PHONOLOGY OF MAMASA

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UNHAS-SIL

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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 Pattae' (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.

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[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: k̚	? ^
vd	b	d			g	
affricate			č			
frivative		s s:				
nasal	m m:	n n:			ŋ ŋ:	
lateral		l l:				
trill		r̃ r̃:				
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.

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[5] [^] 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:]. [k̚] 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: [ˆ], [č], [ɛ], the diphthongs, and the long consonants. The weak glottal stop [ˆ] 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 enviroments 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]	
/awaŋ/	/æβæ/	/aaŋ/	*a(b)ang	'hull'
/awak/	/æβæʔ/	/aak/	*awak	'waist'
/bulawan/	/bulaβam/	/bulaan/	*bulawan	'gold'
/kayu/	/kaju/	/kayu/	*kayu	'wood'
/gayaŋ/	/gæjæ/	/gayaŋ/	*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.

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[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 writes 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.be?/	'father'
/ben.to.en/	'star'
/in.do?/	'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.pa?/	'four'
/an.na/	'and'
/bit.ti?/	'calf (of leg)'
/il.loŋ/	'nose'
/sok.ko?/	'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 enviroments,

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

[8] Word medially /ʔ/ occurs only before voiced consonants. A weak glottal stop [ˆ] 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 noncontigous relationship with the other vowel phonemes.

Table 5: Position of Vowel Phonemes

/i/	1st syll	/iru?/	[ĩru?]	'to drink'
		/illoŋ/	[íloŋ]	'nose'
		/piran/	[pĩran]	'when'
		/inde/	[inde]	'this'
	2nd syll	/moni/	[móni]	'noise'
		/kanniŋ/	[kánniŋ]	'eyebrow'
		/buŋin/	[búŋin]	'sand'
	both	/rindiŋ/	[rĩndiŋ]	'wall'
/e/	1st syll	/bela?/	[béla?]	'garden'
		/tedoŋ/	[tédoŋ]	'water buffalo'
		/lendoŋ/	[léndoŋ]	'eel'
	2nd syll	/pole/	[póle]	'next'
		/rante/	[rãnte]	'flat land'
		/kide/	[kíde]	'forehead'
		/sule/	[súle]	'return'
	both	/tettek/	[tétteḵ]	'hour'
		/tene/	[téne]	'urine'
/u/	1st syll	/ula?/	[úla?]	'snake'
		/punti/	[púnti]	'banana'
		/pune/	[púne]	'tree fern'
		/bulo/	[búlo]	'type of bamboo'
	2nd syll	/asu/	[ásu]	'dog'
		/pitu/	[pítu]	'seven'
	both	/buntu/	[búntu]	'hill'
/o/	1st syll	/bosi/	[bósi]	'rotten'
		/golla/	[gólla]	'sugar'
	2nd syll	/temo/	[témo]	'now'
		/ampo/	[ámpo]	'grandchild'
		/piso/	[píso]	'knife'
		/bulo/	[búlo]	'type of bamboo'
	both	/tondok/	[tóndoḵ]	'village'
/a/	1st syll	/mane/	[máne]	'before'
		/dako?/	[dáko?]	'later'
		/rambu/	[rãmbu]	'smoke'
		/rapi?/	[rãpi?]	'twin'
	2nd syll	/buta/	[búta]	'blind'
		/dada/	[dáda]	'chest'
		/indan/	[índan]	'loan'
		/posa/	[pósa]	'cat'
	both	/rara/	[rãra]	'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/	[ɾ̃ákaʔ]	'hug'
	/raga/	[ɾ̃ága]	'ball'
	/kao/	[káo]	'I'
	/gauʔ/	[gáuʔ]	'deed'
/k/ vs. /ʔ/	/di-barrak/	[di-bárr̃ak̚]	'poured'
	/barraʔ/	[bárr̃aʔ]	'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/	[déna?]	'sparrow'
	/seŋaʔ/	[séŋaʔ]	'other'
	/kamban/	[kámban]	'thick'
	/kambaŋ/	[kámbaŋ]	'swell'
/n/ vs. /l/	/nawa/	[náwa]	'breathe'
	/lawa/	[láwa]	'to block'
	/mane/	[máne]	'just, before'
	/bale/	[bále]	'meat'
/l/ vs. /r/	/lambuk/	[lámbuk̚]	'pound'
	/rambu/	[ɾ̃ámbu]	'smoke'
	/bale/	[bále]	'meat'
	/pare/	[páɾ̃e]	'field rice'
/r/ vs. /d/	/rambu/	[ɾ̃ámbu]	'smoke'
	/dambu/	[dámbu]	'kind of fruit'
	/uruʔ/	[úɾ̃uʔ]	'rub'
	/uduk/	[úduk̚]	'smell'

/w/ vs. /b/	/wai/	[wái]	'water'
	/bai/	[bái]	'pig'
	/bawan/	[báwan]	'parrot'
	/babak/	[bábaḵ]	'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/	/kila?/	[kíla?]	'lightning'
	/kela?/	[kéla?]	'bite'
	/bati?/	[báti?]	'relative'
	/bate?/	[báte?]	'batik'
/i/ vs. /u/	/pira/	[pĩ̃ra]	'how many'
	/pura/	[pṹra]	'all gone'
	/rambi/	[r̃ámbi]	'hit'
	/rambu/	[r̃ámbu]	'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/	[bénna]	'who'
/banua/	[banúa]	'house'
/kalibambaŋ/	[kalibámbaŋ]	'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/	[beluákku]	'my hair'

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

/teka?-i/	[teká?i]	'to climb something'

(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'

(5) The nominalizing confix *peŋ- -an*:

/peŋ-karaŋ-an/	--->	[peŋkarágan]	'a task'

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:

$$V \longrightarrow [+\text{stress}] \;/\; \underline{\quad\quad} \; (C) \; \underbrace{]}_{\text{vocative word}} \; \#$$

stress placement:

$$V \longrightarrow [+\text{stress}] \;/\; \underline{\quad\quad} \; (C) \; (C) \; \underbrace{(V) \; (C)}_{[-\text{stress}]} \; \underbrace{]}_{\text{word}} \; \#$$

Notice that vocatives such as /ani/ (girl's name) are stressed according to the vocative stress rule on the last syllable, that is [aní], 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 constrast 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'

(3) The perfective (or completive) clitic *-mo*:

/kadake-mo-i/	--->	[kadákemi]	'it is already dirty'

(4) The imperfective (or continuative) clitic *-pa*:

/buda-pa-i/	--->	[búdapi]	'there still is a lot'

(5) The clitic *-i* used as an emphasis marker:

/paela?i/	--->	[paéla?i]	'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 belaɬ]	'We are going to the garden.'
[máŋkamo? ummánde]	'I have already eaten.'

imperatives:

[láomokoi]	'Go!'

yes-no questions:

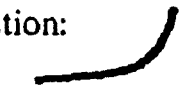
[málaka ditánanni lo?bána bélaɬ]	'Can it be planted in the garden?'
[masáekoka yáo maŋgássa?]	'Were you in Makassar long?'

content questions:

[áka túo illá'an belá?mu]	'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:



[paéla?i 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.luk̚]	'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.

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[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/	[áppaʔ]	'four'
/tt/	/tettek/	[téttek]	'hour'
/kk/	/basikkiʔ/	[basíkkiʔ]	'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/	/kanniŋ/	[kánniŋ]	'eyebrow'
/ŋk/	/daŋkan/	[dáŋkan]	'hand span'
/ŋg/	/aŋga/	[áŋga]	'only'
/ŋŋ/	/paŋŋalaʔ/	[paŋŋálaʔ]	'forest'
/ll/	/illoŋ/	[illoŋ]	'nose'
/rr/	/torro/	[tórro]	'dwell'
/ss/	/issoŋ/	[issoŋ]	'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	ʔ.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/	--->	[r̃r̃]
/ms/	--->	[ss]
/ŋp/	--->	[mp]
/nk/	--->	[ŋk]
/nb/	--->	[mb]
/nm/	--->	[mm]
/nl/	--->	[ll]
/nr/	--->	[r̃r̃]
/ns/	--->	[ss]
/ŋp/	--->	[mp], [p]
/ŋt/	--->	[nt], [t]
/ŋb/	--->	[mb], [b]
/ŋd/	--->	[nd], [d]
/ŋm/	--->	[m]
/ŋn/	--->	[n]
/ŋl/	--->	[ll], [l]
/ŋr/	--->	[r̃r̃], [r̃]
/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/	[maʔbáluk̃]	'to sell'
/ʔd/	/maʔ-dama/	[maʔdáma]	'to work'
/ʔm/	/boyoʔ-mo-i/	[bóyoʔmi]	'already tired'
/ʔn/	/maʔ-nasu/	[maʔnásu]	'to cook'
/ʔl/	/maʔ-lambuk/	[maʔlámbuk̃]	'to pound (rice)'
/ʔr/	/maʔ-rusun/	[maʔr̃úsun]	'to push'
/ʔs/	/maʔ-surruʔ/	[maʔsúr̃r̃uʔ]	'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/	[uŋgaɾ̃ága]	'to make something'
/np/	/uran-pa-i/	[úɾ̃ampi]	'still raining'
/nt/	/pen-tallu/	[pɛntállu]	'third'
/nk/	/pen-karua/	[peŋkaɾ̃úa]	'eighth'
/nb/	/pen-buda/	[pɛmbúda]	'many times'
/nd/	/pen-dua/	[pɛndúan]	'twice'
/nm/	/bulawan-mu/	[bulawámmu]	'your gold'
/nn/	/kurin-na/	[kuɾ̃ínna]	'his/her pot'
/nl/	/pen-lima/	[pɛnlíma]	'fifth'
/nr/	/den-ra-ka/	[déndaka]	'is there'
/ns/	/pen-sa-pulo/	[pɛssapúlo]	'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/	[membúni]	'to hide'
	/saŋ-bulan/	[sabúlan]	'one month'
/ŋd/	/meŋ-dioʔ/	[mendíoʔ]	'to bathe'
	/saŋ-daŋkan/	[sadáŋkan]	'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/	[marrékɛn]	'to count'
	/saŋ-raku/	[saráku]	'one handful'
/ŋs/	/paŋ-sikola/	[passikóla]	'student'
	/saŋ-sii/	[sasíˆi]	'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/	[dío]	'there'
/ia/	/sia/	[sía]	'salt'
/ei/	/ŋei/	[ŋéi]	'place'
/ee/	/deen/	[dé^ɛn]	'there is'
/eu/	/reu/	[r̃éu]	'type of grass'
/eo/	/peo/	[péo]	'loincloth'
/ea/	/keara?/	[keár̃a?]	'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/	[bɛntóɛn]	'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 Sequences[13]

	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^ír̃a?]	'to be sliced'
/ie/	/inde#doti=e/	[índe#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/	[kamaséi]	'to pity'
/ee/	/inde=e/	[índe^e]	'this'
/eo/	/pole=o/	[póleo]	'once again'
/ea/	/ke-anak/	[keának̚]	'to have children'
/ui/	/mu-issan/	[muíssan]	'you understand'
/ue/	/inde#tau=e/	[índe#táue]	'this person'
/uu/	/ku-uduk/	[ku^úduk̚]	'I smell (something)'
/uo/	/mu-ola/	[muóla]	'you go'
/ua/	/ku-alli/	[kuálli]	'I buy'
/oi/	/di-allo-i/	[diallói]	'it is dried in the sun'
/oe/	/ampo=e/	[ámpoe]	'this grandchild'
/oo/	/dio=o/	[dío^o]	'that there'
/oa/	/na-pa-torro-an/	[napatorróan]	'they left (it) for (them)'
/ai/	/na-ita/	[naíta]	'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:

$$/aV/ \text{ ---> } [a^{V}] \,/\, \underline{\quad} \; (C)(-)(C)V$$

Diphthongisation is ordered before stress placement.

	/baine/	/tosae-ku/	/bue-ku/
Diphth	baⁱne	tosaᵉ-ku	------
stress	báⁱne	tosáᵉ-ku	bué-ku
SF	[báⁱne]	[tosáᵉku]	[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 laxed to [ɛ] in closed syllables except before the consonants [k], [g], [ŋ], and [ʔ].

e-laxing:

$$/e/ \text{ ----> } [-\text{tense}] \,/\, \underline{\quad} \; [+\text{anterior}] \begin{Bmatrix} \# \\ C \end{Bmatrix}$$

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

/benna/	--->	[bénna]	'who'
/sesse?/	--->	[sɛ́sse?]	'torn'
/karuen/	--->	[karúɛn]	'afternoon'
/meŋ-keppe?/	--->	[meŋkɛ́ppe?]	'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#déˆɛn]	'there isn't any'
[déndaka#síà]	'is there any salt?'

3) /illaan/ 'inside':

[déŋan#illáˆan]	'is inside'
[sún#illám#mái#dápoʔ]	'came out from the kitchen'

4) /baa/ 'bring'

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

vowel deletion:

$$\begin{matrix} V \\ [\alpha \text{ feature}] \end{matrix} \longrightarrow \emptyset \Big/ \begin{matrix} V \\ [\alpha \text{ feature}] \end{matrix} \underline{\quad\quad} (C) \begin{Bmatrix} \# \\ - \end{Bmatrix}$$

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:

$$\begin{matrix} \# \ C \ V \ C \ \# \\ 1 \ 2 \ 3 \ 4 \ 5 \end{matrix} \longrightarrow 1 \ 2 \ 3 \begin{bmatrix} - \text{ cons} \\ - \text{ cont} \\ - \text{ anterior} \\ - \text{ coronal} \\ - \text{ voice} \\ + \text{ weak} \end{bmatrix} 3 \ 4 \ 5$$

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 [déŋan] 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:

$$\emptyset \longrightarrow \begin{bmatrix} -\text{consonan} \\ -\text{cont} \\ -\text{anterior} \\ -\text{coronal} \\ -\text{voice} \\ +\text{weak} \end{bmatrix} \Big/ \; V_{[\alpha \text{ feature}]} \_\_\_\_\_ V_{[\alpha \text{ feature}]}$$

phonological phrase

underlying form	/deen/	/suun/
e-laxing	deɛn	-----
weak glottal	de^ɛn	su^un
stress	dé^ɛn	sú^un
surface form	[dé^ɛn]	[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:

[búsuk̑]	-	[mambúsuk̑]	'wash clothes'
[pána]	-	[mampána]	'shoot an arrow'
[dío]	-	[mandío]	'bathe'
[túnu]	-	[mantúnu]	'burn'
[gáyang]	-	[maŋgáyang]	'stab'
[káli]	-	[maŋkáli]	'dig'
[r̃ékɛn]	-	[mar̃r̃ékɛn]	'count'
[lámun]	-	[mallámun]	'inter (bury)'
[sápu]	-	[massápu]	'sweep'
[álli]	-	[maŋŋálli]	'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:

$$[+\text{N}] \dashrightarrow \begin{bmatrix} \alpha \text{ anterior} \\ \beta \text{ coronal} \\ \left\langle \begin{matrix} +\text{ continuant} \\ \gamma \text{ voice} \\ \delta \text{ lateral} \end{matrix} \right\rangle \end{bmatrix} \Big/ \_\_ - \begin{bmatrix} \text{C} \\ \alpha \text{ anterior} \\ \beta \text{ coronal} \\ \left\langle \begin{matrix} +\text{ continuant} \\ \gamma \text{ voice} \\ \delta \text{ lateral} \end{matrix} \right\rangle \end{bmatrix}$$

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

/maŋ-busuk/	[mambúsuk̃]	'to wash clothes'
/maŋ-reken/	[mar̃r̃ékɛn]	'to count'
/um-teka-i-na?/	[untekáina?]	'I climb'
/kurin-mu/	[kurímmu]	'your pot'
/turun sia-mo-i/	[túr̃us síami]	'he really came down'
/kayu randan ma-laŋka?-na/	[káyu r̃ándam malάŋka?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	mɛn-teka?-na?
stress	mɛn-téka?-na?
surface form	[mɛntéka?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?/	--->	[ummĩ̃ru?na?]	'I drink (coffee)'
/maŋ-alli/	--->	[maŋŋálli]	'to buy'
/maŋ-ula?/	--->	[maŋŋúla?]	'to follow'
/meŋ-amma?/	--->	[meŋŋámma?]	'to swallow'
/paŋ-allo-na/	--->	[paŋŋallóna]	'her/his laundry'
/paŋ-iru?-an/	--->	[paŋŋĩ̃rúsan]	'food served with drink'
/pen-appa?/	--->	[pɛnnáppa?]	'fourth time'
/saŋ-allo/	--->	[saŋŋállo]	'a day'
/saŋ-issi?/	--->	[saŋŋíssi?]	'a slice'

6.2.3 ŋ-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:

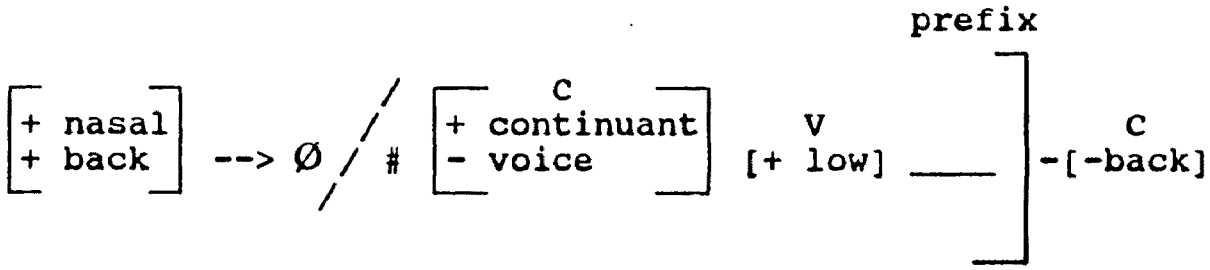
1.	[saŋŋállo]	'one day'
2.	[saŋŋíssi?]	'one slice'
3.	[saŋkílo]	'one kilogram/kilometer'
4.	[saŋkalébu]	'one whole round thing'

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

1.	[sapíak]	'on piece'
2.	[sabúlan]	'one month'
3.	[satáun]	'one year'
4.	[sadáŋkan]	'one hand span'
5.	[sasí?i]	'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.

ŋ-deletion (*saŋ-*):



/saŋ-miŋgu/	--->	[samíŋgu]	'a week'
/saŋ-piak/	--->	[sapíak]	'a piece'
/saŋ-boŋi/	--->	[sabóŋi]	'one night'
/saŋ-taun/	--->	[satáun]	'one year'
/saŋ-daŋkan/	--->	[sadáŋkan]	'one handspan'
/saŋ-raku?/	--->	[saráku?]	'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-tia?/	/saŋ-lolo/	/maŋ-lamun/
ŋ-del.	sa-taun	--------	sa-lolo	---------
N. assim.	-------	men-tia?	-------	mal-lamun
e-laxing	-------	mɛn-tia?	-------	---------
stress	sa-táun	mɛn-tía?	sa-lólo	mal-lámun
surface	[satáun]	[mɛntía?]	[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:

$$\begin{bmatrix} +\text{nasal} \\ +\text{back} \end{bmatrix} \rightarrow \emptyset \;/\; \underline{\quad} \begin{Bmatrix} - \\ \langle\#\rangle \end{Bmatrix} \begin{bmatrix} C \\ [-\text{back}] \end{bmatrix}$$

suffix, enclitic
<word>

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/
[déŋan#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

$$\emptyset \longrightarrow [+\text{nasal}] \,/\, \begin{bmatrix} V \\ \alpha\ \text{high} \\ -\alpha\ \text{low} \end{bmatrix} \_\_\_\_\_ - [C]$$

possessive suffix

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 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	asuŋ-ku
stress	puntím-mu	asúŋ-ku
surface form	[puntímmu]	[asúŋku]
	'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:

$$\begin{bmatrix} C \\ \alpha\ \text{coronal} \\ -\alpha\ \text{back} \end{bmatrix} \quad - \quad V \quad [-\ \text{low}] \quad \text{---> 1 1 2 3}$$

1 2 3

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

/intin-o/	--->	[ítinno]	'that'
/inde#manuk-e/	--->	[índe#mánukke]	'this chicken'
/inde#tedoŋ-e/	--->	[índe#tédoŋŋe]	'this buffalo'
/pa-indan-i-naʔ/	--->	[paindánninaʔ]	'loan me'
/pa-randuk-i/	--->	[paɾándukki]	'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:

$$\begin{bmatrix} C \\ +\ \text{back} \\ -\ \text{voice} \end{bmatrix} \text{---> } \begin{bmatrix} -\text{cons} \\ -\text{back} \end{bmatrix} / \_\_\_\_ \begin{Bmatrix} - \\ \# \end{Bmatrix} \begin{matrix} C \\ [-\ \text{back}] \end{matrix}$$

/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:

$$\begin{bmatrix} -\text{cons} \\ -\text{back} \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +\text{back} \\ -\text{voice} \end{bmatrix} / \_\_\_\_ \begin{Bmatrix} - \\ \# \end{Bmatrix} \begin{bmatrix} C \\ +\text{back} \\ -\text{voice} \end{bmatrix}$$

or

$$/?/ \rightarrow [k] / \_\_\_\_ \begin{Bmatrix} - \\ \# \end{Bmatrix} /k/$$

/di-pa?-kalunteba?-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:

$$/?/ \rightarrow [s] / \_\_\_\_\_ - \begin{bmatrix} /an/ \\ \text{suffix} \end{bmatrix}$$

/na-dasi?-an-na?/	--->	[nadasísanna?]	'she sewed for me'
/na-baya?-an-na?/	--->	[nabayásanna?]	'she pays for me'
/iru?-an/	--->	[irũsan]	'glass, cup'
/paŋ-iru?-an/	--->	[paŋŋirũsan]	'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]

$$/s/ \rightarrow [?] / \_\_\_\_\_ \#$$

---

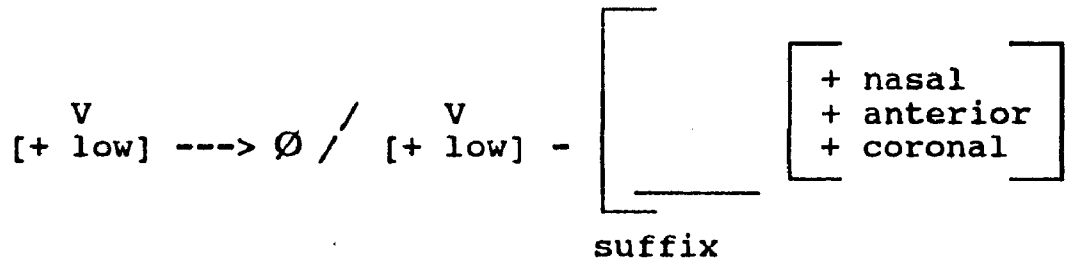
[14] Mills (1975:97) notes that in Sa'dan (Toraja) a similar rule probably depicts what happened historically by analogy.

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-na?/	/na-po-pe-baa-an-i/
a-deletion	na-ala-n-na?	na-po-pe-baa-n-i
consonant gem.	----------	na-po-pe-baa-n-ni
stress	na-alá-n-na?	na-po-pe-báa-n-ni
vowel deletion	----------	na-po-pe-bá-n-ni
surface form	[na^alánna?]	[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 *-na?*, *-kan*, *-ki?*, *-ko*, and *-i* as illustrated in the following table:

Table 13: Aspectual and Person Marking Clitics

	1s na?	1p.ex kan	1p.in ki?	2s ko	3s/pl i
mo	mo?	mokan	miki?	moko	mi
pa	pa?	pakan	piki?	poko	pi
ra	ra?	rakan	riki?	roko	ri

From this table three generalizations can be made:

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

underlying form	/uḿ-ande-mo-na?/	/sae-pa-na?/
nasal gemination	umm-ande-mo-na?	----------
na-deletion	umm-ande-mo-?	sae-pa-?
stress	umm-ánde-mo-?	sáe-pa-?
surface form	[ummándemo?]	[sáepa?]
	'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 [mokan] in the above table.

Underlying form	/la-lao-ra-ko-ka/	/la-lao-mo-ki?-ka/
vowel haromony	la-lao-ro-ko-ka	la-lao-mi-ki?-ka
stress	la-láo-ro-ko-ka	la-láo-mi-ki?-ka
surface form	[laláorokoka]	[laláomiki?ka]
	'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.

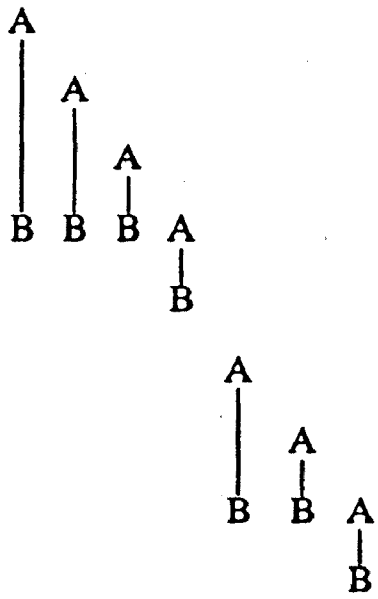
underlying form	/dadi-mo-i/	/maŋka-pa-i/
vowel del. clitic	dadi-m-i	maŋka-p-i
stress	dádi-m-i	máŋka-p-i
surface form	[dádimi]	[máŋkapi]
	'it's already done'	'later when it is finished'

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.

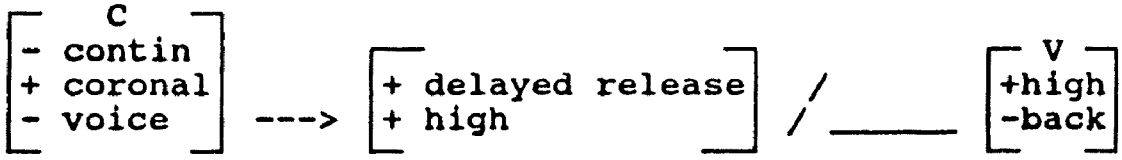
Table 14: Ordered Rules

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



7. FREE VARIATION

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



/punti/	--->	[púnti] ~ [púnči]	'banana'
/andoraʔ tina/	--->	[andóraʔ tína] ~ [andóraʔ 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 ə (schwa)

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

Indonesian	Mamasa	
celana	[talána]	'pants'
geréja	[gaʔéda~geʔéja]	'church'
pendéta	[pandíta]	'minister'
selimut	[salímuʔ]	'blanket'
sembahyang	[sambáyaŋ]	'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	[sikúpaŋ]	'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	[áda?]	'customary law'
duit	[dói?]	'money'
Kamis	[kámi?]	'Thursday'
langsat	[lása?]	'kind of fruit'
liter	[líte?]	'liter'
métér	[méte?]	'meter'
pikir	[píki?]	'think'
selimut	[salímu?]	'blanket'
tamat	[támma?]	'graduate'

There are some exceptions to this rule:

Indonesian	Mamasa	
kapal	[kappála?]	'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	[dámbu]	'kind of fruit'
Jumat	[dúma?]	'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	[saŋgóreŋ]	'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 /dž/, 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 prestigeous 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 Pannei. 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 Mokanam 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 /dž/), /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/ [belúak̚]	/beluak/ [belúak̚]	/beluæk/ [belúæʔ]	'hair'
/manuk/ [mánuk̚]	/manuk/ [mánuk̚]	/mænek/ [méneʔ]	'chicken'
/boʔboʔ/	/boʔboʔ/	/bokbok/ [bóʔboʔ]	'cooked rice'
/asaŋ/	/asan/	/asam/	'all'
/annan/	/annan/	/annam/	'six'
/tedoŋ/	/tedoŋ/	/tedom/	'water buffalo'
/illoŋ/	/illoŋ/	/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/	--->	[sabóŋi]	'one night'
Toraja	/saŋ-boŋi/	--->	[saŋbóŋi]	'one night'
PUS	/sam-beŋi/	--->	[sabéŋi]	'one night'
Mamasa	/saŋ-kayu/	--->	[saŋkáyu]	'one log'
Toraja	/saŋ-kayu/	--->	[saŋkáyu]	'one log'
PUS	/sam-kæju/	--->	[sakǽju]	'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-bisaʔ	mam- isæʔ
stress	mam-bísaʔ	mam- ísæʔ
surface	[mambísaʔ]	[mamísæʔ]
	'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 [r̃] 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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