MORONENE PHONOLOGY

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Moronene phonology is analyzed using the approach of lexical phonology. Syllable structure is almost always CV. Penultimate word stress is affected by diphthongization. Secondary stress is affected by morpheme boundaries. Rules of the lexical module strata 1 and 2 apply to the underlying representation to produce the lexical representation. These include rules of vowel copy, vowel fronting, reduplication, /m/ deletion, identical-syllable deletion and initial-syllable deletion. A special set of lexical rules applies to Malay/Indonesian loan words. Rules of the postlexical syntactic and implementational modules apply to the lexical representation to produce the surface representation. These include rules of apocope, reinterpretation of /i/, mid-vowel centralization, vowel unrounding, vowel fronting, high-vowel centralization, and laryngealization. Palatalization and degemination rules apply in both the lexical and postlexical modules.

1. INTRODUCTION

Moronene is a member of the Bungku-Tolaki language group spoken in Southeast Sulawesi. There are 35,000 speakers divided between two main dialects. The Kabaena or Tokotu'a dialect is spoken on the island of Kabaena. The Rumbia-Poleang or mainland dialect is spoken in the mainland portion of Buton district opposite Kabaena. It has two subdialects, the Rumbia subdialect spoken in the subdistricts of Rumbia and Rarowatu, and the Poleang subdialect spoken in Poleang Timur and Poleang subdistricts as well as the Watubangga subdistrict of Kolaka district. The subdialects differ in a small number of lexical items and have a few grammatical differences. There are no significant phonological differences.

A brief description of Moronene phonology can be found in Muthalib et al (1991). Kalsum (1998) gives a description of the Kabaena dialect using a generative approach. This paper aims to give a detailed description of the Rumbia-Poleang dialect. Most of the data was gathered during nine months of field work in Rumbia and Poleang Timur subdistricts from 1991 to 1994. Additional data-gathering and checking was done from 1996 to 1999 in Rumbia and Kendari.[1]

The primary theoretical approach used is that of lexical phonology as expounded in Mohanan (1986). In particular I found the phonological analysis of West Tarangan (Nivens 1992) a helpful model. In lexical phonology one starts with the underlying representation which undergoes processes of syllabification, stress assignment and various rules in order to produce the lexical representation. This is called the lexical module. Rules which apply in the lexical module have access to morphological information such as morpheme boundaries and exception features. The lexical module may be divided into more than one stratum if some rules only to certain affixes and are blocked for others or if some rules apply to the output of other rules.

In the postlexical module further rules apply in order to produce the surface representation. The postlexical module can be divided into a syntactic module and an implementational module. Rules which apply in the syntactic module have access to syntactic information such as word boundaries. Rules which apply in the implementational module have no access to such information and have no surface exceptions.

The paper is organized according to these various levels and modules. I start with a description of the underlying segments (section 2). This is followed by a section on phonotactic constraints, that is, constraints on how the underlying segments can be combined (section 3). Next comes a section on

syllabification and stress (section 4), followed by sections on stratum 1 and stratum 2 of the lexical module (sections 5 and 6). This is followed by a section on rules which apply in both lexical and postlexical modules, most notably palatalization rules (section 7).

At this point I diverge to look at a phonological subsystem relating to loan words the rules of which differ from the bulk of the language (section 8). I analyze loan word assimilation processes as being a separate set of lexical rules which apply to a different underlying alphabet (that of the loan language) in order to produce a lexical representation of these assimilated loan words.

Following on from there I discuss the postlexical module. First I look at the syntactic module (section 9). Then I look at the implementational module (section 10). I conclude with a listing of surface level phones (section 11).

2. UNDERLYING SEGMENTS

2.1 Segments

The underlying segments of Moronene are set out in the chart below. There are twenty-one consonant segments and five vowel segments. The consonant segments include seven stops, six prenasalized stops, three fricatives, three nasals, and two flaps.

Chart 1. Moronene Underlying Segments

Contoids:

	labial	alveolar	retro-flexed	velar	glottal
stops					
voiceless	p	t		k	ʔ
voiced	b	d		g	
prenasalized stops					
voiceless	^{m}p	^{n}t		^{ŋ}k	
voiced	^{m}b	^{n}d		^{ŋ}g	
fricatives	β	s			h
nasals	m	n		ŋ	
flaps		r	ʈ		

Vocoids:

	front	back
high	i	u
mid	e	o
low		a

Moronene has quite a symmetrical sound system. The three major points of articulation (bilabial, alveolar, velar) are represented by five parallel sets of obstruents, namely four sets of stops (plus or minus voice, plus or minus prenasalization), plus a set of nasals. There is also an extra glottal stop. There are no alveopalatals or semivowels.

The fricatives diverge somewhat from the symmetrical pattern. Instead of a velar fricative, there is a glottal fricative. It is also interesting that the bilabial fricative is voiced, whereas the other two are voiceless. This is an example of the correlation between point of articulation and the voicing of non-coronal fricatives noted by Gamkrelidze (1978, cited in Burquest and Payne 1993:38). He noted a cross-linguistic tendency that voiced labial fricatives were more common than voiceless ones, whereas voiceless velar or glottal fricatives were more common than voiced ones.

The liquids provide an interesting part of the system, for instead of the common distinction between a flap and a lateral, there are two flaps, differing in point of articulation. The retroflexed flap /ʈ/ is found in a number of other Sulawesi languages, such as Rampi.

Most of the above segments need no further phonetic description. The nasal portion of the prenasalized stops is not of short duration; phonetically it is just like a nasal plus stop cluster. In phonemic transcription, the prenasalized stops will be represented as digraphs and the alveolar flap as /r/.

2.2 Distinctive Features

The following chart gives the distinctive features for Moronene consonants and vowels:

Chart 2. Distinctive Features of Moronene Segments

	p	t	k	b	d	g	ᵐp	ⁿt	ᵑk	ᵐb	ⁿd	ᵑg	m	n	ŋ	r	ɽ	β	s	h	ʔ
syllabic	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
sonorant	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	−	−	−	−
continuant	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	−
nasal	−	−	−	−	−	−	+	+	+	+	+	+	+	+	+	−	−	−	−	−	−
anterior	+	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+	−	+	+	−	−
coronal	−	+	−	−	+	−	−	+	−	−	+	−	−	+	−	+	+	−	+	−	−
high	−	−	+	−	−	+	−	−	+	−	−	+	−	−	+	−	−	−	−	−	−
low	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+
back	−	−	+	−	−	+	−	−	+	−	−	+	−	−	+	−	−	−	−	−	−
voiced	−	−	−	+	+	+	−	−	−	+	+	+	+	+	+	+	+	−	−	−	−

	i	e	a	o	u
syllabic	+	+	+	+	+
high	+	−	−	−	+
low	−	−	+	−	−
back	−	−	+	+	+

2.3 Minimal Pairs

The following are minimal pairs of phonetically similar segments (morpheme boundaries are marked with +):

p/b	/me+pio/	'to squeeze'	/me+bio/	'to lay an egg'
b/β	/tobo/	'dagger'	/toβo/	'coconut shell'
b/m	/baɽo/	'block'	/maɽo/	'night'
b/mb	/bue/	'cradle'	/mbue/	'grandparent'
m/mb	/tomi/	'Loranthaceae vine'	/tombi/	'flag'
p/m	/paso/	'nail'	/maso/	'wild banana'
p/mp	/ʔapa/	'water resistant sheet'	/ʔampa/	'stake'
m/mp	/ʔama/	'dad'	/ʔampa/	'stake'
t/d	/mo+tea/	'hard'	/mo+dea/	'drunk'
t/s	/mo+ʔita/	'to request'	/mo+ʔisa/	'to pound'
d/n	/mo+dea/	'drunk'	/mo+nea/	'tame'
d/nd	/ʔona/	'just'	/ʔonda/	'scale'
n/nd	/pena/	'only'	/penda/	'again'
t/nt	/mo+ʔoto/	'to gather branches'	/mo+ʔonto/	'to see'
n/nt	/mo+bini/	'to pinch'	/mo+binti/	'to lift'
d/r	/dema/	'human'	/rema/	'sugar palm'
d/ɽ	/mo+dai/	'to adhere'	/mo+ɽai/	'to flee'
r/ɽ	/roŋo/	'rope'	/ɽoŋo/	'bluebottle fly'
k/g	/koo/	'tied bunch'	/goo/	'iguana'
k/ʔ	/raki/	'climb'	/raʔi/	'face'
k/h	/saka/	'hook'	/saha/	'chili'
ʔ/Ø	/beɽa+ʔu/	'your brother-in-law'	/beɽa+u/	'your wound'
g/ŋ	/gaɽu/	'garden'	/ŋaɽu/	'wind'

g/ŋg	/gogo/	'splash'	/goŋgo/	'buzz'
ŋ/ŋg	/padaŋa/	'sword'	/padaŋga/	'merchant'
k/ŋk	/mo+kara/	'not sweet'	/mo+ŋkara/	'horns far apart'
ŋ/ŋk	/baɲa/	'amazed'	/baŋka/	'boat'
m/n	/ʔama/	'dad'	/ʔana/	'child'
n/ɲ	/bana/	'thread'	/baɲa/	'amazed'
s/h	/siu/	'honey'	/hiu/	'comb'
i/e	/ʔisa/	'lost'	/ʔesa/	'ladder'
e/a	/ndoke/	'monkey'	/ndoka/	'try'
a/o	/maɽa/	'shoulder'	/maɽo/	'night'
o/u	/ʔuru/	'field protection magic'	/ʔoru/	'quick'

3. PHONOTACTIC CONSTRAINTS

In this section I look at constraints on how the underlying segments can be combined in morphemes. First I look at distribution constraints on certain consonants and then at vowel sequences, where it turns out there is very little constraint. What still awaits investigation are constraints on the juxtaposition of consonants and vowels, as well as possible constraints on the co-occurrence of consonants within morphemes.

3.1 Constraints on Consonants

All consonants can be found both word-initially and word-medially. No consonants occur in word-final position. The status of the glottal stop, however, needs special consideration.

3.1.1 Glottal stop

Glottal stop is clearly phonemic when it occurs in morpheme-medial position. Its status at word-initial position and at morpheme boundaries is more problematic.

Glottal stop does not contrast with zero utterance-initially. A glottal stop always precedes a vowel that would otherwise be utterance initial. This suggests that these initial glottal stops might be phonetic, inserted by a postlexical rule, rather than being phonemic. In this case, there would be a constraint on glottal stops that they do not occur in initial position. However, it is not so simple, as we will see below.

Glottal stops sometimes occur at morpheme junctures where two vowels are contiguous. This situation varies, depending on what type of morpheme boundary it is.

If the boundary is between a root and a suffix, there is often a set of contrasting allomorphs, one of which begins with a glottal stop, and one of which does not. Other allomorphs in the set begin with another consonant. The choice of allomorph is morphologically conditioned. Roots can thus be classified into word classes based on which allomorph they take. For example:

-o, -ʔo, -ho 'third singular absolutive'

/me+ʔahu+o/	'it smokes'
/baɽu+ʔo/	'sell it'
/me+ʔau+ho/	'it's sad'

-ako, -ʔako, -hako 'instrumental applicative'

/mo+basa+ako/	'to use to read'
/mo+ʔasa+ʔako/	'to use to remove gills'
/mo+soɽosa+hako/	'to use as a gutter'

In such cases, the glottal is clearly phonemic, contrasting with zero or other consonants. Hence we cannot say that glottal stops cannot occur in morpheme-initial position, since for suffixes, at least, they do.

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An alternative analysis would regard the suffix-initial consonants as underlying morpheme-final consonants which are deleted by rule in word-final position but are retained when there is suffixation. Hence we would reanalyze the earlier example above as follows:

/me+ʔahu+o/	'it smokes'
/baʈuʔ+o/	'sell it'
/me+ʔauh+o/	'it's sad'

While it is probable that such an analysis would be appropriate for an earlier proto-language, it is problematic for contemporary Moronene. The main evidence against it is variation of the consonant when different suffixes are attached to the same root. For example, if we change the above example to third plural absolutive, we get the following forms:

/me+ʔahuh+ira/	'they smoke'
/baʈuʔ+ira/	'sell them'
/me+ʔauh+ira/	'they're sad'

If we insist on morpheme-final consonants, we need two allomorphs of the root /ʔahuh/~/ʔahu/ 'smoke.' And such variation would be found in thousands of roots in the language. Hence it is better to assign the allomorphy to the affixes. The third plural absolutive morpheme has two allomorphs /ʔira/ and /hira/.

When a vowel-final prefix precedes a vowel-initial root, in the vast majority of cases a glottal stop will occur. Note the following examples showing different combinations of vowels at the morpheme juncture:

/e+i/	/te+isa/	[teˈʔisa]	'pounded'
/e+e/	/te+ete/	[teˈʔete]	'a little'
/e+a/	/me+ahu/	[meˈʔahu]	'to smoke'
/e+o/	/pe+oʔanu/	[peoˈʔanu]	'fought'
/e+u/	/te+uβu/	[teˈʔuβu]	'spilled'
/o+i/	/mo+itai/	[moʔiˈtai]	'to help'
/o+e/	/mo+edu/	[moˈʔedu]	'to dish up'
/o+a/	/mo+aha/	[moˈʔaha]	'to sharpen'
/o+o/	/mo+oʈo/	[moˈʔoʈo]	'sour'
/o+u/	/mo+uβeti/	[moʔuˈβeti]	'to scoop'

There are also examples where the glottal is optional. The variants without glottal occur in fast speech.

/i+u/	/ni+uβeti/	[niuˈβeti] ~ [niʔuˈβeti]	'scooped heap'
/e+a/	/te+ati+ho/	[teaˈtiho] ~ [teʔaˈtiho]	'he sneezed'
/e+u/	/me+umba/	[meˈumba] ~ [meˈʔumba]	'to toss'
/o+i/	/mo+ita/	[moˈita] ~ [moˈʔita]	'to ask'
/o+u/	/ko+uʈe/	[koˈuʈe] ~ [koˈʔuʈe]	'wormy'

But there are a few examples in which no glottal stop ever occurs:

/me+i+tonto/	[meiˈtonto]	'to be underneath'
/mo+oʔia/	[moːˈʔia]	'to stay'
/mo+oʔaβa+akono/	[moːʔaβaˈkono]	'to tell'
/mo+oßa/	[ˈmoːßa]	'to carry'
/ʈaa+eʔe/	[ˈʈaeʔe]	'river'
/hai+eʔe/	[haieʔe]	'at the water'
/βamba+eʔe/	[βamˈbaeʔe]	'Water Gate' (village)
/mo+ana/	[moˈana]	'right'
/ho+aʈu/	[hoˈaʈu]	'eight'
/ni+aʈu/	[niˈaʈu]	'eight days ago'

There are a number of possible ways of analyzing the presence or lack of a glottal at root-initial position. One way is to posit a glottal epenthesis rule which inserts glottal stops between prefixes and vowel-initial roots. For some morphemes the rule would be marked as optional.

The rule could be formulated as follows:

$$\emptyset \rightarrow \begin{bmatrix} -\text{syllabic} \\ -\text{continuant} \\ +\text{low} \end{bmatrix} / \text{X V} \begin{Bmatrix} \# \\ + \end{Bmatrix} \underline{\hspace{1em}} \text{V}$$

where X = prefix

Another way of analyzing the data would be to regard the initial glottal stop as phonemic. The morphemes cited above for which no glottal stop appears would then be the only vowel-initial morphemes in the language. All other apparently vowel-initial morphemes would be analyzed as starting with a phonemic glottal.

I propose to adopt the latter solution. It has a number of advantages:

(1) It means that the distribution of glottal stop parallels that of most other consonants, occurring in both initial and medial position. Otherwise we would have to claim that glottal never occurs in word-initial position, even though phonetically it does.

(2) It means that the occurrence of glottal stop in reduplication patterns conforms to that of other consonants. Otherwise reduplication of vowel-initial roots would require a separate pattern to explain the occurrence of glottal stops (see section 6.2.1).

(3) It means we no longer need a glottal epenthesis rule. And we no longer have to explain the exceptions to such a rule. Instead we would have an optional glottal deletion rule which would apply in fast speech. We would also need a rule adding a phonetic glottal in utterance-initial position when one of the handful of vowel-initial morphemes occurs at the beginning of an utterance.

The main overall advantage of the alternate solution of analyzing initial glottals as being phonetic is that it allows Moronene to conform to the apparent tendency for most languages to have many words starting with vowels. But this advantage (if it is one) is outweighed by the factors mentioned above.

Barsel (1994:13) makes a similar analysis of the glottal stop in Mori, a closely related language. She states that glottal stop "occurs before all word-initial vowels except those that begin the independent pronouns (e.g. *omue* 'second person singular, SG2'), the pronominal prefixes (e.g. *i-* 'third person singular subject marker, SG3.SB'), the common noun and proper noun markers, *o* and *i*, respectively, and the locative prefixes, *i-* and *aN-*." These largely correspond with the Moronene proclitics which do not have initial glottal stop.

There is evidence that some of the vowel-initial morphemes developed as the result of deletion of an initial consonant. Note the following protoforms and variants:[2]

/ana/	'right'	*hanaN
/aɽu/	'eight'	*walu (PMP)
/eʔe/	'water'	*iwoi
/apa/	'what'	/hapa/ (variant) < *hapa
/oßa/	'carry'	/ßoßa/ (Rumbia dialect) < *wawa

It is evident that deletion of /w/ or /ß/ or /h/ has given rise to the vowel-initial form. In the case of the final examples, both forms are still extant: the two forms of 'what' are in free variation in the expression /hai+hapa/~/hai+apa/ 'where'; /oßa/ is found in the Poleang dialect whereas /ßoßa/ occurs in the Rumbia dialect. We may hypothesize that initial glottal stop achieved phonemic status because or as the above consonants were deleted.

With regard to phonotactic constraints, we may conclude that there is no constraint on the distribution of glottal stop. It has the same distribution as most other consonants, occurring freely in both morpheme-initial and morpheme-medial position. But there may be some constraint on vowel-initial morphemes, or on the syllable pattern V occurring in morpheme-initial position.

The following is a complete list of vowel-initial morphemes from my database of over four thousand morphemes, grouped according to their position in the phonological word. Roots are divided into two groups; the bound roots must always be preceded by a prefix.

Proclitics:

/i/	'at'
/i/	'person indicator'
/io/	'common noun indicator'

Free roots:

/ia-/	'then'
/eʔe/	'water'
/apa/	'what'

Prefixed roots:

/-ana/	'right'
/-aɽu/	'eight'
/-oʔia/	'stay'
/-oʔaβa/	'tell'
/-oβa/	'carry'

Suffixes:

/-i/	'locative transitivizer'
/-a/	'locative nominalizer'
/-ako/	'instrumental'
/-aku/	'first person singular absolutive'
/-a/, /ako-/	'benefactive'
/-o/	'third person singular absolutive'
/-u/	'your'

Based on the above list we can observe that all the vowels occur in morpheme-initial position, but only /i/, /e/ and /a/ occur in word-initial position. I doubt that this is a systematic constraint, but rather a gap which occurs because of the scarcity of vowel-initial morphemes. Of the more than four thousand Moronene morphemes in my data base, about 99.6% of them begin with consonants.

3.1.2 Consonant frequency

Although every consonant can occur in both word-initial and word-medial position, their frequency of distribution is uneven, as is shown in Table 1 below. These frequencies were calculated from a database of 4237 morphemes. If the consonants were distributed evenly, one would expect a value of just under 5% for each consonant.

Particularly rare are voiceless prenasalized stops in morpheme-initial position. Note the following examples:

/mpiha/	'not at all'
/mpimpii/	'white-necked myna'
/nta/	'will'
/ntiintiinoe/	'lie straight with arms on body'
/ntoɽontoɽo/	'earthworm'
/ŋkoŋkoo/	'Javan black krait'

Overall /ŋg/ is the rarest consonant. This reflects the situation in Proto-Bungku-Tolaki, for which Mead (1998:95) found only one lexical item with /ŋg/. Some Moronene examples:

/ŋgiɽo/	'sparkle'
/ŋgoroŋgoro/	'miniature passion fruit'
/ɽaŋga/	'rest on'
/matuŋga/	'intend'

Mead (1998:95) notes that medial /g/ is unattested in Proto-Bungku-Tolaki; in Moronene this is not the case. Some examples:

/ɽogo/	'race'
/marago/	'noisy'
/tagia/	'forced labor'
/bagasia/	'be noisy at dusk'

Table 1. Consonant Frequency

Segment	Initial	Medial		Segment	Initial	Medial
p	8.4%	4.3%		b	8.2%	3.0%
t	14.0%	5.8%		d	4.6%	4.3%
k	12.3%	7.3%		g	2.2%	1.2%
mp	0.05%	2.3%		mb	0.4%	3.0%
nt	0.3%	2.7%		nd	0.4%	3.3%
ŋk	0.02%	4.0%		ŋg	0.1%	0.6%
w	4.2%	3.9%		m	3.7%	3.1%
s	9.8%	6.2%		n	1.6%	4.7%
h	4.3%	3.4%		ŋ	0.9%	6.9%
r	5.1%	12.1%		ɽ	7.5%	13.5%
ʔ	11.9%	2.9%				

3.2 Vowel Sequences

In two vowel sequences, there are no constraints; all vowels may occur with all other vowels.

/ii/	/tii/	'descend'
/ie/	/ʔosie/	'don't'
/ia/	/ʔopia/	'how many'
/io/	/ʔosio/	'nine'
/iu/	/siu/	'honey'

/ei/	/kei/	'a yell'
/ee/	/keena/	'there'
/ea/	/tea/	'soon'
/eo/	/ʔoɽeo/	'sun'
/eu/	/ɽeu/	'come'

/ai/	/maina/	'which'
/ae/	/pae/	'rice'
/aa/	/ʔopaa/	'four'
/ao/	/ʔao/	'type of bamboo'
/au/	/gau/	'word'

/oi/	/me+soi/	'to cover head with sarong'
/oe/	/mo+ntoe/	'high'
/oa/	/roani/	'bee'
/oo/	/roo/	'medicine'
/ou/	/me+ri'ou/	'previously'

/ui/	/mo+bui/	'to quickly run out'
/ue/	/ʔue/	'rattan'
/ua/	/βonua/	'region'
/uo/	/suo/	'bedroom'
/uu/	/ntuuro/	'nod sleepily'

There seems to be little or no restriction on three vowel sequences. The following are some three vowel sequences which have been found in single morphemes:

/iie/	/diie/	'this'
/iaa/	/ʔiaa/	'he/she'
/eie/	/peie/	'yon'
/eua/	/seua/	'pimple'
/aie/	/taie/	'that above'
/aia/	/paiasa/	'mirror'
/aiu/	/taiu/	'sago sediment'
/aea/	/βaea/	'candlenut'
/aeo/	/saeo/	'tamarind'
/aoa/	/daoa/	'market'
/aua/	/haua/	'type of wood'
/oie/	/koie/	'that'
/oia/	/ʔoia/	'dandruff'
/oea/	/koea/	'fruit bat'
/oae/	/mo+ʔoae/	'to congratulate'
/oau/	/koau/	'type of bird'
/uea/	/buea/	'crocodile'
/uai/	/tuai/	'younger sibling'
/uau/	/ʔuau/	'rice stalk'

The following are some additional three vowel sequences which have been found in polymorphemic words:

/iiu/	/po+ʔihii+u/	'your throne'
/iau/	/tia+u/	'your stomach'
/iuo/	/mo+rini+u+o/	'it's cold to you' (i.e. you find it cold)
/eiu/	/ʔin+eɽei+u/	'your wrongdoing'
/eeu/	/poɽenee+u/	'your eldest child'
/eau/	/bantea+u/	'your pavilion'
/eou/	/ʔeoʔeo+u/	'your ancestry'
/euo/	/mo+deŋke+u+o/	'it's weak to you'
/euu/	/ni+ɽeu+u/	'your coming'
/aeu/	/ntinae+u/	'your words'
/aau/	/βuɽaa+u/	'your gold'
/aou/	/ni+dao+u/	'view obstructed by you'
/auo/	/mo+bata+u+o/	'it's light to you'
/oei/	/ni+ɽoe+i/	'cherished'
/ouo/	/mo+βuro+u+o/	'it's blurry to you'
/uuo/	/mo+βondu+u+o/	'it's fragrant to you'

The following is a four vowel sequence which has been found in a single morpheme:

/uaea/	/kuaea/	'black hawk'

The following are additional four vowel sequences which have been found in polymorphemic words:

/iauo/	/tonia+u+o/	'it's new to you'
/eeuo/	/me+ntee+u+o/	'it's clear to you'
/eauo/	/mo+ɽea+u+o/	'it's spicy to you'
/aeau/	/parasaea+u/	'your belief'
/aeou/	/saeo+u/	'your tamarind'
/aauo/	/mo+ɽiŋaa+u+o/	'it's bright to you'
/auuo/	/me+ŋkau+u+o/	'it's long to you'
/oeuo/	/mo+ntoe+u+o/	'it's tall to you'
/oaea/	/m+poae+a+no/	'his/her compliment'
/oauo/	/ßoa+u+o/	'it's empty to you'
/ueau/	/buea+u/	'your crocodile'
/uaiu/	/tuai+u/	'your younger sibling'
/uauo/	/mo+ßua+u+o/	'it's clean to you'

In conclusion, it seems there are virtually no constraints on vowel sequences. The gaps which exist in the three or four vowel sequences are probably due to lack of data, or random gaps among the large number of possible sequences. One possible constraint I may suggest is a constraint on the sequence of three identical vowels, which would rule out a word such as */daaa/.

4. SYLLABIFICATION AND STRESS

4.1 Basic Pattern

The basic pattern of Moronene syllables and stress assignment is straightforward. There are two syllable patterns, CV and V, and stress occurs on the penultimate syllable of the word. Note the following unambiguous monomorphemic examples:

Chart 3. Some Unambiguous Syllable Patterns

No. of Syllables	Structure	Example	Meaning
2	CV.CV	/ˈki.re/	'eyebrow'
	CV.V	/ˈßo.a/	'empty'
3	CV.CV.CV	/ßo.ˈtu.tu/	'mosquito net'
	CV.V.CV	/ku.ˈa.ra/	'axe handle'
	CV.CV.V	/to.ˈni.a/	'new'
	CV.V.V	/ko.ˈe.a/	'fruit bat'
4	CV.CV.CV.CV	/ra.ra.ˈpo.ke/	'trance'
	CV.V.CV.CV	/pu.i.ˈɽo.si/	'fall out'
	CV.CV.V.CV	/to.nu.ˈa.na/	'ghost'
	CV.CV.CV.V	/ki.ni.ˈßi.a/	'afternoon'
5	CV.CV.CV.CV.CV	/ta.ta.ɽa.ˈha.ga/	'laugh loudly'
	CV.CV.V.CV.CV	/su.mi.a.ˈra.ra/	'red light after sunset'

When any suffix or enclitic is added, the stress normally shifts, staying on the penultimate syllable of the word. This contrasts with many Sulawesi languages in which enclitics are extrametrical, causing no shift of stress.

(A)	[moˈtuʔi]	'dry'	[motuˈʔimo]	'already dry'
	[naˈhina]	'there is not'	[nahiˈnamo]	'there is not any more'
	[moˈkuni]	'yellow'	[mokuˈnimo]	'already yellow'
	[ɽoˈɽaŋa]	'burst into flame'	[ɽoɽaˈŋamo]	'already burst into flame'
	[ˈbonto]	'sopping wet'	[bonˈtoko]	'you're sopping wet'

In contrast to this normal pattern, there are some cases where there is variation. Note the examples below:

(B)   ['ʔaɾi]   'finish'   [ʔa'ɾimo] ~ ['ʔaɾimo]   'already finished'

['duŋku]   'arrive'   [duŋ'kumo] ~ ['duŋkumo]   'already arrived'

[moko'seo]   'be cold'   [mokose'oko] ~ [moko'seoko]   'are you cold?'

[te'βaɾi]   'become'   [teβa'ɾio] ~ [te'βaɾio]   'he became'

[mompa'guɾu]   'teach'   [pagu'ɾuʔo] ~ [pa'guɾuʔo]   'teach him'

It is more common that the stress shifts than that it does not. The motivation for this phenomenon may be the retention of stress in the position where it would normally fall when there is no clitic.

The basic syllable and stress pattern forms the basis for the interpretation of some potentially ambiguous segment sequences, namely prenasalized stops and long vowels.

4.2 Prenasalized Stops

Prenasalized stops are interpreted as single units rather than as a CC sequence. The evidence supporting this is as follows:

1. There are no unambiguous consonant sequences in Moronene except in a few loan words such as /saptuu/ 'Saturday'.

2. There are no words ending in a consonant, which means that CVC or VC syllables never occur word-finally. If we divide word-medial prenasalized stops between two syllables, as below, this would be the only place in the language where CVC or VC syllables occur.

/buŋ.ku/   back
/ʔam.pa/   stake

By analyzing the prenasalized stops as one unit and dividing the syllables /bu.ŋku/, /ʔa.mpa/, we eliminate two unneeded syllable patterns.

3. The prenasalized stops may occur word-initially. Analyzing them as one unit means we do not need to posit an otherwise unneeded CCV syllable pattern. Examples:

/mbue/   'grandparent'
/ndeŋindeɲi /   'bamboo percussion instrument'
/ntei/   'owner'
/ŋguruda/   'garuda (bird)'

4.3 Geminate Vowels

In Moronene, long vowels are clearly contrastive with short vowels. Note the following minimal pairs with long vowels and short vowels (data set C), as well as other words showing long vowels in various positions (data set D):

(C)   [bi'tʃoko]   'shriveled'   [biː'tʃoko]   'water in your ears'

['eko]   'tray'   ['eːko]   'hang you'

['pani]   'wing'   ['paːni]   'bait'

['sapi]   'cow'   ['saːpi]   'crossbeam'

['pono]   'full'   ['poːno]   'his/her mango'

['βuku]   'bone'   ['βuːku]   'my hair'

['susu]   'milk'   ['suːsu]   'suckle'

(D)   ['kiːɾi]   'shave'   ['tiː]   'descend'

['ɾeːko]   'spoiled'   ['neː]   'name'

['kaːho]   'eat it'   [ʔo'paː]   'four'

[meso'soːɾi]   'regret'   ['goː]   'iguana'

['ntuːɾo]   'nod sleepily'   ['tuː]   'knee'

There are two possible ways of interpreting the above data. Muthalib et al (1991:25) regard the long vowels as separate phonemes. Then they analyze stress as being penultimate except for final long vowels. The solution I propose, which also is in line with similar analyses of related Sulawesi languages, is to regard the long vowels as geminates, that is, sequences of the same vowel. This reduces the number of phonemes and preserves the penultimate stress pattern.

4.4 Diphthongization

So far all the data presented has been shown to conform to the basic pattern of syllables and stress. The following data, however, is less easy to accommodate to the basic pattern and necessitates the setting up of somewhat more complex syllabification and stress assignment rules:

(E) ['ko^{i}e]   'that'
     ['pe^{i}e]   'yon'
     ['ta^{i}e]   'that above'
     ['ta^{i}u]   'sago sediment'
     [ku'a^{e}a]   'black hawk'
     ['ßa^{e}a]   'candlenut'

(F) ['ɽa^{i}tʃa]   'house'
     ['ma^{i}na]   'which'
     ['ba^{u}ɾa]   'skin'
     [pa'ŋa^{u}ßa]   'sail'

In the above examples, stress falls on the antepenultimate vowel. At the same time, the penultimate vowel which follows the stressed vowel is very short (indicated by superscript). This can be seen as a process of diphthongization, the two vowels in question becoming the complex nucleus of one syllable (I am here indebted to Laidig (1992) which treats diphthongization in Larike).

A similar phenomenon occurs when the antepenultimate and penultimate vowels of a word form a geminate vowel cluster. In this case the stress falls on the first of the geminate vowels which is the antepenultimate vowel of the word. Examples:

(G) /'kiiri/   'shave'
     /'reeko/   'spoiled'
     /'kaaho/   'eat it'
     /meso'soori/   'to regret'
     /'suusu/   'suckle'
     /'ntuuro/   'nod sleepily'

The diphthongization process discussed above can also be found in other examples where stress is still in the normal penultimate position:

(H) [tu'a^i]   'younger sibling'
     [konu'ʔa^i]   'centipede'
     [mo'ga^u]   'speak'
     [kaɾa'mba^u]   'water buffalo'
     ['pa^e]   'rice'
     ['ßa^o]   'leech'

(I) [ßa^i'pode]   'maiden'
     [ma^i'asa]   'gravestone'

The above sets of data show that stress is not always on the penultimate syllable, and that there is evidence that one syllable may have two vowels as its nucleus. This means the simple syllabification and stress rules we started with are not adequate.

In the case of diphthongs ending with [i] or [u], one might suggest that these be interpreted as semivowels /y/ or /w/, since these are indistinguishable phonetically from the shortened vowels. However there are a number of reasons to reject such an analysis:

1. If we interpret [u] as /w/, it means we would have an otherwise unnecessary additional underlying segment. But this segment would have a skewed distribution, never occurring in morpheme-initial position. On the other hand, in CV phonology, /w/ is merely /u/ attached to a C position on the skeletal tier, so it would not really be an additional segment.[3]

2. When the putative semivowels occur between vowels (data set (E) above), the semivowel interpretation would still conform to the basic syllable pattern, e.g. CV.CV. It would also conform to the penultimate stress rule. For example:

/'ko.ye/   'that'
/'ta.yu/   'sago sediment'

But in data set (F), where the supposed semivowel precedes a consonant, or data set (H), where it is word final, such an analysis would mean the positing of other syllable types, CVC or VC. In data set (H), this would mean that the penultimate stress rule would no longer apply.

3. It is preferable to treat all the vowel sequences which undergo diphthongization the same way. Although interpretation as semivowels could possibly be used for some of the sequences, it is more problematic to explain the sequences /ae/ and /ao/ that way. The same applies to the geminate sequences. I therefore prefer the analysis that the shortened vowels in such sequences retain their status as vowels.

4.5 Syllabification and Stress Rules

I propose the following syllabification and stress rules to explain the data presented above. These rules should probably be regarded as cyclic in that they apply in both stratum 1 and stratum 2 of the lexical module and reapply whenever another rule changes the syllable structure of a word being formed, for example by deletion. This is similar to Mohanan's analysis of English phonology (1986:32) in which "syllable formation . . . applies not only to the forms in the morpheme list, but also to every derived form at strata 1 and 2."

Syllabification rules:
1. Assign C labels to [-syllabic] segments and V labels to [+syllabic] segments.
2. Assign one σ to every sequence of geminate vowels.
3. Assign one σ to each of the following vowel sequences: /aV/, /ei/, /oi/, /ou/.
4. Assign σ to any unassociated V's.
5. Assign C's to σ on the right.

Stress assignment rules:
1. Assign stress to the syllable dominating the penultimate vowel of word.
2. The first vowel of a stressed syllable takes the stress.

Assigning of σ to geminate vowels (Step 2) needs to precede the assigning of σ to other vowel sequences (Step 3) in order to account for data such as the following:

/βu.'ɽaa.u/   'your gold'
/'daa.u/   'your being'

In the above data there are two overlapping vowel sequences subject to diphthongization, namely /au/ and /uu/. Hence there are two possible ways of syllabification which would result in acceptable complex syllable nuclei, e.g. /aa.u/ or /a.au/. But the stress placement on the first geminate vowel shows that the geminate sequences are indivisible when it comes to syllable division.

The application of the syllabification rules is demonstrated in the following example.

Rule 1
```
C V V V C V
t u a i + n o
```

Rule 2   Does not apply

Rule 3
```
      σ
      |\
C V V V C V
t u a i + n o
```

Rule 4
```
σ   σ       σ
|   |\      |
C V V V C V
t u a i + n o
```

Rule 5
```
σ   σ       σ
/|  |\     /|
C V V V C V
t u a i + n o
```

Stress assignment (s = stressed, u = unstressed):

```
u   s       u
|   |       |
σ   σ       σ
/|  |\     /|
C V V V C V
t u a i + n o
```

4.6 Secondary stress

There are two rules which determine the placement of secondary stress. The first is that of alternating stressed syllables; the second is that of penultimate morpheme stress and relates to the function of demarcating the subunits of the phonological word.

The clearest examples of the first rule are four and five syllable words. The antepenultimate syllable takes primary stress; the fourth-to-last syllable takes secondary stress:

/kiniβia/	[ˌkiniˈβia]	'afternoon'
/pineβuβu/	[ˌpineˈβuβu]	'spring'
/tabe+ʔira/	[ˌtabeˈʔia]	'forbid them'
/mon+toria/	[ˌmontoˈria]	'to guard'
/ʔin+aβa+ndo/	[ˌʔinaˈβando]	'found by them'
/ʔu+ʔuŋke+e/	[ˌʔuʔuˈŋkeː]	'look for it'
/po+pate+aku/	[poˌpateˈaku]	'kill me'
/me+nee+hako/	[meˌneːˈhako]	'to name'
/me+βua+tako/	[meˌβuaˈtako]	'to lift up'
/bo+boto+ʔako/	[boˌbotoˈʔako]	'unite'

The second rule comes into play with words longer than five syllables. The rule is that every subunit of the word that has two or more syllables takes a secondary stress on the penultimate syllable of the subunit. These subunits include prefix clusters, the stem, and dimoraic reduplication. A final subunit is the suffix cluster, which takes the penultimate primary stress if it is polysyllabic.

Sometimes there is no conflict between these two rules. This is the case where each subunit is two syllables, or where a one syllable prefix precedes a three syllable stem. In the following examples a hyphen separates the subunits of the word in the phonetic transcription, whereas individual morpheme breaks are shown in the lexical representation.

/mo+po+pate+aku/	[ˌmopo-ˌpate-ˈaku]	'to kill me'
/ndo+pe+tii+hako/	[ˌndope-ˌti:-ˈhako]	'they lowered'
/ndo+ʔoɽiβi+o+mo/	[ˌndo-ʔoˌɽiβi-ˈomo]	'they already advised'
/po+oʔia+ho+mo/	[ˌpo-oˌʔia-ˈhomo]	'he was left'
/kiniβia+ho+mo/	[ˌkiniˌβia-ˈhomo]	'it is evening already'

In cases where the two rules conflict, the demarcation rule takes precedence. Such conflicts usually arise when subunits with an odd number of syllables are juxtaposed with subunits having an even number of syllables.

Three or five syllable suffixes:

/ɽoɽa+ako+o+mo/	[ˌɽoɽa-aˈko:mo]	'already submerged'
/upu+a+no+mo/	[ˌupu-aˈnomo]	'already the end'
/mo+ʔotu+akita/	[ˌmo-ˌʔotu-aˈkita]	'to cut for us'
/te+bi+bintʃo+ʔira+mo/	[ˌte-biˌbintʃo-ʔiˈɽamo]	'they were startled'
/tagiɽi+akomiu+mo/	[taˌgiɽi-ˌakomiˈumo]	'unlock it for you (pl.)'

Three or four syllable stems:

/sosa+ŋkaruru/	[ˌsosa-ŋkaˈɽuɽu]	'fall fluttering'
/pe+ʔuɽea+hi+o/	[pe-ˌʔuɽea-ˈhio]	'got on it'
/mom+poko+mo+taha/	[moˌmpoko-moˈtaha]	'to make red'
/poko+pe+ndua/	[ˌpoko-peˈndua]	'make it twice'
/ɽakiana+ku/	[ˌɽakiaˈna-ku]	'my nephew/niece'

One syllable suffixes:

/to+pe+dandi+mo/	[ˌtope-daˈndi-mo]	'let's promise'
/meka+kuɽe+kuɽe+pi/	[ˌmeka-ˌkuɽe-kuˈɽe-pi]	'to lie to one another'
/raʔi+raʔi+no/	[ˌraʔi-raˈʔi-no]	'his/her face'
/kom+pura+pura+no/	[ko-ˌmpuɽa-puˈɽa-no]	'the final one'

The evidence suggests that morphemes are assigned penultimate stress in the lexical module. This morphemic stress can be overridden by penultimate word stress when the latter falls on the final syllable of the morpheme, as in the above examples with one syllable suffixes. Otherwise the morphemic stress will be manifested as secondary stress.

The pattern of secondary stress in the following words can be explained if we identify them as originally being compound morphemes. Each of the original morphemes takes penultimate stress.

/kanaʔumpe+mo/	[ˌkana-ʔuˈmpe-mo]	'how'
/dadaʔiaa+mo/	[ˌdada-ʔiˈa:-mo]	'continually'
/kanahi+ako/	[ˌkana-hiˈako]	'say'
/kanahi+o+mo/	[ˌkana-hiˈomo]	'he said'

The following words seem to be exceptions to the rules illustrated above in that they have initial stress on the stem. I suggest these morphemes are marked with secondary stress on the initial syllable in the lexicon. This shows that stress in Moronene is not entirely predictable, at least with regard to secondary stress.

| /sumiarara/ | [ˌsumiaˈɽaɽa] | 'red light in clouds after sunset' |
| /ʔoŋkona+ho+mo/ | [ˌʔoŋkona-ˈhomo] | 'it is enough already' |

Monosyllabic prefixes generally do not take secondary stress unless the initial syllable of the stem is unstressed. Nominative proclitics are an exception: they always have secondary stress. This is evidence that they are clitics, not prefixes.

Prefixes:

/me+ɾeu/	[me-'ɾeu]	'come (pl.)'
/me+βiso/	[me-'βiso]	'to enter'

Proclitics:

/mi+ɾeu/	[ˌmi-'ɾeu]	'you (pl.) come'
/mi+βiso+ʔaku+mo/	[ˌmi-ˌβiso-ʔa'kumo]	'you (pl.) put me in'
/ku+daʔa/	[ˌku-'daʔa]	'I don't'
/ndo+ɾako/	[ˌndo-'ɾako]	'they go'

5. LEXICAL MODULE STRATUM 1

Phonological rules which apply in the lexical module apply to the underlying representation and produce the lexical representation. Such rules may be morphologically conditioned; they may apply to certain lexical items but not to others. They may apply within words but not across word boundaries. Because of this they generally have surface exceptions; examples can be found at the surface level where the process outlined in the lexical rule does not apply even though the environment spelled out in the rule is present. Katamba (1989:280) summarizes the distinction between rules applying in the lexical and postlexical modules as follows: "Lexical rules have access to word-internal structure, are structure preserving, cannot apply across word boundaries, apply cyclically and have exceptions; the latter have none of these properties."

The lexical module is divided into two strata. Certain affixes are added in stratum 1 and certain rules apply in that stratum. These rules do not apply to affixes added in stratum 2.

5.1 Vowel Copy

The following process applies to only one morpheme, the diminutive clitic -ʔVte. The first vowel of the clitic matches the final vowel of the stem to which the clitic attaches. Note that the clitic starts with a glottal stop which separates the two identical vowels.

[ʔoˌkidi'ʔite]	'very small'	/ʔokidi/	'small'
[ˌne:'ʔete]	'nickname'	/nee/	'name'
[ˌʔana'ʔate]	'small child'	/ʔana/	'child'
[ˌheo'ʔote]	'small ant'	/heo/	'ant'
[ˌmanu'ʔute]	'small chicken'	/manu/	'chicken'

The rule can be formulated as follows:

(1)   [+syllabic] → [α F] / [α F] +   C ___
                                              [+low]

The above rule means that a syllabic segment preceded by a glottal consonant (+low) in a suffix takes on all the same features as the preceding segment just before the morpheme boundary.

This rule needs to have its domain restricted to stratum 1 because it does not apply with other suffixes which begin with a glottal stop. Note the following cases in which the rule does not apply. Lexical phonology can handle this by assigning the suffixes found in the examples below to stratum 2 of the lexical module.

/tabe+ʔaku/	'forbid me'
/hau+ʔakono+ʔo/	'scoop it for him'
/gagara+ʔo/	'shout at him'
/mo+hoda+ʔira/	'they have a cold'
/koɾo+ʔakita+ʔo/	'cut it for us'

5.2 Low Vowel Copy

A similar vowel copy rule affects the underlying /o/ in possessive suffixes after the morpheme /naʔa/ 'also':

Underlying	Lexical	Meaning
/naʔa+no/	/naʔana/	'also him/her'
/naʔa+nto/	/naʔanta/	'also us (incl.)'
/naʔa+ndo/	/naʔanda/	'also them'

Unlike the previous rule, high vowels are unaffected:

/naʔa+ŋku/	'also me'
/naʔa+u/	'also you'
/naʔa+miu/	'also you (pl.)'

The rule can be formulated as follows:

$$(2) \quad \begin{bmatrix} +\text{syllabic} \\ -\text{high} \end{bmatrix} \rightarrow [+\text{low}] \ / \ \begin{bmatrix} +\text{syllabic} \\ +\text{low} \end{bmatrix} + C \ \underline{\quad}$$

The rule means that the first nonhigh vowel in a suffix becomes low when the final vowel of the stem is low.

This rule needs to have its domain restricted to stratum 1 because it does not apply when possessive suffixes are added to other stems. Note the following cases in which the rule does not apply.

/paʔa+no/	'his/her thigh'
/gaɽa+no/	'his/her bridle'
/saha+nto/	'our chili'
/hapa+hapa+nto/	'our belongings'
/daa+ndo/	'their being'

We cannot handle this by simply assigning the suffixes found in the above examples to stratum 2 of the lexical module. This is because the lexical item which conditions the rule is not the suffix, but the stem. A similar situation arises in English with regard to the prefix *dis-*, which according to Mohanan (1986:45) can be attached at either stratum 1 or 2, depending on which stem it is affixed to. This is because with some stems it undergoes stratum 1 rules, but with others it does not. Similarly I suggest that the affixes /no/, /ndo/ and /nto/ are attached in stratum 1 to the stem /naʔa/, but in stratum 2 to other stems.[4]

6. LEXICAL MODULE STRATUM 2

Most rules applying in the lexical module have stratum 2 as their domain. This is the default domain for any rule which does not need to be assigned to stratum 1 because of its restricted application.

6.1 Nonhigh Vowel Copy

This process is somewhat similar to the stratum 1 vowel copy rule except that it only applies to two nonhigh vowels rather than all five vowels. Another difference is that no consonant is present between the two identical vowels, as was the case in both the stratum 1 vowel copy rules. It only is found with one morpheme, the third person absolute suffix /-o/. When this suffix is attached to a verb with final /a/ or /e/, the vowel of the suffix assimilates to the final vowel of the verb stem. If the verb has final /o/, the suffix is also /o/. Examples:

/turupa/	'leak'	/turupa+a/	'it leaks'
/tuuna/	'fall'	/tuuna+a/	'he falls'
/ʔehe/	'want'	/ʔehe+e/	'want him/her'
/pore/	'naughty'	/pore+e/	's/he's naughty'
/moiko/	'good'	/moiko+o/	'it's good'
/mo+saʔo/	'wrecked'	/mo+saʔo+o/	'it's wrecked'

After high vowels the suffix stays as /-o/. Examples:

/te+tutuβi/	'closed'	/te+tutuβi+o/	'it's closed'
/te+buri/	'written'	/te+buri+o/	'it's written'
/sampu/	'used up'	/sampu+o/	'it's used up'
/te+sambu/	'connected'	/te+sambu+o/	'it's connected'

The rule can be formulated as follows:

$$(3) \quad \begin{bmatrix} +\text{syllabic} \\ -\text{high} \end{bmatrix} \rightarrow \begin{bmatrix} \alpha \text{ back} \\ \alpha \text{ low} \end{bmatrix} \Big/ \begin{bmatrix} +\text{syllabic} \\ -\text{high} \\ \alpha \text{ back} \\ \alpha \text{ low} \end{bmatrix} + \underline{\quad} \#$$

The above rule means that a nonhigh syllabic segment takes on all the same features with regard to backness and lowness as a preceding nonhigh syllabic segment when it is in word-final position. We do not need to give further specifications, since the third singular absolutive suffix is the only suffix which starts with /o/ (see section 3.1.1).

Surface exceptions to this rule occur when the sequences /ao/ or /eo/ occur within morphemes. This is evidence that this rule has access to morphological information and hence applies in the lexical stratum. Examples:

/ʔao/	'type of bamboo'
/kandao/	'sickle'
/peo/	'lagoon'
/mo+reo/	'have a fever'

6.2 Reduplication

There are two main types of reduplication in Moronene, monomoraic and dimoraic reduplication.[5] A mora is a unit of syllable weight. In this case, we are concerned with vocalic morae, so that monomoraic reduplication means that one vowel and its accompanying consonantal onset is reduplicated (this may be one syllable, or less than a syllable), whereas dimoraic reduplication means that two vowels with their accompanying onsets are reduplicated (this may be one syllable or two syllables).

6.2.1 Monomoraic Reduplication

In monomoraic reduplication the first mora of the root is reduplicated. In data set (J), the reduplicated mora is word-initial; in data set (K) the reduplication is preceded by a prefix. A hyphen separates the reduplication from the root.

(J)	/be-berese/	'to thunder'
	/hu-humehe/	'neigh repeatedly'
	/ʔu-ʔume+ti+o/	'frighten him'
	/ʔo-ʔonto+o/	'look at it'

(K)	/me+ke-keo/	'to scratch'
	/mo+ɽi-ɽiti+o/	'to wind around'
	/te+ʔo-ʔotolu/	'three each'

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Note that roots beginning with glottal stop follow the same pattern as other consonants. This adds support to my analysis of initial glottal as phonemic, as discussed above in section 3.1.1.

When the first mora has the vowel /a/ as peak, the reduplicated mora replaces this with /o/. This is probably related to a sound change in Proto-Bungku-Tolaki in which Proto-Malayo-Polynesian */a/ was raised to */o/ in antepenultimate position (Mead 1998:68). Examples:

/ṭo-ṭako/	'go for a walk'
/me+to-tama/	'to chase men'
/mo+do-damba/	'cover with batter'
/mon+to-tai/	'slice up'

In order to handle this variation in the vowel, I posit two different templates for monomoraic reduplication. These are Co and CV. Co means consonant plus the preassociated vowel /o/. This template is used for roots with /a/ in the first mora. The CV template is used for all other roots.

6.2.2 Dimoraic Reduplication

In dimoraic reduplication the first two morae of the root are reduplicated. In data set (L), the reduplicated morae are word-initial; in data set (M) the reduplication is preceded by a prefix.

(L)	/tade-tade/	'go for a walk'
	/ʔoṭe-ʔoṭeo/	'every day'
	/baṭu-baṭu/	'goods for sale'

(M)	/ko+sampa-sampa/	'having many branches'
	/mo+kora-kora/	'rather strong'
	/mo+bio-bio/	'smell of eggs'

The template used for dimoraic reduplication is CVCV.

The following examples show why the reduplication needs to be defined in terms of morae rather than syllables. When a reduplicated root begins with a diphthongized syllable, it is the morae (one V equals one mora) which determine the reduplication, not the surface syllable structure. With dimoraic reduplication in such cases only one surface syllable is reduplicated but it is still two morae. Note the following examples (surface syllables are divided by periods):

/ka+ṭai-ṭaika/	[ka.ṭa^i.'ṭai.tʃa]	'toy house'
/mo+bae-baea/	[mo.ba^e.'ba^e.a]	'to carry casually with hand'
/mo+bau-bauṭa/	[mo.ba^u.'ba^u.ṭa]	'smell of animal hide'

With monomoraic reduplication in such cases the one mora which is reduplicated is less than one surface syllable. Note the following examples:

/me+ṭo-ṭaika/	[me.ṭo.'ṭa^i.tʃa]	'to go from house to house'
/mo+se-sei/	[mo.se.'se^i]	'to cut up'
/mo+so-saa/	[mo.so.'sa:]	'to chase every which way'

6.3 Nasal Assimilation

This process affects only one morpheme, the nasal ligature, symbolized as N-. This morpheme joins two nouns or other items in a close syntactic relationship such as a verb plus adverb, similar to a compound word. The nasal assimilates to the point of articulation of the initial consonant of the second noun. Examples:

(N)	/βonua/	'place'		
	/po+ṭuṭu+a/	'tobacco'	[βo͵nuampoṭu'ṭua]	'tobacco pouch'
	/bote/	'burst'		
	/puhu/	'corn'	[͵botem'puhu]	'popcorn'
	/ʔadaṭo/	'youth'		
	/tama/	'man'	[ʔa͵daṭo'ntama]	'young man'

/kuŋkuma/	'handle'		
/taa/	'sword'	[kuŋˌkumaˈnta:]	'sword hilt'
/kadera/	'chair'		
/keu/	'wood'	[kaˌderaˈŋkeu]	'wooden chair'
/ɽako/	'go'		
/karu/	'foot'	[ˌɽakoˈŋkaɾu]	'go on foot'

(O)
/ʔana/	'child'		
/bebe/	'duck'	[ˌʔanaˈbebe]	'duckling'
/pae/	'rice'		
/dai/	'adhere'	[ˌpaeˈdai]	'sticky rice'
/goɽu/	'ball'		
/gata/	'rubber'	[ˌgoɽuˈgata]	'rubber ball'

(P)
/gondi/	'key'		
/βamba/	'door'	[ˌgondiˈβamba]	'door key'
/teba/	'bridle'		
/sapi/	'cow'	[ˌtebaˈsapi]	'cow bridle'
/tumpu/	'artisan'		
/rada/	'beat'	[ˌtumpuˈrada]	'blacksmith'
/βuɽu/	'feather'		
/manu/	'chicken'	[ˌβuɽuˈmanu]	'chicken feather'

In data set (N) it can be seen that the initial voiceless stop of the second word is prenasalized at the same point of articulation when the two words are compounded. When the second word begins with a voiced stop, there is no prenasalization, as shown in data set (O). Data set (P) similarly shows that no change occurs when the second word begins with a continuant or nasal.

There are at least three ways of formalizing the process exemplified above. The first is to treat it as a case of nasal assimilation as shown below.

(4)
$$[+\text{nasal}] \rightarrow \begin{bmatrix} \alpha \text{ anterior} \\ \beta \text{ coronal} \\ \gamma \text{ high} \end{bmatrix} / \underline{\quad} \begin{bmatrix} -\text{continuant} \\ \alpha \text{ anterior} \\ \beta \text{ coronal} \\ \gamma \text{ high} \end{bmatrix}$$

However it might be felt that this solution does not give sufficient cognizance to the fact that in Moronene, the prenasalized stops are interpreted as one segment, not two. Hence the process should be seen as the replacement of one consonant by another, rather than the addition of an extra nasal segment before the stop. One way of doing this can be seen in Hanna's treatment of a similar phenomenon in Napu (Hanna 1991: 163). He formulated the following rule:

(5)
$$\begin{array}{ccccc} 1 & 2 & & 1 & 2 \\ [+\text{nasal}] & \begin{bmatrix} +\text{consonantal} \\ -\text{continuant} \\ -\text{delayed release} \end{bmatrix} & \rightarrow & \emptyset & [+\text{nasal}] \end{array}$$

The advantage of this solution is that the processes of nasal assimilation and deletion of the preceding nasal occur simultaneously.

Another way of doing this is to regard the ligature as a suprasegmental morpheme, rather than a segment. This means we do not interpret N- as being an underspecified nasal segment or archiphoneme; rather it symbolizes a nasalization process. This nasalization process consists of adding the feature [+nasal] to the first segment of the second word in the compound if that segment is a voiceless plosive. In this case, no assimilation rule is needed, since the nasal feature simply unites with the other features of the segment which already spell out the place of articulation.

Rather than being a phonological rule applying in the lexical module, we regard it as being a morphological rule relating to a particular morpheme which is attached in stratum 2 of the lexical module. Whenever the feature [+nasal] is combined with a voiceless plosive, we always end up with a prenasalized plosive, whether the segment is an underlying prenasalized plosive, or a combination of suprasegmental morpheme and voiceless plosive.

6.4 Vowel Fronting

There are a number of lexical items which exhibit variation between /i/ and /u/:

/ʈakiβa/ ~ /ʈakuβa/   'widower'
/siβa/ ~ /suβa/   'left'
/tiβe/ ~ /tuβe/   'spin piece of coconut shell (game)'

Which form is used varies somewhat from speaker to speaker. We can analyze this as being underlying /i/ optionally changed to /u/ by lexical rule, the following bilabial consonant being the conditioning factor. The rule, stating that a high vowel is fronted before an anterior noncoronal continuant (i.e. /ß/) can be formulated as follows:

(6)
$$\begin{bmatrix} +\text{syllabic} \\ +\text{high} \end{bmatrix} \rightarrow [-\text{back}] \ / \ \underline{\quad} \begin{bmatrix} +\text{continuant} \\ +\text{anterior} \\ -\text{coronal} \end{bmatrix}$$

This rule is classified as applying in the lexical module because we can find lexical items where this process does not take place. These would be marked with an exception feature. Examples:

/hiβahiβa/   'behavior'
/ʔoʈiβi/   'advice'
/kiniβia/   'evening'

6.5 Deletion of /m/

This suffix weakening process affects morphemes denoting first person plural exclusive: the free pronoun /i+kami/, the possessive suffix /mami/, the absolutive suffix /kami/, and the benefactive suffix /akami/. When any of these is followed by a monosyllabic clitic or suffix, such as the clitics /mo/, /po/, or /si/, or the absolutive suffix /ʔo/ or /o/, the medial /m/ is optionally deleted:

/ikami+mo/   ~   /ikai+mo/   'it's us already'
/perari+mami+po/   ~   /perari+mai+po/   'our satisfaction yet'
/moiko+mami+o/   ~   /moiko+mai+o/   'it's good to us'
/ʔorua+kami+si/   ~   /ʔorua+kai+si/   'two of us'
/da+kami+mo/   ~   /da+kai+mo/   'we are already'
/ʔaʈa+akami+ʔo/   ~   /ʔaʈa+akai+ʔo/   'get it for us'

The rule can be formulated as follows:

(7)
$$\begin{bmatrix} +\text{nasal} \\ +\text{anterior} \\ -\text{coronal} \end{bmatrix} \rightarrow \emptyset \ / \ + (C) (V) C V \underline{\quad} V + (C) V \#$$

The rule means that a labial nasal (+anterior, -coronal) becomes zero when it is the onset of the last syllable of a polysyllabic suffix followed by a monosyllabic suffix. One effect of this process is that the resulting vowel sequence /ai/ is diphthongized, hence reducing the number of syllables of the suffix, and stress then falls on the /a/, e.g. [daˈkaⁱmo].

This rule needs to apply in the lexical module because it needs access to morphological information. The rule only applies to suffixes, not to roots. Note the following examples in which the rule does not apply:

/mo+mami+po/	*/mo+mai+po/	'still sweet'
/mom+peradami+mo/	*/mom+peradai+mo/	'do it on purpose!'
/ko+seami+ʔo/	*/ko+seai+ʔo/	'he has straw '
/kurami+o/	*/kurai+o/	'able to do it'

6.6 Identical Syllable Deletion

Like the previous rule, this rule has the effect of reducing the number of syllables of a polysyllabic suffix by one. It does so by optionally deleting the first of two homorganic syllables. Examples:

(Q)	/ʔaɾa+akoˈko+ʔo/	~	/ʔaɾa+aˈko+ʔo/	'get it for you'
	/ʔoɾi+ʔakoˈko+ʔo/	~	/ʔoɾi+ʔaˈko+ʔo/	'buy it for you'
	/ɾaβa+ʔakoˈko+ʔo/	~	/ɾaβa+ʔaˈko+ʔo/	'receive it for you'
	/βaβa+ʔakokomiˈu+ʔo/	~	/βaβa+ʔakomiˈu+ʔo/	'carry it for you (pl.)'
	/mo+oaβa+akokoˈmiu/	~	/mo+oaβa+akoˈmiu/	'to tell you (pl.)'
	/mogau+ʔakokoˈmiu/	~	/mogau+ʔakoˈmiu/	'to speak to you (pl.)'

The above examples show that with the plural form /(ʔ)akokomiu/ the rule can apply whether or not there is a final /ʔo/ suffix (third person singular absolutive). But with the singular form /(ʔ)akoko/, the rule only applies in conjunction with a final /ʔo/ suffix. Note the following cases in which the rule does not apply:

(R)	/mo+ʔaɾa+aˈkoko/	*/mo+ʔaɾa+ako/	'to get for you'
	/mo+ʔoɾi+ʔaˈkoko/	*/mo+ʔoɾi+ʔako/	'to buy for you'
	/mo+ɾaβa+ʔaˈkoko/	*/mo+ɾaβa+ʔako/	'to receive for you'

The explanation for this is that the rule deletes an unstressed nonfinal syllable (that is, no primary stress). In other words, the deleted syllable must be at least three syllables from the end of the word. The two identical syllables cannot be in word-final position. In the above examples in which the rule does not apply, one of the identical syllables is the penultimate stressed syllable and the other is final, so no deletion occurs.

The rule can be formulated as follows:

(8)
$$C \quad V \rightarrow \emptyset \ / + \text{(C)} \ V \underline{\quad} \quad C \quad V \ (+) \ C \ V$$
$$[\alpha \text{ features}] \qquad\qquad\qquad\qquad [\alpha \text{ features}]$$

The rule means that a syllable consisting of a consonant and following vowel will be deleted when it is the second syllable of a four syllable suffix cluster and followed by a syllable the consonant of which has identical features to the deleted consonant. The above rule does not explicitly mention stress, but implicitly it indicates that the deleted syllable is not stressed because at least two syllables follow it.

Note the following examples in which the rule does not apply even though there are two identical syllables in word-medial position.

(S)	/basi+ako+ˈko+mo/	*/basi+a+ˈko+mo/	'throw you away'
	/dudu+rako+komiˈu+po/	*/dudu+ra+komiˈu+po/	'still push you (pl.)'
	/duku+rako+ˈko+po/	*/duku+ra+ˈko+po/	'collide with you'

The difference between these examples and the ones in which the rule applies is that a morpheme boundary intervenes between the two identical syllables. The rule can be seen as a weakening rule which shortens polysyllabic suffixes. Such a rule will not apply when two identical syllables belong to different morphemes. However, one might object that actually there is a morpheme boundary between the two identical syllables of the suffixes which are shortened by the rule. In other words, one should analyze the suffixes as follows:

/ʔako+ko/	'for + you'
/ʔako+komiu/	'for + you (pl.)'

With this analysis, the environment of the examples in which the rule applies, as in data set (Q), would be identical to the second set of examples in which the rule doesn't apply, as in data set (S).

I suggest, that while it is true that the benefactive morphemes can be split up into two morphemes, this analysis applies to an earlier stratum of the phonology, not to stratum 2 in which the rule applies. In other words, at the stage in which rule 8 applies, the morpheme boundary in the benefactive suffixes has been erased, and they are treated as one morpheme for the purposes of the rule. There are two ways we could handle this. We could posit another stratum between strata 1 and 2 and assign the benefactive suffixes to this stratum. Alternatively, we could suggest that this stratum existed in an earlier stage of the language, but no longer exists at the present synchronic stage of Moronene. In other words, we would claim that for present speakers there are no morpheme boundaries in /ʔakoko/ and /ʔakokomiu/; such boundaries only existed at an earlier diachronic stage.

6.7 Initial Syllable Deletion

A small number of lexical items undergo optional deletion of their initial syllable when they occur in utterance-initial position.

/lako+ʔa+u/ ~ /ko+ʔa+u/	'where are you going?'
/tokia/ ~ /kia/	'friend'
/saβaɽi/ ~ /βaɽi/	'but'
/ʔumbee/ ~ /mbee/	'yes'
/ɽeu+mo/ ~ /eu+mo/	'come here!'

This process is limited to a few common lexical items which frequently occur in sentence-initial position. In the last example above, only the initial consonant is deleted.

7. RULES APPLYING IN TWO MODULES

The following rules apply both within the lexical module and the postlexical module.

7.1 Palatalization

Palatalization is probably the most interesting phonological process in Moronene. It has a number of noteworthy features. First of all, it is progressive, not regressive. Consonants are palatalized after a high front vowel, but not before one. Secondly, it affects consonants at different points of articulation including velars, alveolars and retroflexed. Thirdly, it affects different consonants to different degrees. Fourth, it seems to be causing the emergence of new phonemes in Moronene. Fifth, some palatalization processes apply in the lexical module, others apply in the postlexical module, and some apply in both.

7.1.1 Palatalization of velars

The following examples set forth the palatalization process in velar consonants within morphemes.

/ʔika/	[ˈʔitʃa] ~ [ˈʔika]	'fish'
/toriki/	[toˈritʃi] ~ [toˈriki]	'wall'
/hiku/	[ˈhitʃu] ~ [ˈhiku]	'elbow'
/moiko/	[ˈmoⁱtʃo]	'good'
/patiga/	[paˈtija] ~ [paˈtiga]	'mustache'
/tarigu/	[taˈriju]	'wheat flour'
/mo+ɽiŋaa/	[moɽiˈñaː]	'bright'
/moko+ɽiŋaea/	[mokoɽiˈñaᵉa]	'afraid of heights'
/ŋei+ŋei/	[ŋeⁱˈñeⁱ] ~ [ŋeⁱˈŋeⁱ] ~ [ñeⁱˈñeⁱ]	'cicada'

/siŋkoɾodo/	[sintʃoˈɾodo] ~ [siŋkoˈɾodo]	'back of knee'
/miŋku/	[ˈmintʃu]	'week'
/ɾiŋka/	[ˈɾintʃa]	'move'
/tiŋku/	[ˈtintʃu]	'cigarette lighter'
/ɾiŋgara/	[ɾiˈnjaɾa]	'restless'

In some cases variation has been observed, proving the existence of an underlying /k/ or /g/ or /ŋk/. In other cases, only the palatalized variant has so far been encountered. Where there is variation, the palatalized variant is far more common. There is a greater tendency to find the unpalatalized variant among older speakers, suggesting that the palatalization process is a fairly recent innovation. The variation found for the word /ŋeiŋei/ 'cicada' can be attributed to a leveling process in an effort to make both parts of the reduplicated form identical.

The fact that the rule is optionally blocked for some morphemes but not for others indicates that it has access to morphological information such as exception features, and hence applies at the lexical level.

The following examples show the same process at morpheme boundaries.

/te+kaβi+kaβi/	[tekaβiˈtʃaβi]	'drizzle'
/doi+ku/	[doˈitʃu]	'my money'
/ʔapi+ŋku/	[ʔaˈpintʃu]	'my fire'
/ʔari+kita/	[ʔariˈtʃita]	'we (in.) finished'
/tuɾu+mi+kami/	[tuɾumiˈtʃami]	'help us (ex.)'
/dari+ku/	[daˈɾiku] ~ [daˈɾitʃu]	'my net'
/saɾepi+ku/	[saɾeˈpiku] ~ [saɾeˈpitʃu]	'my belt'

Again the presence of forms which optionally do not undergo the process indicates that the rule is applying in the lexical module. I suggest that as a relatively recent phonological innovation, it is still spreading through the language in an uneven way, and some morphemes and words, perhaps particularly the lower frequency ones, still may resist the innovation to some extent and optionally retain the older pronunciation.

The following examples show the same process at word boundaries. This represents an application of the rule in the syntactic postlexical module.

/kai#komea/	[ˈkaⁱtʃoˈmea]	'then it dried up'
/hai#kampo+no/	[ˈhaⁱtʃaˈmpono]	'in his/her village'
/kei#kanaʔumpe/	[ˈkeⁱtʃanaˈʔumpe]	'that how'
/poko+ruru+o+si#koraa/	[poko+ɾuɾu+ˈo+si# tʃoˈɾaː]	'pick it up over there'
/hai#guru/	[ˈha ⁱ juɾu]	'from the teacher'
/hai#garega/	[ˈha ⁱ jaɾega]	'at church'
/hai#ŋapa/	[ˈha ⁱ ñapa]	'at the port'

A rule for palatalization of velars can be stated as follows:

(9) $\begin{bmatrix} +\text{back} \\ -\text{continuant} \end{bmatrix} \rightarrow [+\text{palatal}] \ / \ \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ -\text{back} \end{bmatrix} \ \underline{\quad\quad}$

The above rule states that back obstruents (e.g. velar stops and nasals) become palatalized after a high front vowel.

In addition to the above straightforward examples, there are also cases where palatalization occurs without the presence of a high front vowel to trigger it. Some such words can be explained as

loan words which retain the alveopalatal consonant (see section 8.2.5). But note the following examples which are clearly native Moronene vocabulary:

(T)   ['tʃoʔo]   'you sg.'
        ['tʃomiu]   'you pl.'
        ['tʃita]   'we (inclusive)'
        ['tʃami]   'we (exclusive)'

(U)   [tʃina'ʔaⁱ]   'in the past'

Data set (T) consists of free pronouns. In Moronene, most free pronouns have two forms, as shown below. Absolutive clitics are also listed for comparative purposes:

Chart 4. Moronene Free Pronouns and Absolutive Clitics

	Free		Absolutive
Singular			
1	[i'ʔaku]	['ʔaku]	['aku]~['ʔaku]~['haku]
2	[i'tʃoʔo]	['tʃoʔo]	[ko]
3	[i'aː]		[o]~[ʔo]~[ho]
Plural			
1i	[i'tʃita]	['tʃita]	['kita]
1e	[i'tʃami]	['tʃami]	['kami]
2	[itʃo'miu]	[tʃo'miu]	[ko'miu]
3	[i'ʔira]	['ʔira]	['ʔira]~['hira]

The difference in function, if any, between the two free forms has not yet been established (see Andersen 1995:66). The longer form has the prefix /i-/ which palatalizes the following /k/. The forms in data set (T) can be seen as being derived from the longer form but with deletion of the /i-/.

Data set (U) is a temporal adverb. In Moronene temporal adverbs take an optional preposition /i/ 'at'. The form in (U) can be explained as being the result of palatalization after the /i/ preposition, after which the preposition is deleted.

Diachronically we can hypothesize the following developments which resulted in the present situation. Before the velar palatalization rule appeared in Moronene, the full form of the first person plural inclusive pronoun would have been [ikita]. At a later stage this became [itʃita]. The third stage was caused by a change in the grammar, in that the previously predominant /i/ clitic became less common, giving rise to [tʃita].

The problem is, how can we account for this synchronically? One way would be to have an optional /i/ deletion rule applying after the postlexical palatalization rule. Such an analysis would claim that the underlying form of [tʃita] was still /ikita/. But the presence or absence of the *i*- clitic would seem to be a matter of grammar, not phonology. It is a grammatically optional prefix. Trying to describe its presence or absence on the phonological level would be mixing things up too much.

A better way to handle it in the framework of lexical phonology would be to posit a slightly different rule for the palatalization of velars which would obligatorily apply only to these few morphemes in the lexical module. It would differ from Rule (9) in that the environment of palatalization would be word-initial position rather than after a high front vowel. Rule (9) would apply to other cases of velar palatalization in both the lexical and postlexical modules.

Another way to describe what is happening is to suggest that with these particular morphemes, speakers are aiming at a phonetic, rather than a phonemic target. I assume that the various possible surface representations of each morpheme are stored in the lexicon along with the underlying representation. Of these, the most common of these phonetic targets would have a higher saliency.

In the case of these morphemes, the most common phonetic target was the one with [tʃ]. When the palatalization trigger was deleted, the palatalized target was maintained because of this high saliency as a phonetic target. The fact that speakers continued to shoot for the same phonetic target shows that it had gained greater saliency than the underlying representation. This means the surface representation is gaining some depth.

This can be analyzed as a case of displaced contrast. We can say that /tʃ/ is in the process of emerging as a new phoneme, but it is still at an early stage of the process. Besides the displaced contrast in native Moronene vocabulary, the presence of [tʃ] in unassimilated loan words would also be a contributory factor. At present, I posit that the phonological system is in a state of flux. It seems likely that allophonic processes at the postlexical level may eventually lead to more fundamental changes in the system at an underlying level.

7.1.2 Palatalization of /s/

The palatalization of /s/ is best seen as a rule which applies in the lexical module. It only affects a couple of morphemes.

/isaɽa/	[iˈʂaɽa]	'first'
/mo+ʔoʔisa/	[moʔoˈʔiʂa] ~ [moʔoˈʔisa]	'to winnow'

The rule can be stated as follows:

(10)
$$\begin{bmatrix} +\text{continuant} \\ +\text{anterior} \\ -\text{voiced} \end{bmatrix} \rightarrow [+\text{palatal}] \ / \ \underline{\quad} \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ -\text{back} \end{bmatrix}$$

The above rule states that /s/ (+continuant,+anterior, -voiced) becomes palatalized before a high front vowel.

The following are examples of the many words with the sequence /is/ which have not been observed to undergo palatalization:

/ʔisa/	'post'
/pisaa/	'defecate'
/me+βiso/	'to enter'
/mo+besi/	'to take a bite'
/i+soni/	'Soni (name)'

7.1.3 Palatalization of retroflexed flap

The following examples set forth the palatalization process for the retroflexed flap.

/hai#ɽaika/	[ˈhaiɽʸaitʃa] ~ [ˈhaiⁱɽaⁱtʃa]	'to the house'
/i+ɽobe/	[iˈɽʸobe] ~ [iˈɽobe]	'Mr. Lobe'
/tampiɽa/	[tampiˈɽʸa] ~ [tamˈpiɽa]	'wooden sheath'

Note that the obligatoriness of the palatalization process varies with the consonant. With velars, the process is almost universal, but occasionally one hears unpalatalized variants. With /ɽ/, palatalization is more optional. The rule can be formulated as follows:

(11)
$$\begin{bmatrix} +\text{continuant} \\ -\text{anterior} \\ +\text{coronal} \end{bmatrix} \rightarrow [+\text{high}] \ / \ \underline{\quad} \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ -\text{back} \end{bmatrix}$$

The above rule states that /ɽ/ (+continuant, -anterior, +coronal) becomes high (i.e. palatalized) before a high front vowel. This rule applies in the postlexical implementational module as it has to do with phonetic implementation of the lexical representation.

7.2 Degemination

When a geminate vowel sequence occurs in unstressed position, the sequence may be optionally reduced to a single vowel. It is always in the context of affixation or word compounding. In the case of the existential verb /daa/ and certain compound words, the rule is obligatory and applies in the lexical module:

Underlying	Lexical	Meaning
/daa+'ko+mo/	/da+'ko+mo/	'you are already'
/daa+'ho+po/	/da+'ho+po/	's/he is still'
/daa+'haku/	/da+'haku/	'I am'
/daa+'kami/	/da+'kami/	'we (ex) are'
/ɽaa+ko'mea/	/ɽa+ko'mea/	'Dry Stream' (name of village)
/ɽaa+'dumpi/	/ɽa+'dumpi/	'Narrow Stream' (name of village)
/ɽaa+'eʔe/	/'ɽa+eʔe/	'river'

In the last example above, the rule affects the syllabification, since the form undergoes diphthongization after the geminate cluster is degeminated (see section 4.4). Contrast the following examples in which the root is stressed and the rule does not apply:

/'daa+ko/	'you are'
/'daa+ho/	's/he is'
/'ɽaa#'ea/	'Large Stream' (name of village)

In other cases, the rule applies in the postlexical implementational module. In this module the rule is optional. Examples:

/tuuna+ni+o/	[tuna'nio] ~ [tu:na'nio]	'drop it'
/mo+oʔia/	[mo'ʔia] ~ [mo:'ʔia]	'to stay'
/mo+oʔaβa+akono/	[moʔaβa:'kono] ~ [mo:ʔaβa:'kono]	'to tell him/her'

The rule can be formulated as follows:

$$
(12) \quad \begin{bmatrix} +\text{syllabic} \\ \alpha \text{ features} \\ -\text{stress} \end{bmatrix} \rightarrow \emptyset \; / \; \underline{\quad} \begin{bmatrix} +\text{syllabic} \\ \alpha \text{ features} \\ -\text{stress} \end{bmatrix}
$$

The rule states that an unstressed syllabic segment goes to zero when followed by an unstressed syllabic segment with identical features.

I suggest that the difference between the lexical and postlexical applications of the rule relates to a difference in lexical representation. When the rule applies in the lexical module, it changes the lexical representation to a degeminate form and the geminate form never appears on the surface. When the rule applies in the postlexical module, the lexical representation is still geminate, but it is reduced for reasons of phonetic timing, especially in fast speech. Hence the rule is optional.

8. LOAN WORD ASSIMILATION PROCESSES

Loan words in a language often behave differently from native words in respect to their phonology. If loan words and native words are analyzed together, the true phonological patterns of the native vocabulary may be obscured. For this reason, phonologists often exclude loan words from their analysis, preferring to describe the native phonology, excluding interference from other languages. Such interference, however, is a major cause of changes in the phonological systems of languages. As foreign loan words become assimilated, dynamic tensions arise between contrasting patterns and processes, and eventually a new synthesis arises as patterns and processes are reinterpreted and integrated.

One way of handling the phonology of loan words is to treat it as a subsystem in the overall phonology of the language. Certain sounds and processes are restricted to the loan word subsystem.

Others apply to the whole language. Our analysis assumes that loan words are derived from a different underlying alphabet than native Moronene words. A special set of lexical rules applies to these underlying segments to produce the lexical representation of the loan words. These then undergo the same postlexical rules as all the other words of the language do.

8.1 Distinctive Features of Malay/Indonesian Phonology

Most loan words in Moronene originate from Malay or Indonesian (in Moronene, Indonesian is referred to as /maɾau/). I use the term Indonesian to refer to the modern standard language, whereas Malay refers to various regional dialects. It is usually impossible to distinguish whether a loan word originated from Indonesian or a Malay dialect. Presumably if the loan is a recent one, it would probably be from Indonesian, whereas if it is of long standing, it would be from Malay. But often it is difficult to determine when a certain word was loaned into Moronene. Therefore I will usually not try to distinguish whether words were borrowed from a particular Malay dialect or from Indonesian but rather simply refer to Malay/Indonesian.

Another problem is to distinguish between loan words and cognates which occur in both Moronene and Malay/Indonesian because of a common origin from Proto-Malayo-Polynesian. Many loan words are detectable because they represent items or concepts which are innovations in the culture. Others are detectable because their phonological shape is different from what it would be if they had undergone diachronic sound changes. But for some words it is difficult to know whether they are loan words or inherited cognates. I found Mead's list (1998:424-492) of Proto-Bungku-Tolaki reconstructions helpful in eliminating some terms that I had thought might be loans. However although I have tried to eliminate dubious forms, it is possible that a few of the terms cited below are actually cognates, not loans.

Besides Malay/Indonesian loan words, there are a handful of words which may have been loaned directly from Dutch, as well as some Bugis loan words. These will be noted as they are encountered, but a separate treatment will not be given since they tend to conform to the same rules as loan words from Malay/Indonesian. I only mark as Dutch those words for which there is no Malay/Indonesian equivalent. Another complicating factor is that Malay/Indonesian loan words may not have been directly from Malay, but may have entered Moronene via another regional language such as Wolio, the language of the sultanate of Buton which was suzerain over the Moronene kingdoms. Since Wolio phonology is quite similar to that of Moronene in many respects, it may be the assimilation processes described below actually occurred in Wolio, and the Wolio word was then loaned with little or no change to Moronene. Or it may be that some words were not loaned into Moronene as such, but into an earlier proto-language such as Proto-Bungku-Tolaki, before Moronene existed as a separate language (see Mead 1998:492-497). For the purposes of analysis, however, I will ignore these problems. I will also ignore the fact that some Malay/Indonesian loan words actually originate from other languages such as Arabic or English. I want to describe the processes that Malay/Indonesian words underwent as they entered Moronene, regardless of whether it was a one-step, two-step or three-step process.

The underlying alphabet of Malay/Indonesian differs in the following respects from that of Moronene:

1. There is an extra vowel, /ə/.

2. It lacks the prenasalized stops, the bilabial fricative /β/, and the retroflexed flap /ɾ/.

3. It has the following additional sounds not found in the Moronene underlying alphabet: labial semivowel /w/, lateral /l/, alveopalatals /tʃ/, /j/, /ñ/, fricatives /f/,/z/.

Malay/Indonesian has a broader range of syllable types than Moronene. Additional syllable types include CVC, CCV, VC, CCVC, CCCV. The stress pattern, although predominantly penultimate like Moronene, also includes final stress and antepenultimate stress.[6] When words with these foreign syllable or stress patterns are loaned into Moronene, there is a dynamic tension between the Malay/Indonesian patterns and the native Moronene patterns. The same happens with loan words

containing foreign sounds. To resolve this tension, there is a set of rules which change the underlying foreign representation to a lexical representation conforming more to native Moronene patterns. I will ignore cases in which the foreign word is pronounced virtually unchanged according to the phonology of the foreign language. Such pronunciations, especially typical of bilingual speakers, can be regarded as examples of code switching, so I exclude such cases from this description of Moronene phonology.

8.2 Rules for Transforming Foreign Sounds

In most cases the non-Moronene sounds are changed into phonetically similar Moronene sounds. In some cases there is one-to-one correspondence; a certain foreign sound is always transformed into one corresponding Moronene sound. In other cases the foreign sound may be transformed into a variety of Moronene sounds depending on the individual loan word in question.

8.2.1 $w \rightarrow \beta$

The bilabial semivowel /w/ becomes the bilabial fricative /β/. In this and following sets of examples, the underlying Indonesian form is listed first, followed by the Moronene lexical representation:

/wakil/	/βakiɽi/	'representative'
/waruŋ/	/βaru/	'eating house'
/bawaŋ/	/baβa/	'onion'
/jawa/	/daβa/	'Java'
/kawat/	/kaβa/	'wire'

8.2.2 $l \rightarrow ɽ$

The lateral /l/ becomes the retroflexed flap /ɽ/. Examples:

/lohor/	/ɽohoro/	'midday prayer'
/lusin/	/ɽosi/	'dozen'
/balai/	/baɽai/	'hall'
/kilo/	/kiɽo/	'kilogram'
/halal/	/haɽaɽa/	'kosher'
/amal/	/ʔamaɽa/	'good works'

The retroflexed flap /ɽ/ is sometimes found in free variation with the lateral [l]. This is especially likely with loan words from Malay/Indonesian, and in more bilingual speakers, in which case we can say that the lexical rule changing /l/ to /ɽ/ optionally fails to take effect. Examples:

/bitoɽo/	[biˈtoɽo] ~ [biˈtolo]	'bottle'
/ɽitere/	[ɽiˈteɾe] ~ [liˈteɾe]	'liter'

8.2.3 $f \rightarrow p$

The voiceless labiodental fricative /f/ becomes the voiceless bilabial stop /p/. Examples:

/foli/	/poɽi/	'volleyball'
/tifi/	/tipi/	'television'
/hafal/	/hapaɽa/	'memorize'
/maʔaf/	/maʔapu/	'pardon'
/fœlpen/	/poɽopena/	'pen' (Dutch)

8.2.4 $z \rightarrow s$

The voiced alveolar fricative /z/ becomes the voiceless alveolar fricative /s/. Example:

/gizi/	/gisi/	'nutrient'

8.2.5 Alveopalatal sounds

There is less uniformity in the way the three alveopalatal sounds /tʃ/, /j/, /ñ/, are transformed into Moronene sounds. There are four possibilities: they may be changed into a corresponding alveolar obstruent, an alveolar fricative, a velar obstruent, or else retained as alveopalatals.

With regard to /j/, it is most commonly transformed into a voiced alveolar stop /d/. Examples:

/jadi/	/dadi/	'so'/'happen'
/jaga/	/daga/	'guard'
/jɔmbatan/	/dambata/	'bridge'
/gaji/	/gadi/	'wage'
/meja/	/meda/	'table'
/bɔlanja/	/baɽanda/	'shopping'
/sɔnjata/	/sandata/	'weapon'
/janji/	/dandi/	'promise'

The following examples exhibit an equivalent transformation for /tʃ/, that is tʃ → t.

/bɔlatʃu/	/baɽatu/	'unbleached cotton cloth'
/katʃi/	/kati/	'white cotton cloth'
/ratʃun/	/ratu/	'poison'

A similar process is found with /ñ/, that is ñ → n.

| /miñak tanah/ | /mina tana/ | 'kerosene' |

With /tʃ/, the most common transformation is to change it to the alveolar voiceless fricative /s/. Examples:

/tʃampur/	/sampuru/	'mix'
/tʃɔlaka/	/siɽaka/	'doomed'
/tʃina/	/sina/	'China'
/batʃa/	/basa/	'read'
/pɔrtʃaya/	/parasaea/	'believe'

While alveopalatal sounds are usually fronted to alveolar position, the opposite process of backing to velar position is found in a few words with /j/:

/gɔreja/	/garega/	'church'
/jurusɔlamat/	/gurusaɽama/	'savior'
/mɔsjid/	/masigi/	'mosque'

This process is the mirror image of the palatalization process in which /g/ becomes [j] after /i/. We may assume that in the above cases, Moronene speakers analyzed the surface [j] as being derived from an underlying /g/ and depalatalized it. Such an interpretation would be aided by the fact that a word with initial /j/ in Malay/Indonesian may appear in a phrase environment in which the palatalization should occur. For example:

['haⁱ juɽusa'ɽama]   'to the savior'

When the word appears outside such an environment, the depalatalization would be analogous to what happens to other native Moronene words with word-initial /g/ in such environments (see section 8.1).

Some loan words with underlying /tʃ/ retain the /tʃ/ in the Moronene lexical representation. This indicates that the language is undergoing a structural readjustment and /tʃ/ is gaining status as a phoneme in its own right, not merely, or not always, an allophone of /k/. Examples:

/tʃərita/	/tʃorita/	'tell story'
/tʃeŋke/	/tʃeŋke/	'clove'
/tʃakene/	/tʃakene/	'banana snack' (Bugis)
/tʃotʃok/	/tʃotʃo/	'suitable'
/məritʃa/	/maritʃa/	'pepper'
/rəntʃana/	/rantʃana/	'plan'

The same phenomenon can also be found with /j/:

/ranjaŋ/	/ranja/	'bed'
/anjuŋ/	/ʔanjo/	'bow of boat'
/ajoa/	/ʔajoa/	'yoke' (Bugis)
/parajo/	/parajo/	'plow rope' (Bugis)

8.2.6 Central vowel

There is no uniformity at all with regard to what happens to the Malay/Indonesian central vowel /ə/ when it is transformed into a Moronene sound. It can become any one of the five Moronene vowels. In some cases there may be conditioning factors which help determine which or the five vowels is used, but often no conditioning factors can be identified, and the choice seems unmotivated.

The most common pattern is that /ə/ is lowered to become /a/. This can be considered the default option. Examples:

/sədia/	/sadia/	'available'
/səpatu/	/sapatu/	'shoe'
/bəlimbing/	/baṭimbi/	'starfruit'
/jəmaʔat/	/damaʔa/	'congregation'
/kəndari/	/kandari/	'Kendari' (city)
/ləmari/	/ṭamari/	'cupboard'
/pəmərintah/	/pamarinta/	'government'

Another common pattern is for the /ə/ to be backed to become /o/. This process is not surprising when one takes account of the fact that in monosyllabic reduplication an /o/ appears instead of expected /a/ (with perhaps a centralized /ə/ having been an intermediate stage of the process). See sections 3.1 and 6.2.1. This rule reflects a historical sound change that changed Proto-Austronesian *ə to /o/ in Southeast Sulawesi languages. Sometimes the presence of /o/ in an adjacent syllable may be a conditioning factor motivating the use of /o/ rather than /a/. Examples:

/gərombolan/	/gorombora/	'rebel band'
/səlasa/	/soṭasa/	'Tuesday'
/təgur/	/toguru/	'reprimand'
/tʃokəlat/	/tʃokoṭaa/	'cacao'
/doktər/	/dotoro/	'doctor'
/drəm/	/doromu/	'oil drum'

A related sound change occurs in a loan word from Dutch, in which the low front rounded vowel /œ/ changes to /o/:

| /fœlpen/ | /poṭopena/ | 'pen' (Dutch) |

When the /ə/ occurs after /s/, it may be changed to /i/. This is evidence that /s/ seems to have the feature [+high] or [+palatal] in Moronene. Examples:

/səkolah/	/sikoṭa/	'school'
/sənapan/	/sinapa/	'gun'
/səpeda/	/sipeda/	'bicycle'

/səkopaŋ/	/sikupa/	'shovel'
/tʃəlaka/	/siɽaka/	'doomed'

Perhaps in analogy to the above words, there are also cases in which /e/ changes to /i/ after /s/:

/semprot/	/simporo/	'spray'
/senter/	/sintere/	'flashlight'

There are a few cases in which /ə/ becomes /u/. An adjacent bilabial consonant may be an influencing factor in some of these words. Examples:

/bənduŋan/	/bunduŋa/	'dam'
/sərdadu/	/surudadu/	'soldier'
/səpeda/	/supeda/	'bicycle'

Notice the two alternative forms of 'bicycle' in the above two data sets. There are a number of other loan words with alternate forms. This illustrates that there is some freedom of choice in which rule to apply to the underlying form to get the lexical representation.

Lastly there are a few words in which /ə/ becomes /e/. These may be due to the influence of spelling on the pronunciation. The relative rarity of such cases shows that in most cases it is the sound rather than the spelling of loan words which determines the choice of vowel. Examples:

/sənin/	/senii/	'Monday'
/məsti/	/mesti/	'should'
/pəluru/	/peɽoro/	'bullet'
/kədəlai/	/kadeɽe/	'soy bean'

In the final example above, the first /ə/ undergoes the more common process of becoming /a/, whereas the second becomes /e/. Because of the indeterminacy of what vowel /ə/ may be transformed to, there are a number of words which exhibit variation between two possibilities. Some of these have already been noted separately above.

/səlatan/	/saɽata/ ~ /seɽata/	'south'
/bəndera/	/bandera/ ~ /bondera/	'flag'
/kəbal/	/kabaɽa/ ~ /kobaɽa/	'invulnerable'
/nənas/	/nanasi/ ~ /nonasi/	'pineapple'
/bənduŋan/	/bonduŋa/ ~ /bunduŋa/	'dam'
/səpeda/	/sapeda/ ~ /sipeda/ ~ /supeda/	'bicycle'

8.3 Rules for Transforming Syllable Structure

The following rules represent different processes which transform syllable structures not found in Moronene to those which conform to Moronene syllable constraints, most notably the constraint that all syllables be open. The first two subsections deal with word-final consonants, the next four apply to consonant clusters, and the last subsection deals with word-initial syllables without onsets.

8.3.1 Consonant deletion

If a loan word ends in a consonant, the simplest way to make the word conform to Moronene syllable patterns is to delete the final consonant. Whether or not this process occurs depends on what the final consonant is. Loan words ending in alveolar or velar plosives or nasals (/t,k,n,ŋ/) usually undergo consonant deletion. Examples:

/t/	/silet/	/siɽe/	'razor'
	/ibarat/	/ibara/	'similar to'
	/repot/	/repo/	'busy'
	/baut/	/bau/	'bolt'

/k/	/bebek/	/bebe/	'duck'
	/tembak/	/temba/	'shoot'
	/gosok/	/goso/	'rub'
	/handuk/	/handu/	'towel'
/n/	/alasan/	/ʔaɾasa/	'reason'
	/teken/	/teke/	'signature'
	/nilon/	/niɾo/	'nylon'
	/sabun/	/sabu/	'soap'
/ŋ/	/guntiŋ/	/gunti/	'scissors'
	/benteŋ/	/bente/	'fort'
	/pasaŋ/	/pasa/	'attach'
	/karuŋ/	/karu/	'sack'

There are a few exceptions which are treated in the following section.

Words with final /h/ in Indonesian also have the /h/ deleted. But in all probability the /h/ was already missing in the source word loaned into Moronene. Even in standard Indonesian, final /h/ is often not pronounced. Examples:

/latih/	/ɾati/	'practice'
/tuduh/	/tudu/	'accuse'
/susah/	/susa/	'difficult'

There are also some examples in which initial /h/ is replaced by a glottal stop:

/halus/	/ʔaɾusu/	'refined'
/harta/	/ʔarataa/	'treasure'

8.3.2 Paragogic vowels

If a loan word ends in a consonant, another way of producing an acceptable syllable structure is to add a paragogic vowel. This adds an extra syllable at the end, with the final consonant as the onset and the paragogic vowel as the nucleus. There are a number of possibilities as to what vowel will be added, depending on what the final consonant is:

If the final consonant is bilabial (/m,b,p/), the vowel /u/ is added. This is explained phonetically by the fact that the same articulator (the lips) is used for bilabial consonants and rounded vowels. Examples:

/jam/	/damu/	'clock, hour'
/haram/	/haramu/	'forbidden'
/drɔm/	/doromu/	'oil drum'
/sɔbab/	/sababu/	'because'
/arab/	/ʔarabu/	'Arab'
/maʔaf/	/maʔapu/	'pardon'
/harap/	/harapu/	'hope'

If the final consonant is /s/, the vowel /i/ is added. This is further evidence that /s/ seems to have the feature [+palatal] in Moronene. Examples:

/tas/	/tasi/	'bag'
/tugas/	/tugasi/	'task'
/kempes/	/kempesi/	'flat tire'
/beres/	/beresi/	'in order'
/garis/	/garisi/	'line'
/kamis/	/kamisi/	'Thursday'
/urus/	/ʔurusi/	'process'

If the final consonant of the loan word is a liquid (/r,l/), the paragogic vowel is an echo vowel, identical to the final vowel of the loan word. The liquids become flaps in Moronene, and the instantaneous release of flaps motivates a return to the same vowel target that preceded the flap. Echo vowels are also usually used with loan words which end in /us/ in contrast to the pattern shown above of adding /i/ with words ending in /s/. Examples:

/r/	/pikir/	/pekiri/	'think'
	/senter/	/sintere/	'flashlight'
	/sabar/	/sabara/	'patient'
	/lapor/	/ɽaporo/	'report'
	/ukur/	/ʔukuru/	'measure'
	/kapur/	/kapuru/	'lime'
/ɽ/	/adil/	/ʔadiɽi/	'just'
	/hasil/	/hasiɽi/	'result'
	/nikel/	/nikeɽe/	'nickel'
	/kapal/	/kapaɽa/	'ship'
	/asal/	/ʔasaɽa/	'as long as'
	/kumpul/	/kompuɽu/	'gather'
/us/	/halus/	/haɽusu/	'refined'
	/hapus/	/hapusu/	'erase'
	/harus/	/harusu/	'must'
	/lulus/	/ɽuɽusu/	'pass'

It was mentioned above that loan words ending in /t,k,n,ŋ/ usually delete the final consonant. Occasionally, however, they add a paragogic vowel instead. In such cases, the vowel is usually /i/. Examples:

/adat/	/ʔadati/	'traditional law'
/bərkat/	/barakati/	'blessing'
/malaikat/	/maɽaʔekati/	'angel'
/iman/	/ʔimani/	'faith'
/setan/	/setani/	'demon'
/kuran/	/kurani/	'al-Quran'

Note that most of the above examples are religious terms.

In a couple of examples, the vowel /a/ is added:

/məsin/	/masina/	'engine'
/pədaŋ/	/padaŋa/	'sword'

There are also a couple of exceptions to the rule that loan words ending in liquids take an echo vowel:

/dapur/	/dapura/	'kitchen'
/kantor/	/kantori/	'office'

A final anomalous case is the following:

/atau/	/ʔataßa/	'or'

This is odd for a number of reasons. The final /u/ has apparently been interpreted as a consonant /w/ and then transformed to ß as described above in section 8.2.1. This is odd since the vowel sequence /au/ is perfectly acceptable in Moronene. Then an echo vowel is added, although we might have expected that as a bilabial consonant, the paragogic vowel would be /u/.

To summarize how Moronene usually copes with loan words with final consonants: If it ends in a stop, delete. If it ends in a continuant, add an echo vowel. If it ends in a labial consonant, add /u/. If it ends in /s/, add /i/.

8.3.3 Epenthesis

Native Moronene vocabulary does not have consonant clusters. When a loan word has a consonant cluster in either word-initial or word-medial position, the most common process used to adapt it to Moronene patterns is vowel epenthesis to break up the cluster. As with paragogic vowels, a variety of epenthetic vowels may occur. The choice of vowel may be influenced by one of the consonants of the cluster or by a neighboring vowel.

If the consonant cluster begins or ends with /s/, the vowel /i/ is inserted. This parallels two processes mentioned earlier, namely /ə/ becoming /i/ after /s/ and also /i/ being the choice of paragogic vowel after /s/. Examples:

/kristen/	/karasitee/	'Christian'
/kristus/	/karasitu/	'Christ'
/islam/	/ʔisiʈamu/	'Islam'
/astaga/	/ʔasitaga/	'good heavens!'
/spesial/	/sipsial/	'special'
/paksa/	/pakisaa/	'force'

If the first consonant of the cluster is a labial consonant, the vowel /u/ may be inserted:

| /daftar/ | /daputara/ | 'register' |

Another common pattern is for the epenthetic vowel to be identical to the vowel of the preceding syllable. Note that it is the derived Moronene vowel which is copied, not the original foreign vowel. Examples:

/wahyu/	/βahaiu/	'revelation'
/pərmisi/	/paramisi/	'excuse'
/gərgaji/	/garagadi/	'saw'
/gərtak/	/garata/	'threaten'
/bərkat/	/barakati/	'blessing'
/pərtʃaya/	/parasaea/	'believe'
/sərdadu/	/sorodadu/ ~ /surudadu/	'soldier'
/surga/	/suruga/	'heaven'

In the following example, the epenthetic vowel matches the original preceding vowel, but the latter is subsequently changed to /a/.

| /kotba/ | /katoba/ | 'sermon' |

If however, the cluster is word-initial or the last consonant of the cluster is /r/, the epenthetic vowel will be identical to the vowel of the following syllable. Examples:

/drəm/	/doromu/	'oil drum'
/semprot/	/simporo/	'spray'
/aŋgrek/	/ʔaŋgere/	'orchid'
/distrik/	/distere/	'district'

This principle overrules the earlier one concerning labial consonants. In the following examples the epenthetic vowel is not /u/ but rather identical to the following vowel:

/blek/	/beʈe/	'tin can'
/pluit/	/poʈoi/	'whistle'
/pabrik/	/pabere/	'factory'

The following is the only word so far found whose epenthetic vowel does not conform to the above patterns:

| /tərnate/ | /tarinate/ | 'Ternate' |

8.3.4 Cluster reduction

While clusters usually undergo epenthesis, a less common strategy also found is to reduce the cluster by deleting one of the consonants. In the examples found so far, it is always the first consonant which is deleted. Mead (1998:33) notes a similar tendency in cluster reduction in Proto-Bungku-Tolaki.

/letnan/	/ɾena/	'lieutenant'
/doktər/	/dotoro/	'doctor'
/pəriksa/	/paresa/	'check'
/pərkakas/	/pakakasa/	'utensil'

The following example illustrates two processes. The cluster /ntʃ/ is reduced to /tʃ/ and then /tʃ/ becomes /s/.

| /hantʃur/ | /hasuru/ | 'destroyed' |

8.3.5 Cluster retention

A third strategy to cope with clusters is simply to retain the cluster. This means that the entry of such loan words into Moronene is having an effect on the system, since a new syllable type is present, namely CVC. Some examples:

/saptu/	/saptuu/	'Saturday'
/pesta/	/pestaa/	'party'
/maksut/	/maksuu/	'purpose'
/arti/	/ʔartii/	'meaning'
/iŋgris/	/ʔiŋgrisi/	'English'

In some cases clusters are partially reduced, that is, a three consonant cluster is reduced to two consonants. This still means we are left with an "illegal" cluster. For example:

| /distrik/ | /distere/ | 'district' |

Sometimes there may be a variety of pronunciations of loan words, one pronunciation having no clusters, the other retaining the clusters. For example:

| /kristen/ | /karasitee/ ~ /kristee/ | 'Christian' |
| /harga/ | /haragaa/ ~ /hargaa/ | 'price' |

8.3.6 Resyllabification

If the cluster in a loan word is a nasal followed by a homorganic plosive, no phonetic change is needed to conform to Moronene patterns. A phonological reinterpretation is needed, however. In Malay/Indonesian, such a cluster is two segments, the nasal being the coda of one syllable and the plosive being the onset of the next syllable. In Moronene, however, it is interpreted as one segment functioning as syllable onset. The following examples show the differences between the Malay/Indonesian syllabification and the syllabification after the resyllabification rule has applied:

/kum.pul/	/ku.mpu.ɾu/	'gather'
/gan.tu.ŋan/	/ga.ntu.ŋa/	'hanger'
/san.dal/	/sa.nda.ɾa/	'sandal'
/tʃeŋ.ke/	/tʃe.ŋke/	'clove'
/paŋ.gaŋ/	/pa.ŋga/	'roast'

8.3.7 Phonemicization of initial glottal

In Moronene vowel-initial morphemes are very rare. The entire list of those found so far are shown in section 3.1.1. The vast majority of apparently vowel-initial morphemes actually have an initial glottal stop. In Malay/Indonesian, on the other hand, there are lots of vowel-initial morphemes. Initial glottal stops are phonetic, not phonemic. When such words are borrowed into Moronene, the initial phonetic glottal is reinterpreted as a phonemic glottal. The motivation for this is to avoid the extremely rare morpheme-initial V syllable pattern, but instead have the more common CV syllable pattern. Examples:

/agama/	/ʔagama/	'religion'
/akal/	/ʔakaɽa/	'trick'
/olahraga/	/ʔoɽaraga/	'exercise'
/umur/	/ʔumuru/	'age'

There is evidence for the phonemic status of these glottals from the fact that they are retained in the presence of prefixes:

| /pe+ʔagama/ | 'practice religion' |
| /mo+ʔakaɽa/ | 'to trick someone' |

8.4 Other Rules

There are some other rules which apply to loan words which are not motivated by the need to transform the foreign pattern into a Moronene pattern. The loan word input to these rules already conforms to Moronene patterns. While some of these rules appear to be well-motivated, for others the phonological motivation is less clear.

8.4.1 Vowel gemination

In some cases, the final vowel of loan words are geminated when they come into Moronene. Two motivations for this can be discerned. The first occurs when the loan word has final stress and ends in an alveolar or velar obstruent. As described earlier in section 8.3.1, in such cases the final consonant is deleted. The vowel gemination can be seen as a strategy for preserving the final stress (such a strategy would not be needed in cases when a paragogic vowel was added). Examples:

/səˈnin/	/seˈnii/	'Monday'
/səˈnaŋ/	/saˈnaa/	'happy'
/təˈnaŋ/	/taˈnaa/	'calm'
/jəˈpaŋ/	/daˈpaa/	'Japan'
/juˈmat/	/duˈmaa/	'Friday'
/pərˈlu/	/paraˈɽuu/	'need'

The following example has penultimate stress in Indonesian but it takes final stress in some varieties of Malay (Rick Nivens, personal communication). The gemination can be explained if we assume it was loaned from one of those Malay dialects.

| /naˈbi/ | /naˈbii/ | 'prophet' |

This gemination process is not obligatory in two syllable words. It is quite possible to simply let the stress shift from the final to the penultimate syllable, as the following examples attest:

/bəˈdak/	/ˈbada/	'talcum powder'
/bəˈdah/	/ˈbada/	'operate'
/bənˈtuk/	/ˈbontu/	'form'

In the case of one syllable words, however, the gemination is obligatory. Since stress must be on the penultimate vowel, there needs to be at least two vowels in every stressed word. Gemination is the way the needed second vowel is created.

/ˈban/	/ˈbaa/	'tire'
/ˈteh/	/ˈtee/	'tea'
/ˈrem/	/ˈree/	'brake'

A second case in which final vowels are geminated is when a consonant cluster occurs before the final syllable of the loan word. An epenthetic vowel is inserted into the cluster and the motivation for the gemination is to avoid stress on the epenthetic vowel. Examples:

/ˈkristen/	/karasiˈtee/	'Christian'
/ˈharga/	/haraˈgaa/	'price'
/ˈharta/	/ʔaraˈtaa/	'treasure'
/ˈpaksa/	/pakiˈsaa/	'force'

This pattern also occurs when the cluster is retained rather than undergoing epenthesis. This may be evidence that originally there was an epenthetic vowel in these loan words, but that it subsequently dropped out as knowledge of Indonesian increased in the Moronene community, thus creating more acceptance of foreign syllable patterns. Alternatively it may indicate that there is a constraint on stress occurring before the consonant cluster. Examples:

/ˈsaptu/	/sapˈtuu/	'Saturday'
/ˈpesta/	/pesˈtaa/	'party'
/ˈarti/	/ʔarˈtii/	'meaning'
/ˈmaksut/	/makˈsuu/	'purpose'

8.4.2 Vowel lowering

There are quite a number of loan words in which high vowels are lowered to mid vowels. But there are even more in which high vowels are not lowered. The lowering process may occur at any position in the word. Examples:

/i/	/nikel/	/nekeɾe/	'nickel'
	/pikir/	/pekiri/	'think'
	/tiŋkat/	/teŋka/	'level'
	/sihir/	/sehere/	'sorcery'
	/ahirat/	/ʔahera/	'afterlife'
	/pərintah/	/parenta/	'command'

/u/	/buku/	/boku/	'book'
	/bugis/	/bogisi/	'Bugis'
	/gula/	/goɾa/	'sugar'
	/kubur/	/koburu/	'grave'
	/aturan/	/ʔatora/	'regulation'
	/kaŋkuŋ/	/kaŋko/	'water spinach'
	/kasur/	/kasoro/	'mattress'
	/pəluru/	/peɾoro/	'bullet'

There is a lot of variation between /i/ and /e/ and between /u/ and /o/ in Malay dialects. Hence it may be that this apparent vowel lowering may actually be reflecting a Malay source word in which the vowel was already lowered.

If a loan word contains the sequence /ai/ in word-final position it normally changes to /e/. This may reflect the historical sound change in Bungku-Tolaki languages in which the proto-sequence *ai changed to /e/ (Mead 1998:69). However it may be due to a similar sound change in some Malay dialects.

/rantai/	/rante/	'chain'
/gulai/	/guɾe/	'curry'
/kedelai/	/kadeɾe/	'soy bean'

When the sequence is /ai/ or /ay/ is in word-medial position, it may be lowered to /ae/. Examples:

/kain/	/kae/	'cloth'
/pərtʃaya/	/parasaea/	'believe'
/sambahyaŋ/	/sambahea/	'worship'

Note that in the last example above, the consonant /h/ intrudes in the middle of the /ay/ sequence, but being phonetically a voiceless vowel, it does not affect the sound change. Note also the following example in which an unexplained glottal appears in the midst of the vowel sequence:

/malaikat/	/maɽaʔekati/	'angel'

The following is an example of /e/ being lowered to /a/

/ember/	/ambere/	'bucket'

8.4.3 Deletion of /y/

If a loan word has the sequence /ayu/, the /y/ is deleted. Examples:

/məˈlayu/	/maˈɽau/	'Malay'
/ˈpayuŋ/	/ˈpau/	'umbrella'

The phonological motivation for this rule is not clear since the sequence /aiu/ is found in native Moronene vocabulary:

/ˈtaiu/	'sago sediment'
/ˈbaiu/	'type of tree'

8.4.4 Devoicing and voicing

The velar plosive /g/ is occasionally devoiced to become /k/. Examples:

/miŋgu/	/miŋku/	'Sunday'
/gərgaji/	/karakadi/	'saw'

There is also an example of the opposite process in which /k/ is voiced to become /g/:

/pəndekar/	/pandegara/	'warrior'

In the following examples a velar plosive is either voiced and prenasalized or else becomes a nasal:

/makasar/	/maŋgasa/	'Makassar'
/magrib/	/maŋarebi/	'evening prayer'

8.4.5 Miscellaneous changes

The following loan words show some miscellaneous sound changes each of which is attested by only one example:

o →	i	/botol/	/bitoɽo/	'bottle'
a →	i	/jaket/	/jike/	'jacket'
o →	a	/ondər+rok/	/ʔandoro/	'skirt' (Dutch)
r →	ɽ	/pagar/	/pagaɽa/	'fence'
t →	k	/kərtas/	/taratasi/	'paper'

9. POSTLEXICAL SYNTACTIC MODULE

The following rules need access to syntactic information such as word boundaries. It will be noted that there is a word boundary in the environment of each of the rules in this section.

9.1 Apocope

This optional process is observed when a word ending in the non-high vowel /-o/ is followed by a word starting with the front vowel /i/. There are only a few such words since most apparently vowel-initial words begin with a glottal stop.

/tamano#i+soni/	[ta'mani'soni]~[ta'manoi'soni]	'Soni's father'
/tinano#i+ʔai/	[ti'nani'ʔaⁱ]~[ti'nanoi'ʔaⁱ]	'Ai's mother'
/tamano#i+rusi/	[ta'mani'ɾusi]~[ta'manoi'ɾusi]	'Rusi's father'
/ʔumano#i+mbisi/	[ʔu'mani'mbisi]~[ʔu'manoi'mbisi]	'the queen's garden'
/mebaho#i+mama/	[me'bahi'mama]~[me'bahoi'mama]	'Mama is bathing'
/maŋkumo#i+ʔaku/	[ma'ŋkumi'ʔaku]~[ma'ŋkumoi'ʔaku]	'later I'

The rule can be formulated as follows.

(13)
$$\begin{bmatrix} +\text{syllabic} \\ +\text{back} \\ -\text{high} \\ -\text{stress} \end{bmatrix} \rightarrow \emptyset \ / \ \underline{\quad} \ \# \ \begin{bmatrix} +\text{syllabic} \\ -\text{back} \end{bmatrix}$$

This rule is in the syntactic module because it needs access to information on word boundaries. Note the following examples in which the rule does not apply within words, whether within morphemes or across morpheme boundaries.

/moiko+mo/	[moi'tʃomo]	'good already'
/me+ɾe+ɾemboi+hako/	[meɾeɾemboi'hako]	'to feel'
/ɾi+ɾimboi+haku/	[ɾiɾimboi'haku]	'comfort me'
/mo+gogoso+i/	[mogogo'soi]	'to make rice croquettes'
/me+haɾo+i/	[meha'ɾoi]	'to gather charcoal'
/ni+hedo+i/	[nihe'doi]	'be worked'

9.2 Reinterpretation of /i/

On the surface level the palatal semivowel [y] occurs in both word-initial and word-medial position. In word-medial position, the vowel [i] may be shortened and unstressed so that it can be represented phonetically as [y]. Note the following examples:

['koye]	'that'
['peye]	'yon'
['taye]	'that above'
[ma'yasa]	'gravestone'
[pa'yasa]	'mirror'

/mo+kuɾa+i+aku/	[mokuɾa'yaku]	'I am hot'

As discussed above in section 4.4, I treat this [y] as underlying /i/ which has undergone diphthongization, parallel to what happens with other vowel sequences.

In word-initial position, [y] only occurs in two functor morphemes, the article /io/ and the bound conjunction /ia-/:

/io/	[yo]	'ARTICLE'
/ia+hoo/	[ya'ho:]	'it is'
/ia+ho+mo/	[ya'homo]	'and then'
/ia+ho+po/	[ya'hopo]	'only then'

There are two ways of treating this data. One could posit an underlying segment /y/ with very restricted occurrence. This would account for the occurrence of [y] but would have the disadvantage of introducing an asymmetry into our inventory of segments, especially since there is no bilabial semivowel in Moronene. Alternately one could consider the [y] as derived from an underlying /i/. I

choose this second solution. This way the asymmetrical [y] occurs only at the surface level, not in the underlying representation. This solution is also supported by the fact that the occurrence of [y] is predictable, and hence best analyzed as being rule governed.

The environment in which [y] occurs is in unstressed word-initial position, followed by another vowel. If we remember that vowel-initial morphemes are very rare in Moronene, it is not so surprising that there are only two morphemes in which this process occurs. The rule for initial /i/ changing to [y] can be stated as follows:

$$(15) \quad \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ -\text{back} \\ -\text{stress} \end{bmatrix} \rightarrow [-\text{syllabic}] \ / \ \# \ \_\_\_ \ [+\text{syllabic}]$$

This process gives additional support for our analysis of initial glottal stop as being phonemic (see section 3.1.1). If initial glottal stops were regarded as being phonetic there would be some exceptions to the above rule, that is, words with initial /i/ followed by vowel in which the /i/ does not become [y]. For example:

/ʔia/	[ˈʔia]	'tendon'
/ʔiaa/	[ʔiˈaː]	'he/she'
/ʔia+ku/	[ʔiˈaku]	'my tendon'
/ʔia+mami/	[ʔiaˈmami]	'our tendon'
/ʔia+miu/	[ʔiaˈmiu]	'your(hon.) tendon'

In my early analysis of this problem, I ignored the presence of a phonemic glottal. As a result, I was forced to either regard /y/ as being an underlying segment, or else regard this rule as being morphologically conditioned, and hence a lexical rule. I hypothesized that the process only applied to grammatical functors, rather than to other lexical items, such an nouns and verbs. Once I realized that the key factor was the presence or absence of initial glottal, it was clear that this process was a phonologically conditioned postlexical rule.

9.3 Mid Vowel Centralization

In fast speech there are occasional cases of centralization of the mid vowels /o/ and /e/ so that they become [ə]. This occurs with unstressed vowels which are the first vowel of the word.

/mo+rodo/	[moˈrodo] ~ [məˈrodo]	'strong'
/mo+ŋura/	[moˈŋura] ~ [məˈŋura]	'young'
/te+rapi+sako/	[terapiˈsako] ~ [tərapiˈsako]	'she tripped'
/mo+soɽo#bekee/	[moˈsolo beˈkeː] ~ [moˈsolo bəˈkeː]	'to remove protrusions'

The process can be formulated as follows:

$$(16) \quad \begin{bmatrix} +\text{syllabic} \\ -\text{high} \\ -\text{low} \\ -\text{stress} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{back} \\ -\text{round} \end{bmatrix} \ / \ \# \ \text{C} \ \_\_\_ \ \text{C}$$

10. POSTLEXICAL IMPLEMENTATIONAL MODULE

The implementational module relates to "various phonological phenomena which are implementational in nature in that they spell out the details of the phonetic implementation of a phonological representation in terms of GRADIENT operations. These operations may also refer to phonetic properties which are not included in the universal inventory of distinctive features. These implementational operations are restricted to the post-syntactic module" (Mohanan 1986:151).

All the processes in this section happen to fall into the category of vowel assimilation. Two of them involve /u/.

10.1 Vowel Unrounding

In the first process, /u/ is optionally unrounded following the unrounded vowel /a/. Note the following examples:

/sampaɽu/	[saˈmpaɽɯ] ~ [saˈmpaɽu]	'tamarind'
/me+randu/	[meˈrandɯ] ~ [meˈrandu]	'to beat drum'
/taŋkau/	[taˈŋkaɯ]	'hoe'

The process is less likely to occur in slow deliberate speech. The rule can be stated as follows:

$$(17) \quad \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ +\text{back} \end{bmatrix} \rightarrow [-\text{round}] \ / \ \begin{bmatrix} +\text{syllabic} \\ -\text{round} \\ +\text{back} \end{bmatrix} (C) \underline{\quad}$$

10.2 Vowel Fronting

Another process optionally affecting /u/ is partial fronting after the front vowel /e/. Note the following examples.

/beu/	[ˈbeü] ~ [ˈbeu]	'basket'
/ʔepu/	[ˈʔepü] ~ [ˈʔepu]	'coconut oil'
/pe+ʔuma/	[peˈʔüma] ~ [peˈʔuma]	'gardened'

Interestingly this process is not observed after /i/. The rule can be stated as follows:

$$(18) \quad \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ +\text{back} \end{bmatrix} \rightarrow [-\text{back}] \ / \ \begin{bmatrix} +\text{syllabic} \\ -\text{high} \\ -\text{back} \end{bmatrix} (C) \underline{\quad}$$

Note that the feature [-back] in this case does not indicate complete fronting, but only to the central position. This is a problem with the standard binary feature system.

10.3 High Vowel Centralization

Another optional assimilation process affects /i/ when it is stressed following /h/. Note the following data:

/kanahi+u/	[kanaˈhəˈu]	'you said'
/nahina/	[naˈhəˈna] ~ [naˈhina]	'there is not'
/kanahi/	[kanaˈhəˈ] ~ [kanaˈhiː]	'he said'
/mo+hitu/	[moˈhəˈtu] ~ [moˈhitu]	'restless''

The process can be formulated as follows:

$$(19) \quad \emptyset \rightarrow \begin{bmatrix} -\text{high} \\ -\text{low} \\ +\text{back} \\ -\text{round} \end{bmatrix} \ / \ \begin{bmatrix} +\text{syllabic} \\ -\text{high} \\ +\text{back} \end{bmatrix} \begin{bmatrix} -\text{syllabic} \\ +\text{continuant} \\ +\text{low} \end{bmatrix} \underline{\quad} \begin{bmatrix} +\text{syllabic} \\ +\text{high} \\ -\text{back} \\ +\text{stress} \end{bmatrix}$$

The above rule states that [ə] is inserted after a sequence of a non-high back vowel and /h/ which is followed by a stressed /i/. This process is somewhat similar to the assimilation of /u/ after /a/. The centralization of the non-high back vowels /a/ or /o/ continues in voiceless form as /h/ and

as the tongue moves to the front high position of /i/, the voicing recommences before the target is reached, resulting in the diphthong [əⁱ].

10.4 Laryngealization

This process affects vowels following the glottal consonant /h/. In this position, vowels are optionally laryngealized, that is, pronounced with a creaky voice. Note the following examples:

/meha/	['meha̰ʔ] ~ ['meha]	'other'
/ʔinahu/	[ʔiˈnahɯ̰] ~ [ʔiˈnahɯ]	'vegetable'
/ʔehe/	[ˈʔehḛʔ] ~ [ˈʔehe]	'want'
/tahi/	[ˈtahḭʔ] ~ [ˈtahi]	'salt'

The rule can be stated as follows:

$$(20) \quad [+\text{syllabic}] \rightarrow [+\text{glottal}] \ / \ \begin{bmatrix} +\text{continuant} \\ +\text{low} \end{bmatrix} \text{\_\_\_\_}$$

Note that this process sometimes causes a phonetic final glottal.

11. SURFACE LEVEL

As a way of summing up the various phonological processes that have been described, I list below all the different phones which may appear at the surface level in Moronene. Altogether, there are twenty-one consonant phones and twenty-one vowel phones.

Chart 5. Moronene Phones

Contoids

	labial	alveolar	alveo-palatal	palatal	velar	glottal
stops						
voiceless	b	d			g	ʔ
voiced	p	t			k	
affricates						
voiceless			tʃ			
voiced			j			
fricative						
voiceless		s	ʂ			h
voiced	β					
nasals	m	n	ñ		ŋ	
flaps		ɾ	ʈ	ʈʸ		
semivowels				y		

Vocoids

	front	central	back
high unrounded	i i: ⁱ i̤		ɯ ɯ̤
high rounded		ü	u u: ᵘ
mid	e e: ᵉ e̤	ə	o o: ᵒ
low		a a: a̤	

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NOTES

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2. Except for *walu, which is Proto-Malayo-Polynesian, all the protoforms are from Proto-Bungku-Tolaki. See Mead (1998:46-47, 434-435, 439, 488).

3. Thanks to Rick Nivens for this observation.

4. For a diachronic perspective on this phonological process, see Mead (1998:129-130).

5. The two types of reduplication have different meanings and distribution, but I will not discuss this here.

6. For example /'khasiat/, /'radio/.

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