ASPECTS OF

A PHONOLOGY OF LUMASAABA

by

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SUMMARY

This study of the phonology of Lumasaaba is based on work with an informant in Edinburgh and on fieldwork in Uganda. This is, I believe, the first extensive study of the phonology of Lumasaaba, certainly the first study within a generative framework and certainly the first to attempt to relate the phonology of the six main dialects in a systematic way. Lumasaaba has been the subject of one previous serious study (a grammar, largely concerned with syntax and morphology, written by J.B. Purvis in 1907),of numerous brief mentions in Bantu literature, and of several brief word lists purporting to represent dialect variation. The value and accuracy of these is discussed.

The description of Lumasaaba phonology is couched in a generative framework which owes much to the work of Chomsky, Halle and Stanley (especially Halle, 1959; Stanley, 1967; Chomsky and Halle, 1968). The model of phonology described here does, however, differ in several respects from that developed by Chomsky and Halle. The most important points of departure are:

i) the decision not to mark syllabic values in the lexical entry but to state them as predictable features of the phonetic realisation,

ii) the decision to allow the redundancy rules to act as realisation rules, with the consequent elimination of a level of fully specified systematic phonemes, and reduction in the number of mutation rules.

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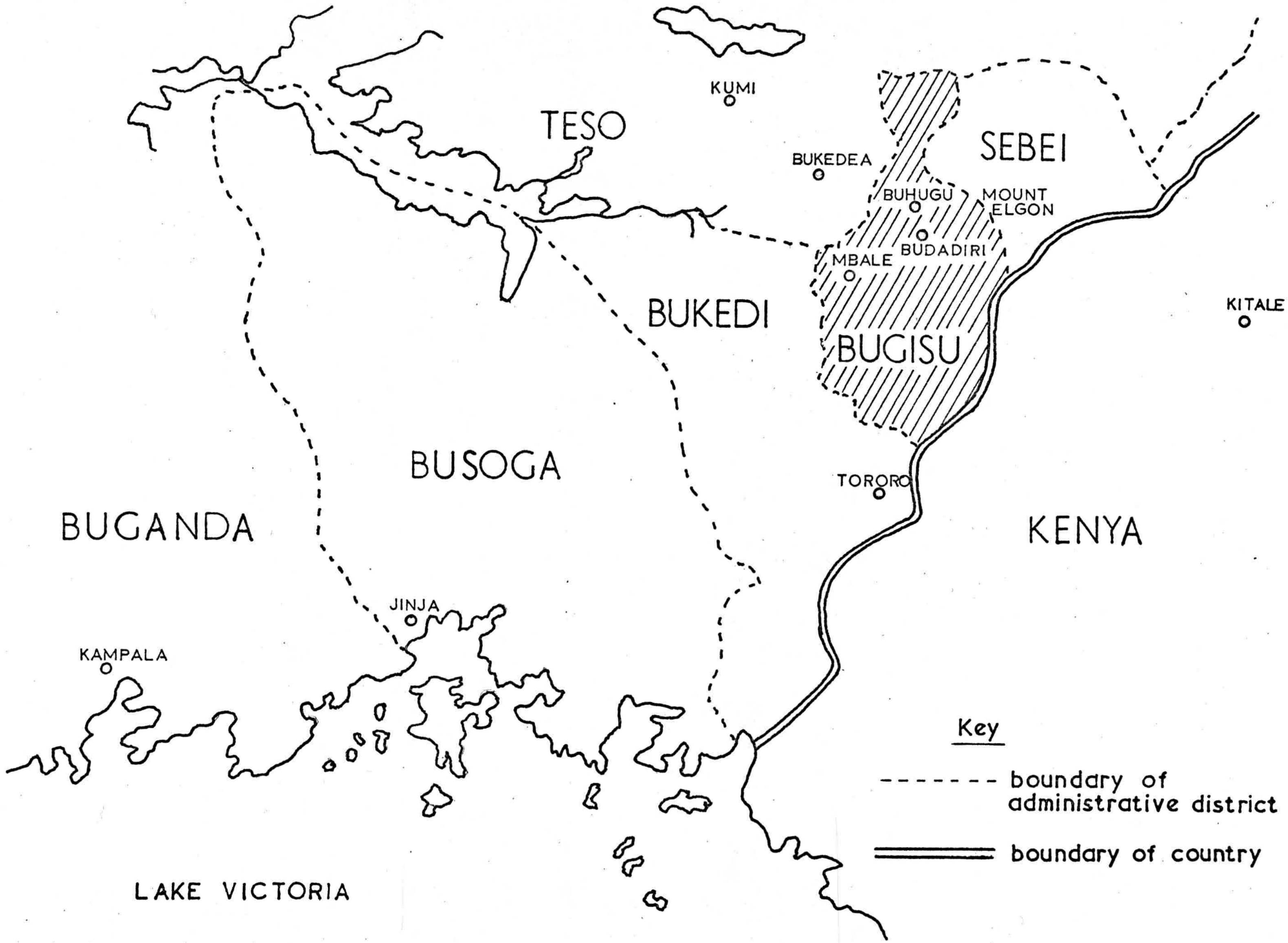
MAP.I.



TESO
KUMI
BUKEDEA
SEBEI
BUHUGU
MOUNT ELGON
BUDADIRI
MBALE
BUKEDI
BUGISU
KITALE
BUSOGA
TORORO
BUGANDA
KENYA
JINJA
KAMPALA
LAKE VICTORIA
Key
boundary of administrative district
boundary of country

INTRODUCTION

Lumasaaba (also called Lugisu) is the language spoken by over 250,000 Bagisu throughout the administrative district of Bugisu in eastern Uganda. It is a Bantu language surrounded on three sides by non-Bantu languages. To the east, beyond Mount Elgon in Kenya, are the Nilo-Hamitic Nandi. To the northeast are the Nilo-Hamitic Sebei and Iteso, and to the south, the Nilotic Badama. Only to the southwest and west are Bantu speakers to be found, the Bakisu and the Bakedi. Bugisu forms a Bantu peninsula jutting up from the northern edge of the Bantu-speaking area.

Bugisu is roughly fifty miles from north to south, with Mount Elgon marking the boundary with Kenya along the eastern side, and plains stretching to the west. At its widest point, where it is just over twenty miles across, a precipitous spur of Elgon juts out, effectively dividing the area into two. Mbale, the administrative and market centre (population around 30,000), is situated at the western end of the spur where all north-south communication must pass through it. The district is divided into four administrative areas: North, Central, Manjiya and South. These areas are sub-divided into gombolola areas which often coincide with areas inhabited by maximal lineages, or clans (La Fontaine, 1959). The gombolola areas are further subdivided into village-sized areas called muluka areas.

Until about 1900 the Bagisu appear to have lived on Mount Elgon itself. After 1900, British colonial rule persuaded the Bagisu to stop fighting with the Bakedi on the

large scale which appears to have been habitual for them up to this time. The Bagisu began to move down into the plains to the west of the mountain. They still, however, maintained their traditional bad relations with the Bakedi and their main source of contact with another Bantu language stems from the British use of Baganda as colonising agents (cf. Roberts, 1963), and the present day teaching of Luganda in the first two years of primary school. Before 1900 the Bagisu appear to have had little amicable interaction with speakers of other Bantu languages.

The only available description of Lumasaaba is A Manual of Lumasaba Grammar written by the medical missionary, the Reverend J.B. Purvis, and published by the S.P.C.K. in 1907. This little book (96 pages) describes the dialect spoken around Nabumali, the centre of the C.M.S. mission, which is about eight miles south of Mbale in the Central area. Purvis was particularly impressed by Lumasaaba, as it seemed to him to represent a more archaic form of Bantu than existed elsewhere: "there seems little doubt but that in the country of Masaba, i.e. the land on and near Mount Elgon, we have the most primitive language of what might well be called the Victoria Nyanza Bantu group". The particular feature of Lumasaaba which impressed Purvis (and other Bantuists after him) was the existence of the so-called "pre-prefixes" to the noun classes: "I have dared to think that the substantival class forms found in the Victoria Nyanza Bantu group, are not now in their original perfect forms···these are (preserved) ··· in the language of these primitive mountain people, the Bagishu or Bamasaba". Sir Harry Johnston presents a list of

Lumasaba words (somewhat erratic as to dialect) and writes of the Masaba language that it "seems more archaic than most other Bantu tongues···presenting us with an older, fuller, form of prefixes and pre-prefixes combined than is met elsewhere" (1919:22). Werner (1915) regards "Gisu" (referred to on her map as "Masaba") as one of the twelve principal languages of East Africa - largely because of the appearance of these pre-prefixes. Doke (1945) writes: "Gishu, spoken by a small group northwest of Lake Victoria, also called 'Gisu' and 'Masaba', is considered to be the most archaic type of Bantu extant".

Today the romantic attraction of this "archaic" language has waned. Guthrie (1948, 1968) deals with it in a very cursory manner and Greenberg (1963) doesn't mention it at all. Guthrie (1948) considers Masaba to constitute a language group: Zone E group 30. The three dialects of this group are Gisu (31a) and the Kenyan dialects of Kisu (31b) and Lubukusu (31c). Tucker and Bryan (1957) classify Gisu as "a language group (?)". They are uncertain about the status of Kisu and Lubukusu but include them tentatively within Gisu. Tucker and Bryan offer a short word list of Gisu (again very erratic as to dialect, see chapter 5 of the present work.) This, together with the work of Purvis and Johnston, constitutes the only published data from Lumasaaba. Of this, only that of Purvis is completely consistent. (Johnston's word lists, it should be remembered, were usually compiled by Assistant District Commissioners with no linguistic training, who were attempting to write down languages which had no orthographies). Voegelin (1964), following

Guthrie, classifies the Masaba-Lahya group as Zone E 30 and includes in Masaba three dialects: Gisu, with 253,500 speakers, Kisu and Bukusu.

The varied use of the names Lumasaaba and Lugisu which we find in the literature is typical of usage throughout Uganda except in Bugisu itself. The Bagisu refer to their language as Lumasaaba. They say that it was the Baganda, the colonising agents of the British, who called the language Lugisu on the general Bantu pattern that we find in "Buganda", the district, "Baganda", the people, "Luganda", the language. The Bagisu today accept the name of the administrative area "Bugisu", and its inhabitants "Bagisu", but call their language "Lumasaaba". The word "Masaaba", the local name for Mount Elgon from which the original ancestor of the Bagisu, Masaaba, is said to have come, occurs as the name of the Coffee Union, of schools, and of many bars in Mbale, where it is spelt with the double "a" representing the long vowel.

Lumasaaba has no orthography. It is said that Purvis wrote some gospel stories in Lumasaaba but they do not appear to have been preserved. Dr. B. Siertsema has privately circulated some suggestions for an orthography but government policy is to develop the use of Luganda rather than encourage the development of minority languages. The Lumasaaba Historical Association, which has its headquarters in Mbale, is at the moment trying to develop an orthography based on the speech of the dialect of Lufumbo in the Central area.

The description presented here is based on work with

an informant in Edinburgh over a period of two years. My informant was Mrs. Florence Wamanga, a primary school teacher, from the gombolola area of Buhugu, in the northern area. The dialect of this area, Luhugu, differs in some respects from other northern dialects and comparison will sometimes be made with the northern dialect of Luwalasi as well as with the Central dialect of Lufumbo. All these differ in a very marked way from dialects spoken south of Mbale, and these differences are discussed in chapter 5 of the present work. The dialect material presented in chapter 5 and compared, throughout the work, with Luhugu, was collected during a survey, which covered 35 of the 36 gombolola areas of Bugisu, in the summer of 1968.

SYMBOLS

The following symbols are used in examples to indicate phonetic quality. The phonetic quality is briefly glossed here, (cf. chapter 4 on phonetic realisation for further discussion).

b	voiced bilabial stop
B	voiced bilabial fricative
m	voiced bilabial nasal stop
p	voiceless bilabial stop
f	voiceless labio-dental fricative
ɱ	voiced labio-dental nasal stop
w	voiced labio-velar approximant
d	voiced alveolar stop
l	voiced alveolar lateral
n	voiced alveolar nasal stop
t	voiceless dental stop
s	voiceless alveolar fricative
z	voiced alveolar fricative
r	voiced alveolar tap
ɟ	voiced palatal stop, affricated release
c	voiceless palatal stop, affricated release
ɲ	voiced palatal nasal stop
ç	voiceless palatal fricative
y	voiced palatal approximant
g	voiced velar stop
k	voiceless velar stop
ŋ	voiced velar nasal stop
x	voiceless velar fricative

X	voiceless uvular fricative
h	voiceless open approximant
i	close front unrounded vowel
e	half open front unrounded vowel
a	open unrounded vowel
o	half open back rounded vowel
u	close back rounded vowel

The symbol N is used in phonological representations to indicate a syllabic nasal homorganic with the following consonant.

<u>diacritics</u>

C̩	syllabic
V:	long
Cʲ	palatalised
Cʷ	rounded
Ṽ	nasalised
V̝	raised
V̟	advanced

1. CHAPTER ONE

A BRIEF INTRODUCTION TO LUMASAABA

This chapter is intended as a simple guide to enable the reader to enter the more complicated chapters that follow with some idea of the data which this description accounts for. Terms used in this chapter have no theoretical implication for the rest of the description.

Part 1 is concerned with the relationship of the phonetic realisation to an underlying representation. Part 2 outlines the morphological structure of the items which are described.

1.1. The relationship of the phonological representation to the phonetic realisation

1.1.1. Consonants

In this description fifteen underlying consonants are recognised. These are:

/p,b,m,B,f,t,d,n,l,s,z,k,g,ŋ,j/.

Twenty different symbols are used, however, to characterise the phonetic realisation, in different environments, of these fifteen underlying consonants; and in a phonemic transcription, twenty different symbols would be needed to represent twenty contrastive sounds. For example, /k/ is normally realised in stems as [c] before front vowels and [k] before nonfront vowels. This complementary distribution suggests that [c] and [k] should be considered as environmentally conditioned variants of the same underlying element. It is however possible to find examples of [c] occurring before a nonfront vowel, as in [cica:ma] "a piece of metal", and of [k] occurring before a front vowel, as in [kaki:ko] "a small eye". (Such examples are comparatively rare.) In a phonemic description it would be necessary to recognise /k/ and /c/ as two separate phonemes, since [c] and [k] can be shown to occur in parallel distribution. In the present description the morphological constituents are examined to see why the unexpected forms, [c] before nonfront vowels and [k] before front vowels, occur. It appears that [cica:ma], which has a plural form [BiBya:ma], is most simply analysed as consisting of two identical prefixes followed by a vowel-initial stem: /ki+ki+ama/. Similarly [kaki:ko] (plural, [BuBwi:ko]) is

most simply analysed as two identical prefixes followed by a vowel-initial stem: /ka+ka+iko/. In these examples, as in all others like them, the front or nonfront features of the prefixal vowel are added to the preceding consonant. Then, if the following stem begins with a vowel, the prefixal vowel is either realised as a glide, or is deleted. In the two examples we have just discussed, the prefixal vowel is deleted, but the features of the vowel remain on the preceding consonant. Hence the skewed phonetic realisation of [c] before a nonfront vowel, and [k] before a front vowel. Rather than recognise these as two separate phonological elements, the course chosen in this description is to derive them both from the same underlying element, /k/.

In the example we have just considered we saw how one underlying consonant can be realised by two different phonetic segments. The converse of this situation can also occur; one phonetic segment can realise two underlying consonants. An example of this can be seen in the phonetic realisation of /l/ and /d/ when they follow a nasal prefix:

a) /i+N+da/ [inda] "a louse", /ka+da/ [kada] "a small louse"

b) /zi+N+li/ [zindi] "roots" , /lu+li/ [luli] "a root".

/d/, initial consonant in stem /da/ is realised as [d] in all environments. /l/ initial in stem /li/ is realised as [l] in all environments except when it follows a nasal prefix. When it follows a nasal prefix it is realised as [d]. (A general rule states that voiced continuants /B,l,j/ are hardened into stops following a nasal prefix.)

All underlying representations can be expressed formally

in terms of feature matrices, but generally in the exemplification an informal alphabetic representation is used. This is written between slant brackets, / /. + symbolises a morpheme boundary. Morpheme boundaries are always indicated in the underlying representation so that constraints on morpheme structure can be expressed. Separate words are written in the underlying representation with spaces between them. The phonetic realisation is written between square brackets, [ ].

Table 1 shows the relationship between postulated underlying elements and the phonetic realisation. The relationship is expressed by informal realisation rules. The symbol /N/ represents a nasal consonant which, in the underlying representation, occurs before a second consonant. The maximum sequence of consonants is two. The first of these is always a nasal (/N/) which will be realised as homorganic with the following consonant, which is always a stop. (/z/ is classed as a stop.) No other sequences of consonants occur.

Table 1 showing the phonetic realisation of underlying consonants.

/p/ → [p] following /N/	: /i+N+piso/	[i:piso]	"a needle"
elsewhere			
[y] before [i],[e]:	/ka+piso/	[kayiso]	"a small needle"
[h] before [a]	: /ka+pale/	[kahale]	"pants"
[w] before [o],[u]:	/ku+pula/	[kuwula]	"to conquer"

(contd.

Table 1 (contd.)

/b/ → [b] in all envs. : /ki+bati/ [cibati] "a knife"

/m/ → ∅ following /N/: /i+N+moosi/[iṃo:si] "a heifer"

[m] elsewhere : /u+mu+limi/[umulimi] "a farmer"

/B/ → [b] following /N/: /i+N+Bizi/ [iṃbizi] "a pig"

∅ following /N/ where the second stem consonant is a nasal: /i+N+Boni/ [iṃoni] "an eye"

[B] elsewhere : /ka+Boni/ [kaBoni] "a small eye"

/f/ → [f] in all envs. : /i+N+fula/ [i:fula] "rain"

/t/ → [t] in all envs. : /i+N+teBe/ [i:teBe] "a chair"

/d/ → [d] in all envs. : /ku+daNba/ [kudaṃba] "to lack"

/n/ → ∅ following /N/: /i+N+nepoNgu/[iṇewoŋgu] "a bag"

[n] elsewhere : /mi+naapa/ [mina:ha] "fat meat"

/l/ → [d] following /N/: /zi+N+li/ [ziṇdi] "roots"

∅ following /N/ where the second stem consonant is a nasal: /zi+N+limi/ [ziṇimi] "tongues"

[l] elsewhere : /lu+limi/ [lulimi] "a tongue"

/s/ → [s] in all envs. : /i+N+sige/ [i:siɟe] "a locust"

/z/ → [z] in all envs. : /i+N+zilika/ [iṇzilika] "I faint"

/k/ → [c] before [i],[e]: /ki+miŋiu/ [cimiɲu] "a snail"

[k] elsewhere : /ka+kani/ [kakani] "a small arrow"

/g/ → [ɟ] before [i],[e]:/u+mu+gelema/ [umuɟelema] "a wife"

[g] elsewhere : /mu+guNda/ [muguṇda] "a farm"

/ŋ/ → ∅ following /N/: /i+N+ŋomo/ [iṇomo] "a drum"

[ɲ] before [i],[e]: /ku+ŋila/ [kuɲila] "to wince"

[ŋ] elsewhere : /Bu+ŋoolo/ [Buŋo:lo] "frogspawn"

/j/ → [z] following /N/ where /j/ is initial in a noun stem:

/i+N+ju/ [iṇzu] "a house"

(contd.

Table 1 (contd.)

ø following /N/ where the second stem consonant is a nasal: /i+N+jaNza/ [iɲanza] "a lake"

[j] following /N/ where /j/ is initial in a verb stem: /i+N+jega/ [iɲjega] "I mix"

[y] elsewhere : /ka+ju/ [kayu] "a small house".

1.1.2. Vowels

There are five underlying vowels. These are written in the underlying representation as /i/, /e/, /a/, /o/, /u/. These will not necessarily be realised phonetically as syllabic vowels. They may be realised as nonsyllabic onset to the syllable (e.g. [w],[y],), or as syllabic vowels (e.g. [i],[u]) or they may undergo a deletion rule so that they are not realised phonetically at all. (In the formal description we shall refer to these underlying elements as nonconsonants and reserve the term vowel for phonetic syllabic vowels).

The informal rules in Table 2 represent general tendencies within a word. The maximum number of underlying vowels occurring in sequence in a word is two. When two vowels occur in sequence the first may be realised as a glide ([w] or [y]) and the second lengthened, or the first may not be realised but the second will still be lengthened. Lengthening does not occur before a sequence of two consonants (nasal+stop) or when the second vowel is word final. No diphthongs occur, nor do sequences of dissimilar syllabic vowels without an intervening consonant.

Table 2, showing the phonetic realisation of underlying vowels

/i/ → [y] before any vowel (except [i], or following a velar/palatal consonant and preceding a second vowel):

/gi+mi+esi/ [ɟimye:si] "months"

ø before [i]: /Bi+Bi+ilima/ [BiBi:lima] "shades"

ø following a velar/palatal consonant and preceding a second vowel: /ki+ki+elo/ [cice:lo] "a broom"

[i] elsewhere : /i+N+siNda/ [i:sinda] "an egg yolk"

/e/ → ø before any vowel: /i+N+meeme/ [ime:me] "a kid goat"

[e] elsewhere : /i+N+kese/ [i:cese] "a sheep"

/a/ → ø before any vowel: /ka+ka+elo/ [kake:lo] "a small broom"

[a] elsewhere : /ki+sapa/ [cisaha] "a mat"

/o/ → ø before any vowel: /i+N+golooBe/[iŋgolo:Be] "time past"

[o] elsewhere : /i+N+goko/ (iŋgoko] "a hen"

/u/ → [w] before any vowels except o/u:/gu+mu+aŋia/[gumwa:ɲa] "a ventilation slit"

ø before o/u : /gu+mu+uŋiu/ [gumu:ɲu] "salt"

[u] elsewhere : /Bu+kuna/ [Bukuna] "nakedness"

1.1.3. Problems in deciding on what basis to assign some phonetic segments to underlying elements

It is not always possible to assign a phonetic segment to an underlying element in a nonarbitrary way. When no obvious assignment can be made, two principles are followed:

1) Segments are assigned to underlying elements by analogy with their assignment to underlying elements in phonologically determined variants of the same morpheme.

Thus we first establish the principle of phonological conditioning on the basis of morphological variation, and then postulate that this principle is more widely applicable, and generalise it as far as possible. In the following example, [w] following a consonant and preceding a vowel, can be demonstrated, by the principle of phonologically conditioned morphological variation, to derive from /u/:

a) /u+mu+kana/ [umukana] "a girl"

b) /Ba+kana/ [Bakana] "girls"

c) /u+mu+ana/ [umwa:na] "a child"

d) /Ba+Ba+ana/ [BaBa:na] "children".

The stem in a, and b, is identified as consonant-initial /kana/ and in c, and d, as vowel-initial /ana/. Before a consonant, /mu/ is realised as [mu], but before a vowel as [mw]. If we now postulate that, in general, close vowels preceding dissimilar vowels will be realised as glides, we may analyse the phonetic sequence [nw] in [munwa] "a mouth" as realising an underlying sequence /nu/, by analogy with the process we observed in c, above. For [munwa] then, we postulate the underlying representation /mu+nua/.

2) Where no obvious analogical process can be observed, that assignment is made which allows the segment to be derived by the fewest possible rules.

In the following sections typical difficulties of this sort are examined and the reason for choosing one assignment rather than another is explained.

a) <u>The underlying representation of [y]</u>.

/y/ can be derived from /i/, /p/ and /j/.

i) where [y] alternates with [i] in different phonetic environments it is analysed as deriving from /i/ as in: /Bi+Bi+ezi/ [BiBye:zi] "streams".
In this example /i/ is realised as [i] before a consonant, ([B]) and as [y] before a vowel ([e]).
Where [y] follows a consonant and precedes a vowel, it is also analysed as deriving from /i/, as in:
/na+Biuma/ [naByu:ma] "a bluebottle".
[y] deriving from /i/ never immediately precedes [i].

ii) Where [y] alternates with [p] in different morphological environments, it is derived from /p/, as in:
/ku+pila/ [kuyila] "to take"
/i+N+pila/ [i:pila] "I take".
[y] which alternates with [p] only occurs before front vowels.
Where [y] alternates with [h] or [w], in an environment where [y] only occurs following [i], and preceding a low vowel ([e], [a], [o]), and [w] only occurs following [u] and preceding a low vowel, [y] is derived from /p/ as in:
/li+si+poNdo/ [li:yọndo] "a vegetable marrow"
/lu+poNdo/ [luwọndo] "a rotten vegetable marrow".

iii) Where [y] alternates with [j] in different phonetic environments, it is derived from /j/, as in:
/ku+jeBa/ [kuyeBa] "to dig up"
/i+N+jeBa/ [iɲjeBa] "I dig up"

All derivations so far discussed can be justified by reference to phonetic or morphological variation. There are however many occasions when no such justification is possible, as in the case of stem-medial segments, e.g.:

/ku+duja/ [kuduya] "to find".

In cases like this [y] is derived from /j/ since the smallest number of rules is required for this derivation. [y] derived from /j/ can be shown to occur before all vowels (unlike [y] derived from /i/ or /p/). This analysis allows us to make the general statement that no entries appear in the lexicon with more than two underlying vowels occurring in sequence.

b) <u>the underlying representation of [w]</u>

[w] can be derived from both /u/ and /p/.

i) Where [w] alternates with [u] in different phonetic environments it is analysed as deriving from /u/, as in:

/u+mu+Balisi/ [umuBalisi] "a tally man"

/u+mu+ifi/ [umwi:fi] "a thief".

Where [w] follows a consonant at syllable onset it is also derived from /u/, as in:

/ma+digui/ [madigwi] "hips".

[w] does not occur immediately before [u] or [o] in the same word except word initially, as in

/u+okisiNgo/ [wocisiŋgo] "Mr. Hippo".

ii) Where [w] alternates with [p] it is derived from /p/ as in:

/ku+pula/ [kuwula] "to conquer"

/i+N+pula/ [i:pula] "I conquer".

[w] alternating with [p] occurs only before round vowels (or rarely, following [u] and preceding a low vowel).

[w] also occurs medially in stems as in:

[imbewo] "a wind".

All attested examples of [w] occurring medially in stems are where [w] precedes a round vowel. Since [w] which can be demonstrated to derive from /u/ never occurs before round vowels the [w] which occurs medially in stems is derived from /p/.

c) <u>The underlying representation of [c], [ɟ] and [ɲ] before nonfront vowels</u>

We have already discussed the assignment of [c] to underlying /k/ followed by a front vowel. Similarly [ɟ] and [g], [ɲ] and [ŋ] usually occur in complementary distribution, with the palatal consonants occurring before front vowels [i] and [e] and the velar consonants occurring before nonfront vowels. When a palatal consonant precedes a nonfront vowel it is analysed as a sequence consonant+/i/+nonfront vowel, as in:

/ku+kia/ [kuca] "to dawn".

The underlying consonants are symbolised /k/, /g/ and /ŋ/ respectively. The choice of /i/ rather than /e/ as the fronting vowel influence is arbitrary, since both front vowels palatalise preceding consonants. Those velar consonants which have been palatalised are never followed by a [y] glide.

d) <u>The underlying representation of phonetically long vowels</u>

Some phonetically long vowels can be demonstrated to derive from a sequence of two underlying vowels, as in:

/u+mu+ana/ [umwa:na] "a child"

/Ba+Ba+ana/ [BaBa:na] "children".

We have already noted that the stem here is considered to be vowel-initial /ana/.

We can state a rule which says that in a sequence of two underlying vowels, the first will be realised as non-syllabic or deleted, and the second will be realised as syllabic and long. This rule will be held to apply within stems. Phonetically long vowels within stems will be represented as a sequence of two identical vowels except:

i) when the long vowel is preceded by a glide, [y] or [w], in which case the sequence will be represented as /i+vowel/ or /u+vowel/ respectively, or

ii) when a palatal consonant is followed by a long non-front vowel (cf. discussion under c, above).

Examples of the application of this convention:

[imo:si] "a heifer" is represented as /i+N+moosi/

[maha:fu] "skins" " " " /ma+paafu/

[luBe:le] "an udder" " " " /lu+Beele/.

e) <u>The underlying representation of consonants following /N/ medially in stems</u>

Following nasal prefixes the continuants /B,l,j/ are realised as stops. These stops following nasal prefixes are phonetically identical to those derived from underlying stops /b,d,g/. With nasal prefixes, then, we have these combinatorial possibilities:

[mb] where [b] derives from /b/ or /B/

[nd] where [d] derives from /d/ or /l/

[ɲʄ] where [ʄ] derives from /g/+front vowel, or /j/

[ɲz] where [z] derives from /j/ or /z/

and [ŋg] where [g] derives from /g/.

We can test whether the underlying stem initial consonant is a continuant by taking the stem out of the nasal prefix context and putting it after, for example, the diminutive classifier /ka/. Then, if the stem initial consonant is still realised as a stop, as in [kada] "a small louse", we derive the stop in [inda] "a louse" from an underlying /d/. If, on the other hand, the initial consonant is realised as a continuant following the diminutive prefix, as [kaBusi] "a small goat", we derive the stop in [imbusi] "a goat" from an underlying continuant /B/.

The same set of nasal-stop sequences also occurs medially in stems. The consonant following the nasal is always represented in the informal alphabetic transcription as a stop. In the formal description any stem-medial sequence nasal+consonant will be only partially specified in the underlying representation. (see Discussion in 2.2.6).

When the sequence [ɲʄ] occurs stem medially, it is always derived from a sequence /Ng/+front vowel /i/. If the vowel following the sequence is low, we still postulate the front vowel /i/ immediately following /g/ in the underlying representation. It requires a simpler process to front the /g/ than would be required to effect a realisation from a postulated underlying sequence /Nj/. Thus

[umuganʄi] "a doctor" is derived from /u+mu+gaNgi/

and [kukwiyanʄa:la] "to be amazed" is derived from /ku+ku+ijaNgiala/.

f) <u>The underlying representation of the prefixes to class 5</u>

The first of the two class 5 prefixes is always written /li/ in the underlying representation, and the second is written /si/. When prefix 2 occurs before a consonant-initial stem, /s/ is deleted and the sequence /li+i/ results in a phonetically long vowel, as in:

/li+si+gaNgilo/ [li:gaŋ$_{j}$ilo] "a dispensary".

When prefix 2 occurs before a vowel-initial stem the /i/ is deleted, as in:

/li+si+ulu/ [lisulu] "a nose".

Notice that in this last example no [y] glide follows the [s] and the stem vowel is not lengthened. (see Discussion in 3.3.)

1.1.4. <u>Tone</u>

Lumasaaba is a tone language, like most East African Bantu languages, in which tone is used primarily for making grammatical rather than lexical distinctions. It is rare to find lexical minimal pairs differentiated by tone alone. Many examples of tone used to mark distinctions of tense and aspect in the verb can be found however, e.g.

[a:Bo:ne] "he saw" (near past)

[a:Bo:ne] "he saw" (perfect)

Considerable tonal variation occurs in the realisation of one item repeated on different occasions in the same syntactic and phonological environment. This variation is especially marked in the case of words uttered in isolation. Since much of the present discussion is in terms of isolated words, and, specifically, of the noun phrase rather than the

verb phrase, a formal analysis of tone is not proposed here. The informal sketch in the following paragraph merely outlines some probabilities of realisation of tone when the noun occurs in isolation in the Buhugu dialect.

Most nouns in isolation are realised with low tone on the prefix(es), high tone on the first syllable of the stem and low tone on the last syllable of the stem:

[cisiɟe] _ −_ "an eyebrow"

[namadutu] _ ¯ _ "a vulture"

[Bitele] _ ¯ _ "ornaments"

A long vowel in the first syllable of the stem is realised with a falling tone:

[umuse:za] _ _ ◝ _ "a man"

[luda:gu] _ ◝ _ "a bowl"

[lulu:zi] _ ◝ _ "a door"

If the noun stem is monosyllabic and a glide [w] or [y] precedes the vowel, the vowel is realised with a fall:

[mutwe] _ ◝ "a head"

[ciswa] _ ◝ "an anthill"

[Bilyo] _ ◝ "food"

If the noun stem is monosyllabic but without a glide the tone pattern is especially unstable in isolation, with the possibility of low tone prefix followed by high tone stem and of high tone prefix followed by low tone stem:

[BuBi] ¯ _ / _ ¯ "badness"

[kada] ¯ _ / _ ¯ "a louse"

[kazi] ¯ _ / _ ¯ "a ring"

If two prefixes to the noun are realised as one long vowel this is always said, in isolation, with a high tone:

[i:piso]‾ ‾_ "a needle"

[li:gumba]‾ ‾_ _ "a bone"

It seems likely that an adequate account of the tonal phenomena in Lumasaaba could be made in terms of two tones, one high and one low, and a feature of downstep (cf. Welmers, 1959; Stewart, 1964; Schachter and Fromkin, 1968). "Down-drift", (Welmers), or "automatic downstep", (Stewart), does not occur.

Variation in tone patterns was frequently mentioned by informants in Bugisu as characterising the speech of different dialect areas. Thus in Buhugu "a fly" is [i:sami]‾_ _, but in Buwalasi is [i:sami]_‾ ‾.

Since a formal account of tone is not given in this description tone will not hereafter be marked in the representation.

1.2.1 Morphological Structure

Most of the exemplification in this description will be in terms of nouns and noun phrases. The description does in fact also account for much of the phonology of the verb but since the purpose of the description is to describe the phonology of Lumasaaba rather than the morphology, the complicated morphology of the verb is not described in detail. Some account of the morphology is however necessary for an understanding of the relation between the phonological analysis and the phonetic realisation.

1.2.2 The classification system

In Lumasaaba, as in other Bantu languages, nouns are classified by a system of prefixes into various genders. Gender concord operates between the noun and its modifiers, and between the noun as subject of the sentence and the predicate.

Meinhof (1933:39) gives each of the prefixes which can immediately precede a noun stem a separate number. According to his system there are twenty-one different classes of nouns in Lumasaaba, (see Table 3). In a phonological description it is convenient to be able to refer to the phonological and phonetic characteristics of specific prefixes, and this is why Meinhof's numbering system is used in the present work. We may note, however, that the classes numbered 1-10 would more naturally be considered as five classes, or genders, with singular and plural prefixes to each class. Purvis (1907), in his description of Lumasaaba, recognises six main classes, with paired singular and plural prefixes.

Table 3

Meinhof's number	det.	class	example	number	classification
1	u/a	mu	[umusinde] "a boy"	sing.	human
2	Ba	Ba	[Basinde] "boys"	pl.	"
3	gu	mu	[gumwe:na] "a song"	sing.	
4	gi	mi	[jimye:na] "songs"	pl.	
5	li	si	[lisanda] "a piece of charcoal"	sing.	
6	ga	ma	[gamanda] "charcoal"	pl.	
7	ki	ki	[cice:lo] "a broom"	sing.	
8	Bi	Bi	[BiBye:lo] "brooms"	pl.	
9	i	N	[imbizi] "a pig"	sing.	domestic objects, animals
10	zi	N	[zimbizi] "pigs"	pl.	"
11	lu	lu	[lulwi:ga] "a horn"	sing.	
13	ka	ka	[kake:lo] "a small broom"	sing.	diminutive
14	Bu	Bu	[BuBwe:lo] "small brooms"	pl.	"
			[BuBu:ci] "honey"	uncountable	
15	ku	ku	[kukwe:za] "to come"		verb infinitive
16		pa	[hacitimba] "the town"		place locative
17		ku	[kucitimba] "to the town"		locative
18		mu	[mucitimba] "in the town"		locative
20	gu	gu	[gugwe:lo] "a huge broom"	sing.	augmentative
	ga	ga	[gage:lo] "huge brooms"	pl.	"
	u	nama	[namadutu ugwa] "the vulture falls"	sing.	
	u	a	[wanambi] "beans"	uncountable	

No examples of Meinhof's classes 12/19/21 are attested in Lumasaaba.

Similarly Gregerson, in his account of the concordial system in Swahili, suggests that nine genders should be recognised and the paired singular and plural prefixes regarded as "manifestations of a shared feature of gender" (1967:15).

Traditionally, gender in Bantu languages has been associated with semantic classification. The association is often not very distinct. In Lumasaaba, classes 1 and 2 contain only human and superhuman entries. No absolute restrictions govern entry to other classes but some preferences may be noted: classes 9 and 10 contain animals and domestic belongings and class 14 contains many uncountable items.

Each noun stem is characteristically associated with one gender and normally occurs preceded by one of the prefixes appropriate to that gender. All stems can, however, undergo "secondary recategorization" (cf. Lyons, 1968:282). The most common reclassification is into diminutive or augmentative genders, thus:

[mulyaŋgo] "a door" unmarked, singular

[kalyaŋgo] "a small door" diminutive, singular

[gulyaŋgo] "a large door" augmentative, singular.

The diminutive and augmentative genders carry no derogatory meaning in the above example, since no separate lexical items exist to express "a small door" or "a large door". If, however, a separate lexical item does exist, as in the case of

[imbusi] "a goat"

[ime:me] "a kid goat",

then reclassification does carry a derogatory meaning, as in

[kaBusi] "a small (undergrown) goat".

A handful of stems occur, in their unmarked form, with prefixes identical to the diminutive and augmentative prefixes, for example:

[kaɲu:ɲi] "a bird"

[gusala] "a tree".

There is no evidence that [kaɲu:ɲi] is a diminutive form or that [gusala] is an augmentative form. Similarly the plural prefix of the diminutive gender ([Bu]) is phonetically identical to the prefix which classifies uncountable nouns. It seems probable that this is a case of superficial homophony and that the diminutive classifiers /ka/ and /Bu/ and the augmentative classifier /gu/ should be regarded as distinct from the classifiers /ka/ /Bu/ and /gu/ which carry no diminutive or augmentative implications.

The process of secondary recategorisation can also reclassify a noun stem so that it occurs with the prefix of a gender other than its normal unmarked gender, and other than diminutive or augmentative genders. Such reclassification always carries a derogatory meaning. This practice is regarded as socially reprehensible when used of a human being or parts of the body, e.g.:

[Base:za] "men"

[zi:se:za] "less than human men"

[li:gosi] "a neck"

[lugosi] "a revolting neck"

No stem is ever reclassified into classes 1 and 2* and no nonanimate stem into classes 9 and 10.

The account of the classificatory system given here differs considerably from that which claims that a given stem can occur in so many different genders that no unmarked gender can properly be distinguished. Marconnès (1931:235) writes: "One cannot insist too strongly on the variability of the articles which the same noun can take". Not only does an account which fails to recognise an unmarked classification increase the complexity of a description, but also it appears to conflict with the normal usage of native speakers. Throughout the many dialects of Lumasaaba items are classified by the same unmarked classifiers. Native speakers are fully aware of the often derogatory implications of secondary recategorization.

1.2.3 The Noun

The simple noun consists of the sequence (prefix 1 +) prefix 2 + stem. We will first consider the prefixes and stem and then examine the operation of the prefixes in the concordial system.

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* One exception to this general rule is the anthropomorphic classification of animal characters in folk tales. The names of these characters are often prefixed by /ua+na/ as in [wanakamu:na], "Mr. Squirrel" and [wanayofu], "Mr. Elephant". They can occur both with the concordial prefix /ua/, and with the concordial prefixes of class 1 as in:

"wanayofu afucilila" "Mr. elephant agreed"

"wanayofu, umusilu" "Mr. elephant, the fool".

Prefix 1

Prefix 1 does not appear in all syntactic environments except in class 10 where it always precedes prefix 2. When nouns occur in isolation prefix 1 precedes prefix 2:

a) before all stems occurring in classes 1, 5, 9 and 10:

examples

Class 1 /u+mu+silu/ [umusilu] "a fool"

Class 5 /li+si+zune/ [li:zune] "a head of hair"

Class 9 /i+N+Bizi/ [imbizi] "a pig"

Class 10 /zi+N+Bizi/ [zimbizi] "pigs"

b) before vowel-initial stems in all classes:

examples

Class 1 /u+mu+ana/ [umwa:na] "a child"

Class 2 /Ba+Ba+ana/ [BaBa:na] "children"

Class 3 /gu+mu+eɲia/ [gumwe:ɲa] "a song"

Class 4 /gi+mi+eɲia/ [ɟimye:ɲa] "songs"

Class 5 /li+si+aNda/ [lisanda] "a piece of charcoal"

Class 6 /ga+ma+aNda/ [gamanda] "charcoal"

Class 7 /ki+ki+aŋiaga/ [cica:ɲa:ga] "a creak"

Class 8 /Bi+Bi+aŋiaga/ [BiBya:ɲa:ga] "creaks".

(In Southern dialects of Lumasaaba, though not in Luhugu, prefix 1 also occurs in the noun in isolation before a consonant-initial stem in classes 3, 4 and 6:

examples

Class 3 /gu+mu+jeNbe/ [kumuyembe] "a mango"

Class 4 /gi+mi+jeNbe/ [cimiyembe] "mangoes"

Class 6 /ga+ma+gono/ [kamakono] "voices".)

In Bantu literature, prefix 1 is often referred to as a "preprefix" or, together with prefix 2, as a "reduplicated prefix". Greenberg suggests that it is a doubled prefix with consonant alternance. Gregerson (1967), following Greenberg, derives the "preprefix" from the "class prefix" (prefix 2) and regards the co-occurrence of the two prefixes as a reduplicated element. Guthrie (1948:43) calls this form, together with prefix 2, a "double prefix". Doke (1945) writes: "In the Northern zone -- disyllabic prefixes are general -- shown in their fullest form in the archaic Gishu where each of the two syllables of the noun prefix has a consonant".

In languages other than Lumasaaba the most frequent form of the "preprefix" is the so-called "initial vowel" which is found, for example in Luganda, Zambian Tonga and Bemba. Informal rules for the occurrence of the "initial vowel" before nounstems in these languages have been developed by Ashton et al. (1954), Carter (1963) and Sharman (1963) respectively. In all the accounts mentioned so far the "preprefix", in whatever form, is regarded as a prefix which only precedes noun stems (and sometimes adjectival stems).

A different analysis is adumbrated by some earlier writers. Purvis (1907) is concerned by the fact that in many classes the "preprefix" is identical in form with the pronoun which shows concord on the verb: "so far as I am aware no hint has ever been given as to why, to take one case only, the pronominal forms of Class 11 (classes 3 and 4 G.B.) should be 'gu' and 'gi': and bearing in mind the difficulty

to account for the 'initial vowel', I have dared to think that the substantival class forms found in the Victoria Nyanza Bantu group are not now in their original perfect forms". Meinhof (1932:40) suggests that the form of the"pronominal roots" developed from the first element of the "reduplicated prefix". He suggests that this first element was originally a "universal pronominal copula" -- "This was prefixed to the noun to give it prominence". He still does not identify the "preprefix" to the noun with the pronominal form but Johnston (1922:224) suggests what seems to be the most attractive analysis: "The full form of the prefix in the most archaic Bantu languages is disyllabic and consists of the generally detachable preprefix and of the prefix proper. The preprefix in its fullest development is identical with the pronoun or demonstrative of the class. The prefix on the other hand is primarily a classifier and is repeated in the adjectival concord. The preprefixes -- are abbreviated pronouns and demonstratives".

Let us consider a paradigm showing noun-verb concord in Lumasaaba in classes 1-10:

Class 1 /u+mu+Bofu a+gua/ [umuBofa:gwa] "the blind man falls"

Class 2 /Ba+Ba+ana Ba+gua/ [BaBa:naBagwa] "the children fall"

Class 3 /gu+mu+oju gu+gua/ [gumo:yugugwa] "the heart falls"

Class 4 /gi+mi+oju gi+gua/ [ɟimyo:yuɟigwa] "The hearts fall"

Class 5 /li+si+ino li+gua/ [lisino ligwa] "the tooth falls"

Class 6 /ga+ma+ezi ga+gua/ [game:zigagwa] "the water falls"

Class 7 /ki+ki+uma ki+gua/ [cicu:macigwa] "the machine falls"

Class 8 /Bi+Bi+uma Bi+gua/ [BiByu:maBigwa] "the machines fall"

Class 9 /i+N+gatu i+gua/ [iŋgati:gwa] "the shoe falls"

Class 10/zi+N+gatu zi+gua/ [ziŋgatuzigwa] "the shoes fall"

In all classes except class 1, prefix 1 is identical to the pronoun preceding the verb. (Class 1 has other irregular features). We adopt the proposal made by Johnston and identify Prefix 1 and the "concordial prefix" as the same item, hereinafter called the <u>determiner</u>.

The only stems not regularly preceded by the determiner when the noun occurs in isolation, are consonant-initial stems, where either the two prefixes are phonetically identical, or the determiner consonant is /g/ and the prefix 2 consonant /m/. (In southern dialects, as we have seen, the only exceptions are those where the two prefixes are phonetically identical). It seems likely that the form of the noun in isolation should be specified as:

determiner + prefix 2 + stem

with rules which delete the determiner in specified environments.

<u>Prefix 2</u>

Prefix 2 is traditionally analysed as a class prefix or classifier. It always, in all environments, precedes the noun stem. In this description it is called the <u>classifier</u>.

The stem

In the phonetic realisation all nouns consist of at least one consonant followed by one vowel. In the present analysis the underlying representation of all noun stems is, minimally, one consonant followed by one vowel.

It seems probable that some stem final vowels represent derivational endings as in:

/u+mu+iti/ [umwi:ti] "a murderer" (/ku+ku+ita/ [kukwi:ta] "to kill")

/u+mu+niini/ [umuni:ni] "a climber" (/ku+niina/ [kuni:na] "to climb")

/u+mu+limi/ [umulimi] "a farmer" (/ku+lima/ [kulima] "to farm").

Meinhof suggests that the final i is an agentive suffix (1933:40), and remarks further that most final vowels in noun stems are, in origin at least, some form of suffix. Nonetheless, he says, "we -- find nouns ending in -a, which do not seem to be derived from a verb, and in which the function of -a is not clear, e.g. Swahili mbwa 'dog'.". Certainly in Lumasaaba it would be difficult to postulate a productive process which would account for final vowels in stems like:

/mu+to/ [muto] "a pillow"

/ki+lo/ [cilo] "a night"

/ki+de/ [cide] "a ball".

In this description, which is not concerned with nominalisation processes, all stems are entered in the lexicon with the final vowel as part of the stem. The position adopted here is unlike that of many Bantu scholars who consider that the Bantu radical always ends in a consonant and represents an "irreducible core" (cf. for example,

Guthrie, 1968:14). In this description the noun stem, incorporating the final vowel, is itself regarded as an "irreducible core". (For a somewhat similar approach cf. Chomsky, 1969, who adopts a "lexicalist" position towards derived nominals).

The verb stem is always considered to be followed by an inflexional ending:

/a+li+a/ [alya] "he eats" (present habitual)

/a+li+ile/ [ali:le] "he has eaten" (near past)

/a+ka+li+e/ [akalye] "he will eat" (near future)

/a+gu+a/ [agwa] "he falls"

/a+gu+ile/ [agwi:le] "he has fallen"

/a+ka+gu+e/ [akagwe] "he will fall"

/a+dek+a/ [adeka] "he cooks"

/a+dek+ile/ [adecile] "he has cooked"

/a+ka+dek+e/ [akadece] "he will cook"

/a+iB+a/ [e:Ba] "he steals"

/a+iB+ile/ [e:Bile] "he has stolen"

/a+ka+iB+e/ [aki:Be] "he will steal".

However it is not always clear how to represent the underlying form of verbs which are realised in the infinitive simply as consonant-vowel, as in [kuha] "to give", [kuBa] "to be". Since the vowel following the stem consonant is always realised as long, for example in the near past tense, and since long vowels elsewhere invariably arise as a result of the coalescence of two vowels, an underlying stem vowel is postulated in these cases:

/a+pa+a/ [aha] "he gives" (/i+N+pa/ [i:pa] "I give")

/a+pa+ile/ [ahi:le] "he has given"

/a+Ba+a/ [aBa] "he exists"

/a+Ba+ile/ [aBi:le] "he will exist"

(A sequence of two vowels is not realised as phonetically long in word final position.)

Despite the fact that the verb stem is considered to be followed by an inflexional ending, the final vowel will be informally represented in the present work as part of the stem. This enables us to concentrate attention on those morpheme boundaries which mark the domain of the main phonological processes in Lumasaaba.

1.2.4 The concordial system

The classifier

Every noun stem is always preceded by a classifier. No formative can be inserted between the stem and the classifier. When an adjective modifies a noun, the adjectival stem is preceded by the same classifier as the noun stem. (In classes 9 and 10 the adjectival stem, like the noun stem, is preceded by the sequence: determiner + classifier).

Class 1 /u+mu+kana mu+laji/ [umukanamulayi] "a fine girl"

Class 2 /Ba+kana Ba+laji/ [BakanaBalayi] "fine girls"

Class 3 /mu+pila mu+laji/ [muwilamulayi] "a fine ball"

Class 4 /mi+pila mi+laji/ [miyilamilayi] "fine balls"

Class 5 /li+si+gi si+laji/ [li:ji:layi] "a fine egg"

Class 6 /ma+gi ma+laji/ [majimalayi] "fine eggs"

Class 7 /ki+lefu ki+laji/ [cilefucilayi] "a fine chin"

Class 8 /Bi+lefu Bi+laji/ [BilefuBilayi] "fine chins"

Class 9 /i+N+simu i+N+laji/ [i:simiṇdayi] "a fine telephone"

Class 10/zi+N+simu zi+N+laji/[zi:simuziṇdayi] "fine telephones"

The determiner

The determiner precedes the classifier when nouns occur in isolation, except in certain environments. It is not the object of this description to discuss the syntactic distribution of the determiner before the noun, but in order to demonstrate that the determiner is, in Johnston's phrase, "detachable", let us consider two paradigms. In the first the structure of the phrase is:

imperative + locative /ku/ + particle /e/ + determiner + classifier + stem.

(The determiner is not realised in classes 2, 7 and 8, where the determiner and classifier are phonetically identical, except before vowel-initial stems.)

In the second the structure of the phrase is:

imperative + locative /ku/ + classifier + stem.

(In class 10 the determiner precedes the classifier. No syntactic environment can be constructed in which the class 10 classifier is not preceded by the determiner.)

1. "stand by the _____"

Class 1 /jima ku+e u+mu+siNde/ [yimakwo:musiṇde] "boy"

Class 2 /jima ku+e Ba+siNde/ [yimakweBasiṇde] "boys"

Class 3 /jima ku+e gu+mu+ogo/ [yimakwegumo:go] "cassava"

Class 4 /jima ku+e gi+mi+ogo/ [yimakwejimyo:go] "cassavas"

Class 5 /jima ku+e li+si+guNba/ [yimakweli:gumba] "bone"

Class 6 /jima ku+e ga+ma+guNba/ [yimakwegamagumba] "bones"

Class 7 /jima ku+e ki+sielo/ [yimakwecisye:lo] "hide"

Class 8 /jima ku+e Bi+sielo/ [yimakweBisye:lo] "hides"

Class 9 /jima ku+e i+N+BeBa/ [yimakwembeBa] "rat"

Class 10/jima ku+e zi+N+BeBa/ [yimakwezimbeBa] "rats"

2. "jump on the _____"

Class 1 /suna ku+mu+siNde/ [sunakumusinde]

Class 2 /suna ku+Ba+siNde/ [sunakuBasinde]

Class 3 /suna ku+mu+ogo/ [sunakumo:go]

Class 4 /suna ku+mi+ogo/ [sunakumyo:go]

Class 5 /suna ku+si+guNba/ [sunakwi:gumba]

Class 6 /suna ku+ma+guNba/ [sunakumagumba]

Class 7 /suna ku+ki+sielo/ [sunakucisye:lo]

Class 8 /suna ku+Bi+sielo/ [sunakuBisye:lo]

Class 9 /suna ku+N+BeBa/ [sunakumbeBa]

Class 10/suna ku+zi+N+BeBa/ [sunakuzimbeBa]

The determiner marks the concordial relationship with the noun in the following syntactic environments -- the examples are from class 3, where the determiner /gu/ is phonetically different from the classifier /mu/.

a) /mu+tue gu+gua/ [mutwegugwa] "the head falls"

b) /gu+gua/ [gugwa] "it falls"

c) /mu+tue gu+no/ [mutweguno] "this head"

d) /mu+tue gu+e u+mu+silu/ [mutwegwo:musilu] "the fool's head"

e) /mu+tue gu+ŋeŋe/ [mutwegunene] "the head itself"

f) /Ba+silu gu Ba+Bona/ [BasiluguBaBona] "the fools see it"

In a) the determiner shows concord on the verb and in b) it shows concord with an independent subject noun not realised in the same sentence. In c) it shows concord on the demonstrative particle /no/, in d) on the genitive particle /e/ and in e) on the reflexive particle /ŋeŋe/. In f) it appears as object of the verb with no referent noun realised in the sentence. In f) it is the class 2 determiner, /Ba/, which shows the subject-verb concord. (Only those syntactic environments which occur in the present description are listed here.)

For different approaches to the problem of accounting for the concordial relationships holding between subject and verb, etc., cf. Whitely, 1960 and Gregerson, 1967.

1.2.5 Grammatical formatives

Grammatical formatives which occur in the discussion are the demonstrative particles /no/ and /o/. Examples:

/mu+to gu+no/ [mutoguno] "this pillow"

/mu+to gu+o/ [mutogo] "that pillow"

/mi+to gi+no/ [mitoǰino] "these pillows"

/mi+to gi+o/ [mitoǰo] "those pillows".

The genitive particle /e/ occurs in the possessive construction:*

/i+N+Bua i+e u+mu+siNde/

Cl.9 det. + cl. + stem Cl.9 det. + "genitive/e/" Cl.1 det. + cl.+ stem

possessed possessor

[imbwayo:musinde] "the boy's dog".

*In Brown (1970:4) the genitive particle is wrongly represented as /o/ due to a series of proof-reading errors by the author. That /e/ is the correct analysis can be seen when the genitive particle is realised before a C-initial prefix:
/i+N+Bua i+e Ba+siNde/, [imbwayeBasinde] "the boys' dog".

Occasional reference is made to the Class 1 pronouns which precede the verb. The first person singular pronoun is similar in form to the sequence determiner + classifier of noun class 9, and its underlying representation is identical with this sequence - /i+N/. It produces identical phonological variation. The third person singular pronoun is represented as /a/. This pronoun does not produce any phonological mutation. All examples of these pronouns occur in the present habitual tense of the verb:

/i+N+Bona/ [imbona] "I see"

/aBona/ [aBona] "he sees"

/i+N+saNba/ [i:samba] "I kick"

/asaNba/ [asamba] "he kicks".

2. CHAPTER TWO

THE MODEL OF DESCRIPTION

2.1 The model developed by Chomsky and Halle

The model of description used in this account of Lumasaaba phonology derives from the theory of generative phonology developed by Chomsky and Halle (cf. Halle, 1959 and 1964; Chomsky, 1964; Chomsky and Halle 1965 and 1968).

In their model the phonological component is provided with information by other parts of the grammar; by the lexicon, the syntactic component and the readjustment rules. The phonological component "assigns a phonetic interpretation to the syntactic description" (Chomsky and Halle, 1968:7).

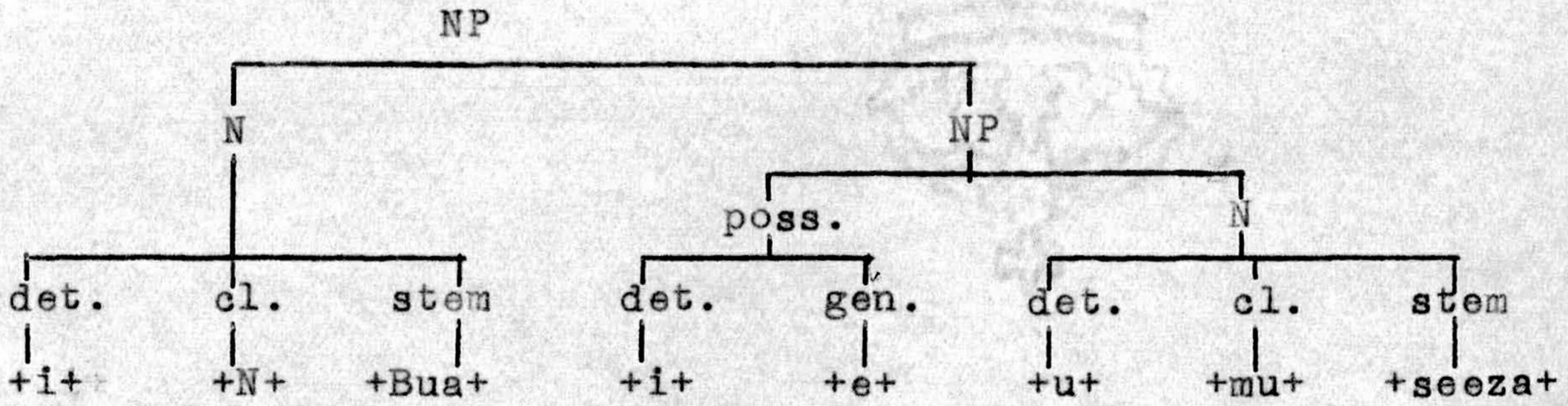
2.1.1 The lexicon

The lexicon contains a list of all lexical items and grammatical formatives. Each entry is characterised by sets of syntactic, morphological, and phonological features. The phonological features appear in a matrix organised into vertical columns and horizontal rows. Each column represents a systematic phoneme (or underlying phoneme, both terms are used). Each row is labelled with the name of a phonological feature. Entries under each column show a plus or minus value for each feature or, if a feature value is redundant for a given phoneme, a blank entry. (A blank entry is sometimes represented by the symbol 0.) No more values are stated in the lexical entry than are sufficient to allow an unambiguous realisation. This is said to be a nonredundant representation (also called underlying representation and lexical

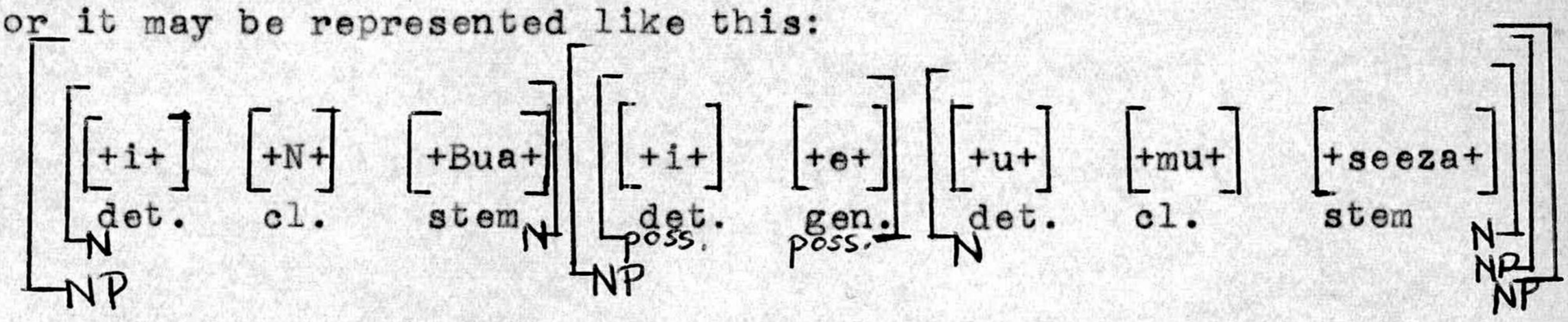
representation). No information is stated in this representation which can be predicted by general rules which express constraints on the composition of individual systematic phonemes, and which govern the sequence of systematic phonemes within the morpheme.

2.1.2 The syntactic component

The output of the syntactic component is the syntactic surface structure. Lexical entries are identified by their morphological and syntactic features, abstracted from the lexicon and inserted into the syntactic surface structure by the operation of a lexical rule (cf. Chomsky, 1965). The syntactic surface structure is composed of a labeled series of brackets. The surface structure of a possessive noun phrase in Lumasaaba can be represented like this:



or it may be represented like this:



[imbwayo:muse:za]

"the dog of the man".

The bracketting indicates boundaries of phrases, words and morphemes. Phrases and words are often, but not always, coextensive, with phonological phrases and phonological words.

2.1.3 Readjustment rules

The output from the syntactic component is passed into the readjustment rules. The function of these rules is to adjust the output of the syntactic component so that it can enter the phonological component. Chomsky and Halle (1968) suggest that one set of functions of these rules is to group the syntactic structures into phonological phrases, to delete any bracketting which is not relevant for the operation of phonological rules, and, where necessary, to insert phonological word boundaries. The phonological word boundary is inserted "at the beginning and end of every string dominated by a major category, i.e. by one of the lexical categories -- or by a category --- which dominates a lexical category" (Chomsky and Halle, 1968:366).

The only function of readjustment rules which has been explored in detail is the function of that subset of readjustment rules variously called "morpheme structure rules" (Halle, 1959), "morpheme structure conditions" (Stanley, 1967) and "lexical redundancy rules" (Chomsky and Halle, 1968). The lexical redundancy rules exist to fill in all feature values left unspecified in the nonredundant lexical representation. They predict the unspecified values by stating general regularities which govern the composition of individual systematic phonemes, and the sequence of systematic phonemes

within the morpheme. The following demands are made of these rules:

i) that they should specify a value for every entry in every column so that no blank entry is left in any matrix when it enters the phonological rules. (Following Stanley (1967), Chomsky and Halle incorporate this condition in 1968, Chapter eight).

ii) that they should only operate within and not across morpheme boundaries.

The lexical redundancy rules are regarded as having a dual function. Not only do they fill in feature values which were redundant in the lexical entry, but also they act "as conditions on the lexicon.--- They can be thought of as filters that accept or reject certain proposed matrices but that do not modify the feature composition of a matrix as a phonological rule does" (Chomsky and Halle, 1968:388).

The output of the lexical redundancy rules is specified at the systematic phonemic level.

2.1.4 The Phonological component

The phonological component consists of phonological rules. These are rules which add, delete, permute, or otherwise mutate feature values. Every matrix is passed through these rules, which operate cyclically. First they operate on matrices within morpheme boundary markers, and then, when the morpheme boundary markers are deleted, they operate within the next set of brackets until they reach the level of the phonological word. When the phonological word has been specified, matrices enter the noncyclical Word Level

rules, which account for mutations caused by the catenation of formatives within the phonological word.

If a matrix fits the entry condition to a rule, the rule operates upon it. If a matrix does not fulfil the entry condition to any rule, it emerges unchanged at the end of the rules.

The output of these rules is at a <u>systematic phonetic level</u>. The degree of detail provided in most descriptions is about that of a conventional allophonic description. Low level phonological rules provide phonetic detail by relating the phonological feature characterisation to articulatory parameters. (In early works they were related to acoustic parameters as well. Cf. Halle, 1959.)

2.1.5 <u>The features</u>

Since Jakobson, Fant and Halle (1951) emphasised the arbitrary <u>phonetic</u> distinction between consonants and vowels it has been customary in generative work to characterise all systematic phonemes, both those which will be realised as phonetic consonants and those which will be realised as phonetic vowels, by one set of features. In recent works these have been features which relate directly to articulatory parameters (cf. Chomsky and Halle, 1968). The functional distinction between consonants and vowels is characterised by the functional (nondescriptive) features <u>consonantal</u> and <u>vocalic</u>. (The term <u>syllabic</u> replaces the term <u>vocalic</u> in Chomsky and Halle, 1968.) Systematic phonemes are all characterised by values for both the feature <u>consonant</u> and the feature <u>vocalic</u> (or <u>syllabic</u>).

LEXICON

maximally nonredundant entries of lexical items and grammatical formatives

SYNTACTIC SURFACE STRUCTURE

consists of a labeled and bracketted string

READJUSTMENT RULES

(a) insert phonological phrase and word boundaries

(b) act as REDUNDANCY RULES which fully specify a systematic phonemic level

PHONOLOGICAL RULES

all matrices enter these rules

cyclical rules operate within word boundaries morpheme boundaries deleted

noncyclical rules operate within and across word boundaries

low level rules assign features of phonetic realisation

output: systematic phonetic

A diagrammatic representation of the Chomsky-Halle model (1968)

2.2 The model proposed for the description of Lumasaaba

The model proposed for this description differs in some important respects from that of Chomsky and Halle. It is claimed that the modifications proposed here allow a simpler, but nonetheless more general, description than that which would be possible within the Chomsky-Halle model outlined in the previous section. In spite of the modifications, the description does, as will be evident, owe much to Chomsky and Halle.

We will first outline the revised model, noting where it diverges from the Chomsky-Halle model, and then we will return to discuss the advantages of the proposed modifications in detail.

2.2.1. Outline of the model

1) the lexicon

lexical items are entered in the lexicon proper and grammatical items are entered in a "second lexicon". Positive Conditions (See 2.2.3) express the structure of permitted entries in each lexicon in terms of constraints on CV sequence. Some items in the lexicon which will cause complications in the phonology are marked [+P-rule]. No vocalic or syllabic values are stated in the lexical entry.

2) the readjustment rules

the readjustment rules operate on the labeled and bracketted syntactic surface structure. They assign phonological phrase and word boundaries as in the

Chomsky-Halle model. Unlike the Chomsky-Halle readjustment rules, they delete morpheme boundaries. The output of the readjustment rules consists of phonological words within phonological phrases.

3) the redundancy rules

the redundancy rules fully specify every value in every matrix. Unlike the Chomsky-Halle redundancy rules, they apply within the phonological word rather than within the morpheme. Unlike the Chomsky-Halle rules, they specify values not only for features which occur in the lexical entry, but also for features of syllabicity, length and "vowel harmony". They also specify assimilatory values. They send into a P-rule loop any item which causes complications in the phonology and, when the P-rules have operated and the item re-enters the redundancy rules, they complete its specification. The output of the redundancy rules, in the model proposed here, is a systematic phonetic output (the equivalent of a conventional allophonic transcription) rather than the systematic phonemic output which emerges from the Chomsky-Halle redundancy rules.

4) the P-rule loop

the rules in the P-rule loop consist of phonological mutation rules which exist to sort out specific problems in the phonology. Only items marked [+P-rule] enter these rules (in the Chomsky-Halle model all matrices must pass through the phonological rules, whether or not they will be affected by them). Since there are only 4

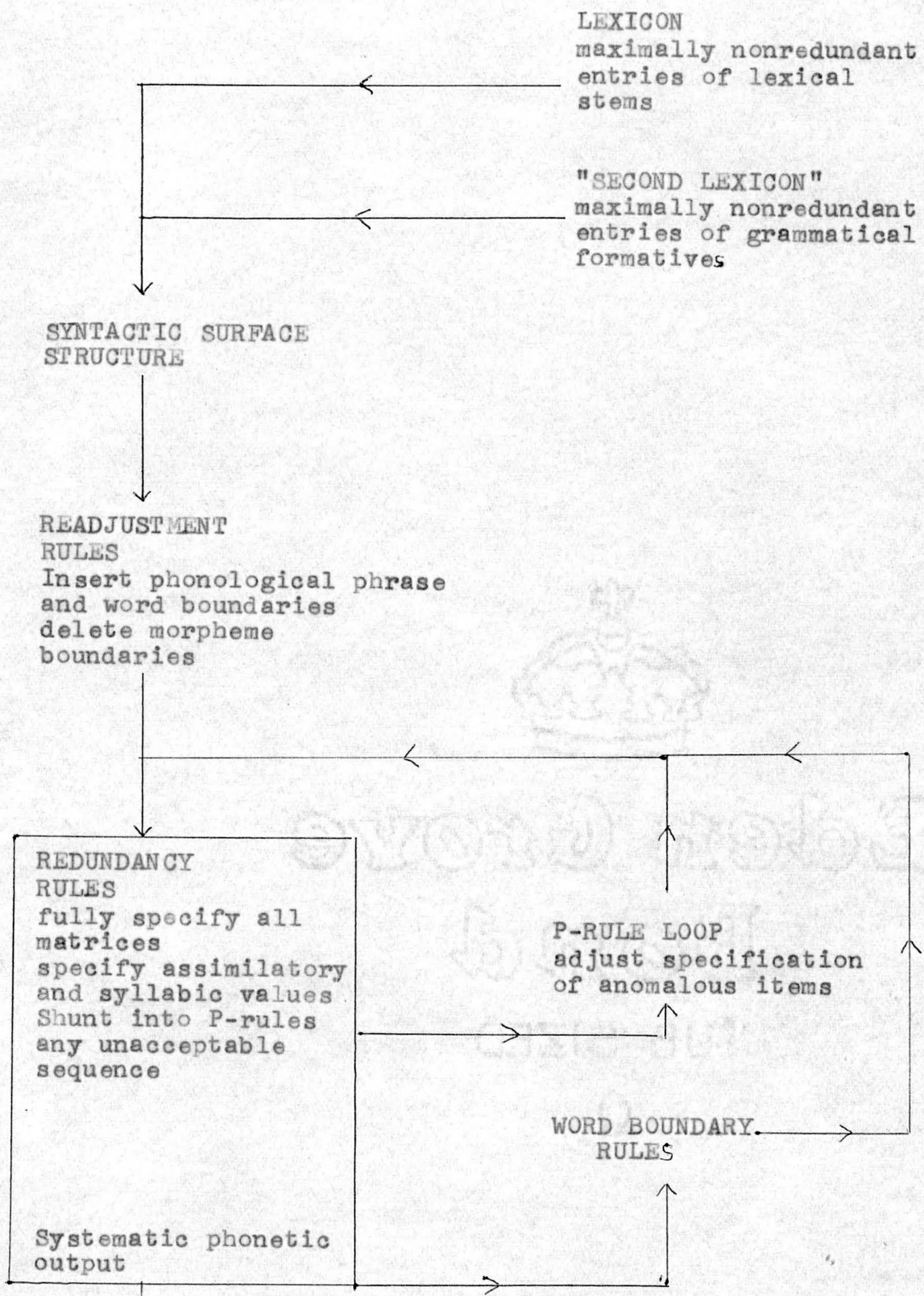
generally complicating areas in the phonology there are only 4 P-rules.

5) the word boundary rules

these rules are mutation rules which operate on sequences of vowels at phonological word boundaries (as they would in a Chomsky-Halle model).

6) the features

in this description underlying consonants are characterised by a set of features different from that which characterises the underlying nonconsonants. Some phonetic features - syllabic, long and raised are introduced by the redundancy rules.



A diagrammatic representation of the model proposed in this description.

2.2.2 A comparison of the Chomsky-Halle model with the model proposed for this description

The theory of generative grammar should, it is claimed, be able to discover and state formal and substantial universals of natural languages (cf. Chomsky, 1965, § 4). It so happens that the phonological component of this theory has been constructed in the course of describing European (and, to a lesser extent, Amerindian) languages whose phonology is complex. The theory has been shown by several writers to yield valuable insights into phonological processes (cf. for example, Kiparsky, 1968, and Postal, 1968). A powerful formal framework has been evolved which is capable, for instance, of accounting for the complex stress systems of English in an impressively competent way (cf. Chomsky and Halle, 1968). The phonology of the language we are considering in this description, Lumasaaba, appears in the present state of our knowledge, to be comparatively simple. Only twenty underlying elements are recognised and the constraints on their combination can be stated quite simply. (The present description, as we have already seen, does not account for the operation of tone.) If the morphophonemics of Lumasaaba are described in terms of the current framework of generative theory, a powerful machinery is called into play which provides an unnecessarily complex, and frequently repetitive, description.

As matters stand, any language which does not have a complex phonological system must struggle to fill the giant weeds of current theory as best it can. It is perhaps pertinent to ask whether a more satisfactory universal frame-

work might be achieved by first constructing a model adequate to account for relatively small morpho-phonemic systems, and then considering how such a model would need to be enlarged to account for more complicated systems. The modified framework proposed here allows a simpler description of Lumasaaba phonology than is possible in terms of the Chomsky-Halle model.

The most important points of modification are:

i) the introduction of Positive conditions (following Stanley, 1967)

ii) the deletion of morpheme boundaries by the readjustment rules before matrices enter the phonological component,

iii) the statement of syllabic values as a function of phonetic realisation rather than as values in the lexical entries,

iv) the function of redundancy rules as realisation rules which have as output a systematic phonetic representation, and the consequent reduction in the number of P-rules,

v) the characterisation of underlying consonantal elements by different primary features from those which characterise underlying nonconsonantal elements.

The discussion in the rest of this section explains why these modifications have been introduced.

2.2.3 Positive Conditions

The concept of Positive Condition is borrowed from Stanley (1967) who introduced the idea in order to express constraints on, for example, syllable structure. In their description of the phonology of Akan, Schachter and Fromkin state constraints on syllable structure in terms of Positive Conditions (Schachter and Fromkin: 1968).

In the present work Positive Conditions express constraints on the sequence of underlying elements. The most general sequential constraint is expressed by a meta-rule which expresses constraints that hold within formatives and also within the phonological word (Cf. 3.1 for discussion). Other Positive Conditions express constraints on the structure of the lexical stem (thus embodying the notion "possible lexical stem") and the grammatical formative (embodying the notion "possible grammatical formative").

A statement of constraints on sequence forms a proper part of any phonological description. Martinet (1937:63), writes "Une étude des combinaisons de phonèmes d'une langue qui ne permet pas d'apercevoir les limites de ce qui est licite et de ce qui ne l'est pas, manque de précision, et est peut-être, de ce fait, inutilisable.". Such constraints are sometimes expressed primarily in terms of permitted syllables (see, for example, Abercrombie, 1967:73; Rand, 1968; Varma, 1964) and sometimes as constraints on specific types of formatives. Uhlenbeck (1950) writes: "That there are rules governing the phonematic composition of the word and the morpheme in every language has been known for a long time". Westermann and Bryan express constraints on lexical

items in familiar terms: "The most common form of the Root, (Noun or Verb) appears to be disyllabic: CVCV, CV + syllabic nasal, or CVV." (Westermann and Bryan, 1952:42). (For similar statements see Guthrie, 1948:11, Hockett, 1958:284, and many prosodic descriptions, e.g. Palmer, 1955.)

In current generative phonological theory, constraints on sequence usually have to be abstracted from the possibilities expressed in the redundancy rules. They do not appear in a separate, explicit statement. The stating of such constraints in an immediately accessible way is made more complicated than it is in conventional descriptions, by the division of the systematic phonemes which appear in the underlying representation into four main classes, each specified for the features <u>vocalic</u> and <u>consonantal:</u>

consonant	[+consonantal]	[-vocalic]
vowel	[-consonantal]	[+vocalic]
glide	[-consonantal]	[-vocalic]
liquid	[+consonantal]	[+vocalic].

In 1968, Chomsky and Halle substitute the feature <u>syllabic</u> for the feature <u>vocalic</u> and recognise seven main classes - vowels, syllabic liquids, syllabic nasals, nonsyllabic liquids, nonsyllabic nasals, glides, obstruents. This of course only makes the statement of constraints, like those expressed by Westermann and Bryan above, still less accessible - though certainly still possible. General statements of this kind have not, however, been a feature of generative descriptions. Constraints on sequences of systematic phonemes have appeared piecemeal in the redundancy rules, and no general constraints within different formatives have been stated (cf., for example, Halle, 1959).

In the present description, two functional classes of underlying elements are recognised: consonants and non-consonants, symbolised C and V, (though it should be noted that the V holds no implications of syllabicity, it simply indicates nonconsonant). C will generally be associated in the phonetic realisation with nonsyllabic consonants and V with syllabic vowels and nonsyllabic glides. By reducing the number of underlying classes of elements we can return to the valuable custom of making explicit statements of sequential constraints. We state, then, possible sequences of CV within the phonological word and discuss the implications of these constraints on the phonetic realisation of all utterances, and we state the permitted structure of lexical stems and grammatical formatives (3.1).

2.2.4 Readjustment rules and phonological boundary symbols

The readjustment rules exist to adapt the output of the syntactic surface structure for entry to the phonological component. The readjustment rules have three tasks:

i) to insert phonological phrase boundaries

ii) to insert phonological word boundaries

iii) to delete morpheme boundaries (sometimes called formative boundaries).

The strings composed of phonological words organised into phonological phrases which form the output of the readjustment rules are passed through a Positive Condition which states permitted sequences of underlying elements in the phonological word.

While it is possible for the bracketting of words and phrases in the syntactic surface structure to be identical to the bracketting required for phonological words and phrases, this is not always so. The present discussion is not concerned with the relationship between the output of the syntactic component and the input to the phonological component. It is, however, concerned to state characteristics by which the phonological word (and the phonological phrase) may be recognised, and hence the demands which must be made on the composition of phonological words (and phrases).

i) The phonological phrase

This is not a construct which we shall be much concerned with, since we shall not discuss syntax and the operation of tone. The phonological phrase is tentatively characterised as the maximal unit within which assimilation of vowels can occur. No assimilation can take place across the boundaries of phonological phrases. (This unit could also be characterised as the maximal unit within which tonal downstep can occur.)

ii) The phonological word

The phonological word is defined for the purposes of this description as the maximal unit within which intra-word vowel assimilation occurs and within which vowel harmony occurs.[1] It is defined as a phonological unit and characterised by the phonological processes which occur within its domain.

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1. The term "vowel harmony" is used to characterise the process whereby all nonfinal vowels within a phonological word are realised as raised if the final vowel is front.

Chomsky and Halle (1968:366) propose the following convention to define the notion "word" for the phonological component:

"The boundary ++ is automatically inserted at the beginning and end of every string dominated by a major category, i.e. by one of the lexical categories 'noun', 'verb', 'adjective', or by a category such as 'sentence', 'noun phrase', 'verb phrase', which dominates a lexical category." They remark further: "The boundary ++ plays a role in defining the notion 'word' which --- is crucial for phonology since it constitutes the domain of application of the non-cyclic rules." This definition does not prove useful in the phonology of Lumasaaba since it does not define the class of items within which certain phonological processes can occur, and exclude other classes from these processes. A case in point is the genitive phrase where the genitive marker, determiner + /e/, must be considered, on the basis of the phonological processes which occur within it, a word separate from either the possessing noun or the possessed noun.

The notion "phonological word" may be somewhat uneasily related to the traditional definition of the notion "word" which tends to rely on criteria such as isolatability, rigidity of order, interruptibility (see for example Lyons, 1968, Rosetti, 1965, Pike 1967). In the sort of model which Chomsky and Halle envisage, the syntactic component will determine the realisation of a given sequence, as a sequence of one or more words. Thus in the example they give (1968: 368) the utterance "the book was in an unlikely place" is divided into three phonological words: "the book", "was in an

unlikely" and "place", each word either realising or being dominated by a lexical category. It must be supposed that if the copula is marked by some accentual feature in the surface structure and realised as "the book WAS in an unlikely place", with a tonic fall on "was", that "was" would now be analysed as a separate phonological word. The relationship which Chomsky and Halle suggest exists between the syntactic surface bracketting and the phonetic realisation in "words" must certainly be mediated by readjustment rules in utterances like "John's coming" where orthographic and phonological convention associate "is" with "John" rather than with "coming" - compare the phonetic realisation of "is" in "Jack's coming". (In the phonology of English a discussion of syllable quantities within the rhythmic foot may provide further indications of the influence of word boundaries in the phonetic realisation, cf. Abercrombie:1964).

In Lumasaaba the phonological definition of the phonological word which has already been offered is further justified by the fact that other phonological processes occur within this domain but do not occur across phonological word boundaries. The following phonological processes must all be stated in termsof a word boundary marker:

i) intra word vowel assimilation takes place only within word boundaries

ii) inter word vowel assimilation only occurs across word boundaries

iii) a sequence of two underlying vowels is not realised as long before a word boundary (e.g. /i+N+sua/ [i:swa] "an ant) (Redundancy rule 34).

iv) vowel harmony occurs only within phonological word boundaries (Redundancy rule 35).

v) optional final devoicing only occurs before a word boundary (word boundary is included in the phonological phrase boundary.) (Word Boundary rule 2)

vi) [w] derived from /u/ cannot precede [o] or [u] at any point other than immediately following a word boundary - /Bu+Bu+oNbeka/ [BuBo:mbeka] "small buildings" but /na+mu+aNdu u+ula mi+situ/ [namwanduwu:lamisitu] "the old woman uproots the weeds". (Redundancy rule 28).

We may add to this list the requirement that in fluent speech there will be no pause in the utterance of a phonological word, and the requirement that every phonological word must end either in a vowel (Sequence Structure Condition) or a syllabic voiceless fricative (optional Final Devoicing rule).

iii) Morpheme boundaries

The third readjustment rule deletes all morpheme (formative) boundaries. This is because in Lumasaaba once we have stated constraints on the sequence of underlying elements in the Positive Conditions we shall find no examples of constraints holding within morphemes that do not also hold within the phonological word.

Although morpheme boundaries are deleted by readjustment rule iii, we shall continue throughout the discussion to indicate these boundaries in the informal underlying representation in order to make clear to the reader where the boundaries of the units under discussion are. Thus for example

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[gumwi:go] "a year" will be informally represented as /gu+mu+igo/ rather than as /gumuigo/.

In the Chomsky-Halle model each individual formative in the syntactic surface structure representation is flanked by <u>morpheme boundary</u> symbols, +. These boundary symbols provide essential information, since redundancy rules, in their model, and the first cycle of the phonological rules, operate only within morpheme boundaries.

Let us consider the need for morpheme boundary symbols in redundancy rules. Chomsky and Halle, (1968:171), remark: "We cannot in all cases determine from the form of a rule whether it is a lexical redundancy rule or a rule of the phonology. If---a rule---were to apply across (a) formative boundary it could not be a lexical redundancy rule." The reason for demanding that redundancy rules do not operate across morpheme boundaries would seem to be that they may be kept <u>formally</u> distinct in this way from (some) phonological rules. Stanley (1967:397) provides a stronger argument. He says that to allow redundancy rules to apply only within the morpheme "reflects the easily verified empirical fact that the constraints holding within single morphemes are more restrictive than those which characterise larger units". If this is true it certainly provides a well motivated reason for the decision to allow redundancy rules to apply only within morpheme boundaries. But is this true? (It is not irrelevant to remark first that much of Stanley's discussion is in terms of constructed languages.) Let us examine a simple example from English. It is well known that when two obstruents

(non-nasal stops, and fricatives) occur in sequence within a syllable they must agree in voicing as, for example, in the final sequences of:

i. apse, cats

ii. adze, cads.

This regularity holds whether or not there is a morpheme boundary, as in the case of the second word in each of the two examples above. In the Chomsky-Halle model it is impossible to state this general regularity in one rule. Redundancy rules will fill in values for <u>apse</u>, <u>adze</u>, <u>cat</u>, <u>cad</u> and for the plural formative. The values assigned to the plural formative will be arbitrary, but since it is a condition on the redundancy rules that they fully specify all matrices, a complete set of values must be assigned to it. (For discussion of this condition cf. Stanley 1967, and Chomsky and Halle, 1968:384.)

Let us suppose that the plural formative is specified as voiced, i.e. /z/. Then the sequences /cat/+/z/ and /dog/+/z/ will enter the phonological rules. /dog/+/z/ will be realised as [dogz] by a rule identical to that which specified the voicing sequence in <u>adze</u> - except that this phonological rule contains a morpheme boundary. A mutation rule will be necessary to change the [+voice] value of the plural formative to [-voice] when it follows /cat/. If morpheme boundaries were irrelevant to the operation of redundancy rules the value of the plural formative could have been stated in the redundancy rules by the same rule which governed the voicing sequence in <u>apse</u> and <u>adze</u>.

We will find many examples in Lumasaaba of the same rules applying within morpheme boundaries and across morpheme boundaries, for example.

a) /gu+mu+eɲia/ [gumwe:ɲa] "a song"

b) /ka+duaja/ [kadwa:ya] "a little cockerel"

c) /i+N+goko/ [iŋgoko] "a hen"

d) /lu+kiNga/ [luciŋga] "a tail"

In a, and b, /u/ followed by a second nonconsonant is realised as [w], and the second nonconsonant is realised as long. In c, and d, the sequence /N+g/ is realised as [ŋg]. In neither case does the morpheme boundary affect the phonetic realisation. In the Chomsky-Halle model separate rules would be needed to state the realisation of a, and b, and c, and d. The realisation of b, and d, would be stated in redundancy rules, but phonological rules, identical in each case, except that they contain morpheme boundaries, would be needed to realise a, and c.

The boundary which does affect phonetic realisation is the phonological word boundary as we saw in the preceding section. Chomsky and Halle suggest that phonological word boundaries should be inserted at the beginning and end of every string dominated by a lexical category (366, op.cit.). The insistence on the presence of a lexical item within each phonological word is too strong a condition for the analysis presented here, in which the criteria for the identification of the phonological word are phonological.

The effect of a phonological word boundary when it occurs between vowels in contiguous words may be compared with

the effect of a morpheme boundary occurring between an identical set of vowels, /a,i/:

a) /i+N+Bua i+Bon+a li+si+guNba/ [imbwe:Bonali:gumba]
"the dog sees the bone"

b) /Ba+Ba+iti/ [BaBi:ti] "murderers"

In a) where the sequence [imbwa][iBona] is separated by a phonological word boundary, the stem-final vowel [a] is deleted, and the following determiner vowel [i] is lowered and realised as long [e:]. In b) the classifier vowel [a] is deleted, and the stem-initial vowel following the morpheme boundary is still realised as a front nonlow vowel, with the added feature [+long], [i:].

iv) The output of the readjustment rules

The output of the readjustment rules is a string of minimally specified matrices, consisting of phonological words which are organised into phonological phrases. The only boundary markers remaining in the representation are those of phonological words and phrases.

2.2.5 The Redundancy rules as realisation rules

The redundancy rules form the main part of the phonological component. Following the suggestions made by Stanley (1967) four formal demands are made of these rules:

i) that they may add, but not change, feature values

ii) that they apply and reapply until all values are specified

iii) that they are unordered

iv) that they operate within, and not across, phonological word boundaries, (this is less stringent than Stanley's demand that they operate only within morpheme boundaries (see discussion 2.2.4.)

The redundancy rules have two main functions:

i) to specify values for every unspecified <u>primary</u> feature in every matrix

ii) to specify values for every <u>derived</u> feature in every matrix.

1) <u>The specification of primary features</u>

Consonants are characterised in the underlying representation by values for the features of place, voice, nasality and degree of obstruence. These are regarded as <u>primary</u> features for consonants. Thus /b/ will be characterised as

$$\begin{bmatrix} +\text{consonantal} \\ -\text{lingual} \\ +\text{voice} \\ -\text{continuant} \\ -\text{nasal} \end{bmatrix}$$

in the lexical entry. The redundancy rules will fill in values for the redundant consonantal features. /b/ will be assigned the values $\begin{bmatrix} -\text{apical} \\ +\text{stop} \end{bmatrix}$.

All nonconsonants are characterised by values for features of closeness, frontness and roundness. These are primary features for nonconsonants. Thus /e/ would be specified in the lexical entry as $\begin{bmatrix} -\text{consonantal} \\ +\text{front} \\ +\text{low} \end{bmatrix}$. The redundancy rules will assign to /e/ a value for the redundant primary feature <u>round</u>.- [-round].

ii) the specification of derived feature values

Derived feature values are acquired by an underlying element by virtue of its place in a sequence of segments. Derived features are of four kinds.

a) An element may acquire some of the feature values of an immediately adjacent element due to the process of phonetic similitude, defined by Abercrombie (1967:87) as the "accommodation of the articulation of one segment to the articulation of an adjacent segment". Consonants acquire the characteristic primary features of the immediately following nonconsonants. For the consonants these are derived features. Thus in the sequence /ki+gugu/ [cigugu] "insect", /k/ will acquire the feature values $\begin{bmatrix} +\text{front} \\ -\text{round} \\ -\text{low} \end{bmatrix}$ and will be realised as palatalised, [c]. Both /g/s will acquire the feature values $\begin{bmatrix} -\text{front} \\ +\text{round} \\ -\text{low} \end{bmatrix}$ and will be realised as nonfronted, closely rounded [g_w].

Nonconsonants following nasal consonants acquire the feature value [+nasal] as a derived value. Thus in /mu+Bano/ /u/ and /o/ are realised as slightly nasalised: [mũBanõ] "a knife". So the primary features for the set of nonconsonants are the potential derived features for the set of consonants (and vice versa to a more limited extent) thus expressing the concepts of similitude and secondary articulation (cf. Abercrombie, 1967:60).

b) a nonconsonant may acquire the feature value [+long] if it is the second of two nonconsonants, except when it precedes a sequence NC or a word boundary. Thus

/lu+lu+ali/ is realised as [lulwa:li] "sand"

/lu+ŋiiga/ as [luɲi:ga] "papyrus mat"

/gu+mu+igo/ as [gumwi:go] "a year"

/Bu+ŋoolo/ as [Buŋo:lo] "frogspawn".

[+long] is a feature value which does not occur in any lexical entry. It is a value which is added by the redundancy rules, which have access to information about the sequence of non-consonants within the phonological word. It is a feature of the phonetic realisation, not of the underlying specification.

Similarly the feature [+raised] does not occur in the lexical representation, but is added by the redundancy rules as a feature of the phonetic realisation. All syllabic vowels in a phonological word are [+raised] if the last vowel of the word is specified as [+front]. Thus in [kalasile] "a drop of blood" the two [a]s and the [i] are phonetically raised. This raising constitutes the "vowel harmony" which has already been mentioned. (For a discussion of the phonetic effect of raising see 4.2.iii.)

c) The catenation of morphemes within the phonological word sometimes produces sequences of elements which do not conform to the constraints on the structure of the phonological word. Thus for example a sequence nasal + nonstop can be generated as in:

/i+N+Bata/, /i+N+Bagala/, /i+N+Bagu/.

In all these instances the P-rules must operate to harden the continuant to a stop and yield:

[imbata] "a duck" ([kaBata] "a small duck"), [imbagala] "a lizard" ([kaBagala] "a small lizard"), [imbagu] "a hoe" ([kaBagu] "a small hoe"). Sequences like these are marked in all columns with the feature value [+P-rule]. When all the other feature values have been stated by the redundancy rules, matrices marked [+P-rule] will enter the P-rules to have their specification made to conform to the constraints of the language. Interestingly enough it is items which enter the P-rules which chiefly contribute to dialect diversity in Lumasaaba (see Chapter 5).

d) every underlying element is assigned a value for the feature <u>syllabic</u> by the redundancy rules. Like the features described in b) above, <u>syllabic</u> is not a feature which appears in the lexical entry. The syllable is regarded as the unit of distribution in the phonetic realisation. That is to say we accept the suggestion that human speech is realised by a succession of syllables which have some physiological correlate (cf. Abercrombie, 1967:34 <u>et seq</u>.). Each syllable must have a <u>nucleus</u> which is usually a vowel but can also be a nasal or, utterance finally, a voiceless fricative. Syllables can have <u>onsets</u> which are usually consonants but can be nonsyllabic nonconsonants [w] or [y]. An underlying element realised at syllable onset, will be shorter in duration than the same underlying element realised at syllable nucleus. Thus for example in

/u+mu+afuli/ [umwa:fuli] "a crouching man"

the /u/ of the determiner, realised as [u] is longer in duration than the /u/ of the classifier, realised as [w].

The simple noun in Lumasaaba is, as we have seen, formed by the sequence: determiner+classifier+stem. The determiner is deleted in some environments. The following nouns occur in class 3 (determiner /gu/, classifier /mu/):

1. /mu+dikini/ [mudicini] "morning"
2. /gu+mu+eɲia/ [gumwe:ɲa] "a song"
3. /mu+kuapa/ [mukwa:ha] "an armpit".

In 1 and 3 where the classifier /mu/ is followed by a consonant-initial stem /u/ is realised as a syllabic nucleus, [u]. In 2, where the classifier is followed by a nonconsonant-initial stem, /u/ is realised as a glide, [w], which forms part of the syllable onset,and stem-initial /e/ is realised as the syllable nucleus with the feature [+long], [e:]. In 3 the stem /kuapa/ contains a sequence of two nonconsonants. The first is realised as a glide, [w], part of the syllable onset, and the second is syllable nucleus with the feature [+long], as in 2. We see from these examples that the same underlying element is realised sometimes at syllable onset and sometimes at syllable nucleus.

A close front nonconsonant /i/ also occurs in prefixes. The determiner and classifier to class 7 are identical in form, /ki/.

4. /ki+taBu/ [citaBu] "a book"
5. /ki+ki+iko/ [cici:ko] "an eye"
6. /ki+ki+ama/ [cica:ma] "a machine"

7. /mu+kiuNgua/ [mucuŋgwa] "an orange"

8. /mu+keka/ [muceka] "a mat made of palm leaves"

In 4, 5 and 6 the velar /k/ is fronted to palatal affricate before [i] in the classifier /ki/ and before the front nonconsonants [i] and [e] in the stems in 7 and 8. When the classifier /ki/ occurs before a nonconsonant it is realised at syllable onset as a palatal affricate, and the second nonconsonant is realised at syllable nucleus with the phonetic feature [+long] (except when it occurs before a syllabic nasal or word boundary as in 7).

The third nonconsonant which occurs in class prefixes is /a/. In class 13 the "diminutive" class, the classifier and determiner are identical, /ka/.

9. /ka+kaafu/ [kaka:fu] "a small cow"[1]

10. /ka+ka+iko/ [kaki:ko] "a small eye"

/ka/ is realised as a velar stop at syllable onset when it occurs before a nonconsonant. (Morpheme boundaries do not affect the realisation.)

Notice that when two nonconsonants occur in sequence in the underlying representation there is not complete identity between the number of underlying nonconsonants and the number of syllables which realise them phonetically. Thus in the underlying representation 2 and 3 have five and four nonconsonants respectively. Yet each is realised by three syllables. (In 3 the syllable boundary coincides with classifier-stem division but in 2 it does not.)

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1. This analysis of /kaafu/ as the stem is justified by the realisation in the diminutive plural as [Buka:fu], "small cows", whereas the plural of 10 is realised as [BuBwi:ko] "small eyes".

Another striking example of the lack of identity between the number of nonconsonants in the underlying representation and the number of syllables in the phonetic realisation can be illustrated by a phrase which extends beyond the word:

/Bi+Buno Bi+e u+mu+siNde/ [BiBunoByo:musinde]
"the boy's buttocks".

In this example a sequence of three underlying nonconsonants is realised in one phonetic syllable, [Byo:].

Examples of the realisation of the same underlying element at syllable onset or syllable nucleus have all been taken from sequences of nonconsonants. The principle illustrated in detail here, that different allophonic realisations of the same underlying element can be accounted for in terms of realisation within the syllable, has obviously a wider application. Thus for example we may briefly note that nasals which, in the underlying representation, precede nonconsonants are realised at syllable onset:

/u+mu+leme/ [umuleme] "a cripple"

while nasals which in the underlying representation precede consonants are realised as syllable nucleus:

/lu+saNbu/ [lusambu] "a dead millet plant".

The concept of the syllable has not yet been introduced into the theory of generative phonology in a way which exploits its potential for accounting for the phonetic distribution of underlying elements. Chomsky and Halle have constantly used the syllable as an informal descriptive term (cf. Chomsky, Halle and Lukoff, 1956; Halle, 1964; Chomsky and Halle, 1968)

but it is not accorded any formal status until 1968 (where it is only briefly discussed after the main model has been presented in terms of the feature vocalic). Here it appears that a substitution of the name "syllabic" for the name "vocalic" is what is proposed. It is difficult to see what theoretical improvement this terminological change can bring about. We are still left with statements like: "When vowels become nonsyllabic they turn into glides" (354).

If we want to identify the classifier /mu/ as the same item in, for instance, our examples 1 and 2, and if all underlying vowels must be specified as [+syllabic] in the lexical representation, following Chomsky and Halle, the value [+syllabic] will always have to be changed to [-syllabic] when /mu/ occurs before a vowel-initial stem.

A simpler solution is proposed in the present description. No underlying element in the lexical entry is specified for syllabic values. The lexical entry cannot correctly specify syllabic values, since it has no access to information about the catenation of morphemes within the phonological word. This information is, however, available to the redundancy rules, and they may correctly specify syllabic values. Thus if they find a sequence of two consonants, whether in the surface structure representation they were separated by a morpheme boundary or not, the redundancy rules will specify the first as [+syllabic] and the second as [-syllabic]. In the present description the syllable is regarded, not as an inherent feature of any underlying element, but as the unit of distribution in the phonetic realisation. Fry (1964:219) writes:

"it is at least plausible ... that syllabification is one feature of the brain's control of motor speech activity, and that the true function of the syllable ... is to form the unit of neural organization."

Some of the physiological correlates of the syllable are expounded in a particularly accessible way in Kimasaaba songs. Songs are accompanied by a clap pulse and, where possible, by flute and amadinda. (The amadinda is the xylophone found throughout East Africa, cf. Cooke:1970). When both instruments accompany the song, together with the clap pulse, every syllable acquires recognition from some part of the accompaniment. Long vowels, which we derive from two underlying non-consonants, are accompanied by two pulses, non-lengthened vowels by one pulse, and N by one pulse. (On any syllabic nasal the amadinda typically drops down a fourth.)

2.2.6 The output of the redundancy rules

Writers on generative grammar, notably Chomsky (1965) and Postal (1968) have charged taxonomic phonemics with introducing a level of description which merely complicates the grammar. A similar charge may be brought against the decision in generative phonology to construct a level of fully specified systematic phonemes and to interpose this level between the redundancy rules and the phonological rules.

The idea of a fully specified level of systematic phonemes has been developed in the years between Halle's partially specified morphonemes (1959) and Stanley's fully specified systematic phonemes (1967). In 1964 Chomsky assigned

the status of "linguistic level" to the partially specified lexical entry in the syntactic surface structure. If we need to specify such a level, this seems as good a moment to choose as any, since we do, as Chomsky remarks, imply "by the word 'systematic' that the choice of elements at this level is deeply determined by properties of both the syntactic and phonological component." (1964:87). But in 1967, Stanley (following Lightner, 1963) raised the valid objection that to allow partially specified matrices into the phonological rules makes it "all too easy to be formally inconsistent by letting '0' function as a third value", (410). He proposed that it is "more natural to attribute theoretical significance to two FULLY SPECIFIED levels"(397) - that is the systematic phonemic and systematic phonetic levels. One result of this hardening of approach has been the loss of the valuable concept of the archiphoneme. We have already noticed, in trying to specify the plural forms of dog and cat, the complication that a fully specified systematic phonemic level introduces into the grammar.

The assumption that the level of output of the redundancy rules must be systematic phonemic has not been a topic of general discussion, because general interest has centred on the phonological rules and phonological features. But in fact the actual output of the redundancy rules is not always obviously systematic phonemic, even when this is claimed to be the appropriate level. Stanley (1967) is scrupulous in describing the levels of his presentation throughout his discussion. He states the level of output of the

redundancy rules unambiguously: "It is possible that, just as MS. rules (morpheme structure rules, or redundancy rules, GB.) state redundancies at the systematic phonemic level, there may be rules which state redundancies at the systematic phonetic level" (397). Since many of Stanley's proposals are accepted by Chomsky and Halle (1968), and at least one description, (Schachter and Fromkin, 1968) has already appeared in terms of the modified model that he proposes, let us follow his argument on. The function of phonological rules "is to map the fully specified representations of the systematic phonemic level on to the systematic phonetic level" (397). But the output of the phonological rules is "automatically subjected to the segment structure rules", that is to those redundancy rules which specify the redundant features of systematic <u>phonemes</u>. So we see that the features of the systematic phonemes also apply to the <u>output</u> (systematic phonetic) of the phonological rules. It is true that Stanley remarks in a footnote that at some point in the phonological rules their output will no longer be cycled through the redundancy rules. But he produces no motivation for this suggestion and is unable to suggest a principled moment at which the cut-off should apply. This is a particularly clear example of the implicit assumption, explicitly denied, that the level specified by the redundancy rules is really that of a minimally specified systematic phonetics. (It should be acknowledged that the reason why it is possible to follow this argument through is that Stanley explicitly states the level he is operating at.)

Chomsky and Halle have also insisted that the redundancy rules have as output a systematic phonemic representation. This output has to be submitted to phonological rules whether or not <u>invariance</u> obtains between the systematic phonemic and systematic phonetic levels. (<u>Invariance</u> is defined thus: "the phonological matrix given in (the) lexical entry is a submatrix of the phonetic matrix corresponding to it" (1968: 166)). This insistence is curious in view of statements like these: "the more direct the relationship between classificatory and phonetic matrices the less complex - the more highly valued - will be the resulting grammar." (1968:381). "The most highly valued, 'simplest' grammar then, is one in which phonological processes that apply when there is no formative boundary apply also when this unit is present".

It must be supposed that the reason why constraints expressed in the redundancy rules have been repeated in identical phonological rules is that these two sets of rules perform different functions. But, as we have seen, they often perform identical functions. Observe Chomsky and Halle confronting a rule which does apply both within and across morpheme boundaries. They find "certain regularities are observed within certain lexical items as well as across certain boundaries - the rule governing voicing in obstruent sequences in Russian for example". They decide that this rule must be placed among the phonological rules: "to avoid duplication of such rules in the grammar it is necessary to regard them not as redundancy rules but as rules that happen to apply internally to a lexical item" (1968:382). But in the immediately following paragraphs they discuss Stanley's suggestion that all lexical items must be fully specified

on entry to the phonological rules, a suggestion which is accepted. This of course means that the rule governing voicing in obstruent sequences in Russian does have to be stated twice, once in the redundancy rules to allow the lexical item to enter the phonological rules fully specified, and once in the phonological rules to state the same regularity over morpheme boundaries. The metric of simplicity is abandoned to the doctrine that redundancy rules do not apply across morpheme boundaries. And this indeed appears to be the crucial distinction between redundancy rules and phonological rules - whether or not a morpheme boundary is present. Chomsky and Halle admit that when a morpheme boundary is not present to identify a redundancy rule "We cannot in all cases determine from the form of a rule whether it is a lexical redundancy rule or a rule of the phonology" (171, op.cit.). If all morpheme boundaries are deleted before matrices enter the redundancy rules, as we propose in the present description, it is clear that many former phonological rules will no longer be needed. Indeed only rules which change feature values will now appear in the phonological rules. Since it is clear that such rules have only a very narrow application, rather than cycle all matrices through them, as the Chomsky-Halle model does, only matrices to which the rules apply are obliged to enter the P-rules. The output of the P-rules is then resubmitted to the redundancy rules as Stanley suggests.

In the proposals made here, the different functions of the redundancy rules and phonological rules are distinguished by the operations they perform. The redundancy rules are

realisation rules: they complete the phonetic specification of the output of the syntactic surface structure. The formal constraint on their function is that they may only add features. The phonological rules, on the other hand, are exclusively mutation rules. They exist only to adjust the specification of items. They may only perform operations other than simple additioning operations.

When all values are specified by the redundancy rules, any matrix containing the specification [+P-rule] is passed into the P-rules. When the appropriate P-rule operates, the feature [+P-rule] is deleted. The matrix then re-enters the redundancy rules, which check that all feature values are specified. When a matrix is fully specified and contains no feature [+P-rule] it emerges from the redundancy rules as a systematic phonetic representation. This representation contains about as much information as a conventional "narrow" transcription. An example of such a representation might be:

	l	i:	g	o	c	e
cons	+	-	+	-	+	-
ling	+	+	+	+	+	+
apic	+	-	-	-	-	-
voice	+	+	+	+	-	+
cont	+	-	-	-	-	-
nasal	-	-	-	-	-	-
stop	-	-	+	-	+	-
front	+	+	-	-	+	+
round	-	-	+	+	-	-
low	-	-	+	+	+	+
syll	-	+	-	+	-	+
long		+				
raised		+		+		

[lʲiːgʷoce] "ash". This tells us that [l] is palatalised, ([+front]), that [i:] is syllabic, long and raised, that [g] is rounded but not closely rounded ([+round],[+low]),that [o] is syllabic and raised, that [c] is a palatalised velar ([-apical],[+front]),and that [e] is syllabic.

One result of the decision to allow the redundancy rules to specify a systematic phonetic level is that this leaves no level of fully specified systematic phonemes. The statement in 1.1 that "fifteen underlying consonants are recognised" oversimplifies the position. There are only fifteen underlying consonants if a level of fully specified systematic phonemes is recognised - where each row in each column of every matrix is specified for a value before phonological rules operate. Thus in the Chomsky-Halle model the /s/ which occurs initially in English "start" will have the same set of feature values as the /s/ at the beginning of "set". It is possible, in their model, to go through the fully specified columns of a number of matrices and group together those columns whose feature specification is identical and produce a list of fully specified phonemes. The implication must be that in some sense the systematic phonemes are the contrastive elements and that both redundant and nonredundant feature values are necessary to identify them <u>no matter in what environment they occur</u>. By setting up this quite unnecessary level of analysis, the valuable notion of the redundancy of some features, within some structures in an utterance, is obscured.

In the model I describe here there is no systematic phonemic level. The unit of phonological opposition is the

distinctive feature, and it is the presence or absence of a value for a distinctive feature within a given structure in the lexical entry which shows where redundancy lies. I would not wish to identify the /s/ element initial in "start" with the /s/ element initial in "set". Most of the values for the initial /s/ in "start" are completely redundant, as was pointed out by Jakobson, Fant and Halle in 1951 (cf. also Halle, 1964.) There is no phonological opposition other than +/-consonantal word initially before a /t/. There is, however, clearly opposition before /et/, between the initial consonants in "set", "pet", "let", "met" etc. and at this point the initial consonant must be more fully specified.

In Lumasaaba I do not identify a stem-initial /b/ with the labial element which must follow /N/, or a [+front] non-consonant, which is redundantly [+low] following /j/, with /e/ in another environment. If the theory of redundancy in phonology has any purpose other than the rather trivial one of allowing us "to shorten the dictionary, which is an integral part of the grammar by many hundreds of features" (Halle, 1964:340), it must surely be to account, for instance, for the perception of utterances which are masked by a high degree of noise. The problem is one of identifying the minimum input necessary for interpretation of an utterance. It is a highly redundant theory of phonology which insists that a minimally redundant acoustic input must always be processed (or indeed produced) by stringing together fully specified systematic phonemes and taking no account of the word, or message, in which they appear.

The phoneme theories of Daniel Jones (Jones: 1950) or

the Yale phonemicists (Bloch and Trager, 1962) or Pike (Pike: 1947) gather together similar phonetic entities and group them into phonemes which have a practical value in the construction of orthographies, the rapid exploration of the phonology of a language, and (rather more dubiously) in language teaching. The systematic phoneme theory developed by the generative school, gathers together abstract elements, grouped on the basis of the phonetic realisation they will eventually achieve. I see no value, either practical or theoretical, in the construction of this level.

2.2.7 Phonological rules

The phonological rules, called P-rules, exist to deal with anomalies in the phonology. Whereas a formal requirement on redundancy rules is that they only add feature values, a formal requirement on phonological rules is that they may only change feature values. There are four, numbered, phonological rules, each one of which deals with a specific complication in the phonology. Thus, for example, P-rule ii applies to all matrices containing /p/, P-rule iii to all matrices containing the sequence N+C where C is other than a voiced, nonnasal, stop.

In the Chomsky-Halle model all matrices emerge from the redundancy rules and pass through the P-rules, whether or not they are correctly specified by the redundancy rules. I believe it is because all matrices have inevitably had to undergo a further processing after the redundancy rules, that the concept of a fully specified phonemic level has crept into

generative phonology. In order to stress the ability of the redundancy rules to fully and correctly specify the phonetic realisation of the majority of matrices, in the model described here only those matrices which need adjustment enter the P-rule loop. This means that such matrices must be identified before they enter the P-rule loop. Traffic rules in the redundancy rules mark inadmissible sequences to enter the P-rules. Whereas in the Chomsky-Halle model all matrices enter the P-rules and are matched against the structurel description of each rule to see whether it applies, in the present model traffic rules express the structural description which will be found in P-rules, and mark any matrix conforming with its structural description to enter the appropriate P-rule. The P-rule then operates on the matrices identified by the traffic rule. The consequence of this arrangement is that a certain amount of redundancy is built into the model - the structural description must be stated in the traffic rule and then be repeated in the P-rule. This redundancy is not an essential part of the model. It would be perfectly possible to do away with the redundancy traffic rules and allow all matrices to run through the P-rules as the Chomsky-Halle model does. I have preferred to allow the redundancy in the present exposition, in order to demonstrate that the realisation rules are in fact <u>phonetic</u> realisation rules. In a minimally redundant description this heuristic principle would be abandoned, and all matrices would run through the P-rules, as in the Chomsky-Halle model.

For a similar heuristic reason I have marked some items to enter the P-rules in their lexical entry (/p/ and class 5

classifier /si/) rather than identify them by traffic rules. This allows a distinction to be made between those items whose own specification demands mutation, no matter in what phonological environment they occur, and those items which form inadmissible sequences as a result of their catenation within the phonological word. The former are marked [+P-rule] in the lexical entry, the latter are identified by traffic rules. In a minimally redundant description all items, including those here marked in the lexical entry, would be identified by the structural description of the relevant P-rule.

When a matrix enters a P-rule it will be operated on by any sub-rule whose structural description applies. In some cases more than one sub-rule will apply to one matrix. (For example the sequence nasal+/j/-initial noun stem is operated on by three sub-rules of P-rule iii, one which hardens [y] to [ȷ], and two which front the nasal and stop respectively to alveolars, yielding,for example, [inzila] "a path", from /i+N+jila/.) In such cases each sub-rule will operate in the specified order. When the last sub-rule applies, the feature [+P-rule] is automatically deleted. The matrix then goes back into the redundancy rules,which complete its specification.

Most dialect variation can be accounted for by reference to the operation of the P-rules. (See Chapter 5 for discussion of dialect variation and its relation to the P-rules.)

2.2.8 Word Boundary rules

When the specification of a matrix is complete and no [+P-rule] feature remains in it, the matrix is passed through

the word boundary rules. These, like the P-rules, are mutation rules. They alter feature values of segments which abut in contiguous phonological words when an impossible sequence threatens to appear. The impossible sequence which they are concerned to block is the sequence of two dissimilar syllabic vowels, with no intervening consonant. When a sequence of dissimilar syllabic vowels appears these rules cause the vowels to coalesce into one long vowel. Thus they cause the sequence /i+a/ in the following example to be realised as [a:]:

/u+mu+fiidi a+tegelesa/ [umufi:da:tejelesa]

"the youngest (child) obeys".

2.2.9 The characterisation of underlying elements

The range of features posited within generative theory has increased considerably since the original twelve were described by Jakobson, Fant and Halle in 1951 - in 1968 the number has nearly doubled and many of the original features have been changed (cf. Chomsky and Halle, 1968). It is customary in generative description to select features from those currently available and to characterise all underlying elements by the same set of selected features. The decision to describe both consonants and vowels by the same set of features appears to have been taken because there is no non-arbitrary acoustic or articulatory criterion which can distinguish members of the set of all possible phonetic consonants from members of the set of all possible phonetic vowels (Jakobson, Fant and Halle, 1951).

From a phonological point of view this is a difficult decision to justify. One of the more powerful reasons for using features to characterise phonological elements is that such features can be used to define natural classes of elements where members of a class characterised by a given feature value function in a similar way. (The concept of natural class, formalised by Jakobson, is of course a familiar one in traditional description. In phonemic description "symmetry" ("pattern congruity") has been evoked as a criterion for setting up phonemes (cf. for example, Hockett, 1942). It is true that, within the class of consonants, elements characterised by a shared feature value tend to function in a similar way, and that within the class of nonconsonants elements characterised by a shared feature value tend to function in a similar way. It is not true, however, that when an underlying consonant and underlying nonconsonant are characterised by a shared feature value that they function in a similar way. (This does not of course deny that adjacent consonants and vowels often share assimilatory values.) There is no meaningful sense in which a voiced consonant can be held to function like a voiced non-consonant. Similarly there is no meaningful sense in which a back consonant can be said to function like a back non-consonant. To characterise these two major classes of elements by the same set of features can only obscure the function of natural class.

Not only does the classification of these two classes by the same set of features obscure the function of natural class, it also makes the description of the process of phonetic similitude (the sharing of the feature values of one element

with an adjacent element) complex and unwieldy. If, for example, both consonants and vowels are characterised as [+round] (as in Chomsky and Halle, 1968) it is necessary to introduce another feature to describe the phonetic labialisation of consonants preceding [+round] vowels.

In the present description, underlying consonants and nonconsonants are characterised by different sets of primary features. Then when a consonant precedes a [+round] nonconsonant, the primary round feature of the nonconsonant is shared by the consonant, for which [+round] is a derived feature. This allows the process of phonetic similitude to be expressed in a very natural way. It is not necessary in this model, as it is in the Chomsky-Halle model, to introduce an extensive set of features in the low level phonological rules in order to account for this process. (In the present model only three non-lexical features are introduced - syllabic, raised and long.)

The introduction of feature-sharing to account for similitude, enables us to express generalisations about the structure of the syllable in the phonetic realisation, which resemble in some respects the sort of statements made about syllable prosodies by prosodic phonologists. Thus we note in Lumasaaba that consonants share the feature values of the following nonconsonants and that nonconsonants share the nasal feature value of the preceding consonant. The unit within which similitude occurs may be expressed as consonant-nonconsonant (CV). The shared values may be stated as values of the phonetic syllable, rather than as values of the phonetic vowel or consonant. Thus any phonetic syllable containing the

vowel [i], as in [cisimita] "a knife", may be said to be a palatalised syllable, since the value [+front] is shared by both vowel and preceding consonant, as we find in [ci], [si], and [mi]. Robins (1964:164) writes: "In some, but not all, languages nasal consonants are always followed by nasalised vowels within the same syllable, and nasalised vowels only appear after nasal consonants. --- Such features may be treated as prosodies of the syllable concerned, abstracted from and manifested in the sequence of consonant and vowel --- and not assigned phonologically to any one place as distinctive or significant as against any other place." It is important however to remember that in prosodic phonology the syllable is a phonological, not a phonetic, syllable: "The structure in question is the phonological, not the phonetic, syllable, and it is a phonological structure defined in terms of phonematic units and prosodies" (Robins: ibid. 162). In the present description the features which are shared within the phonetic syllable are regarded as primary, distinctive features for one underlying phonological element, but as derived, redundant features for the other. Whereas in a prosodic account the features would be assigned to the phonological syllable, we here regard the similitude as a feature of the phonetic realisation in this language (and therefore expressible in its redundancy rules) not as a relation between the abstract elements of the phonology.

2.2.10 The features

These are the minimal units of the phonological description. The use of features allows simple but explicit statements to be made which can overtly exploit the concept of "natural class" (cf. Halle, 1964) which has traditionally been used in phonological description.

The term "feature" is used ambiguously in generative literature. As Bazell remarks, the negative is often treated as a feature in itself rather than as the absence of a feature (Bazell: 1953). Thus for example Jakobson, Fant and Halle list as a "secondary consonantal source feature" the feature "voiced vs. voiceless" and comment "The use of the distinctive consonantal opposition voiced vs. voiceless is widespread in the languages of the world." (1951:26). It is clear here that the absence of the feature voice must be regarded as a positive identifier for consonants. Similarly Chomsky and Halle write, "we can now say that sets of segments that have features in common are more "natural" than sets of segments that have no common features." (1968:335). Since all consonants are classified in terms of all consonantal features (and many vocalic features) this remark is meaningless unless it is interpreted as "sets of segments having identical feature values in common". There is no suggestion that the values held in common must be positive values or that positive values represent in any way a more proper classificatory class than negative values. Indeed Chomsky and Halle explicitly state that positive and negative values are equally to be regarded as classificatory features: "In the case of the phonological matrix each square represents simply a pair of

opposed categories"(1968:165).

Since the term "feature" is now commonly used to mean "feature value" as well as "feature" it will be used in this informal way in the present work except when some change in values is being discussed in the context, for example, of a mutation rule. Then we will use the more precise term "feature value". (Notice that the implication of Chomsky and Halle's remark, that sets of segments with "features" in common constitute a natural class, is either that the number of features is doubled or that features are no longer binarily-valued.)

Underlying elements are divided into two main classes, consonants and nonconsonants. Consonants are characterised as [+consonantal]. They are also characterised in terms of articulatory features of place (lingual, apical) voicing (voice) nasality (nasal) and obstruence (continuant, stop). These are the primary features which characterise the consonants. Nonconsonants are characterised by features of place (front), labiality (round) and degree of aperture (low). These are primary features for nonconsonants.

Derived features are added by the redundancy rules. They are features which can be predicted from information about the sequence of underlying elements. They express realisation within the syllable (syllabic), secondary articulation or phonetic similitude (primary consonant features mapped on to contiguous nonconsonants as derived features and vice versa) and features of vowels in some stated environment (raised and long).

The features used to characterise the underlying elements

of Lumasaaba are not those used in the description of Russian by Halle, (1959) or of English by Chomsky and Halle (1968). In working with a language with a comparatively small system of underlying elements it is difficult to make a non-arbitrary choice among the large range of features described, for example, in The Sound Pattern of English. A particularly good example of this difficulty arises with the characterisation of /z/.

The characterisation of /z/

In the labial series there occurs a voiced stop /b/, and a voiced non-stop /B/. When /B/ occurs following a nasal prefix it is realised as [b], thus:

/i+N+Bizi/ [imbizi] "a pig" (/ka+Bizi/[kaBizi] "a small pig")

In the apical series there occurs a voiced stop /d/ and two voiced nonstops, /l/ and /z/. When /l/ follows a nasal prefix it is realised as [d], thus:

/zi+N+li/ [zindi] "roots" (/lu+li/ [luli] "a root")

but when /z/ follows a nasal prefix (exemplified here in the verb, because no /z/-initial noun stems are attested in classes 9 and 10) it is realised as [z] thus:

/i+N+zinisa/ [inzinisa] "I hunt".

In generative descriptions /l/ has usually been assigned the features [+consonantal], [+vocalic], (cf. Halle, 1959, Chomsky and Halle 1968). Presumably this characterisation was chosen, partly at least, because /l/ frequently functions as a syllabic consonant in some familiar European languages, and the feature value [+vocalic] keeps /l/ apart from other consonants. In Lumasaaba however it is not /l/ which we need to make different,

at a phonological level, from other consonants. /l/ functions as a regular member of the set of voiced continuants /B,l,j/. It is /z/ which must be characterised as functioning in a way different from other consonants. It alone, of the consonants which are not realised phonetically as stops, can follow a nasal.

It seems likely that some realisations of [z] derive historically from the same element as /j/, (cf. Meinhof, 1933: 117). The morphophonemic alternations:

/i+N+ju/ [inzu] "a house", /ka+ju/ [kayu] "a small house"

/i+N+jila/ [inzila] "a path", /ka+jila/ [kayila] "a small path"

suggest this relationship. [z] here functions as the stop congener to /j/. In the verb, as we have already noted, [z] functions as the stop congener to /z/:

/i+N+zin+a/ [inzina] "I feel", (/ku+zin+a/ [kuzina] "to feel").

Whereas in Buhugu generally /z/ is realised as a voiced alveolar fricative, in the speech of some Buhugu speakers, and in some Northern accents, notably Lufumbo, /z/ is realised as [dz], a voiced alveolar stop followed by voiced affrication. In Southern dialects /z/ is realised as [ts], a voiceless affricated alveolar stop.

In the present work /z/ is characterised as possessing the feature values [+continuant], which brings it phonetically into a class with [B], [l], [y], [f] and [s] as oral non-stops, and with the feature [+stop] which brings it into the functional class of /b,d,g/. Although this is not a completely satisfactory solution, since the feature stop is introduced merely to characterise /z/, no other obvious

solution can be found which does not carry unfortunate implications of natural class. It would be possible, for example, to introduce the feature strident to distinguish /z/ from /l/, but this feature would also characterise the phonetic realisation of /f/ and /s/, which function phonologically in a quite different way, and would fail to reveal that /z/ functions like a voiced stop.

The features chosen

It would be theoretically possible to characterise the underlying consonants of Lumasaaba by only four features. But if four, or even five, features are chosen the principle of "natural class" is violated. It would be possible, for instance, to characterise the class of nasal consonants by the feature values [-continuant][-stop]. ([+stop] would then be phonetically interpreted as demanding a velic stop as well as an oral stop.) But it would then be impossible to suggest that natural assimilatory processes produce nasalised vowels following nasal consonants, or stops rather than continuants following nasal stops.

Underlying elements shown in a classificatory matrix

The matrix shows a set of nonredundant feature specifications for some individual elements. Since no element ever occurs in isolation, this matrix has no theoretical status whatsoever. It simply indicates to the reader which set of feature values the alphabetic symbols used in the informal representation may be related to. The matrix does not exhaust the set of possible underlying elements. For

instance, in the informal representation /ku+fuNba/, the /b/ following /N/ will only be specified as [+consonantal, -lingual]. All other feature values are predicted by the redundancy rules.

	p	t	k	b	d	g	m	n	ŋ	B	l	j	f	s	z	i	e	a	o	u
consonant	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-
lingual	-		+	-		+	-		+	-		+	-							
apical		+	-		+	-		+	-		+	-								
voice	-	-	-	+	+	+				+	+		-	-						
continuant	-	-		-	-	-				+		+	+	+	+					
nasal				-	-	-	+	+	+											
stop										-		+								
front													+	+	-					
round																-	+	+		
low													-	+		+	-			

2.2.11 The phonetic realisation

If this phonological description formed part of a complete grammar it would be reasonable to expect that the output from the phonological component should be capable of realisation by, for example, giving instructions to a speech synthesiser. The present work does not attempt a formal link-up between the output of the phonological component and the phonetic realisation. The chapter on phonetic realisation offers an informal articulatory characterisation of bundles of primary features with different sets of derived features.

3. CHAPTER THREE

THE RULES OF THE PHONOLOGY

3.1 Positive Conditions

The concept of Positive Conditions is borrowed from Stanley (1967), who used them to express constraints on syllable structure. In the present description the Positive Conditions express sequential constraints on the sequence of phonological elements (consonants and nonconsonants) within the phonological word, on the sequence of phonological elements within lexical entries and on the sequence of segments, in the phonetic realisation, within a phonological tone group.

Let us examine permitted sequences within lexical entries and the phonological word. In expressing the permitted sequences the following symbols are used:

++ word boundary, + formative boundary

C [+consonantal]

V [-consonantal].

If the length of an item is greater than that characterised in the sequential statement, the constraints within bracket R reapply.

A. Lexical stem:

$$+(\ V(C)\ )\ C\ (V)\ V\ {}^{R}(\ (C)\ C\ (V)\ V\ )^{R}{}_{+}$$

This condition states:

a) a lexical stem consists minimally of CV,

b) a lexical stem may begin with the sequences CV, CVV, V,

c) the maximum sequence of V is VV,

d) the maximum sequence of C is CC,

e) final element must be V.

B. Grammatical formative:

$$+ (C (V)) V {}^{R}(\_(C) C (V) V)^{R}+ \quad / +C+$$

This condition states:

a) a grammatical formative consists minimally of V or C,

b) a grammatical formative may begin with the sequence CV, CVV, V,

c) the maximum sequence of V is VV,

d) the maximum sequence of C is CC,

e) when a formative is not represented simply as C,[1] it must end in a V.

C. Phonological word:

$$++ (C) (V) V {}^{R}((C) C (V) V)^{R}++$$

This condition states:

a) a phonological word consists minimally of V,

b) a phonological word may begin with the sequence CV, CVV, VV, V,

c) the maximum sequence of V is VV,

d) the maximum sequence of C is CC,

e) the final element must be V.

It is clear that to state the sequential constraints on the language in this form would miss a significant

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1. If formatives represented as /C/ were analysed as /ni/ (as Meinhof suggests for Ur-Bantu, 1932:40, cf. also Ferguson's suggestion that it is universally true that "a nasal syllabic phoneme -- always results from a loss of a vowel" (1963)), the general statement that all formatives must end in V would become possible. Against this possibility we have to set increased complexity in other areas of the synchronic description. It becomes, for example, impossible to derive the phonetic realisations of C here symbolised as /N/ in /i+N+bila/ (imbila "bead") and /lu+ŋiaNbafula/ (lunambafula "earthworm") by the same rule.

generalisation. If we abstract the statements common to conditions A, B and C, we obtain the following set, which will hold for all sequences within the phonological word:

a) an item cannot begin with the sequence CC,

b) the maximum sequence of V is VV,

c) the maximum sequence of C is CC,

d) the final element must be V (except when a grammatical formative is represented as C).

We may state then the following general condition:

Sequence condition: ++(C) (V) V ^{R}((C) C (V) V)^{R} ++

which will hold within the phonological word.

We may also state a general condition on lexical entries:

+ ((V) C) V (C) · · · · +

This states that no lexical entry may begin with a sequence VV. Having stated these generalities we are left with a residue of specific constraints:

a) lexical stem: +CV····+

A lexical stem consists minimally of CV,

b) grammatical formative: +V··+ +C+

A grammatical formative consists minimally of V or C,

c) phonological word: ++V···++

A phonological word consists minimally of V.

The information expressed by the Sequence Condition is also expressed by the redundancy rules which fill in values for stated permitted sequences. It would be possible to arrive at the statement made in the Sequence Condition simply by going through all the redundancy rules and noting the maximum sequences that the redundancy rules permit. It may be objected,

therefore, that the Sequence Condition is itself redundant. The view taken here, however, is that the Sequence Condition does not merely summarise concisely the constraints scattered through the redundancy rules (and if it did no more than this it would be justifiable to include it in the description, in order that a statement of the permitted structure of items should be readily accessible) but that, rather, it governs the possibilities of sequence expressed in the redundancy rules. The Sequence Condition is here regarded as a meta-rule of the phonology. Every later rule must conform to the constraints that it expresses (for a discussion of meta-rules in phonology cf. Kim, 1970, Lass, 1970).

The decision to regard the Sequence Condition as a meta-rule on the phonology as a whole, rather than simply as a summary of the sequence constraints expressed in the redundancy rules, is supported by the fact that the Sequence Condition dominates the phonetic output. This will not be immediately clear, so let us examine it further. The maximum sequence of consonantal elements which the meta-rule allows is CC. Redundancy rules tell us that the first C will always be a syllabic nasal. In the phonetic realisation the maximum sequence of consonants is syllabic nasal + consonant. The maximum sequence of V elements which the meta-rule allows is VV. These can be realised as (glide) vowel (+length) as in:

a) /ki+guaBi/ [cigwa:Bi] "a gourd pipe" (glide+long vowel)

b) /gu+mu+eNdo/ [gumwendo] "price" (glide+vowel)

c) /i+N+sua/ [i:swa] "an ant" (glide+vowel)

d) /Ba+Ba+eji/ [BaBe:yi] "sweepers" (long vowel)

e) /ga+ma+eNdo/ [gamendo] "prices" (vowel)

Thus the maximum phonetic realisation ("maximum" in the rather crude sense of being most easily observed) of the underlying sequence VV is glide plus long vowel. The minimum phonetic realisation is a vowel. Now, when two phonological words occur in sequence, it can happen that the first word can end in a sequence of two VVs and the second can begin with V, as we have already seen in the genitive construction:

/i+N+Bata i+e u+mu+kaasi/ [imbatayo:muka:si]

"the woman's duck"

Within the genitive /ie/ the /i/ is realised as nonsyllabic [y] before [e] giving [ye] - not long, because word final. (There is no length in [e] in /zi+N+Bata zi+e Ba+kaasi/ [zimbatazeBaka:si], "the ducks of the women".) Between words the /u/ is lowered to [o] and lengthened, and the [e] is deleted, giving [yo:]. Three underlying Vs are realised in one long syllable. A sequence of two dissimilar syllabic vowels is impossible in the phonetic realisation.

It is in this sense that the meta-rule constrains the phonetic realisation - if the catenation of formatives within a phonological phrase gives rise to a sequence of elements not specified by the meta-rule, P-rules must operate to change the specification so that the phonetic realisation will conform to the pattern of phonetic realisations of the sequences stated in the meta-rule. Thus we may state for any <u>phonetic</u> realisation:

a) it will not begin with a sequence syllabic nasal+consonant,

b) the maximum vowel sequence will be (glide) vowel (length)

c) the only consonant sequence will be syllabic nasal+ consonant,

d) the final element must be a vowel.

The meta-rule controls not only the sequence of underlying elements within the phonological word but also the sequence of segments in the phonetic realisation.

Now that we have established the scope of the meta-rule let us consider the remaining sequential constraints. Since the statement of these constraints requires access to information about the type of formative, the statements of permitted sequence within the lexical stem and the grammatical formative are framed as Positive Conditions on items in the two "lexicons". (They could not be formulated as redundancy rules because the readjustment rules delete morpheme boundaries before the redundancy rules apply.)

Positive Conditions can also express other, less general, constraints. Fromkin (1965:605) writes: "The relation between morpheme classes and phonological structure is not made explicit in the transformational model". We have already seen that Positive Conditions can provide at least a partial answer to this criticism by distinguishing the permitted structure of grammatical vs. lexical morphemes. A Positive Condition will also state that the only vowels permitted in the set of noun determiners and classifiers are /i/,/a/,/u/:

$$\text{Classifier/determiner: } + (C) \begin{bmatrix} V \\ \text{front} \\ \text{round} \end{bmatrix} \cdots +/\ +C+$$

This tells us that the structure of a classifier or determiner is either (C)V or C and that the feature <u>low</u> is not relevant

to the characterisation of a vowel in this system. (/a/ can be characterised as [-front][-round] cf. redundancy rule 20.)
A more formal expression of this Condition appears in the summary of this section. (See also discussion in Appendix 2.)

A problem which we must mention briefly here is the realisation of the initial consonant of /j/-initial noun stems as [z] following a nasal prefix. (This question is discussed at length in 3.3.) Whereas a verb stem initial /j/ is realised as [j] following a nasal prefix, in accordance with a general hardening rule which hardens /B/ to [b] and /l/ to [d] following a nasal prefix (see P-rule iii), a special process applies to /j/-initial noun stems. In order for this special process to apply, the stem must be identified as a noun stem when it enters the phonological rules. We have, then, to retain the lexical classification of all /j/-initial noun stems which can occur in class 9 (see discussion in 1.2.2 on reclassification) so that they are still marked with the feature [+noun] when they enter the phonological component.

Summary of the Positive Conditions

1. Meta-rule - Sequence Structure Condition

$$++ \ (C) \ (V) \ V \ {}^{R}(\ (C) \ C \ (V) \ V \ )^{R} \ ++$$

All redundancy rules and lexical entries must conform to the sequential constraints expressed in this condition:

a) an item can begin with the sequences CV, CVV, VV, V,

b) the maximum sequence of V is VV,

c) the maximum sequence of consonants is CC,

d) final element must be V (except when a grammatical

formative consists of C alone as in /i+N+jego/ [inzego] "a structural beam".)

This condition applies over the whole of the phonology. Every item inserted in the lexicon must be matched against this condition. Loan words will be constrained by this condition; e.g. English:

"electricity" [ileketelisiti]

"kitchen" [cicini]

"sandwich" [sandwi:ji]

where the constraints stated in the condition are observed.

The phonetic realisation must conform to the possibilities of phonetic realisation expressed in this condition. No utterance may contain a sequence which would not be permitted by this condition, irrespective of morpheme or phonological word boundaries (which are not marked in the phonetic realisation, cf. Rosetti: "Le mot n'est pas reconnaissable dans l'émission de la voix parlée. Les tracés de la voix parlée....ne donnent aucune indication sur les limites du mot" (1965:18)).

2. <u>Lexical entry conditions</u>

a. + ((V) C) V (C)···+

No lexical entry may begin with a sequence VV.

b. Lexical stem: + CV···+

A lexical stem consists minimally of CV.

c. Grammatical formative: + V···+ / +C+

A grammatical formative consists minimally of V or N.

d. Determiner/Classifier: $+ (C)_{X} \begin{bmatrix} V \\ l\ front \\ r\ round \end{bmatrix} + \ / \ + \underset{X}{N} +$

where l and r have any value.

The vowel in a determiner or classifier is one of the set /i/,/a/,/u/. (Redundancy rules 18 and 19 exclude the possibility [+front, +round]. The X, marking classifier and N, indicates that it is only a classifier which can be represented as N. (No determiner is represented as N.)

Examples of the underlying structure of typical noun stems

In a sample of 800 noun stems -

419 were of the structure [+cons][-cons][+cons][-cons] (CVCV)

examples:	/ki+ziki/	[cizici]	"a stump"
	/li+si+lofu/	[li:lofu]	"a ripe banana"
	/i+N+BeBa/	[imbeBa]	"a rat"
	/ki+tete/	[citete]	"a dress"
	/ki+dete/	[cidete]	"a fingernail"
	/i+N+fula/	[i:fula]	"rain"
	/lu+seke/	[lusece]	"a beer pipe"
	/i+N+Bula/	[imbula]	"a monitor lizard"

142 were of the structure [+cons][-cons][-cons][+cons][-cons] (CVVCV)

examples:	/i+N+taala/	[i:ta:la]	"a lamp"
	/u+mu+kaasi/	[umuka:si]	"a woman"
	/ma+suele/	[maswe:le]	"hair on man's chest"
	/ki+guaBi/	[cigwa:Bi]	"a gourd pipe"
	/i+N+joolo/	[inzo:lo]	"a lizard"
	/Bu+ŋiasi/	[Buna:si]	"grass"
	/ki+sielo/	[cisye:lo]	"a cow's hide"
	/zi+N+muani/	[zimwa:ni]	"coffee"

103 were of the structure [+cons][-cons][+cons][+cons][-cons] (CVCCV)

examples: /li+si+guNba/ [li:gumba] "a bone"
/li+si+poNdo/ [li:wondo] "a vegetable marrow"
/ka+jiNgo/ [kayiŋgo] "a small beer pot"
/mu+jeNbe/ [muyembe] "a mango tree"
/ma+jeNde/ [mayende] "a jigger fly"
/ma+boNdi/ [mabondi] "a sweet potato"
/li+si+saNda/ [li:sanda] "a boundary marking tree"
/ki+tuNda/ [citunda] "a passion fruit"

49 were of the structure [-cons][+cons][-cons] (VCV)

examples: /Bu+Bu+uki/ [BuBu:ci] "honey"
/lu+lu+ala/ [lulwa:la] "a finger"
/lu+lu+elo/ [lulwe:lo] "a wooden tray"
/ma+ezi/ [me:zi] "water"
/lu+lu+iga/ [lulwi:ga] "a horn"
/lu+lu+aka/ [lulwa:ka] "a boundary"

32 were of the structure
[+cons][-cons][+cons][-cons][+cons][-cons] (CVCVCV)

examples: /zi+N+fifizi/ [zi:fifizi] "a safari ant"
/ki+kalaBu/ [cikalaBu] "a hand"
/ki+sakati/ [cisakati] "a fence"
/i+N+kalaja/ [i:kalaya] "a round bowl"

22 were of the structure [+cons][-cons] (CV)

examples: /li+si+tu/ [li:tu] "a leaf"
/zi+N+ku/ [zi:ku] "firewood"
/lu+li/ [luli] "a root"
/Bu+lo/ [Bulo] "millet"

12 were of the structure [+cons][-cons][-cons] (CVV)

examples: /ki+tue/ [citwe] "a pool"

/Bi+lio/ [Bilyo] "food"

/i+N+sua/ [i:swa] "an ant"

/mu+kua/ [mukwa] "a gourd"

5 were of the structure [-cons][+cons][+cons][-cons] (VCCV)

examples: /li+si+aNda/ [lisaṇda] "a piece of charcoal"

/ki+ki+oNgo/ [ciconɲgo] "a brain"

4 were of the structure

[+cons][-cons][+cons][-cons][-cons][+cons][-cons] (CVCVVCV)

examples: /i+N+mizaani/ [iṃiza:ni] "a scab"

/mi+sumaali/ [misuma:li] "nails"

2 were of the structure

[+cons][-cons][+cons][-cons][-cons] (CVCVV)

/li+si+digui/ [li:digwi] "a hip"

/na+mu+lekua/ [namulekwa] "a widow"

1 was of the structure

[+cons][-cons][-cons][+cons][+cons][-cons] (CVVCCV)

/ua+ɲiaNbi/ [waɲaṃbi] "beans"

1 was of the structure

[+cons][-cons][-cons][+cons][+cons][-cons][-cons] (CVVCCVV)

/mu+kiuNgua/ [mucuŋgwa] "an orange"

1 was of the structure

[+cons][-cons][+cons][-cons][+cons][-cons][-cons] (CVCVCVV)

/lu+sukumue/ [lusukumwe] "a thumb"

1 was of the structure

[+cons][-cons][+cons][+cons][-cons][+cons][-cons] (CVCCVCV)

/mi+loNgolo/ [miloŋgolo] "vertical poles in house frame"

5 were reduplicated forms of structures already mentioned

examples: /ka+zilizili/ [kazilizili] "a marrow flower"

/Bu+nuanua/ [Bunwa:nwa] "beard"

3.2 Redundancy rules

Redundancy rules predict the phonetic realisation of underlying elements. They do this

i) by filling in primary feature values which are left unspecified in the underlying representation,

ii) by adding derived feature values which can be predicted from the catenation of elements.

This is a quite straightforward process and feature values are automatically assigned as a matrix proceeds through the rules. Some of the redundancy rules have another function, and this is to act as traffic rules. Traffic rules identify inadmissible sequences, and mark all columns of a matrix containing an inadmissible sequence with the feature [+P-rule X] (where X represents the number of the relevant P-rule). The two P-rules concerned are the Nasal Prefix rule which adjusts the specification of certain stem-initial consonants, so that they are realised as voiced stops after a nasal consonant (and also adjusts the specification of the nasal prefix in certain environments), and the Nonconsonant deletion rule which deletes the first of a sequence of two syllabic vowels. Each traffic rule is marked with an asterisk after its number. We shall be concerned with the differences in traffic rules in different dialects when we come to discuss dialect variation in Chapter 5.

Two of the traffic rules arise as a result of idiolectal variation. I have chosen to represent my main informant's pronunciation in stating these rules. In both cases the rules represent a usage which is common but not universal.

Each of these rules is marked with two asterisks after its number. Idiolectal rules will not be referred to in the discussion of dialect variation in Chapter 5.

The redundancy rules are expressed as If-Then conditions. (The notion of If-Then conditions expressing redundancies was first expounded by Stanley, 1967.) An If-Then condition looks like this:

If [-X] [-X]
⇓
Then [+Y].

an If-Then condition will add feature values to a matrix M if:

i) matrix M contains all the values expressed in the If matrix

ii) matrix M contains no values that conflict with values stated in the Then matrix. (If a conflicting value appears in the Then matrix of matrix M, the If-Then condition does not apply to matrix M.)

iii) matrix M does not contain the values expressed in an exception clause which states an environment in which the If-Then condition may not apply.

If these conditions are fulfilled matrix M will be supplied with the feature values expressed in the Then matrix.

The If-Then conditions are not ordered - they may apply in any order and continue to apply until all values are specified. They are not ordered because they may only add, not change, feature values and there is no non-arbitrary way of ranking the different features so that the assignment of one feature value would always depend on the previous assignment of another feature value. (For other arguments against ordering

in redundancy rules cf. Stanley, 1967 and Chomsky and Halle, 1968.) There is however a small number of rules (for instance rule 24) which must be stated as context sensitive rules because the rules are not ordered.

In the presentation here, the redundancy rules are numbered for convenience of reference, and rules performing similar functions are grouped together so that they may be discussed together. The numbering and grouping do not imply any ordering.

All the rules of the phonology are formulated so that only primary features appear in the structural description which must be matched if a matrix is to enter a rule. (The structural description is the <u>If</u> matrix in the case of redundancy rules, and the matrix on the left of the arrow in the case of P-rules.) In the lexical entry consonants are only specified in terms of features which are primary for consonants, and nonconsonants are only specified in terms of features which are primary for nonconsonants. Once a matrix has entered the redundancy rules we have no formal mechanism for distinguishing between features that are primary and features that are derived, other than by inspecting the value for the feature <u>consonant</u> of the element concerned. In order to prevent a matrix from entering a quite inappropriate rule, by virtue of some of its derived feature values matching the matrix of the structural description, a value for the feature <u>consonant</u> is stated at the head of each column of each matrix in every rule.

The redundancy rules apply and reapply until all possible values are stated. Only when all values have been stated

(eleven for consonants and eleven for nonconsonants with the possibility also of the features long and raised for nonconsonants in specified environments) is an item regarded as fully specified in the terms of this description, and finally realised as a narrow phonetic transcription. When an item is completely specified by the redundancy rules, and no feature [+P-rule] appears in the matrix, invariance is said to obtain. When a fully specified matrix contains one (or more than one) feature [+P-rule] the matrix is shunted into the P-rules. It makes no difference whether the feature [+P-rule] was assigned in the lexical entry (as in the case of lexical stems whose initial consonant is /p/) or by one of the traffic rules (as in the case of the sequence [m̥B]). When the first P-rule which a matrix is marked to enter has operated, the feature [+P-rule] for that particular rule is automatically deleted. The matrix is sent back into the redundancy rules which complete the specification of any partially specified segments inserted by the operation of the P-rule. If any further P-rule feature remains, the matrix enters the P-rules again, the P-rule operates, the appropriate P-rule feature is deleted, and it returns to the redundancy rules. This cycle continues until the matrix is fully specified and no [+P-rule] feature remains. The matrix is then realised, if it does not enter the Word Boundary rules, as a narrow phonetic transcription.

If the matrix is a phonological word in isolation it may enter Word Boundary rule 2, (optional). If it is one of a sequence of phonological words within a phonological phrase it must enter Word Boundary rule 1. Matrices operated

on by Word Boundary rules are sent back into the redundancy rules so that the segments which the Word Boundary rule has affected may be fully specified. Although the redundancy rules are framed to state redundancies within the phonological word, every sequence of segments which they state is controlled, as we have already remarked, by the Sequence Structure Condition which applies to all phonetic sequence within the phonological phrase. It is therefore quite appropriate that at this stage, when all the rest of the phonological word is fully specified, the sequence of vowels at word boundaries should be subject to the language general redundancy rules which forbid the sequence of two syllabic vowels.

Sequential If-Then conditions assign primary feature values

Greek letters α, β, γ, stand for the plus and minus value of features. They indicate agreement of values in different parts of a rule.

1. If [+cons] $\Rightarrow$ Then $\begin{bmatrix} \alpha\text{lingual} \\ \beta\text{apical} \\ +\text{nasal} \end{bmatrix}$ $\begin{bmatrix} +\text{cons} \\ \alpha\text{lingual} \\ \beta\text{apical} \end{bmatrix}$

In any sequence of two consonants the first will be a nasal homorganic with the second consonant.

examples:

/i+N+gatu/	[iŋgatu] "a shoe"
/u+mu+jiNdifu/	[umuyiṇdifu] "a rich man"
/mu+gaNba/	[mugaṃba] "to morrow"
/Bu+siNza/	[Busiṇza] "time"

2. If [+cons] [+cons]
   Then ⇓ [+voice, -cont, -nasal, +stop]

In a sequence of two consonants the second will be a voiced stop (see examples to 1, above). The partially specified /z/ element will not be operated upon by this rule since its value [+cont] conflicts with the value [-cont] in the then condition. (/z/ is specified in all lexical entries as [+cont][+stop]. Redundancy rule 14 exists to fully specify /z/.)

3.* If [+cons] [+cons, -voice]
   ⇓ ⇓
   Then [+P-rule iii] [+P-rule iii]

Rule 3 is a traffic rule. If the second of a sequence of two consonants is specified as voiceless the matrix is marked to enter P-rule iii.

4.* If [+cons] [+cons, +cont, -stop]
   ⇓ ⇓
   Then [+P-rule iii] [+P-rule iii]

If the second of a sequence of two consonants is specified as a nonstop continuant the matrix is marked to enter P-rule iii. (/B,l,j/ are not specified as [-stop] in the lexical entry. Redundancy rule 15 will add this value. Rule 4 then cannot operate on these elements until after rule 15 has applied.) If rule 4 applies before rule 3 it will mark /s/ and /f/ to enter P-rule iii.

5.* If [+cons] ⇓ Then [+P-rule iii]

$$\begin{bmatrix}+\text{cons}\\+\text{nasal}\end{bmatrix} \Downarrow \begin{bmatrix}+\text{P-rule iii}\end{bmatrix}$$

When the second of two consonants is nasal the matrix is shunted into P-rule iii. (P-rule iii will delete the second of a sequence of nasal consonants.)

6. If

$$\begin{bmatrix}+\text{cons}\\-\text{ling}\\-\text{cont}\\-\text{voice}\end{bmatrix} \quad \begin{bmatrix}-\text{cons}\end{bmatrix} \quad \begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$$

$$\Downarrow$$

Then [+low]

For any matrix which contains the sequence /p/ followed by two nonconsonants the value [+low] is redundant for the first nonconsonant as the phonetic realisations of /p/, [p], [y], [h] and [w], are never followed by glides. There is no evidence to suggest that any matrix exists in which an underlying [-low][+low] sequence of nonconsonants occurs following /p/.

7. If

$$\begin{bmatrix}+\text{cons}\\+\text{ling}\\-\text{apical}\\+\text{cont}\end{bmatrix} \quad \begin{bmatrix}-\text{cons}\end{bmatrix} \quad \begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$$

$$\Downarrow$$

Then [+low]

For any matrix which contains the sequence /j/ followed by two nonconsonants the value [+low] is redundant for the first nonconsonant. [y] is never followed by a glide. The possibility of [y] derived from /i/ being followed by a glide is precluded by the Sequence Structure Condition (the maximum sequence of V is VV). The possibility of [y] derived from /p/ being followed by a glide is precluded by 6 above and now we complete the exclusion of the possibility of [y] being

followed by a glide in the present rule. There is no evidence to suggest that any matrix exists in which an underlying [-low][+low] sequence of nonconsonants occurs following /j/.

Segmental If-Then conditions assign primary feature values

8. If $\begin{bmatrix}+\text{cons}\\-\text{lingual}\end{bmatrix}$

Then [-apical]

Non-lingual consonants are redundantly [-apical].

9. If $\begin{bmatrix}+\text{cons}\\+\text{apical}\end{bmatrix}$

Then [+lingual]

Apical consonants are redundantly [+lingual].

10. If $\begin{bmatrix}+\text{cons}\\+\text{cont}\end{bmatrix}$

Then [-nasal]

There are no nasal continuants.

11. If $\begin{bmatrix}+\text{cons}\\-\text{voice}\end{bmatrix}$

Then [-nasal]

There are no voiceless nasals.

12. If $\begin{bmatrix}+\text{cons}\\+\text{nasal}\end{bmatrix}$

Then $\begin{bmatrix}+\text{voice}\\-\text{cont}\end{bmatrix}$

All nasals are voiced stops.

13. If $\begin{bmatrix}+\text{cons}\\-\text{cont}\end{bmatrix}$

Then [+stop]

All consonants which are not continuants are stops.

14. If $\begin{bmatrix} +cons \\ +cont \\ +stop \end{bmatrix}$

Then $\begin{bmatrix} +lingual \\ +apical \\ +voice \end{bmatrix}$

The only element with the feature values [+cont][+stop] is /z/.

15. If $\begin{bmatrix} +cons \\ +cont \end{bmatrix}$

Then [-stop]

Any consonant with the value [+cont] will acquire the redundant value [-stop]. (This rule cannot apply to /z/ since it is specified as [+stop] in the lexical entry.)

15a. If $\begin{bmatrix} +cons \\ -stop \end{bmatrix}$

Then [+cont]

This rule reciprocates the statement made in 15.

16. If $\begin{bmatrix} +cons \\ +lingual \\ -apical \\ -voice \end{bmatrix}$

Then [-cont]

There is no voiceless velar continuant.

17. If ([+cons]) $\begin{bmatrix} +cons \\ +lingual \\ -apical \\ +cont \end{bmatrix}$

Then ([+front]) $\begin{bmatrix} +front \\ +voice \end{bmatrix}$

/j/ acquires the redundant feature value [+voice]. /j/ (and a preceding homorganic nasal) acquires the redundant feature value [+front]. (For discussion of this characterisation cf. P-rule iii,F.)

18. If $\begin{bmatrix} -\text{cons} \\ +\text{front} \end{bmatrix}$

Then $\Downarrow$ [-round]

and, reciprocally,

19. If $\begin{bmatrix} -\text{cons} \\ +\text{round} \end{bmatrix}$

Then $\Downarrow$ [-front]

No nonconsonant can be simultaneously [+front] and [+round].

20. If $\begin{bmatrix} -\text{cons} \\ -\text{front} \\ -\text{round} \end{bmatrix}$

Then $\Downarrow$ [+low]

The only nonconsonant that is neither [+front] nor [+round] is /a/.

<u>Segment structure conditions assign derived feature values to nonconsonants</u>

21. If [-cons]

Then $\Downarrow$ $\begin{bmatrix} +\text{lingual} \\ -\text{apical} \\ +\text{voice} \\ -\text{cont} \\ -\text{stop} \end{bmatrix}$

All nonconsonants are, redundantly, lingual and voiced. These primary <u>consonantal</u> features always have the same value for all nonconsonants. Only the feature <u>nasal</u> can have different values in different environments (cf. redundancy rule 33).

Nonconsonants are specified as [-continuant] in order to distinguish between [w] and [B]. A consonantal glide [w] can be produced by the operation of P-rule ii. (This consonantal glide arises from the mutation of [p].) When [B] has the derived features [+round,-low], acquired by preceding [u],

the only value which distinguishes between consonantal [w] and [B] is the value for the feature continuant.

If-Then conditions assign syllable values

Syllable values are predicted by If-Then conditions from information about the sequence of consonants and nonconsonants in the lexical entry. These are derived values - they can only be predicted from sequential information, so they cannot be stated in the lexical representation.

For Lumasaaba we recognise two places in the syllable - syllable onset and syllable nucleus. An element realised at syllable onset will always be shorter in duration than the same element realised at syllable nucleus. Thus /Bu+Bu+eni/ is realised as [BuBwe:ni], "forehead", where the /u/ of the determiner is realised as a vowel, [u], at syllable nucleus and the/u/ of the classifier is realised as a glide, [w], part of the syllable onset. The glide is shorter in duration than the vowel. There may be other phonetic correlates, for example tenser articulation, a greater degree of liprounding, but the parameter selected as crucial here is that of duration. This parameter also applies to distinguish phonetically a nasal consonant assigned to syllable onset or syllable nucleus. Once again the nasal occurring at syllable onset, as in [mutwe] "a head", will be shorter in duration than a nasal occurring at syllable nucleus as in [imbwa] "a dog".

22. If [+cons] [-cons] ([-cons])
Then ⇓ [-syll]

A consonant occurring before a nonconsonant or series of non-

consonants will be realised as (part of) syllable onset.

example: /u+mu+gulisi/ [umugulisi] "a shopkeeper"

where /m,g,l,s/ are realised at syllable onset.

23. If [+cons] [+cons]

Then [+syll]

The first of a sequence of two consonants will be realised as syllabic nucleus. Rule 1 stated that this will always be a nasal, homorganic with the following consonant. It would be more economical to include rule 23 within rule 1 - it is stated here simply in order that the syllabicity-assigning rules can be grouped together for discussion.

example: /i+N+siNbikila/ [i:simbicila]

"a pin-tailed widah bird" where stem-medial /N/ is realised as syllabic [m].

Since the Sequence Structure Condition states that the maximum sequence of underlying consonants is two, it is clear that all possible syllable values for consonants have now been expressed.

24. If [-cons]

Then [+syll] except $\left[\frac{\quad}{-\text{low}}\right]$ [-cons]

A nonconsonant will be realised as syllable nucleus except when it is [-low] and precedes a second nonconsonant. (The exception clause is necessary here because the rules are unordered. If the rules were ordered it would be possible to order the next rule (rule 25) before the present one and thus avoid the necessity of stating the exception environment.)

examples: /ki+kalaBu/ [cikalaBu] "a hand", where /i,a,a,u/ are realised as syllable nucleus,

/u+mu+kaasi/ *[umukaasi] where /u,u,a,a,i/ are realised at syllable nucleus.[1] A traffic rule, rule 26, will mark the sequence [aa] to enter P-rule i, where the first [a] will be deleted.

25. If $\begin{bmatrix}-\text{cons}\\-\text{low}\end{bmatrix}$ [-cons]

Then [$\downarrow$-syll].

A [-low] nonconsonant preceding a second nonconsonant will be realised as nonsyllabic - as part of syllable onset if it follows a consonant, or as syllable onset if no consonant precedes it.

examples: /ma+diofu/ [madyo:fu] "bubbles"

/gi+mi+oju/ [ǰimyo:yu] "hearts"

/ki+tue/ [citwe] "a pool".

In each case the first nonconsonant in the series /io/, /io/ and /ue/ is realised as a glide, part of the syllable onset.

The next set of rules are all traffic rules which will mark matrices to enter the P-rule loop.

26.* If $\begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$ [-cons]

Then [$\Downarrow$+P-rule i] [$\Downarrow$+P-rule i].

Whenever the first of a sequence of nonconsonants is [+low] the matrix is marked to enter P-rule i where the first vowel

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1. May I remind the reader that the use of slant and square brackets is informal - that slant brackets enclose the lexical entry and square brackets everything thereafter. If all illustrations were in terms of matrices the theoretical status of items in square brackets would be clear - nonetheless I persist with the use of informal alphabetic notation in discussion as I believe it is easier to read than matrices.

will be deleted. Rule 26 applies to all those sequences of nonconsonants which do not conform to the <u>If</u> matrix of rule 25: i.e. /e/, /a/ or /o/ followed by /i,e,a,o,u/.
There are however other constraints which govern nonconsonant sequences where /i/ or /u/ is the first nonconsonant. These constraints are stated in the remaining traffic rules.

27.* If $\begin{bmatrix}-\text{cons}\\+\text{front}\\-\text{low}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{front}\\-\text{low}\end{bmatrix}$

Then ⇓ ⇓

[+P-rule i] [+P-rule i]

This rule states that any sequence of identical [+front,-low] nonconsonants must enter P-rule i. This means that no sequence [yi] (where [y] derives from /i/) will appear in the phonetic realisation. We find:

/Bi+Bi+iko/ [BiBi:ko] "eyes" (not*[BiByi:ko])

/mi+igo/ [mi:go] "years"(not*[myi:go]).

This rule will also capture the sequence [ii] produced by the Nasal Prefix P-rule which replaces the nasal consonant before a voiceless consonant by [i]. Thus /i+N+saNbo/ enters the Nasal Prefix rule specified as [insaṃbo] which is changed by the Nasal Prefix rule to [iisaṃbo]. Redundancy rule 24 will assign the feature [+syllabic] to the second vowel (the first vowel will have received the feature [+syllabic] during the first passage through the redundancy rules). The second of the sequence of two syllabic vowels thus produced will be lengthened by rule 34 and then P-rule i will operate to delete the first [i].

28.** If [-cons, +round] ⇓ [-cons, +round] ⇓ Then [+P-rule i] [+P-rule i] except in the env. ++ _____.

This rule states that any sequence of round nonconsonants is marked to enter P-rule i, except after a phonological word boundary. This rule is expressed with maximum generality and the feature low is not mentioned. It will operate on sequences /ou/, /oo/, which are already captured in rule 26, as well as /uu/ and /uo/. Such sequences will be marked to enter P-rule i, where the first nonconsonant will be deleted. This reflects the fact that no sequences [wu] or [wo] appear in the phonetic realisation except initially in a phonological word.

Examples: /Bu+Bu+oNgo/ [BuBoŋgo] "brains" (not *[BuBwoŋgo])
/mu+uka/ [mu:ka] "a red spider" (not *[mwu:ka]).

Examples of word-initial sequences:

/u+ukala/ [wu:kala] "you mess about"
(compare /ku+ku+ukala/ [kuku:kala] "to mess about")
/u+ota/ [wo:ta] "you bask"
(compare /ku+ku+ota/ [kuko:ta] "to bask").

The next traffic rules deal with constraints on the realisation of certain sequences of glide+vowel after certain consonants.

29.* If [+cons, +lingual, -apical] ⇓ [-cons, +front] ⇓ [-cons] ⇓ Then [+P-rule i] [+P-rule i] [+P-rule i]

This rule marks [+P-rule i] any matrix which contains

the sequence /g,k,ŋ/,+ [+front] nonconsonant, +nonconsonant. Where the front nonconsonant is /e/ it is taken care of by rule 26 in any case. Rule 7 states that /j/ is never followed by /i/+ nonconsonant. The sequences we are concerned with here are exemplified by the following words:

/ki+ki+ama/ [cica:ma] "a machine" (not *[cicya:ma])

/Bu+ŋiasi/ [Buɲa:si] "grass" (not *[Bunya:si])

/mi+limo gi+o/ [milimoɟo] "those jobs"

(not [*milimoɟyo]).

In each case the sequence velar consonant +/i/ + nonconsonant is realised as a consonant with extensive palatal closure followed by a vowel of a quality which derives from the second nonconsonant. There is an inevitable transition from the palatal consonant to the following vowel, but this is no more marked in those words where a sequence of nonconsonants is involved than in words where no such sequence is involved:

/mu+dikini/ [mudicini] "a morning"

/ki+fanaŋi/ [cifanaɲi] "an image"

/ma+fugi/ [mafuji] "blood".

All velar consonants are fronted before a front nonconsonant by rule 32. No fronted velar consonant is ever followed in the phonetic realisation by a [y]-glide.

30.* If $\begin{bmatrix}+\text{cons}\\+\text{cont}\\+\text{stop}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{front}\end{bmatrix}$ [-cons]

⇓ ⇓ ⇓

Then [+P-rule i] [+P-rule i] [+P-rule i].

A sequence /z/ +front nonconsonant +nonconsonant is marked [+P-rule i] by this rule. No [y]-glide follows [z] in the

phonetic realisation. This appears to be a constraint peculiar to northern dialects: compare Luhugu [kuza] "to go" (from /ku+zia/) with a southern dialectal form [xutsya] where a [y]-glide follows [ts] (the southern equivalent of [z]).

31.** If $\begin{bmatrix}+\text{cons}\\-\text{lingual}\\-\text{voice}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{round}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$

Then [+P-rule i] [+P-rule i] [+P-rule i]

A voiceless labial consonant followed by a sequence of two nonconsonants the first of which is round and the second low is marked to enter P-rule i. The possibility /puV/ is excluded by rule 6 and the possibilities /poV/, /foV/ are marked to enter P-rule i by rule 26. The sequence we are concerned to capture here is the sequence /fuV/ where V is [+low]. [f] is never followed by the sequence [w]-glide +vowel in the speech of my main informant - this rule again expresses the possibility of idiolectal variation. Where this rule applies

/ku+fua/ is realised as [kufa] "to die" and

/fue/ is realised as [fe] "us".

In the speech of many speakers the rule does not apply and these items are realised as [kufwa] and [fwe] respectively. (Purvis, (1907:30) writes /fue/ as "fwe".)

32. If ([+cons]) [+cons] $\begin{bmatrix}-\text{cons}\\\alpha\text{front}\\\beta\text{round}\\\gamma\text{low}\end{bmatrix}$

Then $\left(\begin{bmatrix}\alpha\text{front}\\\beta\text{round}\\\gamma\text{low}\end{bmatrix}\right)$ $\begin{bmatrix}\alpha\text{front}\\\beta\text{round}\\\gamma\text{low}\end{bmatrix}$

A consonant (or sequence of consonants) preceding a

nonconsonant will acquire the feature values which characterise the articulation of the nonconsonant. Thus a [+front] nonconsonant will <u>front</u> a preceding consonant, a [+round] nonconsonant will <u>round</u> a preceding consonant and a [-front][-round] nonconsonant will render a preceding consonant incapable of later fronting or rounding even though the conditioning /a/ is itself deleted.

examples:
a) /ku+kina/ [k͡ʷucina] "to dance"
b) /lu+daagu/ [l͡ʷuda:g͡ʷu] "a bowl"
c) /ki+Bina/ [ciβina] "a group"
d) /lu+limi/ [l͡ʷuʎimi] "a tongue"
e) /ka+ka+elo/ [kake:l͡ʷo] "a small wooden tray"
f) /i+N+kese/ [i:ceʂe] "a sheep"
g) /ki+ki+ama/ [cica:ma] "a machine"
h) /ka+BaNgili/ [kaBaɲ͡ʝiʎi] " bangle"
i) /u+mu+geNge/ [umuʝeɲ͡ʝe] "a leper"
j) /ka+ka+ita/ [kaki:ta] "a petty larceny".

Notice that whereas in (a), (c), (f), /k/ is realised as [c] before a following front vowel, in (e) and (i) such palatalisation is inhibited by the [-front] feature value which the present rule assigns to the consonant. (P-rule i will later delete the classifier vowel [a].) The importance of insisting that the redundancy rules complete all specifications before a matrix is shunted into the P-loop is well illustrated in this example.

33. If $\begin{bmatrix}+\text{cons}\\ \alpha\text{nasal}\end{bmatrix}$ [-cons] ([-cons])
⇓ ⇓
Then [αnasal] ([αnasal])

A nonconsonant (or sequence of nonconsonants) acquires the value of the nasal feature of the preceding consonant. Thus a vowel following a nasal consonant is nasalised whereas a vowel following a non-nasal consonant is not.

examples: /Bu+nini/ [Bunĩnĩ] "milk from a tree"

/mi+sumaali/ [mĩsuma:li] "nails"

/ma+Bono/ [mãBonõ] "props to support a fruit laden tree"

/mu+kimiloNgolo/ [mũcimĩlongolo] "a vertical pole in house construction".

In the rest of the description the effect of the operation of redundancy rules 32 and 33 will not be marked in the informal alphabetic transcription. All the features we have discussed so far are obligatory for the specification of the phonetic realisation of all underlying elements. All phonetic specifications must include, for every element, a value for every one of the features that can appear in the lexical entry and a value for the feature syllabic. The last two rules, 34 and 35, assign values for the phonetic features long and raised. These features will only apply to those matrices which fulfil the conditions for entry to the rules. Values for these features are not obligatory for all segments.

34. If [-cons]

Then [-cons] ⇓ [+long] except i) /___ [+cons][+cons]

ii) /___ ++

The second of a sequence of two nonconsonants will be realised as [+long] except where the sequence occurs before /CC/ or a phonological word boundary.

examples: /ku+luala/ [kulwa:la] "to be ill"

/u+mu+meeli/ [umume:li] "a drunkard"

/lu+saasa/ [lusa:sa] "a date palm leaf"

/lu+lu+iga/ [lulwi:ga] "a horn".

examples of exceptions:

/Bu+sagua/ [Busagwa] "poison"

/li+si+fuluNgue/ [li:fulungwe] "a caterpillar"

/ku+sia/ [kusya] "to grind"

/mu+tue mu+aNgale/ [mutwemwangale]

"a bald head".

We are now in a position to state the possible structure of the syllable in the phonetic realisation. Capital letters in the formulation represent the following phonetic categories:

C consonant, syllable onset

V vowel, syllable nucleus

G glide, (part of) syllable onset

N nasal, syllable nucleus.

: represents length on a vowel.

The possible syllable structure may be represented like this:

1. (C)(G) V (:)

2. N .

This shows the maximal possibilities when a vowel is syllable nucleus and shows that the minimum syllable is V or N. There is a third possibility which is expressed in Word Boundary (optional) rule 2 which states that in word final position in certain conditions the consonant preceding the final vowel becomes syllabic and the final vowel is itself deleted. To complete the picture of the syllabic possibilities in the

phonetic realisation we should add a third possibility:

3. C .

35. If ++ [-cons, +syll] X [-cons, +front] ++

Then [+raised]

where X represents any number of elements, irrespective of whether they are + or - cons, + or - syll.

When a word-final nonconsonant has the feature value [+front] any syllabic nonconsonant (vowel) which precedes it in the same phonological word is assigned the feature [+raised].

examples: /u+mu+naBi/ [umunaBi] "a tailor"

/anaBile/ [anaBile] "he has sewn"

(compare /anaBa/ [anaBa] "he sews")

/u+mu+soBozi/ [umusoBozi] "a business man"

/mu+kiuzi/ [mucu:zi] "gravy"

3.3 The P-rules

The P-rules exist to alter the specification of items marked [+P-rule] in order that they should conform to regularities expressed in the redundancy rules. The regularities which are violated by those matrices which are marked by the redundancy rules to enter the P-rules are sequential ones:

a) no sequence of two syllabic vowels is permissible (and, in certain circumstances, some sequences of glide+vowel are not permitted). Violations of this regularity are dealt with by P-rule i.

b) when a sequence of two consonants occurs, the first must be nasal and the second a voiced stop. P-rule iii deals with violations of this regularity.

The P-rules also state regular mutation processes which may be assumed to have taken place historically:

a) the realisation of /p/ as a consonantal glide, except when it occurs after a nasal prefix. This statement is made in P-rule ii.

b) the realisation of the class 5 classifier in different environments. This is stated in P-rule iv.

There are four P-rules. Ordering is essential between P-rule ii and P-rule iii (see discussion of P-rule ii) but otherwise no ordering need exist between the rules. Ordering of subrules within a rule is essential - this will be discussed within the context of each rule.

P-rules are expressed in the form of rewrite rules:

[a] ⟶ [b] / ——— [c].

In this rule [a] represents the structural description required for the rule to apply, [b] represents the altered value(s) which the rule specifies for [a], [c] specifies the environment which is necessary for the rule to apply, and _____ indicates the relationship of [a] to the specified environment - in this case [a] immediately precedes [c]. A matrix M must be a sub-matrix of [a] in order to enter the rule, and the environmental condition (that [a] be followed by [c]) must be satisfied in order for the rule to operate.

When a P-rule operates the feature [+P-rule] is automatically deleted. The matrix is then sent back into the redundancy rules. It is possible for one matrix to be marked to enter more than one P-rule. Thus, for example, the matrix /i+N+saapa/ would be marked to enter three P-rules: P-rule i (to delete the first of the sequence of vowels), P-rule ii (to specify the realisation of [p]) and P-rule iii (to change the nasal consonant to a close front vowel before voiceless[s]). After each P-rule applies, the matrix re-enters the redundancy rules before being shunted back for the next P-rule, so that in every case a P-rule only operates on a fully specified matrix. When P-rule iii has applied to /i+N+saapa/ to change the nasal to [i] another sequence of vowels will be created, [ii], which redundancy rule 27 will mark to enter P-rule i. Thus /i+N+saapa/ enters the P-rules four times (it is an extreme case) and is finally realised as [i:sa:ha] "a watch". Each time it enters the P-rules a simple process of mutation operates, and each time it emerges from the P-rules, language-general redundancy rules operate to fully specify the matrix.

P-rule i Nonconsonant deletion rule

[-cons] ⟶ ∅ / ——— [-cons]

This P-rule deletes the first of a sequence of two vowels. It only applies to those matrices which are marked to enter it by redundancy rules 26-31. Notice that, as it's formulated, it can apply to sequences of two vowels which are both specified as [+syllabic] (captured by rule 26) and to sequences of two nonconsonants where the first is specified as nonsyllabic and the second as syllabic (captured by rules 27, 28, 29, 30, 31).

Examples of the effect of this rule in deleting the first of two syllabic vowels:

/ma+Baagia/	[maBa:ʄa] "mice"
/Ba+Ba+izikulu/	[BaBi:zikulu] "grandchildren"
/ki+mooŋiu/	[cimo:ɲu] "a secret".

Examples of its effect in deleting a nonsyllabic glide:

/Bi+siisa/	[Bisi:sa] "shadows"
/Bi+Bi+ilima/	[BiBi:lima] "darkness"
/ki+taBu ki+o/	[citaBuco] "that book"
/gu+mu+uŋiu/	[gumu:ɲu] "salt"
/Bu+kuana/	[Bukwa:na] "ruins".

P-rule ii [p] rule

In many Bantu languages reflexes of proto-Bantu *p cause complications in the phonology (cf. Meinhof, 1933:29-30; Guthrie, 1968:70). In Lumasaaba /p/ is always realised as [p] after a nasal prefix and elsewhere as [y] before [i] and [e], [w] before [o] and [u], and [h] before [a]. It is

interesting to note that young children find difficulty with this. Thus the /p/ which occurs stem-initially in many names for animals and common domestic objects is realised by children as [p] even when it does not follow a nasal prefix. They produce the correct form with the nasal prefix:

/i+N+piso/ [i:piso] "a needle"

/i+N+pale/ [i:pale] "trousers"

/i+N+pusu/ [i:pusu] "a cat"

but produce deviant diminutive forms:

adult form	childish form	
[kayiso]	[kapiso]	"a small needle"
[kahale]	[kapale]	"pants"
[kawusu]	[kapusu]	"a little cat".

All matrices containing /p/ are marked in their lexical entry [+P-rule ii]. In general the values stated for /p/ will be changed by this rule. We have however an immediate difficulty. When it follows a nasal prefix, /p/ is always realised as [p]. Let us consider the possible ways of achieving the realisation of the underlying matrices /i+N+pusu/ and /ka+pusu/. Let us call the first of these matrices A and the second B. A will be marked

[+P-rule ii] (in the lexical entry)

[+P-rule iii] (by redundancy rule 3).

B will be marked [+P-rule ii] (in the lexical entry).

When B enters P-rule ii an operation of mutation will be performed on this matrix and [p] will be replaced by [w]. But when A enters P-rule ii no change in the specification of [p] will be needed,because in the special environment following

a nasal prefix [p] will not undergo mutation. It is necessary that P-rule ii should perform some operation in order that the feature [+P-rule ii] be deleted. It is not helpful to re-order P-rules ii and iii and to allow the nasal prefix rule to operate first since even if P-rule iii applies first there is still no way to delete the feature [+P-rule ii] on matrix A.

The tentative expedient suggested here is that P-rule ii should operate to delete the feature [+P-rule ii] when [p] follows a nasal prefix.

a) [+P-rule ii] $\longrightarrow \emptyset$ / [+cons] $\left[\frac{\quad}{-\text{lingual}}\right]$

The operation of this subrule deletes the feature [+P-rule ii]. Matrix A is vetted again by the redundancy rules, found to be complete, and shunted into P-rule iii.

The other part of P-rule ii changes [p] into [y] before front vowels, [w] before round vowels and [h] before [a]:

b) $\begin{bmatrix}+\text{cons}\\-\text{ling}\\-\text{voice}\\-\text{cont}\end{bmatrix} \longrightarrow$ i. $\begin{bmatrix}+\text{lingual}\\-\text{stop}\end{bmatrix}$ / $\underline{\quad\quad}$ $\begin{bmatrix}-\text{cons}\\-\text{front}\\-\text{round}\end{bmatrix}$

ii. $\begin{bmatrix}+\text{lingual}\\+\text{voice}\\-\text{stop}\\-\text{low}\end{bmatrix}$

Sub-rule a) is ordered before sub-rule b) so that the feature [+P-rule ii] is deleted before b) operates to change the specification of [p] so that it does not fit the structural description of a).

Sub-rule b) i) is ordered before b) ii) so that the value [-voice] is retained for [h] before [a]. Then b) ii) may operate in the unrestricted environment.

Sub-rule b) changes some of the feature values which characterise [p] and creates [y], [h] and [w]. [p] enters P-rule ii characterised by the following feature values:

$$\begin{bmatrix} +\text{cons} \\ -\text{ling} \\ -\text{apical} \\ -\text{voice} \\ -\text{cont} \\ -\text{nasal} \\ +\text{stop} \\ -\text{syll} \\ X\text{front} \\ Y\text{round} \\ Z\text{low} \end{bmatrix}$$

where X, Y and Z represent the values which characterise the vowels following [p].

Sub-rule b) i) changes the specifications for the features lingual, and stop. No other feature values are affected. The operation of this sub-rule creates a phonetic consonant that we have not met elsewhere in the description-consonantal glide [h]. [h] is redundantly characterised thus:

$$\begin{bmatrix} +\text{cons} \\ +\text{ling} \\ -\text{apical} \\ -\text{voice} \\ -\text{cont} \\ -\text{nasal} \\ -\text{stop} \\ -\text{syll} \\ -\text{front} \\ -\text{round} \\ +\text{low} \end{bmatrix}$$

It differs from [p] preceding [a], in that there is no labial closure during the articulation of [h]. It differs phonetically from the following vowel, [a], in that it is voiceless, and nonsyllabic. The second sub-rule, sub-rule b) ii) converts [p] to a voiced consonantal glide before front or round vowels. Like sub-rule b) i) it changes the

values for the features lingual and stop. It also changes the value for voice to [+voice] and changes a [+low] feature derived from the following vowel to [-low]. (If the value of the low feature of the following vowel is already [-low] this part of the rule will apply vacuously.). The consonantal glides [w] and [y] differ phonetically from the following vowel in that they are nonsyllabic.

The mutation rule which changes [p] to [y],[h] and [w] is clearly to be regarded as a rule which assimilates the consonant to the following vowel.

In the following list of examples of the effect of this process, round brackets after each example show the realisation of the same stem following a nasal prefix:

/p/ before [a]: /ka+paja/ [kahaya] "a small male goat"
([i:paya] "a male goat")

/ku+paNba/ [kuhaṃba] "to catch"
([i:paṃba] "I catch")

/ku+paa/ [kuha] "to give"
([i:pa] "I give")

/p/ before [i],[e]: /ka+piso/ [kayiso] "a small needle"
([i:piso] "a needle")

/ku+pila/ [kuyila] "to take"
([i:pila] "I take")

/ku+peela/ [kuye:la] "to pant"
([i:pe:la] "I pant")

/p/ before [o],[u]: /lu+pomelo/ [luwomelo] "a fraud"
([zi:pomelo] "frauds")

/ku+pola/ [kuwola] "to rest"
([i:pola] "I rest")

/ku+puna/ [kuwuna] "to stab"

([i:puna] "I stab").

(Many of these examples are taken from verbs because whereas [p] occurs frequently in verb stems it occurs rather rarely initially in noun stems.)

<u>Alternative [p] rule b (optional)</u>

Occasionally sub-rule b)is over-ridden by personal variation as we see in examples like this:

/li+si+paafu/ [li:ha:fu] "skin"

[li:ya:fu]

where alternative possibilities of realisation exist. The alternative realisations occur when the nonconsonant following /p/ is [+low] and that preceding it is [-low].

$$\begin{bmatrix}+\text{cons}\\-\text{lingual}\\-\text{voice}\\-\text{cont}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{lingual}\\+\text{voice}\\-\text{stop}\\\alpha\text{front}\\\beta\text{round}\\-\text{low}\end{bmatrix} \;/\; \begin{bmatrix}-\text{cons}\\\alpha\text{front}\\\beta\text{round}\\-\text{low}\end{bmatrix} \text{———} \begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$$

This alternative to sub-rule b)operates so that [p] instead of being changed to [h] before [a] is realised as a glide similar in frontness and roundness to the preceding vowel.

Examples of alternative realisations:

/u+mu+pati/ [umuhati] "a man who peels (a fruit)"

[umuwati]

/Bu+paNgafu/ [Buhaŋgafu] "difficulty"

[Buwaŋgafu]

/ki+paNgafu/ [cihaŋgafu] "a difficult (thing)"

[ciyaŋgafu]

/li+si+poNdo/ [li:wondo] "a vegetable marrow"

[li:yondo]

P-rule iii Nasal Prefix rule

Much of the complication in this description is caused by the "nasal prefixes", that is by the classifiers to noun classes 9 and 10, and by the first person singular pronoun in the verb. These prefixes are nonredundantly represented in the lexical entry as [+cons]. Redundancy rule 1 further specifies [+cons] as a nasal, with the place features of the following consonant. The consonant which follows /N/ is specified as a voiced stop by redundancy rule 2. The redundancy rules will complete the specification of all sequences /Nb/, /Nd/, /Ng/ and /Nz/, whether they occur stem medially or as the sequence nasal prefix+stem initial consonant. None of these sequences will be marked to enter P-rule iii since they do not violate the sequence constraints stated in redundancy rules 1 and 2.

examples of such sequences:

/i+N+bululuka/	[imbululuka]	"I fly"
/i+N+daBilo/	[indaBilo]	"a mirror"
/i+N+goloBe/	[iŋgoloBe]	"a pig"
/i+N+zuguza/	[inzuguza]	"I throw".

All matrices containing a nasal prefix + a consonant other than /b,d,g,z/, will be shunted into P-rule iii by redundancy rules 3, 4, and 5. P-rule iii is a complex of sub-rules some of which operate on the prefix and some on the initial consonant of the stem. These sub-rules will eventually be labeled by lowercase letters but during the discussion, which involves questions of ordering, they will be temporarily labeled by capital letters.

$$\text{A.}\quad [+\text{cons}] \longrightarrow \begin{bmatrix} -\text{cons} \\ +\text{front} \\ -\text{low} \end{bmatrix} \;/\; \text{———} \; \begin{bmatrix} +\text{cons} \\ -\text{voice} \end{bmatrix}$$

This sub-rule changes the homorganic nasal into a close front vowel when the nasal prefix occurs before a voiceless consonant. Whereas in P-rule ii a mutation rule was discussed which merely changed some feature values of a segment, in the present rule one type of segment ([-cons]) is being substituted for another ([+cons]). When the [+cons] segment is rewritten as [-cons] all the [+cons] feature values are deleted. The new segment, which is nonredundantly specified in the structural change as [-cons, +front, -low], must be fully specified by the redundancy rules for all the features not mentioned in the structural change.

The decision to account for the phonetic [i:], which realises the determiner-classifier sequence of noun class 9 before voiceless consonants, as deriving from a sequence [ii], rather than as compensating length added to the determiner vowel when the classifier is deleted, is justified by forms like this:

a) /suna ku+N+temu/ [sunakwi:temu] "jump on the snake"

b) /suna ku+N+Bagala/ [sunakum̥bagala] "jump on the lizard".

These sequences are analysed as imperative + locative /ku/ + classifier /N/ + stem. In a) the classifier is realised as [i] before the stem-initial voiceless consonant, and the sequence [kui] yields [kwi:]. In b) the classifier is realised as [m̥] before the voiced stem-initial consonant. No determiner is realised in this environment.

In forms like /ku+N+temu/ and /i+N+temu/ the vowels of the prefix in each case are specified as [+syllabic] by redundancy rule 24. (Neither of them was followed by a vowel until P-rule iii changed the nasal consonant to [i].) Now however the present rule produces a sequence of two syllabic vowels with no intervening consonant. Redundancy rule 27 would mark the sequence [ii] to enter P-rule i, where the first [i] would be deleted. There is however no redundancy rule which can adapt the specification in our example a) above, where the vowel of the locative preposition [ku] has been specified as [+syllabic] by rule 24 during its first passage through the redundancy rules. We need a rule which states that the [+syllabic] value of any vowel preceding the nasal prefix must be changed to [-syllabic] when the mutation occurs. We will now restate sub-rule A to include this requirement:

$$A_i \quad [\text{-cons}]\ [\text{+cons}] \longrightarrow [\text{-syll}] \begin{bmatrix} \text{-cons} \\ \text{+front} \\ \text{-low} \end{bmatrix} / \text{———} \begin{bmatrix} \text{+cons} \\ \text{-voice} \end{bmatrix}$$

Sub-rule A_i now states that the vowel preceding the nasal consonant which is mutated to [i], must be realised as [-syllabic]. There will always be such a vowel, since the form classifier + stem (i.e. with no determiner) never occurs in isolation, but only in constructions in which the classifier follows a preposition, which consists of (C)V. The only form which occurs in isolation consists of determiner + classifier + noun. So for the following matrices: /ku+N+temu/, /i+N+temu/, the operation of this rule will change the specification of these matrices to [kwitemu] (redundancy rule 34 will add length

to the second vowel) and [yitemu] (redundancy rule 27 will mark this to enter P-rule i, which will delete [y], and redundancy rule 34 will add length to [i]). The output will then be [kwi:temu], as in example b) above, and [i:temu] "a snake". Other examples:

/i+N+funiko/ [i:funiko] "a ball"
/i+N+paja/ [i:paya] "a male goat"
/i+N+sija/ [i:siya] "a bowstring"
/i+N+teBe/ [i:teBe] "a chair"
/i+N+kokolo/ [i:kokolo] "a boat".

(Sub-rule A of P rule iii does not apply to all dialects of Lumasaaba. Thus for example in Lufumbo the sequence nasal consonant+voiceless consonant is possible:

[iŋfuniko] "a ball"
[iŋpaya] "a male goat"
[iŋsiya] "a bowstring"
[iŋteBe] "a chair"
[iŋkugunu] "a heel".)

B. $\begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \longrightarrow \emptyset \; / \; [+\text{cons}] \; \_\_\_$

Nasal stem-initial consonants are deleted when they follow nasal prefixes. (Homorganic values were assigned to the prefix by redundancy rule 1, and the value [+syllabic] was assigned to the prefix by redundancy rule 23.) Examples:

/i+N+muga/ [iŋuga] "a calabash" ([kamuga] "a small calabash")
/i+N+nuNgo/ [iŋuŋgo] "a shelf" ([kanuŋgo] "a small shelf")
/i+N+ŋiNgo/ [iɲiŋgo] "a waterpot" ([kaɲiŋgo] "a small waterpot").

C. $\begin{bmatrix}+\text{cons}\\-\text{stop}\end{bmatrix} \longrightarrow \emptyset \;/\; [+\text{cons}] \_\_\_\_ [-\text{cons}] \begin{bmatrix}+\text{cons}\\+\text{nasal}\end{bmatrix}$

If the second stem consonant is nasal and the first stem consonant is a voiced nonstop continuant (i.e. [B,l,y]) the first stem consonant is deleted after a nasal prefix. No value for the feature <u>voice</u> need be specified in the structural description of this rule. If sub-rule A is ordered before sub-rule C, no sequences of [+cons] $\begin{bmatrix}+\text{cons}\\-\text{voice}\end{bmatrix}$ remain at this point. (The prefix is, as we saw in B above, already specified for place of articulation and syllabicity.) Examples:

/i+N+Boni/ [iṃoni] "an eye" ([kaBoni] "a small eye")

/zi+N+limi/ [ziṇimi] "tongues" ([lulimi] "a tongue")

/i+N+jaNza/ [iṇaṇza] "a lake" ([kayaṇza] "a small lake").

This sub-rule reflects the operation of the Ganda Law in Lumasaaba. Meinhof gives this account of the Ganda Law (1933:183): "When two successive syllables both begin with a nasal+following voiced plosive, the plosive of the first syllable is lost.". The Law, as we see from the examples, operates a little differently in Lumasaaba. The second syllable may either be a nasal followed by a vowel in the next syllable, or a nasal followed by a consonant vowel sequence in the next syllable (as in [iṇaṇza], above). Another difference is that the "plosive of the first syllable" is only deleted when the underlying stem initial consonant is a continuant (i.e. /B/, /l/, or /j/). It is not deleted when the underlying stem-initial consonant is a stop. This is illustrated in the following minimal pair:

/i+N+lima/ [iṇima] "I dig" ([kulima] "to dig")

/i+N+dima/ [iṇdima] "I run" ([kudima] "to run").

The same environment, where the second consonant in the stem is a nasal, applies in each case. The continuant /l/ is deleted in the environment /N__VN/, but the stop /d/ is not.

It is possible to combine the two sub-rules, B and C, into one complex sub-rule, since B and C both describe a similar operation of deletion. We may use the convention of angled brackets, $\langle\ \rangle$, in the formulation of this rule. When a matrix conforms to the specification within one set of angled brackets the rule will only apply if the matrix also conforms to the specification expressed in the second set of angled brackets, (for discussion of this convention cf. Chomsky and Halle, 1968:77; Harms, 1968:66).

D. $\left\{ \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \right.$
$\left. \left\langle \begin{bmatrix} +\text{cons} \\ -\text{stop} \end{bmatrix} \right\rangle \right\}$ $\longrightarrow$ $\emptyset$ / $[+\text{cons}]$ ——— $\left\langle [-\text{cons}] \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \right\rangle$

This complex sub-rule states that a nasal consonant will be deleted after a nasal prefix, and that a (voiced) continuant will be deleted after a nasal prefix when the second stem-consonant is nasal.

E. $\begin{bmatrix} +\text{cons} \\ -\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{cont} \\ +\text{stop} \end{bmatrix}$ / $[+\text{cons}]$ ———

This sub-rule converts (voiced) continuants ([B], [l] and [y] derived from /j/) into voiced stops when they follow nasal prefixes. (Notice that E must apply after rule D, which deletes voiced continuants in the environment /N_VN/. If rule E operated before D all voiced continuants would have been changed into stops, and there would be no matrices for D to operate on.)

Examples:

/i+N+Buga/ [imbuga] "a hole" ([kaBuga] "a small hole")

/zi+N+li/ [zindi] "roots" ([luli] "a root")

/i+N+jeda/ [injeda] "I help" ([ayeda] "he helps")

The third example is of a verb stem following a nasal prefix, because when /j/-initial noun stems follow a nasal prefix the stem-initial consonant is realised as [z]. Rule E therefore accounts for the realisation of /j/ following a nasal prefix when it is initial in a verb stem but not when it is initial in a noun stem. Rule E accounts for the realisation of all /j/ initial verb stems following nasal prefixes:

/i+N+jeBa/ [injeBa] "I shave" ([kuyeBa])

/i+N+jeda/ [injeda] "I help" ([kuyeda])

/i+N+jooja/ [injo:ya] "I eat compulsively" ([kuyo:ya]).

Rule E also accounts for the realisation of /j/ when it occurs as the initial consonant in noun stems following nasal prefixes in the neighbouring dialect of Luwalasi:

/i+N+jofu/ [injofu] "an elephant"

/i+N+jila/ [injila] "a path"

/i+N+ju/ [inju] "a house".

We will need another rule to account for the realisation of /j/ following a nasal prefix when it is the initial consonant in a noun stem in Luhugu:

$$F.\quad \begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \\ +\text{cont} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{apical} \\ +\text{stop} \end{bmatrix} \;/\; [+\text{cons}] \_\_\_\_ N$$

where N is a noun stem[1]

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1. Sub-rule F will need an indication of which /j/-initial stems are noun stems. All /j/ initial stems which are capable of occurring in classes 9 and 10 must be marked [+noun] in their phonological characterisation (cf. discussion in 3.1.1). The need to differentiate nouns and verbs in this way exemplifies a statement made by Lyons (1968:132): "it is frequently the case that a quite different set of phonological contrasts

[contd.

This rule converts [y] to [z] when [y] is initial in a noun stem. (The [y] in this case is still characterised as a functional consonant by the feature value [+cons]. There is no possibility of this rule applying to a [y] derived from /i/.)

Examples: /i+N+jofu/ [inzofu] "an elephant" ([kayofu])
/i+N+jila/ [inzila] "a path" ([kayila])
/i+N+ju/ [inzu] "a house" ([kayu]).

It seems likely that there is a close historical relationship between /j/ and /z/ which is reflected in these alternations within and between dialects (cf. Guthrie, 1968:77). Thus in Luhugu there are no /z/ initial noun stems which occur in classes 9 and 10, but in all /j/-initial noun stems in these classes /j/ is realised as [z]. It seems probable that /z/ derives historically from the same element as /j/, and underwent a process of fronting, of the sort which occurs productively when a back consonant precedes a front vowel, as in:

/u+mu+eNbaki/ [umwembaci] "a builder"

(compare /ku+ku+eNbaka/ [kukwembaka] "to build").

An examination of the forms found in the Luwalasi dialect lends support to this suggestion. In Luwalasi /z/ is realised as a slightly fronted [ʒ̟] thus:

/zi+N+li/ [ʒ̟indi] "roots"
/ki+zuuBi/ [kiʒ̟u:Bi] "a flame tree".

Footnote contd.]

is relevant for different grammatical classes.". This has long been pointed out by writers in the Firthian tradition, see for example Robins, 1953; Waterson, 1956.

Another characteristic of Luwalasi is that back consonants are not fronted to palatal affricates before front vowels, as they are in Luhugu, but are realised as fronted velar stops:

	Luhugu	Luwalasi	
/li+si+gi/	[li:ʄi]	[li:g̟i]	"an egg"
/ki+sito/	[cisito]	[k̟isito]	"a burden"
/u+mu+gelema/	[umuʄelema]	[umug̟elema]	"a wife"
/i+N+kese/	[i:cese]	[i:k̟ese]	"a sheep".

Compare now the set of consonants which seem historically to derive from voiced back consonants in the two dialects:

	/ga/	/gi/	/j/	/z/	/Nj/ (noun)	/Nj/ (verb)	/Nz/ (verb)
Luhugu	[ga]	[ʄi]	[y]	[z]	[ɳz]	[n̡ʄ]	[n̡z]
Luwalasi	[ga]	[g̟i]	[y]	[g̟]	[n̡ʄ]	[n̡ʄ]	[n̡ʄ]

In both of these accents velar consonants followed by a sequence of two dissimilar nonconsonants, the first of which is front, are never followed by glides. We have already noticed in Luhugu that /z/ can never be followed by a glide (redundancy rule 30, P-rule i) and /j/ can never be followed by a glide (redundancy rule 7, P-rule i). It seems likely that we would be justified in suggesting that both /j/ and/z/ have historically undergone a process of fronting which now precludes the possibility of their being followed in the phonetic realisation by a glide. (See further discussion in 5.2.ii.).

The homorganic nasals which precede this set of consonants add a further justification to this hypothesis in the case of /j/. The relevant nasals are [ɲ] and [ŋ]. [ŋ] occurs in a few stems before nonfront vowels:

/ku+ŋapa/ [kuŋaha] "to be thin"

/i+N+ŋomo/ [iŋomo] "a drum" ([kaŋomo])

/i+N+ŋani/ [iŋani] "a tomb" ([kaŋani])

/ku+ŋoona/ [kuŋo:na] "to prepare".

[ŋ] occurs frequently before [g] preceding a nonfront vowel:

/i+N+goko/ [iŋgoko] "a hen"

/i+N+gatu/ [iŋgatu] "a shoe"

/mu+goNgo/ [mugoŋgo] "a spine".

[ɲ] occurs much more frequently. It occurs in many stems, usually before front vowels:

/i+N+ŋeŋesi/ [iɲeɲesi] "a star" ([kaɲeɲesi])

/na+mu+ŋiŋi/ [namuɲiɲi] "a mosquito"

/Bu+ŋifu/ [Buɲifu] "cold"

but occasionally before nonfront vowels:

/ka+ŋiuŋi/ [kaɲu:ɲi] "a bird"

/ga+ŋiaNga/ [gaɲaŋga] "a praying mantis"

/lu+ŋiumilo/ [luɲu:milo] "a vein".

When [ɲ] occurs before nonfront vowels it is analysed as /ŋ/ followed by a front nonconsonant followed by a dissimilar nonconsonant. It is regarded as having been fronted by redundancy rule 32.

[ɲ] also occurs before a palatal stop preceding a front vowel:

/u+mu+geNge/ [umujeɲje] "a leper"

/u+mu+gaNgi/ [umugaɲji] "a doctor"

/ka+BaNgili/ [kaBaɲjili] "a bracelet"

where the sequence of fronted consonants is regarded as having been produced by redundancy rule 32. [ɲ] also occurs when an underlying /j/ has been deleted as in /i+N+jaNza/ [iɲaɲza] "a lake". And, as we have seen, [ɲ] occurs as the nasal

congener to /j/ when /j/-initial verb stems follow nasal prefixes.

These two distinct phonetic nasals are here regarded as deriving from one underlying back nasal, symbolised /ŋ/. Then all phonetic realisations of /ŋ/ as [ɲ] must be accounted for in terms of fronting. /j/ must, then, be regarded as a fronting influence just like the front vowels /i/ and /e/. In this analysis /j/ is regarded as inherently possessing the feature [+front]. This feature is added to /j/ by redundancy rule 17. It is never distinctive, and is never specified as the entry condition to any rule. It simply marks the postulated historical process and accounts for the phonetic realisation of /j/ and its nasal congener as palatal rather than velar.

It seems probable that a diachronic or comparative phonology would represent /z/ as a back consonant having been historically fronted in a way similar to /j/. This is a difficult decision to justify in a synchronic phonology based on the Luhugu dialect. /z/ is always realised with an apical [n̠] as its nasal congener and it functions not only as stop congener of /j/ but also as an independent element /z/. The description would be more complicated if /z/ were introduced as a functional back consonant which needed in all cases to be realised phonetically as an apical consonant.

Sub-rule F is needed to account for the realisation of /j/ as [z] when it occurs initially in a noun stem following a nasal prefix. This undoubtedly complicates the description, but the complication certainly exists in the phonology. It is interesting that young children find this a difficult area to

cope with. Compare the adult realisation of

/i+N+jofu/ as [inzofu] "an elephant", and of
/ka+jofu/ as [kayofu]

/i+N+jopu/ [inzowu] "a bull"
/ka+jopu/ [kayowu]

with the forms the children produce:

[inzofu] [kazofu]

[inzowu] [kazowu].

Having converted [y] to [z] in rule F we now need to change the specification of the homorganic syllabic nasal.

$$\text{G.} \quad \begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \end{bmatrix} \longrightarrow [+\text{apical}] \; / \; \underline{\quad} \begin{bmatrix} +\text{cons} \\ +\text{apical} \end{bmatrix}$$

This sub-rule converts [n] to [n].

Ordering in the nasal prefix rule

The nasal prefix rule is expressed as a series of ordered sub-rules:

a) $[-\text{cons}]\ [+\text{cons}] \longrightarrow [-\text{syll}] \begin{bmatrix} -\text{cons} \\ +\text{front} \\ -\text{low} \end{bmatrix} / \underline{\quad} \begin{bmatrix} +\text{cons} \\ -\text{voice} \end{bmatrix}$

b) $\left\{ \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix}, \left\langle \begin{bmatrix} +\text{cons} \\ -\text{stop} \end{bmatrix} \right\rangle \right\} \longrightarrow \emptyset \; / \; [+\text{cons}] \underline{\quad} \left\langle [-\text{cons}] \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \right\rangle$

c) $\begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \\ +\text{cont} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{apical} \\ +\text{stop} \end{bmatrix} / \; [+\text{cons}] \underline{\quad}\, \text{N}$

(where N is a noun stem)

d) $\begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \end{bmatrix} \longrightarrow [+\text{apical}] \; / \; \underline{\quad} \begin{bmatrix} +\text{cons} \\ +\text{apical} \end{bmatrix}$

e) $\begin{bmatrix} +\text{cons} \\ -\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{cont} \\ +\text{stop} \end{bmatrix} \; / \; [+\text{cons}] \underline{\quad}$

Essential ordering exists between the following sub-rules:

a) must precede b) (second part) and e) in order that sequences of nasal consonant+voiceless consonant are removed. Then the value [+voice] need not be stated in the structural descriptions of sub-rules b) and e).

b) (second part) must precede c) since stem-initial [y] must be deleted in the environment N___VN before c) operates to change [y] to [z].

b) (second part) must precede d) which is dependent upon c).

b) (second part) must precede e) to allow voiced continuants to be deleted in the environment N___VN before e) operates to change voiced continuants into stops.

c) must precede d) in order that the output of c) (apical [z]) can be stated as the environment for d).

c) must precede e) so that /j/ when initial in noun stems can be realised as [z], before e) changes [y] to [ɟ].[1]

P-rule iv Class 5 prefix rule

Only a few stems with a nonconsonant as the initial element occur in Class 5. Among them are:

/li+si+ulu/	[lisulu]	"a nose"
/li+si+aNda/	[lisanda]	"a piece of charcoal"
/li+si+ino/	[lisino]	"a tooth".

The plurals of these forms occur in class 6:

---

1. In 5.2. I suggest that a more elegant solution would be to allow the sequence /N+j/ in nouns to undergo hardening rule e) (as in verbs) and then to add a special noun fronting rule which fronts [ɲɟ] to [nz]. If this solution were adopted, e) would be ordered after b). Then c) and d) would be collapsed into one fronting rule.

/ga+ma+ulu/ [gamo:lu] "noses"

/ga+ma+aNda/ [gamaṇda] "charcoal"

/ga+ma+ino/ [game:no] "teeth".

(No attempt is made here to account for the realisation of the plural forms of "nose" and "tooth" with a low vowel in the stem. This lowering process might be identified with that which occurs between phonological words. No other words are attested in which this process occurs. This particular alternation is often found in Bantu languages (cf. Meinhof, 1933:191).)

In the singular examples the [i] of the demonstrative /li/ is not realised as long. No [y] glide follows the [s] before the stem vowel. (It may also be mentioned that the tone on the determiner [li] is low.)

When class 5 prefixes occur before consonant-initial stems the phonetic realisation is different: the vowel of the determiner is realised as long and no [s] is realised. (The tone on the long determiner vowel is high.)

Examples: /li+si+Basa/ [li:Basa] "a blister"

/li+si+jido/ [li:yido] "a groundnut".

The underlying form of the classifier is specified as /si/[1] and it is marked in the lexical representation [+P-rule iv].

a)

	1	2
SD	[+cons, +apical, -voice, +cont, +P-rule iv]	[-cons, +front, -low, +P-rule iv]

SC 1 2 ⟶ 1∅ /____ [-cons]

1 2 ⟶ ∅2 /____ [+cons]

---

1. Meinhof (1932:53) derives this from γf.

The structural description (SD) specifies the form of the classifier, [si]. The first part of the structural change (SC) deletes [i] before a following vowel. This is justified by the fact that no glide follows the classifier in, for example, [lisulu], and the stem vowel is not lengthened.

The second part of the structural change deletes [s] when the classifier precedes a consonant. The form of the sequence classifier [i]+consonant-initial stem can be seen in this example:

/suna ku+si+guNba/ [sunakwi:gumba] "jump on the bone".

In examples like the one just cited, as well as those where the sequence determiner+[i]+consonant initial stem occurs, the result of the operation of sub-rule a) is that sequences of two nonconsonants, both specified as [+syllabic], are produced. Both [u] and [i] in the sequence /ku+si/ will have been specified as [+syllabic] by redundancy rule 24. Similarly, in the sequence /li+si/ (as in /li+si+zalia/ [li:zalya] "a tick bird"), both vowels will have been specified as [+syllabic]. Redundancy rule 27 will pick up the sequence [ii] and send it into P-rule i for the first vowel to be deleted. We have a problem however with the sequence [ui] since the [+syllabic] value of [u] must be changed to [-syllabic] to yield [wi:]. We must therefore incorporate a sub-rule in P-rule iv which changes the [+syllabic] value of [u] in the sequence [ui] to [-syllabic]:

b) $\begin{bmatrix}\text{-cons}\\ \text{+round}\end{bmatrix} \longrightarrow$ [-syll] / ____ [-cons].

This apparently archaic prefix introduces a considerable complexity into the phonology. A complex of rules is necessary

to achieve a correct statement of this one classifier. It is interesting to find that this item is regularised in the speech of many people. Thus in southern dialects the lexical entry for the classifier is /li/,-identical to the form of the determiner. Young children in Buhugu produce forms like southern forms before vowel-initial stems:

[lilyu:lu]	"a nose"
[lilyanda]	"a piece of charcoal"
[lili:no]	"a tooth".

3.4 Word Boundary rules.

The rules so far discussed have been rules which apply within phonological word boundaries. The set of rules discussed in this section only operate when a word boundary is present. The first rule is concerned with the obligatory assimilation of vowels between phonological words which occur within the same phonological phrase (thus conforming to the constraint expressed in the Sequence Structure rule).

1. Assimilation of vowels rule

a) [-cons] ⟶ [+low] / [+low] ++ _____

This rule applies vacuously when the first vowel of the second word is [+low]. It states that where the initial vowel of the second word is [-low], ([i] or [u]) and the final vowel of the first word is [+low] ([e], [a], [o]) the initial vowel of the second word will be lowered:

Examples: /i+N+teBe i+gua/ [i:teBe:gwa] "the chair falls"

/a+gana u+mu+kana/ [agano:mukana] "he loves the girl".

In the first example the determiner [i] is lowered to [e] and in the second the determiner [u] is lowered to [o].

When the Word Boundary rule has operated, the word boundary symbol is automatically removed. The matrix, consisting of two former phonological words is sent back through the redundancy rules. Rule 26 will mark a [+low] vowel which is the first of a sequence of two syllabic vowels to enter P-rule i, which will delete it. Rule 34 will mark the second vowel [+long]. This accounts for the correct phonetic realisation of the above examples.

We still have to account for the fact that if the last vowel of a word has the feature [-low], it is deleted when it precedes a word-initial vowel, not realised as a glide. If a Word Boundary rule deletes the last vowel of a word, the redundancy rules will have no way of knowing that a sequence of two vowels ever existed, and the language-general rule 34 will not be able to lengthen the second, word-initial, vowel. If we simply delete the word boundary at this point, the second vowel will be lengthened but the first will be realised as a glide. The ad hoc solution adopted here is to specify the last vowel of the first word as [+low]:

b) $\begin{bmatrix}\text{-cons}\\\text{-low}\end{bmatrix} \longrightarrow$ [+low] / ____ ++ [-cons]

Since b) is ordered after a), a) cannot now apply to its output and lower the first vowel of the second word if it happens to be [-low]. The word boundary will be deleted and the matrix cycled through the redundancy rules, where rule 26 will mark it to enter P-rule i, and rule 34 will lengthen the first vowel of the second word, yielding:

/u+mu+eNbaki a+zia/ [umwembaca:za] "the builder goes"

/u+mu+zuNgu a+zia/ [umuzuŋga:za] "the white man goes".

The word-final vowel of the subject is deleted in both these examples before the low vowel of the following determiner. In the next two examples the word-final vowel of the subject is deleted before a high vowel:

/i+N+Busi i+zia/ [imbusi:za] "the goat goes"

/i+N+temu i+zia/ [i:temi:za] "the snake goes".

It is not claimed that this vowel-lowering sub-rule offers any insight to any language process. It is merely an ad hoc

mechanism which achieves the appropriate phonetic output.

The second Word Boundary rule applies only in the speech of some speakers and, even then, not in all styles of speech. In the speech of my main informant vowels which were final in phonological phrases tended to be devoiced, especially in intimate conversation. When she was teaching a class of children this feature was much less frequent. In intimate conversation phonological phrase-final vowels were often not realised after voiceless fricatives, and the voiceless fricatives were realised as syllabic. It is a feature which has been commented on as characteristic of the speech of the people from the Northern area (Tucker and Bryan, 1959). It is indeed a feature which is especially noticeable in word lists, where each item constitutes a separate phonological tone group and the informant is speaking privately to the linguist. The following rule then, expresses an optional realisation for some speakers in some styles of speech:

2. <u>Final devoicing rule</u> (optional)

a) $[-\text{cons}] \longrightarrow \emptyset \; / \; \begin{bmatrix} +\text{cons} \\ -\text{voice} \\ +\text{cont} \end{bmatrix} \_\_\_\_\_ //$

b) $[+\text{cons}] \longrightarrow [+\text{syll}] \; / \; \_\_\_\_\_ //$

c) $([-\text{cons}])\,[-\text{cons}] \longrightarrow [-\text{voice}] \; / \; \_\_\_\_\_ //$

The sub-rules within this rule are ordered. Sub-rule a) deletes a phonological phrase final vowel when it follows a voiceless fricative, and sub-rule b) makes the voiceless fricative syllabic:

/Bu+gisu/	[Bugis̩]	"Bugisu" (the name of the district)
/ki+dilisi/	[cidilis̩]	"hive"

/li+si+kosi/ [li:kos̩] "a street"

/i+N+kufa/ [i:kuf̩] "a navel"

/Bu+ɲifu/ [Buɲif̩] "cold"

/u+mu+ifi/ [umwi:f̩] "a thief".

Sub-rule c) devoices all final vowels which do not follow a voiceless fricative. Where there is a final sequence glide+vowel, both are devoiced.

/ki+laBo/ [cilaBo̥] "a gift"

/na+mu+lekua/ [namulekwḁ] "a widow"

/mu+loBami/ [muloBami̥] "a hook"

/li+si+goNzu/ [li:gonzu̥] "a wound".

3.5 Summary of the rules

Positive Conditions

1. Meta-rule Sequence Structure Condition

++ (C) (V) V ^{R}((C) C (V) V)^{R} ++

2. Lexical entry conditions

a. +((V) C) V (C)···+

b. lexical stem: + CV···+

c. grammatical formative: + V···+/+N+

d. determiner/classifier: + (C) $\begin{bmatrix} \text{V} \\ \text{l front} \\ \text{r round} \end{bmatrix}$ + / + N +
X X

l and r have any value.

Redundancy rules

1. If [+cons] ⇓ $\begin{bmatrix} \text{+cons} \\ \alpha\text{lingual} \\ \beta\text{apical} \end{bmatrix}$

Then $\begin{bmatrix} \alpha\text{lingual} \\ \beta\text{apical} \\ \text{+nasal} \end{bmatrix}$

2. If [+cons] [+cons] ⇓

Then $\begin{bmatrix} \text{+voice} \\ \text{-cont} \\ \text{-nasal} \\ \text{+stop} \end{bmatrix}$

3.* If [+cons] ⇓ $\begin{bmatrix} \text{+cons} \\ \text{-voice} \end{bmatrix}$ ⇓

Then [+P-rule iii] [+P-rule iii]

4.* If [+cons] ⇓ $\begin{bmatrix} \text{+cons} \\ \text{+cont} \\ \text{-stop} \end{bmatrix}$ ⇓

Then [+P-rule iii] [+P-rule iii]

5.* If [+cons] ⇓ $\begin{bmatrix} \text{+cons} \\ \text{+nasal} \end{bmatrix}$ ⇓

Then [+P-rule iii] [+P-rule iii]

6. If $\begin{bmatrix}+\text{cons}\\-\text{lingual}\\-\text{cont}\\-\text{voice}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$

Then $\Downarrow$ [+low]

7. If $\begin{bmatrix}+\text{cons}\\+\text{lingual}\\-\text{apical}\\+\text{cont}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$

Then $\Downarrow$ [+low]

8. If $\begin{bmatrix}+\text{cons}\\-\text{lingual}\end{bmatrix}$

Then $\Downarrow$ [-apical]

9. If $\begin{bmatrix}+\text{cons}\\+\text{apical}\end{bmatrix}$

Then $\Downarrow$ [+lingual]

10. If $\begin{bmatrix}+\text{cons}\\+\text{cont}\end{bmatrix}$

Then $\Downarrow$ [-nasal]

11. If $\begin{bmatrix}+\text{cons}\\-\text{voice}\end{bmatrix}$

Then $\Downarrow$ [-nasal]

12. If $\begin{bmatrix}+\text{cons}\\+\text{nasal}\end{bmatrix}$

Then $\Downarrow$ $\begin{bmatrix}+\text{voice}\\-\text{cont}\end{bmatrix}$

13. If $\begin{bmatrix}+\text{cons}\\-\text{cont}\end{bmatrix}$

Then $\Downarrow$ [+stop]

14. If $\begin{bmatrix}+\text{cons}\\+\text{cont}\\+\text{stop}\end{bmatrix}$

Then $\Downarrow$ $\begin{bmatrix}+\text{lingual}\\+\text{apical}\\+\text{voice}\end{bmatrix}$

15. If $\begin{bmatrix}+\text{cons}\\+\text{cont}\end{bmatrix}$

Then $\Downarrow$ [-stop]

15a. If $\begin{bmatrix}+\text{cons}\\-\text{stop}\end{bmatrix}$

Then $[+\text{cont}]$

16. If $\begin{bmatrix}+\text{cons}\\+\text{lingual}\\-\text{apical}\\-\text{voice}\end{bmatrix}$

Then $[-\text{cont}]$

17. If $([\text{cons}])$ $\begin{bmatrix}+\text{cons}\\+\text{lingual}\\-\text{apical}\\+\text{cont}\end{bmatrix}$

Then $([+\text{front}])$ $\begin{bmatrix}+\text{front}\\+\text{voice}\end{bmatrix}$

18. If $\begin{bmatrix}-\text{cons}\\+\text{front}\end{bmatrix}$

Then $[-\text{round}]$

19. If $\begin{bmatrix}-\text{cons}\\+\text{round}\end{bmatrix}$

Then $[-\text{front}]$

20. If $\begin{bmatrix}-\text{cons}\\-\text{front}\\-\text{round}\end{bmatrix}$

Then $[+\text{low}]$

21. If $[-\text{cons}]$

Then $\begin{bmatrix}+\text{lingual}\\-\text{apical}\\+\text{voice}\\-\text{cont}\\-\text{stop}\end{bmatrix}$

22. If $[+\text{cons}]$ $[-\text{cons}]$

Then $[-\text{syll}]$

23. If $[+\text{cons}]$ $[+\text{cons}]$

Then $[+\text{syll}]$

24. If $[-\text{cons}]$

Then $[+\text{syll}]$ <u>except</u> $\begin{bmatrix}\text{\_\_\_\_}\\-\text{low}\end{bmatrix}$ $[-\text{cons}]$

25. If $\begin{bmatrix}-\text{cons}\\-\text{low}\end{bmatrix}$ [-cons]
⇓
Then [-syll]

26.* If $\begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$ [-cons]
⇓ ⇓
Then [+P-rule i][+P-rule i]

27.* If $\begin{bmatrix}-\text{cons}\\+\text{front}\\-\text{low}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{front}\\-\text{low}\end{bmatrix}$
⇓ ⇓
Then [+P-rule i][+P-rule i]

28.** If $\begin{bmatrix}-\text{cons}\\+\text{round}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{round}\end{bmatrix}$
⇓ ⇓
Then [+P-rule i][+P-rule i] except in the env. ++ _____

29.* If $\begin{bmatrix}+\text{cons}\\+\text{lingual}\\-\text{apical}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{front}\end{bmatrix}$ [-cons]
⇓ ⇓ ⇓
Then [+P-rule i][+P-rule i][+P-rule i]

30.* If $\begin{bmatrix}+\text{cons}\\+\text{cont}\\+\text{stop}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{front}\end{bmatrix}$ [-cons]
⇓ ⇓ ⇓
Then [+P-rule i][+P-rule i][+P-rule i]

31.** If $\begin{bmatrix}+\text{cons}\\-\text{lingual}\\-\text{voice}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{round}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{low}\end{bmatrix}$
⇓ ⇓ ⇓
Then [+P-rule i][+P-rule i][+P-rule i]

32. If ([+cons]) [+cons] $\begin{bmatrix}-\text{cons}\\\alpha\text{front}\\\beta\text{round}\\\gamma\text{low}\end{bmatrix}$
⇓ ⇓ ⇓
Then ($\begin{bmatrix}\alpha\text{front}\\\beta\text{round}\\\gamma\text{low}\end{bmatrix}$) $\begin{bmatrix}\alpha\text{front}\\\beta\text{round}\\\gamma\text{low}\end{bmatrix}$

33. If $\begin{bmatrix}+\text{cons}\\\alpha\text{nasal}\end{bmatrix}$ [-cons] ([-cons])
⇓ ⇓
Then [αnasal] ([αnasal])

34. If [-cons] [-cons]
    ⇓
    Then [+long] except i) /_____[+cons][+cons]
    ii) /_____++

35. If ++ [-cons, +syll] X [-cons, +front] ++
    ⇓
    Then [+raised]

where X represents any number of elements, irrespective of whether they are + or - cons, + or - syll.

P-rule i Nonconsonant deletion rule

[-cons] ⟶ ∅ / _____ [-cons]

P-rule ii [p] rule

a) [+P-rule ii] ⟶ ∅ / [+cons] $\begin{bmatrix} \text{\_\_\_\_\_} \\ -\text{lingual} \end{bmatrix}$

b) $\begin{bmatrix} +\text{cons} \\ -\text{lingual} \\ -\text{voice} \\ -\text{cont} \end{bmatrix}$ ⟶ { i) $\begin{bmatrix} +\text{lingual} \\ -\text{stop} \end{bmatrix}$ / _____ $\begin{bmatrix} -\text{cons} \\ -\text{front} \\ -\text{round} \end{bmatrix}$; ii) $\begin{bmatrix} +\text{lingual} \\ +\text{voice} \\ -\text{stop} \\ -\text{low} \end{bmatrix}$ }

alternative b (optional)

$\begin{bmatrix} +\text{cons} \\ -\text{lingual} \\ -\text{voice} \\ -\text{cont} \end{bmatrix}$ ⟶ $\begin{bmatrix} +\text{lingual} \\ +\text{voice} \\ -\text{stop} \\ \alpha\text{front} \\ \beta\text{round} \\ -\text{low} \end{bmatrix}$ / $\begin{bmatrix} -\text{cons} \\ \alpha\text{front} \\ \beta\text{round} \\ -\text{low} \end{bmatrix}$ _____ $\begin{bmatrix} -\text{cons} \\ +\text{low} \end{bmatrix}$

P-rule iii Nasal prefix rule

a) [-cons] [+cons] ⟶ [-syll] $\begin{bmatrix} -\text{cons} \\ +\text{front} \\ -\text{low} \end{bmatrix}$ / _____ $\begin{bmatrix} +\text{cons} \\ -\text{voice} \end{bmatrix}$

b) $\left\{ \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \quad \left\langle \begin{bmatrix} +\text{cons} \\ -\text{stop} \end{bmatrix} \right\rangle \right\} \longrightarrow \emptyset \;/\; [+\text{cons}] \_\_\_\_ \left\langle [-\text{cons}] \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \right\rangle$

c) $\begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \\ +\text{cont} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{apical} \\ +\text{stop} \end{bmatrix} \;/\; [+\text{cons}] \_\_\_\_ N$

(where N is a noun stem)

d) $\begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \end{bmatrix} \longrightarrow [+\text{apical}] \;/\; \_\_\_\_ \begin{bmatrix} +\text{cons} \\ +\text{apical} \end{bmatrix}$

e) $\begin{bmatrix} +\text{cons} \\ -\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{cont} \\ +\text{stop} \end{bmatrix} \;/\; [+\text{cons}] \_\_\_\_$

<u>P-rule iv</u> <u>Class 5 prefix rule</u>

a)

	1	2
SD	+cons +apical -voice +cont +P-rule iv	-cons +front -low +P-rule iv

SC 1 2 $\longrightarrow$ 1 $\emptyset$ / ____ [-cons]

1 2 $\longrightarrow$ $\emptyset$ 2 / ____ [+cons]

b) $\begin{bmatrix} -\text{cons} \\ +\text{round} \end{bmatrix} \longrightarrow [\pm\text{syll}] \;/\; \_\_\_\_ [-\text{cons}]$

<u>Word Boundary rules</u>

1. <u>Vowel assimilation rule</u>

a) $[-\text{cons}] \longrightarrow [+\text{low}] \;/\; [+\text{low}] \;{+}{+}\; \_\_\_\_$

b) $\begin{bmatrix} -\text{cons} \\ -\text{low} \end{bmatrix} \longrightarrow [+\text{low}] \;/\; \_\_\_\_ \;{+}{+}\; [-\text{cons}]$

2. <u>Final Devoicing rule</u> (optional)

a) $[-\text{cons}] \longrightarrow \emptyset \;/\; \begin{bmatrix} +\text{cons} \\ -\text{voice} \\ +\text{cont} \end{bmatrix} \_\_\_\_ \;//$

b) $[+\text{cons}] \longrightarrow [+\text{syll}] \;/\; \_\_\_\_ \;//$

c) $([-\text{cons}])\; [-\text{cons}] \longrightarrow [-\text{voice}] \;/\; \_\_\_\_ \;//$.

3.6 The process of realisation

In this section five matrices illustrate the process of realisation. In the first two matrices the process is relatively straightforward. The next three matrices are chosen to illustrate the operation of mutation rules. The degree of complexity in the realisation of the last three matrices is not typical of the majority of matrices.

In each matrix an informal alphabetic symbol heads each column. The features specified in the top block represent the minimally redundant lexical entry. In the next block down, values for redundant features are added. The number of the redundancy rule which specifies the value appears under each added feature. Where two features appear over one number, both are added by the same rule.

The third block down specifies syllabic values, and the last block specifies assimilatory values. The blocking should not suggest any ordering of the rules. It simply reflects the way in which they were presented for discussion in 3.2.

When a matrix is fully specified, it is shown in phonetic transcription. If it is marked to enter the P-rule loop, the number of the relevant P-rule appears bracketted with it. The change effected by the P-rule is shown in the relevant column. Redundancy rules add any necessary values to the relevant column and the phonetic output appears at the bottom of each matrix.

1.

m	a	g	u	N	b	a
+cons	-cons	+cons	-cons	+cons	+cons	-cons
-ling	-front	+ling	+round		-ling	-front
+nasal	-round	-apic	-low			-round
		+voice				
		-cont				
		-nasal				
-apic	+low	+stop	-front	-ling	+voice	+low
8	20	13	19	+nasal	-cont	20
+voice	+ling		+ling	1	-nasal	+ling
-cont	-apic		-apic	+voice	+stop	-apic
12	+voice		+voice	-cont	2	+voice
+stop	-cont		-cont	12	-apic	-cont
13	-stop		-stop	+stop	8	-stop
	21		21	13		21
				-apic		
				8		
-syll	+syll	-syll	+syll	+syll	-syll	+syll
22	24	22	24	23	22	24
-front	+nasal	-front	-nasal	-front	-front	-nasal
-round	33	+round	33	-round	-round	33
+low		-low		+low	+low	
32		32		32	32	

[mãgumba] "bones".

Matrix 1 illustrates the possibility of <u>invariance</u> obtaining between the phonological representation and the phonetic realisation. Matrix 1 is realised by the redundancy rules and does not enter the P-rules. The redundancy rules assign syllabic and assimilatory values.

There are two points of special interest in this matrix. One is that the underlying representation illustrates the principle that similar phonetic segments are not necessarily identified in the phonological representation - compare the characterisation of initial /m/ with that preceding /b/. The second is that the addition of values to the nasal preceding /b/ illustrates the necessity for the re-application of the

redundancy rules - observe that the value [-apical] is added on the second cycle of the rule. (The word "cycle" is misleading here since it suggests that the rules are ordered. It must be borne in mind that the redundancy rules are unordered and, in principle, may apply in any order. The assumption that matrices cycle through the rules is simply made in order to simplify the difficult concept of thirty-five rules applying simultaneously or in random order.)

2.

u	m	u	i	f	i
-cons +round -low	+cons -ling +nasal	-cons +round -low	-cons +front -low	+cons -ling -voice +cont	-cons +front -low
-front 19 +ling -apic +voice -cont -stop 21	-apic 8 +voice -cont 12 +stop 13	-front 19 +ling -apic +voice -cont -stop 21	-round 18 +ling -apic +voice -cont -stop 21	-apic 8 -nasal 10 -stop 15	-round 18 +ling -apic +voice -cont -stop 21
+syll 24	-syll 22	-syll 25	+syll 24	-syll 22	+syll 24
-nasal 33 +raised 35	-front +round -low 32	+nasal 33	+nasal 33 +long 34 +raised 35	+front -round -low 32	-nasal 33

[um̃w̃ĩ:fi] "a thief"

+syll ∅

Word Boundary rule 2

[um̃w̃ĩ:f] "a thief".

Matrix 2, like matrix 1, illustrates the possibility of invariance obtaining between the phonological representation and the phonetic realisation.

It also illustrates the application of the vowel-lengthening process, the vowel-raising process, and the effect of the application of the optional Word Boundary rule, which deletes the final vowel and realises the previous consonant as syllabic.

Matrix 3 (p. 156) is a good deal more complex than our previous examples and illustrates the complexities which the sequence nasal prefix+voiceless consonant causes. The fully-specified matrix [impusu] emerges from the redundancy rules with the additional features [+P-rule ii] (added in the lexical entry to any matrix containing /p/, - this is why only those columns of the matrix which are part of the lexical stem are marked [+P-rule ii]) and [+P-rule iii] added by redundancy rule 3 to the sequence nasal + voiceless consonant. (All columns of the matrix are marked [+P-rule iii].) P-rule ii deletes the feature [+P-rule ii] when [p] follows a nasal. The matrix then passes through the redundancy rules again and emerges without further change. (It will be remembered that each time a P-rule operates, the output must be fully specified by the redundancy rules so that the next P-rule may only operate on a fully-specified matrix, cf. discussion in 3.2.) The matrix is then operated on by P-rule iii. The matrix fits the structural description of sub-rule a). Sub-rule a) deletes [m] and replaces it by the values which minimally specify [i]. Sub-rule a) also

3.

i	N	p	u	s	u
-cons	+cons	+cons	-cons	+cons	-cons
+front		-ling	+round	+apic	+round
-low		-voice	-low	-voice	-low
		-cont		+cont	
		+Prii	+Prii	+Prii	+Prii
+Priii	-ling	+Priii	+Priii	+Priii	+Priii
3	+nasal	3	3	3	3
-round	1	-apic	-front	+ling	-front
18	+Priii	8	19	9	19
	3				
+ling	+voice	-nasal	+ling	-nasal	+ling
-apic	-cont	11	-apic	11	-apic
+voice	12	+stop	+voice	-stop	+voice
-cont	+stop	13	-cont	15	-cont
-stop	13		-stop		-stop
21	-apic		21		21
	8				
+syll	+syll	-syll	+syll	-syll	+syll
24	23	22	24	22	24
-nasal	-front	-front	-nasal	-front	-nasal
33	+round	+round	33	+round	33
	-low	-low		-low	
	32	32		32	

[im̥p̥us̥u
+Pruleii
+Pruleiii]

P-rule ii deletes [+Prulei

[im̥p̥us̥u
+Pruleiii]

P-rule iii, a,
changes [i] to [y],
[m̥] to [i].

-syll	-cons				
	+front				
	-low				
	-round				
	18				
	+ling				
	-apic				
	+voice				
	-cont				
	-stop				
	21				
	+syll				
	24				
+Pri	+Pri	+Pri	+Pri	+Pri	+Pri
27	27	27	27	27	27
	+long				
	34				

[yi:p̥us̥u
+Prulei]

P-rule i deletes [y].

ø

[i:p̥us̥u] "a cat".

changes the [+syllabic] value of the determiner [i] to [-syllabic], yielding [y]. The redundancy rules fill in the values for the minimally specified [i], adding the features [+syllabic] and [+long]. Traffic rule 27 identifies the inadmissible sequence of two [+front, -low] nonconsonants, and marks it to enter P-rule i. P-rule i deletes [y]. The matrix cycles through the redundancy rules once more and emerges as [i:pusu].

Matrix 4 (p.158) illustrates the complications introduced into the phonology by the weakening of /p/, and by the class 5 classifier, /si/. /lisipaafu/ is marked to enter P-rules i, ii, and iv. P-rule i deletes the first of the sequence of syllabic [a] s in the stem. P-rule ii changes [p] to [h] before [a]. Notice that whereas in matrix 3, when a [+cons] segment was replaced by a [-cons] segment, ([m] by [i]) all the values for the new segment had to be filled in by the redundancy rules, in the present case all that happens is that two features ([lingual] and [stop]) receive new values. All the other values remain unchanged since the segment type has not itself been changed. P-rule iv deletes [s] thus creating a sequence [ii], both specified as [+syllabic]. This new sequence is marked by traffic rule 27 to enter P-rule i, and rule 34 adds the feature [+long] to the second vowel. P-rule i deletes the first [i] and the correct output is produced.

4.

l	i	s	i	p	a	a	f	u
+cons	-cons	+cons	-cons	+cons	-cons	-cons	+cons	-cons
+apic	+front	+apic	+front	-ling	-front	-front	-ling	+round
+voice	-low	-voice	-low	-voice	-round	-round	-voice	-low
-stop	+Priv	+cont	+Priv	-cont	+Prii	+Prii	+cont	+Prii
+Priv		+Priv		+Prii			+Prii	
+ling	-round	+ling	-round	-apic	+low	+low	-apic	-front
9	18	9	18	8	20	20	8	19
+cont	+ling	-stop	+ling	-nasal	+ling	+ling	-nasal	+ling
15,a	-apic	15	-apic	11	-apic	-apic	10	-apic
-nasal	+voice	-nasal	+voice	+stop	+voice	+voice	-stop	+voice
10	-cont	10/11	-cont	13	-cont	-cont	15	-cont
	-stop		-stop		-stop	-stop		-stop
	21		21		21	21		21
-syll	+syll	-syll	+syll	-syll	+syll	+syll	-syll	+syll
22	24	22	24	22	24	24	22	24
+Pri	+Pri	+Pri	+Pri	+Pri	+Pri	+Pri	+Pri	+Pri
26	26	26	26	26	26	26	26	26
+front	-nasal	+front	-nasal	-front	-nasal	-nasal	-front	-nasal
-round	33	-round	33	-round	33	33	+round	33
-low		-low		+low		+long	-low	
32		32		32		34	32	

[lisipaa:fu
 +Prulei
 +Pruleii
 +Pruleiv]

P-rule i deletes [a]

∅

[lisipa:fu
 +Pruleii
 +Pruleiv]

P-rule ii changes [p] to [h]

+ling
-stop

[lisiha:fu
 +Pruleiv]

P-rule iv deletes [s]

∅

+Pri	+Pri	+Pri	+Pri	+Pri	+Pri	+Pri	+Pri	+Pri
27	27		27	27	27	27	27	27
			+long					

34

[liiha:fu
 +Prulei]

P-rule i deletes [i]

5.

i	N	B	u	a ++	i	g	u	a
-cons +front -low	+cons	+cons -ling +voice +cont	-cons +round -low	-cons -front -round	-cons +front -low	+cons +ling -apic +voice -cont -nasal	-cons +round -low	-cons -front -round
-round 18 +ling -apic +voice -cont -stop 21 +Priii 4	-ling +nasal 1 +voice -cont 12 +stop 13 -apic 8 +Priii 4	-apic 8 -nasal 10 -stop 15 +Priii 4	-front 19 +ling -apic +voice -cont -stop 21 +Priii 4	+low 20 +ling -apic +voice -cont -stop 21 +Priii 4	-round 18 +ling -apic +voice -cont -stop 21	+stop 13 -front 19 +ling -apic +voice -cont -stop 21	-front 19 +ling -apic +voice -cont -stop 21	+low 20 +ling -apic +voice -cont -stop 21
+syll 24	+syll 23	-syll 22	-syll 25	+syll 24	+syll 24	-syll 22	-syll 25	+syll 24
-nasal 33	-front +round -low 32	-front +round -low 32	-nasal 33	-nasal 33	-nasal 33	-front +round -low 32	-nasal 33	-nasal 33

[imBwa / +Pruleiii] [igwa]

P-rule iii, e, changes [B] to [b]

-cont
+stop

[imbwa] [igwa]

Word Boundary rule i changes [i] to [e]

+low

[imbwaegwa]

P-rule i
27

all columns must enter P-rule i

+long
34

[imbwae:gwa / +Prulei]

P-rule i deletes [a]

[imbwe:gwa] "the dog falls".

Matrix 5 illustrates what happens to a sequence [m̥B] and also shows the operation of word boundary rules. The matrix /iNBua/ is marked in all columns by redundancy rule 4 to enter P-rule iii. P-rule iii changes [B] to [b].

The word boundary rule changes the determiner [i] before the verb to [e], rule 34 lengthens [e] and rule 27 marks the matrix (in all columns) to enter P-rule i. P-rule i deletes [a], yielding [im̥̆bwe:ğwa].

4. CHAPTER FOUR

PHONETIC REALISATION

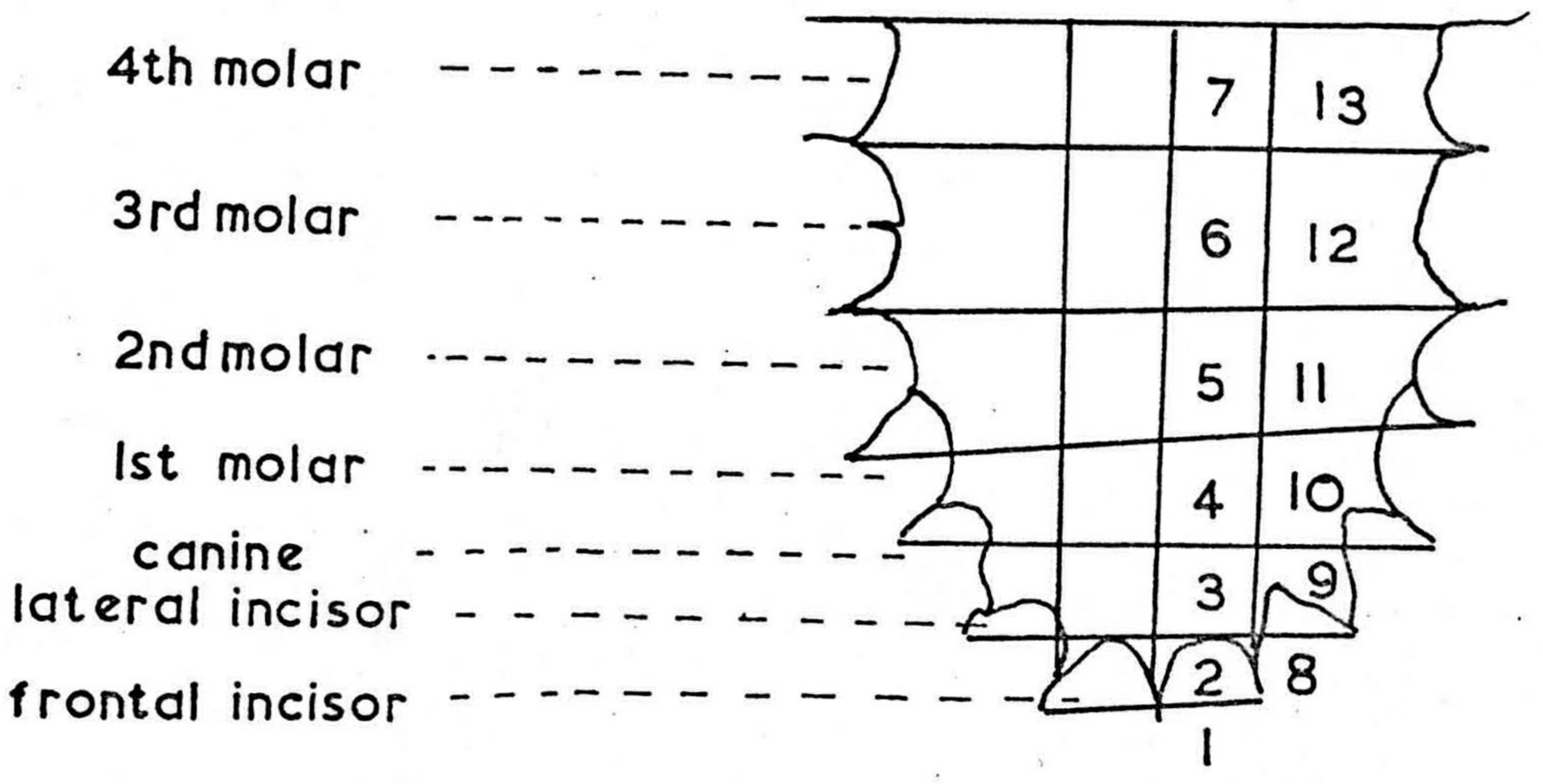
In this chapter the output of the redundancy rules is informally related to the articulatory terms of traditional phonetic description.

Occasional reference is made to palatographic evidence. No palatograms are presented with this description. Forty palatograms were made but they are of poor quality. My informant was inhibited by the palatographic apparatus and disliked having the mirror properly inserted into her mouth. Diagram I (p.161a) is traced from the best palatogram and zoned as in Firth, (1948). Reference is made to wipeoff in the numbered zones. Unless otherwise stated palatographic references apply to both sides of the mouth.

Brief general characterisation of features

Any given feature value can only be given explicit articulatory characterisation in terms of the whole feature bundle in which it occurs. Thus the feature [-lingual] will be interpreted as the articulation of the lower lip with the upper lip for all [-lingual] consonants except for that bundle of features informally represented as /f/, where the lower lip articulates with the upper teeth. Nonetheless since the features are held to define natural classes it is clear that some general parameters should characterise each feature.

I Tracing of palatogram.



4.1 Consonants

Two classes of underlying elements are specified, consonants and nonconsonants. Members of one class may freely combine with members of the other class, but there exist strong constraints on the sequence of members of the same class. The distinction consonant-nonconsonant is set up as a functional distinction which usefully characterises the underlying elements and the constraints on their sequence. When we come to the phonetic realisation this functional characterisation has no descriptive relevance. Nonetheless for convenience of presentation we shall first consider the set of segments which is derived from underlying consonantal elements and then the set of segments which is derived from underlying nonconsonantal elements.

The members of the set of consonants are characterised by the following features:

[+lingual]	the active articulator is the tongue
[-lingual]	the active articulator is the lower lip
[+apical]	the active articulator is the point or blade of the tongue
[+lingual, -apical]	the active articulator is the tongue, specifically the dorsum - the front or back of the tongue
[+voice]	the vocal cords vibrate, producing voice
[-voice]	the vocal cords are apart, not in vibration
[+nasal]	there is resonance in the nasal cavities
[-nasal]	there is no resonance in the nasal cavities

[+continuant]	the oral flow of air is partially obstructed by a stricture in the oral cavity (possibility of friction)
[-continuant] [+stop]	the oral flow of air is blocked by complete closure in the mouth
[-continuant] [-stop]	the oral flow is relatively unimpeded (no possibility of friction)
[+stop] [-cont]	see [-continuant, +stop]
[+stop] [+cont]	the oral flow is partially impeded, strong friction ([z]), possibility of briefly held stop followed by affricated release ([dz]) especially following a nasal ([ndz]).

These general labels characterise features which can only receive adequate description in the context of the feature bundle in which they occur.

Segments are described as they occur in a citation form in isolated segments or in a very limited environment. They are described as though a static posture of the vocal organs was maintained for a period of time. The term "stricture" is used in the description somewhat idiosyncratically - it refers to the relationship between two articulators at the point where they are most nearly in contact. Thus a description of [b] would state that there is a stricture of complete closure at the lips. If however the [b] were palatalised it would be necessary to state that there was a second stricture of open approximation between the front of the tongue and the palate.

4.1.1. We will first consider <u>consonants occurring before [a]</u>.

[p] +cons -lingual -apical -voice -cont -nasal +stop -front -round +low -syll — lower lip forms a stricture of complete closure with upper lip. Lower jaw is slightly protruded. The lower lip is slightly protruded and the external surface of the lip is pushed up so that it almost forms a horizontal plane at the point of contact, which is with the external surface of the upper lip. During the closure small vertical wrinkles appear on both sides of the mouth. Release is vigorous. The corners of the mouth are drawn slightly back, the protruded lower lip and jaw are drawn back and down. The voiceless closure is followed immediately by voicing.

[b] +cons -lingual -apical +voice -cont -nasal +stop -front -round +low -syll — lower lip forms a stricture of complete closure with upper lip. Lips and jaw as in [p], similar lateral wrinkles, similar vigorous release. [b] is prevoiced, occasionally slightly implosive (especially in the sequence [m̥b]) and is fully voiced throughout the articulation.

[B] +cons -lingual -apical +voice +cont -nasal -stop -front -round +low -syll — there are several possibilities of realisation:
a) lower lip forms a stricture of complete closure with upper lip. Closure is shorter in duration than for [b]. no lateral vertical wrinkles, no protrusion of lip or jaw. Point of closure with upper lip is at bottom of

exterior surface of upper lip. Closure not vigorously released. Voicing during closure.
b) lower lip forms a stricture of close approximation with the upper lip. Brief period of stricture, and brief audible voiced friction.
c) lower lip forms a stricture of open approximation with upper lip, lips almost touch all along adjoining edges but no audible friction. Voicing during stricture.
a) is frequent in utterance initial position but is not otherwise attested. b) occurs rarely, usually as utterance initial. c) is most frequent in normal conversation.

[m]	+cons -lingual -apical +voice -cont +nasal +stop -front -round +low -syll	lower lip forms stricture of complete closure with upper lip. Point of closure is with lower external surface of upper lip. Lower lip and jaw slightly protruded. No vertical wrinkles. Voicing and nasal resonance throughout stricture.
[f]	+cons -lingual -apical -voice +cont -nasal -stop -front -round +low -syll	lower lip forms stricture of close approximation with upper incisors. Point of contact on lower lip is on upper part of external surface so that upper incisors are visible during stricture. Lower lip is drawn up and back under teeth during this stricture. Lower lip presses into upper teeth, air escapes through

gaps between teeth. [f] is heard as strongly fricative.The stricture is of short duration and vigorously released. No voice throughout stricture,but voicing follows immediately on release.

[t]	+cons +lingual +apical -voice -cont -nasal +stop -front -round +low -syll	tip and blade of tongue form a stricture of complete closure with the upper internal surface of the upper teeth and alveolar ridge. Sides of tongue form a stricture of complete closure with teeth and gums. Wipeoff occurs in zones: 2, 8 and 3, and laterally in zones 9, 10, 11, 12 and 13. [t] is not voiced during the period of closure. It is vigorously released and normally voicing follows immediately on release. Occasionally in rapid speech the release is very slightly affricated.
[d]	+cons +lingual +apical +voice -cont -nasal +stop -front -round +low -syll	blade of tongue forms a stricture of complete closure with alveolar ridge. Sides of tongue form a stricture of complete closure with teeth and gums. Wipeoff occurs in zones 3, 9 and laterally in 10, 11, 12 and 13. [d] is prevoiced, and is fully voiced throughout period of stricture. [d] is slightly longer in duration than [b] and [g] in similar environments.

[n] +cons
+lingual
+apical
+voice
-cont
+nasal
+stop
-front
-round
+low
-syll

blade of tongue forms a stricture of complete closure with alveolar ridge, and sides of tongue form a stricture of complete closure with teeth and gums. Wipeoff as in [d]. Voicing and nasal resonance throughout articulation.

[l] +cons
+lingual
+apical
+voice
+cont
-nasal
-stop
-front
-round
+low
-syll

tip of tongue forms a stricture of complete closure with alveolar ridge. Sides of tongue form stricture of complete closure as far back as the back of the first molar. Palatograms show no wipeoff between 1st and 2nd molars (L) and between 2nd and 3rd molars (R). Behind this area of no wipeoff, wipeoff occurs again laterally in zones 12 and 13.

Following vowels [i] and [e] a variant of this articulation sometimes occurs. The tip of the tongue does not make a stricture of complete closure with the alveolar ridge but curls back slightly leaving a centre channel of open approximation. This sounds like a retroflex open approximant. No satisfactory palatograms of this articulation were obtained. [l] (and its variant), is voiced throughout the period of stricture.

[s]	+cons +lingual +apical -voice +cont -nasal -stop -front -round +low -syll	Sides and blade of tongue form a stricture of complete closure with teeth and gums, extending to the front of the canines. A narrow channel of open approximation, with the blade of the tongue longitudinally grooved is formed on the alveolar ridge, behind the two frontal incisors. The tip of the tongue falls behind the tops of the lower incisors. The lower lip is slightly protruded. Palatograms show wipeoff laterally in zone 3, all over zone 9, and laterally in zones 10, 11, 12 and 13. [s] is heard as a sibilant fricative. No voicing throughout this segment.
[z]	+cons +lingual +apical +voice +cont -nasal +stop -front -round +low -syll	Stricture as in [s] except that the palatograms suggest that the channel behind the incisors is a little wider. [z] is heard as strongly fricative. (Some speakers produce a variant [dz], in which a very briefly held stricture of complete closure at the alveolar ridge precedes the fricative.) [z] is strongly voiced.
[k]	+cons +lingual -apical -voice -cont -nasal +stop -front -round +low -syll	Back of tongue makes a stricture of complete closure with velum. Visual inspection of previously sprayed interior of mouth reveals wipeoff extending across velum from behind the 4th molar and extending back almost to the uvula. Palatogram shows no central wipeoff

but some lateral wipeoff in zones 12 and 13.

[k] is voiceless throughout closure. Voicing occurs immediately on release of closure.

[c] +cons
+lingual
-apical
-voice
-cont
-nasal
+stop
+front
-round
+low
-syll

([c] can occur before [a] as we have seen in, e.g., [cica:ma] "a piece of metal" (/ki+ki+ama/.) The front of the tongue and the back of the blade of the tongue form a stricture of complete closure with the palate and the back of the alveolar ridge. Palatograms show wipeoff in the rear half of zones 3 and 9 and throughout zones 4, 5, 6, 7, 10, 11, 12, 13. Visual observation showed that the wipeoff area ceases at around the 4th molar line. The release of this closure is strongly affricated. No voicing occurs during the stricture.

[g] +cons
+lingual
-apical
+voice
-cont
-nasal
+stop
-front
-round
+low
-syll

stricture as for [k].

[g] is prevoiced when utterance-initial.

Fully voiced throughout stricture.

[j] +cons
+lingual
-apical
+voice
-cont
-nasal
+stop
+front
-round
-low
-syll

(as in /Bu+giafa/ [Buja:fa] "beans")

stricture as for [c].

[j] is fully voiced.

[ŋ] +cons — stricture as for [g].
+lingual
-apical — Voicing and nasal resonance throughout
+voice
-cont — articulation.
+nasal
+stop
-front
-round
+low
-syll

[ɲ] +cons — (as in /Bu+ɲiasi/ [Buɲa:si] "grass")
+lingual
-apical — stricture as for [c] except that no wipeoff
+voice
-cont — appears on palatograms in zone 7, and in
+nasal
+stop — zone 6 (R).
+front
-round — Voicing and nasal resonance throughout
+low
-syll — articulation.

[y] +cons — Front of tongue makes stricture of open
+lingual
-apical — approximation with palate. Sides of tongue
+voice
-/+cont — make stricture of complete closure as far
-nasal
-stop — forward as lst molar.
+front
-round — [y] is fully voiced. ([y] will be specified
+low
-syll — as [+cont] if it derives from /j/ and [-cont]
if it derives from /p/. Since there is no
other segment characterised by the rest of the
values which characterise [y], the correct
phonetic realisation may be assigned whichever
value is stated for <u>continuant.)</u>

[w] +cons — Back of tongue is raised towards the velum.
+lingual
-apical — Corners of the mouth are drawn forward, the
-cont
+voice — lips protrude. Vertical wrinkles appear on
-nasal
-stop — the lips as they form a small o-shaped
-syll
-front — aperture.
+round
-low

[h]	+cons +ling -apical -cont -voice -nasal -stop -syll -front -round +low	The tongue is low in the mouth, the lips neutral. [h] is realised as a voiceless onset to [a]. Sometimes slight pharyngeal friction occurs, especially when utterance-initial.

Where a nonconsonant is specified as having the feature values

$$\begin{bmatrix} -\text{front} \\ -\text{round} \\ +\text{low} \end{bmatrix}$$

the preceding consonant is normally realised without any palatalisation or liprounding. There are however some exceptional and interesting cases where a lexical /a/, whose features values are assigned to the preceding consonant by the operation of redundancy rule 32, is itself deleted before a following [+round] or [+front] vowel, by the operation of P-rule i. Here the $\begin{bmatrix} -\text{front} \\ -\text{round} \end{bmatrix}$ values of the consonant succeed to a large extent in inhibiting any process of similitude occurring between the two phonetically contiguous segments. Thus in a) /ka+ka+iko/ [kaki:ko] "a small eye"

b) /ka+ka+uma/ [kaku:ma] "a small piece of metal"

the [k] of the classifier in a) is not fronted to [c] and in b) is not rounded as is, for example, the [k] in /ma+kupa/ [makuwa] "news". However the [k] of the classifier in a) is in fact more fronted than the [k] of the determiner. Whereas the [k] of the determiner is realised with wipeoff occurring across the velum behind the 4th molar, visual observation after the articulation of [kaki:ko] shows wipeoff as far forward as the line between the third and fourth molar.

(Palatograms show lateral wipeoff extending forward as far as the first molar, but this wipeoff is presumably attributable to the vowel [i].) This [k] is heard as a <u>front</u> velar stop.

In b) the consonant of the classifier is unrounded throughout the period of closure but the lower lip begins to project and the corners of the mouth to be drawn forwards immediately the closure is released, whereas in [maꞵkuwa] the [k] is rounded throughout the period of closure. Whereas visual observation of the interior of the mouth shows wipeoff extending over the uvula itself in [maꞵkuwa], no wipeoff of the uvula occurs in [kaku:ma].

4.1.2. <u>Consonant before other [+low] vowels</u>

Where the feature [+low] is accompanied by [+front] or [+round] it has little obvious effect on the preceding consonant. Sometimes a consonant before a $\begin{bmatrix}+\text{round}\\+\text{low}\end{bmatrix}$ vowel seems to be less rounded than a consonant before a $\begin{bmatrix}+\text{round}\\-\text{low}\end{bmatrix}$ vowel, but in normal speech the degree of rounding does not vary much, between these two environments. Similarly palatograms of the sequence [ci] and [ce] show no difference in area of wipeoff.

4.1.3. <u>Consonants occurring before front vowels [i/e]</u>.

By the operation of redundancy rule 32 feature values of vowels are added to preceding consonants. Consonants preceding [i/e] are assigned the feature value [+front]. Consonants with the feature value

a) [-lingual] are realised with simultaneous raising of the front of the tongue, which forms a stricture of open approximation with the palate. Sides

of tongue form a stricture of complete closure with gums as far forward as the first premolar.

b) [+apical] place of articulation is sometimes slightly retracted from that described as occurring before [a]. Thus palatograms of [t] before [i/e] show little wipeoff in zone 2. Front of the tongue is raised as in a) above.

c) [+lingual, -apical] front of tongue articulates against the palate and the back of the blade articulates against the back of the alveolar ridge as described in [c] etc. above.

4.1.4. Consonants occurring before round vowels [o/u]

Consonants preceding [+round] vowels will be assigned the feature value [+round].

[f] +cons, -lingual, -apical, -voice, +cont, -nasal, -stop, -front, +round, αlow, -syll

[f] when [f] is realised with the feature value [+round] the lower lip is everted and the upper incisors press into the inner surface of the lower lip, about ½ inch down from the boundary with the external surface.

[-lingual] for the other labial consonants, [p], [b], [B] and [m] the corners of the mouth are drawn forwards and the lips wrinkle vertically.

[+lingual] for all other consonants the corners of the mouth are drawn forwards and the lower lip everted. This is most marked on [s] and [z]. (Occasionally /su/ is realised as [ʃu] by some speakers but this did not occur in my informant's speech.)

4.1.5. Consonants with the derived feature value [+syllabic]

A consonant which acquires the feature value [+syllabic] will be longer in duration than the same consonant which acquires the value [-syllabic].

4.2 Vowel

Members of the set characterised as [-cons] are characterised in terms of the following set of features:

[+front] articulated with the front of the tongue higher in the mouth than the back of the tongue.

[-front] front of the tongue not higher than the back of the tongue.

[+round] articulated with the back of the tongue higher in the mouth than the front of the tongue. Lips rounded.

[-round] back of the tongue not higher than the front of the tongue. Lips not rounded.

[+low] articulated with the highest portion of the tongue lower in the mouth than for the [-low] vowels.

[-low] with the highest portion of the tongue higher in the mouth than for the [+low] vowels.

All vowels acquire the feature values $\begin{bmatrix} +\text{lingual} \\ -\text{apical} \\ +\text{voice} \\ -\text{cont} \\ -\text{ stop} \end{bmatrix}$ by the operation of redundancy rule 21. A value for the feature nasal is assigned by redundancy rule 33.

4.2.1. The following vowels are characterised as they occur when following a non-nasal consonant.

[i] -cons, +lingual, -apical, +voice, -cont, -nasal, -stop, +front, -round, -low, +syll — the front of the tongue is raised towards the palate. Sides of the tongue make a stricture of complete closure with teeth and gums as far forward as the 1st molar. Palatograms show wipeoff throughout zones 10, 11, 12, 13. Lips

are neutral. Tip of tongue touches internal surface of lower incisors. If a pencil, $\frac{1}{4}$ inch in diameter, is inserted into the mouth against the palate the speaker feels the tongue press strongly against the pencil during the articulation.

[e] -cons +lingual -apical +voice -cont -nasal -stop +front -round +low +syll — the front of the tongue is raised slightly less than for [i] and the sides of the tongue make closure with teeth and gums as far forward as the second molar. The jaw is held slightly open and the lips are neutral. If the pencil is inserted into the mouth of the speaker and held against the centre of the palate the speaker does not feel it during the articulation of this vowel.

[a] -cons +lingual -apical +voice -cont -nasal -stop -front -round +low +syll — the centre of the tongue is raised, above the front and back of the tongue. The area of most raising occurs just beneath the highest part of the dome of the palate. The degree of raising is very slight. The front of the tongue lies close to the floor of the mouth and appears to dip slightly before the area of most raising. The jaw is held slightly open. Lips are neutral.

[o] -cons +lingual -apical +voice -cont -nasal -stop -front +round +low +syll — the back of the tongue is drawn back towards the back of the velum. The whole body of the tongue is retracted. Sides of tongue just touch the upper 4th molars. The jaw is held slightly open. The lower lip is slightly everted, the corners of the mouth are drawn forwards and both lips slightly rounded.

[u] -cons +lingual -apical +voice -cont -nasal -stop -front +round -low +syll — the back of the tongue is raised towards the centre of the velum. Sides of tongue make a stricture of complete closure with teeth and gums as far forward as the second molar. The whole of the tongue is retracted so that the tip of the tongue touches the floor of the mouth behind the lower teeth. The corners of the mouth are drawn forward and vertical wrinkles appear on the lips as they form a small o-shaped aperture.

All these vowels are voiced throughout their articulation. They are all characterised as [+syllabic].

4.2.2. Nonsyllabic realisations

[y] -cons +lingual -apical +voice -cont -nasal -stop +front -round -low -syll — [y] is articulated like [i] but is shorter in duration.

[w]	-cons -lingual -apical +voice -cont -nasal -stop -front -round -low -syll	[w] is articulated like [u] but is shorter in duration.

There is an inconsistency in the characterisation of phonetic [y] and [w]. They are included within the set characterised as [+consonantal] and within the set characterised as [-consonantal]. This reflects the traditional difficulty of classifying phonetic glides which have an ambivalent phonological function. There is, as Jakobson, Fant and Halle suggested in 1951, no absolute phonetic criterion for distinguishing between the set of consonants and the set of vowels. In the present description it is assumed that the functional distinction characterised by the feature consonantal has no descriptive relevance at the level of phonetic realisation.

Notice that whereas [y] derived from /i/ is always characterised as [-low], Consonantal [y] may be characterised as [+low] when it occurs before a low vowel (by the addition of the features of the following vowel). This characterisation does reflect some difference in the phonetic realisation. Thus the [y] in [kuyeda] "to help" may be articulated with a slightly more open tongue position than the [y] in [BiBye:lo] "brooms". This difference is not always maintained. It would, of course, be possible to formulate a rule which changed the [-low] specification of [-consonantal][-syllabic]

[y] to [+low] before a low vowel. It would be premature to add extra rules at this level before more is known about the articulation of speech which is not deliberately slowed down into citation forms for the benefit of a non-native investigator.

4.2.3. The effect of the derived features long, nasal and raised

[+long] A syllabic vowel which receives the feature [+long] from the application of redundancy rule 34 will be realised as longer in duration than a similar vowel which does not receive the feature [+long]. (Tone on long vowels is usually high, or a fall from high to low.)

[+nasal] A nonconsonant which receives the feature [+nasal] by the operation of redundancy rule 33 will be realised with slight nasal resonance. Nasal resonance is most pronounced during the articulation of [u].

[+raised] Any nonconsonant which receives the feature value [+raised] by the operation of redundancy rule 35 will be realised with slightly more raised and fronted articulation than in the general description already given. Thus in /i+N+pale/ [i:pale] "trousers" where the final vowel is front, all the preceding vowels will be realised as [+raised].
a) the [i:] of the prefixes is so close and front that occasionally local turbulence is heard and the vowel is whispered rather than voiced. Whereas in [i:piso] "a needle" the prefix vowel is lower and more retracted.

b) the [a] of the stem is realised with the front of the tongue not lying flat on the floor of the mouth (as described in the previous section) but very slightly raised, and pushed forward. (Perceptually this fronted [a] is very close to the open front [a] heard in the speech of older RP speakers e.g. in "hat", whereas the nonfronted [a] is very close to a similar speaker's [ʌ] in "hut".) It seems possible that the most satisfactory account of this phenomenon would be in terms of the tongue root harmony proposed by Stewart (1967).

4.3 Frequency of occurrence of segments in texts

A sample was taken from extracts from two folk stories in order to assess the frequency of occurrence of phonetic segments in running text. The following distribution was found:

p	t	c	k	b	d	ɟ	g	B	l	z	f	s	m	n
2	6	43	101	3	33	21	40	64	161	29	17	32	72	105

ɲ	ŋ	y	w	ᵐb	ⁿd	ᵑg	ⁿz	a	e	i	o	u
24	3	30	131	18	17	36	7	427	150	174	118	150

Such a small sample cannot yield enough information to make a reliable statement of distribution. Nonetheless certain general tendencies emerge which confirm my impressionistic assessment of the relative frequency of segments:

i) labial stops occur very rarely indeed. velar stops on the other hand, especially [k], occur very frequently.

ii) [m] and [n] are frequent, [ŋ] very rare indeed.

iii) the voiced continuants [B], [l], and [w] are frequent.

iv) [a] is by far the most frequent vowel.

5. CHAPTER FIVE

THE DIALECTS OF LUMASAABA

This chapter is divided into three parts. The first gives a report of the dialectal variation in Bugisu. The second expresses formally the phonological variation between the various accents. The third is an outline of the socio-linguistic situation in Bugisu.

In this chapter the following symbols are used with the values stated below:

x voiceless velar fricative (not strongly fricative)

X voiceless uvular fricative (strongly fricative)

ç voiceless palatal fricative

y voiced velar fricative (not strongly fricative)

r voiced alveolar tap

ts voiceless alveolar affricate

5.1. Dialectal variation

In order to understand the dialect situation in Bugisu it is necessary to consider the geographical and administrative structure of the district. These factors not only influence the dialect distribution but also appear to have shaped, in different ways, the analysis of dialect distribution made by earlier writers.

Bugisu is, as we remarked in the Introduction, about fifty miles long from north to south and about twenty five miles across at its widest point - about half way down its length (see map 2). All along the eastern side are the foothills of Mount Elgon. Halfway down the length of Bugisu

a precipitous spur of Elgon juts out right across the district, almost reaching the town of Mbale which is situated at the western end of the spur. The name of the spur is Nkokongera, "the white cock". The higher foothills of Mount Elgon are very sparsely inhabited and Nkokongera itself is uninhabited.[1] Until British rule, in the early 1900s, enforced peace among the warring tribes, the Bagisu inhabited only the lower mountain slopes (La Fontaine, 1959). From this time on, as the population of the lush mountain slopes increased rapidly, the Bagisu moved out into the plains and began to herd cattle. Until this time then, when they began to intermingle on the plains, it would appear that the people north of Nkokongera can have had little communication with the people from the south. It would have been necessary to go down into the plains, among the hostile Iteso, and walk right round Nkokongera in order to get from the north to the south of the mountain.

If this is a true picture of the situation it seems likely that at some time previous to their separation by Nkokongera the Bagisu must have inhabited one area. Otherwise it is difficult to explain their social and linguistic

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1. Local Government officials told me that Nkokongera was uninhabited, and pointed out that it is virtually uninhabitable because of its steep slopes. I was, however, told by several different people that there is a group of about a hundred people who live right on top of Nkokongera, and have to be reached by a rope ladder after a very difficult climb. These people were said to speak the "oldest and purest" Lumasaaba. No-one I met had actually been there, or could say how the language spoken there differed from his own. My informant was confident that, given a landrover and the dry season, he could have got me to within three miles of where the climb begins. I asked, tentatively, whether these people were in fact the Ancestors, but was told they were ordinary human beings.

homogeneity. The people north of Mount Elgon have a story of a dire catastrophe during which man-eating monsters ([wonesilice]) ate nearly all the members of the Bagisu family. Mwambo, one of the Ancestors, followed the most monstrous of the monsters to the north of the mountain and killed it with his spear. Then he cut off the monster's little finger and out of the finger came Mwambo's own wife, his parents, his friends and all the members of his clan. Then they all settled down and lived happily together. It is tempting to suppose that this may represent some episode in pre-history when some of the Bagisu were driven up into the mountain north of Nkokongera by hostile tribes.

The first plains areas to be settled appear to have been those immediately beneath the mountain in South Bugisu County. The map shows several gombolola areas which extend from the originally inhabited mountain area and stretch out like long fingers into the plains (e.g. Busoba, Bukiende, Buwagogo). The next areas to be settled were the plains around Mbale - Bungokho and Nakaloke. These areas are largely inhabited by people from the South. Mbale itself, as the main administrative and market town, has a heterogeneous population drawn from all over Bugisu, as well as a large Asian trading population. The last areas to be settled appear to have been the gombolola areas of Cheptui and Muyembe. These plains in the far north were first settled in the late twenties and early thirties, mostly by people from the south of Bugisu. There is still a trickle of new settlers to these arid northern areas from all over Bugisu, especially from the south. There are also many Sebei immigrants as well as people from neighbouring

areas of Kenya.

Bugisu district was, until 1967, divided into three administrative areas, North, Central and South. A recent subdivision of the southern area yields the small county of Manjiya. Manjiya County consists of the gombolola areas of Bukiga, Bukigai, Bududa and Bulucheke which are isolated from the rest of Bugisu by virtue of being situated high up in a corner of the mountain, where Nkokongera joins the main mass of Mount Elgon.

This report does not claim to be the first account of dialect variation in Bugisu. It does, however, claim to offer more extensive and reliable data for stating dialect distribution than previous published accounts have done. We will therefore briefly consider what previous writers have said, before passing on to the body of the present account.

The most reliable published account of Lumasaaba is certainly A Handbook of Lumasaba Grammar, written by the Reverend J.B. Purvis of the Nabumali Mission, and published by the S.P.C.K. in 1907. Purvis is chiefly concerned with describing the language spoken in Busoba, in Central Bugisu County. He does however comment on different usages among the clans, especially those in the north. He clearly regards the language spoken throughout Bugisu as essentially one language with minor local variation. He notes that the variation is most marked in the speech of those from the north. Unfortunately this valuable book does not appear to have been available to most writers early in this century who were concerned with the classification of the Bantu languages. Their

knowledge of Lumasaaba appears to derive mainly from the word lists published by Sir Harry Johnston in his massive work on comparative Bantu (1918, 1922). These word lists are, unfortunately, not all equally reliable. It seems that while Sir Harry was Governor of Uganda he required his Assistant District Commissioners in outlying areas to compile word lists for him. It is clear that the A.D.C.s varied in the degree of ability and interest they were able to devote to their task. While the total value of the work is certainly to be considered a great achievement and a landmark in the study of comparative Bantu, it is hardly surprising that the detail of the lists for some of the languages is not completely satisfactory. Johnston gives two word lists for Lumasaaba - one for Lukonde and one for Lumasaba (or Lugisu). Lukonde is spoken by one of the two major lineages who inhabit the gombolola of Bufumbo, on the northern face of Nkokongera. Johnston reports that in 1899 C.W. Hobley "discovered the Northernmost colony of Bantu in Eastern Africa - the Konde people of North-west Elgon". The Lukonde word list is representative of the dialect spoken in Bufumbo, the most northerly gombolola of the Central County. There are a few minor inconsistencies. The Lumasaba word list is, again, not entirely consistent, but is representative of the dialect spoken in the south of Central County (i.e. that described by Purvis).

More recently data from Lumasaaba has been provided by scholars from the School of Oriental and African Languages. This data is necessarily brief, as it always forms part of much

more general surveys, but it is on this data that most modern assessments of dialect variation in Bugisu are based. Since it is not clear to me why some of the conclusions which have been reached <u>have</u> been reached, nor indeed how they could have been reached on the basis of the known data, we shall discuss the better known accounts in some detail.

Guthrie (1948) classifies Masaba as a "dialect cluster", consisting of the Kenyan dialects Lubukusu and Lukisu, and the dialect spoken in Bugisu, which he calls Gisu, (Zone E, group 30 numbers 31 a,b,c). Presumably the language spoken throughout Bugisu is classified as one dialect on the basis of the fact that speakers throughout Bugisu regard themselves as speaking one language (cf. Guthrie's discussion of the terms "language" and "dialect", p. 29). It is difficult to know in what terms he would then discuss the variation within Bugisu. Tucker and Bryan (1957) in their survey of the northern Bantu borderland, divide Gisu into three main dialects: South, North and Dadiri. (Dadiri is a town situated in the Northern County, in the gombolola of Buhugu i.e. the area of the dialect described in the present work.) It is not clear how this division is arrived at. If South includes everything south of the Dadiri dialect it must include the whole of Southern County, Manjiya County and Central County. (This is essentially the position taken in the present account.) It is not clear how they can then distinguish between Dadiri and North. They provide a word list for the Dadiri dialect (containing several anomalous forms) which is characteristic of the dialect spoken throughout

the Northern county except in the two most northerly gombolola areas of Cheptui and Muyembe. We have already noted that these are areas of recent habitation, largely settled by immigrants from the south. Tucker and Bryan provide no word list for this "North dialect" but remark "according to Guthrie there is no pre-prefix in the Northern dialect (not represented here)". Once again it is not clear what this might mean. The pre-prefix (determiner) occurs in many constructions in all dialects of Lumasaaba. It is true that the determiner-classifier sequences whose initial consonants are g-m (i.e. classes 3, 4 and 6) do not occur when a noun is produced in isolation, as it might be in a word list, throughout the area where the Dadiri dialect is spoken, whereas throughout the area where the Southern dialect is spoken the sequence is produced in a word list, thus:

Dadiri	South	
[mulimo]	[kumulimo]	"a task"
[mimilo]	[cimimilo]	"throats"
[madeBe]	[kamateBe]	"tins".

This does not of course provide an argument for the existence of a dialect more northerly than Dadiri. Voegelin (1964) perpetuates the same classification by recognising three dialects spoken within Bugisu: Dadiri, Buya (South) and Northern Gisu.

La Fontaine (1959) and Siertsema (unpublished suggestions for Lumasaaba orthography) recognise three dialect areas which coincide with the administrative divisions: North, Central and South (including Manjiya) Counties.

5.1.1. The present account of dialect distribution in Bugisu is based on six weeks' fieldwork which I carried out in Bugisu in 1968. This could not, of course, provide an adequate amount of data for a definitive account of dialect distribution, but it does provide an account of some important systematic variations which are locally regarded as shibboleths. During the course of this survey I visited twenty-five of the twenty-six gombolola areas. (The exception was Buginyanya - but word lists of Luginyanya speakers living in other areas were recorded.) Most gombolola areas are inhabited by one maximal lineage - that is by one large clan whose members all claim descent from the same ancestor. As far as I could tell on the basis of ten word lists of 107 items, as well as numerous brief tests all made within the Busoba gombolola, there is little systematic phonetic or lexical variation within the speech of one clan. (Variation between the speech of younger and older generations is discussed in 5.3.) This observation is confirmed by the opinions expressed by people I talked to about this. It is still of course possible that a finer grid might reveal regularities which my word list missed. Men said that they could tell from a man's speech which muluka area, within their own gombolola area, he came from. Community of reference may well play an important part here. It was not possible in a rapid and extensive survey to discover any consistent linguistic parameters which functioned at this level of delicacy.

Ninety-three word lists of 107 items were collected, with at least three from each gombolola area. The word list was

based on a list I had compiled in Edinburgh by comparing forms produced by my Luhugu speaking informant with forms occurring in Purvis' Grammar. It was constantly adapted during the first week of the survey. (A sample of the final form of the list is in the Appendix.) A short list of 38 items was then made which included all the items which appear to distinguish between dialects. (Samples of these lists are also in the Appendix 1.) The short word list was completed by a further forty people.

In each gombolola I visited, at least one word list was completed by an old man. (Women are often unsatisfactory as informants typical of the area they are living in, as the Bagisu are traditionally exogamous and take wives from a clan different from their own.) Where it was possible to find an old man who had lived in the area all his life and knew no Luganda or English, I did so. Schoolchildren who had never moved from their homes were also used as informants. A discussion of the speech of those who had moved from their own areas (i.e. recent settlers, wives and boarding school children) will be found in 5.3.

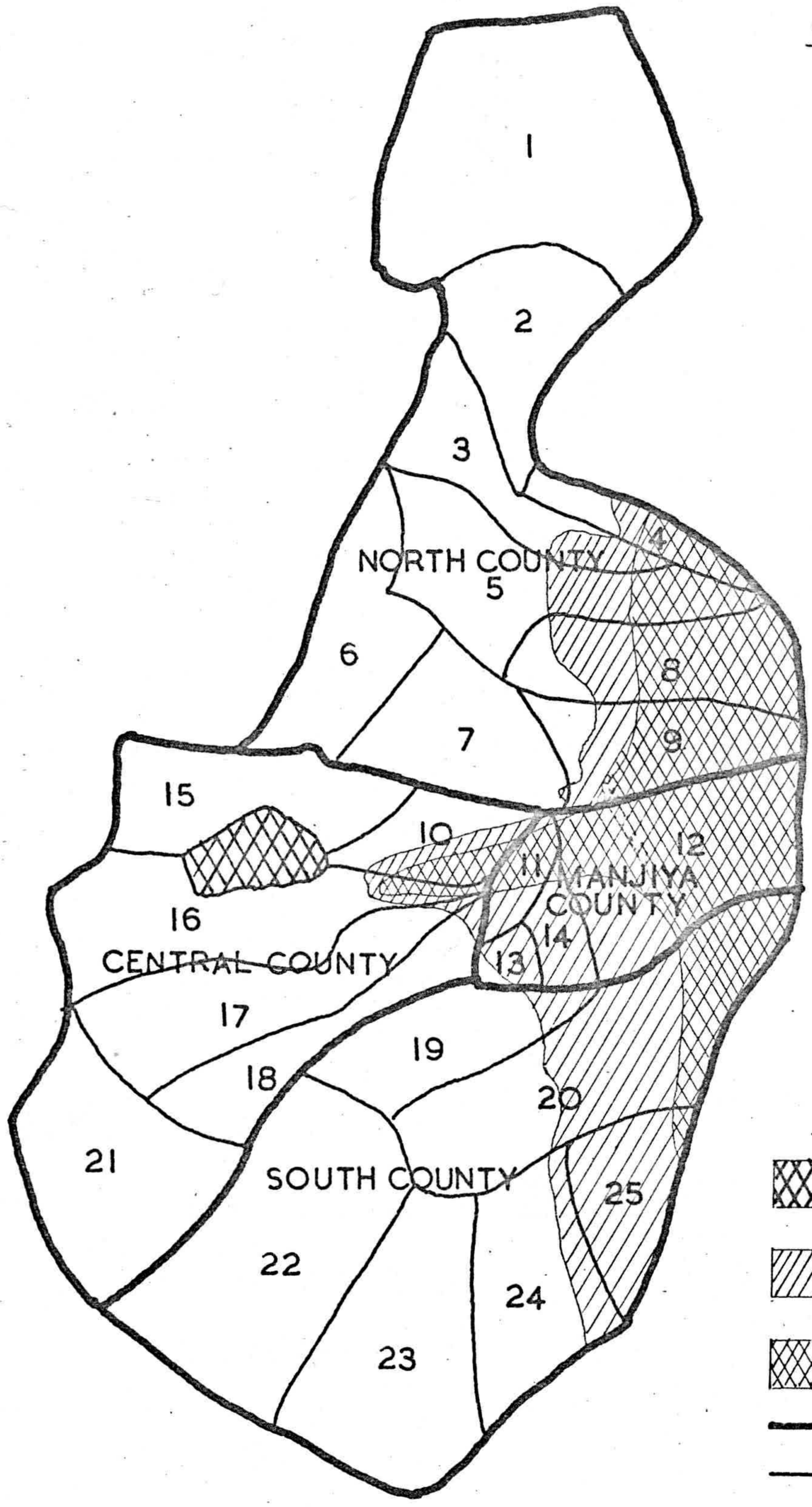
Throughout the survey the opinion of local people was constantly used as a guide to shibboleths which distinguish various clans, and as a check on the acceptibility of my interpretation of the word lists. Indeed the arrogance of my claim that my statement of dialect distribution is a more accurate account than others I have discussed is, I hope, to some extent mitigated by the fact that in all respects my statement does agree with that of people I talked to at beer-

sucking parties, gombolola headquarters, dispensaries, schools and missions. (In Bugisu millet beer is sucked through hollow reeds from a common cauldron.)

The data from the word lists is summarised and presented on charts 1-4 following Map 2. Map 2 shows the administrative organisation of the District. The charts are abstracted from this, and each square on each chart is marked with a number corresponding to a gombolola area on the map. The material is presented on charts rather than maps simply because charts are easier to draw - the form of the chart has no theoretical implication. On each chart Mbale is shaded and the dividing line of Nkokongera is drawn. Mbale and recently settled Nakaloke and the two northern gombolola areas of Cheptui and Muyembe are not discussed in this section (but see 5.3.).

In the discussion, the underlying forms written in slant brackets are those which we have postulated in the earlier part of this description as the underlying forms for Luhugu. In order to simplify the discussion in this section I shall assume an inventory of underlying consonants. The underlying consonants /m,n,ŋ,f,s,B,l,j/ are realised similarly throughout Bugisu. The underlying consonants /p,b,t,d,k,g,z/, hereafter numbered 1-7, are realised in a strikingly different way north and south of the dividing line of Nkokongera. Chart 1 shows the realisation of these 7 consonants as they occur stem-initially. In column A in each case the consonant follows the nasal prefix /N/ of the first person singular before a verb stem. In column B the

Map 2 showing administrative divisions of Bugisu



Gombolola areas

1. Cheptui
2. Muyembe
3. Bulago
4. Buginyanya
5. Buhugu
6. Buwalasi
7. Buyobo
8. Bumasifwa
9. Busulani
10. Bufumbo
11. Bukiga
12. Bulucheke
13. Bududa
14. Bukigai
15. Nakaloke
16. Bungoko
17. Busoba
18. Bukiende
19. Buwagogo
20. Buwabwala
21. Busiu
22. Bugobero
23. Butiru
24. Bubutu
25. Bumbo

Key

Mbale

mountain

uninhabited mountain

County boundary

Gombolola boundary

Scale: approx. 6 miles to an inch

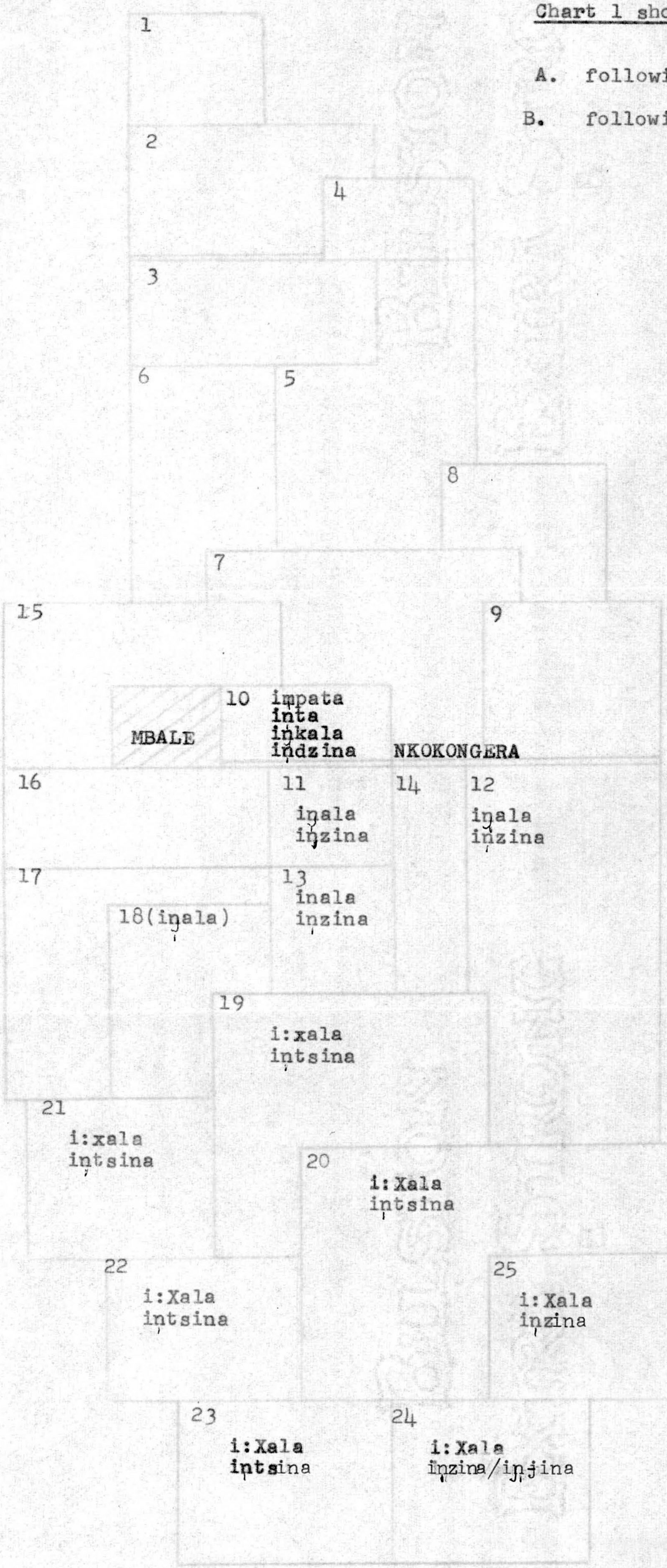


Chart 1 showing realisation of consonants 1-7

A. following a nasal prefix.

B. following a nonnasal prefix.

A. 1. i:pata
2. imbululuka
3. i:ta
4. indamba
5. i:kala
6. ingana
7. inzina

B. 1. ahata
2. abululuka
3. ata
4. adamba
5. akala
6. agana
7. azina

A. 1. imbara
2. imbululuxa
3. inda
4. indamba
5. ingala
6. ingana
7. i:tsina

B. 1. awara
2. apululuxa
3. ara
4. atamba
5. axala
6. akana
7. atsina

Chart 2 showing prefix and lexical variation

"beans" wanambi
naButama
mata:ma
kamakanda

"earth" li:doyi
li:loBa

"skull" /ki+ki+oNgo/
cicongo
(si)ciyanga

g-m-/k-m-

indicates that the determiner precedes the classifier when nouns in isolation occur in classes 3, 4 and 6.

1

2

4 wanambi
li:doyi
cicongo

3 wanambi
li:doyi
cicongo

6 wanambi/
naBudama
li:doyi
kikongo

5 wanambi
li:doyi
cicongo

8 wanambi
li:doyi
cicongo

7 wanambi
li:doyi
kikongo

15 k-m-
naButama
li:toyi
cicongo

9 wanambi
li:doyi
cicongo

MBALE

10 g-m-
wanambi/naBudama
li:doyi cicongo

. . . . NKOKONGERA . . . . . .

16 k-m-
naButama
li:loBa
ciyanga

11 k-m-
kamakanda
li:loBa
ciyanga

14 k-m-

12 k-m-
kamakanda/mata:ma
li:loBa
ciyanga

17 k-m-

18 k-m-
naButama
li:loBa
ciyanga

13 k-m-
kamakanda
li:loBa
ciyanga

19 k-m-
kamakanda
li:loBa
ciyanga

21 k-m-
naButama
li:loBa
ciyanga

20 k-m-
kamakanda
li:loBa
ciyanga

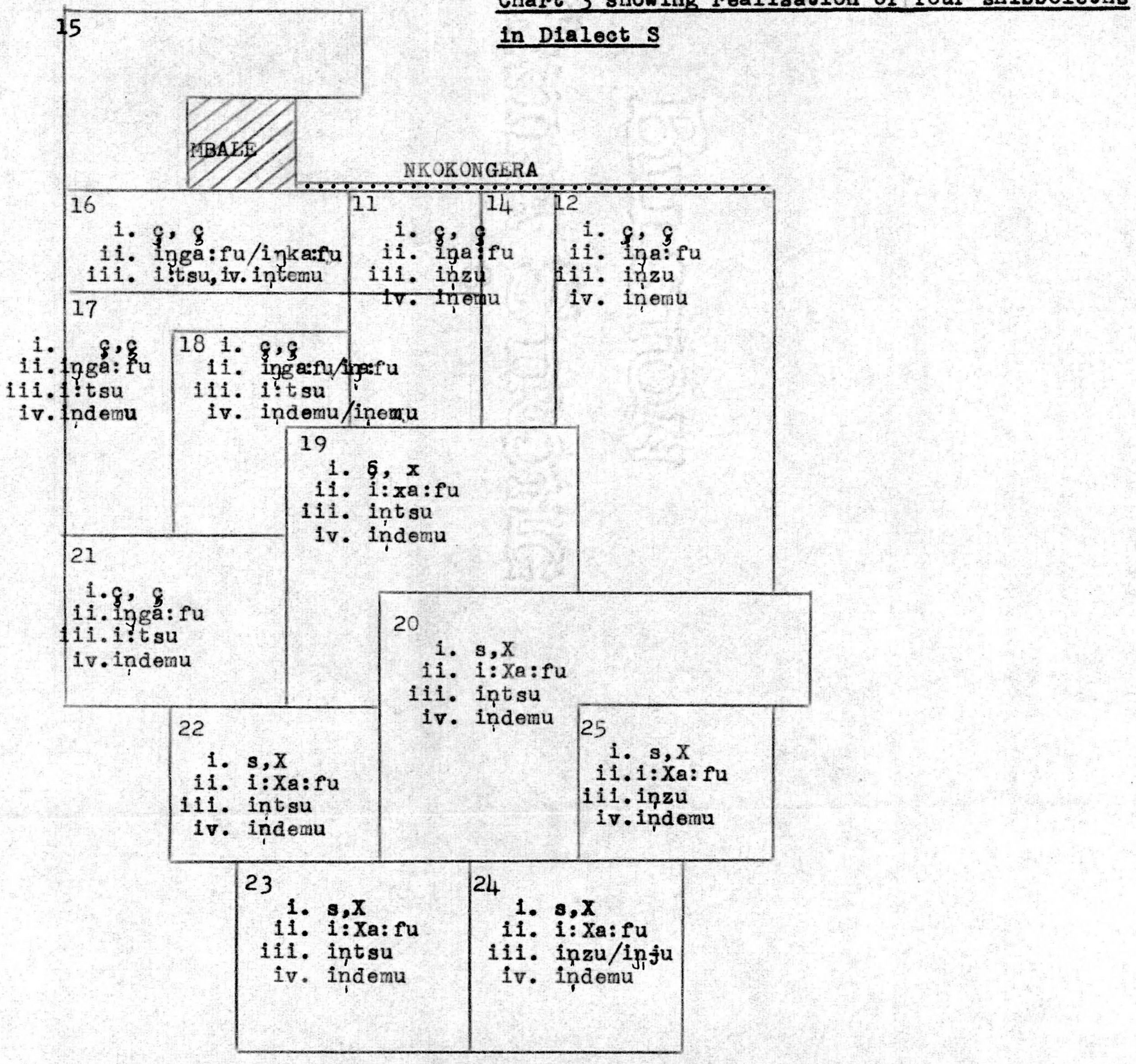
22 k-m-
kamakanda
li:loBa
siyanga

25 k-m-
kamakanda
li:loBa
siyanga

23 k-m-
kamakanda
li:loBa
siyanga

23 k-m-
kamakanda
li:loBa
siyanga

Chart 3 showing realisation of four shibboleths in Dialect S



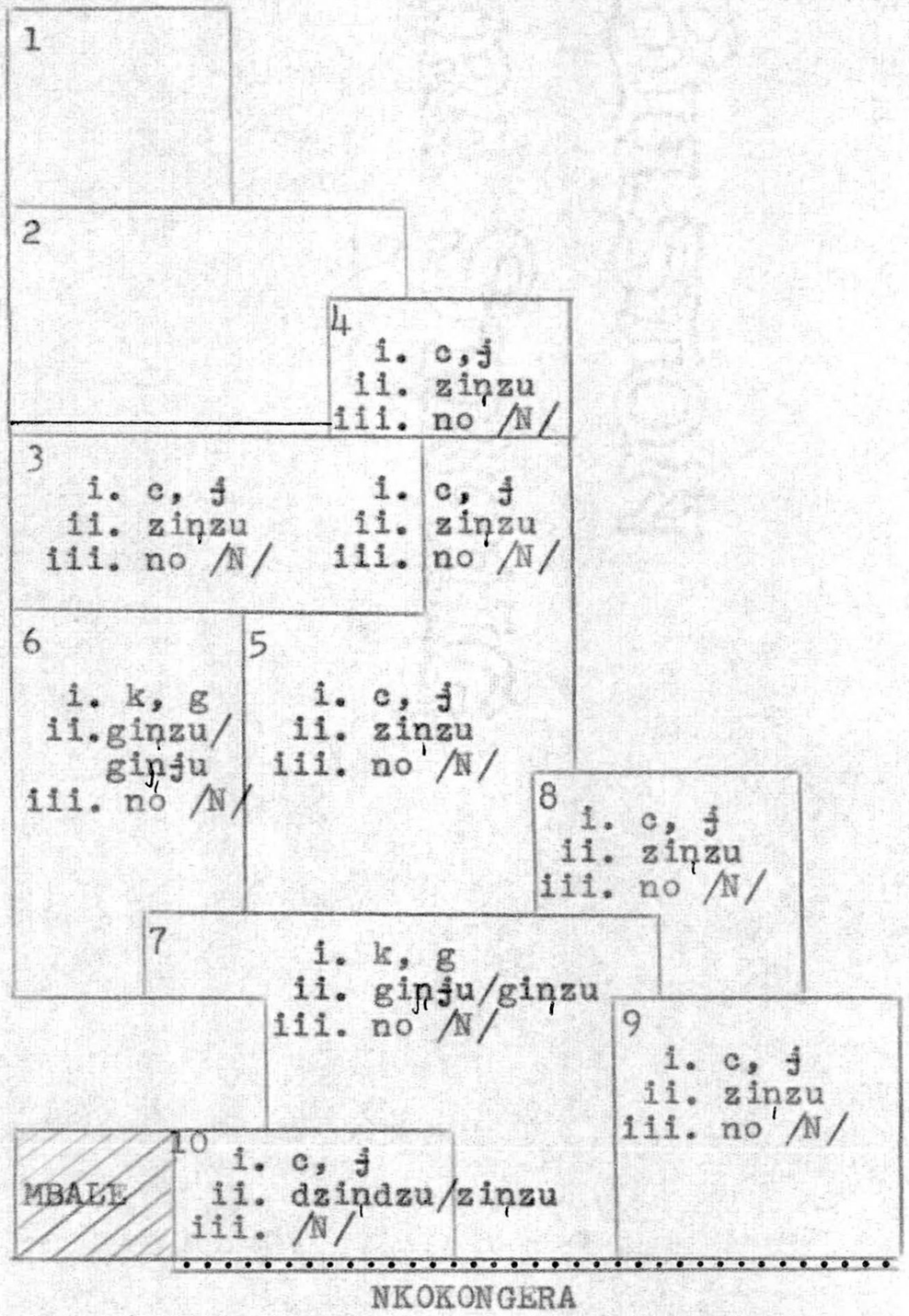
i. a) realisation of /k/ in prefix /ki/,
   b) as stem initial before front vowels

ii. class 9 classifier /N/ + /k/ initial stem, /i+N+kaafu/, "a cow"

iii. class 9 classifier /N/ + /j/ initial stem, /i+N+ju/, "a house"

iv. class 9 classifier /N/ + /t/ initial stem where second stem consonant is nasal, /i+N+temu/, "a snake".

Chart 4 showing realisation of three shibboleths in dialect N



i. realisation of velar consonants before front vowels

ii. realisation a) of /z/ in class 10 prefix /zi/
b) of /j/ following a nasal prefix

iii. realisation of nasal prefix before voiceless consonants

"no /N/" means nasal deleted

/N/ means nasal realised

consonant follows the third person singular prefix before the same stem. The meanings of stems 1-7 are "peel, fly, keep, lack, cut, like, and feel". The top set of A and B columns represents a typical realisation of these consonants as they occur in all gombolola areas north of Nkokongera, including Bufumbo (No. 10) which is in the Central County. The bottom set of A and B columns represents a typical realisation of these consonants in the area south of Nkokongera. In both cases a gombolola area is left blank if A and B correctly represent the typical realisation of this area. Thus the top set A and B correctly represent the realisations for gombololas 3-9. 10 however (Bufumbo) has some variant forms, notably that a nasal is realised before a voiceless consonant, and these variant forms are written in in section number 10. It immediately becomes clear that there is more variation in the southern half, but note that the variation is confined to two items - the realisation of consonant 5,/k/, and of consonant 7,/z/, following a nasal prefix. The most striking variation lies in the realisation of consonants 1-7 from north to south and this is the feature by which Bagisu themselves characterise the two main dialects of Bugisu. Let us call the dialect north of Nkokongera N and the dialect south of Nkokongera S. We can then characterise their typical consonant systems like this:

Table 1

	A		B	
consonants 1-7 before /a/, not following /N/.			consonants 1-7 before /a/, following /N/.	
	N	S	N	S
1. /p/	h	w	p	b
2. /b/	b	p	b	b
3. /t/	t	r	t	d
4. /d/	d	t	d	d
5. /k/	k	x	k	g/x
6. /g/	g	k	g	g
7. /z/	z	ts	z	ts/z.

Apart from local variation of the realisation of consonants 5 and 7 following /N/ in the S dialect, we can correctly predict the values of consonants 1-7 for any speaker, and state whether he comes from south or north of Nkokongera, if we know how he realises any one of consonants 1-7 (not following /N/ where contrasts are neutralised in dialect S). We can state, for example, that for anyone who speaks dialect N, the English loan word "cabbage" will be realised as [kabiɟi] and for a dialect S speaker as [xapiçi].

No other parameter yields such an absolute criterion for distinguishing between the two main dialects. Two non-phonetic variants do however coincide to some extent with this division. Chart 2 shows the occurrence of the determiner preceding the classifier in nouns in isolation in classes 3, 4 and 6, as well as lexical variation in the words for "beans" and "earth". The word lists were constructed to show

phonetic variation. The variation in these common items is only recorded as an interesting corroboration of the general outline which the big consonant division suggests. Chart 2 also shows different phonetic realisations of the word for "skull" - this distribution coincides with that recorded for the realisation of the word for "bird" - [kaɲu:ɲu] in the north and [kaɲwi:ɲwi:] in the south ([kayu:ni] in gombololas numbered 24 and 25). These items are recorded here because they were each readily used by my informants to identify the speech of another area. These areas were generally gross north/south. No N dialect except Lufumbo uses the g-determiner of classes 3, 4 and 6 before consonant-initial stems in isolation. All S dialects and Lufumbo do. The word for "beans" suggests a three way division between a northern usage [waɲaṃbi], a central usage [naBudama]/[naButama] and a south usage [kamakaṇda]. The word for "earth" and the different realisations of "skull" and "bird" coincide with a general N/S division but predictably there is no clear line of demarcation.

Within each of the two major dialect areas there are consistent variations of phonetic realisation which serve as shibboleths between speakers of different areas. We might wish to call such areas of minor phonetic variation accent areas (cf. Abercrombie, 1956, for a useful distinction between dialect and accent). We shall turn now to consider such local variation as appeared in the word lists. (It may of course be that there are many other parameters of variation - tone is certainly one.) The variation which was commented on by local

people and which, alone, can correctly identify the accent area from which a speaker comes, within the area in which dialect S is spoken, can be summarised under four heads:

i) consonant 5, /k/ before front vowels in class 7 prefixes, and in stems,

ii) consonant 5, /k/ following a nasal prefix,

iii) consonant /j/ following a nasal prefix,

iv) consonants 1, 3 and 5, /p/, /t/ and /k/, as stem-initial consonant following a nasal prefix when the second stem-consonant is a nasal,

and in /u+mu+Ntu/ ("a person"), /ki+Ntu/ ("a thing").

5.1.2. Local Variation within dialect S

Chart 3 shows the main areas of phonetic variation within the southern dialect. On the basis of this variation we distinguish three main accent areas: a central area which we shall call Lusoba (gombolola area 17), a mountain area which we shall call Manjiya (the name of the administrative county) and a southern area which we shall call Lubutu (gombolola area 24). Lusoba is spoken in the following gombolola areas: 16, 17, 18, 21. The eastern ends of 16, 17 and 18 are up in the mountains, and, in 18 especially, Manjiya characteristics can be found. Manjiya is spoken in the four mountainous gombolola areas 11, 12, 13, 14. Lubutu is spoken in the administrative area called South Bugisu County which includes gombolola areas 19, 20, 22, 23, 24, 25.

In Table 2 the shibboleths which characterise the three accents are presented in three adjacent columns for ease

of reference. 1 c) which does not appear on chart 3, is added to show the realisation of /k/ before nonfront vowels in the three accents and 4 b) is added to show the realisation of /u+mu+Ntu/. /t/ represents the set of voiceless stops in 4 a).

Table 2.

		Lusoba	Manjiya	Lubutu	
1.a)	/ki+naga/	çinaka	çinaka	sinaka	"a pipe"
b)	/ku+kina/	xuçina	xuçina	XuXina	"to dance"
c)	/ku+kaBala/	xuxaBala	xuxaBala	XuXaBala	"to plough"
2.	/i+N+kaafu/	iŋga:fu	iŋa:fu	i:Xa:fu	"a cow"
3.	/i+N+ju/	tsi:tsu	tsiɲzu	tsiɲzu	"a houses"
4.a)	/i+N+temu	iɳdemu	iɲemu	iɳdemu	"a snake"
b)	/u+mu+Ntu/	umuɳdu	umuɲu	umuɳdu	"a person".

1. In Lusoba and Manjiya /k/ is realised as a palatal, fricative before all front vowels and as a velar fricative before all nonfront vowels. In Lubutu however /k/ is realised as a uvular fricative in all environments except when it occurs before /i/ in the class 7 prefixes. Then it is realised as [s]. In Lubutu the other velar consonants, /g/ and /ŋ/, are realised as slightly fronted velars by some speakers or as palatals. The realisation does not vary between stem and prefix. Thus we find a speaker from Bumbo, gombolola area 25 producing:

/li+si+gi/ [li:ci] "an egg"

/gi+mi+iBa/ [cimi:Ba] "sugar cane".

2. In order to show that the items selected as shibboleths really are the only ones which vary, after nasal prefixes, within accents of dialect S, Table 3 gives the various realisations of consonants 1-7, as well as the voiceless consonants /s/ and /f/ following nasal prefixes:

Table 3

	Lusoba	Manjiya	Lubutu	
1. /i+N+piso/	imbiso	imbiso	imbiso	"a needle"
2. /i+N+bululuka/	imbululuxa	imbululuxa	imbululuxa	"I fly"
3. /i+N+teBe/	indeBe	indeBe	indeBe	"a chair"
4. /i+N+da/	inda	inda	inda	"a louse"
5. /i+N+kele/	injele	inele	i:Xele	"a frog"
6. /i+N+gue/	iŋgwe	iŋgwe	iŋgwe	"a leopard"
7. /i+N+jofu/	i:tsofu	inzofu	inzofu	"an elephant"
/i+N+fula/	i:fula	i:fula	i:fula	"rain"
/i+N+sami/	i:sami	i:sami	i:sami	"a fly".

In all accents the nasal classifier is realised in the length of the vowel, before a voiceless fricative. In all accents all stops except 5 and 7 are regularly realised as voiced stops following the nasal prefix.

3. In all southern accents /z/ is realised as [ts] except in Manjiya and Lubutu when /z/ follows a nasal prefix. Then it is realised as [z].

4. a) In Lusoba and Lubutu the rule which voices a stop following a nasal prefix applies. As we saw in 3.3 in the discussion of the nasal prefix rule, part C, the Ganda law

which deletes the nasal prefix when stem-initial consonant is a voiced continuant and second stem-consonant is nasal, does not apply when the stem-initial consonant is a stop. In Manjiya however we have an example of the Ganda law applying when the stem-initial consonant is /t/, a stop. (It also applies to /p/ and /k/, see 5.2).

b) The only stem in the lexicon which we need to postulate as having an initial cluster NC is /Ntu/. This occurs as the stem of the word for "person", /u+mu+Ntu/, and as the stem for the word for "thing", /ki+Ntu/. (Whether these stems should in fact be classified as the same lexical entry is a question we need not go into here.) In all accents other than Manjiya the sequence NC obeys the laws governing the behaviour of the sequence: nasal prefix + stem-initial consonant. In Manjiya this stem obeys the law which governs nasal prefix + /t/ initial stem consonant + nasal second stem-consonant. (Reference to Table 3, item 3 will confirm the fact that normally /t/ initial stems following nasal prefixes do not undergo the Ganda Law if the second stem-consonant is not a nasal.)

5.1.3. Local variation within dialect N

Chart 4 shows the main areas of phonetic variation within the northern dialect. The northern dialect is much more homogeneous than the southern dialect. There are some minor variations which are not recorded on Chart 4 because they seemed to be idiosyncratic to specific words rather than generalisable differences. There is, for example, a tendency in gombolola areas 3, 4, 5, 8 and 9 to pronounce /Bi+lio/ as [Bidyo] "food" whereas areas 6, 7 and 10 tend to pronounce this

as [Bilyo]. (My original informant who came from area 5 regularly pronounced this as [Bilyo] however.) The variation shown on chart 4 indicates those items which were consistently mentioned to me as shibboleths identifying where a speaker came from. The fact that Lufumbo speakers use the /g-m-/ prefixes before all nouns in classes 3, 4 and 6 when they occur in isolation was also usually mentioned. On the basis of this variation three accent areas are identified: Lufumbo, spoken only in gombolola 10 (which includes the Bakonde people mentioned by Johnston), Luwalasi, spoken in gombolola areas 6 and 7, and Luhugu, spoken in areas 3, 4, 5, 8 and 9 (this includes the town of Dadiri mentioned by Tucker and Bryan).

i. in Lufumbo and Luhugu velar consonants /g,k,ŋ/ are fronted to palatals before front vowels and the stops are realised as palatal affricates. In Luwalasi the velar consonants are only very slightly fronted in this environment and they are not affricated. Luwalasi /k/ as in /ki+naga/ is pronounced as [k͡inaga] "a pipe", where the [k] has a very similar quality to the [k] of an English R.P. speaker pronouncing "key".

ii. In Luhugu /z/ is realised always as [z], and /j/ following a nasal prefix is realised as [z] when it occurs in noun stems, but as [j͡] when it occurs in verb stems (see discussion in 3.3. under P-rule iii, F.). The same rule applies to Lufumbo except that in the speech of some people where Luhugu has [z] they have [dz]. In Luwalasi the prefix to class 10 is regularly realised as [gi] - where the [g] is slightly fronted, not affricated (very much as in R.P. "geese"). Elsewhere in the vocabulary /z/ is usually realised as [j] by

older speakers, [z] by younger speakers. /j/, as a noun initial consonant following a nasal prefix is realised in the speech of some people as [z], as it is elsewhere in the northern dialect, but for the majority of people it is realised as [j], an affricated palatal stop, as it is in other northern accents before a verb initial stem. In the speech of some old people all sequences of /Nz/ occurring within stems are also realised as [ɲ̟j]. Thus we find /i+N+jaNza/ (following the analysis postulated for my Luhugu speaking informant) realised as [iɲ̟aɲ̟ja] "a lake".

iii. We have already seen in the main body of this description that, before voiceless stem-initial consonants, nasal prefixes are not realised as nasal consonants but as length added to the preceding determiner vowel. (In constructions where the determiner vowel is not realised the classifier is realised as [i] cf. 3.3. iii, i.) This rule, P-rule iii(a), applies not only to Luhugu but also to Luwalasi. Lufumbo however is unique among the accents of Lumasaaba in realising the nasal prefix as a syllabic nasal before voiceless stops and fricatives. Table 4 shows the realisation in Luhugu (and Luwalasi) and Lufumbo of the items listed for the southern accents in Table 3.

Table 4.

		Luhugu	Lufumbo
1.	/i+N+piso	i:piso	impiso
2.	/i+N+bululuka/	imbululuka	imbululuka
3.	/i+N+teBe/	i:teBe	inteBe
4.	/i+N+da/	inda	inda
5.	/i+N+kele/	i:cele	incele
6.	/i+N+gue/	iŋgwe	iŋgwe
7.	/i+N+jofu/	inzofu	indzofu
	/i+N+fula/	i:fula	imfula
	/i+N+sami/	i:sami	insami

Lufumbo also realises /u+mu+Ntu/ as [umuntu] "a person" whereas the other northern accents realise this as [umu:tu].

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5.2. The relationship between the dialects

In 5.1. I discussed the striking phonetic variation which exists between the six dialects. In the present section I hope to show that these dialects can be very simply related within a general statement of Common Lumasaaba phonology. During the discussion I shall make several simplifying assumptions. I shall assume that each dialect is homogeneous and that the characteristics by which I identify each dialect obtain throughout the dialect area. I shall further assume that those features which occur regularly in the word lists of a given dialect constitute the common core of the dialect and that features which do not occur regularly can be omitted from the statement of the common core.

The entries in the Common Lumasaaba lexicon are identical to the entries in the Luhugu lexicon (with two minor exceptions which will be stated in the course of the discussion). The Positive Conditions and the redundancy rules are identical to those which apply in Luhugu. The same set of P-rules applies in Common Lumasaaba but three more P-rules are added to the set, in order to account for the realisation in southern dialects. A special southern traffic rule scans the output of the redundancy rules and marks any matrices containing [p, t, k, b, d, g, z] to enter the southern P-rules. Nine P-rules are needed altogether (four of these are the sub-parts of the Nasal Prefix rule, P-rule iii, now separately stated). Not all P-rules apply

to all dialects. The correct phonetic realisation for each dialect is achieved by specifying which of the P-rules apply in a given dialect, and in what order they apply.

It will often happen that matrices emerge from the redundancy rules correctly specified for the northern dialects, with no need to enter the P-rules. This will happen much more rarely in the case of the Southern dialects because of the requirement that all matrices containing stops should be submitted to the southern P-rules. It is not suggested that the model of Common Lumasaaba phonology outlined here bears any relation to the process of language acquisition or production for any speaker of any dialect of Lumasaaba. Such a suggestion would be especially intolerable in the case of speakers of southern dialects, since southern dialects are being explicitly derived from (and thus compared with) the output of redundancy rules especially designed to yield a correct specification for northern dialects. (The propriety of deriving southern forms from a northern form in this manner is discussed in 5.2.2.)

Table 5 illustrates the data that the rules in 5.2.2. will account for:

Table 5

	Luhugu	Luwalasi	Lufumbo	Lusoba	Manjiya	Lubutu
1. /p/	y,h,w	y,h,w	y,h,w,	y,w	y,w	y,w
2. /b/	b	b	b	p	p	p
3. /t/	t	t	t	r	r	r
4. /d/	d	d	d	t	t	t
5. /ka/	k	k	k	x	x	X
6. /ga/	g	g	g	k	k	k
7. /z/	z	z	z	ts	ts	ts
8. /Np/	ip	ip	mp	mb	m/mb	mb
9. /Nb/	mb	mb	mb	mb	mb	mb
10./Nt/	it	it	nt	nd	n/nd	nd
11./Nd/	nd	nd	nd	nd	nd	nd
12./Nk/	ik	ik	ŋk	ŋg	ŋ	iX
13./Ng/	ŋg	ŋg	ŋg	ŋg	ŋg	ŋg
14./Nj/	nz	ɲj	nz	its	nz	nz
15./Nf/	if	if	mf	if	if	if
16./Ns/	is	is	ns	is	is	is
17./NB/	mb/m	mb/m	mb/m	mb/m	mb/m	mb/m
18./Nl/	nd/n	nd/n	nd/n	nd/n	nd/n	nd/n
19./Nn/	n	n	n	n	n	n
20./ki/stem	c	k	c	ʧ	ʧ	X
21./ki/prefix	c	k	c	ʧ	ʧ	s

Where an alternative realisation is given, the alternative is due to the operation of the Ganda Law (i.e. the

sequence nasal + voiced continuant will be realised as nasal + stop, except when the second stem-consonant is nasal, in which case the continuant is deleted.)

5.2.1. General phonological rules

The P-rules are briefly stated here. They are not discussed or exemplified in any detail at this point. The effect of the application of these rules will be discussed in the context of each separate dialect.

1. P-rule i, which forbids sequences of two syllabic vowels, applies to all dialects. It is not further discussed in this section.

2. P-rule iv, which specifies the realisation of class 5 classifier /si/, applies in all northern dialects but not in southern dialects. The lexical entry of this prefix must be /li/ in southern dialects, yielding e.g. [lilyu:lu] "a nose" (from /li+li+ulu/). In the speech of many southern speakers determiner /li/ is not realised when a consonant-initial noun occurs in isolation, simply the classifier /li/, with a short vowel, as in [lifuluma] "a cave". Some speakers however produce a form with a lengthened vowel [li:fuluma]. For these speakers a modified form of P-rule iv will be needed:

$$\text{SC}\quad 1\ 2 \longrightarrow \emptyset\ 2\ /\ \underline{\qquad}\ [+\text{cons}]$$

$$\text{SD}\quad \begin{bmatrix} +\text{cons} \\ +\text{apical} \\ +\text{voice} \\ -\text{stop} \end{bmatrix}\ [-\text{cons}]$$

where SD describes a classifier

This rule deletes the initial consonant of classifier /li/ before consonant-initial stems, leaving the sequence [lii]. This is realised by the procedure described in 3.3. under P-rule iv. This rule does not apply universally for all speakers of southern dialects and therefore the characteristic described here does not constitute a shibboleth. For this reason, and because the ordering of this rule with respect to the remainder of the P-rules is arbitrary, P-rule iv will not be mentioned again in this section.

3. South Weakening rule

Expressed in its most general form the South Weakening rule looks like this:

$$\begin{bmatrix} -\text{voice} \\ +\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{voice} \\ -\text{stop} \end{bmatrix}$$

In this form it applies to [p], [t] and [k] in all southern dialects. It does however need modification in order to express the fact that, in southern dialects, /p/ is realised as [y] before front vowels and [w] before nonfront vowels. It is necessary to order the sub-rule which applies to [p] alone, before the more general rule:

a) $$\begin{bmatrix} -\text{lingual} \\ -\text{voice} \\ +\text{stop} \\ \langle -\text{front} \rangle \\ -\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{lingual} \\ +\text{voice} \\ -\text{stop} \\ -\text{low} \\ \langle +\text{round} \rangle \end{bmatrix}$$

b) $$\begin{bmatrix} -\text{voice} \\ +\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{voice} \\ -\text{stop} \end{bmatrix}$$

Sub-rule a) changes [p] to a consonantal glide. This rule closely resembles the Luhugu rule, P-rule ii, which changes [p] to a consonantal glide when not following a nasal. In

the present case the rule is context free. The angled brackets indicate that where [p] has received the values [-front, -round] from the following vowel (by the operation of redundancy rule 32) the [-round] value is changed to [+round]. This means that when [p] is followed by [a], it will be changed to [w]. (In northern dialects [p] followed by [a] is changed to [h], see P-rule ii.) In all cases when [p] is not followed by [a], the front or round value for the consonantal glide will have been specified by redundancy rule 32. Sub-rule a) supplies the value [-low]. (This part of the sub-rule will operate vacuously where [-low] is already specified.) This sub-rule produces [y] before [i,e] and [w] before [a, o, u].

Sub-rule b) operates on the remaining voiceless stops, [t] and [k]. (This sub-rule has no counterpart in the northern dialects.) It specifies [t] as a voiced non-stop. In matrices where no further mutation occurs, [t] will be phonetically specified in all southern dialects as a voiced alveolar tap. In all southern dialects the South Velar Devoicing rule will further mutate the voiced velar nonstop produced by this rule.

4. This rule, and the next three rules, are all rules which we have already encountered, in very much their present form, as sub-rules of the Nasal Prefix rule (see P-rule iii). These sub-rules are now discussed as separate rules since we shall see that, reordered with respect to each other, they have a different effect in different dialects.

Ganda Law

$$\left\{\left\langle\begin{bmatrix}+\text{voice}\\-\text{stop}\end{bmatrix}\right\rangle \quad [+\text{nasal}]\right\} \longrightarrow \phi \;/\; N \_\_\_\_ \langle VN\rangle^{1}$$

The Ganda Law is, properly, only that part of the rule stated within angled brackets. We state the nasal-deletion rule with it, as we did in P-rule iii. The nasal deletion rule operates similarly in all dialects and does not involve questions of ordering so we shall not discuss it further.

The Ganda Law will apply to delete [B,l,y] in the environment N___VN in all dialects, and to delete the output of the South Weakening rule if the South Weakening rule is ordered before the Ganda Law.

5. Hardening

$$\begin{bmatrix}+\text{voice}\\-\text{stop}\end{bmatrix} \longrightarrow [+\text{stop}] \;/ N \_\_\_\_$$

This rule applies to [B,l,y] in all dialects (except when the Ganda Law applies) to realise them as [b], [d], [j] following a nasal. It will also apply to the output of the South Weakening rule.

6. Nasal Prefix Conversion

$$/N/ \longrightarrow [i] \;/\; \_\_\_\_ [-\text{voice}]$$

This rule applies to the nasal prefix when it occurs before a voiceless stem-initial consonant. In northern dialects it will apply before [p,t,k,f,s]. In southern

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1. Where possible in the formulation of rules, and in discussion, throughout this section the abbreviatory conventions V and N are used to represent [-cons] and [+cons, +nasal] respectively.

dialects it will apply to [f,s] and whatever consonants are specified as voiceless after the application of the South Weakening rule.

7. Noun [j] fronting

$$[\text{ɲ}\!\!\not{\text{j}}] \longrightarrow [\text{ɲz}] \;/\; \underline{\qquad}_{\text{noun}}$$

This rule applies in all accents except Luwalasi to front the sequence palatal nasal + palatal stop to alveolar, when [ɟ] is initial in a noun stem. (This rule combines sub-rules c) and d) in P-rule iii.)

8. South Devoicing

This rule applies only in southern dialects.

$$[+\text{stop}] \longrightarrow [-\text{voice}] \;/\; \text{V/++} \;\underline{\qquad}$$

This rule will devoice any stop not following /N/. It will devoice [b,d,g,z].

9. South Velar Devoicing

$$\begin{bmatrix} +\text{cons} \\ +\text{ling} \\ -\text{apical} \\ -\text{cont} \\ -\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{voice} \\ +\text{cont} \end{bmatrix}$$

This rule only applies in southern dialects. It accounts for the behaviour of /k/ in different southern dialects.

Northern dialects

We will only briefly discuss the northern dialects since the north is relatively homogeneous and the Luhugu dialect has already been fully discussed in 3.

The P-rules required for the three northern dialects

(apart from P-rules i and iv) are the following:

Luhugu	Luwalasi	Lufumbo
[p] Weakening	[p] Weakening	[p] Weakening
Nasal Prefix Conversion	Nasal Prefix Conversion	Ganda Law
Ganda Law	Ganda Law	Hardening
Hardening	Hardening	Noun [j] Fronting
Noun [j] Fronting		

The [p] Weakening rule is regarded as essentially similar to sub-rule a) of the South Weakening rule. The difference here is that in northern dialects the Weakening rule is context restricted - it does not apply to [p] following a nasal prefix.

In order to compare the northern and southern dialects more directly we must abandon the heuristic device of marking the lexical entry of matrices containing /p/ to enter the P-rules, and formulate a traffic rule which sends /p/ into the P-rules:

If $\begin{bmatrix} +\text{cons} \\ -\text{lingual} \\ -\text{voice} \\ +\text{stop} \end{bmatrix}$

$\Downarrow$

Then [+P-rules].

This traffic rule states that any matrix containing [p] must enter the P-rules. The structural description and environment stated in each sub-rule of each P-rule will ensure that the correct operation of mutation takes place. The traffic rule for the south will be much more general:

If $\begin{bmatrix} +\text{cons} \\ +\text{stop} \\ -\text{nasal} \end{bmatrix}$

$\Downarrow$

Then [+P-rules].

Later on we shall discuss the effect of this in each southern dialect.

The Nasal Prefix Conversion rule operates in Luhugu and Luwalasi but not in Lufumbo. Redundancy rule 3, the traffic rule which marks the sequence nasal + voiceless consonant, to enter the Nasal Prefix Rule, will not apply in Lufumbo. Redundancy rule 2 will operate on stem-medial clusters, and the lexical entry will specify a value for the features voice and continuant for consonants in stem-initial position, as they do in Luhugu. The only difference between Luhugu and Lufumbo is that a traffic rule (redundancy rule 3) and a P-rule (Nasal Prefix Conversion) apply in Luhugu but not in Lufumbo. The effect of this difference may be seen by considering matrix 3, in 3.6. In Lufumbo [impusu] emerges from the redundancy rules with only the feature [+P-rule ii] added to it. Once this feature has been deleted the specification for the Lufumbo form is complete.

The Noun [ɟ] Fronting rule applies in Luhugu and Lufumbo but not in Luwalasi. Luwalasi is also remarkable for the fact that /k/ and /g/ are not fronted to palatal affricates before front vowels, as they are in Luhugu and Lufumbo, and that /z/ is realised as [g]. Luwalasi appears to be particularly resistant to fronting of any kind.

Redundancy rule 32, which adds the features of vowels to preceding consonants, will need a special interpretation in Luwalasi when consonants precede front vowels. (Velar consonants are very slightly fronted - about as much as in English "key", "geese", - before front vowels.) If we can

demonstrate that the absence of [z] in Luwalasi is caused because certain fronting rules have failed to apply, we can show that all the variations by which Luwalasi differs from Luhugu are due to the same cause - the resistance to fronting rules in Luwalasi.

[z] occurs in Luhugu (and Lufumbo) in three environments:

a) initially in class 10 determiner /zi/, as [zi]

b) realising /N+j/ in noun stems, as [nz] e.g. [inzu] "a house".

c) initially and medially in stems, e.g. [umuyazi] "a madman".

In all these cases Luwalasi has a slightly fronted [g] or [ǰ]:

a) [gi]

b) [inǰu]

c) [umuyaǰi]. (Usage in Buwalasi in the case of c) varies a good deal. Old men produce the form cited here but younger, more mobile, people, tend to produce [z]. See discussion in 5.3.)

The most plausible explanation of these variants is that [z] derives historically from a back consonant which has undergone a series of fronting rules in all dialects except Luwalasi. (Guthrie's topogram of reflexes of *ja suggests that fronting is a very common process in Bantu (1968:77).) We may postulate that the following rules applied historically in all dialects except Luwalasi:

a) If $\begin{bmatrix} +\text{cons} \\ +\text{velar} \end{bmatrix} \begin{bmatrix} -\text{cons} \\ +\text{front} \end{bmatrix}$
X
⇓
Then [+front]

a) is exactly like the productive redundancy rule 32 in Luhugu, and has the same effect: a velar consonant is fronted to a palatal affricate before a front vowel. X indicates a velar consonant that is different from /g/.

b) If $\begin{bmatrix}+\text{cons}\\+\text{velar}\\+\text{front}\end{bmatrix}$ $\begin{bmatrix}-\text{cons}\\+\text{front}\end{bmatrix}$

Then $\Downarrow$ [+front ii].

This appears to be a quite unmotivated rule, from the point of view of synchronic phonological processes at least. It is possible that the second fronting process occurred as a push-chain reaction, to distinguish fronted X from fronted /g/. The result of the second fronting realises palatal affricate [ǰ] as alveolar affricate [dz]. ([dz] occurs sometimes in Lufumbo as a variant of [z], thus [indzu] "a house". The voiceless counterpart of [z] in Southern dialects is [ts]).

If this very tentative outline of possible historical fronting rules is accepted, we may account for all the phonetic differences between Luwalasi and Luhugu by postulating a meta-rule, which has governed Luwalasi phonology, and restricted the operating of fronting rules. The fact that the Noun [ǰ] fronting rule does not apply in Luwalasi, would be predicted by such a rule.

In a synchronic description of Luwalasi, the most straightforward course is to state that /z/ must be represented in the lexical entry as /g/ in the class 10 determiner, and as a palatal affricate, /ǰ/ elsewhere. The palatal affricate will be specified as [+continuant, +stop], like /z/ in Luhugu. Redundancy rule 14 must be modified so that it specifies

[+cont, +stop] as [-apical]. Redundancy rule 17 which states that /j/ is redundantly [+front] will also apply, unmodified, to /j̈/. These adjustments will allow the correct realisation of the following examples:

/zi+N+da/ : Luwalasi entry /gi+N+da/, [g̈inda] "lice",

/ku+suaza/ : Luwalasi entry /ku+suaj̈a/ [kuswa:j̈a] "to humiliate".

The rules of the phonetic realisation must state that in Luwalasi a velar consonant followed by a front vowel is minimally fronted, yielding:

/ki+gugu/ [k̟igugu] "an insect" (compare Luhugu [cigugu])

/li+si+legelo/ [li:leg̟elo] "a school"

(compare Luhugu [li:lej̈elo]).

The phrase "minimal fronting" is certainly open to the sort of objection which confronts any discussion of "extrinsic" and "intrinsic" allophones (cf. Ladefoged, 1965). In the present context it may be interpreted as meaning "a certain adjustment of the articulation of the velar consonant towards the front vowel, but much less than occurs in any other northern dialect".

The following matrix illustrates the process of realisation in Luwalasi of the item /zi+N+jaNza/:

Example of realisation in Luwalasi

Luwalasi lexical entry /gi+N+jaNja/

g	i	N	j	a	N	j	a
+cons	-cons	+cons	+cons	-cons	+cons	+cons	-cons
+ling	+front		+ling	-front		+cont	-front
-apic	-low		-apic	-round		+stop	-round
+voice			+cont				
-cont							
-nasal							
+stop	-round	+ling	-nasal	+low	+ling	+ling	+low
13	18	-apic	10	20	-apic	-apic	20
+Priii	+ling	+nasal	-stop	+ling	+nasal	+voice	+ling
4	-apic	1	15	-apic	1	14	-apic
	+voice	+voice	+voice	+voice	+voice	-nasal	+voice
	-cont	-cont	+front	-cont	-cont	10	-cont
	-stop	12	17	-stop	12	+front	-stop
	21	+stop	+Priii	21	+stop	17	21
	+Priii	13	4	+Priii	13	+Priii	+Priii
	4	+front		4	+front	4	4
		17			17		
		+Priii			+Priii		
		4			4		
-syll	+syll	+syll	-syll	+syll	+syll	-syll	+syll
22	24	23	22	24	23	22	24
+front	-nasal	-round	-round	-nasal	-round	-round	-nasal
-round	33	+low	+low	33	+low	+low	33
-low		32	32		32	32	
32							

[ginyanja
+Priii]

The first P-rule this matrix can enter is the Ganda Law. This rule deletes [y].

[ginanja] "the lakes".

/g/ is realised as a very slightly fronted [g̟]. The Ganda Law operates to delete a voiced continuant in the environment N__VN. Redundancy rule 17 specifies both sequences of nasal + consonant as [+front]. This specification

cannot be altered by the later application of redundancy rule 32.

Southern Dialects

The southern dialects must be discussed in more detail as there is much more phonetic variation among the southern dialects than there is in the north.

In all southern dialects the special south traffic rule

If $\begin{bmatrix} +\text{stop} \\ -\text{nasal} \end{bmatrix}$

$\Downarrow$

Then [+P-rules] must apply.

Manjiya

The first three rules in Manjiya must be ordered. The next four may apply in any order. (Ordering of rules is discussed in 5.2.2.)

South Weakening rule

Ganda Law

Hardening

Nasal Prefix Conversion

Noun [j] Fronting

South Devoicing

South Velar Devoicing.

The first rule to apply is the Weakening rule. The effect of the Weakening rule is to change the set of voiceless stops into a set of voiced nonstops. The value for the feature continuant is left unchanged, in order to distinguish the newly created set of voiced nonstops from the set [B,l,y].

The next rule which can apply is the Ganda Law. This

will operate on any matrix containing a voiced non-stop in the environment N__VN. It will operate both on the series [B,l,y] and on the new series created by the Weakening rule. The Ganda Law has a wider application in Manjiya than in any other dialect. Let us consider the effect of the Ganda Law on the new series of consonants in the stated environment:

/i+N+pima/ [iɱima] "a hyena"

/i+N+temu/ [iɳemu] "a snake"

/i+N+kuNbo/ [iŋumbo] "an elbow".

In each case the stem-initial consonant is deleted.

The rule is further expanded in Manjiya by the addition of a sub-rule which states that any stem-initial $^{*}/k/^{1}$ is deleted after N:

$$\begin{bmatrix} +\text{lingual} \\ -\text{apic} \\ -\text{cont} \\ -\text{stop} \end{bmatrix} \longrightarrow \emptyset \ / \ N \ \_\_\_\_$$

This rule states that the velar consonant created by the Weakening rule is deleted after N. The effect of this is to produce in Manjiya, but in no other dialect, forms like these:

/i+N+kaafu/ [iŋa:fu] "a cow"

/i+N+kele/ [iɳele] "a frog".

In these examples the correct specification for the nasal is assigned by redundancy rule 1, and redundancy rule 32 specifies

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1. In order to avoid introducing a new set of symbols to represent the segments produced by the operation of the Weakening rule, symbols in slant brackets are used in the discussion, as $^{*}/k/$ is here. Slant brackets normally enclose an element which has not undergone mutation. In the present case $^{*}/k/$ has just undergone a mutation rule (the Weakening rule) which has changed it to a segment which could be represented as [ɣ], a segment which does not occur in the phonetic realisaion. In order to avoid the use of such transitional symbols we continue to refer back to the underlying element from which the mutated segment derives. The asterisk indicates that the element has undergone mutation.

assimilatory values.

It is possible that the rule deleting *[k] in this environment should be expressed separately, rather than subsumed under the general heading of the Ganda Law. Whereas the Ganda Law is a widespread phenomenon among East African Bantu languages, it is not elsewhere, to my knowledge, extended in this particular way.

The next rule to operate is the Hardening rule. This rule will operate on matrices marked to enter P-rule iii by redundancy rule 4. Redundancy rule 4 was specially framed for Luhugu to capture [l,B,y] but exclude [z]. Since all southern matrices containing stops must enter the P-rules we will reformulate redundancy rule 4 by deleting the feature [+cont]. Rule 4 will now mark any sequence N+[-cons, -stop] to enter P-rule iii. It will now mark not only [B,l,y] but also [z], as well as the products of the Weakening rule. The Hardening rule will operate vacuously on [z] which is already specified as a stop. In the other cases it will change the [-stop] specification to [+stop]. The operation of the Hardening rule yields:

a) /zi+N+Bafu/ [zimbafu] "ribs"

b) /i+N+lulu/ [indulu] "an alarm"

c) /i+N+jodelesa/ [injodelesa] "I compose"

d) /i+N+pakasa/ [imbakasa] "I trade"

e) /i+N+taala/ [inda:la] "a lamp"

The first three examples are realised as in northern dialects. The last two examples are unfamiliar forms. The effect of the Weakening rule was to voice *[p,t] and to change the stop

value to [-stop]. The Hardening rule operates to change these voiced non-stops created by the Weakening rule, into stops after nasals. Whereas in the northern dialects there is neutralisation between underlying voiced continuants and voiced stops after the nasal prefix, in Manjiya there is neutralisation between underlying voiceless stops as well as underlying voiced stops and continuants in this environment.

The Nasal Prefix Conversion rule changes a nasal consonant to [i] before all voiceless consonants. The only voiceless consonants in Manjiya at this stage are [f] and [s]. Thus while the form of the rule is exactly like that of sub-rule A in P-rule iii, it can only apply to two consonants. (In Luhugu and Luwalasi it applies to [p,t,k] as well).

So far we have considered the South Weakening rule and three of the sub-rules of P-rule iii. The last sub-rule of P-rule iii is the Noun [j] Fronting rule. This rule fronts the sequence nasal +[j], where [j] is initial in a noun stem, to [nz] (sometimes [ndz])as in /i+N+jila/ - [inzila] "a path".

The South Devoicing rule must apply to all matrices containing stops. It operates on all stops which do not immediately follow a nasal. It applies to [b,d,g,z] and changes the voicing value to [-voice] in each case, yielding the set of voiceless stops [p,t,k,ts]:

/ma+bosu/	[maposu]	"prison"
/li+si+duku/	[li:tuxu]	"a harp"
/mu+gaNgo/	[mukaŋgo]	"a cooking spoon"
/ki+zo/	[çitso]	"a skull".

(The decision to characterise /z/ with the functional value [+stop] (see discussion in 2.2.11) is justified by the fact that /z/ undergoes all rules which apply to stops, and functions, in all respects, exactly like the other members of the set of voiced stops.)

The last rule is the South Velar Devoicing rule which devoices the velar member of the set **/p,t,k/*. It would have been possible to modify the expression of the Weakening rule so that the velar member of the set is never voiced. This would not only complicate the expression of the Weakening rule but also that of the Ganda Law. As it is the rules are stated in their maximally general form. This reveals the fact that **/k/* in Manjiya functions like a voiced consonant, in that it undergoes the Ganda Law, and not like the voiceless consonants [f] and [s] which the Nasal Prefix Conversion rule applies to.

The effect of the South Velar Devoicing rule is to characterise **/k/* as [-voice, +cont]. **/k/* is realised as a voiceless velar fricative [x], (or, fronted, as [ç]):

/ka+tiNba/ [xarimba] "a mosquito net"

/ki+sanika/ [çisanixa] "a cover".

The following matrix shows the process of realisation of the matrix /i+N+kokolo/.

The realisation of /i+N+kokolo/ in Manjiya

i	N	k	o	k	o	l	o
-cons +front -low	+cons	+cons +ling -apic -voice	-cons +round +low	+cons +ling -apic -voice	-cons +round +low	+cons +apic +voice -stop	-cons +round +low
-round 18	+ling -apic	-nasal 11	-front 19	-nasal 11	-front 19	+ling 9	-front 19
+ling -apic +voice -cont -stop 21 +Priii 3	+nasal 1 +voice -cont 12 +stop 13 +Priii 3	-cont 16 +stop 13 +Priii 3	+ling -apic +voice -cont -stop 21 +Priii 3	-cont 16 +stop 13 +Priii 3	+ling -apic +voice -cont -stop 21 +Priii 3	+cont 15,a -nasal 10 +Priii 3	+ling -apic +voice -cont -stop 21 +Priii 3
+syll 24	+syll 23	-syll 22	+syll 24	-syll 22	+syll 24	-syll 22	+syll 24
-nasal 33	-front +round +low 32	-front +round +low 32	-nasal 33	-front +round +low 32	-nasal 33	-front +round +low 32	-nasal 33

[iŋkokolo
+P-rule iii]

South Weakening rule

+voice
-stop

+voice
-stop

Ganda Law, Manjiya sub-rule

∅

South Velar Devoicing

-voice
+cont

[iŋoxolo] "a boat"

This matrix illustrates the application of the special Manjiya sub-rule of the Ganda Law which deletes *k following a nasal prefix. It also illustrates the application of the relevant South rules which realise /k/ as [x].

Lubutu

The correct realisation for Lubutu is obtained by ordering the P-rules thus:

Ganda Law

South Weakening

South Velar Devoicing

Hardening

Nasal Prefix conversion

South Devoicing

Noun [j] Fronting.

The Ganda Law is ordered before the Weakening rule. The effect of this is that the Ganda Law only applies to the set of voiced non-stops [B,l,y] - the Ganda Law operates in Lubutu as it does in all dialects except Manjiya.

The Weakening rule operates on all matrices and converts the voiceless stops [p,t,k] into voiced nonstops. As in Manjiya the value [-cont] is left unchanged in order to distinguish the just-produced set from the set [B,l,y]. The same realisation of /p/ as [y] and [w], and of /t/ as [r] will be specified in the phonetic realisation, as in Manjiya.

The South Velar Devoicing rule immediately operates to change the just-voiced velar (*/k/) back into a voiceless consonant. It is certainly arguable here that */k/ should have been excluded from the operation of the Weakening rule. The decision to present the rules in this way is made in order that the form of the Weakening rule and the Velar Devoicing rule may be the same for all dialects, so that the importance of their ordering with respect to each other and to the other

P-rules may be made clear. */k/ must be voiceless when the remaining rules apply, as it behaves in all rules like a voiceless consonant. The phonetic realisation rules must specify the realisation of /k/ as a strongly fricative uvular consonant, which is only very slightly fronted before front vowels:

/lu+seke/ [luseXe] "a drinking tube" (compare Lusoba [luseʒe]).

/Ba+ganiki/ [BakaniXi] "talkers" (compare Lusoba [Bakaniʒi]).

One feature of the phonetic realisation which is peculiar to Lubutu (though it also occurs in the speech of some Manjiya speakers) is the realisation of the class 7 prefixes as [si], thus:

/ki+lomo/ [silomo] "a word" (compare Lusoba [ʒilomo]

/ki+ki+alilo/ [sisa:lilo] "a plant" (compare Lusoba [ʒiʒa:lilo]).

It seems possible that [s] should be considered to derive from the sort of double fronting process which we discussed with reference to [g] in Luwalasi and [z] in other northern dialects. This would account for the fact that no y-glide follows [s] before a vowel-initial stem; [sisa:ma] "a piece of metal". This is exactly like the behaviour of fronted velars in other accents, where P-rule i deletes [y] following a velar consonant. In a synchronic account of Lubutu the simplest analysis would be to specify the class 7 prefixes as /si/ and add a traffic rule to mark any sequence class 7 prefix, /si/ +V to enter P-rule i.

When the South Velar Devoicing rule has applied, the set of voiceless consonants in Lubutu is [f,s,X].

The Hardening rule applies next to any matrix containing the sequence nasal + voiced nonstop. This rule applies to [B,l,y], as it does in all other dialects, and to the labial and alveolar voiced nonstops created by the operation of the Weakening rule. It cannot apply to *[k] because the South Velar Devoicing rule has already specified *[k] as [-voice] ([X]). The effect of this rule on *[p] and *[t] is precisely the same as it was in Manjiya:

/i+N+piso/ [imbiso] "a needle"

/i+N+tusi/ [indusi] "a flea".

The Hardening rule also applies to those matrices where the stem-initial consonant is *[p,t,ʃ] which were operated on by the Ganda Law in Manjiya. Compare the following forms with those found in Manjiya:

/i+N+pima/ [imbima] "a hyena"

/i+N+temu/ [indemu] "a snake".

The Nasal Prefix Conversion rule operates to change a nasal consonant into [i] before the set of voiceless consonants [f,s,X], yielding:

/i+N+fila/ [i:fila] "a worm"

/i+N+sua/ [i:swa] "an ant"

/i+N+kufa/ [i:Xufa] "a navel".

The South Devoicing rule and the Noun [ɟ] Fronting rule apply exactly as in Manjiya.

The main differences between the phonetic realisation of Manjiya and of Lubutu can be attributed to the different

ordering of the application of the Ganda Law, the Weakening rule and the South Velar Devoicing rule. In Manjiya, the Ganda Law applies to the output of the Weakening rule, but in Lubutu it does not. In Manjiya */k/ functions like a voiced consonant, in that the Ganda Law applies to it, and it is only realised as a voiceless phonetic consonant after the application of all the other relevant rules. In Lubutu */k/ functions like a voiceless consonant. The Hardening rule does not apply but the Nasal Prefix Conversion rule does.

We will now compare the realisation of the Matrix /i+N+kokolo/ in Manjiya and Lubutu. The Lubutu realisation begins with the output from the redundancy rules - at this stage the derivation is identical with that stated for Manjiya:

[iŋkokolo, +Pruleiii]

i N k o k o l o

South Weakening voices and unstops [k]

+voice
-stop

+voice
-stop

South Velar Devoicing devoices */k/

-voice
+cont

-voice
+cont

Nasal Prefix Conversion changes nasal to [i]

-cons
+front
-low

Redundancy rules complete specification of [ii].

[i:χoχolo] "a boat"

Lusoba

Lusoba resembles Lubutu in that the Ganda Law does not apply to the output of the Weakening rule, and it resembles Manjiya in that *[k] functions throughout the rules like a voiced consonant (exactly like *[p] and *[t]) and is only made voiceless when the other relevant P-rules have operated. It differs from both the other dialects, in that [z] functions like a voiceless consonant in Lusoba. In order to achieve the correct realisation the rules must be ordered like this:

Ganda Law

South Weakening

Hardening

Noun [j] Fronting

South Devoicing

Nasal Prefix Conversion

South Velar Devoicing.

The first two rules operate as they do in Lubutu - the Ganda Law applies only to the set [B,l,y].

The Hardening rule hardens [B,l,y] and *[p,t,k,] to stops when they follow a nasal prefix. Lusoba is the only dialect which realises the sequence nasal + *[k] as [ŋg] - in Manjiya the extended Ganda Law applies to this matrix, and in Lubutu *[k] functions like a voiceless consonant:

	Lusoba	Lubutu	Manjiya	
/i+N+kimiŋiu/	[iɲɟimiɲu]	[i:Ximiɲu]	[iɲimiɲu]	"a snail"
/i+N+kani/	[iŋgani]	[i:Xani]	[iŋani]	"an arrow".

The next rule to apply is the Noun [j] Fronting rule.

This has the effect of fronting any sequence nasal + [j̈], where [j̈] is initial consonant in a noun stem, to [nz].

The South Devoicing rule now applies to devoice the set of voiced stops [b,d,g,z] when they do not immediately follow a nasal. So far the rule operates exactly as in the other dialects. A special sub-rule is needed for Lusoba:

$$\begin{bmatrix} +\text{cont} \\ +\text{stop} \end{bmatrix} \longrightarrow [-\text{voice}]$$

This is a context-free rule which devoices [z] in any environment, including the environment when it is preceded by a nasal. The operation of this rule produces matrices containing the sequence [nts]. Let us examine the derivation in Lusoba of a simple, familiar matrix /i+N+ju/. It emerges from the redundancy rules specified as

$$\begin{bmatrix} \text{inju} \\ +\text{Pruleiii} \end{bmatrix}$$

It will enter two sub-rules of P-rule iii. First that which converts the sequence nasal + continuant into nasal + stop (now called the Hardening rule), then that which fronts the sequence nasal + [j̈] (now called the Noun [j̈] Fronting rule). The Hardening rule produces the form [inj̈u], which is then fronted to [inzu] by the Noun [j̈] Fronting rule. The South Devoicing rule, with its special Lusoba sub-rule, devoices [z] yielding [intsu]. Redundancy rule 3 will mark this matrix (containing nasal + voiceless consonant) to enter P-rule iii. This time it will enter the Nasal Prefix Conversion rule. The Nasal Prefix Conversion rule operates in matrices containing the sequence nasal + [f,s,ts], yielding:

/zi+N+fa/ [zi:fa] "cracks"

/i+N+siNda/ [i:sinda] "an egg yolk"

/i+N+jofu/ [i:tsofu] "an elephant"

/i+N+ju/ [i:tsu] "a house".

The last rule to apply is the South Velar Devoicing rule which devoices */k/ yielding [x] or [ç] as in:

/Bu+kuna/ [Buxuna] "nakedness"

/ki+simita/ [çisimita] "a knife".

Rule Order

It was claimed in 5.2.1. that the variation in phonetic realisation of the different dialects of Lumasaaba, can be largely accounted for by the omission or re-ordering of certain of the P-rules. Variation in the north was shown to be largely due to the omission of the Nasal Prefix Conversion rule in Lufumbo and to the omission of the Noun [j] Fronting rule in Luwalasi. The variation between north and south can be attributed to the effect of the South Weakening rule, the South Devoicing rule and the South Velar Devoicing rule - rules which do not apply in the north.

All dialects require the following ordering:

Ganda Law

Hardening

Noun [j] Fronting.

The Ganda Law must always precede the Hardening rule so that it may operate on voiced continuants before the Hardening rule changes them into stops. The Hardening rule must precede the Noun [j] Fronting rule in order that [j] should be specified as a stop.

All southern dialects also require the following ordering:

South Weakening
Hardening
South Devoicing.

South Weakening must precede Hardening in order that the Hardening rule structural description [+voice, -stop] applies to */p/, */t/ (and */k/ in Lusoba) to make them into voiced stops following a nasal. The Weakening rule must precede the Devoicing rule in order that the Weakening rule should only operate on [p,t,k] derived from /p,t,k/ and not on [p,t,k] derived from /b,d,g/. No ordering is required between the Hardening and Devoicing rules.

Variation between the southern dialects can be accounted for by further demands on ordering. The table shows the rules which each dialect requires to be ordered with respect to each other: the general requirements already mentioned are assumed, not demonstrated.

<u>Lusoba</u>

1 Ganda Law
1 South Weakening
4 Hardening
2 Noun [ɟ] Fronting
2 South Devoicing
3 Nasal Prefix Conversion
South Velar Devoicing

<u>Lubutu</u>

1 Ganda Law
1 South Weakening
3 South Velar Devoicing
2 Hardening
Nasal Prefix Conversion

<u>Manjiya</u>

1 South Weakening
1 Ganda Law

Lusoba demands the most complex ordering. This, together with the general restrictions already mentioned, means

that the ordering of all the rules is completely determined.

1. The Ganda Law must precede the South Weakening rule so that it only applies to [B,l,y]. 2. Noun [ɟ] Fronting must precede South Devoicing in order that [ɟ], changed to [z], can be devoiced. 3. South Devoicing must precede Nasal Prefix Conversion in order that it can specify the [-voice] value of [ts] before the Nasal Prefix Conversion rule operates.

4. Hardening must precede South Velar Devoicing in order that */k/ can be changed to [g] following a nasal - if Devoicing applied first, */k/ would not fit the structural description of the Hardening rule.

1. Lubutu, like Lusoba, orders the Ganda Law before the South Weakening rule. 2. The South Velar Devoicing rule is ordered before the Hardening rule so that the Hardening rule cannot affect */k/. 3. The South Velar Devoicing rule must precede the Nasal Prefix Conversion rule so that the Nasal Prefix Conversion rule can apply to */k/. These constraints, together with the general constraints, mean that the ordering of these rules is completely determined, except that the relative ordering of the last two - South Devoicing, Noun [ɟ] Fronting - is arbitrary.

Manjiya orders the South Weakening rule before the Ganda Law. The effect of this has already been described in the previous section. The ordering of the last four rules in Manjiya - Noun [ɟ] Fronting, Nasal Prefix Conversion, South Devoicing and South Velar Devoicing - is rendered quite arbitrary since no matrix remains, after the operation of the */k/ sub-rule of the Ganda Law, which can enter more than one of the remaining rules.

Summary of the P-rules discussed in this section

South Weakening rule

i) northern dialects

$$\begin{bmatrix} -\text{voice} \\ -\text{lingual} \\ +\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{voice} \\ -\text{stop} \end{bmatrix}$$

(and see 3.3. P-rule ii)

ii) southern dialects

$$\begin{bmatrix} -\text{voice} \\ +\text{stop} \\ -\text{lingual} \\ -\text{front} \\ -\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{voice} \\ -\text{stop} \\ +\text{lingual} \\ -\text{low} \\ +\text{round} \end{bmatrix} \quad \text{———}$$

Ganda Law

$$\left\{ \left\langle \begin{bmatrix} +\text{voice} \\ -\text{stop} \end{bmatrix} \right\rangle \atop [+\text{nasal}] \right\} \longrightarrow \emptyset \quad / \quad \text{N} \quad \text{———} \quad \langle \text{VN} \rangle$$

Manjiya sub-rule

$$\begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \\ -\text{cont} \\ -\text{stop} \end{bmatrix} \longrightarrow \emptyset \quad / \quad \text{N} \quad \text{———}$$

Hardening

$$\begin{bmatrix} +\text{voice} \\ -\text{stop} \end{bmatrix} \longrightarrow [+\text{stop}] \; / \; \text{N} \quad \text{———}$$

Nasal Prefix Conversion

/N/ ⟶ [i] / ——— [-voice]

Noun [ɟ] Fronting

$$[\underset{\downarrow}{\text{n}}\text{ɟ}] \longrightarrow [\underset{\downarrow}{\text{n}}\text{z}] \; / \; \underset{\text{noun}}{\text{———}}$$

South Devoicing

$$[+\text{stop}] \longrightarrow [-\text{voice}] \;/\; V/{+}{+} \_\_\_\_$$

Lusoba sub-rule

$$\begin{bmatrix} +\text{cont} \\ +\text{stop} \end{bmatrix} \longrightarrow [-\text{voice}]$$

South Velar Devoicing

$$\begin{bmatrix} +\text{cons} \\ +\text{lingual} \\ -\text{apical} \\ -\text{cont} \\ -\text{stop} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{voice} \\ +\text{cont} \end{bmatrix}$$

5.2.2. Why the southern dialectal forms are derived from northern forms

In the previous section we noticed that whereas the redundancy rules frequently yield a correct specification for northern dialectal forms, this happens much less frequently with southern dialectal forms. This is because southern dialectal forms containing stops can only be correctly specified by undergoing the special southern P-rules. The southern dialectal forms are thus explicitly derived from a northern form. I shall now try to justify the decision to derive southern forms from a northern form.

I had hoped that it would be possible to construct a form for Common Lumasaaba which would be neutral as between southern and northern realisations. I found however that the neutral forms I managed to construct did not resemble any known phonological system, and that parity of derivational difficulty, as between the two realisations, was only achieved by constructing long and difficult derivations for both south

and north. Furthermore these derivations yielded no insights into the nature of the relationship between the dialects. I next attempted to derive northern forms from a southern form. I did this because I was anxious not to be prejudiced by my longer acquaintance with northern forms into supposing that a northern form would necessarily provide the best model for Common Lumasaaba. I found that whereas an inventory of northern consonants could be derived from an inventory of southern consonants, and vice versa, with equal ease, it was much more difficult to predict the realisation of underlying elements in different sequences if a southern form was used as the basic form. It was not possible, for example, to use the sub-rules of P-rule iii, such as the Hardening rule, to make very general statements about processes which apply in all dialects. It turned out that fewer rules were needed if a northern form was taken as the base form, and that these rules were much more general.

The decision to derive southern forms from northern forms is justified by the more economical and revealing statement which this derivation allows. The decision is supported by Meinhof's suggestions of the direction of sound change in Bantu generally. This is not an appropriate place to embark on a full discussion of Bantu comparative linguistics. I should like however to mention some points of Meinhof's analysis. Meinhof (1932:Chapter 2) postulates a consonant inventory for Ur-Bantu which looks like this:

voiceless stops	p	t	k
voiced fricatives	B	l	ɣ
nasals	m	n	ŋ
nasal compounds	mp	nt	ŋk.

He adds to this inventory a set of "voiced palatals" whose modern reflexes are y and l and a series of "voiceless palatals" whose modern reflexes are s and z . He suggests that voiced stops are to be derived from the compounding of voiced fricatives with preceding nasals: "In a number of languages the fact that ɣ,l,B, become plosive after a nasal sometimes causes them to remain plosive, even when the nasal has dropped off again for some reason or other". (1932:35). He derives f from *ku. There are difficulties in Meinhof's approach, as there must be in any account which deals with inventories of fully-specified phonemes and ignores the structures in which the phonemes appear. Nonetheless it is interesting to note that this account of Ur-Bantu accords pretty well with the postulated form of Common Lumasaaba. The voiced stops present in Lumasaaba can be accounted for, as Meinhof suggests, by the operation of the Hardening rule which is still productive in all Lumasaaba dialects.

The direction of soundshifting which Meinhof suggests accords with that of the model proposed for Common Lumasaaba in which the Weakened southern forms are derived from a northern form. Meinhof (1932:29) remarks "It should be noted that in some languages sound shifting can be observed to have taken place with perfect regularity for all three sounds (voiceless stops G.B.) so that for instance

B.	*k	*t	*p
is Swahili	k	t	p
Sotho	X	r	f."

(f represents a voiceless bilabial fricative.)

The same direction of shifting is implicit in Guthrie's account of Common Bantu. (See especially Guthrie's topograms for the reflexes of Common Bantu *pa, *ta and *ka, 1968:70, 72,74). It is a type of shifting which is attested in many language families. Consider for example the relevant parts of the sound systems of classical Greek and Gothic in the Indo-European family:

Greek:	p	t	k	b	d	g
Gothic:	f	θ	h	p	t	k.

Lyons (1968:124) summarises part of Grimm's Law in terms of distinctive features:

i) [-voice] ⟶ [+fricative]

ii) [+voice] ⟶ [-voice].

These two rules capture the relationship between the relevant parts of the classical Greek and Gothic systems. They closely resemble the South Weakening rule and the South Devoicing rule which relate the southern dialects to the northern dialects in Lumasaaba. A similar type of relationship is postulated between some members of the stop system in different Dravidian languages, (Emeneau: 1959):

Tamil	p	t	ṭ	k
Kurukh	p	t	r	x
Malto				
Bahui				

(ṭ represents a retroflex consonant.)

In this case too, the postulated direction of sound change is the same - voiceless stops are weakened. As this direction of sound change is well attested in several languages it seems reasonable to suggest that a similar process accounts for the relationship between the northern and southern dialects of Lumasaaba.

I do not suggest that the southern dialects derive historically from any existing northern dialect, nor that the presentation in 5.2.1. provides a reasonable model for a synchronic description of any one of the southern dialects. My intention is simply to demonstrate that the dialects can be shown to be related to each other by a small number of quite general rules. If, at any time in the historic past, Lumasaaba was one homogeneous language (and there seems small reason to suppose that a homogeneous language ever exists) it seems probable, on the basis of comparison with languages whose history is at least partially known, that northern dialectal forms resemble this putative Common Lumasaaba more closely than southern forms.

5.3.

5.3.1. Social Factors affecting the dialect situation.

Lumasaaba is not recognised as one of the official languages of Uganda. It has no orthography; no textbooks, newspapers, or official notices are written in Lumasaaba. Uganda Government policy is to encourage the use of Luganda and English. Local government administration is, officially, carried on in English. In fact, since, for example in a court of Law, a plaintiff may not understand Luganda or English whereas the magistrate is a native Lumasaaba speaker, much local administration is carried on in Lumasaaba. Similarly the official policy is that children shall learn Luganda for their first two years in primary school and then progress to English. In the schools I visited this programme was rarely carried out. Children arrive at school with no knowledge of Luganda and their teacher is usually from the local area. They tend to emerge from two years' schooling with a very partial understanding of Luganda and, apart from a few songs, appear not to use it at all. Since the teacher's task is to teach the children to write in Luganda they pick up some rudimentary knowledge of Luganda orthography. The teacher herself, writing examples on the blackboard, often writes in Lumasaaba, improvising an orthography according to the rules of Luganda orthography. The Luganda orthography represents many phonological features peculiar to Luganda, for example the doubling of consonant symbols represents geminated consonants which do not occur in Lumasaaba, so orthographic representations in Lumasaaba tend to be inconsistent and ad hoc.

Most of the older people speak only Lumasaaba. Many old school teachers were compulsorily retired, when the Government implemented its policy of teaching Luganda in the first two years' of primary school, by insisting that teachers should pass an examination in Luganda. In general there was a considerable resistance to the idea of learning Luganda. People from the northern area find the phonological system of Luganda less difficult than people from the south. Many southerners remarked that the northern dialect is "mixed with Luganda".

There was considerable variety of opinion about the degree of difficulty in understanding the speech of someone who came from the other major dialect area. People concerned to stress that Lumasaaba is one language, brought down from Mount Elgon (Masaaba) by one of the Ancestors, Muutu (or Muntu or Mundu), say that there is very little difficulty in communication. A local government Treasury official from the north who gave the impression of being particularly vigorous and efficient, stated that he had found it necessary to "learn" the Lusoba accent in order to have orders quickly and correctly interpreted. In general people agreed that they experience no difficulty at all in talking with someone from their own dialect area but considerable difficulty in talking to people from the other main dialect area.

People were remarkably ready to comment on the speech of their neighbours and to mimic known shibboleths of distant accents. Most people have a fairly intimate knowledge of several accents, within their own dialect area at least,

because the Bagisu are exogamous and wives are chosen from distant muluka areas and often from distant gombolola areas. I met several wives in the south who came from the northern dialect area. A man's wife may often speak a different accent from his own. If his brother dies he takes the widow, who may speak yet another accent, as one of his wives. In the compound of a man with several wives two or three accents may be spoken. Children tend to learn their mother's accent first. They live in her house and go with her to the small-holding she is responsible for cultivating. By the time a child is old enough to go to primary school he usually speaks the local accent most of the time.

A notable fact of life in Bugisu is the constant mobility of the inhabitants. The roads and dirt tracks bustle with people going to the local market, going to the dispensary, going to a beer party. Since the women are responsible for cultivation and herding the cattle, the men lead a remarkably active social life. Beer parties of up to twenty members may meet at 9 o'clock most mornings and continue through until evening. Many beer parties consist regularly of inhabitants of the local muluka, but passing strangers are traditionally made welcome. The strong traditions of family relationships and hospitality mean that a man may travel over much of Bugisu and be entertained for several days by the families of wives of cousins whom he has not met before. In this way people constantly come into contact with people who speak different accents from their own.

5.3.2. The speech of recent settlers and young people

A few word lists were taken from old women from the north who had lived all their adult lives with their husbands in the south. In all cases they produced word lists which were exactly like those of their place of origin. Similarly lists from two old men in the far northern county of Cheptui who had moved there thirty and forty years ago respectively, were still identical with lists from the southern gombololas that they came from. Again, lists taken from young men who had spent all their lives in Sebei (a non-Bantu speaking district) and Bakedi (a Bantu district) were representative of their father's accent.

Sixth form students at Nabumali secondary school, a boarding school established by the mission for which Purvis worked, and one of the most prestigious schools in Uganda, completed twenty word lists, and discussed with great interest tendencies that they thought they perceived among speakers from different accents within the school. The suggestions made by these students were then checked by a further ten short word lists made by young people working in Mbale. The result of this brief investigation is of course extremely tentative. However there seems to be a tendency for younger people's speech to lose the characteristic shibboleths which mark them off within the southern or northern areas. Thus students from the Lubutu area no longer produced the distinctive uvular friction in the realisation of /k/ as [X]. They tended to produce the class 7 prefixes as [ɕi] rather than [si] and to produce the sequence /N/+/k/ as [iŋg] rather than as [i:X].

The behaviour of /k/ in the speech of these people is exactly like that of Lusoba speakers. (In the terms of the model we discussed in 5.2. /k/ functions for these speakers as a voiced consonant rather than as a voiceless consonant.) /ts/ on the other hand was always realised voiced following /N/, as in [inzu]. (This of course would be the form produced by all northern speakers in the community.)

Students and young people from Manjiya produced typical Lusoba form for /N+p,t,k/. (The Ganda Law no longer operates on these items.) The general tendency among southern speakers appears to be to produce forms more like Lusoba. This may be because Lusoba is the accent spoken nearest to Mbale and that this is the accent spoken around Nabumali school.

There is less variation in the northern dialect. The only change that I noted here was that Buwalasi speakers at Nabumali school did not produce the distinctive non-fronted velars before front vowels and realised /z/ as [z] wherever it is realised as [z] in Luhugu (e.g. in class 10 determiner /zi/).

Older people who were asked whether the young people were speaking differently agreed that they were, and deplored the change. It is difficult to know whether the items I had in mind were the ones they felt particularly strongly about. They particularly mentioned the fact that young people no longer produce the forms [lisanda], [lisino], [lisulu] for "charcoal" "tooth" and "nose" but produce simple reduplicated forms of the determiner [lilyanda], [lili:no], [lilu:lu].

Similarly old men in the north produced forms which were generally admitted by older people everywhere to be genuine Lugisu forms for "market" and "ring" - [li:gaɲzo] and [kazi] whereas by young people in the north and throughout the south the Luganda form [xarale] and [iɱbera] were used.

Interesting examples of simplification of rules was found in the forms produced by some young children. In the north for example a child would correctly give the form [i:piso] when asked for the word "needle". But he would then produce the form [kapiso] for the diminutive instead of the expected [kayiso]. For such children P-rule ii (the /p/ rule which weakens /p/ when it does not follow a nasal) is not productive yet, but /p/ functions like the other voiceless stops /t/ and /k/. Similarly children would correctly produce the form [iɲzu] for "house" but the form [kazu] as a diminutive rather than [kayu]. It is probable that these diminutive forms occur so rarely in everyday speech that the children are quite unfamiliar with them, and simply produce regularised forms.

Some speakers claimed to be able to speak an accent from the other main dialect area. These speakers were asked to complete two word lists, one for their home accent and one for this second accent. The most interesting result of this was that, whereas the main consonant switch was appropriately made in stems, there was some uncertainty and inconsistency in the realisation of /N/+/k/ and /N/+/z/, and there was often a complete failure to make the consonant switch in the noun prefixes. The prefixes were usually pronounced as they would be

in the speaker's own accent. Two speakers volunteered to tell short stories in the second accent and, with remarkable consistency, produced the consonant switch in stems but not in affixes. Clearly much more investigation must be carried out before we can begin to speculate profitably in this area. A tempting hypothesis is that grammatical affixes are stored in a different manner from stems (as suggested for example, by Schachter and Fromkin, 1968) and that different sets of rules apply to them.

In general people were very ready to comment on their neighbours' speech and speakers from one area usually agreed about the way in which other people's speech differed from theirs. Everyone appeared passionately interested in their language and anxious for it to be written down. No-one thought that the two dialects constitute two separate languages. Despite difficulties in communication from south to north it is clear that from a sociological point of view Lumasaaba must be considered as one language.

APPENDIX I

Examples of short word lists

		Bulago	Buhugu (Dadiiri)	Buwalasi	Buyobo	Bufumbo (Konde)	Busoba	Bukiende	Bukiga	Buwabwala
1.	trousers	i:pale	i:pale	i:pale	i:pale	impale	imbale	imbale	imbale	imbale
2.	small "	kahale	kahale	kahale	kahale	kahale	xawale	xawale	xawale	Xawale
3.	to fly	kubululuka	kubululuka	kubululuka	kubululuka	kubululuka	xupululuxa	xupululuxa	xupululuxa	XupululuXa
4.	I fly	imbululuka	imbululuka	inbululuka	imbululuka	imbululuka	imbululuxa	imbululuxa	imbululuxa	imbululuXa
5.	snake	i:temu	i:temu	i:temu	i:temu	intemu	indemu	indemu (inemu)	inemu	indemu
6.	small "	katemu	katemu	katemu	katemu	katemu	xaremu	xaremu	xaremu	Xaremu
7.	to run	kudima	kudima	kudima	kudima	kudima	xutima	xutima	xutima	Xutima
8.	I run	indima	indima	indima	indima	indima	indima	indima	indima	indima
9.	to dig	kulima	kulima	kulima	kulima	kulima	xulima	xulima	xulima	Xulima
10.	I dig	inima	inima	inima	inima	inima	inima	inima	inima	inima
11.	sheep	li:cese	i:cese	(li:-) i:kese	i:kese	incese	injese	injese (inese)	inese	i:Xese
12.	small sheep	kacese	kacese	kakese	kakese	kacese	xaçese	xaçese	xaçese	XaXese
13.	cow	i:ka:fu	i:ka:fu	i:ka:fu	i:ka:fu	inka:fu	inga:fu	inga:fu (ina:fu)	ina:fu	i:Xa:fu
14.	small cow	kaka:fu	kaka:fu	kaka:fu	kaka:fu	kaka:fu	xaxa:fu	xaxa:fu	xaxa:fu	XaXa:fu
15.	pipe	cinaga	cinaga	kinaga	kinaga	cinaga	çinaka	çinaka	çinaka	sinaka
16.	egg	li:ji	li:ji	li:gi	li:gi	li:ji	li:ci	li:ci	li:ci	li:ki
17.	pl.	maji	maji	magi	magi	gamaji	kamaci	kamaci	kamaci	kamaki
18.	leopard	ingwe	ingwe	ingwe	ingwe	ingwe	ingwe	ingwe	ingwe	ingwe
19.	small leopard	kagwe	kagwe	kagwe	kagwe	kagwe	xakwe	xakwe	xakwe	Xakwe
20.	person	umu:tu	umu:tu	umu:tu	umu:tu	umuntu	umundu	umundu (umunu)	umunu	umundu
21.	pl.	Ba:tu	Ba:tu	Ba:tu	Ba:tu	BaBantu	BaBandu	BaBanu	BaBanu	BaBandu
22.	house	inzu	inzu	inju(inzu)	inzu	inzu	i:tsu	i:tsu	inzu	inzu
23.	small house	kayu	kayu	kayu	kayu	kayu	xayu	xayu	xayu	Xayu
24.	to grow	kuyo:la	kuyo:la	kuyo:la	kuyo:la	kuyo:la	xuyo:la	xuyo:la	xuyo:la	Xuyo:la
25.	I grow	injo:la	injo:la	injo:la	injo:la	injo:la	injo:la	injo:la	injo:la	injo:la
26.	to pound	kuzowa	kuzowa	kuzowa	kuzowa	kuzowa	xutsowa	xutsowa	xutsowa	Xutsowa
27.	I pound	inzowa	inzowa	inzowa	inzowa	inzowa	i:tsowa	i:tsowa	inzowa	inzowa
28.	bull	inzowu	inzowu	injowu	injowu	inzowu	i:wunwa	i:wunwa	inzowu	i:wunwa
29.	pl.	zinzowu	zinzowu	ginjowu	ginjowu	zinzowu	tsi:wunwa	tsi:wunwa	tsinzowu	tsi:wunwa
30.	charcoal	lisanda	lisanda	lisanda	lisanda	lisanda	lisanda	lisanda (lilyanda)	lilyanda	lilyanda
31.	pl.	(ga)manda	manda	manda	manda	gamanda	kamanda	kamanda	kamanda	kamanda
32.	beans	wanambi	wanambi	wanambi (naBuda:ma)	wanambi	wanambi	naButa:ma	naButa:ma	kamakanda (naButa:ma)	kamakanda
33.	brain	(ci)congo	cicongo	kongo	kongo	cicongo	çiçongo	çiyanga	çiçongo	siyanga
34.	earth	li:doyi	li:doyi	li:doyi	li:doyi	li:doyi	li:loBa	li:loBa	li:loBa	li:loBa
35.	broom	(ci)ce:lo	cice:lo	ke:lo	ke:lo	cice:yelo	çiçe:yo	çiçe:yo	çiçe:yo	sise:yo
36.	pl.	(Bi)Bye:lo	BiBye:lo	Bye:lo	Bye:lo	BiBye:yelo	BiBye:yo	BiBye:yo	BiBye:yo	BiBye:yo
37.	fly	i:sami	i:sami	i:sami	i:sami	insami	i:sami	i:sami	i:sami	i:sami
38.	threshold	mulyango	mulyango	mulyango	mulyango	gumulyango	kumulyango	kumulyango	kumulyango	kumulyango

Examples of long word lists

		Lusoba	Lufumbo	Luhugu
1.	a frog	iɲjele	iɲcele	i:cele
2.	a small frog	xaʒele	kacele	kacele
3.	an elephant	i:tsofu	iɲdzofu	iɲzofu
4.	a small "	xayofu	kayofu	kayofu
5.	a house	i:tsu	iɲdzu	iɲzu
6.	a small house	xatsu	kayu	kayu
7.	an eye	iɱoni	iɱoni	iɱoni
8.	a small eye	xaBoni	kaBoni	kaBoni
9.	pl.	tsi:ɱoni	dzi:ɱoni	zi:ɱoni
10.	pl. small "	BuBoni	BuBoni	BuBoni
11.	a head	(ku)-murwe	(gu)-mutwe	mutwe
12.	a root	luli	luli	luli
13.	pl.	tsiɲdi	dziɲdi	ziɲdi
14.	an egg	li:ci	li:ji	li:ji
15.	pl.	kamaci	gamaji	maji
16.	a drum	iŋomo	iŋomo	iŋomo
17.	small drum	xaŋomo	kaŋomo	kaŋomo
18.	a needle	iɱbiso	iɱpiso	i:piso
19.	small needle	xayiso	kayiso	kayiso
20.	a buffalo	iɱboko	iɱbogo	iɱbogo
21.	small buffalo	xaBoko	kaBogo	kaBogo
22.	a butterfly	ʒipulupulu	cibulubulu	cibulubulu
23.	a snake	iɲdemu	iɲtemu	i:temu
24.	small snake	xaremu	katemu	katemu
25.	a person	umuɲdu	umuɲtu	umu:tu
26.	pl.	BaBaɲdu	BaBaɲtu	BaBa:tu
27.	a lake	iɲa:tsa	iɲaɲza	iɲaɲza

		Lusoba	Lufumbo	Luhugu
28.	small lake	xaya:tsa	kayaɳza	kayaɳza
29.	charcoal	lilyaɳda	lisaɳda	lisaɳda
30.	pl.	kamaɳda	gamaɳda	gamaɳda
31.	a bird	xaɲwi:ɲwi	kaɲwi:ɲwi	kaɲu:ɲu/kaɲu:ɲi
32.	a wing	lutawa	ludaha	ludaha
33.	pl.	tsiɳdawa	dziɳdaha	ziɳdaha
34.	a doorway	kumulyaŋgo	gumulyaŋgo	mudyaŋgo/ mulyaŋgo
35.	firewood	luxu	luku	luku
36.	pl.	tsiŋgu	dziŋku	zi:ku
37.	a cow	iŋga:fu	iŋka:fu	i:ka:fu
38.	small cow	xaxa:fu	kaka:fu	kaka:fu
39.	beer	iɳdali	iɳdali	iɳdali
40.	small beer	xatali	kadali	kadali
41.	a hair	li:tsune	li:dzune	li:zune
42.	rain	i:fula	imfula	i:fula
43.	a fingernail	çitere	cidete	cidete
44.	a rat	imbeBa	imbeBa	imbeBa
45.	small rat	xaBeBa	kaBeBa	kaBeBa
46.	a beersucking straw	luseçe	lusece	lusece
47.	a hen	iŋgoxo	iŋgoko	iŋgoko
48.	small hen	xakoxo	kagoko	kagoko
49.	a fly	i:sami	insami	i:sami
50.	a leopard	iŋgwe	iŋgwe	iŋgwe
51.	small leopard	xakwe	kagwe	kagwe
52.	a tooth	lili:no	lisino	lisino
53.	pl.	kami:no	game:no	game:no
54.	a feather	lilyo:lu	lisulu	lisulu

		Lusoba	Lufumbo	Luhugu
55.	pl.	kamo:lu	gamo:lu	gamo:lu
56.	an ear	xuxuru	kukutu	kukutu
57.	pl.	kamaru	gamatu	matu
58.	a thief	umwi:fi	umwi:fi	umwi:fi
59.	stream	lulu:tsi	lulu:dzi	lulu:zi
60.	pl.	tsi:tsi:tsi	dzi̱ndzi:dzi	zi̱nzi:zi
61.	earth	li:loBa	li:doyi	li:doyi
62.	a ring	i̱mbera	i̱mpeta	kazi
63.	small ring	xayera	kayeta	kazi
64.	beans	naButama	naBudama	wa̱na̱mbi
65.	a skull	ɕiɕoŋgo	cicoŋgo	cicoŋgo
66.	food	Bilyo	Bilyo	Bidyo/Bilyo
67.	an eyebrow	ɕisice	cisiʝe	cisiʝe
68.	a bee	i:tsuɕi	i̱ndzuci	i̱nzuci
69.	a small bee	xayuɕi	kayuci	kayuci
70.	a sheep	i̱ɲʝese	i̱ɲcese	i:cese
71.	a pig	i̱mbitsi	i̱mbidzi	i̱mbizi
72.	small	xaBitsi	kaBidzi	kaBizi
73.	a leper	umuceɲʝe	umuʝeɲʝe	umuʝeɲʝe
74.	a tongue	lulimi	lulimi	lulimi
75.	pl.	tsi̱ni̱mi	dzi̱ni̱mi	zi̱ni̱mi
76.	to dance	xuɕina	kucina	kucina
77.	I dance	i̱ɲʝina	i̱ɲcina	i:cina
78.	to kill	xuxwi:ra	kukwi:ta	kukwi;ta
79.	to die	xufwa	kufwa	kufa
80.	to run	xudima	kudima	kudima
81.	I run	i̱ndima	i̱ndima	i̱ndima
82.	to dig	xulima	kulima	kulima

		Lusoba	Lufumbo	Luhugu
83.	I dig	inima	inima	inima
84.	to fly	xupululuxa	kubululuka	kubululuka
85.	I fly	imbululuxa	imbululuka	imbululuka
86.	to grow	xuyo:la	kuyo:la	kuyo:la
87.	I grow	iɲjo:la	iɲjo:la	iɲjo:la
88.	to pound	xutsowa	kudzoha	kuzowa
89.	I pound	i:tsowa	indzoha	inzowa
90.	to strike	xuxupa	kukuba	kukuba
91.	I strike	iŋgupa	iŋkuba	i:kuba
92.	to lack	xutamba	kudamba	kudamba
93.	I lack	indamba	indamba	indamba
94.	to see	xuBona	kuBona	kuBona
95.	I see	imona	imona	imona
96.	to remain	xutama	kudama	kudama
97.	I remain	indama	indama	indama
98.	to act	xuramba	kutamba	kutamba
99.	I act	indamba	intamba	i:tamba
100.	to hold	xuwamba	kuhamba	kuhamba
101.	I hold	imbamba	impamba	i:pamba
102.	a day	lunaxu	lunaku	lunaku
103.	a wick	lurambi	lutambi	lutambi
104.	a hive	ʒitilisi	cidilisi	cidilisi
105.	a dam	ʒitiBo	cidiBo	cidiBo
106.	times	Bisi:tsa	Bisinza	Bisinza
107.	a week	i:sapiri	insabiti	i:sabiti

APPENDIX 2

Some unanswered questions

Certain predictions may be made about the form of the determiner and its associated classifier. These are most naturally expressed as a set of redundancy rules. They state the "phonematic system of the concord prefixes" (Firth, 1948). They make statements of the following kind:

1. If determiner V: $\begin{bmatrix}\alpha\text{front}\\ \beta\text{round}\end{bmatrix}$

   $\Downarrow$

   Then classifier V $\begin{bmatrix}\alpha\text{front}\\ \beta\text{round}\end{bmatrix}$

   (classifier vowel is identical to determiner vowel)

2. If determiner C: $\begin{bmatrix}+\text{ling}\\ -\text{alv}\end{bmatrix}$

   $\Downarrow$

   Then $\begin{bmatrix}-\text{cont}\\ -\text{nasal}\\ +\text{stop}\end{bmatrix}$

   (determiner C is [k] or [g] if dorsal)

3. If determiner C:

   $\Downarrow$

   Then either $\begin{bmatrix}+\text{ling}\\ -\text{alv}\end{bmatrix}$ or [+cont].

(determiner C is either /k,g/ as specified in 2, or one of the series [+continuant]/B,l,z/. (/j/ is excluded by rule 2.))

4. If plural determiner C:

   $\Downarrow$

   Then [+voice].

   (plural determiner consonant is always voiced.)

The rules could go on to state that plural determiner Cs must be one of the set /B,g,z/ and that none of these consonants is ever a singular determiner C, (except in the case of class 20 which must be separately specified as an

augmentative class). They could go on to state, even more narrowly, that if the plural determiner is /z/ the determiner vowel will be /i/ and the classifier, a nasal, homorganic with the stem consonant which must follow it.

These rules are not stated as part of the formal description because they raise certain questions which are not easily answered within the conventional generative framework at the present time. For example, it is clearly a relevant part of the phonological description to state that vowels in classifiers are identical to those of their associated determiners. In the terms of the generative model this cannot be stated in the redundancy rules, because there are occasions when the classifier occurs but is not preceded by the determiner (as in /mu+jaju/ [muyayu] "a wild cat"), which means that the determiner cannot predict the classifier vowel, and occasions when the determiner occurs but is not immediately followed by the classifier (as in /gu+ŋiaŋia/ [guŋa:ɲa] "it (referent not identified in phrase) chews") which means that the classifier cannot predict the determiner vowel. The most natural answer might be to allow the redundancy rules to specify the correct form of all grammatical formatives in a given environment. This would mean, for instance, that class 9 and 10 classifiers would then be correctly specified as [i] before voiceless consonants and syllabic nasal elsewhere, rather than [i] being derived from the nasal by a mutation rule, a P-rule, as in the present study.

A related area of difficulty in the conventional generative model is the expression of statistical probabilities in cases where the probability does not obtain in one hundred

per cent of cases. I believe that it is a proper part of the statement of the phonology of a language to specify preferred sequences in given structures. Here are some examples of statistical probabilities in Lumasaaba:

1. If the stem-initial C derives from /p/, then second stem-C will be [+nasal] or [l], [y] or [w] in 93% of cases.
2. If stem-initial C is [+nasal], second stem-C will be [+nasal] in 80% of cases.
3. If stem-initial C is [+stop] then second stem-C will be [+stop] (33%), [+nasal] (28%), [+nasal],[+stop] (25%).

(The sample was 500 CVCV stems).

Statements of this sort cannot be expressed in redundancy rules of the sort we have discussed, since these statements are not predicting required values, merely stating preferred values. It may be possible to enlarge the concept of redundancy to include rules of the following form:

$$\text{If } + \begin{matrix} C \\ [+\text{stop}] \end{matrix} \quad V \quad C$$

$$\text{Then} \qquad \Downarrow$$

[+stop] unless already specified as [-stop], with the convention that preferred values (as stated in 3, above) will be specified in redundancy rules, rarer values in the lexical entry.

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Abbreviations:

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C.U.P.: Cambridge University Press.

I.J.A.L.: International Journal of American Linguistics.

M.I.T. Press: Massachusetts Institute of Technology Press.

O.U.P.: Oxford University Press.

S.P.C.K.: Society for the Propagation of Christian Knowledge.

T.P.S.: Transactions of the Philological Society.

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