tudo/

'lop (branches)'
'k.o stick'

/t/ vs. /nt/:

/kota/
/konta/

'lie'(n.)
'enau-palm fruit'

/tanu/
/ntanontano/

'pile'(v.)
'beetle grub'

/d/ vs. /nd/:

/tadu/
/tandu/

'umbrella'
'horn'

/dalu/
/ndamu/

'song'
'axe'

/nt/ vs. /nd/:	/loonto/ /londo/	'float' 'step on coconut palm tree for climbing'
/d/ vs. /n/:	/βidaβa/ /βinalu/	'k.o.tuber' 'k.o.rice dish'
	/dahu/ /nahu/	'dog' 'cook'
/d/ vs. /r/:	/tadu/ /taru/	'umbrella' 'k.o. basket'
	/donta/ /roonto/	'to fall' 'to fall(leaves)'
/d/ vs. /l/:	/umbeda/ /umbele/	'near' 'depression in rice field where fish can breed'
	/daa/ /laa/	'still' (adv.) 'big river'
/r/ vs. /l/:	/sala/ /sara/	'road' 'hair brush'
	/rongo/ /longo/	'carry on shoulders' 'sesam seed'
/k/ vs. /g/:	/kango/ /gango/	'but' 'beard'
	/uki/ /suugi/	'write' 'rich'
/k/ vs. /ŋk/:	/saki/ /saŋki/	'cross over' 'answer'
/g/ vs. /ŋg/:	/gori/ /ŋgori/	'line' 'carve'
	/ŋaŋa/ /gaŋgo/	'mouth' 'beard'
/ŋk/ vs. /ŋg/:	/maŋka/ /maŋgali/	'perhaps' 'left'
/g/ vs. /ŋ/:	/gaŋgo/ /ŋako/	'beard' 'very'
	/βagi/ /aŋi/	'a kind of dessert' 'wind'

/ŋ/ vs. /ŋg/:	/loŋo/ /loŋgo/	'sesame seed' 'get wet, watery'
/ʔ/ vs. /h/:	/taʔi/ /tahi/	'excrement' 'sea'
/ʔ/ vs. its absence:	/siʔe/ /sie/	'rice barn' 'that'(dem.pron.)
	/taʔu/ /tautau/	'year' 'old man'
/ʔ/ vs. /k/:	/puʔu/ /puku/	'classifier for trees' 'bone'
	/taʔi/ /saki/	'excrement' 'cross over'

5. Description of Vowels

/a/	[a] low central unrounded vowel		
	[ʼalo]	/alo/	'take'
	[ʼtaʔu]	/taʔu/	'year'
	[siʼdaβa]	/sidaβa/	'corn'
/e/	[e] mid front unrounded vowel		
	[eluʔʼelu]	/eluelu/	'orphan'
	[ʼmete]	/mete/	'sea fish'
	[moʼluβe]	/moluβe/	'lazy'
/i/	[i] high front unrounded vowel		
	[ihiʼkuro]	/ihikuro/	'uncooked rice'
	[oʼpitu]	/opitu/	'seven'
	[ʼtami]	/tami/	'mirror, glass'

In some function words there is free variation between /i/ and /e/, for example in /endipie/, /indipie/ 'when, at what time (in the past)'; /serio/, /sirio/ 'over there (near)'; /epie/, /ipie/ 'long time' and in /helinie/, /hilinie/ 'now'. The rule seems to be that when the stressed syllable contains an /i/, the /e/ in the preceding syllables is raised to /i/. Free variation seems to occur in the word /sedaβa/, /sidaβa/ 'corn' too.

/o/	[o] mid back rounded vowel		
	[oʼliβi]	/oliβi/	'advice'
	[paʼtolo]	/patolo/	'pencil'
	[simo]	/simo/	'clothes louse'

/u/ [u] high back rounded vowel

{ 'uma }	/uma/	'father'
{ paʔa'lua }	/paʔalua/	'pillow'
{ 'labu }	/labu/	'iron'

In the proximity of /e/ and /i/ the mid-high back unrounded allophone [ü] of /u/ often occurs:

{ me'süe }	/mesue/	'other, different'
{ meʔeü'eü }	/meeueu/	'to change'

The phonemes /o/ and /u/ are sometimes in variation, like in the word /luhuʔa/, /luhoʔa/ 'waist', or in the subject marking prefixes like /ro-/ , /ru-/ '3 p' or /o-/ , /u-/ '2s'. Variation between the phones [u] and [o] is common in Austronesian languages (cf. Campbell (this volume)).

Contrasts.

/e/ vs. /i/ vs. /o/ vs. /u/:	/ole/	'medicine'
	/oli/	'buy'
	/olo/	'day'
	/oluolu/	'shade'

/a/ vs. /e/ vs. /i/:	/saruf	'with, in the company of'
	/seruf	'cloud'
	/siruf	'spoon'

/a/ vs. /o/ vs. /u/:	/aluf	'rice stamper'
	/oluolu/	'shade'
	/ulu/	'head'

6. Stress

Stress is always on the penultimate syllable, regardless of suffixes added to the root word, whether derivational, inflectional or aspectual (cf. Martens 1988 and Barr 1988, for Uma and Da'a, where the stress placement is not as straightforward). For example:

{ 'raha }	/raha/	'house'
{ ra'hangu }	/raha + ngu/	'my house'
{ raha'miu }	/raha + miu/	'your house'
{ rame'rame }	/rame + rame/	'festive, lively'
{ peramera'meʔa }	/pe + rame + rame + a/	'celebration'
{ pa'guru }	/paguru/	'teach'
{ paguruko'miu }	/paguru + komiu/	'teach you'

The stress may optionally shift back one syllable, if it originally occurs on the second of two contiguous vowels. The result is then a stressed, phonetically long vowel or a stressed diphthong (cf. Mead 1989):

[pi'ingo] ~ ['piingo]
[ne'ine] ~ ['neine]

'to have no more'
'aunt'

7. Distribution

7.1. Syllables

Padoe has two univalent syllable patterns: CV and V. They occur freely in any combination.

Although the highest number of syllables in stems seems to be four, derivational and inflectional affixes can add a number of syllables up to nine.

1:	V	/i/	'unspecif. loc. prep.'
	CV	/ndi/	(inform.use) 'to, for (s.o.)'
2:	CV.CV	/ba.na/	'cloth, fabric'
	V.CV	/a.to/	'roof'
	CV.V	/βu.a/	'fruit'
	V.V	/i.a/	'to stay, to live'
3:	V.V.V	/o.i.o/	'contradict. "yes"'
	CV.CV.CV	/ga.lu.ra/	'rainy season'
	CV.CV.V	/me.nte.e/	'right, true'
	V.CV.V	/a.mba.u/	'water buffalo'
	CV.V.V	/su.a.i/	'cucumber'
	CV.V.CV	/ho.o.ra/	'usually, often'
	V.CV.CV	/i.ne.hu/	'greens'
	V.V.CV	/a.a.mbo/	'not yet'
4:	CV.V.V.V	/bu.a.e.a/	'crocodile'
	CV.CV.CV.CV	/po.li.βo.βa/	'doorway'
	CV.CV.CV.V	/ko.lo.pu.a/	'turtle'
	CV.CV.V.CV	/so.sa.e.lo/	'leave one's home area'
	V.CV.CV.V	/e.ndi.pi.e/	'when (in the past)'
	CV.CV.V.V	/la.la.e.o/	'nature'
	V.CV.CV.CV	/o.li.ma.ma/	'butterfly'
	CV.V.CV.CV	/po.o.ma.ʔa/	'purse, bag'

The following patterns emerge from the list:

1. Pattern CV.V.CV.V is not found in root words (it often occurs in reduplications).
2. In four-syllabic roots there has to be at least one CV syllable; i.e. pattern V.V.V.V. is not possible.
3. A four-syllabic root cannot begin with a sequence of two vowels.

7.2. Consonants

Segmental phonemes occur freely within syllable and word patterns of Padoe, with the following exceptions:

- a. The glottal stop is not contrastive word initially.
- b. The sequence #V? does not occur.
- c. Of the voiceless prenasalized stops, /nt/ and /ŋk/ occur only word medially (see also p.6 above). /mp/ is an exception in that it occurs also word initially in the plural verb marker:

/mpe + limba/	'(pl. actor) move'
/mpo + βoβau/	'(pl. actor) make'
/mpo + ema/	'(pl. actor) ask for s.t.'

As for their voiced counterparts, /mb/, /nd/, and /ŋg/, they do occur word initially, but their frequency is low.

7.3. Vowels

The vowels can occur freely within syllable and word structure of Padoe, i.e. any vowel can occur in any vowel position. All possible combinations of vowel segments occur in Padoe. They are always divided by a syllable boundary (see 3. 'Interpretation' above).

ii	-	/βiiβi/	'to shiver, shudder'
ie	-	/unie/	'this'
ia	-	/moia/	'to stay, to live'
io	-	/molio/	'empty'
iu	-	/siu/	'honey'
ee	-	/meene/	'midday (10am -3pm)'
ei	-	/ainei/	'who'
ea	-	/rea/	'blood'
eo	-	/meo/	'cat'
eu	-	/meeu/	'to change'
aa	-	/aambo/	'not yet'
ai	-	/laika/	'house in the rice field'
ae	-	/kae/	'hand'
ao	-	/molao/	'to flee'
au	-	/ambau/	'water buffalo'
oo	-	/ŋoole/	'albino'
oi	-	/menangoi/	'to swim'
oe	-	/boe/	'pig'
oa	-	/aroa/	'heart, center of emotions'
ou	-	/bou/	'fish'

uu	-	/meluluu/	'work for s.o.'
ui	-	/apui/	'fire'
ue	-	/ue/	'lord'
ua	-	/buaea/	'crocodile'
uo	-	/poʔohuo/	'youngest (child)'

8. Morphophonemics

8.1. Nasal Accretion

Nasal accretion is a process in which a root or stem initial voiceless plosive becomes a prenasalized plosive at the same point of articulation. In Padoe nasal accretion occurs only with voiceless plosives and, in the western dialect, also with the alveolar fricative. Capital N is here chosen to represent the 'underlying' nasal. It is found in the following cases:

1. With verbal and derivational prefixes such as moN-, poN-, mpoN-, meN-, peN-, and mpeN-:

moN + paho	----->	/mompaho/	'to plant (rice)'
moN + tamba	----->	/montamba/	'to chase (s.t.)'
poN + taʔu + a	----->	/pontaʔua/	'consolation ceremony'
meN + puei	----->	/mempuei/	'to bathe in the sun'
peN + kono + a	----->	/peŋkonoa/	'meaning'

ki + mpoN + kulii -> /kimponʒkulii/ 'we peel (wood)'

ro + mpeN + toro -> /rompentoro/ 'they (mult.act) sit'

In the western dialect:

moN + sou	----->	/monsou/	'to sow'
moN + sue	----->	/monsue/	'to see'

In the following examples the /N/ is not realized, because the first phoneme of the root is not a voiceless plosive:

moN + nahu	----->	/monahu/	'to cook'
moN + βoβau	----->	/moβoβau/	'to make'
moN + oŋgo	----->	/moongo/	'to tie'

There are two examples of voicing taking place with the nasal accretion:

moN + kaa	----->	/mongaa/	'to eat'
moN + kito	----->	/mongito/	'to look at s.t.'

In the verbs /mengoti/ 'to stand', /mendamo/ 'to enter' and /mombaane/ 'to fly' it seems as if voicing has taken place but in fact the roots are, respectively, /ŋgoti/, /ndamo/ and /mbaane/.

2. In some expressions of compound noun-phrases:

/korono/	'river'	/βiβi ŋkorono/	'river bank'
/pau/	'word, speech'	/βuku mpau/	'title'

In a few cases the velar plosive is also voiced:

/kae/	'hand, arm'	/palai ŋgae/	'palm of hand'
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3. In some fixed numeral + noun expressions:

/taʔu/	'year'	/oruo ntaʔu/	'two years'
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In the western dialect:

/soβu/	'thousand'	/aso nsoβu/	'one thousand'
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8.2. Glottal Insertion

Whenever two morphemes are joined so that a sequence of two vowels is the result, a glottal stop is inserted at the morpheme boundary:

/me + iβi/ ----->	[meʔiβi]	'to cry'
/mo + aβa/ ----->	[moʔaβa]	'to laugh'
/te + iti/ ----->	[teʔiti]	'dripping'
/ku + asa + o/ ----->	[kuʔasaʔo]	'I sell (s.g.)'
/no + oliβi + iro/ ----->	[noʔoliβiʔiro]	'he advises them'
/ule + ule/ ----->	[uleʔule]	'insect'

The fact that the glottal stop does not always occur before vowel initial verbal or nominal suffixes is due to the fact that there are several allomorphs of the same suffix, some of which have the glottal, some of which do not (see Vuorinen 1991, and Karhunen 1991).

8.3. Shortening

Phonetically long vowels in non-final position are shortened if the word is affixed or if it is used as a modifier. Such words are especially several bare intransitive and stative verbs plus a few other intransitive verbs. A couple of adverbs fall into that category too, as the shortening seems to take place whenever the adverb alone does not constitute an independent clause. The numeral /aaso/ 'one' is another example of these kinds of words. See the examples below:

Bare intransitive:

/tuuβu/			'life; live'
/mompot + tuuβu/ ----->	/mompotuβu/		'to raise'
/maate/			'die'
/maate + a/ ----->	/matea/		'death'

Bare stative verbs:

/piingo/ 'have no more'
 /ko + piingo + RED + no + to/-> /kopingopingonoto/ 'the longer the less'

/buuke/ 'full of'
 /buuke + to/ -----> /buketo/ 'already full'

Other intransitives:

/loonto/ 'appear'
 /me + loonto + RED/ -----> /melonto-lonto/ 'to float'

/saaro/ 'credit'
 /mo + saro/ -----> /mosaro/ 'to receive credit'

Adverbs:

/aando/ 'not any more'
 /aando + ku + kito + o/ ----> /ando kukiteo/ 'I don't see it anymore'
 /aando + lalau/ -----> /ando lalau/ 'there is no more'

/aambo/ 'not yet'
 /aambo + no + to?ori + o/ -> /ambo noto?orio/ 'he does not know it yet'
 /aambo + lalau/ -----> /ambo lalau/ 'there is not yet'

Numeral /aaso/:

/aaso/ 'one'
 /aaso + etu/ -----> /asoetu/ 'one hundred'
 /aaso + ta?u/ -----> /asonta?u/ 'one year'
 /aaso + toβa/ -----> /asontoβa/ 'a lake'

(For the nasal linkage in the last two examples, see Karhunen 1991, 'The Noun Phrase in Padoe'.)

In some cases where there is a minimal pair with the short vowel. This phonetically long vowel tends to stay long, despite affixation.

/βiiβi/	'shiver, tremble'	vs.	/βiβi/	'edge, bank'
/noβiiβi/	'he shivers'			
/mepaahi/	'to throw'	vs.	/mepahi/	'move sideways when sitting down'
/metuundu/	'how'	vs.	/tetundu/	'turn upside down a certain toy'
/mosaari/	'chase away'	vs.	/mosari/	'sieve'

Verbs the roots of which have the long vowel in final, i.e. stressed, position, retain the long vowel also in affixed forms:

/kulii/		
/to + kulii + o/ ----->	/tokuliio/	'peal'
		'we (inc) peal it'
/luluu/		
/no + pe + luluu/ ----->	/nopeluluu/	'work for someone'
		'he works for s.o.'

8.4. Vowel merger

There is one verb where merger can be said to have taken place. The /e/ of the verb prefix has merged with the /i/ of the root:

/me + ine?i/ ----->	/mine?i/	'to descend'
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8.5. Dissimilation

The final /o/ in some verbs becomes /e/ when the verb suffix -o 'it' is added:

/alo + o/ ----->	/aleo/ as in,	
/kualéo/ 'I take it'		
/kito + o/ ----->	/kiteo/ as in,	
/kikiteo/ 'we (ex) see it'		
/βaβo + o/ ----->	/βaβeo/ as in,	
/βaβeoto ai raha/ 'take it home!'		

8.6. Assimilation

In the three verbs mentioned above, /mo'alo/ 'to take', /mongito/ 'to see' and /moβaβo/ 'to take, bring', the final /o/ becomes /a/ when a suffix with an initial /a/ is added:

/alo + akune/ ----->	/alaakune/	'take (it) for me'
/kito + aku/ ----->	/kitaaku/	'look at me'
/βaβo + akito/ ----->	/βaβaakito/	'bring to us'

Originally, probably, these verbs had a final -a. This still surfaces when affixed with an a-initial suffix.

8.7. Infix -um-

The verbal infix -um- cannot be affixed to verb roots with initial bilabial sounds. This feature seems to be similar to the Tolaki language (Scott Youngman p.c.). Thus, we can have:

/l[um]eko/	'go'	(from /leko/)
/s[um]ikeno + o/	'ask s.o.'	(from /sikeno/)

But we cannot have:

*/β[um]usu/	'look for'	(from /βusu/)
*/p[um]aho/	'plant'	(from /paho/)

9. Loan Words

As Padoes in general can speak Indonesian very well, many words are borrowed as such, without any phonological changes, even if the loan contains phonemes foreign to Padoe, or ends with a consonant. However, the following changes can be noticed:

/j/ (voiced palatal affricate) has been replaced by /d/ or by /g/:

Indonesian	Padoe	
/meja/	/meda/	'table'
/jambu/	/gampu/	'kind of fruit'
	(actually this is a loan from Bugis /jampu/; see Esser 1927:40)	

/c/ (voiceless palatal affricate) is replaced by /t/ or by /s/:

/cicak/	/tita/	'house lizard'
/cara/	/sara/	'way to do something'

/ə/ (schwa) is replaced by /i/ or by /u/ (or /o/ in free variation, see p.10):

/səpatu/	/sipatu/	'shoe'
/səkolah/	/sikola/	'school'
/səpeda/	/supeda/	'bike'

/ɲ/ (palatal nasal) is replaced by n:

/ɲaɲi/	/nani/	'sing'
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Final consonants are either deleted or a vowel is added:

/pasar/	/pasa/	'market'
/jam/	/ja/	'clock, time'
/dokter/	/dotoro/	'docter'
/kasur/	/kasoro/	'mattress'
/botol/	/botolo/	'bottle'
/tanggal/	/tangala/	'date'
/kakus/	/kakusu/	'toilet'

Consonant clusters in loan words either lose one of the consonants, or a vowel is inserted between the consonants:

/Sabtu/	/olo satu/	'Saturday'
/dokter/	/dotoro/	'doctor'
/kristus/	/kerisituu/	'Christ'

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