PROCEEDINGS OF THE SEVENTEENTH ANNUAL MEETING OF THE BERKELEY LINGUISTICS SOCIETY

February 15-18, 1991

SPECIAL SESSION ON AFRICAN LANGUAGE STRUCTURES

Berkeley Linguistics Society
Berkeley, California, USA

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edited by

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TABLE OF CONTENTS

SPECIAL SESSION

• • •

The following papers were presented at the conference but do not appear in this volume:

Glide alternations in Yoruba
AKIN AKINLABI

Root and foot in Kikuyu reduplication
LONG PENG

TABLE OF CONTENTS FOR GENERAL SESSION AND PARASESSION TO BE FOUND IN BLS 17

GENERAL SESSION

PARASESSION

• • •

The following papers were presented at the conference but do not appear in this volume:

Wackernagel's Law cliticization from unaccusative and unergative subject positions in Anatolian
ANDREW GARRETT

Quantity-sensitivity and the nature of templatic parsing
PAUL KIPARSKY

The metaphorical understanding of event structure
GEORGE LAKOFF

Morphological variability in verb serialization and event structure
MARSHALL LEWIS

PREFACE

It was gratifying indeed to see such an impressive gathering of Africanists at this inaugural Special Session on African linguistics; it inspired me to hope for two things for the future. One, that work and conferences on African linguistic topics at Berkeley will continue to expand. The other, that the effort we've made to get as many copies as possible of this volume to Africa will result in greater contact between scholars here and scholars there.

Special thanks go to Larry Hyman for assistance with organizing the conference, and Pearl-Alice Marsh of the African Studies Center for support and advice. Thanks also to Sharon Inkelas and Josephat Rugemalira for chairing sessions at the conference, and to Laurel Sutton for help in editing the proceedings. I look forward to a "reunion" and an even better African Special Session in 1994.

Asanteni nyote.

Kathleen Hubbard
Special Session Coordinator

SPECIAL SESSION

ON

AFRICAN LANGUAGE

STRUCTURES

THE THREE-WAY VOWEL HARMONY IN Nəni
(BANTU A.44, CAMEROON)

Pierre BANCEL
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ABSTRACT

Nəni has three distinct, successively ordered ATR-type vowel harmony processes. A description is drawn of how each applies to its respective domain. Then we show the implications of the interaction between the harmony and vowels-in-contact rules in the particular morphological field of Preverbal Markers.

*Two consequences follow from these implications: (i) synchronically, the preservation of morphological information of certain morphemes after the word-formation level; (ii) diachronically, a link may be established with the shift from the Proto-Bantu *S-V-O word-order to Nəni S-O-V through intermediate stages.*

Nəni (also [Tu]Nen) is a Bantu language (A.44 in Guthrie's classification) spoken in Cameroon around Ndikinimeki by approximately 30 to 40.000 speakers, calling themselves Pənəni (sg. Mùnəni, also Banen). Nəni is fairly well documented, with regard to most other minor languages of Cameroon.

This is due to the work of an anthropologist, Idelette DUGAST, who devoted her entire scholarly career to the description of the Pənəni culture and language. Previous analyses of vowel harmony in Nəni rely on her data (STEWART & VAN LEYNSEELE, 1979; MOUS, 1986). The present paper aims at presenting the three distinct harmony processes of this language, as elicited in seven weeks fieldwork[1] in December 1989 and January 1990, in the Ndiki dialectal area, which was Dugast's implicit reference dialect.

Two main points will be dealt with. The first will be the morphological implications of the definition of the harmony domains, in the light of other phonological rules concerning vowels and boundaries. Secondly, a link will be established between the present morphological properties of Nəni, as they appear from the vowel phonology, and its other peculiarity of having a SOV word-order, as against SVO in all other Bantu languages.

The Nəni vowel system displays a rather unusual distribution of segments in the phonetic space, with its four auditory height constrasts in back vowels, as against only two in front vowels (table 1a). This uneconomic distribution, however, is counterbalanced at the phonological level by an optimal integration in terms of distinctive features (table 1b).

In table 1a, the division between the + and - ATR vowels has been represented, in order to show that all the +ATR vowels are phonetically higher than any -ATR vowel. This is another unusual feature for cross-height harmony systems, which

would justify an articulatory investigation. Until then, we will continue to refer to the harmonic feature as ±ATR, but with some reservations as to its actual articulatory implementation.

+ATR	i ə	u ɑ
-ATR	ɛ a	o ɔ

a. Nəni radical vowels (phonetic representation).

Table 1.

The vowel system of Nəni.

		-Back	+Back
+ATR	+High	i	u
	-High	ə	ɑ
-ATR	+High	ɛ	o
	-High	a	ɔ

b. The Nəni vowel system (phonological classification).

I. Primary Obligatory Harmony.

The first harmony process, which I will call Primary Obligatory Harmony (henceforth POH), was analyzed by STEWART & VAN LEYNSEELE (1979), followed by MOUS (1986). My data disagree with Dugast's transcriptions on several points regarding vowel qualities, and my analysis of POH will therefore correspondingly diverge from that of these authors, most notably in rejecting the existence of neutral or, rather, transharmonic[2] vowels. These differences will not be discussed as such here.

POH has an equal effect on all the eight vowels of the Nəni inventory, as represented in (1).This inventory may be divided up into either two harmonic series of freely co-occurring vowels, as in (2), or into four alternating pairs, as in (3).

(1) Inventory: / i ɛ ə a u o ɑ ɔ /

(2) Harmonic Series: / i ə ɑ u /$_{+ATR}$ vs / ɛ a ɔ o /$_{-ATR}$

(3) Alternating Pairs: / i ~ ɛ /, / ə ~ a /, / ɑ ~ ɔ /, / u ~ o /.

POH is characterized by its **obligatoriness** within the word. It applies to any morpheme sequence where it may apply, and throughout the whole sequence.

A very important excursus must be made, to make clear that not all the morphemes considered as affixed to the verb root in other Bantu languages really are affixes in Nəni. Among them, only those of the sequence [Nominalization Prefix (class 3a) + Passivisation Prefix + Verb Root + all the Suffixes] are affixed, and as such regularly undergo POH. But POH does not apply to the sequence of the separable preverbal markers, namely [Subject + Negation + Tense / Aspect + Direction Markers].

Between them and the verb root the object noun is regularly inserted; thus, they are not true affixes, and their harmonization will be treated in section II below.

The second feature of POH is its **asymmetricality**. In verbs, the dominant roots such as /twən/ in (4 a, b & c), always surface with +ATR vowels, and harmonize all the affixes. Recessive roots such as /pA1/, on the contrary, surface with -ATR vowels when combined with Ø- or recessive affixes such as the nominalizing prefix (NP) and the applicative suffix in (5a), but harmonize to +ATR, together with the recessive affixes, in combination with dominant affixes such as the causative suffix (5b & c)[3].

(4) a. [ù-twən-ìn] *to sit somewhere.* NP cl. 3a +Verb Root+Applicative

b. [ù-twən-ì] *to cause to sit.* NP cl. 3a +Verb Root+Causative

c. [ù-twən-ìn-ì] *to cause to sit somewhere.* NP cl. 3a +Vb Rt+Applic.+Causat.

(5) a. [ò-pá l-ɛ́n] *to climb somewhere.* NP cl. 3a +Verb Root+Applicative

b. [ù-pɔ̀ l-ì] *to cause to climb.* NP cl. 3a +Verb Root+Causative

c. [ù-pɔ̀ l-ín-ì] *to cause to climb somewhere.* NP cl. 3a +Verb Root+Causative

This asymmetricality is not present in its typical form in all the morphological types undergoing POH. For instance, POH might be analyzed as symmetrical in nouns and qualifying adjectives, since only the affixes (in fact, the noun prefixes) alternate, according to the themes they combine with, while the themes themselves do not. This may be accounted for in an overall asymmetrical model, in assuming that all the noun prefixes are recessive.

Conversely, POH is more complex in the small set of numeral adjectives (consisting of the first eight positive integers), where POH is **triply** asymmetrical. The specific numeral prefixes [4] must be divided up into dominant (in classes 3, 4, and 19) and recessive ones (table 2), since the themes for "one" and "two" display vowel alternation according to the class prefix allotted by the determined noun.

Class	1	2	3	4	5	6	7	8	9	13	14	19
Num. Prefixes	O-	pA-	u-	i-	nE-	A-	E-	pE-	E-	tO-	pO-	hi-

Table 2. The recessive and dominant Numeral Prefixes of Nɔ̀nì.

Also, it follows that the two relevant themes are recessive.

An example of each variant of "two" is given in (6a & b). It may be noted that the two nouns are recessive; furthermore, their underlying forms end in the same vowel /A/, elided before a (non high front) vowel-initial word. This shows that the nouns are not the trigger of the difference between the two forms of the theme.

(6) a. [mɛ̀-sáp ɪ́-fɔ̀ndɪ̀] *two machetes* (cl.4). NP cl. 4 + Theme # Num P cl. 4 + Theme.

b. [pà-ná pá-fàndɛ̀] *two children* (cl.2). NP cl. 2 + Theme # Num P cl. 2 + Theme.

Only one numeral theme is dominant, namely /nisɔ/, "four", and it surfaces with +ATR vowels in all cases, as well as any class prefix it takes (7).

(7) a. [mɛ̀-sáp ɪ́-nɪ̀s] *four machetes* (cl.4). NP cl. 4 + Theme # Num P cl. 4 + Theme.

b. [pà-ná pɔ́-nɪ̀s] *four children* (cl.2). NP cl. 2 + Theme # Num P cl. 2+ Theme.

The other numeral themes, "three", "five", "six", "seven" [5] and "eight" harmonize to -ATR the numeral prefixes of all classes. The theme for "three", for instance, surfaces with the expected -ATR vowel after the recessive class 2 numeral prefix in (8b); but, contrary to what happens to "one" and "two", when following in (8a) the dominant class 4 numeral prefix, the theme still surfaces with a -ATR vowel, and the dominant +ATR prefix harmonizes to -ATR.

(8) a. [mɛ̀-sáp ɛ́-lɪ̀l] *three machetes* (cl.4). NP cl. 4 + Theme # Num P cl. 4 + Theme.

b. [pà-ná pá-làl] *three children* (cl.2). NP cl. 2 + Theme # Num P cl. 2 + Theme.

Thus, the not-intrinsically +ATR numeral themes must be divided into two distinct series. On the one hand, the themes whose vowels are harmonized by a +ATR morpheme (belonging to the same harmony domain), and which otherwise surface with -ATR vowels; the first two numerals are to be classified here.

On the other hand, the themes that always surface with -ATR vowels, and which harmonize to -ATR the underlying +ATR vowels within their harmony domain.

The -ATR numerals "three", "five", "six", "seven" and "eight" belong here.

If the former type still may be called recessive, the latter, on the contrary, is in fact -ATR **superdominant**, since it controls dominant, +ATR morphemes [6].

Another feature of POH is its **bidirectional spreading**. In the examples above, +ATR spreads rightwards in (6a), leftwards in (5b & c) and (7b), and both leftwards and rightwards in (4a).

Lastly, it must be noted that another word category regularly behaves in a very particular way with regard to POH. The possessives and the non-emphatic demonstratives [7] are dimorphemic compounds, formed on the scheme:

Concord Prefix of Determined Noun + { Person / Number Marker of Possessor (possessives) / Specific Demonstrative Morpheme (demonstratives) }

Each of the two constituents may be either dominant (+ATR) or recessive, so that the four combinations occurr. In the first morpheme, being common to the two word-types, the dominant concord prefixes are those of exactly the same classes as in the numeral adjectives, namely class 3 /u-/, cl. 4 /i-/, and cl. 19 /hi-/. The possessor marker of the possessives is dominant in the plural persons, and recessive in the three singular ones (table 3).

Pers. / Numb.	sing.	1	2	3	plur.	1	2	3
Possessor Mker		-AmA	-A	-AjA		-ən(u)ə	-əs(u)ə	-əp(u)ə

Table 3. The recessive singular and dominant plural Number / Person Markers of Nəni.

The specific demonstrative morphemes are either dominant or recessive as well, according to case. The proximal demonstrative (Ø-marked) and the anaphoric demonstrative /-EjE/ are recessive, whereas the distal demonstrative /-ini/ is dominant.

The particularity of demonstratives and possessives, with regard to harmony, is that POH applies to them, if and only if they have at least one dominant, +ATR constituent. The 3rd pers. sg. possessive /-AjA/, when in combination with a cl.1 recessive concord prefix, surfaces with -ATR vowels (9a). In combination with a cl. 4 dominant concord prefix, it surfaces with +ATR vowels, irrespective of the + or - ATR value of the following noun (9b & c).

(9) a. [w-à já mò-n] *his child* (cl.1). DP cl. 1 + PNM 3rd sg # NP cl. 1 +Theme.

b. [j-ọ́ jọ́ mì-sə̀kụ] *his elephants* (cl.4). DP cl. 4 + PNM 3rd sg # NP cl. 4 +Theme.

c. [j-ọ́ jọ́ mj-ă l] *his buffaloes* (cl.4). " " " "

(10a & b) are two ill-formed variants of (9c). They show that neither may the possessive harmonize a -ATR noun (10a), nor may the noun harmonize the possessive [8] to -ATR (10b). Thus, the two sequences are independent POH-domains.

(10) a. *[j-ọ́ jọ́ mj-ə̆ l] *"his buffaloes"* (cl.4).

b. *[j-ạ́ já mj-ă l] *"his buffaloes"* (cl.4).

However, when the two constituent morphemes of the possessive (or of the demonstrative) are recessive, as in (9a), the possessive does not undergo POH, but is optionally harmonized to +ATR by the following +ATR noun. The same possessive as that of example (9a) may be partially (11b) or completely (11c) harmonized before a +ATR noun, though it may also surface with -ATR vowels in this environment as well (11a). Needless to say, the recessive possessive may not

surface with +ATR vowels before a recessive noun, as in example (9a).

(11) a. [w-à já mwᵎɔ́ɔ́ndụ] *his woman* (cl.1). DP cl. 1 + PNM 3rd sg # NP cl. 1 +Theme.

b. [w-à jɔ́ mwᵎɔ́ɔ́ndụ] " " " " " "

c. [w-ə̀ jɔ́ mwᵎɔ́ɔ́ndụ] " " " " " "

This optional harmonization is in fact a case of the second harmony process, which we will now consider.

II. Optional Primary Harmony.

Optional Primary Harmony (hereafter Opt PH) has not been mentioned by previous analysts of the Nəni phonology. Opt PH depends on the preceding POH, in that +ATR spreads from a POH-domain to the right, to the contiguous morpheme or morpheme sequence to the left, being subject to Opt PH. Recall that the separable preverbal (subj. + neg. + tense/asp. + dir.) markers are not affixed to the verb root, and do not belong to its POH-domain. Instead, they undergo Opt PH.

In (12a), the subject marker /mE/ and the unaccomplished present marker /ndO/ always surfaces with -ATR vowels, when they precede the recessive root /pA l/. On the contrary, they may be harmonized by a dominant root such as /twən/, although the variant (12b), as opposed to (12b') and (12b") shows that this harmonization is optional [9].

(12) a. [mɛ́ ndɔ̀ pál] b. [mɛ́ ndɔ̀ twə̀n]

a'. *[mɛ́ ndù pál] b'. [mɛ́ ndù twə̀n]

a". *[mí ndù pál] b". [mí ndù twə̀n]

a'". *[mí ndɔ̀ pál] b'". *[mí ndɔ̀ twə̀n]

Subj. 1st sg. + Unacc. Pres. + Verb Root — *I climb.*

Subj. 1st sg. + Unacc. Pres. + Verb Root — *I sit.*

Further, one can see in (12b' & b") that +ATR is successively assigned by Opt PH to each vowel from right to left, so that the failure of harmonizing a vowel precludes in (12b'") any spreading of +ATR further left. This holds true, whatever the vowel qualities and the morpheme sequence length might be [10].

II. 1. Opt PH in Connectives.

The connectives are harmonizable by the following noun; if the noun is -ATR valued, as in (13a), the connective itself is always -ATR; if the noun is +ATR, as in (13b), the connective may have any of the the two ATR surface values.

(13) Determined (Noun Prefix + Theme) # Connective ≠ Determining (Noun Prefix + Theme)

a. [nɛ̀hɔ́ká nɛ́ mɔ̀ndọ] *[nɛ̀hɔ́ká ní mɔ̀ndọ] *the axe of the man.*

b. [nɛ̀hɔ́ká nɛ́ mwᵎɔ́ɔ́ndụ] ~ [nɛ̀hɔ́ká ní mwᵎɔ́ɔ́ndụ] *the axe of the woman.*

II. 2. Opt PH in Separable Preverbal Markers.

Separable preverbal markers are harmonizable by a +ATR verb base, if they immediately precede it, as already shown in (12) above. But they may also be harmonized by the object noun, whose canonical place is between them and the verb base; (14) and (15) exemplify the four possible combinations of + and - ATR objects nouns and verb bases, showing that harmonization of the preverbal markers does not depend on their syntactic relationships, but only on the ATR value of the next word to the right.

(14) Subj. 1st sg. ≠Accompl. Recent Past ≠ Object Noun$_{-ATR}$ # Verb Root (+ Intensive) + Applicative

a. [mɛ̀ ná sànj!á p!ɛ́l–ɛ̀n] *[mì nə́ sànj!á p!ɛ́l–ɛ̀n] *I put down the mouse.*

b. [mɛ̀ ná sànj!á sj̱!–ə̱́k–ɪ̱́n] *[mɪ̱̀ nə̱́ sànj!á sj̱!–ə̱́k–ɪ̱́n] *I saw the mouse.*

(15) Subj. 1st sg. ≠Acc. Recent Past ≠ Object Noun$_{+ATR}$ # Verb Root (+ Intensive) + Applicative

a. [mɛ̀ ná hɪ̱–s!ɪ́nɪ́ p!ɛ́l–ɛ́n] ~[mɪ̱̀ nə̱́ hɪ̱–s!ɪ́nɪ́ p!ɛ́l–ɛ́n] *I put down the pot.*

b. [mɛ̀ ná hɪ̱–s!ɪ́nɪ́ sj̱!–ə̱́k–ɪ̱́n] ~[mɪ̱̀ nə̱́ hɪ̱–s!ɪ́nɪ́ sj̱!–ə̱́k–ɪ̱́n] *I saw the pot.*

II. 3. Opt PH in Demonstratives and Possessives.

Recessive demonstratives and possessives, contrary to the dominant ones (those having at least one dominant constituent), do not constitute a POH-domain, but are harmonizable by the following noun. Below is developed the series of well- and ill-formed variants of the class 3 proximal demonstrative (16), whose concord prefix is intrinsically +ATR. Its vowel is always +ATR, regardless of the ATR value of the following noun, be it either -ATR (16a), or +ATR (16b).

(16) Proximal Demonstrative. # Noun Prefix + Theme

a. [wʊ̱́ mɔ̀–kàŋà] * [wɔ́ mɔ̀–kàŋà] *this root* (cl.3).

b. [wʊ̱́ mʊ̱̀–ɲə̱̀] * [wɔ́ mʊ̱̀–ɲə̱̀] *this tomb* (cl.3).

The following examples, on the contrary, illustrate the fact that the proximal demonstrative always surfaces with -ATR vowels, when it determines a recessive noun from a class, other than classes 3, 4 & 19. The concord prefixes are here recessive (17a). When the noun itself is +ATR, the proximal demonstrative freely surfaces with + or -ATR vowels (17b), i.e. is optionally harmonized by the noun.

(17) Proximal Demonstrative. ≠ Noun Prefix + Theme

a. [pɔ́ pɔ̀lɛ̀] *[pʊ́ pɔ̀lɛ̀] *this tree* (cl.14).

b. [pɔ́ pʊ̱̀sɪ̱́] ~ [pʊ̱́ pʊ̱̀sɪ̱́] *this face* (cl.14).

The same alternation scheme holds for the anaphoric demonstrative, still with regard to underlying + and -ATR concord prefixes (18).

(18) Demonstrative Prefix + Anaphoric Marker. # Noun Prefix + Theme

a. [w̱–ɪ̱́jɪ̱́ mɔ́–kàŋà] *[w–ɛ́jɛ́ mɔ́–kàŋà] ... *this root* (cl.3).

b. [w̱–ɪ̱́jɪ̱́ mʊ́–ɲə̀] *[w–ɛ́jɛ́ mʊ́–ɲə̀] ... *this tomb* (cl.3).

c. [pw–ɛ́jɛ́ pɔ́lɛ̀] *[pw–ɪ́jɪ́ pɔ́lɛ̀] ... *this tree* (cl.14).

d. [pw–ɛ́jɛ́ pʊ̱́sɪ̱́] ~ [pw–ɪ̱́jɪ̱́ pʊ̱́sɪ̱́] ... *this face* (cl.14).

The possessives have been dealt with in sufficient detail at the end of the previous section, to see that they behave exactly the same way as demonstratives.

III. Optional Secondary Harmony.

The last harmony process is Optional Secondary Harmony (Opt SH). It has already been mentioned by JANSSENS (1988: 66, note 2), though not in full detail, in a paper mainly dealing with tone and vowel elision in Nə̀nɪ̀. It applies to a word-final vowel, which has already been POH-harmonized, and which is thus

reharmonized, hence the proposed designation of Secondary for this process.

Secondary Harmony regularly applies to the [ə–a] vowel pair only [11] ;

ATR spreads leftwards from the vowel at the right, belonging to either a POH- or to a Opt PH-domain ;

In (19), the final vowel of /nE–hɔkA/, *"the axe"*, is not harmonizable to [ə] if followed by a connective and a recessive noun (19a), but only if the connective itself is already harmonized, in application of Opt PH, by a following, +ATR noun (19b). In turn, the final [ə] of /O–mìnə̀/ is harmonizable to [a] before + or -ATR nouns (19c• & d•), but only if the connective itself remains with the default, -ATR value. This shows that Opt SH is controlled by the next vowel to the right only.

(19) Determined Noun # Connective ≠ Determining Noun

a. *[nɛ̀hɔ́ká nɪ́ mòndǫ] *[nɛ̀hɔ́kə́ nɪ́ mòndǫ] *the axe of the man.*

b. [nɛ̀-hɔ́kə́ nɪ́ mwˡ-ə́ɔ́ndụ] *[nɛ̀-hɔ́kə́nɛ́ mwˡ-ə́ɔ́ndụ] *the axe of the woman.*

c. [ù–mìnə̀ wà mwˡ–ə́ɔ́ndụ] d. [ùmìnə̀ wà mòndǫ]

c'. [ù–mìnə̀ wə̀ mwˡ–ə́ɔ́ndụ] d'. *[ù–mìnə̀ wə̀ mòndǫ]

c•. [ù–mìnà wà mwˡ–ə́ɔ́ndụ] d•. [ùmìnà wà mòndǫ] *the taro of the man.*

*[ù–mìnà wə̀ mwˡ–ə́ɔ́ndụ] *the taro of the woman.*

In (20), the final [ə] of a possessive, having an underlying +ATR constituent and thus being an independent POH-domain, is optionally reharmonized to [a] by a following recessive noun (20b).

There is a clear difference between the effect of Opt PH on recessive possessives and that of Opt SH on dominant possessives: in the former case, the two vowels of the possessive may be harmonized to +ATR by a dominant noun (see (11) above), while in the latter case, only the last vowel is reharmonizable to -ATR by the following noun (20b).

(20) Possessive # Noun

a. [hj–ə́mə́ hí–nɔ̀nì] *[hj–ə́má / hj–ámá hí–nɔ̀nì] *my bird* (cl.19).

b. [hj–ə́mə́ hj–ə̀fɔ̀] ~ [hj–ə́má hj–ə̀fɔ̀] *[hj–ámá hj–ə̀fɔ̀] *my fish* (cl.19).

(hi–AmA → (POH) hi–əmə → (Desyll.) hj–əmə → (Opt SH) hj–əma)

Opt SH may also apply in spreading +ATR directly from the dominant vowel of a POH domain. In example (21), the final vowel of the object noun reharmonizes before an opposite ATR-valued verb.

(21) [mɛ́ nd ɛ̀-tákə̀ sìn] *I see the kitchen shelf.* (EtAkA# → a# → ə#)

ATR-spreading is **symmetrical**, contrary to what happens for the Primary Harmony processes, so that a -ATR [a] may be reharmonized to [ə] by a following +ATR vowel, as in (19b, 21), as well as a +ATR final [ə] may reharmonize to [a] before a following -ATR vowel as in (19 c• & d•, 20b).

IV. The morphological status of the Preverbal Markers.

The 3 harmony rules are clearly ordered in the encoding process, since Opt PH depends on the output of POH, and Opt SH depends on the output of both POH and Opt PH. Furthermore, Opt PH must take place after the morphological word formation stage, since harmonization of preverbal markers may be triggered by completely heterogenous sequences (e.g. verb bases, object nouns and even possessives or demonstratives, if they precede a sequence [determiner + object noun].

Opt SH is quite clearly distinct from the two primary harmony processes. One could wonder, however, whether POH and Opt PH could not be the result of two conditioned applications of one and the same rule. The conditioning factor could be an optional cliticization rule, applying to preverbal markers, connectives, recessive possessives, etc. A unique, obligatory Primary Harmony rule would apply only afterwards. The cases of non-harmonization of clitics were accounted for by the optionality of the cliticization rule.

In fact, the morphemes undergoing Opt PH have to be marked lexically, in order to differentiate them from those that undergo Opt SH. An optional cliticization mark is the solution to this effect. But cliticization does not solve all the problems posed by POH and Opt PH. As shown in section I, a dominant possessive constitutes an independent POH-domain (9b & c; 10), while recessive possessives undergo Opt PH from the following noun (9a; 11). If both harmonizations were caused by one and the same (bi-directional, obligatory) rule, one would expect dominant possessives to harmonize a following recessive noun, at least optionally. In fact, this does not occur (10a).

On the contrary, dominant possessives in such an environment optionally undergo secondary harmonization of their final vowel - and only of this final vowel (sect. III, (20b)). Thus, the leftwards-only ATR spreading direction in Opt PH cannot be accounted for by a cliticization rule alone, but must in fact be considered as a distinctive feature of Opt PH, as opposed to POH.

IV. Preverbal Markers and the Vowels-in-contact Rules.

A remarkable thing is that this necessary cliticization does not always have the same effects, besides the ATR-spreading rules. This may be seen in the divergent behaviors of the subject and tense markers respectively with regard to vowel elision and desyllabification rules.

Within the word, a morpheme-final back vowel before a morpheme-initial front vowel is regularly desyllabified to a labio-velar glide, as illustrated in (22a) by a noun prefix before a vowel-initial theme, or in (22b) by a CV verb root, followed by the applicative suffix.

(22) a. /tO iɲə iɲə/ → [twǐɲíɲ] *small teeth.* NP cl.13 plur. + *tooth*

b. /sO Ak/ → [swàk] *wash.* *wash* + INTENSIVE

The tense / aspect markers, ending with the same vowel, such as /ndO/, unaccomplished present, /nO/, accomplished present, or /ŋO/, determined future, when followed by a front vowel, do not undergo desyllabification, but obligatory elision of their final vowel, as in (23). The vowel-initial word triggering the vowel elision may be the verb base (23a), as well as the object noun (23b).

(23) Subject Marker + T/A Marker ≠ (Object #) Verb Base

a. /mE ndO əmbin/ → [mí nd ə̀mbǐn] *I throw.*

b. /mE ndO EtAkA sǐn/ → [mé nd ɛ̀tákə̀ sǐn] *I see the kitchen shelf.*

Final back vowel elision before another vowel is found elsewhere in Nə̀nǐ only word-finally in nominals, though not obligatorily, and under several tonal and syllabic conditions, which have been discussed in JANSSENS (1988: 88-90). These conditions are not fullfilled by the relevant tense markers; thus, it cannot be the same rule at work in their case. However, one may consider that this elision rule is of a word-boundary sensitive type.

Other morphemes undergoing Opt PH, e.g. connectives, undergo the affixal vowel desyllabification in the same environment, see (24).

(24) /pOlE pO EmbɔmA/ → [pɔ̀ljá pw ɛ́mb!ɔ́m] *the tree of the bush.*

The most interesting phenomenon is perhaps that the subject markers ending in a back vowel such as /tO/ and /nO/, respectively 1st and 2nd plural persons, undergo vowel desyllabification as well, before a vowel-initial verb base (25a & b), and before a vowel-initial object noun (25c).

(25) a. /tO AkAn/ → [twákán] *let us go.*

b. /tO əmbin/ → [twəmb!ín] *let us throw.*

c. /tO EtAkA sin/ → [tw ɛ̀tákə̀ sìn] *we see the kitchen shelf.*

The elision of the vowel is in their case not allowed, even if they immediately precede the verb root - a position where the cliticizable final boundary of the preverbal markers sequence should have the same effect on subject as on tense markers, but in fact does not have it - insofar as vowel-in-contact rules are concerned.

The effect of this boundary is however the same as regards harmony, since in such sequences, exemplified in (26) with a consonant-initial verb, harmonization of the subject marker remains optional.

(26) /tO twən/ → [tɔ̀tw̲ə̀n] ~ [tù̲tw̲ə̀n] *we sit.*

Thus, while the harmonic behaviors of respectively the subject and tense markers remain the same in all cases, their behaviors diverge before a vowel-initial word. Since both processes (Opt PH and Desyllabification) take place after the word-formation stage only, this implies two distinct degrees of cliticization in subject and tense markers respectively.

In other words, we must assume not only that the subject and tense markers have different morphological properties, but also that these properties are still accessible after the word-formation level.

On the basis of the behaviors of their final vowels, one is tempted to say that the tense markers are radical-type clitics, while the subject markers are clitics of a prefixal type. We are thus faced in Nənì with four hierarchized morphological degrees, including affixes, roots, and two different types of clitics.

IV. The Status of the Preverbal Markers and the SOV word-order.

This difference between subject and tense markers must be the result of a historical process. In Proto-Bantu (PB), both subject and tense markers are reconstructed as affixes. The evolution from the affixal to the clitic status would be a highly unexpected one. It would have violated an apparent diachronic universal (though it does not seem to be documented in the literature), to the effect that a morpheme, once fallen to the affix status in a given syntactic use, may survive or perish, for instance as a result of phonetic erosion, but by no means recover a higher status.

Let us now consider that the basic word-order reconstructed for PB is *S-V-O, while it is S-O-V in Nənì (more precisely, S-preverbal markers-O-V), an almost unique case in Bantu languages, where apart from Nənì and the neighbouring, unclassified micro-language Nyɔʔɔn (MOUS & BREEDVELD, 1979: 189), the SVO word-order is universal. Thus, in the evolution from PB to Nənì, the object noun should have been displaced from the clause-final place, to be inserted between tense marker and verb base. This insertion would have been made within a morphological word, which appears to be another impossibility, determined by the reverse side of the same universal: if it is impossible for an affix to recover combinatory freedom from the root it attaches to, it is impossible for a word to be inserted

within another word. In Nəni, the two apparent violations of the two sides of the same prohibition have occurred at the same place. It is more than likely that a link exists between the two.

An explanation is offered by the widely accepted proposal that the tense markers of Proto-Bantu derive from earlier modal verbs. The changes having given rise to the degraded forms of the modal verbs may also have triggered changes in the word-order. For instance, the loss by the verb base of its own person, number and tense markers may have entailed an attraction of the modal verb (becoming an auxiliary) on the object, because of the preservation of its own verbal marking, thus precisely in the name of the *SVO order.

This would have yielded the sequence [Subject Prefix + Mod./Aux. Verb + Object + Verb], very close to the present situation, with only the degradation of the auxiliary to its clitic status remaining to be performed. Moreover, this change had occurred not only without breaking the SVO order, but, on the contrary, to preserve it.

The syntax of Nəni, if examined in more depth [12], gives several arguments in favor of this hypothesis.

The first argument is that in fact, not only the object is found in Nəni at the crucial place, between the tense markers and the base. The "emphatic subject pronouns" described by DUGAST (1971: 130) are compounds of two morphemes. They are used as single words before a verb in a Ø-marked tense (27).

(27) [nías, mìámɛ̀ nyɔ̀k] *"Leave it, I'll do by myself."* (DUGAST, 1971)
leave 2nd sg. IMPERATIVE – 1st sg. EMPHATIC SUBJECT – *work* SUBJECTIVE INTENSIVE

However, as is stated by DUGAST herself, although in a remote section (1971: 334-5), and in a euphemistic form: "Les pronoms emphatiques se scindent couramment en deux parties, soit dans une proposition négative, soit quand la proposition est exprimée à un temps qui demande [...] un indicateur [... ;] dans ce cas, les adverbes de négation ou les indicateurs de temps viennent s'insérer entre les deux parties du pronom".

Indeed, it appears from her own data that this split is not only "courant", but obligatory, if there is any negation or tense marker in the verb construction (28).

(28) [mɛ̀ lɛ́ nd' àmɛ́ màny] *"For my part, I do not know."* (DUGAST, 1971)
1st sg. SUBJECT – NEGATION – UNACC. PRESENT – 1st sg. EMPHATIC – *know*

This clearly points to an earlier construction, where the tense marker was a conjugated verb and the verb base the equally conjugated verb of a subordinate clause.

Secondly, a verb in the nominal form, when used as an object of another verb, is never inserted between the separable markers and the verb base, but is obligatorily postponed, thus restoring the *SVO order. This SVO order, with ordinary nouns as objects, is also found in a range of presumably archaic constructions (e.g. songs, etc.) in DUGAST's (1975) volume of oral literature.

(29) a. [bá kabiənə̀ bănáɛ balɛndolonum] *"They begot seven children."*
3rd pl. SUBJECT – REMOTE PAST *bear* – cl.2 *child* – cl.2 *seven* (DUGAST, 1975: 175)

Thirdly, Nəni makes use of modal verbs in several constructions, where they vary from the full verbal status to that of auxiliaries; moreover, this might involve consequences for the word-order.

A root such as /tik/, *"leave"*, is used in a fully auxiliary way as a subsecutivizer, the modalized verb appearing as a naked base, without even the nominalizing prefix, as in (30). The object of the base is inserted between the auxiliary and the base (30a), but shows a clear tendency to be rejected after it (30b), a tendency that might also point to a former *SVO order.

(30) a. [mùənyi na tik émàŋá tuana] *"The woman carried then the kernels."*
cl.1 *woman* – ACCOMPL. RECENT PAST – *leave* – cl.4 *kernel* – *carry* (DUGAST, 1975: 41)

b. [à ná tikə yimɔ̀tí kàk ibil] *"He cut then another bunch of palm-nuts."*
3rd sg. SUBJ. – ACC. REC. PAST – *leave* – cl.7 *one* – *cut* – cl.7 *bunch of palm-nuts* (ibid.)

A verbal root such as /pAl/, *"begin"*[13], modalizes verbal clauses, whose verb is in the nominalized form. One may find in DUGAST (1975: 79) one clause at least, where the object of the modalized verb precedes the modal verb (31).

(31) [mɛ̌lo nakà bofìa bal útìmə nân] *"The rat went over there to begin to dig*
cl.9 *rat* – PAST / REMOVING – cl.14 *pit* -- *begin* – cl.3 *dig* – *over there* *[the grave."*

Since in Nəni, the object canonically precedes the verb, this example might be, other things being equal, a case of attraction of the object by the modal verb, very parallel to that hypothesized above for the shift from *SVO to SOV [14].

Finally, it is worth saying that apart from Primary Obligatory Harmony, which is so clearly attested in Dugast's data that it could give way alone to second-hand analyses, optional harmonization is also attested in her transcriptions.

Notably, while word-final vowel secondary harmonization is scarcely attested in Dugast, connectives sometimes undergo an optional harmonization, although no case of shift from [a] to [ə] is attested, but only of other vowels.

On the contrary, the preverbal markers frequently undergo harmonization, but the most commonly harmonized vowel is by far [a], and in the rightmost vowel of the sequence only. This is just the way Opt SH applies word-finally today, whereas the preverbal markers now undergo Opt PH. Thus, Opt SH was a transposition of a former verb clitic harmonization. The verb clitics had in turn undergone an extension of the optional harmonization to all vowel pairs, probably under the influence of POH, as a further step in their degradation process.

This again seems to show that the preverbal markers sequence enjoyed then a morphological status, near to that of an independent word, of which the present situation is the trace.

If this is correct, the two problems of the two-fold cliticization of the separable preverbal markers and the long-lasting one of the SOV word-order in Nəni find here a unique solution.

NOTES

1. My best thanks are due to MOUNDOUBOU Robert, MOUTOMBI Jean, NDOUNG Pierre-Giraud, MASSALAMANDA Ernest, to the ONGMOUTOMBO family, and to all the Pənəni people who made this fieldwork not only a fruitful enterprise, but also a delightful period. Grateful thanks are also due to the LACITO (C.N.R.S.) for the material support which made this work possible.

2. I call **transharmonic** a vowel which may occur with vowels of the two sets, but is not neutral, since it takes a particular ATR value, according to the morphemes where it is found.

3. Underlinings have the following meanings: V vowel triggering harmonization; V vowel undergoing primary harmonization; V vowel undergoing secondary harmonization.

4. The specificity of the numeral prefixes may be seen at the segmental level from the class 6 numeral prefix /a/, to be compared with /ma/ in all the other forms.

5. In fact, [-lɛndɾɔmɔn] "seven" displays other exceptional peculiarities, in having the single attested occurrence of [ɾ] in the Nəni lexicon, and in allowing vowels of opposite harmonic series to co-occur in the same theme.

6. One will remark how strikingly it corresponds to the Turkana vowel harmony described by NOSKE (this volume). Turkana makes a wider use of the triple ATR opposition, the only formal difference with Nəntɨ being that Turkana displays the full set of contrasts in suffixes instead of themes.

7. My data are restricted to the plain demonstratives. In DUGAST, an emphatic form exists for each of them. According to the vowel correspondences between the data in possessives and plain demonstratives, the emphatic ones might well display the same harmonic behavior.

8. In a single example of my data, however, a recessive noun undergoes harmonization from the preceding dominant possessive.

9. This harmonization may occurr even with a recessive root, if the root had been harmonized to +ATR before, by e.g. a dominant suffix, such as the causative one.

10. This does not constitute an obvious difference between Opt PH and POH, since the obligatoriness of the latter prevents any detailed observation of ATR-spreading over its domain.

11. Here must also be mentioned a handful of exceptions, where -ATR vowels, other than [a], undergo reharmonization to +ATR [i] or [u].

12. I lack personal information on the matter, and am forced to rely on Dugast's transcriptions, which I hold for generally phonetically reliable. A fortiori, they can be confidently relied upon from the word-order point of view. DUGAST's orthography has been respected.

13. Its differs tonally from /pAl/, *"climb"*, appearing in several previous examples.

14. Most other Bantu languages also make use of modal verbs (HEINE, this volume). Among them, the case of yi-Punu (B.52), which has the classical SVO order, but allows the object to precede the verb in infinitive subordinate clauses (J. BLANCHON, pers. comm.), might be a case of the hypothesized attraction of the object by the verb of the main clause. It seems, however, to be isolated in the numerous SVO Bantu languages.

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THE TWO-DIRECTIONAL TONE MELODY SPREAD IN SUKUMA

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1. INTRODUCTION

1.1 Earlier Studies on Sukuma Tone

The tone structure of Sukuma, a language spoken by over 4 million people in north-west Tanzania and classified as F21 in Guthrie's classification of Bantu languages, was first described by Richardson (1959), followed later by Batibo (1976, 1977/85). Both studies made insightful descriptions of the tone displacement phenomenon characteristic of this language. Recent studies by Goldsmith (1985) and Philippson (forthcoming) have attempted to refine the earlier studies by using autosegmental approaches as described in Goldsmith (1982) and Clements and Goldsmith (1984).

In this paper, I will highlight the tone rules which underlay the nominals, that is the words, and especially lexical morphemes, that belong to the [+N] category. I will demonstrate that the synchronic Sukuma tone system consists of two sets of opposite LH melody spread rules which interact in order to produce the surface tone realization. The major argument in this paper is that the two sets of rules conspire to ensure that no more than one H is realized on each morpheme.

1.2 The Tone Patterns of Sukuma Nominals

Traditionally, Sukuma nominals have been tonally distinguished between the toned or marked and the toneless or unmarked at the underlying level. The toned nominals have again been differentiated between those associated with a fixed H and those associated with a shifted H (Richardson, 1959; Batibo, 1977/85). The three types are exemplified in (1) below. These forms represent all the possible underlying and surface tone patterns before pause. In our convention, an acute accent (´) will be used to indicate a fixed H; a multiplication sign (ˣ) will represent a shifted H; and a grave accent (`) will represent an extra low tone realization. All H tones are realized with a falling pitch in word-final position when followed by pause.

(1) (a) Underlying Toneless (25% of all nominals)

/ø-sa/	[sa]	'watch, clock'
/i-we/	[iwe]	'stone'
/n-kolo/	[ŋholo]	'sheep'
/n-taale/	[nhaale]	'big one' (cl.9/10)
/ma-halage/	[mahalage]	'beans'
/βa-lɪmɪlɪji/	[βalɪmɪlɪji]	'paid farm workers'

(b) Shifted H (44% of all nominals)

/wɛ̃ˣ/	[wè]	'he,him'
/n-damãˣ/	[ndamà]	'calf'
/βa-dʊgʊ̃ˣ/	[βadʊgʊ̀]	'relative'
/βa-tɛ̃mi/	[βatèmì]	'chiefs'
/n-tʊ̃mbɪ̃lɪ/	[nhʊʊmbìlì]	'monkey'
/n-kʊ̃ngʊ̃lʊ̃me/	[ŋhuungulùmè]	'cock, rooster'

(c) Fixed H (34% of all nominals)

(i)	/ɪ-mó/	[ɪmô]	'one'
	/ø-talá/	[talâ]	'lamp'
	/m-βeelé/	[mbeelê]	'breasts'
	/i-taanó/	[itaanô]	'five'
	/kɪ-dalí/	[kɪdalî]	'sternum'
	/n-ʃilikalé/	[nʃilikalê]	'policeman, soldier'
	/ø-suluβalé/	[suluβalê]	'pair of trousers'
(ii)	/i-gópo/	[igópò]	'cup'
	/i-βalaβála/	[iβalaβálà]	'road'
	/ø-kasógone/	[kasógònè]	'gonorrhea'
	/ø-sákambulɪ/	[sákaambùlì]	'hiccup'
(iii)	/ma-dʊʊtʊ/	[madʊútù]	'leaves'
	/ø-βaángili/	[βaángìlì]	'bracelet'
	/ø-ameélika/	[ameélìkà]	'America'
(iv)	/ø-kúʊlɪ/	[kúʊlɪ]	'monitor lizard'
	/ø-tʉ́ʊnge/	[tʉ́ʊnge]	'bat'
	/i-páanga/	[ipáanga]	'matchet, bush knife'
	/βʊ-láaʃi/	[βʊláaʃi]	'brush'
	/ø-sogóoni/	[sogóoni]	'market place'

1.3 The H Shift phenomenon

Sukuma data is noted for what has been described as a H tone shift rule which displaces an H from its original TBU (tone bearing unit). The displaced H shifts from the original TBU to the third TBU on the right, if it is within the same word. If there remains less than two TBU's before the end of a word, then, unless constrained by another H in the environment, it will surface on the second TBU of the following word. These rules are shown in (2) below:

(2) a. k-βon-el-a ---> kʊβonela [kʊβonelâ] 'to see by means of'

H H

b. kʊ-βon-a ma-halage ---> kʊβona mahalage [kʊβona mahálage] 'to see some beans'

H H

c. n-dʊgʊ geete ---> ndʊgʊ geete [ndʊgʊ geetê] 'a true relative'

H H

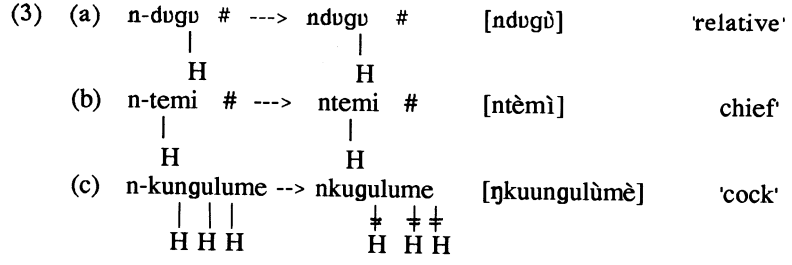
d. n-temi geete ---> ntemi geete [ntemi geetê] 'a real chief'

H H

It should be stated right at the outset that the TBU in Sukuma neither corresponds to the syllable nor to the mora. A long syllable in which the two moras are tonally identical is considered as one TBU; while a long syllable in which the two moras are not tonally identical (one may be potentially H as it is the case of extensions) is regarded as having two TBU's.

1.4 The EL (Extra Low) Realization:

If an H is shifted from a penultimate or final TBU before pause, the TBU concerned will be realized as EL, transcribed in this study with a grave accent. Whenever an L on a penultimate TBU has to be realized as EL, the L on the final TBU will also be realized likewise. At the moment, we shall consider the 'shifting' phenomenon as a delinking of H from its original syllable. This process is shown in (3) below:



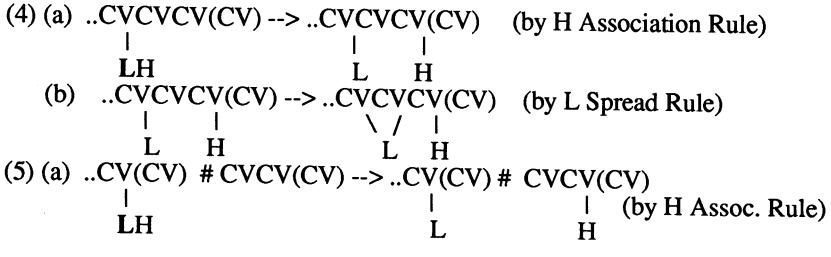
2. THE TWO-DIRECTIONAL TONE MELODY SPREAD RULES

2.1 The LH Spread Rules

In this study, I shall treat the H shift phenomenon as an LH melody spread. This is because H does not shift completely from its original TBU but rather extends in such a way that the H part surfaces on the third TBU while the L part remains to block any H from the left from associating with the original TBU. As will be demonstrated in this section, the LH melody spreads both ways, where the L part is fixed, the H part will extend rightward, and where the H part is fixed, the L part will extend leftwards. In order to distinguish between the two types of spreading, we shall mark the rightward melody as LH and the leftward melody as **LH** (the bold letter will indicate the fixed part).

2.2 The **LH** Melody Spread Rules:

The **LH** spread phenomenon, illustrated in (2) above, could be captured by the rules shown in (4) below.



(b) ..CV(CV) # CVCV(CV) --> CV(CV) # CVCV(CV)
L H L H (by L Spread Rule)

According to the rules in (4) above, the H of **LH** contour associates with the third TBU on the right, and then the L part associates with the second TBU. Where there are not enough TBU's on the same word then Rule (5) operates. In this case the H of **LH** will associate with the second TBU of the following word. Then the L part will associate with the remaining TBU's on the right. However, there are other tone characteristics which cannot be handled by the rules in (4) and (5), as shown in (6) below:

(6)
ø-sakambʊlɪ geete --> sakambʊlɪ geete [sákaambʊlɪ geetê] 'a true hiccup'
LH H **L** H

What happens in (6) can be explained by the rules in (7). The cross sign (+) represents a morpheme boundary.

(7) (a) +CVCVCVCV+ # CVCV --> +CVCVCVCV+ # CVCV
LH **LH** **LH** (**LH** Derivation Rule)
(b) +CVCVCVCV+ # CVCV --> +CVCVCVCV+ # CVCV
H **LH** H L H (H Assoc.)
(c) +CVCVCVCV+ # CVCV --> +CVCVCVCV+ # CVCV (L Spread)
H L H H L H

As shown in Rule (7a), an **LH** melody derives or triggers an **LH** melody on the following TBU, if the latter is within the same morpheme. On the other hand, Rule (7b) indicates that the H of **LH** contour does not associate with the third TBU on the right, instead it crosses into the next word and links to the second TBU. One important motivation of rule (7) is to prevent the occurrence of two H's on the same morpheme. The example from one of the newly acquired multisyllabic loanwords presented in (8) will serve as further evidence.

(8) (a) ø-telegilaamu ɪyɪ --> telegilaamu ɪyɪ (Rule 7a) 'this telegram'
LH **LH** **LH**
(b) telegilaamu ɪyɪ --> telegilaamu ɪyɪ (Rule 7b)
LHLH LH L H
(c) telegilaamu ɪyɪ --> telegilaamu ɪyɪ (Rule 7c)
H L H H L H

2.3 The LH Melody Spread Rules:

The H association restriction described in (7a) above also takes place, in somewhat different ways, leftwards. In this case, the L part of LH stretches leftwards to associate with the first TBU of the respective morpheme. The basic rules of the LH melody are shown in (9) below:

(9) (a) +CVCVCVCV(V)(CV)+ --> +CVCVCVCV(V)(CV)+ (L Assoc. Rule)
LH L H

(b) +CVCVCVCV(V)(CV)+ --> +CVCVCVCV(V)(CV)+ (L Spread Rule)
L H L H

One important effect of Rule (9) is that no H from an LH of a previous morpheme can associate with the morpheme already linked by L, as exemplified in (10) and (11) below:

(10) (a) ku-βon-a ø-suluβale --> kuβona suluβale 'to see a pair of trousers"
LH LH LH L H

Rule (9)

(b) kuβona suluβale --> kuβona suluβale [kuβoná suluβalê]
LH L H L H L H

(11) (a) ku-βon-a i-βalaβala --> kuβona i-βalaβala 'to see a road'
LH LH LH L H LH Rule (7a) and (9)

(b) kuβona i-βalaβala --> kuβona i-βalaβala [kuβoniíβalaβálà]
LH L H LH L H L H LH

However, the leftward spread of the L of an LH melody is subjected to many specific conditions, all connected with the position of the TBU in the morpheme to which the LH is initially linked. Consider, for example, the cases in (12) below:

(12)(a) ku-βon-a kɪ-dali-->kuβona kɪdali [kuβoná kɪdalî]'to see a sternum'
LH LH L H L H *[kuβona kídalî]

(b) ku-βon-a ma-gunɪla -->kuβona magunɪla [kuβona mágunílà] 'to see sacks'
LH LH L H LH LH *[kuβoná magunílà]

(c) ku-βon-a ma-goodi -->kuβona ma-goodi [kuβona mágóodi] 'to see shirts'
LH LH L HLH Also [kuβoná magóodi]

(d) ku-βon-a ma-duʊtu --> kuβona madʊʊtu [kuβona mádʊútù] 'to see leaves'
LH LH L H LH LH *[kuβoná madʊútù]

The somewhat peculiar conditions found in (12a), (12b), (12c) and (12d) above can, in fact, be summarized by Rules (13a) and (13b) below:

(13) (a) #..CV+CVCV+ --> #..CV+CVCV+

| \ / |

LH L H

(b) # ..CV+CV(C)VCV(CV) --> #..CV+CV(C)VCV(CV)

| | |

LH L H

Thus, across morpheme boundary, the L of **LH** associates with two TBU's if the H component is in morpheme-final position, but with only one TBU if the former is in a position other than final. Rule (14) below shows that there is an option for the L of **LH** to be deleted if the H is in morpheme-initial position on the first mora of a long syllable. This then permits an H from a preceding **LH** contour to link with the TBU immediately preceding the TBU associated with the H.

(14) +CVVCV --> + CVVCV (L Deletion Rule)

| |

LH LH

3. FURTHER OBSERVATIONS:

The incidence of the two-directional tone melody spread and the many specific rules attached to each type give rise to a number of theoretical and historical issues connected with the Sukuma data. Some of the important ones are discussed below.

3.1 The Essence of the two-directional Spread:

At the lexical level, Sukuma nominals could be described as belonging to one of the three types shown in (15) below.

(15) (a) CVCVCV (b) CVCVCV (c) CVCVCV

LH(LH) **LH**

Category (15a) represents the toneless nominals, that is those nominal morphemes which are not associated with any tone melody at the underlying level. They become associated with a default L at the surface level. Categories (15b) and (15c) represent marked nominals, that is, nominals in which at least one of their TBU's is associated with either **LH** or **LH**. While more than one **LH** contours may associate with a given morpheme, only one **LH** can be associated with a morpheme. As we saw above, the rules of **LH** will always have precedence over those of **LH**, as the former operate normally within the boundaries of a morpheme, while the latter nearly always transcend such boundaries.

Clearly the two tone spread types have a lot in common in that apart from the fact that they both conspire to disallow the surfacing of more than one H in the same morpheme, they ensure that any H in an adjacent syllable surfaces at least one L (one TBU) away from a prevailing H. In fact, the **LH** Derivation Rule presented

in (7a) above could have originated from the same condition of restricting the occurrence of another H on the right. The one L condition for the H is presented in rule (16) below.

(16)
```
CVCVCV
 |  |  |
 H  L  H
```

The general condition demonstrated in (16) gives rise to a well-graded LHLHLH pattern which tends to be realized with a downdrift in Sukuma. On the other hand, as we saw in (12c) above, the succession of two H's is acceptable across morpheme boundary if the second H is linked to the first mora of a long syllable.

Other cases in which more than one H is associated with one morpheme are found in former compounds whose constituent stems are no longer separable. Some of these compounds are exemplified in (17) below:

(17)	/ø-βaláβaapú/	'butterfly'
	/ø-kɪtwangaβúleénde/	'camel'
	/ø-kɪdʊʊndúfiilú/	'kind of insect with big stomach'
	/ø-kasungúseelyá/	'praying mantis'

Another case where two H's can coexist on the same morpheme is where intonational surface rules bring two H's on a given morpheme. This is exemplified in (18) below:

(18)		yo súluβalê!	'That is truly a pair of trousers!'
		yo súluβále?	'Is that a pair of trousers?'
	But:	yó suluβalê.	'That is a pair of trousers.'

Also, an H may surface on a morpheme already associated with H if the former is restricted from crossing into another morpheme. This is exemplified in (19) below.

(19)	sákaambulí gàʃì	'It is a really hiccup'
	télegilaamú fà	'It is indeed a telegram'

3.2 The Interplay Between Tonology and Morphology

One important feature about the specific rules described above is that they are, to a large extent, dependent on the position of the TBU in the morpheme or syllable. The position may be morpheme-final vs. non-final, or first vs. second mora of a syllable. This morphological and syllabic dependency tends to go against the classical tone rule association conventions in which segments and tones are expected to link on a one-to-one basis without any reference to morphological or syntactic information.

Another related fact is that, in multisyllabic Sukuma loans, the LH has invariably associated with the first mora in a long penultimate syllable, but with the second mora in a long antepenultimate syllable. This is exemplified in (20) below. The stress in this case was interpreted as a high tone in penultimate or final syllable.

(20)	/ø-filíimbi/	'flute'	(Sw. fi'liimbi)[4]
	/ø-βasikéeli/	'bicycle'	(Sw. basi'keeli)
	/ma-dafáali/	'bricks'	(Sw. mato'faali)
	/ø-sanáamu/	'statue, picture'	(Sw. sa'naamu)
	/ø-deléeva/	'driver'	(Sw. de'reeva)
	/ø-kaláamu/	'pen, pencil'	(Sw. ka'laamu)
	/ø-lúula/	'ruler'	
	/βʊ-áya/	'wire'	
	/ø-giláasi	'glass'	
	/βʊ-swíizi/	'Switzerland'	
	/ø-βúuʃi/	'Bush'	

But:

/ø-ameélika/	'America'	
/ø-loóndoni/	'London'	
/β-hoolaandi/	'Holland'	
/ø-meételo/	'metro'	
/ø-leédiyo/	'radio'	
/ø-moódoka/	'car'	(Sw. moto'kaa)
/ø-paádili/	'priest'	
/ø-paásita/	'pastor'	
/ø-leégaani/	'Reagan'	

3.3 The Complex Historical Development of Sukuma

As a general rule, most of the nominals associated with the **LH** contour belong to the old stock of Sukuma vocabulary, and those associated with the **LH** belong to latter adoptions. The former comprises more than 44% and the latter about 34% of the nominals in the language. In some cases, the same Proto-Bantu term may appear in Sukuma under two reflexes, one representing the old or authentic form and the other an adoption from another Bantu (Swahili or neighbouring) language. A few such examples are demonstrated in (25) below.

(21)	Authentic		Recent Adoption	
	/n-cũ̃βa/	'beer calabash'	/ø-cupá/	'bottle'
	/ø-ʃ̃íkʊ/	'days'	/lʊ-ʃíkʊ/	'day of 24 hours'
	/ø-sukũ̃ma/	'north'	/n-sukúma/	'a Sukuma speaker' (Northerner)
	/kʊfunga/	'to open'	/kʊfungʊlá/	'to close'
	/ø-dakã̃ma/	'south'	/n-dakáma/	'a Nyamwezi speaker' (Southerner)

Moreover, in the case of **LH**-associated vocabulary, the more recent stock is the one in which the **LH** is linked to the first mora of a long syllable as in (1c(ii)) above. Most of these terms are either Swahili or English loans, or terms which are not found in the other related languages in the area. This would suggest that the Sukuma people acquired them upon arrival on the southern shores of the lake which is now known as Lake Victoria. On the other hand, the stock in categories (1c(i),

(1c(iii)) and (1c(iv)) is, generally, the intermediate vocabulary. Moreover, other observations could be made in connection with the recent loans in Sukuma:

First, a number of nominals were borrowed as toneless lexical items. These terms cannot be distinguished from the authentic Sukuma stock. Examples of such nominals include /kɪ-taβo/ 'book' (from Arabic through Swahili) and /kɪ-tanda/ 'bed' (from Swahili).

Second, some authentic lexical items like /m-βeelé/ 'breast' and /i-taanó/ 'five' are associated with **LH** because the shifted H failed to cross the boundaries of the morpheme. Conversely, there are at least two new terms which are associated with **LH** contour. These are /n-sa la βa/ 'Cross' (from Arabic through Swahili) and /ø-muse̩e le/ 'bishop' (apparently from French). One possible explanation of these exceptions is that the two words were pronounced strangely by the French missionaries.

Third, there are recent adoptions such as /i-gópo/ 'cup' (from English through Swahili) and /i-βalaβála/ 'road' (from Swahili) in which the H (representing stress in the language of origin) has surfaced on a short, usually penultimate vowel.

Thus, Sukuma nomianls could be categorized according to how far H has shifted from the original syllable to cause an **LH** or **LH** melody. The process may have involved two (old stock) or one (intermediate stock) TBU shift, or no shift at all (recent stock). Examples of the three categories are presented in (22) below.

(22)	Original Association	New Association	
	(a) Old Stock		
	/i-táano/	/i-taanó/	'five'
	/m-βéele/	/m-βeelé/	'breast'
	(b) Intermediate Stock		
	/ø-tála/	/ø-talá/	'lamp'
	/ø-cúpa/	/ø-cupá/	'bottle'
	(c) Recent Stock		
	/i-gópo/	/i-gópo/	'cup'
	/i-βalaβála/	/i-βalaβála/	'road'
	/i-góodi/	/i-góodi/	'shirt'
	/ø-lúula/	/ø-lúula/	'ruler'

The categories shown above should be treated as a general impression of historical development, and should not be associated with any strict chronological events, as the H shift rule may have affected the vocabulary in different ways.

4. CONCLUSION

This paper was concerned with the description of the two tone melody spread types which characterize Sukuma nominals. It has been demonstrated that each type presents a number of conditions and restrictions, many of which are language-specific. Many of the rules are morphologically dependent, and some of them may not seem to conform to the standard autosegmental framework. This is clearly one feature which led Richardson (1959) to state that some of the rules in Sukuma were difficult to bring to systematization.

One of the Sukuma restrictions described by Goldsmith (1990:18) is that 'no High tone in Sukuma can be associated with more than one vowel'. This condition could, in fact, be generalized to present a restriction of the surfacing of any two H's on the same morpheme and the succession of two H's on adjacent TBU's. One effect of this restriction has been the creation of the **LH** Derivation Rule presented in (7a) above. This rule triggers an **LH** melody whose effect is to displace the H at least three syllables away from the preceding H.

The other related issues which have been highlighted in this paper include the realization of the **LH** contour before pause in final or penultimate positions. Also the tone pattern of loanwords was described. It was seen that one of the major reasons the Sukuma tone system is so complex is because of substantial inflow of foreign words that have entered at different periods and therefore caused different tone patterns.

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Vowel Height Assimilation in Bantu Languages

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1. Introduction

The linguistic study of a population of closely related languages offers interesting possibilities for observing minimal patterns of variation across the same or very similar structural conditions. From this point of view, the Bantu languages offer especially rich materials for the study of vowel height and other phonological processes. While their vowel systems are quite similar at the level of underlying representation, at the surface they show subtle differences in respect to how vowels of different heights may be sequenced within the stem or word. The study of these differences can shed light on the formal representation of vowel height in phonological feature theory.

Many Bantu languages preserve the 7-vowel system of Proto-Bantu in which vowels are arrayed in four heights, as shown in (1a). Others have reduced this to a 3-height system, usually through the merger of the two highest ranks, as shown in (1b).

(1) Bantu vowel systems:

	a. 7-vowel (Proto-Bantu, Kikuyu, etc.)		b. 5-vowel (Runyakore, Luganda, etc.)	
height 4:	ị	ụ		
height 3:	i	u	i	u
height 2:	e	o	e	o
height 1:	a		a	

In most Bantu vowel systems, phonological rules of height assimilation typically create striking patterns of alternation. One very common pattern, described by Greenberg (1951) and attributed to Proto-Bantu by Meeussen (1967), is illustrated below. In this pattern, the first vowel of a stem determines the height of subsequent vowels: [i] is lowered to [e] after [e] and [o], and [u] is lowered to [o] after [o]. For example, in the 7-vowel system of Kikuyu, the applied suffix, which elsewhere has the form [-ir], appears as [-er] after either of the height 2 vowels, as shown in the second column in (2). (Tones are omitted in these and all following examples, since they are irrelevant to the rules under discussion.)

(2) vowel height alternations in Kikuyu:

tɨɣ-ir-a	'stop for'	ker-er-a	'chop for'
rʉt-ir-a	'work for'	ror-er-a	'look at'
rih-ir-a	'pay for s.o. else'		
kum-ir-a	'rebuke for'		
ɣamb-ir-a	'bark at'		

The same alternations are found in languages like Runyakore which have reduced the original seven vowels to five. The comparable alternations are shown in (3):

(3) vowel height alternations in Runyakore:

hik-ir-a	'reach for, arrive'	reet-er-a	'bring for'
kub-ir-a	'fold for'	kor-er-a	'work for'
gamb-ir-a	'say to'		

Using the classificatory scheme in (1), we can generalize over these cases as follows: height 3 vowels are lowered to height 2 after height 2 vowels, except that a back vowel is lowered only after a back vowel.[1]

Most recent treatments of vowel height in Bantu have described vowels in terms of the binary features [high] and [low]. In other respects, however, analyses have differed. For example, in systems with four vowel heights, the height 3 vowels have sometimes been treated as [+high] and sometimes as [-high]. This disagreement is reflected in the widespread use of two different transcription systems for Bantu vowels. One transcribes the highest four vowels as /ɨ ʉ i u/ as shown in (1), implying that the height 3 vowels are high. The other transcribes them as /i u e o/, implying that they are mid. Furthermore, while the height 2 vowels have been most often treated as [-low], some analysts have characterized them as [+low] (see section 5). A further problem arises from the fact that the features [high] and [low] only characterize three heights, due to the fact that [+high] cannot combine with [+low]. An additional feature is required to characterize the fourth height of languages like Kikuyu. Many linguists have used [ATR] for this purpose, but others have used [tense]. As a result of these (and other) disagreements, there does not yet exist a uniform model for the representation of vowel height in Bantu.

The aim of this paper will be to seek an improved model of vowel height for Bantu languages. Based on a study of several representative patterns of height assimilation, it will suggest that vowel height can be regarded as a uniform phonetic and phonological parameter, characterized in terms of a single, binary feature [open]. This approach differs both from the standard feature system discussed above, in which vowel height is described in terms of several formally unrelated features such as [high] and [low], and from alternative models in which vowel height is characterized in terms of one-valued features,

also called particles (see, for example, Schane 1984). The new approach is described in the next section.[2] The following sections apply it to several different Bantu vowel height systems, and show that it provides a straightforward account of several different types of assimilation processes, while allowing a uniform characterization of vowel height across superfically different systems.

2. A Hierarchical Model of Vowel Height

In the model proposed here, vowel height forms a uniform phonological dimension, which we may designate by the feature [open]. This dimension can be viewed as defining an abstract phonological "space" which is divided into a series of regions, or *registers*. The first level of division partitions the space into two *primary* registers. Either (or both) of these primary registers can then be divided into two *secondary* registers. Either (or both) of the secondary registers can then be subdivided in turn, and so on. This conception is informally schematized in Figure 1:

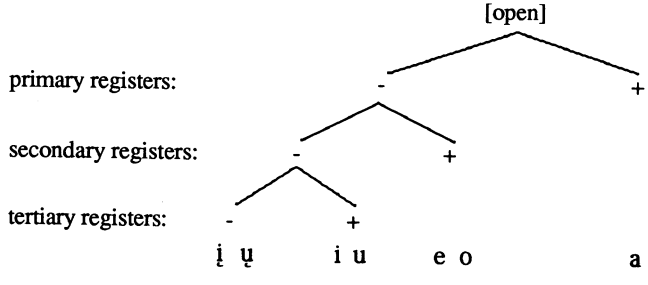


Figure 1: A hierarchical conception of vowel height.

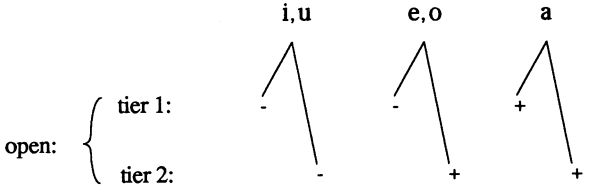
At the top of this diagram we see a split of the vowel height space into two primary registers, designated by the features [-open] and [+open]. Vowels can be assigned to either of these primary registers. If no further distinctions are made, we have a 2-height vowel system such as Classical Arabic /i u a/, in which the [-open] vowels are /i u/ and the [+open] vowel /a/. If one of the two primary registers is futher divided to form two secondary registers, we have a 3-height system. In Classical Latin, for example, the higher primary register, designated by [-open], is subdivided into two secondary registers, creating the 3-height system /i u e o a/. And registers can be further subdivided to create successive new subregisters, yielding 4-height systems (such as that of Italian or Yoruba) and eventually 5-height systems (such as that of the Sotho languages, discussed below).

In principle, since vowel height constitutes a uniform phonetic dimension, there is no upper limit on the number of subregisters that may be created. In reality, however, 5-height systems seem to constitute a *de facto* upper limit, due most likely to inherent limits

on the ability of the auditory system to resolve differences between sounds that approach a perceptual threshold.

I will call this conception a *hierarchical* model of vowel height. In order to formalize this model in terms of current multi-tiered feature theory, we may array the binary feature [±open] on several autosegmental tiers, assigning each a rank from 1 to *n*. The feature [±open] arrayed on a tier with any rank *i* assigns a vowel to one of the two registers characterized at rank *i* of the hierarchy. Thus, the feature [+open] on tier 1 assigns a vowel to the lower of the two primary registers, while [-open] on this tier assigns it to the higher primary register. The same features on tier 2 assign vowels to the lower or higher of the secondary registers, and so forth. This model is illustrated in (4), which represents the vowels of Latin:

(4)



In this diagram, the nonlow vowels /i u e o/ are assigned to the higher of the two primary registers, designated by [-open] on tier 1. Within this primary register, the high vowels /i u/ are assigned to the higher of the two secondary registers, and /e o/ are assigned to the lower one. /a/ is assigned to the lower of the two primary registers, and (redundantly) to its lower (and only) secondary register, indicating that it is the lowest possible vowel in the system, phonologically speaking.

For convenience, we will hereafter designate any occurrence of the feature [±open] on tier *i* as [±open$_i$]. Thus, for example, [+open$_2$] designates an occurrence of [+open] on tier 2.

Natural classes are defined by identical feature specifications along any tier. Thus in (4), /i u e o/ constitute a natural class since they are characterized by the feature [-open] on tier 1, and similarly, /e o a/ constitute a natural class since they are characterized by [-open] on tier 2, even though they belong to different primary registers.

The logic of this system requires that a vowel can only be characterized for a lower register if it is also characterized for the higher register of which the lower register is a subdivision. We may formalize this requirement in terms of a universal implication [open$_i$] → [open$_{i-1}$], which states that the presence of a lower-ranked feature in a vowel implies the presence of a feature of the next higher-ranked category. Thus if [αopen$_i$] characterizes a vowel, for some value of α, [βopen$_{i-1}$] must be present as well, for some (not

necessarily identical) value of β. To put it another way, the presence of a feature of any lower register in a vowel "activates" all the higher registers. (This means, for example, that a vowel cannot be characterized for [+open$_2$] unless it is also characterized for some value of [open$_1$].)

In this model, the prototypical Bantu 7- and 5-vowel systems given in (1) can be characterized as shown in (5). (Association lines are omitted here for convenience.)

(5) the feature representation of vowel height systems:

a. 4-height systems :		i̱ u̱	i u	e o	a
(primary registers)	open$_1$:	-	-	-	+
(secondary registers)	open$_2$:	-	-	+	+
(tertiary registers)	open$_3$:	-	+	+	+
b. 3-height systems:			i u	e o	a
(primary registers)	open$_1$:		-	-	+
(secondary registers)	open$_2$:		-	+	+

Vowels are given here in fully-specified form with all redundant values filled in, showing how they would appear in surface representations if no feature-changing rules applied to them. In agreement with most current work (e.g. Clements 1987, Archangeli 1988), however, I assume that vowels are underspecified in underlying representations, and receive their surface values through the operation of redundancy rules. Thus, for example, [+open$_2$] and [+open$_3$] are redundant in [+open$_1$] (low) vowels, since [+open$_1$] entails both [+open$_2$] and [+open$_3$]. Accordingly, these features will not appear in underlying feature representations, and will be introduced in the course of derivations through the operation of redundancy and default rules. I will discuss underspecification below whenever it is relevant to the discussion.

As (5) shows, 3-height systems are analyzed in the same way as the Latin vowels shown in (4). In feature terms, 3-height systems form a strict subset of 4-height systems, and are derived from them by eliminating [open$_3$] from vowel representations.

Since [open] is a binary feature, any vowel can be characterized as either [+open] or [-open] on each tier. In a multitiered model of the sort proposed in Clements (1985, in press) and Sagey (1986), this means that each vowel is potentially able to trigger rules of assimilatory lowering (by spreading the feature [+open]) and assimilatory raising (by spreading [-open]). In contrast, if [open] were treated as a one-valued feature [+open], as in theories of particle phonology (Schane 1984), we would predict that only lowering assimilation could take place. Both types of assimilation occur in Bantu languages, as we will see below.

By imposing a hierarchy on the registers, we express the view that some are more fundamental to a system than others. The more basic registers, such as the primary

registers which distinguish the low vowels from all others, are typically those that involve the most salient distinctions and that prove the most resistant to historical merger and synchronic neutralization. In contrast, the less basic registers, such as the tertiary registers which differentiate the height 4 and height 3 vowels, are often less well separated in perceptual terms, and are frequently neutralized by historical mergers and by synchronic rules and constraints.

If we adopt the model in (5), these patterns of merger and neutralization can be expressed as the loss of a lower-ranked feature category, such as [open$_3$], from the set of distinctive features. For example, as noted earlier in connection with (1), 4-height systems typically simplify to 3-height systems through the merger of vowel heights 3 and 4 (that is, **ɪ ʊ i u > i u**). The model in (5) allows us to express this merger in terms of the loss of [open$_3$], designating the tertiary registers.

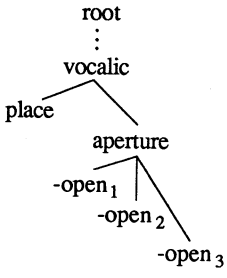
We also find synchronic mergers in certain contexts. For example, the noun class prefixes are reconstructed with only the four vowels /**ɪ i u a**/ in Proto-Bantu (Meeussen 1967), and /**ɪ**/ is eliminated from these prefixes in many modern Bantu languages, leaving only three vowels /**i u a**/. This system is also found in some suffix classes.[3] We can represent such reduced systems by eliminating both of the lower-ranked registers, leaving only the primary registers, as shown in (6) (/I U/ are written in upper case to indicate their archiphonemic status in these systems):

(6) reduced 3-vowel system:		I	U	a
(primary registers)	open$_1$:	-		+

(Here as in (5) both values of [open$_1$] are given, although strictly speaking [-open$_1$] is redundant, being predictable from the other features of /I/ and /U/.)

Let us consider now how the feature [open] can be integrated into a multi-tiered model of feature representation of the sort proposed in Clements (1985), Sagey (1986) and much subsequent work. I suggest that each occurrence of the feature [open] links directly to an *aperture* node, which links in turn to the *vocalic* node. This conception is illustrated in (7), which represents the vowel [ɪ] in the 4-height system shown in (5).

(7)

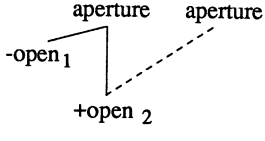


Other vowel features (not shown here) link to the place node, although the internal structure of this node is not crucial to the present discussion. Given the model in (7), we predict that any node can spread. Thus, for example, we expect that any occurrence of [open] can spread, as well as the aperture (and place) nodes themselves. These predictions are well supported by Bantu data, as discussed below.[4]

In an alternative view, one might suggest that the various tokens of [open] are linked not as sisters (as in (7)) but one under another, forming a chain. This view would be attractive, since it would express the hierarchical ranking of each feature [open$_i$] directly: the higher the feature, the higher its rank. However, such a model would predict that the spread of any feature [open] entails the concomitant spread of all features linked under it. This prediction appears to be wrong. The evidence provided by scalar rules, to be discussed in more detail in section 3, shows that the spread of a higher-level feature, such as [open$_1$], crucially does *not* entail the spreading of lower-ranked features, such as [open$_2$] and [open$_3$]. In contrast, all evidence discussed in this paper is consistent with the predictions of the model in (7), and accordingly we will continue to assume this model in the rest of the discussion.

In this model, then, the height assimilation rules illustrated in (2) and (3) can be given a unified statement as follows:

(8) Bantu Vowel Lowering (7- and 5-vowel systems):



conditions:
(i) stem domain
(ii) structure-preserving

This rule applies to the feature characterizations in (5), spreading the feature [+open$_2$] from a height 2 vowel to a following vowel in the same stem. In both 7- and 5-vowel

systems, it will lower the height 3 vowels [i u] to height 2 [e o]. Vowels of lower heights are of course not changed, since they are [+open$_2$] already.

Condition (i) restricts the rule to the stem domain. Condition (ii) requires it to apply in a structure-preserving fashion, that is, in such a way that it does not create feature combinations not already present at the level at which the rule applies. (This condition is intended as a shorthand way of saying that the rule to which it is attached belongs to a stratum at which the marking conditions governing underlying feature combinations are still in force; see Kiparsky (1985) for fuller discussion.) Without this condition, the rule would apply too generally, lowering height 4 vowels as well as height 3 vowels. With this condition, however, the rule cannot apply to height 4 vowels since the feature combination that would result, namely [+open$_2$, -open$_3$], does not occur at this level.

We have tacitly assumed up to this point, crucially to the analysis, that the low vowels of Bantu constitute a separate height, distinct from that of the mid vowels [e o]. This decision stems in part from the fact that low vowels typically do not trigger height assimilation rules such as rule (8). This behavior is directly expressed in our analysis by assigning low vowels a separate height ([+open$_1$]), and explicitly excluding them from the domain of height assimilation rules.[5] We will see independent evidence for the treatment of low vowels as a separate height in our discussion of scalar rules in section 4.

In sum, given the analysis of Bantu vowels proposed in (5) above, rule (8) accounts for the patterns of vowel alternation found in both 7- and 5-vowel systems.

3. Total Height Assimilation in Kimatuumbi

Now that we have examined the most general pattern of vowel height assimilation in Bantu languages, let us consider several more idiosyncratic patterns.

One interesting example, illustrating *total* height assimilation (assimilation of all vowel height features), comes from Kimatuumbi, a Bantu language of Tanzania described by Odden (1989, 1990). In this language, stem-initial vowels are drawn from the full set of seven given earlier in (5a), while medial vowels are drawn from the reduced set of three given in (6). These feature characterizations are repeated below for convenience:

(9) Kimatuumbi vowels

a. stem-initial:

	ɨ ʉ	i u	e o	a
open$_1$:	-	-	-	+
open$_2$:	-	-	+	+
open$_3$:	-	+	+	+

b. stem-medial:

	I U	a
	-	+

The height assimilation rule causes a nonlow suffix vowel to acquire the height of a preceding nonlow vowel (not just of a height 2 vowel, as in the more widespread Bantu rule (8) discussed earlier). It applies only within the domain of the stem. As in the case of rule (8), which may be its ancestor, this rule does not cause /U/ to assimilate to /e/. In contexts where this rule does not apply, such as following a low vowel, noninitial /I/ and /U/ are realized as [ɪ̨] and [ʊ̨]. Thus we find the following realizations (tones are omitted):

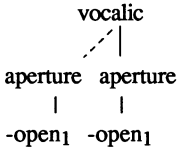
(10) Kimatuumbi height assimilation:

underlying:	*surface:*	*example (stem):*	
ɪ̨ + I	ɪ̨ + ɪ̨	yɪ̨pɪ̨lya	'thatch with for'
ɪ̨ + U	ɪ̨ + ʊ̨	lɪ̨bʊ̨lwa	'be ground'
ʊ̨ + I	ʊ̨ + ɪ̨	ʊ̨tɪ̨ka	'be pullable'
ʊ̨ + U	ʊ̨ + ʊ̨	yʊ̨pʊ̨lwa	'be served'
i + I	i + i	twikilwa	'be lifted' (of a load)
i + U	i + u	tikulya	'break with'
u + I	u + i	ugilwa	'be bathed'
u + U	u + u	kumbulya	'beat with'
e + I	e + e	cheengeya	'make build'
e + U	e + ʊ̨	kwemʊ̨lya	'comb'
o + I	o + e	boolelwa	'be de-barked'
o + U	o + o	bomolwa	'be destroyed'
a + I	a + ɪ̨	asɪ̨mɪ̨lwa	'be borrowed'
a + U	a + ʊ̨	tyamʊ̨lya	'sneeze on'

In order to account for the total height assimilation, both [open$_2$] and [open$_3$] must spread. We do not want to spread [open$_3$] by a separate rule, since as Odden points out, the proposed new rule would have to apply under exactly the same conditions (and have the same set of exceptions) as the rule spreading [open$_2$]. Nor can we modify rule (8) by stipulating that *both* of these features must spread, since [open$_2$] and [open$_3$] do not by themselves form a single constituent in phonological representations (cf. (7)); in the framework assumed here, assimilation rules apply only to single constituents (Clements 1985).

An alternative is available, however, if following Odden's original analysis, we allow the entire aperture node (or height node, in Odden's terminology) to spread, holding all other conditions constant. The revised rule is stated in (11).[6]

(11) Kimatuumbi Height Assimilation:



conditions:
(i) stem domain
(ii) left-to-right

This rule spreads an aperture node characterized by the feature [-open$_1$] to a vocalic node characterized by the same feature. The second aperture node then delinks as a result of a general convention disallowing branching configurations (Clements 1990). Since it is the aperture node itself that spreads, rather than any single feature, height assimilation is total.

Let us compare this feature analysis with an analysis using the traditional features [high] and [low]. Since these two features can only characterize a maximum of three vowel heights, they are not adequate by themselves to characterize a 4-height system such as that of Kimatuumbi. In order to express four vowel heights, standard frameworks must introduce an additional feature such as [ATR], as shown below:

(12)	i̱ u̱	i u	e o	a
low	-	-	-	+
high	+	+	-	-
ATR	+	-	-	-

It will easily be seen that both analyses predict exactly the same set of natural classes. Thus, comparing this chart to the one in (9), we see that [αlow] corresponds to [αopen$_1$], [αhigh] to [-αopen$_2$], and [αATR] to [-αopen$_3$]. How, then, can these two analyses be distinguished?

To answer this question, let us consider the formal nature of assimilation more closely. Current phonological theory requires assimilation rules to be expressed in terms of node *spreading*, rather than the changing of feature specifications as in earlier theories. This assumption has been built into the rule formulations given above. A further constraining assumption is that only *single* nodes may spread; this assumption has also been incorporated into the analyses given earlier.

It follows directly from these assumptions that the height assimilation rule of Kimatuumbi must be expressed as the spreading of a single node. In a system employing features like those of (12), what can this node be? It cannot be the dorsal node, in the sense of Sagey (1986), since this node is defined in terms of the activity of the tongue body, and [ATR] is a tongue root feature. Even if we were to extend the definition of dorsal in such a way as to include the tongue root and link [ATR] under the dorsal node,

we would still be unable to express Kimatuumbi spreading, since the dorsal node also dominates the tongue body feature [back], which does not spread in this rule.

We must therefore assume a somewhat different organization from that proposed by Sagey, in which a single node, such as the aperture or height node, dominates [high], [ATR] and perhaps [low]. But this assumption leads to a new problem. As is well known, [ATR] defines the location of a vocal tract constriction defined in terms of the activity of a specific articulator, the tongue root (Painter 1967, Lindau 1979). As an articulator-bound feature, we would normally expect it to pattern with other articulator-bound features, perhaps under the domination of the place node (McCarthy 1991). In any case, we would not expect it to pattern with articulator-free features such as [high] and [low]. Since [ATR] does pattern with the aperture features in Kimatuumbi, however, the suspicion is raised that this feature is being improperly used as a stand-in for a true aperture feature. In the analysis proposed here, [ATR] is replaced by a genuine aperture feature, [open$_3$].[7]

To summarize, we have seen that a feature model incorporating the hierarchical feature [open] allows a simple and straightforward expression of the Kimatuumbi rule of total height assimilation. We have also discussed some considerations suggesting that an analysis using [open] is more appropriate for the analysis of this rule than a more traditional analysis using the features [high], [low], and [ATR].

4. Scalar Height Assimilation in Nzɛbi, Esimbi and Kinande

In this section we consider a new source of evidence for the hierarchical feature [open], involving *scalar* rules: that is, rules that move vowels one step up or down along the height scale.

4.1. Nzɛbi

A first example of scalar height assimilation can be cited from Nzɛbi, a Bantu language of Gabon described by Guthrie (1968). Nzɛbi has a 7-vowel system as shown in (1a), with an additional vowel [ə], possibly deriving from /a/, occurring in positions of reduced contrast. Guthrie uses the symbols /i u e o ɛ ɔ a/ for our /i̱ u̱ i u e o a/, respectively, and we follow his usage here. This practice is strictly notational, however, and does not reflect a different feature analysis. We therefore give Nzɛbi vowels the feature interpretation in (13), identical to that of standard 7-vowel systems as given in (5a) earlier:

(13) Nzɛbi vowels:

	i u	e o	ɛ ɔ	a
open1:	-	-	-	+
open2:	-	-	+	+
open3:	-	+	+	+

Nzɛbi has a pattern of alternation in verbs conditioned by the presence of the "fleeting" suffix vowel /-i/, which is overtly pronounced only in extra-careful speech and when followed by an enclitic. This suffix markes certain verb tenses. In these tenses, the nearest nonreduced root vowel shifts up one degree in height, as shown below:

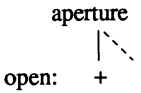
(14)

plain	*shifted*	*examples:*	
e	i	-bet-/-bit(-i)	'to carry'
o	u	-kolən-/-kulin(-i)	'to go down'
ɛ	e	-suɛm-/-suem(-i)	'to hide self'
ɔ	o	-tɔɔd-/-tood(-i)	'to arrive'
a	ɛ	-sal-/-sɛl(-i)	'to work'

The vowels /i u/ do not shift, as they are already high. The rule applies both to monosyllabic roots and to roots with the suffixal extension [ə], which shifts to [i], as is shown in the second example above. According to Guthrie, all these shifts are neutralizing, and do not produce new vowel qualities. Thus the rule is structure-preserving in its effect.

Given the feature assignments given in (13), we can state the vowel raising rule as follows:

(15) Nzɛbi Vowel Raising

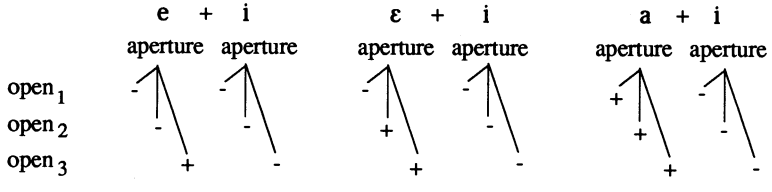


conditions: (i) stem domain
(ii) structure-preserving

This rule states that the feature [-open] spreads leftward onto a preceding aperture node bearing the feature [+open] on the same tier. Condition (i) restricts this rule to the stem domain, and condition (ii) states that it is structure-preserving in the sense discussed above. As a result of the spreading, the original feature [+open] is deleted. Although only the "fleeting" final vowel /i/ triggers this rule, no morphological conditioning is required, since no other nonlow vowels occur in the rule context, as long as we assume that [ə] can be analyzed as underlying /a/.

What is novel about this rule in comparison with a rule like Bantu Vowel Lowering (8) is the fact that no restriction is placed on the tier on which the [+open] [-open] sequence must occur. That is, the rule is defined on [+open] [-open] sequences occurring on *any* tier in the representation, and can potentially apply to any of the tiers [open$_1$], [open$_2$], and [open$_3$]. This property of the rule, together with the structure-preservation condition, accounts for its scalar effect. To see this, consider how the rule is defined on the three underlying sequences /e-i/, /ɛ-i/, and /a-i/ shown below:[8]

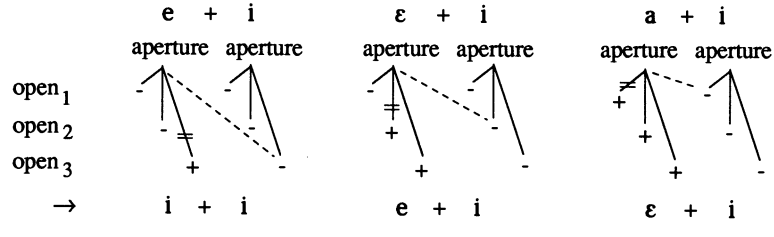
(16)



In the first of these sequences, rule (15) is defined only on tier 3; here, the fact that the rule does not mention any specific tier does not raise any problem of interpretation. But in the second and third sequence, the rule is defined on more than one tier. In each of these example, however, only one of the potential applications is structure-preserving. Thus, in the second sequence, the application of rule (15) to the [open$_2$] tier is structure-preserving since it creates the feature representation [-open$_1$, -open$_2$, +open$_3$]. This set of features characterizes [e], which occurs independently in the system. Therefore, rule (15) can apply on this tier without violating the structure-preservation condition. However, if we applied the rule to the [open$_3$] tier, the result would be a novel feature combination ([-open$_1$, +open$_2$, -open$_3$]) which does not define any independently existing vowel in the system. For similar reasons, the only structure-preserving application of rule (15) to the third example is on the [open$_1$] tier.

The full set of "legal" applications of rule (15) is given below, with "=" indicating lines deleted in the output:

(17)



This analysis captures the stepwise nature of vowel raising directly and economically, making use of a single rule of the utmost simplicity. In contrast, a feature theory making use of the features [high], [low] and [ATR] would require a complex rule and special assumptions simply in order to describe the facts. In such an analysis, the Nzɛbi vowels would have the same feature analysis as that of the corresponding Kimatuumbi vowels shown in (12). Assuming this feature analysis, the vowel shift rule would have to collapse the following three cases:

(18) (i) e→i, o→u : [-ATR] → [+ATR]
(ii) ɛ→e, ɔ→o : [-high] → [+high]
(iii) a→ɛ : [+low] → [-low]

Under this analysis, [e o] are analyzed as [-ATR, +high] vowels. The change of [e o] to [i u] is therefore a change in the feature [ATR]. No simplification would result if we analyzed [e o] as mid, since [ATR] would then be required to distinguish the four mid vowels. The problem here is that the single rule of height assimilation must involve changes in three separate features.

These three changes can probably be collapsed with the angled bracket notation and/or the Greek-letter variables provided by standard generative phonology. However, the very fact that such powerful notational devices are required at all only emphasizes the inappropriateness of these features for expressing scalar height assimilation, a natural and widely attested rule (Clements 1991). Moreover, such an approach would be unable to explain why such special machinery is required for rules involving vowel height, and no other features. The Nzɛbi facts therefore offer strong support for analyzing vowel height in terms of the hierarchical feature [open].

4.2. Esimbi

Let us now consider a more complex case of scalar assimilation, found in Esimbi, a Broad Bantu language spoken in Cameroon. The present description is based upon a recent article by Hyman (1988), developing an earlier analysis by Stallcup (1980).

Esimbi surface vowels are presented below. Following Hyman, I use the transcription system /i u e o ɛ ɔ a/ with the same values as in Nzɛbi, together with /ɨ/ for the high central unrounded vowel found in stems. In the surface phonology, prefix vowels form a complete 4-height system, while all stem vowels are high (i.e., height 4):

(19) Esimbi surface vowels:

	prefixes:		stems:		
height 4:	i	u	i	ɨ	u
height 3:	e	o			
height 2:	ɛ	ɔ			
height 1:		a			

This system is a highly unusual one, since in most languages, roots show more vowel contrasts than affixes.

In Hyman's analysis, which I follow in its essentials, the underlying vowel system is quite different from the surface one, especially as far as the vowel distribution is concerned. For prefixes, he proposes the reduced 2-height system /I U A/, and for stems, he proposes the 4-height system /i u e ə o ɛ ɔ a/. The four underlying stem vowel heights are neutralized at the surface by a rule assigning all stem vowels the value [+high]. Thus, all front stem vowels are realized as [i], both central stem vowels are realized as [ɨ], and all back rounded vowels are realized as [u]. This neutralization rule does not apply, however, until after the operation of a rule that *transfers* the height features of the stem vowel to the prefix. As a result of this rule, for example, the prefix vowel /I/ is realized as [i], [e], and [ɛ] after height 4, height 3, and height 1 or 2 stem vowels respectively, and the prefix vowel /U/ has the parallel representations [u], [o], and [ɔ].

These patterns are summarized in (20). Notice that in the case of the third prefix vowel /A/, each alternant is one step lower in height than the corresponding /I-/ and /U-/ alternant. We return to this fact below.

(20) Esimbi prefix alternations:

	prefix:		
surface form before:	/I-/	/U-/	/A-/
height 4 stems:	i	u	o
height 3 stems:	e	o	ɛ / __ e
			ɔ / __ o, ə
height 1 or 2 stems:	ɛ	ɔ	a

Each column gives the surface realizations of one of the prefixes before each of the vowel heights. Thus, for example, when the prefix /I-/ occurs before a stem with the height 4 vowel /i/ or /u/, it takes the form [i], when it occurs before a stem with the height 3 vowel /e/ or /o/, it takes the form [e], and when it occurs before a stem with the height 1 or 2 vowel /ɛ/, /ɔ/, or /a/, it takes the form [ɛ]. Some examples follow (tones are omitted):

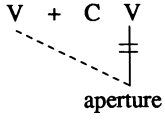
(21)

height 4:	/I-bi/ →	[i-bi]	'goat'
	/I-su/ →	[i-su]	'fish'
height 3:	/I-gbe/ →	[e-gbi]	'bushfowl'
	/I-bə/ →	[e-bɨ]	'canerat'
	/I-so/ →	[e-su]	'hoe'
height 1/2:	/I-nyɛmɛ/ →	[ɛ-nyimi]	'animal'
	/I-zɔ/ →	[ɛ-zu]	'snake'
	/I-tla/ →	[ɛ-tlɨ]	'place'

Examining (20), we see that the surface realizations of the prefix vowels /I/ and /U/ are the result of combining their intrinsic place features (back, round) with their derived height features (as inherited from the stem vowel). Their realizations before stems with the height 1 vowel /a/ are unexpected if the low vowel constitutes an independent fourth height (since we would expect height 1 prefix vowels, not height 2 ones), and we return to this case below.

These facts, as analyzed by Stallcup and Hyman, provide strong confirmation for a model recognizing a separate height (or aperture) node. Without such a node, the spread of all height features as a unit would be arbitrary, violating the otherwise well-motivated principle that only single nodes and features can spread. With it, the analysis is straightforward: vowel height transfer shifts the aperture node from the stem vowel to the prefix vowel, as shown in (22) (intermediate nodes are omitted). We can thus view vowel height transfer as a type of total assimilation, like the Kimatuumbi rule discussed earlier.

(22) Vowel Height Transfer:



The analysis of the prefix vowel /A-/ is more complex, as the data in (20) show. Although the surface realization of this vowel is always predictable from the stem vowel, it does not involve simple height assimilation as in the case of /I-/ and /U-/. The basic observations we must account for are summarized below:

(23)

when the underlying stem vowel is:		*/A-/ is realized as:*	
height 4	(i u)	height 3	(o)
height 3	(e ə o)	height 2	(ɛ / ɔ)
height 1 or 2	(ɛ a ɔ)	height 1	(a)

In brief, the prefix vowel /A/ is realized as a vowel which is *one step lower in height* than the underlying stem vowel. (However, it is low before a low stem vowel, which follows if height 1 constitutes the "floor" in the system.)

A further irregularity in the analysis of /A/ concerns the fact that it shifts to a rounded or fronted quality before underlying stem vowels of height 3 and 4, on a partly arbitrary basis. The explanation for these shifts must be that if they did not take place, the otherwise nonoccurring surface vowels [ə] and [ʌ] would result. If this account is correct, the fact that no such shifts occur before height 1 and 2 vowels is explained by the fact that the vowel resulting directly from the stepwise lowering process, [a], occurs independently as a surface vowel. Following Hyman (p. 260), we will account for these irregular realizations in terms of secondary processes, of no consequence to the treatment of vowel height.

The problem, then, is to account for the stepwise lowering effect of the prefix vowel /A/ in a principled way. Let us give Esimbi vowels the analysis shown in (24). (As before, we include redundant values for the convenience of the reader, though these are assumed to be absent in underlying representations.)

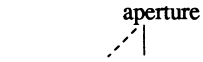
(24) feature analysis of Esimbi vowels:

	stems:			prefixes:		
	i ɨ u	e ə o	ɛ ʌ ɔ	I	U	a
open$_1$	-	-	-	-	-	+
open$_2$	-	-	+			
open$_3$	-	+	+			

This analysis treats Esimbi stem vowels as forming a 3-height system, with the height 2 vowel /ʌ/ replacing the low vowel /a/ of Hyman's analysis. This decision is well motivated on phonological grounds: the stem vowels /ɛ ɔ ʌ/ behave identically with respect to vowel height transfer, causing the prefix vowels /I, U/ to be realized as height 2 vowels and the prefix vowel /A/ to be realized one step lower as a height 1 vowel. There is no reason to distinguish these three vowels in terms of their underlying height. Under this analysis, there are no height 1 vowels in stems, and the realizations in the bottom row of (20) are entirely regular throughout.

Consider now the prefix vowel /A/, which we have analyzed analyzed in (24) as a height 1 vowel. We will assume that before Vowel Height Transfer (22) applies, this vowel triggers a rule of stepwise Stem Vowel Lowering, applying from left to right as shown below (as usual, irrelevant intermediate nodes are omitted):

(25) Stem Vowel Lowering:

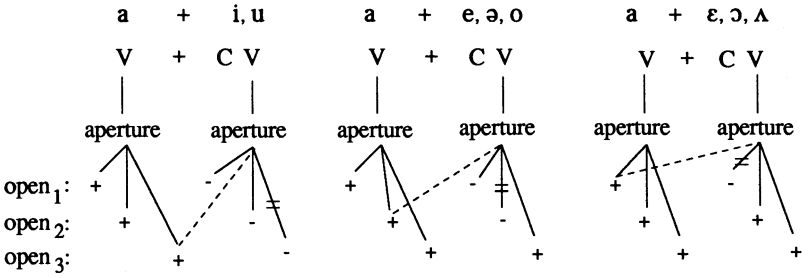


conditions: (i) word domain
(ii) structure-preserving

This rule spreads the feature [+open] rightward onto the aperture node of a vowel bearing the feature [-open]. The feature [+open] necessarily characterizes the /A-/ prefix, since no other prefix has this feature, and stem vowels have only a single-member vowel melody (cf. Stallcup). The rule cannot apply across word boundaries due to condition (i). Thus the rule is triggered only by the /A-/ prefix, and it applies only to an immediately following stem vowel.

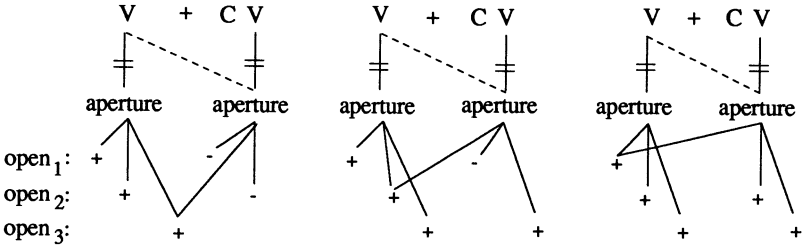
As in the case of Nzɛbi, this rule is constrained by structure-preservation (cf. condition (ii)), and no restriction is placed upon the tier on which the sequence [+open] [-open] occurs. Accordingly, the rule applies wherever it can, subject to structure-preservation. The application of (25) is illustrated below:[9]

(26)



By this rule, the aperture node of the stem vowel is lowered by one degree. The derived aperture nodes are then shifted to the prefix by Vowel Height Transfer (22), as shown below:

(27)



The aperture node of the prefix vowel, now delinked, is deleted by the general convention which eliminates floating segments created in the course of derivation. The stem vowels, lacking an aperture node, are assigned the feature [-open3] (perhaps by a default rule, as in Hyman's analysis), accounting for their surface realization as height 4 vowels.

As the reader will observe, this analysis represents the mirror image inversion of the Nzɛbi stem vowel raising rule. In Nzɛbi, a high suffix vowel raises a preceding stem vowel by one step. In Esimbi, a low prefix vowel lowers a following stem vowel by one step.

Again, as in the case of Kimatuumbi and Nzɛbi, it would be technically possible to account for these facts in terms of the standard features [high], [low], and [ATR] (or [tense]). However, such an analysis seems less than fully satisfactory, for all of the reasons cited earlier. We might consider following a suggestion by Hyman to loosen the traditional definition of [ATR] and interpret it as a third vowel height feature, whose function is to shift vowel height "register" in a manner comparable to tonal downstep. But in such a proposal, [ATR] would function quite differently from the way it functions in languages with true ATR-based vowel harmony such as Akan, where it designates the activity of the tongue root. Hyman suggests, therefore, that [ATR] might be understood as "a more general cover feature possibly involving different gestures in different languages (height, quality, pharyngealization, centralizing, flattening, etc.)" (p. 266). But such a proposal opens the door to considerable abstractness in phonological analysis. In contrast, we have seen that the hierarchical feature [open] provides a simple and direct analysis of scalar rules in Esimbi and Nzɛbi, and - by making the use of "cover features" unnecessary - allows us to maintain the strong and highly predictive position that any feature is defined in a uniform and consistent way from one language to another.

4.3. Kinande

We turn now to a discussion of a non-structure-preserving rule of scalar height assimilation found in Kinande, a Bantu language of Eastern Zaire. Kinande has a standard underlying 7-vowel system, for which we revert to the traditional transcription system /ị ụ i u e o a/. Our data are drawn primarily from the detailed study of Valinande (1985); for a description of a somewhat different variety of Kinande, see Mutaka (1991).

The rule of interest to us here is Vowel Raising, according to which vowels rise one degree in height before the height 4 vowels [ị ụ]. By this rule, the height 3 vowels [i u] are raised to the height 4 vowels [ị ụ], while the height 2 vowels [e o] are raised to the upper mid vowels [ẹ ọ], constituting a new, derived height, which we will call "height 2a." [10]

Examples are given in (28) below. Underlying representations of root vowels are given at the left. Column A shows infinitives formed from the prefix sequence /e-ri-/; here, both prefix vowels rise one step in height if the following root vowel is of height 4 (see (28a)).[11] Column B shows agentive nouns formed from the same verb roots as those given in column A. These nouns are formed with the prefixes /o-mu-/, whose underlying height 3 vowels are revealed as such by other forms like *o-mu-tahi* in which no following height 4 vowel triggers assimilation. The agentive suffix is /-ị/, with an invariant height 4 vowel. This vowel triggers stepwise raising in all vowels to its left.

(28) Kinande Vowel Raising:

		A		B	
a.	/ị/:	ẹ-rị-lịm-a	'to exterminate'	ọ-mụ-lịm-ị	'the exterminator'
	/ụ/:	ẹ-rị-hụk-a	'to cook'	ọ-mụ-hụk-ị	'the cook'
b.	/i/:	e-ri-rim-a	'to cultivate'	ọ-mụ-rịm-ị	'the farmer'
	/u/:	e-ri-hum-a	'to beat'	ọ-mụ-hụm-ị	'the beater'
c.	/e/:	e-ri-hek-a	'to carry'	ọ-mụ-hẹk-ị	'the porter'
	/o/:	e-ri-boh-a	'to tie'	ọ-mụ-bọh-ị	'the tier'
d.	/a/:	e-ri-sat-a	'to dance/play'	ọ-mụ-sat-ị	'the dancer'

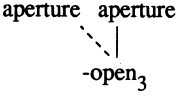
The final example in (28d) seems to show that the low vowel /a/ does not undergo the rule, but allows assimilation to pass through it to the preceding prefix vowel. There are two possible ways of accounting for this fact. One, proposed by Valinande (1985), is to assume that the low vowel is transparent to assimilation, acting neither as undergoer nor blocker. The other, proposed by Hyman (1989), is to assume that the low vowel actually does undergo the rule, but is later reassigned its original value, so that the effect of the rule is cancelled out on the surface. In support of this analysis, Hyman points out that long low vowels actually do surface with the predicted raised value [ʌ:], as is shown by other forms like [o-mụ-kʌ:lị] 'woman' from the underlying stem /ka:lị/. In this analysis, only the

short vowel is neutralized. For present purposes it makes no difference which of these two analyses we adopt. The important point is that the rule is scalar in effect, causing each affected vowel to rise one step in height, and non-structure-preserving, since it produces the novel vowel qualities [ɐ̨ ɔ̨], and perhaps [ʌ:].

Consider now how Vowel Raising can be formulated. The stepwise nature of this rule has led previous investigators to believe that it operates on the feature [ATR] (or [tense]), since these features have been described as functioning in similar ways in other languages, and are in fact the only ones available, in standard feature frameworks, to distinguish the alternating pairs of vowels. However, if we used [ATR] to distinguish the height 3 and 4 vowels in Kinande and do not also use it in other Bantu languages (such as those discussed elsewhere in this paper), we would be forced to claim that the Kinande vowel system is organized in a way fundamentally different from those of other, closely related languages. There is little or no evidence that this is true: the only relevant respect in which Kinande differs from its neighbors is that it has Vowel Raising. This minimal and quite superficial difference should not force us to postulate a fundamentally different underlying structure.

However, the hierarchical feature [open] can account for Kinande Vowel Raising rule in a straightforward way. Let us assume that Kinande vowels are underlyingly represented in the same way as in other 7-vowel Bantu languages, as shown in (5a). Vowel Raising can then be described by a rule spreading [-open$_3$] onto the aperture node of a preceding vowel, as follows:

(29) Kinande Vowel Raising (non-structure-preserving)



This rule is not subject to a structure-preserving constraint. In consequence, not only will it map [i] and [u] into [i̪] and [u̪], respectively, but it will map the height 2 vowels [e] and [o] into the derived "height 2a" vowels [ɐ̨] and [ɔ̨]. In addition, if we allow it to apply to the low vowels, it will raise /a/ to [ʌ].

The complete set of surface vowels derived by this rule is shown below:

(30) Kinande surface vowels:

	i̪ u̪	i u	[ɐ̨ ɔ̨]	e o	[ʌ]	a
open$_1$	-	-	-	-	+	+
open$_2$	-	-	+	+	+	+
open$_3$	-	+	-	+	-	+

Notice that in this system, [open$_3$] functions in a way analogous to [ATR] or [tense] in previous analyses.

The Kinande vowel system is of particular interest to feature theory due to the fact that its pattern of alternation, involving two ranks of high vowels and two ranks of mid vowels, has previously been taken as irreducible evidence for the need for a feature like [ATR] (or [tense]). If the analysis given here is correct, it shows that patterns of this type can be created by the spread of [open] at the lowest hierarchical level, making [ATR] (or [tense]) formally unnecessary for this purpose. It remains to be seen whether other cases apparently requiring one of these features can be reanalyzed in similar terms.[12]

5. Vowel Raising in Sesotho

We now consider the 5-height vowel system of Sesotho, and show that it, too, is susceptible to a straightforward analysis in terms of the feature [open].

The Sotho group of languages, spoken in Southern Africa, are possibly unique among Bantu languages in having 5 (or perhaps 6) well-defined surface vowel heights. In addition, they have a rule of mid vowel raising which raises lower mid (height 2) vowels to a new "height 2a." Unlike the raising rules of Nzɛbe and Kinande, it is triggered not just by height 4 vowels, but by *any* higher vowel. It is this aspect of the rule that will concern us here. The discussion will be based primarily on the recent analysis of Sesotho by John Harris (1987), with further data and generalizations drawn from Doke and Mofokeng (1957), Kunene (1961), Mabille and Dieterlen (1961), and Khabanyane (1986, 1991).[13]

A chart of surface vowels is given below; a feature analysis will be proposed later. In the numbering below, vowel heights 1, 2, 3, and 4 correspond historically to those bearing the same number in other Bantu languages, while height 2a is a Sotho innovation (not corresponding to height 2a in Kinande). The following transcription uses "ẹ, ọ" instead of "ɛ, ɔ" for the height 2a vowels, to express the fact that the difference between "ẹ, ọ" and "e, o" is *not* parallel to the difference between "i̱, u̱" and "i, u". The reason for this will become clear as the discussion proceeds.

(31) Sesotho vowels:

height 4:	i̱	u̱
height 3:	i	u
height 2a:	ẹ	ọ
height 2:	e	o
height 1:	a	

Heights 2 and 2a are well-separated phonetically, having the approximate IPA values [ɛ ɔ] and [e o], respectively. There is also a further height, intermediate between 3 and 4, which will be described later.

Previous writers have suggested that the distinction between height 2 and height 2a vowels is not underlying, but arises from a rule of Mid Vowel Raising to be discussed below. I will begin by showing that at the surface level, at least, two distinct vowel series must be recognized. This is shown by minimal and near-minimal pairs such as the following:

(32) minimal and near-minimal pairs involving heights 2 and 2a:

bona	'it'	bọna	'this one'
sesefala	'to become thin'	sẹsẹbala	'to be quiet'
hlotse	'piece of dry skin or leather'	hlọtsa	'to limp'
lihotlo	'bare patch of skin on animal'	muhọtlẹ	'coot' (species)
muetse	'back, side of animal'	muẹtsọ	'way of doing'
poso	'error'	fọsa	'to err'
pere	'horse'	pẹrẹ	'pear'

Many more examples like these can be found in the extensive dictionary entries of Mabille and Dieterlen (1961); see also Khabanyane (1991) and the examples in (36) below.

The rule of Mid Vowel Raising is illustrated by the forms in (33).[14] Column A shows unraised vowels, and Column B shows their raised alternants. The forms in (33a,b) show that height 2 vowels are raised to height 2a before vowels of height 3 or 4. The forms in (33c,d) show that they are also raised before the locative suffix [-ŋ], which can be derived from a more abstract form /-įŋ/, with an underlying height 4 vowel (see Harris 1987, and additional evidence cited in (43)). The examples in (33a,c) involve single vowels, and those in (33b,d) vowel sequences.

(33) Sesotho Mid Vowel Raising:

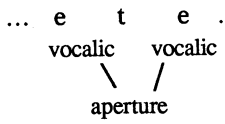
	A: unraised		B: raised	
a.	-seb-a	'gossip'	mu-sẹb-į	'gossiper'
	-betl-a	'sharpen'	-bẹtl-ụw-ẹ	'has been sharpened'
	-rok-a	'praise'	si-rọk-į	'poet'
	-bol-a	'rot'	si-bọd-ụ	'rotten thing'
	-betl-a	'sharpen'	-bẹtl-i	'not to sharpen'
	-ep-a	'dig'	-ẹp-ul-l-a	'dig out'
	-bon-a	'see'	-bọn-i	'to have seen'
	-kob-a	'bend'	-kọb-ul-l-a	'unbend'
b.	-kob-eh-el-a	'curve towards'	-kọb-ẹh-ẹl-i	'not to curve towards'
	-hlek-eh-a	'become clear'	-hlẹk-ẹh-įlẹ	'to have become clear'
	-hlohlon-a	'itch'	-hlọhlọn-i	'not to itch'

c.	lisapo	'bone'	lisapǫ-ŋ	(locative)
	kopano	'meeting, assembly'	kopanǫ-ŋ	(locative)
d.	sihole	'deformed person'	sihǫlę-ŋ	(locative)
	theko	'price'	thękǫ-ŋ	(locative)
	pepenene	'open space'	pępęnęnę-ŋ	(locative)

There is evidence that not only height 3 and 4 vowels, but also height 2a vowels trigger Mid Vowel Raising. This point is somewhat harder to demonstrate, since most surface occurrences of height 2a vowels are created by Mid Vowel Raising itself. However, the very fact that the rule applies iteratively gives us a first argument for this view. Under iterative application, it first applies to the last member of a sequence of potential target vowels, changing e.g. underlying /-kob-eh-el-i/ to [-kob-eh-ęl-i]. In subsequent iterations, the derived vowels [ę] trigger new applications of the rule to preceding vowels, giving the surface form [-kǫb-ęh-ęl-i]. It is the second (and subsequent) applications of the rule that show that height 2a vowels are themselves triggers for the reapplication of the rule.

Let us briefly consider a possible alternative analysis which does not require iterative rule application. In this alternative, the two mid vowels would be viewed as sharing a single aperture node as a result of the Obligatory Contour Principle (OCP) (McCarthy 1986), which, in its most general formulation, disallows adjacent identical nodes on any tier. In the present case, this principle would disallow two adjacent identical aperture nodes, and cause them to be collapsed into a single one. As a consequence, the vowel sequence in the stem /tetem-/ would share a single aperture node, as shown below:

(34)



Mid Vowel Raising could then apply in a single step, in which case it would not offer any crucial evidence that height 2a vowels can be rule triggers.

While this analysis is a possible one, there is some evidence that the OCP does not operate as a general constraining principle in the segmental phonology of Sesotho. Harris (1987) shows that Sesotho has a rule which deletes high front vowels between a voiced coronal and any following coronal. This rule can be stated roughly as follows (using standard features):

(35) I- Deletion

[-cons, +high, -back] → Ø / [+cor, +voiced] ___ [+cor]

This rule creates OCP violations at the level of the entire segment (i.e., the root node) in examples like nọn-ịn-e → nọn-n-e [nọnnẹ] 'be fat', derived from underlying /non-ịl-e/ via a rule of nasal assimilation. It also creates OCP violations at the level of the feature [coronal] in examples like bọn-ịs-a → bọn-s-a → [bọntsha] 'show', derived from underlying /bon-ịs-a/. Such examples show that if the OCP applied to the aperture tier, it would be as a special case, since OCP violations are tolerated elsewhere. While an OCP-based analysis of vowel sequences cannot be ruled out in principle, there is little or no independent evidence showing that the OCP operates elsewhere in Sesotho.[15]

A second argument that height 2a vowels can trigger Mid Vowel Raising comes from a general restriction on surface vowel sequences, according to which height 2 vowels do not cooccur with height 2a vowels in adjacent syllables. This constraint applies not only to height 2a vowels created by Mid Vowel Raising, but also to height 2a vowels occurring in contexts where Mid Vowel Raising is not defined, as in word-final position. Several examples of the latter type were given in (32), and further examples are given below:

(36)				
	thẹpẹ	'kind of vegetable'	sihlẹkẹhlẹkẹ	'island'
	lẹlẹlẹ	'long, tall'	mukọlọkọ	'procession'
	manọlọ	'fertilizer'	liqịtọlọ	'one with tricks'
	sibẹlẹ	'rumor'	shwẹshwẹ	'type of wild flower'

Such examples show that if a height 2a vowel occurs anywhere in a mid vowel sequence, all vowels in that sequence must be height 2a. Thus we do not find "mixed" sequences like *[ẹ...e], *[ọ...o], *[e...ẹ], and so forth. If we assumed that *all* height 2a vowels were underlying in such examples, it would be a striking and unexplained accident that "mixed" height 2 and 2a sequences do not occur. At best, we could rule them out with a special word structure constraint, replicating the conditions under which Mid Vowel Raising applies. If instead we assume that the word-final height 2a vowels illustrated in (36) are underlying (or possibly created by other rules operating before Mid Vowel Raising), and that they trigger Mid Vowel Raising in preceding height 2 vowels, we account for the absence of mixed sequences in a principled way. Thus if this analysis is correct, height 2a vowels must be Mid Vowel Raising triggers.[16]

To summarize the discussion so far, we have seen evidence that Mid Vowel Raising raises height 2 vowels to height 2a when followed by a vowel of height 2a, 3, or 4 in the next syllable. In a nutshell, it raises height 2 vowels by one degree when followed by any higher vowel. How can we express this generalization in feature terms?

We can provide a direct answer to this question if we assume that the feature analysis given earlier for the basic vowel heights 1, 2, 3, and 4 in other Bantu languages holds for Sesotho as well, as shown by the specifications for [open$_{1\text{-}3}$] in (37) below. Height 2a

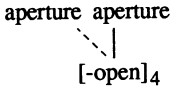
results from the split of the lower of the two secondary registers into a further pair of subregisters (in the sense of figure 1), opposing the upper mid vowels to the lower mid vowels. We define this new pair of subregisters in terms of a new [open] tier, which, as it characterizes the least contrastive vowel height in the system (i.e., the one most subject to neutralization), is assigned the lowest rank 4. This gives us the following analysis, in which redundant values are once again filled in for clarity.

(37) Sesotho vowels:

height:	4	3	2a	2	1
	i̱ u̱	i u	ɛ ɔ	e o	a
open1	-	-	-	-	+
open2	-	-	+	+	+
open3	-	+	+	+	+
open4	-	-	-	+	+

The class of all vowels that are higher than height 2 is a natural class, defined by the feature [-open$_4$]. We can state Mid Vowel Raising as follows:

(38) Sesotho Mid Vowel Raising (structure-preserving):



This rule is structure-preserving, since it only creates vowels that already exist in the rule's input. This means that it cannot apply to low vowels, since if it did, it would create a new, previously nonoccurring series of upper low vowels ("height 1a"). For this reason, it is not necessary to explicitly restrict the set of target vowels to [-open$_1$] (nonlow) vowels.[17]

Once again, it would be possible to describe the Sesotho facts in terms of a standard feature system making use of the features [high], [low], and [ATR] (or [tense]). But such an analysis is less straightforward. Suppose we were to assume an analysis like that given in (12) for Kimatuumbi, with the height 2a vowels constituting an additional, [+ATR] series of mid vowels:

(39) Sesotho vowels (using standard features):

height:	4	3	2a	2	1
	ị ụ	i u	ẹ ọ	e o	a
low	-	-	-	-	+
high	+	+	-	-	-
ATR	+	-	+	-	-

This analysis cannot identify the spreading node in Mid Vowel Raising as a natural class. The feature [+high] will not do, since if [+high] spreads it will incorrectly map height 2 into height 3, instead of height 2a. The feature [+ATR] will not do either, since it will not account for the fact that height 3 vowels are also triggers.

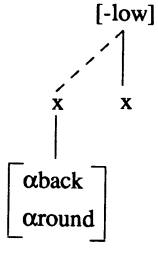
We could solve this problem if we reanalyzed /e o/ as low, rather than mid vowels, as proposed by Harris. In this case, the feature [ATR] would be distinctive only in the class of high vowels, and the feature chart would become the following:

(40) Sesotho vowels (after Harris 1987):

height:	4	3	2a	2	1
	ị ụ	i u	ẹ ọ	e o	a
low	-	-	-	+	+
high	+	+	-	-	-
ATR	+	-			

In this analysis, the spreading node is [-low], and the raising rule can be stated as follows:

(41) Mid Vowel Raising (Harris 1987):



This statement requires the target vowel to agree in [back] and [round]; the rule thus applies to /e/ and /o/, but not /a/.[18]

While this analysis can account for the data, it is less satisfactory than an analysis involving [open], on several counts. First, the treatment of /e/ and /o/ as [+low] vowels is

motivated only by the rule in question. This analysis has no further phonological motivation, since /a/ does not otherwise pattern with the height 2 vowels as a class. Nor does this treatment have any phonetic motivation, since /e/ and /o/ have the phonetic values [ɛ] and [ɔ], not [æ] and [ɒ], and there is a considerable difference in first formant frequency between /a/ and /e, o/ (see Khabanyane 1991). We could account for this discrepancy by late realization rules assigning /ɐ ɷ/ the surface features [+ATR,-low] and /e o/ the features [-ATR, -low] for instance, but such rules only underscore the point that the phonological analysis does not mesh with the observed phonetic realizations.

Similar remarks extend to the use of [ATR], which is being used here as a "cover feature" in the sense discussed earlier in connection with Esimbi. As far as the acoustic evidence is concerned, Sesotho gives no grounds for treating the five phonemic vowel heights in terms of anything but a uniform phonetic parameter of vowel height. All vowels tend to be of equal duration in similar contexts, and fall along a single, uniform scale as far as first and second formant values are concerned (see Khabanyane). In classical ATR-based systems, such as that of Akan, the [+high, -ATR] vowels are not well separated in first formant frequency from the [-high +ATR] vowels (Lindau 1975). Furthermore, Sesotho does not have a system of "cross-height" vowel harmony pairing its different vowel heights into overlapping sets, as do Akan and many other languages for which [ATR]-type harmony has been reported.

In the context of the comparative focus adopted in this study, an analysis in which /e o/ are treated as low vowels is at odds with the analysis required on independent grounds for other Bantu languages. We have seen that in Nzɛbi and Esimbi, and perhaps Kinande as well, the relation of /a/ to /e, o/ is parallel to that of /e, o/ to /i, u/: the scalar raising and lowering rules treat /a/ as the lowest point on a scale of vowel height on which /e, o/ constitute the next step. This relation is not defined in a system in which /e, o/ are assigned the same height as /a/; in Sesotho, such a treatment would ultimately be motivated by only a single rule in the language.

In contrast, we have seen that a hierarchical feature model using the feature [open] permits an analysis of Sesotho which is simple, close to the phonetics, and consistent with the analyses of other Bantu languages. In this analysis, the core system of Sesotho (and that of other Sotho languages, which are similar in relevant respects) consists of its height 1, 2, 3, and 4 vowels, characterized in exactly the same way as the historically cognate vowel heights in other Bantu languages.

Sesotho bears out two interesting predictions of the hierarchical feature model that we have not previously discussed. First, the model predicts that we should be able to find rules that make reference to the class of vowels that are "higher than" (or alternatively, "lower than") some other set of vowels. This is because for each vowel height, the system provides a way of designating this class. This prediction is borne out by Mid Vowel Raising, which refers to the class of all vowels "higher than" height 2.

Second, the model predicts that hierarchical subdivision is open-ended, in the sense that there is no *formal* upper limit on the number of tiers to which [open] can be assigned. The earlier study of 4-height Bantu vowel systems has shown that this number may be three, but Sesotho shows that it may be greater than three.

In fact, there is some evidence that Sesotho is in the process of undergoing yet a *further* phonological split, creating a fifth [open] tier. As described by Kunene (1961) and Khabanyane (1986), a rule of High Vowel Raising raises height 3 vowels to a new height 3a, intermediate between heights 3 and 4. This rule applies to vowels under the following conditions:

(42) a. preceding a syllable containing one of the vowels [i̱ u̱] of height 4;
b. preceding the locative suffix [-ŋ] (derived from /-iŋ/);
c. following a syllable containing one of the height 4 vowels [i̱ u̱] of identical backness to the affected vowel.

Some examples illustrating these cases are given below:

(43) a.

-bila	'boil'	-bi̱di̱le̱ (perfect)	-bi̱di̱sa (causative)
-nuka	'season'	-nu̱ki̱le̱ (perfect)	-nu̱ki̱sa (causative)

b.

sibi	'sin'	si̱bi̱-ŋ	(locative)
buhuluhulu	'long ago'	bu̱hu̱lu̱hu̱lu̱-ŋ	(locative)
sirupi	'thigh'	si̱ru̱pi̱-ŋ	(locative)

c.

mu̱ri̱fi̱	'clay pot'
-ru̱mu̱la	'tease, provoke'
-phu̱thu̱lu̱ha	'become unfolded'

The distinction between the corresponding height 3a and 4 vowels is a subtle one, even for listeners with phonetic training. Acoustic measurements show mean first formant differences between corresponding height 3a and 4 vowels ranging between 20 and 80 Hz (Khabanyane, 1991). However, these differences, though small, are apparently perceptible. In the very similar vowel system of Tswana, Cole reports that minimal pairs such as [-bi̱di̱tse̱] 'call' (perfect stem) and [-bi̱di̱tse̱] 'beat' (perfect stem) are reliably distinguished by native speakers (Cole 1949, 115). One might expect comparable pairs to be distinguishable in Sesotho.

Given the subtlety of the distinction between height 3a and 4 vowels, one might ask whether the height 3a vowels arise through a rule of phonetic implementation, rather than a feature-changing phonological rule. If this were the case, they would have no direct bearing on phonological feature models. Some evidence for a phonetic rule analysis might

be suggested by Khabanyane's observation (1986) that in some contexts, High Vowel Raising does not seem to affect the first in a string of several vowels. This might suggest that we are dealing with a gradient implementation rule whose "window" extends over several syllables, affecting vowels most strongly at the end of the domain but only weakly, if at all, at the beginning.

In spite of this observation, further evidence suggests that High Vowel Raising may be truly phonological in nature. As we have seen, this rule applies before height 4 vowels and the nasal suffix [-ŋ], though not before other high consonants, such as velar stops. On the surface, these segments do not form a natural class. However, we have already remarked that the nasal can derived from the more abstract sequence /-i̱ŋ/ at a point in the derivation following the application of Mid Vowel Raising. We can explain the fact that [-ŋ] triggers High Vowel Raising if we assume that it still has the representation /-i̱ŋ/ at the point at which this rule takes place. On this analysis, High Vowel Raising would triggered by the natural class of high vowels [i̱ u̱] alone. On the widely-held assumption that phonological rules precede phonetic implementation rules, this would argue that High Vowel Raising is a phonological rule, since it crucially precedes the phonological rule reducing /-i̱ŋ/ to syllabic [ŋ].

There is further evidence that High Vowel Raising may be phonological in nature, which I cite quite tentatively in the absence of strict phonetic verification. This evidence comes from certain forms noted by Khabanyane (1986). The negative suffix /-i/, illustrated earlier in several examples in (33), is realized as [-i̱] under the following conditions:

(44) a. before a noun object:

hu si phụphụth-i̱ muthu	'not to shake off a person'
ha a kụp-i̱ mme	'he does not ask mother'

b. after a vowel of height 4:

hu si i̱s-i̱	'not to take away'
hu si dụl-i̱	'not to sit'

Elsewhere, though still triggering High (and Mid) Vowel Raising, it is realized as [-i]:

(45)

hu si phụphụth-i	'not to shake off'
ha a kụp-i	'he does not ask'
hu si sẹb-i	'not to gossip'
hu si kọkọt-i	'not to knock'

What is curious is that the suffix triggers High Vowel Raising in such examples even when it is realized as the lower vowel [i]. In one possible analysis, the basic value of the suffix

could be taken as /i̱/, which triggers High Vowel Raising in preceding height 3 vowels in all contexts, and is subsequently lowered to [-i] after lower vowels in absolute phrase-final position. If these admittedly subtle facts can be confirmed, they offer further evidence that height 3a vowels may be phonological in nature: not only does High Vowel Raising precede another phonological rule (in this case, phrase-final lowering), but the vowel /i̱/ is underlying, or derived by an early morphologically-conditioned rule.

If High Vowel Raising is a true phonological rule involving phonological features, it is clear that no possible combination of the standard features [high], [low], and [tense]/[ATR] can give a straightforward account of the height 3a vowels. In contrast, the hierarchical model can account for them by allowing [open] to occur on a fifth tier, as follows:

(46) Sesotho surface vowels:

height:	4	3a	3	2a	2	1
	i̱ u̱	i̱ u̱	i u	ɛ ɔ	e o	a
open$_1$	-	-	-	-	-	+
open$_2$	-	-	-	+	+	+
open$_3$	-	+	+	+	+	+
open$_4$	-	-	-	-	+	+
open$_5$	-	-	+	+	+	+

In this analysis, height 3 vowels are distinguished from height 3a vowels by the feature [open$_5$]. High Vowel Raising can now be expressed as the spread of the feature [-open$_5$] to from height 4 vowels to height 3 vowels.

To conclude this discussion of Sesotho, let us consider whether it is possible to collapse Mid Vowel Raising and High Vowel Raising into a single, comprehensive rule raising any nonlow vowel one degree in height before a higher vowel (cf. a similar suggestion by Ladefoged 1989). Elegant as such a proposal might appear, it is contradicted by the fact that the nonderived mid vowels /ɛ ɔ/ are not raised before higher vowels. This is shown by representative examples like the following (Kunene 1961, Mabille and Dieterlen 1961):

(47) nonderived /ɛ ɔ/ followed by higher vowels:

a. ɛts-a 'do':

mu-ɛts-i̱	'doer'
mu-ɛts-u̱wa	'victim'
ɛts-i̱s-a	'cause to do'
ɛts-ul-l-a	'to undo'

b. fọs-a 'err':

mu-fọs-i̱	'one who errs'
bu-fọs-i̱	'fallibility'
mu-fọs-ụwa	'one at the prejudice of whom a mistake has been committed'
fos-i̱s-a	'cause to miss'

Note that the height 2a vowels in these stem cannot be derived by Mid Vowel Raising, since they do not occur in the context for this rule. The consonants /ts, s/ do not provide a regular raising context, as we see from examples like *hlesa* 'to shiver', *poso* 'error', *khoso* 'string of beads worn around the loin', *sesefa* 'to avoid', *sosobana* 'to become wrinkled or creased', *bokotsa* 'to pat', *hlotse* 'piece of dry skin or leather', *kxhotso* 'peace', etc. Many other examples confirm the fact that heights 2a vowels are not raised before higher vowels. For example, the relative (or pronominal) prefixes have height 2a vowels to the exclusion of all other nonlow vowels. These vowels do not shift in height, whatever the height of the following vowel: cf. *ẹ-chi̱tja* 'hornless' (class 9), *ọ-muhulu* 'big' (class 3).

In addition to these facts, Mid Vowel Raising applies under a variety of morphological conditions which do not govern High Vowel Raising (see the references in note 14). It thus seems that we are dealing with two independent rules, Mid Vowel Raising and High Vowel Raising, which happen to overlap in their domain of application.

6. Alternative Theories of Vowel Height

We have seen reasons in the preceding discussion to believe that vowel height assimilation rules of the sort found in Bantu languages cannot be adequately treated in terms of the standard features [high], [low], and [ATR]. In this section we consider whether these rules might be better treated in other (nonhierarchical) feature theories.

Stepwise (or scalar) raising and lowering rules have occasionally been cited as evidence for multi-valued features (e.g. Johnson 1972, Lindau 1978). Specifically, it has been suggested that vowel height can be described in terms of a single, multivalued feature [*n*High]. In such theories, a rule such as Nzɛbi Vowel Raising (15) might be expressed as in (48):

(48) V → [n+1 High] / __ [4 High]

This rule states that a vowel rises one step in height before a height 4 vowel.

One important difference between a multivalued feature theory and the binary, hierarchical model proposed here involves their different implications for the formal description of assimilation. In autosegmental theory, assimilation is expressed as feature spreading, as we have seen; no other formal treatment is available (Clements 1985).

However, rules like (48) do not express partial assimilation as autosegmental spreading, since they simply respecify one feature in the context of another, formally unrelated one. More problematically, we cannot restate this rule in terms of autosegmental spreading, since spreading [4High] from one vowel to another carries out total, not partial assimilation; it would cause all vowels to become [4 High] in the context of another [4 High] vowel. Nor can we spread the values 1, 2,... independently of each other, since they are not independent features but *specifications* of the feature [High], and cannot spread independently of the feature [High] itself. There is thus no way to express partial height assimilation (whether scalar or nonscalar) as autosegmental spreading in multivalued feature frameworks as they are currently formulated.[19]

Moreover, rules such as "V → [n+1 High]" cannot express non-structure-preserving vowel raising rules like that of Kinande in a straightforward way. In effect, such rules would have to map not only height 3 vowels onto height 4, but also height 2 vowels onto a new height 2a (and perhaps height 1 onto a new height 1a, depending on our analysis of the low vowel). The computational machinery require to carry this out would be arbitrary and quite unconstrained. Alternatively, one might propose to regard the underlying vowel heights of Kinande as forming a discontinuous scale (6, 5, 3, 1), but there is no independent evidence for such an analysis. As a last resort, the feature [ATR] could be used as an abstract "cover" feature to supplement the multivalued feature [High], but it would then be available to express all other types of scalar vowel raising as well, making the multivalued specifications of [High] entirely superfluous.

The stepwise raising and lowering rules described above also raise problems for one-valued feature theories such as those proposed in particle theory (Schane 1984) and dependency phonology (Anderson and Ewen 1987). In such theories, vowel height is expressed in terms of a one-valued feature *a* (usually called a particle, or component) designating vocal tract opening. In such theories, scalar lowering could be expressed by allowing more than one occurrence of *a* in the representation of a given vowel. The Esimbi rule, for example, could add a token of *a* to any stem vowel occurring after the prefix /A-/. However, as one-valued feature theories do not recognize any features corresponding to [+high] or [-open], they have no way of expressing scalar raising rules (or indeed, any kind of assimilatory raising rules!) in terms of the same formal mechanisms used elsewhere for the expression of assimilation. As a result, such theories strongly predict that raising rules such as those of Nzɛbi, Kinande, Sesotho, and many other languages should not exist.

We have seen, in contrast, that the hierarchical feature [open] can provide a simple, direct account of a variety of assimilatory raising and lowering rules in Bantu languages, while preserving a uniform system of underlying feature representation for Bantu vowels.

7. Summary and Discussion

This study has argued for a new theory of vowel height, based on data from Bantu languages. In this model, vowel height is characterized along a uniform phonetic and phonological dimension, represented in terms of the binary feature [open]. This feature is *hierarchical* in the sense that it maps onto sets of successively embedded registers and sub-registers. The rank of the tier on which [open] is arrayed determines the hierarchical level of the height register onto which it maps. As a hierarchical feature, [open] differs from most other phonological features, with the possible exception of [high tone], which has sometimes been characterized in similar hierarchical terms (Clements 1983, Hyman 1986).

While individually, any of the Bantu systems discussed in this study could be described by other feature systems with a greater or lesser degree of arbitrariness, taken together, they provide a powerful argument for the hierarchical model. A highly desirable result of the present study is that it has succeeded in providing a uniform way of characterizing Bantu vowels at the level of underlying representation, treating surface divergences as the result of historical or synchronic assimilation rules. It seems appropriate that groups of genetically and typologically related languages should be characterized in such a way as to bring out their fundamental structural unity, especially when this unity is not imposed on them by arbitrary analysis, but follows deductively from an appropriately-chosen model.

In contrast to the traditional descriptivist view that "each language must be described in its own terms," that is without respect to the structure of closely related languages, we may propose that closely related languages will, in a fully adequate analysis, display an important shared core of basic features of structure, perhaps expressible as shared parameter choices in the most general sense of this term. In phonology, for instance, these might take the form of a shared set of underlying feature categories, or a common core of similar lexical rules, applying under similar conditions. Differences at more superficial levels of structure will result largely from divergences in the rule system, increasing in importance as we proceed from earlier to later rule strata. Such a comparative perspective proves to be appropriate and revealing when applied to the analysis of the Bantu languages, which form a homogenous unit comparable in their basic structural similarity to e.g. the Romance or Chinese languages. Linguistic theories which allow us to bring genuine, deep-seated relationships of this sort to light should be preferred to those that force us to postulate different, unrelated analyses of fundamentally similar phenomena. The hierarchical model of vowel height proposed here seems to represent an improvement over earlier feature models in just these terms, since it makes it possible to attribute a common shared system of vowel features to an interesting variety of Bantu vowel systems, many of whose differences can be attributed to fairly superficial aspects of their rule systems.

The theory of vowel height presented here, if correct, has several consequences for feature theory. We have seen considerable evidence that it provides a better alternative for the characterization of vowel height than do the standard features [high], [low], and [ATR]

(or [tense]). These results should encourage a reexamination of the appropriateness of the standard features for analyses of other languages and language groups. We have also seen that the hierarchical model provides a more adequate treatment of vowel height than alternative models making use of a multivalued feature [*n*High] or a one-valued feature (or particle) *a*. It appears that vowel height is in fact best viewed as a binary feature, but one that can be arrayed on multiple tiers.

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Notes

1 This rule extends to prefixes in a few languages (e.g. Gusii, Llogoori), probably as an innovation. Also, [u] lowers to [o] after [e] in some languages (e.g. Kongo), also probably as an innovation. The fact that [u] generally assimilates only after [o] and not [e] may reflect a crosslinguistic tendency according to which one segment, A, is more likely to assimilate to another segment, B, to the extent that A and B have more features in common (Kiparsky 1988).

2 The present study forms part of a larger work in progress, in which the model is extended to a wider range of phenomena (Clements 1990, 1991).

3 In most 4-height languages, however, the system of verb suffixes involves a contrast among four or five vowels. Thus in Kikuyu, for example, the vowel of the causative suffix /-ɨ/ contrasts with the vowel of the applied suffix /-ir/ both in intrinsic height, and in failing to lower after height 2 vowels (see e.g. *yu-ðer-ɨ-a* 'to cleanse'); the same is true of the current past completive tense suffix /-ɨre/ (e.g. *tu-ror-ɨre* 'we looked at').

4 Odden (1989) gives further evidence in support of separate place and aperture nodes for vowels.

5 In a possible alternative analysis, we might regard /a/ as the default vowel in Bantu in the sense of Archangeli (see e.g. Archangeli 1984, 1988). In such an analysis, /a/ would be entirely featureless, and would receive its surface features by default rules

would be entirely featureless, and would receive its surface features by default rules inserting [+open$_1$], [+open$_2$] and other relevant features. Having no height features, /a/ would have no aperture node and could not serve as a trigger in the rule, allowing us to eliminate the mention of [-open$_1$] from its context. This analysis would explain quite elegantly why low vowels do not have a lowering influence on other vowels. A problem, however, is that under Archangeli's other assumptions, rule (8) should trigger the RROC (Redundancy Rule Ordering Constraint), which requires that a redundancy rule inserting feature [αF] applies before any rule mentioning [αF]. Given this principle, rule (8) should require the prior application of the redundancy rule introducing [+open$_2$] in low vowels, and we would still have to explicitly exclude low vowels from the class of triggers.

6 Recall that since consonants do not have aperture nodes, they will not block the application of this rule.

7 I leave open the question of whether [ATR] ever patterns with place features in other languages. If it does not, one must question whether [ATR] is justified as an independent phonological feature, distinct from [open] on the one hand and [radical] or [constricted pharynx] on the other.

8 The following derivations crucially require that the rules inserting the redundant features [+open$_2$] and [+open$_3$] under the aperture node of /a/ apply before rule (15) does. This effect is predicted by the RROC, mentioned in note 5.

9 As in the case of Nzɛbi (see note 8), the redundancy rules assigning the features [+open$_2$] and [+open$_3$] must apply before this rule does.

10 In the variety of Kinande described by Valinande (1985), Vowel Raising applies bidirectionally, subject to the same conditions in both directions. In the variety described by Mutaka (1991), Vowel Raising applies rightward only under a more restricted set of conditions. These differences, whether individual or dialectal, do not appear to have any consequences for the feature analysis of Kinande. They will accordingly be disregarded in the following discussion, which focuses on the leftward case.

11 In the variety of Kinande described by Mutaka (1991), word-initial vowels are only optionally affected by the raising rule.

12 Another Bantu language reported to have ATR-like vowel harmony is Tunen (see van der Hulst et al. (1986) and references therein).

13 The Sotho languages include Tswana, Northern Sotho, and Sesotho (also known as Southern Sotho); see Tucker (1929) and Doke (1954) for general descriptions of the group as a whole. While the present discussion concerns the particularly well-documented case of Sesotho, nearly identical vowel systems are found in the other Sotho languages. For fuller discussion of Tswana see Cole (1949, 1955), and for

Northern Sotho see Ziervogel (1967). In the earlier stages of preparing the present account, I had the benefit of many discussions of Sesotho phonology with Evelyn Khabanyane, a resident of Motsethabong district, Welkom, South Africa, who is the author of the phonetic and phonological studies cited in the text..

[14] Mid Vowel Raising applies under a complex variety of conditions, some of which are purely phonological and some of which are morphological. We will be concerned here only with the phonological environments, in which height 2 vowels are raised to height 2a when a higher vowel follows in the next syllable. See Doke and Mofokeng (1957) and Kunene (1961) for more complete descriptions.

[15] See Odden (1988) and Yip (1988) for further discussion of the OCP, and evidence that it does not operate as an automatic mechanism eliminating OCP violations wherever they arise.

[16] The facts are slightly more complicated than stated above, in ways that do not affect the main point. By a separate rule, a height 2a vowel triggers the raising of a following height 2 vowel, as in *ɐts-a* 'do', *kɐts-o* 'deed', *ɐts-ɐh-ɨle* 'to be practicable'. This rule does not apply to a vowel in the penultimate syllable, as shown by *ɐts-eh-a* 'to happen' and similar examples (Doke and Mofokeng 1957). Thus it would also be possible to account for the examples in (36) by postulating a height 2a vowel in the penultimate syllable, which triggers spreading both leftward and rightward. Even in this analysis, however, height 2a vowels would have to be Mid Vowel Raising triggers to account for its application in longer sequences such as those in *mukɔlɔkɔ*, etc.

[17] Harris (1987) argues that Mid Vowel Raising is a non-structure-preserving rule, since he views the height 2a series as entirely derived. However, I have given evidence above that this series occurs underlyingly. Specifically, examples such as those in (32) and (36), and many others of the same sort not considered by Harris, offer reason to believe that height 2a vowels are already present in representations at the point at which Mid Vowel Raising applies in the synchronic grammar. (Of course, the rule may have applied in a non-structure-preserving fashion at an earlier historical stage of the language, a point not at issue here.)

[18] This restriction is required in Harris's analysis, since, as we have remarked in note 17, he regards this rule as non-structure-preserving. Since we have shown the height 2a vowels to occur in the input to this rule, however, we could regard the rule as structure-preserving. This will allow us to eliminate the [αback, αround] condition, since the rule will not be able to assign [-low] to /a/ without violating the structure-preservation condition (nonlow vowels must be front or rounded). With this modification, Harris's rule is comparable to the one in (38) in terms of formal simplicity.

[19] This argument is originally due to Hayes (1990).

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Command and Fula ɗum pronominals

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1. Introduction

Since the earliest studies of anaphora, some notion of command has been taken to be crucial to understanding the binding properties of pronouns.* In this paper I argue that the binding properties of the ɗum forms in Fula must be characterized without reference to any notion of command. This is a highly unusual situation for non-logophoric pronouns (Sells 1988) and provides support for a Lexical Functional Grammar (LFG) analysis of binding properties.

2. The data

Fula is a language with noun classes, but I will be considering pronouns from just one of the classes: the neutral (or ɗum) class. In addition, I will be considering only the Object form (ɗum), used as Direct and Indirect Objects, and the Complement form (muuɗum/mum), used as Possessors, Objects of Prepositions, and in certain other constructions which I will not detail here. The forms are given in (1).

(1) Fula ɗum forms

a. Object	ɗum
b. Complement	muuɗum/mum

Although Fula exhibits a wide variety of dialectal variation (Culy 1990), the data considered here are from three dialects that seem to have identical properties as far as the Object and Complement pronouns are concerned. The three dialects are Adamawa, spoken in Nigeria (East 1934/67), Gombe, also spoken in Nigeria (Arnott 1970), and Liptako, spoken in Burkina Faso (Bidaud and Prost 1982).

A word of caution is in order: all of these sources are traditional descriptive grammars, and as such give only positive data. I have little or no negative evidence concerning the properties under consideration. On the other hand, there are no counterexamples to the generalizations I will give. Thus, I think that these grammars do give us a pretty accurate view of the pronouns in these dialects.

3. Agreement

There are three aspects of the binding properties of the ɗum forms, and none of these aspects involve the notion of command. The first aspect could be called a type of agreement. ɗum forms are used only when they are coindexed with non-pronominal NPs, as suggested by the examples in (2). In (2a), we have a ɗum form coindexed with the non-pronominal NP *Bello*. For comparison, in (2b,c) we see the singular human class Complement pronoun *maako*, which normally cannot be coindexed with non-pronominal NPs. In (2b) then, it must be disjoint from *Bello*, while in (2c) *maako* can be coindexed with the pronoun *o* (see also Culy and Gnalibouly Dicko 1988 on a Fula dialect spoken in Mali).

(2) Short distance agreement facts (Gombe, Arnott 1970:154)

a. Bello -noddi soobajo muudɗum
Bello called friend muudɗum
'Bello$_i$ called his$_i$ friend'

b. Bello -noddi soobajo maako
Bello called friend maako
'Bello$_i$ called his$_{k/*i}$ friend'

c. 'o -noddi soobajo maako
3sg called friend maako
'He$_i$ called his$_{i/k}$ friend'

This restriction on the ɗum forms is not limited to antecedents in the same clause, as we can see in the examples in (3). In (3a) the subordinate object ɗum form is coindexed with the matrix subject non-pronominal, *Amadu*; in (3b) the human class object form *mo* cannot be coindexed with the matrix subject *Amadu*; and in (3c), the human class object form *mo* can be coindexed with the pronominal matrix subject. (3d) contains a real-life example from Adamawa Fula, where the object ɗum form is coindexed with a non-pronominal object in a preceding conjunct.

(3) Long distance agreement facts

a. Lipatako, Bidaud and Prost 1982:82
Amadu wi'ii ɓe nodda ɗum
Amadu said they call ɗum
'Amadu$_i$ said that they call him$_i$'

b. Lipatako, Bidaud and Prost 1982:82
Amadu wi'ii ɓe nodda mo
Amadu said they call mo
'Amadu$_i$ said that they call him$_k$'

b. Lipatako, Bidaud and Prost 1982:82
o wi'ii ɓe nodda mo
o said they call mo
'He$_i$ said that they call him$_{i/k}$'

d. Adamawa, East 1934/67:122
o neli dou Lamɗo Mandara, o umri ɗum tokkago mo
he sent to chief Mandara, he ordered ɗum follow him
'He sent to the chief of the Mandara$_i$, and ordered him$_i$ to follow him'

When the choice of pronoun depends on a property of its antecedent we say that it agrees with its antecedent with respect to that property. Thus, we can follow a suggestion made by Joan Bresnan and say that Fula pronouns must agree with their antecedents with respect to pronominality (see also Koopman and Sportiche 1989 on Abe). While agreement in pronominality is unusual, it is also very robust across the dialects (Culy 1990). Clearly, no notion of command is relevant for agreement.

4. Non-coargument condition

The second aspect of the binding properties of the ɗum forms is more familiar. A ɗum form does not have as its antecedent a coargument. In other words, the antecedent of a ɗum form will not be an argument of the same predicate that the ɗum form itself is an argument of. Some examples illustrating this property are in (4). In (4a), the father is the one doing the telling, and the ɗum form cannot refer to the father, but must refer to Gooto. Similarly, in (4b), Bello will do the bringing, and the ɗum form has to refer to Towɗo, not Bello.

(4) Non-coargument condition
a. Gombe, Arnott 1970:158
baaba 'on -noddi Gooto, -wi'i ɗum...
father the called Gooto, said ɗum
the father$_i$ called Gooto$_k$ and told him$_k$/*himself$_i$...

b. Liptako, Bidaud and Prost 1982:83
Towɗo wi'ii Bello, waddana ɗum dewtere makko
Towɗo told Bello, bring, ɗum book makko
'Towɗo$_i$ told Bello$_k$ to bring him$_{i/*k}$ his$_k$ book'

Clearly, the notion of coargument does not depend on any type of comand. Thus, the non-coargument condition on ɗum forms does not make use of any type of command.

5. Same sentence condition

The third aspect of the binding properties of the ɗum forms, and the one that is the most crucial for the claim that command is not relevant in characterizing the binding properties, is that the ɗum forms must be coindexed with a non-pronominal NP in the same sentence. Arnott's description of the ɗum forms is given in (5).

(5) Arnott 1970:153 on ɗum forms

> The ɗum-forms, on the other hand, are used in referring to (a) a full nominal, (b) a specifier, (c) a verbo-nominal, or (d) the relative element **mo**, when the antecedent and the pronominal form occur *in the same sentence* ... [emphasis in original—CC]

Another way of putting this is that ɗum forms cannot be free in a sentence. So for example, *muuɗum* in (2a) can only refer to Bello, and cannot refer to some person who is merely salient in the discourse.

To see that command is not relevant for this aspect of the binding properties, consider the examples in (6). In each of these examples, the antecedent does not in any sense command the pronouns. In (6a), the antecedent "chief" is the subject of a temporal clause and the pronouns are in the matrix clause; in (6b) the antecedent "chief" is in the protasis of a conditional and the pronouns are in the

apodosis; and in (6c) the antecedent "people" is the possessor of a direct object in one conjunct, and the pronouns are in other conjuncts.

(6) Antecedent does not c-command pronoun
a. Antecedent in temporal clause, Arnott 1970:156
nde laamiiɗo -fini, sey ndu-wari les muuɗum
when chief awoke then it came close to muuɗum

ŋgam ndu-holla-ɗum ko ndu-haɓɓanaa
so that it might show him what it had.had.tied.to.it
'when the chief awoke, it came close to him, so that it might show him what it had had tied to it'

b. Antecedent in protasis, Biduaud and Prost 1982:205
si ni jowro wattitay, himɓe diwan ɗum nder wuro
if ASP chief change-NEG, people chase-Fut ɗum from village
'if the chief doesn't change, the people will chase him from the village'

c. Antecedent in conjunct, Arnott 1970:313
ɓeɗon -pecca deeɗi yimɓe ɓe-ta'ya tetekki muuɗum ɓe-nyootitoo-ɗum
they-open.up stomachs people they-operate intestines muuɗum they-sew.
up ɗum
'they open up people's stomachs, operate on their intestines, and sew them up again'

Let's look at (6a) in a little more detail. The ɗum forms must be bound in the sentence, and "chief" is the only possible antecedent for them, so they are bound by "chief." However, "chief" does not, in any sense, command the pronouns, so command is not relevant to this third aspect of the binding properties of the ɗum forms.

6. The problem

These properties of the Fula ɗum forms, while intuitively natural and simple, are in fact extremely difficult to capture in most existing theories of anaphora, e.g. Government and Binding, Head Driven Phrase Structure Grammar, and Lexical Functional Grammar. The difficulty arises because these theories incorporate some form of command into the notion of binding. A sample quote from *Lectures on Government and Binding* is given in (7).

(7) C-command and binding in GB, Chomsky 1981:184
α is X-bound by β if and only if α and β are coindexed, β *c-commands* α, and β is in an X position [emphasis added—CC]

Thus in GB, the property of c-command is built into the very definition of binding. A pronoun simply cannot be bound, on this view, if its antecedent does not c-command it. Yet we have just seen that the Fula ɗum forms can have non-c-commanding antecedents. In some cases, the only possible antecedent is a non-c-

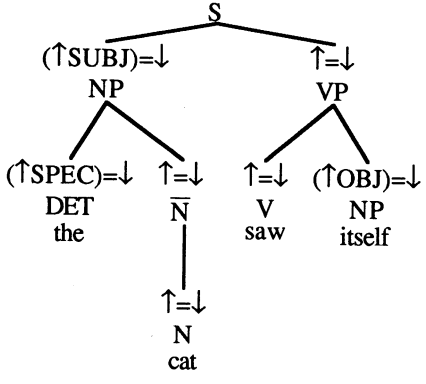
commanding one. The challenge, then, is to modify theories of binding to account for the Fula facts, where command is not relevant.

7. A solution

I will now show how LFG can be adapted to handle the lack of command in Fula by modifying slightly the approach in Dalrymple 1990. The analysis presented here will also provide a neat way of parameterizing the differences in command facts across languages.

LFG makes use of three levels of structure: c(onstituent)-structure, f(unctional)-structure, and s(emantic)-structure. In (8) are sample c- and f-structures for the English sentence "the cat saw itself". How these structures are constructed is not relevant for our purposes. Nor will s-structure play much of a role, and I have omitted it.

(8) Sample c-structure and f-structure
a. c-structure



b. f-structure

$$\begin{bmatrix} \text{SUBJ} \ {}_1\begin{bmatrix}\text{SPEC} & \text{DEF}\\ \text{PRED} & \text{'cat'}\end{bmatrix} \\ {}^3\text{PRED} \ \text{'see<}\ (\uparrow\text{SUBJ})\ (\uparrow\text{OBJ})\text{>'} \\ \text{OBJ} \ \ {}_2[\text{PRED} \ \text{'pro'}\ ] \end{bmatrix}$$

In Dalrymple's LFG approach, each pronoun has associated with it binding constraints, expressed in the form of equations relating the relevant pieces of the three types of structure. The schematic form of a constraint is given in (9a).

(9) Schematic binding equation (Dalrymple 1990)

a. [(DomainPath $\uparrow$) AntecedentPath] $_{\sigma} = \uparrow_{\sigma}$

b. $\uparrow$ = the f-structure of the pronoun

c. (DomainPath $\uparrow$) = f-structure containing the antecedent and the pronoun

d. AntecedentPath = the path in (c) to the antecedent

e. X_{σ} = the projection in semantic structure of X

I will explain what the different parts of the constraint mean, by using the English example as a reference, as shown in (10). As indicated in (9), the $\uparrow$ refers to the f-structure of the pronoun, labelled "2" in our example. The expression (DomainPath $\uparrow$) refers to the f-structure containing the f-structures of the pronoun and of its antecedent. This is similar to the notion of "governing category" in GB, and in our example it is the whole f-structure, labelled "3". The DomainPath stands for the sequence of attributes in the large f-structure leading to the f-structure of the pronoun. In our example the DomainPath is simply OBJ. Similarly, the AntecedentPath stands for the sequence of attributes in the large f-structure leading to the f-structure of the antecedent. In our example the AntecedentPath is just SUBJ. Finally, the σ indicates that the identity is not between the f-structures themselves, but between their corresponding parts in s-structure. If we put everything together in the example, we end up with the constraint that the semantic projections of the subject and the object must be the same, i.e. they must be coindexed.

(10) Example (9) illustrated ("The cat saw itself")

a. $\uparrow = 2$

b. (DomainPath $\uparrow$) = 3

c. DomainPath = OBJ

d. AntecedentPath = SUBJ

e. Substitution: $(3\ \text{SUBJ})_{\sigma} = 2_{\sigma}$

Instead of using c-command, LFG makes use of its analog in f-structure, called f-command, defined in (11).

(11) Definition of f-command
An element α f-commands an element β iff every f-structure properly containing α also contains β, and α does not contain β.

The way f-command is encoded in the binding equation is by constraining the length of the AntecedentPath to be 1, as shown in (12). In other words, speaking in terms of f-structures, the antecedent must be an immediate element of

the f-structure containing it and the pronoun. Thus, the f-structure of the antecedent will necessarily f-command the f-structure of the pronoun.[1]

(12) F-command constraint

| AntecedentPath | = 1

Given that the f-command constraint is so nicely isolated, it is easy to relax it to account for the Fula ɗum facts. So for the ɗum forms, we will say that there is no restriction on the length of the AntecedentPath.

An application of this mechanism to part of the Fula example in (6a) ('when the chief awoke, it came close to him, ...') is given in (13). The ↑ is the f-structure of the pronoun, labelled "2" again. The (DomainPath ↑) is the f-structure containing the f-structures of the pronoun and of its antecedent. Again it is the whole f-structure and labelled "3". This time the DomainPath is OBL OBJ, while the AntecedentPath is TEMP SUBJ. Note that the AntecedentPath is of length 2 in this case. Putting it all together, we have that the temporal clause's subject is coindexed with the oblique object of the matrix clause.

13. Fula example (6a) ('when the chief awoke, it came close to him, ...')
a. Rough f-structure

$$\begin{bmatrix} \text{TEMP} & \begin{bmatrix} \text{SUBJ} & {}_1[\text{PRED 'chief'}] \\ \text{PRED} & \text{awaken}\langle\uparrow\text{SUBJ}\rangle \end{bmatrix} \\ \text{SUBJ} & [\text{PRED 'pro'}] \\ \text{PRED} & [\text{PRED come}\langle\uparrow\text{SUBJ}\rangle] \\ \text{OBL} & [\text{OBJ } {}_2[\text{PRED 'pro'}]] \end{bmatrix}_3$$

b. ↑ = 2

c. (DomainPath ↑) = 3

d. DomainPath = OBL OBJ

e. AntecedentPath = TEMP SUBJ

f. Substitution: $(3\ \text{TEMP SUBJ})_\sigma = 2_\sigma$

It may turn out that there should be other constraints on the AntecedentPath to account for the full range of facts in Fula. For example, it might be that the AntecedentPath must end in a SUBJ or POSS if the length is longer than one. In other words, it might be the case that only subjects and possessors are allowed as non-f-commanding antecedents. Certainly all of the examples I have given are consistent with this generalization.

Another possible constraint would be to restrict the AntecedentPath to being of length less than or equal to two. In other words, if the antecedent does not f-command the pronoun, then perhaps the f-structure containing the antecedent must itself f-command the pronoun. Again, all the examples I have given seem consistent with this generalization.

Whatever the ultimate generalizations end up being, we have a neat way of isolating the parameter of variation: in the AntecedentPath.

8. Conclusion

In this paper I have examined the binding properties of the d'um Object and Complement pronouns in three varieties of Fula. In particular, I have shown that no notion of command is relevant for the characterization of the binding properties, a fact which is a challenge to current theories of anaphora.

I have also shown how LFG can be modified to account in a precise way for the Fula facts, as well as for accounting for the cross-linguistic variation in the role of command in binding constraints. Other theories of anapahora do not have mechanisms in place to handle this variation. Unless new mechanisms are introduced, theories such as Government and Binding and Head Driven Phrase Structure Grammar will have to parameterize either the notion of binding, or the notion of c-command.[2]

I should note that parameterizing the notion of c-command is essentially the approach I have taken in LFG, and that to a certain extent, c-command has already been parameterized in some GB work (Chomsky 1986). Thus, it seems that parameterizing the notion of c-command is the right approach, independent of the particular framework.

Notes

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[1]Strictly speaking, we also need to constrain the DomainPath to being non-null, but this is required independently to prevent the pronoun from containing the antecedent.

[2]Or o-command in the case of Head Driven Phrase Structure Grammar.

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Jita Glide Epenthesis and the Maximality Principle*

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1. Introduction

In Jita, an Eastern Bantu language spoken in Tanzania, derived glides arise in two vowel hiatus contexts. In a sequence of two monomoraic vowels, if the first vowel is [+high] it will become a glide - or off-glide - and the following vowel is compensatorily lengthened. This is shown in (1a):

(1a) Glide Formation in Jita[1]
oku - iga --> ok^{w}i:ga 'to imitate'
eBi - ára --> eB^{y}á:ra 'fingers'

In a sequence of three monomoraic vowels, again, if the first vowel is high it will glide and the second vowel will lengthen. In addition, the glide [y] is epenthesized before the third vowel, as shown in (1b):

(1b) Glide Epenthesis in Jita
oku-í-ocera --> ok^{w}i:yócera 'to roast for oneself'

Odden & Odden (1985) account for very similar facts in KiHehe, another Tanzanian Bantu language, using a skeletal approach by proposing two ordered rules. A rule of Glide Formation first applies to derive glides from high vowels in words like (1a), then a rule of Glide Epenthesis applies to the output of Glide Formation in words like (1b). If the opposite ordering applied, then an incorrect form for (1b) would surface as shown in (1c):

(1c) Glide Epenthesis incorrectly precedes Glide Formation (applying left to right)

UR	oku-í-ocera
Glide Epenthesis	okuyíocera --> okuyiyocera
Glide Formation	cannot apply
SR	*okuyiyocera

Adopting Itô's (1986, 1989) prosodic theory of syllable structure, I shall first show in this paper that the rules of Glide Formation and Glide Epenthesis are motivated by the syllable structure of Jita. As syllabification rules, they are not ordered in the phonology, but instead apply whenever their context is met. After presenting Odden and Odden's (1985) analysis of the KiHehe facts, I shall show that the apparent ordering of these two rules falls out straightforwardly from the directionality and maximality principles of prosodic theory which Itô (1989) has shown typically predict epenthesis sites.

2. Syllable Structure of Jita

2.1. Basic Syllable Template

Like many Bantu languages (e.g., Shona (Myers 1987), Kirundi (Broselow & Niyondagara 1989), Kinyambo (Bickmore 1989) and LuGanda (Katamba 1985)), Jita has the basic syllable template (C)V(V). That is, a syllable must contain at least one vowel, and a maximal syllable may consist of a single

segment in the onset followed by a long vowel. No closed syllables or complex onsets may occur, so no consonant clusters are found in Jita.[2] Although onsetless (vowel-initial) short syllables seem to constitute the minimal syllable in Jita, this minimal syllable occurs most regularly in only one context, namely, phrase-initial position. Some typical Jita words illustrating these preliminary generalizations about syllable structure are given in (2), below (the syllables are set off by periods in these examples):

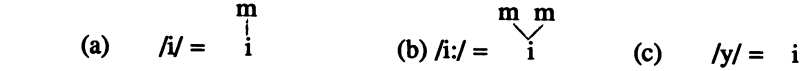
(2)	(a)	o.ku.su.ka	'to weave; pour'
	(b)	o.mu.sa:.ni	'friend (cl.1)'
	(c)	e.mi.li.mu	'jobs; tasks (cl.4)'
	(d)	e.Bi.re.fu	'chins; beards (cl.8)'
	(e)	u.ta:.té:.ka	'you didn't cook'
	(f)	i.ta:.lú:.Ba	'it (cl.9) didn't follow'

To account for Jita syllable structure, I will adopt the prosodic licensing approach defended by Itô (1986, 1989) and Goldsmith (1989). Under this approach, syllable structure is not assigned by ordered rules (as in, for example, Steriade (1982), Levin (1985)). Rather, syllabification results from matching sequences of segments to a syllable template. According to Itô (1986), the syllable template and the other syllabification principles of a language are to be understood as Well-Formedness Conditions (WFC's) defining which segment sequences form the permissible syllables of a language. Since these syllabification rules are WFC's they are what Halle & Vergnaud call "persistent rules" and reapply whenever their context is met, rather than being ordered among the phonological rules (Itô 1986).

Following Itô (1989), I further assume that syllabification conventions license sequences of moras and root nodes, in the case of onsets and codas, not skeletal timing units (X or CV slots). As Hayes (1989), Hock (1986), Hyman (1985) and McCarthy & Prince (1986) have all convincingly argued, moras give a more insightful account of prosodic timing than CV or X slots do in relation to a number of phonological phenomena, including compensatory lengthening and syllable structure. Although there are some differences in the details of these moraic theories, all agree that, on the surface at least, onsets do not contribute a mora to the syllable. Only elements in the rhyme - universally the nuclear vowel(s) and, on a language-particular basis, consonants in the coda - contribute a mora to the syllable and thus affect syllable weight.

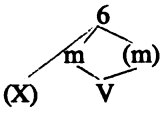
Short vowels, in moraic theory, are universally associated with a single mora, while long vowels are associated with two moras. Glides are distinguished from high vowels in that they are not linked to a mora (Hayes 1989; Hyman 1985). Since Jita has both phonemic glides and phonemic vowel length, I assume mora association must be present underlyingly, so that the contrast between /i, i:, y/, for example, is represented as shown in (3):

(3) Representation of Short vs. Long Vowels vs. Glides
(Hayes 1989, p. 256; "m" = mora)



Using the moraic approach, then, the basic syllable template for Jita is formulated as in (4):[3]

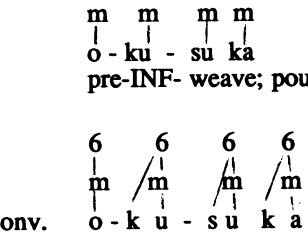
(4) Basic Syllable Template ("6" = syllable)



In other words, Jita syllables are maximally bimoraic. Only a single non-moraic segment (glide or consonant) is licensed in onset position, and the second mora must be the second half of a geminate vowel. Neither consonant sequences nor vowel sequences (diphthongs) are licensed within a syllable.

The application of the moraic syllabification principles discussed so far is illustrated by the derivation of (2a) oku-suka 'to weave; pour' given in (5):

(5) Syllabification of (2a) oku-suka 'to weave; pour'



The other words in (2) would have analogous derivations.

These rules also account for the slightly more complex data given in (6):

(6)	(a)	o.ku.i:.ga	'to pass a test'
	(b)	a.ma.u:.kâ	'caterpillars' (Cl.6)
	(c)	e.mi.a:.no	'yells' (n., Cl. 4)

In these words, notice that onsetless syllables occur word-medially only when a long vowel immediately follows a short vowel. Since onsets are optional (though note that this will be revised shortly) and long vowels are licensed by the Basic Syllable Template (4), these words would be syllabified just like (2a).

2.2. (Off-) glide Formation and Compensatory Lengthening

As was shown by the data in (2) and (6), onsetless monomoraic syllables only occur regularly in phrase-initial position in Jita. Elsewhere, onsetless monomoraic syllables are disfavored, as they seem to be in other Bantu languages (e.g., Kirundi (Broselow & Niyondagara 1989); LuGanda (Katamba 1985); Kinyambo (Bickmore (1989); and Shona (Myers 1987)). When monomoraic vowel sequences arise in Jita, they are regularly eliminated. As shown by the data in (7), if the first vowel in a sequence of two (non-identical)

monomoraic vowels is [+high], it will become an (off-)glide and the second vowel is lengthened (compare these data with those in (2), above):[4]

(7)	(a)	o.ku.i.ga -->	o.k^{w}i:.ga	'to imitate'
	(b)	o.mu.á.na -->	o.m^{w}á:.na	'child' (cl.1)
	(c)	e.mi.o.yo -->	e.m^{y}o:.yo	'hearts' (cl.4)
	(d)	e.Bi.á.ra -->	e.B^{y}a:.ra	'fingers' (cl.8)
	(e)	u.a.té:.ka -->	wa:.té:.ka	'you cooked'
	(f)	i.a.lu:.Ba -->	ya:.lu:.Ba	'it (Cl.9) followed'

Note that (off-)glide formation and vowel lengthening do not occur if the second vowel is long (compare (6a) oku-i:ga 'to pass a test' with (7a) ok^{w}-i:ga 'to imitate'). Instead, only adjacent monomoraic vowels trigger off-glide formation.

If the two adjacent [+high] vowels are identical, they combine to form a single long vowel, as shown in (8):

(8)	(a)	o.ku.ú.ma -->	o.kú:.ma	'to become dry'
	(b)	e.li.í.no -->	e.lí:.no	'tooth'
BUT	(c)	o.ku.u:.ta:.sya -->	o.ku.u:.ta:.sya	'to hurt (tr.)'

Again, this process is blocked if the second vowel is long (compare (8a) okú:ma 'to become dry' with (8c) oku-u:ta:sya 'to hurt (someone)').

To account for the fact that onsetless monomoraic syllables are eliminated in Jita by combining two adjacent monomoraic vowels in separate syllables to form a single bimoraic syllable, I propose that the mora of the second vowel is delinked from its syllable and incorporated into the syllable of the first vowel by the Restructuring rule given in (9), which is very similar to a Resyllabification rule proposed by Myers (1987) to account for analogous Shona data:

(9) Onsetless Syllable Restructuring

Restructuring (9) in Jita may be motivated by what Itô (1989) has called the Onset Principle, cited in (10), below:

(10) Onset Principle (Itô 1989: 223, fig. (3))
Avoid $_{\sigma}$[V

which states that onsetless syllables are to be avoided whenever possible. Restructuring (9) may then be considered a strategy for repairing ill-formed onsetless syllables in Jita. To account for the fact that onsetless syllables may only occur in phrase-initial position in Jita, I also follow Itô (1989) in proposing

that these peripheral moras may be extraprosodic and so be invisible to the Onset Principle (10).

The Onset Principle as it stands does not explain why onsetless bimoraic syllables, as in (6), resist Restructuring (9), however. One possible explanation would be to propose that in Jita the bimoraic limit on syllable weight blocks restructuring of onsetless bimoraic syllables, since the result would necessarily exceed the bimoraic limit. Another possibility is to propose that Jita syllables are subject to the Branching Constraint, formulated in (11):

(11) Branching Constraint

Syllables must branch, either by containing an onset (a) or by containing two moras (b)

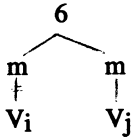
(a) 

(b) 

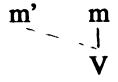
Since onsetless bimoraic syllables do not violate the Branching Constraint (11), they are well-formed and so not subject to Restructuring (9). Onsetless monomoraic syllables do violate the constraint, however, and must undergo Restructuring (9) to derive well-formed syllables.

After two adjacent monomoraic vowels are combined into a single bimoraic syllable by Restructuring (9), other rules must apply to derive a geminate vowel in the syllable, as diphthongs are not licensed in Jita.[5] If the two restructured vowels are identical, their feature hierarchies are fused to conform to the OCP (Odden 1986), and a geminate vowel is derived. If the restructured vowels are non-identical, the following repair rules must apply to derive a geminate vowel. First, the vowel on the left delinks from its mora by the rule in (12). Then the features of the vowel on the right spread leftward to the resulting free mora to derive a geminate vowel by the Compensatory Lengthening rule given in (13):

(12) Vowel Demorification



(13) Compensatory Lengthening
(m' = unassociated mora)



Although Stray Erasure eventually deletes the vowel features delinked by Demorification (12), I assume they do not delete immediately but instead are able to reassociate with other positions within the syllable. As shown by the data in (14), if there is no onset consonant preceding the demorified high vowel derived by Demorification (12), it surfaces as a glide followed by a long vowel:

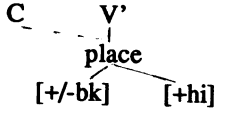
(14) Simple Glide in Onset Position

(a)	u-amá-gura -->	wa:magúra	'you bought'
(b)	u-amá-ge:nda -->	wa:magé:nda	'you went'
(c)	i-amá-gwa -->	ya:mágwa	'it (Cl.9) fell'
(d)	i-amá-Birima -->	ya:maBírima	'it (Cl.9) ran'

Since the Basic Syllable Template (4) allows glides to be syllabified in onset position (if the onset position is not already filled by a consonant), the data in (14) have a straightforward derivation. After Demorification (12) and Compensatory Lengthening (13) apply, the demorified high vowel is licensed in onset position as a glide.

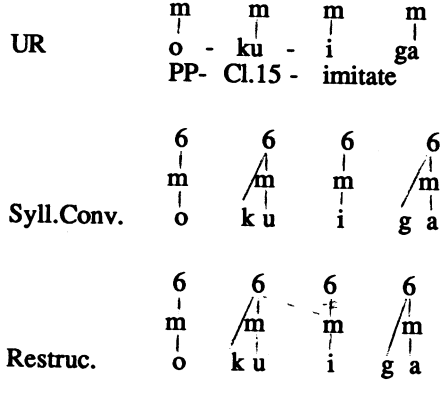
When the demorified [+high] vowel is preceded by an onset consonant, it may not be syllabified in onset position. Instead, its place features reassociate with the onset consonant as an off-glide, by the rule given in (15):

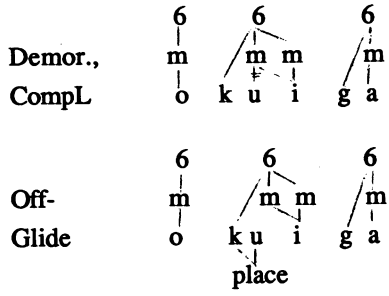
(15) (Off-)glide Formation (V' = unsyllabified vowel)



The remaining unassociated root node and vowel features are deleted by Stray Erasure. The application of Glide Formation (15) is illustrated in the derivation of (7a) ok^{w}i:ga 'to imitate' given in (16):

(16) Derivation of (7a) ok^{w}i:ga 'to imitate'





SR ok^{w}i:ga 'to imitate'

To summarize this section, we have seen that (Off-)Glide Formation is motivated by the Branching Constraint on well-formed syllables in Jita. Onsetless monomoraic syllables are ill-formed, and so undergo a rule of Restructuring which incorporates them into the preceding syllable. Other rules then apply to derive Compensatory Lengthening and Off-glide Formation. It is important to note at this point that the output of (Off-)Glide Formation and Compensatory Lengthening is a maximal syllable of Jita, namely, an onset followed by a bimoraic vowel.

3. Glide Epenthesis

Underlying sequences of three adjacent monomoraic vowels are also found in a few contexts in Jita, notably when the reflexive object marker /-í-/ is affixed to a vowel-initial verb stem. Since syllables are maximally bimoraic in Jita, only two - the first two - of the sequence of three adjacent vowels may undergo Restructuring and Compensatory Lengthening. The third monomoraic onsetless vowel cannot also be restructured into that syllable without violating the bimoraic limit on syllable weight. Instead, a glide is inserted before this third vowel, as shown by the data in (17):

(17) Glide Insertion (Form of infinitives is:
Infinitive prefix - Reflexive Object Prefix - Verb Stem)

(a)	oku-í-ocera -->	ok^{w}i:yócera	'to roast for oneself'
(b)	oku-í-úmya -->	ok^{w}i:yúmya	'to dry oneself'
(c)	oku-í-enda -->	ok^{w}i:yé:nda	'to like oneself'
(d)	oku-í-élelwa -->	ok^{w}i:yélelwa	'to understand oneself'

Glide insertion is also clearly triggered by the Branching Constraint. Just like Restructuring, glide insertion repairs ill-formed onsetless monomoraic syllables. It may thus be more properly considered a rule of onset epenthesis, and formulated as shown in (18):

(18) Glide Epenthesis

The unspecified onset will later be assigned the features of the palatal glide [y] by default. (Recall that phrase-initial onsetless syllables will not undergo Glide Epenthesis because they are extraprosodic.)

In sum, Glide Epenthesis, like Glide Formation, may be considered a syllabification principle of Jita, as it also repairs ill-formed syllables which violate the Branching Constraint. It is important to note that the output of Glide Epenthesis - in contrast with Glide Formation - is only a minimal syllable of Jita, namely, an onset followed by a monomoraic vowel.

Thus far, I have assumed that Glide Formation applies before Glide Epenthesis, since otherwise the incorrect form in (1c) would be derived. Further, I have assumed that both rules apply from left to right, since it is the first two - not the second two - of the three adjacent vowels which undergo Restructuring. Before showing how the prosodic principles of maximality and directionality proposed by Itô (1989) account for the order and direction of application of these two rules, I shall compare the analysis so far with a skeletal account of very similar KiHehe facts proposed by Odden & Odden (1985).

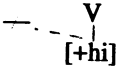
As shown by the data in (19), KiHehe - like Jita - has a rule of Glide Formation which derives a glide from a high vowel when it immediately precedes another vowel:

(19) Glide Formation in KiHehe (Odden & Odden 1985, fig. (2))

kú-teléka	'to cook'	kw-íita	'to spill'
kw-éengéla	'to carry on back'	kw-áaka	'to be lit'
mu-sito	'heavy (1,3)'	mw-áangufu	'fast (1,3)'
kú-mu-tóva	'to him him'	a-mw-éenda	'he will like him'
mi-síto	'heavy (4)'	my-áangufu	'fast (4)'
fi-síto	'heavy (8)'	fy-áangufu	'fast (8)'
kú-lu-gúla	'to buy it (11)'	kú-lw-iíta	'to pour it (11)'

Odden & Odden account for this by the skeletal rule of Glide Formation cited in (20a), which derives a glide from a high vowel when it immediately precedes another vowel:

(20a) Glide Formation (Odden & Odden 1985, fig. (3))



KiHehe also resembles Jita in having a rule of Glide Epenthesis which inserts a glide before the third in a sequence of three adjacent vowels after Glide Formation (20a) applies to the first two vowels. Odden & Odden's skeletal rule of Glide Epenthesis is formulated in (20b), and an example from KiHehe showing the application of both rules is given in (20c):

(20b) Glide Epenthesis in KiHehe (Odden & Odden 1985, fig. (4))

$$\emptyset \text{ --> } C \,/\, \underset{\substack{| \\ 6}}{V} \_\_ \underset{\substack{| \\ 6}}{V}$$

(20c) KiHehe example illustrating both Glide Formation and Glide Epenthesis:
kú-i-eénda --> kwíiyeénda 'to love each other'

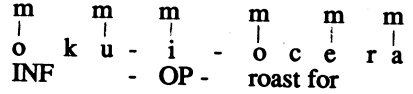
Since the two rules apply in nearly the same context (i.e., to adjacent vowels), Odden & Odden must stipulate that Glide Formation applies before Glide Epenthesis in order to prevent the derivation of incorrect forms like that given in (1c).

If we compare Odden & Odden's skeletal analysis of KiHehe with the present prosodic analysis of Jita, it is clear that the skeletal approach misses the generalization that both Glide Formation and Glide Epenthesis are motivated by syllabification principles. It is just a coincidence in the skeletal approach that the rules apply to sequences of adjacent vowels. This omission is especially unfortunate in the case of Glide Epenthesis since, as Itô (1986, 1989) has argued, epenthesis rules almost universally increase syllable well-formedness. Further, in the skeletal account it is not clear why two rules should apply in near identical environments. In the prosodic account presented here, however, I have shown that Jita syllables are maximally bimoraic, so that only two monomoraic vowels may be incorporated into a single syllable by Restructuring. In a sequence of three vowels, one will be left "stranded," and Onset Epenthesis allows this stranded vowel to be incorporated into a well-formed minimal syllable.

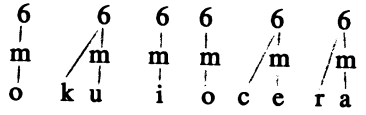
What remains to be explained is how the direction and order of application of Glide Formation and Glide Epenthesis may be accounted for. The direction of application of these two rules falls out from the directionality principle (Itô 1989), which states that the direction of syllable construction must be specified in each language. In Jita, syllables must be constructed from left to right across the word, since it is the two leftmost of three adjacent vowels which restructure into a single syllable, leaving the third onsetless. If syllabification applied from right to left, we would incorrectly predict that the rightmost two vowels of the three adjacent vowels in the data in (17) would restructure into a single bimoraic syllable, leaving the first of the three vowels unchanged. This can be seen by comparing the correct derivation of (17a) ok^{w}i:yócera 'to roast for oneself' given in (21) with the incorrect derivation given in (22):

(21) Correct derivation of (17a) ok^{w}i:yócera 'to roast for oneself': Left to right syllabification

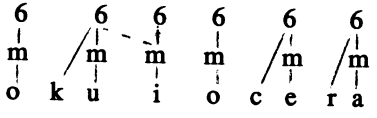
UR



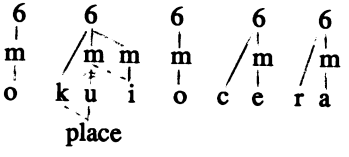
Syll.Conv



Restruc

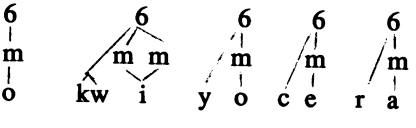


CompL, Off-Glide



Restruc. Not Applicable

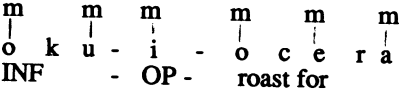
Glide Epenth.



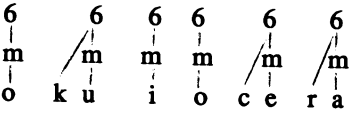
SR ok^{w}i:yócera 'to roast for oneself'

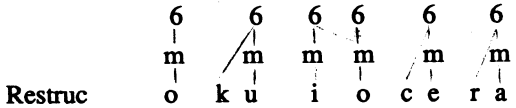
(22) Incorrect derivation of (17a) ok^{w}i:yócera 'to roast for oneself': Right to left syllabification

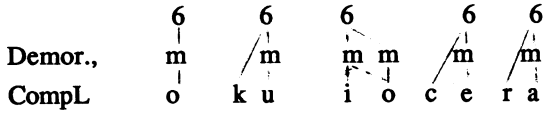
UR

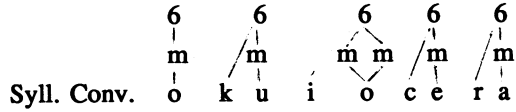


Syll. Conv









Restruc.,
Glide Epenth. Not applicable

SR *okuyo:céra 'to roast for oneself'

Next we must account for the fact that Glide Formation must apply before Glide Epenthesis. This ordering is especially problematic, since syllabification rules may not be ordered in the prosodic approach I have adopted. Further, in general, Goldsmith (1990) has suggested that if a language has two rules which repair the same phonotactic constraint (like the Branching Constraint), the two rules should apply freely subject to the Elsewhere Condition, which states that if two rules apply in the same phonological context, the more specific rule must apply before the more general rule. Otherwise, the more specific rule will never be able to apply. The Elsewhere Condition will not allow us to impose the correct ordering on Glide Formation and Glide Epenthesis, however. Because neither rule applies in a particular morphological context, it is difficult to see in what sense one rule is more specific than the other. Instead, I propose that the correct ordering of these two rules falls out from the maximality principle (Itô 1989), which states that maximal structures - in the case of syllable structure, maximal syllables - are always constructed before minimal structures; otherwise, maximal structures would never surface. Recall that Glide Formation derives maximal (bimoraic) syllables while Glide Epenthesis derives minimal (monomoraic) syllables. The maximality principle therefore correctly requires Glide Formation to apply before Glide Epenthesis. Otherwise, as shown in (1c), Glide Formation would never have a chance to apply.

4. Conclusion

In sum, Jita provides striking confirmation for Itô's (1989) hypothesis that the prosodic principles of maximality and directionality correctly predict epenthesis sites in languages. As I have shown, the Branching Constraint on Jita syllable structure motivates the two syllable repair rules which apply in sequences of three adjacent vowels. Glide Epenthesis inserts a glide before the third vowel, after a rule of Glide Formation restructures the first two vowels of

the sequence into a single bimoraic syllable. This rule ordering need not be specified, as it falls out from the maximality principle: since Glide Formation derives maximal syllables, it must apply before Glide Epenthesis, which only derives minimal syllables. Directionality allows us to specify that syllabification rules in Jita apply from left to right. As a result, it is the third in a sequence of three adjacent vowels which will be left onsetless after Glide Formation applies. Jita Glide Epenthesis, like epenthesis rules cross-linguistically, thus incorporates stranded segments into well-formed syllables. A skeletal insertion approach to Glide Epenthesis like that proposed by Odden & Odden (1985), in contrast, both must stipulate the ordering of the two rules and also misses the generalization that Glide Epenthesis, like Glide Formation, improves syllable well-formedness.

NOTES

*The data presented in this paper are taken from my work with F.T. Magayane, a native speaker of Jita from the island of Ukerewe. I would like to thank Magayane for his patient, friendly cooperation in providing me with the data which appears in this paper. I would also like to acknowledge the assistance of the University of Illinois African Studies Center who supported this research by granting me a FLAS Fellowship and a research grant for the 1988-89 academic year.

[1] The following transcription conventions have been adopted for this paper: "B" indicates a voiced bilabial fricative; high tones are indicated by an acute accent on a vowel, falling tones with a circumflex accent, while low tones are unmarked; and off-glides on consonants are indicated by a superscripted glide.

[2] The only exceptions I know of to the generalization that consonant clusters do not occur in Jita are a tiny handful of words which are transparently borrowed from either Swahili or English: e.g., i:Bustáni 'garden' (from Arabic via Swahili) and i:plastíki 'plastic bucket' (from English). Since Magayane is fluent in both English and Swahili, I am assuming the syllable structure of these words was also borrowed and have not tried to account for them in the analysis of Jita syllable structure which follows.

[3] The symbols "C", "V" and "X" are used in this paper as abbreviations for a root node associated with the feature [+consonantal], [-consonantal] or [+/-consonantal], respectively, not as timing slots.

[4] Examples of other Bantu languages with lengthening in this context are: Haya (Byarushengo 1977), Kinyambo (Bickmore 1989), KiHehe (Odden & Odden 1985), LuGanda (Clements 1986; Katamba 1985; Tucker 1962) and Kinyarwanda (Sagey 1986).

[5] According to Prince (1984), it is not uncommon for languages to have long vowels but not diphthongs. He proposes to capture that fact by a constraint prohibiting tautosyllabic sequences of the feature [-consonantal]. (Recall that, by the OCP, geminate vowels are represented as one set of features linked to two moras.) This allows the optimal Jita syllable to be defined on the feature tier simply as a single C followed by a single V.

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LOCATIVES VS. INSTRUMENTALS IN KINYARWANDA*

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Lindsay Whaley
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1. Locatives and Instrumentals as objects.

In Kinyarwanda, as Kimenyi (1980) demonstrates, many "obliques"—such as the Locatives in (1) and the Instrumentals in (2)—can be expressed either as prepositional phrases, as in (1a) and (2a), or as objects in an applied construction, as in (1b) and (2b).[1]

(1) a. Umugóre y-oohere-je umubooyi kw'iisóko.
woman she-send-asp cook to market
"The woman sent the cook to market."

b. Umugóre y-oohere-jé-ho isóko umubooyi.[2]
woman she-send-asp-to market cook
"The woman sent the cook to market."

(2) a. Umugabo a-ra-andik-a íbárúwa n'ííkárámu.
man he-pres-write-asp letter with pen
"The man is writing a letter with the pen."

b. Umugabo a-ra-andik-iish-a íbárúwa íkárámu.
man he-pres-write-instr-asp letter pen
"The man is writing a letter with the pen."

Kimenyi (pp. 81-82; 94-96) shows that the "obliques" in (1b) and (2b) are objects by a variety of tests, including passivization, pronoun incorporation, and relativization, as shown in (3) for Locatives and (4) for Instrumentals.

(3) a. Iposita y-oohere-j-w-é-ho íbárúwa n'ûmugabo.
post office it send-asp-pass-asp-to letter by man
"The post office was sent a letter to by the man."

b. Umwáalímu y-a-ry-oohere-jé-ho igitabo.
teacher he-pst-it-send-asp-to book
"The teacher sent the book to it."

c. íshuûri úmwáalímu y-oohere-jé-ho igitabo
school teacher he-rel-send-asp-to book
"the school that the teacher sent the book to"

(4) a. Ikárámu i-ra-andik-iish-w-a íbárúwa n'ûmugabo.
pen it-pres-write-instr-pass-asp letter by man
"The pen is used to write a letter by the man."

b. Umwáalímu a-ra-y-aandik-iish-a íbárúwa.
teacher he-pres-it-write-instr-asp letter
"The teacher is wring a letter with it."

c. Dore íkárámu umugabo y-aandik-iish-a íbárúwa.
look pen man he-rel-write-instr-asp letter
"This is the pen that the man uses to write the letter."

The structure of (1b) and (2b) has sparked much discussion, since, as noted by Kimenyi, the initial direct object in (2b) retains its object properties. For example, it undergoes passivization, pronoun incorporation and relativization, as seen in (5).

(5) a. Ibárúwa i-ra-andik-iish-w-a íkárámu.
letter it-pres-write-instr-pass-asp pen
"The letter is being written with a pen."
b. Umugabo a-ra-y-andik-iish-a íkárámu.
man he-pres-it-write-instr-asp pen
"The man is writing it with a pen."
c. íbárúwa umugabo y-aandik-iish-a íkárámu
letter man he-write-instr-asp pen
"the letter that the man is writing with a pen"

Since the Instrumentals in (2b) also show object properties, researchers (including Gary and Keenan (1977), Kimenyi (1980), and Bresnan and Moshi (1990)) have been led to the conclusion that such clauses have more than one direct object, thus violating the Stratal Uniqueness Law of Relational Grammar (Perlmutter and Postal (1983)). Informally, the SUL prohibits more than one nominal bearing the same term relation (1, 2, or 3) per stratum. In contrast, the initial direct object in (1b) loses its object properties, as the data in (6) show, and so has been claimed by Kimenyi (1980) to be a chômeur.

(6) a.*Igitabo cy-oohere-j-w-é-ho íshuûri n'úúmwáalímu.
book it-send-asp-pass-asp-to school by teacher
"The book was sent to school by the teacher."
b.*Umwáalímu y-a-cy-oohere-jé-ho íshuûri.
teacher he-pst-it-send-asp-to school
"The teacher sent it to school."
c.*igitabo úmwáalímu y-oohere-jé-ho íshuûri
book teacher he-send-asp-to school
"the book that the teacher sent to school"

No Stratal Uniqueness Law violation is posited in the case of Locative applicatives.[3]

Thus, for Kimenyi there are two types of oblique-to-object advancement in Kinyarwanda: those like Instr-to-object that result in double objects, as represented in the stratal chart in (7), and those like Loc-to-object that result in the chômage of the initial object, as represented in the stratal chart in (8).

(7)	1	P	2	INSTR
	1	P	**2**	**2**
	man	write	letter	pen

(8)	1	P	2	LOC
	1	P	**CHO**	**2**
	woman	sent	cook	market

Perlmutter and Postal (1983) and Perlmutter (1989) have made use of the fact that both direct and indirect objects exhibit "object" properties to support the claim that so-called double object constructions actually have one of each type of object. As Kimenyi (pp. 64-68) notes, both the direct object and the indirect object of ditransitive clauses like (9) exhibit object properties.

(9) Umuhuûngu y-a-haa-ye umukoôbwa igitabo
boy he-pst-give-asp girl book
"The boy gave the book to the girl."

As (10) and (11) show, both the direct object and the indirect object can passivize, appear as incorporated pronouns, and relativize.

(10) a.Igitabo cy-a-haa-w-e umugóre n'ûmugabo
book it-pst-give-pass-asp woman by man
"The book was given to the woman by the man."
b.Umugabo y-a-ki-haa-ye umugóre.
man he-pst-it-give-asp woman
"The man gave it to the woman."
c. igitabo umuhuûngu y-a-haa-ye umukoôbwa
book boy he-pst-give-asp girl
"the book which the boy gave the girl"

(11)a.Umugóre y-a-haa-w-e igitabo n'ûmugabo
woman she-pst-give-pass-asp book by man
"The woman was given the book by the man."
b.Umugóre y-a-mu-haa-ye igitabo.
woman she-pst-him-give-asp book
"The woman gave him a book."
c.umukoôbwa umuhuûngu y-a-haa-ye igitabo
girl boy he-pst-give-asp book
"the girl to whom the boy gave the book"

Perlmutter and Postal (1983) propose that ditransitives like (9) involve the advancement of the initial 3 to 2 and the retreat of the initial 2 to 3, as represented in (12); both nominals exhibit object properties and no violation of the Stratal Uniqueness Law is involved.[4] Instrumental applicatives like (2b) are given a similar analysis, as in (13).

(12)

1	P	2	3
1	P	**3**	**2**
boy	give	book	girl

(13)

1	P	2	INSTR
1	P	**3**	**2**
man	write	letter	pen

In contrast, Locative-to-2 advancement results in the chômage of the initial 2, as represented in (8) above.

Whether the double object or the retreat approach is taken to Instr-to-object advancement, the question remains: why is this construction different from Loc-to-object advancement? Our paper seeks to answer this question. We propose that the applied constructions in (1b) and (2b) differ because the structures that underlie them (i.e. (1a) and (2a)) differ. Contrary to other researchers' assumptions that both Locatives and Instrumentals are "oblique" nominals in initial structure, we claim that only Locatives are "oblique" arguments of the predicate. Instrumentals, we claim, are not arguments of the main predicate in initial structure, but rather constitute a predicate domain of their own. In section 2, we give a number of ways in which Locatives and Instrumentals differ. In section 3, we make our analyses of initial Locatives and Instrumentals more precise and show how the effects in section 2 are predicted. Furthermore, we show how the different initial structures lead to

applicatives with the different properties discussed above.

2. Locatives vs. Instrumentals.

This section presents six ways in which unadvanced Locatives and Instrumentals differ.

2.1 Oblique pronoun incorporation.

As illustrated above, object pronouns are incorporated into the verb complex in Kinyarwanda. An incorporated pronoun form -ha also exists to refer to Locatives:

(14) Ba-ra-kí-há-shyir-a.
they-pres-it-there-put-asp
"They put it there."

In contrast, incorporated pronouns cannot refer to unadvanced Instrumentals, but only to advanced Instrumentals in applicative structures like (2b).

2.2. Oblique Subjects.

Kimenyi (pp. 129-130) notes that Locatives can be directly passivized, without being first advanced to object. In such passives, as in (15), the Locative appears with its preposition in subject position and the verb takes locative agreement.

(15)	Kw'iiposita	h-ooherej-w-e	íbárúwa	n'ûmugabo.
	to post office	it-send-pass-asp	letter	by man
	"To the post office was sent the letter by the man."			

Instrumentals, however, do not appear as subjects in such constructions:

(16)	*N'ííkárámu	i-ra-andik-w-a	íbárúwa	n'ûmugabo.
	with pen	it-pres-write-pass-asp	letter	by man
	"With the pen is written the letter by the man."			

Unlike Locatives, Instrumentals appear as subjects only in applied constructions, as in (4a).

2.3 Object/subject reversal.

Kimenyi (pp. 141-146) discusses a structure in which the word order of the subject and the object nominals is reversed, giving the sentence a "passive reading". No passive morphology appears on the verb or on the postposed subject. The verb in such clauses agrees with the preposed object, as illustrated in (17b).

(17)a.	Umuhuûngu	a-ra-som-a	igitabo.
	boy	he-pres-read-asp	book
	"The boy is reading the book."		
b.	Igitabo	cyi-ra-som-a	umuhuûngu.
	book	it-pres-read-asp	boy
	"The book is being read by the boy."		

As Kimenyi (pp. 141-142) notes, Locatives behave like objects with respect to object/subject reversal, since they can appear in preverbal position, as in (18). In this case the verb takes locative agreement.

(18) Kw'iishuûri ha-gii-ye umúnyéeshuûri.
to school it-go-asp student
"To school went the student."

Unadvanced Instrumentals, however, cannot appear in preverbal position in a reversal construction, as (*19) shows.

(19) *N'ííkárámu i-ra-andik-a úmwáalímu.
with pen it-pres-write-asp teacher
"With pen writes the teacher."

2.4 Topicalization strategies.

As Kimenyi (pp. 191-196) points out, Locatives and Instrumentals are topicalized using different strategies. Locatives, like subjects, objects, indirect objects, and benefactives, are topicalized directly: the phrase appears to the left of the clause and the verb takes agreement/incorporation cross-referencing the preposed element. An example of a topicalized direct object appears in (20) and of a topicalized Locative in (21).

(20) Igitabo, úmwáana a-ra-gi-som-ye.
book, child he-pres-it-read-asp
"The book, the child has just read it."
(21) Kuú ntebe, ábáana ba-ra-h-iica-ye.
on chair children they-pres-there-sit-asp
"On the chair, the children are sitting on it."

The Locative appears with its preposition and the verb shows locative agreement.

In contrast, Instrumentals cannot be topicalized in this fashion:

(22) *N'ííkárámu, umukoôbwa a-ra-y-andik-a íbárúwa.
pen girl she-pres-it-write-asp letter
"The pen, the girl is writing a letter with it."

Instead, a second strategy, involving a resumptive pronoun, is used to topicalize Instrumentals:

(23) Ikárámu, umukoôbwa a-ra-andik-a íbárúwa ná yo.
pen girl she-pres-write-asp letter with it
"The pen, the girl is writing a letter with it."

This strategy is used to topicalize other elements, including possessors and nominals within relative clauses. However, Locatives cannot be topicalized in this manner, as (*24) shows.

(24) *Intebe, umukoôbwa a-z-iicar-a kûrí yo.
chair girl she-fut-sit-asp on it
"The chair, the girl will sit on it."

2.5 Possessor ascension hosts.

As discussed by Kimenyi (pp. 97-98), possessor ascension, where a possessor ascends to take on an object role, is possible in Kinyarwanda.[5] As seen in (25a), possessors typically follow their heads and are introduced by a preposition, but when they ascend to object, as in (25b), they precede their heads and appear without a preposition.

(25)a. Umuhuûngu y-a-twaa-ye igitabo cy'ûmukoôbwa.
boy he-pst-take-asp book of girl
"The boy took the book of the girl."

b. Umuhuûngu y-a-twaa-ye umukoôbwa igitabo.
boy he-pst-take-asp girl book
"The boy took the girl's book."

In the above example, the object serves as the host for possessor ascension. Locatives can also host ascension, as (26b) shows.

(26)a. Umwáana y-a-andits-e izíná rye mu igitabo cy'ûmugabo.
child he-pst-write-asp name his in book of man
"The child wrote his name in the man's book."

b. Umwáana y-a-andits-e umugabo mu igitabo izíná rye.
child he-pst-write-asp man in book name his
"The child wrote his name in the man's book."

In contrast, unadvanced Instrumentals cannot serve as possessor ascension hosts:

(27)a. Umuhuûngu y-a-andits-e íbárúwa n'ííkárámu y'ûmukoôbwa.
boy he-pst-write-asp letter with pen of girl

b.*Umuhuûngu y-a-andik-i-ye íbárúwa umukoôbwa n'ííkárámu.
boy he-pst-write-appl-asp letter girl with pen
"The boy wrote the letter with the girl's pen."

2.6 Derivational causatives.

Kimenyi (pp. 164-165) discusses causatives formed with the derivational affix -iish. In such causatives, the causee appears immediately after the verb:[6]

(28) Umugabo a-ra-som-eesh-a ábáana ibitabo.
man he-pres-read-caus-asp children books
"The man is making the children read the books."

As (29) shows, derivational causatives can be formed on a clause containing a Locative.

(29) Umugóre y-iica-j-e úmwáana kuú ntebe.
woman she-sit-caus-asp child on chair
"The woman made the child sit on the chair."

In contrast, derivational causatives cannot be formed on clauses that contain Instrumentals:

(30) *Umwáalímu a-ra-andik-iish-a umúnyéeshuûri n'ííkárámu.
teacher he-pres-write-caus-asp student with pen
"The teacher made the student write with a pen."

2.7 Summary.

The data in the preceding sections show that Locatives and Instrumentals differ systematically in a variety of constructions. We see that Locatives behave as an argument of the predicate. Like other arguments—direct objects, indirect objects, and benefactives—they can appear as incorporated pronouns, subjects in passives, preposed nominals in object/subject reversal constructions, direct topics, and possessor ascension hosts. In contrast, instrumentals cannot, indicating that they are not arguments of the predicate.

3. Our analysis.

The discussion above has led to the conclusion that unadvanced Locatives, like those in (1a) above, are "oblique" arguments of the predicate, and thus are appropriately represented by the structure in (31).

(31) 1 P 2 **LOC**
woman send cook market

The Locative applicative construction (1b) can be claimed to involve an advancement to object. To be precise, we posit that Locative advancement in applicatives like (1b) involves first an advancement to 3 and then an advancement to 2. Evidence for this claim comes from examples like (32b) where Locative advancement takes place in a clause which contains an initial indirect object.

(32)a. Umugóre a-ra-he-er-a umuhuûngu ibitabo mw'iishuûri
woman she-pres-give-appl-asp boy books in school
"The woman gave the boy books in school."
b.Umugóre a-ra-he-er-a-mo ishuûri umuhuûngu ibitabo
woman she-pres-give-appl-asp-loc school boy books
"The woman gave the boy books in school."

Not only is the direct object placed en chômage, as exemplified in (7) above, but, as Kimenyi (p. 96) notes, the indirect object also loses its object properties. For example, it does not passivize (33a), nor is it referred to by an incorporated pronoun (33b).[7]

(33)a.*Umuhuungu a-rá-hé-er-w-á-mo ishuûri ibitabo n'ûmugóre.
boy he-pres-give-appl-pass-asp-in school books by woman
"The boy is given the books in the school by the woman."
b.*Umugóre a-rá-mu-hé-er-á-mo ishuûri ibitabo
woman she-pres-him-give-appl-asp-loc school books
"The woman is giving him the books in the school."

Thus, we posit Loc-3-2 advancement for examples like (32b), as represented in the stratal chart in (34).

(34)

1	P	2	3	**LOC**
1	P	2	**CHO**	**3**
1	P	**CHO**	**CHO**	**2**
woman	give	books	boy	school

In contrast, Instrumentals are not arguments of the main predicate in initial structure but rather constitute a predicate domain of their own that is linked to the main clause to form a sentence, as represented by the bracketed structure for (2a) given in (35).

(35) [[Umugabo arandika íbárúwa][n'ííkárámu.]]

Since Instrumentals are not arguments of the main predicate, they cannot appear as incorporated pronouns, subjects in passives, preposed nominals in object/subject reversal constructions, direct topics, and possessor ascension hosts. Furthermore, Instrumentals are predicted not to be able to form Causatives, since derivational causatives are not formed on complex structures.

With respect to Instrumental applicatives like (2b), we propose that, like the causatives discussed in section 2.6, these structures are multipredicate clauses in the sense of Davies and Rosen (1988).[8] For a Causative such as (36), we propose the structure in (37).

(36) Umugabo á-r-úubak-iish-a abákozi inzu.
man he-pres-build-cause-asp workers house
"The man is making the workers build the house."

(37)

	P		1	2
1	âP	P	**3**	**2**
man	build	-iish	workers	house

In (37), the first predicate "build" has two arguments, a subject and a direct object. The Causative morpheme is the second predicate. Besides having a subject of its own (the "causer"), the second predicate also inherits the direct object. Furthermore, the subject of the first predicate is revalued as the indirect object of the second predicate. Thus, the Causative morpheme has the effect of increasing the valency of "build" from a two-place predicate to a three-place one. This analysis is consistent with the fact that, as Kimenyi (pp. 170-171) points out, both the causee (cf. 38) and the initial direct object (cf. 39) have object properties; for example, they passivize and can appear as incorporated pronouns.

(38) a. Abákozi bá-r-úubak-iish-w-a inzu n'ûmugabo.
workers they-pres-build-caus-pass-asp house by man
"The workers are made to build the house by the man."
b. Umugabo a-rá-b-úubak-iish-a inzu.
man he-pres-them-build-caus-asp house
"The man is making them build the house."

(39) a. Inzu í-r-úubak-iish-w-a abákozi n'ûmugabo.
house it-pres-build-caus-pass-asp workers by man
"The house is being made to be built by the workers by the man."
b. Umugabo a-rá-y-úubak-iish-a abákozi.
man he-pres-it-build-caus-asp workers
"The man is making the workers build it."

We claim that Instrumental applicatives likewise involve a multipredicate clause.9 Thus, we would also represent (2b) as in (40); the Instrumental is the subject of a first predicate that is revalued to 3, while the direct object of the first predicate inherits its role.

(40)

	P		1	2
1	P̂	P	**3**	**2**
man	write	-iish	pen	letter

The structure in (40), since it posits that both the Instrumental and the direct object are final objects, explains why both nominals have object properties (cf. (4) and (5) above).

There are several ways in which the Causee in derivational Causatives and the Instrumental in applicatives behave like indirect objects rather than direct objects, thereby supporting this analysis. To give one example, when both direct objects and indirect objects appear as incorporated pronouns, the indirect object follows the direct object, as (41):

(41) Umugabo y-a-yá-b-éerets-e
man he-pst-them-them-show-asp
"The man showed them [pictures] to them [people]."

The incorporated pronoun referring to the Causee in (42) and the Instrumental in (43) appears after the pronoun referring to the direct object, as predicted by (37)/(40).

(42) Umugabo a-rá-yi-**b**-uubak-iish-a.
man he-pres-it-**them**-build-caus-asp
"The man is making **them** build it."
(43) Umugabo a-ra-yi-**y**-aandik-iish-a.
man he-pres-it-**it**-write-instr-asp
"The man is writing it with **it**."

4. Conclusion.

We have shown that Locatives and Instrumentals in Kinyarwanda have different structures: while Locatives are oblique nominal arguments of the main predicate, Instrumentals are not. This posited difference in structure explains why Locative applicatives and Instrumental applicatives differ. Locative applicatives involve the advancement of an oblique to object; the initial direct object is a chômeur as expected in Locative applicatives. Instrumental applicatives, however, are multipredicate clauses having the same structures as derivational Causatives in Kinyarwanda. Like multipredicate clauses in many languages (including French, Japanese, Tagalog, Telugu, and Tzotzil), the subject of the first predicate is revalued as the indirect object while the direct object inherits its role. Thus, multipredicate clauses are valence-increasing. Consequently, both the Instrumental or Causee and the direct object have object properties.

Our analysis has advantages over those previously posited for Kinyarwanda. Unlike Kimenyi's analysis (see (7) and (8)), our analysis is consistent with the Stratal Uniqueness Law. Unlike Perlmutter and Postal's analysis (see (12) and (13)), we need not posit a rule of 3-2 advancement nor a rule of 2-3 retreat. No evidence independent of the requirements of Stratal Uniqueness was offered for these rules. Furthermore, evidence from other languages for structures involving advancement to object and retreat to indirect object in the same stratum has not materialized. So neither language-internal nor cross-linguistic evidence has been offered to support such an analysis.

Finally, our analysis motivates a difference between Locative and Instrumental applicatives that follows from their initial structures. The difference between these structures under the analyses proposed by Kimenyi and by Perlmutter and Postal was merely stipulated. Under our analysis this difference is expected. Moreover, the constructions we posit for Kinyarwanda, namely oblique advancements creating chômeurs and valence-increasing multipredicate clauses, are well attested in languages of the world.

Notes

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[1]Much of the data in this paper is from Kimenyi (1980). We have followed his system of interlinear glosses, which he gives on p. xv. The following Relational Grammar abbreviations are used: 1 subject, 2 object, 3 indirect object, CHO Chômeur, INSTR Instrumental, LOC Locative, P Predicate, and âP P-chômeur.

[2]Our Kinyarwanda consultant thinks that sentences like (1b) are somewhat artificial. He considers the sentences in (3) to be less so.

[3]In the parlance of Bresnan and Moshi 1990, Kinyarwanda is a symmetrical language if (2b) is considered but an asymmetrical language if (1b) is considered.

[4]This contrasts with an analysis which posits that ditransitives are monostratal structures. See Kimenyi (1980) and Dryer (1983) .

[5]Bickford (1986) argues that inalienable possessors ascend to 2 while alienable possessors ascend to 3.

[6]A variety of forms mark the causative, including -eesh and -j.

[7]Kimenyi's data and those of our consultant thus contradict the data in Dryer (1983).

[8]This claim is the RG equivalent of the structure for English instrumentals posited by Lakoff (1968).

[9]Noting that Instrumental applicatives and Causatives take the same verbal morphology -iish, Kimenyi (p. 164) claims: "Causatives and instrumentals are in fact drawn from the same structure, the only difference being that while subjects of causatives are always animate, those of instrumentals are inanimate."

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Object Asymmetries in Kitharaka

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Recent research on object asymmetries in Bantu languages within the Lexical Mapping Theory (LMT) component of Lexical-Functional Grammar (LFG) has focussed on two types of languages: asymmetrical and symmetrical, terms proposed in Bresnan & Moshi (1990).[1] The properties of asymmetrical and symmetrical languages have been the topic of a substantial prior literature. Notable examples include Hawkinson & Hyman (1974), Hyman & Duranti (1982), Gary & Keenan (1977), and Kisseberth & Abasheikh (1977), to name only a few. (Cf. Bresnan & Moshi (1990) and other LMT literature cited in this paper for discussion and further references.)

The difference between asymmetrical and symmetrical languages may be illustrated by the object properties of the two objects of transitive verbs with the applicative extension; i.e., the applicative object and the secondary object. Two frequently cited examples of object properties are passivization and control of object markers. (Word order of objects is another, and will be taken up later in the paper.) In an asymmetrical language like Chichewa, an applicative object bearing one of a limited range of thematic roles may passivize or control an object marker, to the exclusion of the secondary object (Alsina & Mchombo (forthcoming and 1990), Bresnan & Moshi (1990)). In a symmetrical language like Kichaga, both the applicative and secondary objects may passivize or control object markers (Bresnan & Moshi (1990)).

Kitharaka is a Bantu language spoken mainly in the Tharaka Division of Meru District in Kenya. Heine & Möhlig (1980), in their areal classification of the Bantu languages spoken in Kenya, place Kitharaka within the Meru-Tharaka subgroup of the Central Kenya group, one of five such groups. Guthrie (1971), in a pan-Bantu classification, places it within his Zone E.50 Kikuyu-Kamba group. It is mutually intelligible with dialects of Kimeru. (Cf. Hodges (1976) for a discussion of object properties in a dialect of Kimeru).

Kitharaka exhibits the symmetrical properties of permitting either object in an applicative construction to passivize and of permitting either object to control an object marker. This pattern is illustrated with a Beneficiary applicative in examples (1)-(2) and (3)-(4)).[2]

1. Mw-íkí	ná - á - rá - túm - íír - w - é	ngúò	né - ékúrú.
1-bride	foc-SM1-past-sew-past/appl-pass-FV	10/clothes	by-2/women
'The bride had clothes sewn for her by the women'			

2. Ngúó ní - í - rá - túm - íír - w - é mw-íkì né - ékúrú.
10/clothes foc-SM10-past-sew-past/appl-pass-FV 1-bride by 2/women
'The clothes were sewn for the bride by the women'

3. Èékúrú ! í - bá - rá - mú - túm - íír - è ngùò.
2/women foc-SM2-past-OM1-sew-past/appl-FV 10/clothes
'The women sewed clothes for her.'

4. Èékúrú ! í - bá - í - túm - íír - è mw-ìkì.
2/women foc-SM2-OM10-sew-past/appl-FV 1-bride
'The women sewed them for the bride.'

In spite of these examples, I will argue that Kitharaka is an asymmetrical language. (Zaenen (1984) argues for a similar conclusion for Kikuyu, within LFG but not LMT.) In order to make this argument, it is first necessary to discuss how Lexical Mapping Theory accounts for object symmetries and asymmetries.

The domain of LMT is the relationship between the thematic roles of a verb's argument structure and the grammatical functions which determine how these roles are realized syntactically. LMT assumes four grammatical functions: subject, a thematically unrestricted object, a thematically restricted object and a thematically restricted oblique. These functions are decomposed into plus or minus values for a pair of binary features, [+/-unrestricted] and [+/-objective]. (Cf. Alsina & Mchombo (1990), Bresnan & Kanerva (1989) and Bresnan & Moshi (1990) for further details). The feature decomposition for each function is given as follows:

5. SUBJ: [-r, -o]
OBJ: [-r, +o]
OBJtheta: [+r, +o]
OBLtheta: [+r, -o]

Thematic roles are mapped onto these functions by receiving plus or minus feature values assigned by mechanisms including the intrinsic classification of certain thematic roles, morpholexical rules such as Passivization and Applicative Formation, and defaults. All assignments are subject to wellformedness conditions. (Cf. Bresnan & Kanerva (1989), Alsina & Mchombo (1990), Bresnan & Moshi (1990), Harford (forthcoming) for details of the application of LMT to Bantu languages.)

The argument or arguments of a verb which have access to object properties are classified [-r]; that is, only arguments that are eventually mapped onto subject or unrestricted object[3]. Patient arguments of unextended verbs have access to this feature classification, as do the arguments introduced by the

applicative extension (Cf. Alsina & Mchombo (1988), Alsina & Mchombo (1990) and Harford (forthcoming).) In an asymmetrical language, only one argument is classified [-r], whereas the other is classified [+o]. In symmetrical languages, both arguments may be classified [-r]. This difference is formulated by Bresnan & Moshi (1990) as the Asymmetrical Object Parameter (AOP), which operates in asymmetrical languages to prohibit the intrinsic assignment of [-r] to more than one argument. This constraint does not hold in symmetrical languages. The AOP is formalized in Bresnan & Moshi (1990) as follows:

6. Asymmetric Object Parameter (AOP): "..only one role can be intrinsically classified unrestricted." (Bresnan & Moshi 1990: 172)

* θ ... θ
| |
[-r] [-r]

Note now that the data in (1)-(4) indicate that both the Beneficiary and Patient objects in Kitharaka have access to the [-r] classification, which suggests that Kitharaka lacks the AOP. However, if both objects are classified [-r] within a single lexical form, then it ought to be possible for Passivization to cooccur with object markers; that is, one object becomes the passive subject and the other controls an object marker. This prediction is not borne out, as seen in examples (7) and (8):

7. *Mw-iki na - a - ra - i - tum - iir - w - e ne - ekuru.
1-bride foc-SM1-past-OM10-sew-past/appl-pass-FV by-2/women

8. *Nguo ni - i - ra - mu - tum - iir - w - e ne - ekuru.
10/clothes foc-SM10-past-OM1-sew-past/appl-pass-FV by-2/women

Furthermore, Kitharaka only permits one object marker at a time to appear on a verb, a property of asymmetrical languages:

9. *Eekuru i - ba - ra - i - mu - tum - iir - e.
2/women foc-SM2-past- OM10-OM1- sew-past/appl-FV
mu - i
OM1 OM10

Kitharaka thus exhibits properties that cut across the dichotomy between asymmetrical and symmetrical languages. This observation has also been made for Kikuyu by Zaenen (1984). The question now is, does Kitharaka invalidate this two-way classification? This paper will argue that, in terms of Lexical Mapping Theory, it doesn't.

When these data are considered together, the principal generalization that emerges is that whereas either object may have access to object properties, only one object at a time within a particular lexical form actually has this access. In LMT terms, either object may be [-r], but not both at a time. This is an analysis considered and rejected for Kichaga, a genuinely symmetrical language, by Bresnan & Moshi (1990). However, this paper will incorporate it as part of an LMT analysis of these data in which Kitharaka has the following properties: 1) it is asymmetrical; 2) either object in an applicative construction may be classified [-r], 3) an object marker may only represent a [-r] object. (Note that in Kichaga object markers may represent objects that are either [-r] or [+o].)

The two possible classifications of the objects for the examples discussed so far are given in examples (10) and (11):[4]

10.

	<Ag	Ben	Pt>
Intrinsic Applicative	[-o]	[-r]	[+o]
Default	[-r]		[+r]
	SUBJ	OBJ	OBJθ

11.

	<Ag	Ben	Pt>
Intrinsic Applicative	[-o]	[+o]	[-r]
Default	[-r]	[+r]	
	SUBJ	OBJθ	OBJ

In the lexical form in (10), the Beneficiary argument is classified [-r] and the Patient argument is classified [+o]. Therefore, the Beneficiary argument may either passivize or control an object marker, as in examples (1) and (3). In the lexical form in (11), the Patient argument is classified [-r] and the Beneficiary argument is classified [+o], giving examples (2) and (4). Double object markers, as in example (5), are ruled out, since an object marker must be [-r], and only one object may be classified [-r]. The cooccurrence of passivization and object marking is ruled out because only one object is classified [-r] and the same argument may not be a passive subject and an object at the same time. What is being proposed is minimally different from the analysis of Chichewa proposed in Alsina & Mchombo (forthcoming, 1990), in which arguments bearing thematic

roles higher than Instrumental are constrained to be realized as [-r] roles in the applicative. Kitharaka differs only in lacking this constraint.

In light of this analysis, I would like to propose that asymmetrical and symmetrical languages cannot be distinguished in terms of whether one or two objects have access to object properties, since languages like Kitharaka and Kichaga are the same in this respect, but only in terms of whether object properties can cooccur, as when a passive verb has an object marker. Such cooccurrences should be attested in symmetrical languages, but not in asymmetrical languages.

This account will now be extended to include aspects of the interaction of the reciprocal construction with the applicative, passive and object marker. First, an example of a reciprocalized applicative is given in (12):

12. Èékúrú ! í - bá - rá - túm - án - íír - è.
    2/women foc-SM2-past-sew-rec-past/appl-FV
    'The women sewed clothes for each other/other people.'

I have referred to the -an- extension as the reciprocal because it is cognate to the reciprocal in other Bantu languages and because it has a reciprocal meaning. However, as seen in example (8), it may be glossed as either "each other" or "unspecified other people". Therefore, the most accurate way to describe its function is to say that it suppresses an argument, which then cannot be realized syntactically, and optionally coindexes it with the highest thematic role in the lexical form.[5]

Note now that the Beneficiary argument has been reciprocalized. I assume, following a proposal by Alsina & Mchombo (1990) that only a [-r] argument may be reciprocalized, and that therefore the Beneficiary is the [-r] argument in this example. However, it also turns out that it is not possible to reciprocalize the Patient argument of a Beneficiary applicative verb, contrary to the proposal that either the Beneficiary or the Patient may be classified [-r]. This pattern is the same one found in Chichewa, as described by Alsina & Mchombo (1990), in which only the Beneficiary argument of a Beneficiary applicative verb may be classified [-r]. On the other hand, in Kitharaka, there is additional evidence which suggests that either object may reciprocalize, provided that its thematic role is higher on the Thematic Hierarchy than that of the other. The Thematic Hierarchy is given in (13) (Bresnan & Moshi (1988)):[6]

13. Agent > Beneficiary > Goal/Recipient > Instrumental > Patient/Theme > Locative > Motive

Evidence for this proposal comes from example (14), in which the applicative argument is a Motive, which Bresnan & Moshi (1988) propose is lower on the hierarchy than Patient:

14. Èékúrú í - bá - kw - èèndà gù - túr - án - ír - à àntù àrúmè.
2/women foc-SM2-T/A-want inf-beat-rec-appl-FV 2/people 2/male
'The women want to beat each other/other people because of the husbands.'
(reciprocalized argument is Patient, higher than Motive)

#'The women want to beat each other/other people for the husbands.'
(reciprocalized argument is Patient, lower than Beneficiary)

#'The women want to beat the husbands because of each other/other people.' (reciprocalized argument is Motive, lower than Patient)

In example (14), only the Patient may reciprocalize, not the Motive, as indicated by the unacceptability of the third reading. This pattern suggests that there is an independent constraint on reciprocalization and that the unacceptability of reciprocalizing the Patient argument of a Beneficiary applicative is not a counterexample to the proposal that either object in an applicative construction may be classified [-r].

Turning now to the interaction of the reciprocal with the applicative, passive and object marker, note that a reciprocalized applicative verb may not take an object marker or undergo passivization, as seen in examples (15) and (16), respectively:[7]

15. *Eekuru i - ba - ra - i - tum - an - iir - e.
2/women foc-SM2-past-OM10-sew-rec-past/appl-FV

16. *Nguo ni - i - ra - tum - an - iir - w - e.
10/clothes foc-SM10-past-sew-rec-past/appl-pass-FV

These examples are predicted to be ungrammatical by the theory developed here regardless of whether the applicative argument is higher or lower on the Thematic Hierarchy than the Patient. Only one argument may be classified [-r] and that argument is suppressed by Reciprocalization and cannot be realized syntactically, following assumptions made by Alsina & Mchombo (1990). Therefore, there is no other [-r] argument available to control an object marker or serve as a passive subject.

A note on word order: like object marking and passivization, word order has typically been one of the properties used to distinguish symmetrical from asymmetrical languages (cf. Bresnan & Moshi 1990 and the references cited there). Chichewa, Kichaga and Kitharaka are alike in requiring Beneficiary/Goal applicative objects to follow the verb directly. In the theories developed by Alsina & Mchombo (1990) and Bresnan & Moshi (1990), the [-r] object is the one that follows the verb. Under this assumption, the theory developed in this paper predicts that Kitharaka (although not the other two) should allow either object in

this position, just as it permits either object to passivize or control an object marker. I will assume, however, that since there is no correlation between symmetricality or asymmetricality and word order, word order need not be treated as part of the typological differences between these languages but may be accounted for by an independent constraint.

In conclusion, I have argued that Kitharaka is an asymmetrical language, in spite of its apparently symmetrical properties, using data from the applicative, passive and reciprocal constructions, as well as object marking. It therefore patterns typologically with languages like Chichewa, rather than languages like Kichaga. This conclusion suggests that the cooccurrence of object properties is the crucial criterion in determining whether a Bantu language is symmetrical or asymmetrical.

Notes

1. I am grateful to Alex Alsina, Joan Bresnan and Larry Hyman for comments and suggestions about this paper. The judgements reported in this paper are those of Nyaga Mzalendo-Kibunjia, from Nkondi, Tharaka, and I would like to thank him for all of his help during the time that this paper was being written. Thanks are also due to Patrick R. Bennett for assistance with tone-marking. This study is based upon work supported by the National Science Foundation under grant BNS-8609642. All mistakes are my own responsibility.

Abbreviations are as follows: appl: applicative, foc: focus, FV: final vowel, inf: infinitive, OM: object marker, pass: passive, rec: reciprocal, SM: subject marker, T/A: tense/aspect marker. An acute accent indicates high tone, a grave accent low tone. Numbers in the glosses are noun class numbers.

2. The pattern also appears in Goal applicatives. Instrumentals are not yet attested. Locative applicatives show the pattern with respect to passivization but, since there are no locative object markers, the pattern cannot be observed across the board. Note that example (4) does not contain the tense marker -ra- which is present in examples (1)-(3). This example is acceptable with -ra- only with an interpretation of the applicative object as Goal, with the weird reading 'The women sewed the clothes to the bride.' The question of why this is the case should be taken up in future research. Larry Hyman has suggested to me that a plausible line of investigation would be to examine the interaction of the applicative with the focus system of the language.

3. Object markers in symmetrical languages are also controlled by [+o] objects, since the Lexical-Functional Grammar principle of Biuniqueness (Bresnan 1982), which rules out more than one instance of a grammatical function in a single lexical form, prevents lexical forms from having three [-r] roles (one the subject, the other two unrestricted objects) (Bresnan & Moshi (1990).

4. Default classifications assign [-r] to the highest available role in the lexical form to map it onto the SUBJ function, and [+r] to lower roles, to map them onto the thematically restricted functions OBJtheta and OBLtheta. Defaults cannot change values assigned by the intrinsic classifications and morpholexical rules. Cf. Bresnan & Kanerva (1989), Alsina & Mchombo (1990) and Bresnan & Moshi (1990).

5. This formulation of the effect of the reciprocal extension is a modification of that given for Chichewa by Alsina & Mchombo (1990) and for Kichaga by Bresnan & Moshi (1990). In Chichewa and Kichaga, both suppression and coindexation are obligatory.

6. This version of the hierarchy is taken from Bresnan & Moshi (1988), an earlier version of Bresnan & Moshi (1990). It is identical to the hierarchy used in other work within the LMT framework, except for the Motive role at the bottom, which is missing elsewhere.

7. Example (16) is ungrammatical under the intended interpretation but is acceptable with the idiomatic reading 'The clothes were sent off by the women', without any reciprocal interpretation.

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AUXILIARIES IN AFRICAN LANGUAGES: THE LINGALA CASE

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1 The problem

In 1978, Mufwene described a number of Lingala items which he referred to as "auxiliaries" (1978:102). One year later he appears to have changed his mind. In a paper jointly published with Bokamba, entitled "Are there modal-auxiliaries in Lingala?", these two authors argue that the question raised in the title of the paper must be answered in the negative, that is, that there are no auxiliaries in this language. Their discussion is concerned with the set of seven "putative modal-auxiliaries" listed in Table 1, which are used "to fulfil a formal grammatical role which in other languages is performed by a specific set of finite-form verbs or by special verbal-inflectional affixes" (Mufwene & Bokamba 1979:253).

> N.B. The term "modal-auxiliary" is a bit misleading since, of the seven items discussed, only one has a modal function while all others may be described as aspectualizers, i.e. as elements marking primarily aspectual distinctions.

Table 1. "Modal-auxiliaries" in Lingala (Mufwene & Bokamba 1979)

Form	Verbal semantics	Grammatical function
ko-tíka	'abandon, leave'	egressive
ko-síla	'finish, end'	egressive, terminative
ko-úta	'come from'	egressive, terminative
ko-kóma	'arrive'	ingressive
ko-banda	'start, begin'	ingressive
ko-zala	'be'	durative
ko-koka	'fit'	potentiality (ability)

The items listed in Table 1 exhibit a number of properties which quite a number of scholars might consider to be strongly suggestive of an auxiliary status, like the ones presented in Table 2.

Table 2. Properties of "modal-auxiliaries" in Lingala according to Mufwene and Bokamba (1979) (not applicable to the main verb uses of the relevant items)

(a) They express a grammatical function (p. 244, 246),

(b) they take infinitival verbs as their complement,
(c) they do not passivize (p. 249),
(d) they cannot take purposive complements with **mpó (te)** 'in order to' (p. 249),
(e) they do not take verbs inflected in the subjunctive as complements (p. 250).

The questions that one might wish to raise are in particular: (i) How is the fact to be explained that Mufwene referred to one and the same kind of entities as "auxiliaries" in 1978, but as "verbs" one year later? (ii) Which of the two terms employed, "verb" or "auxiliary", is more appropriate to describe the nature of the items in question?

It would seem that this change in terminology is not based primarily on the kind of linguistic data considered but rather on the theory adopted. Furthermore, both terms may be said to be simultaneously justified and unjustified and that, in order to understand the nature of these items, a different framework is required, one that parts with the notion of discrete categorization as a *sine qua non* for linguistic description.

2 Properties of the "modal-auxiliaries"

Mufwene (1978) does not elaborate on why he treated the items listed in Table 1 as "auxiliaries"; most likely, he simply conformed with orthodox notions of grammatical description prevalent in African linguistics and, hence, he adopted the terminological convention established by previous Lingala grammarians such as Guthrie (1951) and Everbroeck (1958). That Mufwene and Bokamba (1979) abandoned this tradition and proposed a contrasting description is due primarily to the fact that they decided to adopt a model expounded by Ross (1969), McCawley (1971), Huddleston (1976b) and others according to which there is no semantic or other formal grammatical property in terms of which auxiliaries can be defined as a category distinguishable from the category of verbs. On the

basis of this model, Mufwene and Bokamba had to conclude that the "modal-auxiliaries" of Lingala are to be classified as full verbs, especially since these items clearly exhibit more verb-like features than corresponding English items do that have traditionally been referred to as auxiliaries. In doing so, they ignored alternative approaches, like the one proposed by Chomsky (1957) and adopted by most students working within the generative-transformational paradigm, according to which there is a cross-linguistic category called "auxiliary" or "AUX".

The discussion presented by Mufwene and Bokamba (1979) suggests that they had in fact good arguments in favor of their analysis: The presence of the properties listed in Table 2 does not constitute a necessary and sufficient condition for defining these items as a category of its own; rather these properties are also encountered with items that are unambiguously classified as full verbs. Thus, with reference to the five properties listed in Table 2, Mufwene and Bokamba observe:

(a) The "modal-auxiliaries" also occur as full/independent verbs and the denotation in both cases is "not that much different" (p. 246). (b) The "modal-auxiliaries" are neither more nor less constrained than "other verbs" with regard to nominal vs. verbal-argument alternations. A verb like **ko-linga** 'like/love', for example, may alternate in the same way as do "modal-auxiliaries", it may, e.g., take infinitival complements, as in (1):

(1) Pólo a-ling-í ko-mela míngi.
Paul he-like-NPERF INF-drink much
'Paul likes to drink a lot.'

(c) The inability to passivize is not confined to the "modal-auxiliaries", it also applies to a number of motion verbs such as **ko-kenda** 'go' and **ko-zónga** 'return'. (d) The inability to take purposive **mpó (te)** complements is not confined to "modal-auxiliaries" either, it is also found with some full verbs like **ko-linga** 'like/love' or **ko-bóya** 'refuse'. Furthermore, some of the "putative modal-auxiliaries" such as **ko-kóma** 'arrive' and **ko-banda** 'start' may in fact have such a purposive complement. From the evidence available it would seem that in those cases where these "modal-auxiliaries" can take a purposive

complement, it is not their grammatical but rather their lexical use which is invoked, that is, in such cases they are used as main verbs rather than as "auxiliaries". An example is provided in (2).

(2) A-kóm-í mpó (te) á-koma mokandá.
he-arrive-NPERF so.that he-write letter
'He has arrived in order to write a letter.'

(e) The inability to take verbs inflected in the subjunctive as complements once again is not restricted to "modal-auxiliaries", it is also characteristic of verbs such as **ko-kenda** 'go' and **ko-yá** 'come'.

To summarize, the position maintained by Mufwene and Bokamba (1979) appears to be well founded, in that the "modal-auxiliaries" of Lingala share most of their defining properties with at least some items clearly behaving like full verbs in every respect.

There are, however, a few problems that need to be accounted for, especially the following: Why do the "modal-auxiliaries" exhibit a clearly grammatical function when used with non-finite verbal complements, and why are they used as main verbs in other contexts, that is, what accounts for their twin-role as grammatical markers on the one hand and as lexical items on the other? And why did previous authors, including Mufwene himself, classify these items as auxiliaries in the first place?

I will now try to deal with these questions by proposing a framework that is meant to take care of them. This is the framework of grammaticalization theory.

3 The conceptual basis

One major strategy employed by man to deal with his environment is to conceive and express experiences that are less easily accessible or more difficult to understand or describe in terms of more immediately accessible, clearly delineated experiences (Lakoff & Johnson 1980). This strategy entails in particular that complex contents are expressed by means of less complex and more basic contents, and abstract concepts by means of more concrete concepts. Grammatical concepts are fairly abstract: they do not refer to physical objects or

kinetic processes; they are defined primarily with reference to their relative function in discourse. Research on the genesis of grammatical expressions suggests that grammatical categories do not emerge *ex nihilo*, rather they are almost invariably derived from the domain of concrete concepts, and grammatical morphology tends to develop out of lexical structures, especially out of such categories as nouns and verbs (see Heine, Claudi & Hünnemeyer 1991 for references).

However, quite a number of conceptual processes leading to the development of grammatical categories do not concern linguistic units such as words or morphemes but rather more complex conceptual entities. For example, in the grammaticalization of perfect aspects in a number of European languages, at least two markers were involved: an auxiliary 'have' or 'be' and a marker of non-finiteness, which typically was a passive participle morpheme; and progressive aspect constructions in many languages world-wide even involve three distinct morphological elements: an auxiliary verb, a nominalization marker, and a locative morpheme. The same complex construction can be observed, for example, in the English future marker *be going to*.

Perhaps the most striking example is that of the Latin verb *habere* 'have' which in the Romance languages has given rise to perfect markers on the one hand and to future markers on the other. What accounts for this divergent development is the fact that it was not the verb *habere* which was grammaticalized, rather grammaticalization involved entire periphrastic constructions: the construction *habere* + perfect passive participle gave rise to perfect expressions, while *habere* + infinitive periphrasis was responsible for the development of future constructions (see below).

That such complex forms of linguistic marking are not anomalous in any way becomes clear when one looks at the cognitive structures underlying grammaticalization. In Heine, Claudi and Hünnemeyer (1991, Cha. 2) a distinction is made between source concepts and source propositions. While the former refer to concrete objects, processes, or locations, i.e. to simple concepts, the latter may be viewed as *events* or *minimal scripts*; they relate to propositional contents expressing states or dynamic

situations which appear to be basic to human experience and are encoded linguistically by means of predications typically involving one argument and two participants. The most common propositions identified so far are listed in Table 3. They have been defined on the basis of cross-linguistic generalizations on constructions giving rise to expressions of tense, aspect, and modality. The question of whether these propositions can be defined as universally relevant cognitive structures would seem to require further research; concerning a discussion of some of these propositions in a different framework, see Binnick 1976.

Table 3. The main source propositions for grammatical categories of tense and aspect

Conceptual form	Proposed label
(a) "X is at Y"	Locational Proposition
(b) "X moves to/from Y"	Motion Proposition
(c) "X does Y"	Action Proposition
(d) "X wants Y"	Volition Proposition
(e) "X becomes Y"	Change-of-State Proposition
(f) "X is (like) a Y"	Equational Proposition
(g) "X is with Y"	Accompaniment Proposition
(h) "X has Y"	Possessive Proposition
(i) "X stays in a Y manner"	Manner Proposition
(j) "X does-Y does-Z"	Sequence Proposition

There is considerable variation in the shape any of these propositions may take in a given language. In (a), for example, instead of a copula verb 'be', postural verbs such as 'sit', 'stand' or 'lie', or durative verbs such as 'live' or 'stay', are found in some languages, and the label "at" stands for a variety of locative notions, such as 'in', 'on', 'under', etc.

The Locational Proposition (a) is most commonly used to develop progressive aspects; in fact it probably accounts for more progressive constructions in the languages of the world than all other propositions taken together. The main associations between source propositions and resulting grammatical categories are listed in Table 4. Note that these propositions are not the only source structures employed to develop grammatical categories of tense, aspect and modality.

Table 4. Source propositions and the most common grammatical functions derived from them

Locational Proposition	progressive, ingressive, continuous
Motion Proposition	ingressive, future
Action Proposition	progressive, continuous
Volition Proposition	ingressive, future
Change-of-State Proposition	ingressive, future
Equational Proposition	progressive, perfect, future
Accompaniment Proposition	progressive
Possessive Proposition	perfect, future
Manner Proposition	progressive
Sequence Proposition	progressive, perfect, terminative

In the following paragraphs, concrete concepts or propositions giving rise to the expression of grammatical concepts are referred to as *source* items and the latter as *target* items. When an expression used for a lexical source concept is transferred to also designate a grammatical target concept then the result is *ambiguity* since one and the same expression refers simultaneously to two different concepts. Subsequently, the expression may be further extended to contexts where it no longer refers to the source concept but is exclusively a marker of the target concept. The structure underlying the transition from a full verbal concept to a grammatical concept can be described as in Figure 1.

Figure 1. An Overlap Model of conceptual shift

Stage:	I	II	III
Type of concept:	Source	Source Target	Target

Note that the stages distinguished in Figure 1 are not to be understood as discrete or prototypical entities; they are merely a convenient descriptive means of segmenting what is more appropriately analyzed as a *chain of grammaticalization* (Heine 1990). The data presented by Mufwene and Bokamba (1979) suggest, for example, that the Lingala items listed in Table 1 are located between Stage I and Stage II when followed by a nominal complement, but close to Stage III when followed by a non-finite verb.

The structure sketched in Figure 1 has both a diachronic and a synchronic dimension: diachronic in that the development from Stage I to III is likely to reflect a historical process, and synchronic in that Stage I presents the most concrete and Stage III the most abstract concept or, in other words, Stage I presents the lexical and III the grammatical meaning, with II combining both meanings.

The Overlap Model, as I will call the structure presented in Figure 1, does not only apply to conceptual transfer, rather it applies to other domains of language structure as well. Once a given expression is transferred from source concept to target concept, that is, from denoting a verb to carrying a grammatical function, it loses in properties characteristic of its former category and acquires the properties of grammatical markers. The overlap Stage II entails that two different forms are employed as optional variants for the same function: one form exhibits a fully verbal morphosyntax and the other a reduced verbal morphosyntax, where "reduced verbal morphosyntax" means, e.g., that the relevant item may no longer passivize or form imperatives, is no longer inflected for tense, aspect, etc., may no longer be governed by auxiliaries, and/or may not take a nominalizer or complementizer.

4 Properties of auxiliaries

We are now in a position to deal with the questions raised in the introduction. When talking about auxiliaries, we refer to one particular outcome of a cognitive process whereby concrete, propositional contents are employed for the expression of abstract grammatical concepts. The major linguistic result of this process can be seen in the emergence of what I propose to call *Verb-To-TAM chains* with a concrete, verbal-lexical structure at one end and an extremely grammaticalized structure serving the expression of tense, aspect, and modality (TAM) at the other, as sketched in Figure 2.

Figure 2. Some properties of the endpoints of Verb-To-TAM chains
(A = starting point, B = endpoint)

Domain	A	B
Semantics:	Full verbal meaning	Grammatical function
Syntax:	High degree of variability	Fixed position
Morphology:	Inflected for TAM, person, number, negation, etc.;	Invariable element
	Free word	Affix
Phonology:	Full form	Reduced form

When viewed from the perspective of A, the starting point, auxiliaries tend to be described as de-categorialized or "defective" forms of verbs (Hopper & Thompson 1984; Heine, Claudi & Hünnemeyer 1990, Ch. 8.5). When viewed from the perspective of B, however, auxiliaries are likely to be described as grammatical markers exhibiting some peculiar verbal properties. This means on the one hand that an auxiliary is no longer a full verb but not yet a grammatical inflection either, and it is likely to exhibit properties that are characteristic of the intermediate stages between main verb and inflectional category, such as the ones mentioned with reference to Lingala, that is,

- it is part of a closed set of entities used to express notions such as tense, aspect, modality, etc.;
- while having a grammatical function, its morphosyntax is verbal to some extent;
- since it is historically the main verb while the actual main verb is historically its complement, it is marked for person, number, negation, etc., while the actual main verb occurs in an invariable form;
- as a result of decategorialization, it occupies a fixed place in the clause and exhibits a reduced verbal behavior; for example, it may only associate with a restricted spectrum of verbal inflections, it may lack the ability to occur in non-finite forms, to passivize, or to form imperatives;
- in view of its erstwhile main verb status, it also exhibits the word order characteristics described by Greenberg (1963:67) and Steele (1978), in that it occupies that position in the clause that was

normally assigned to main verbs at the time when the grammaticalization process started;
- as a result of "auxiliary reduction" or erosion, it may be unable to carry distinctive stress or tone and tends to have a phonologically reduced form as an optional variant;
- being derived from a propositional structure, it may be part of a discontinuous marker which also includes elements that can be traced back to a nominalizing or adpositional morphology.

On the other hand, in accordance with the Overlap Model sketched in Figure 1, the auxiliary exhibits the variable behavior of grammaticalization chains, which accounts for much of its "amphibian nature" and means in particular that

- it has at least two different uses, one of which is a lexical and the other a grammatical one, or one showing a full and the other a reduced verbal morphosyntax, or one having a full and the other a phonologically reduced form, etc., and that
- two different meanings may correspond to one form, or two different forms may express one and the same meaning, etc. (cf. the "twin rôle" of auxiliaries; Abraham 1990:201).

A number of authors have experienced problems when confronted with the question as to whether auxiliaries should be treated as part of the morphology or the syntax of a given language. One might say that, the closer a given auxiliary, or a particular use of it, is located towards Point A in Figure 2, the more likely it is to be associated with the syntax of the clause, while auxiliaries located close to Point B are more suggestive of an analysis in terms of morphological parameters. It would be more appropriate to argue, however, that this question is largely irrelevant: considering the overall nature of Verb-To-TAM chains, any decision of tracing a boundary between morphology and syntax must remain arbitrary to some extent.

4 Conclusions

If two scholars use the same methodology, apply it to the same kind of data within one and the same language and arrive at maximally contrasting conclusions, then this fact would seem to require an explanation. A paradigm case can be seen in the

controversies between McCawley (1975) and Jackendoff (1972), or between Pullum and Wilson (1977) on the one hand and Akmajian et al. (1979) on the other, or between Huddleston (1976a, 1976b) and Palmer (1979): while the former claim that English auxiliaries are main verbs, the latter insist that they are not, rather that auxiliaries constitute a category different from main verbs. Mufwene (1978) vs. Mufwene and Bokamba (1979) provides one out of the many similar examples that could be adduced from African linguistics.

Findings on grammaticalization suggest that both positions are at the same time right and wrong, and that such a controversy becomes redundant once one views auxiliaries as resulting from a cognitive process whereby grammatical functions are conceptualized and expressed in terms of concrete propositional contents. This process, which has both a diachronic and a synchronic dimension, leads to the emergence of grammaticalization chains having a lexical/verbal structure at one end and a grammatical structure at the other.

These observations suggest a characterization of auxiliaries that differs greatly from most previous definitions: auxiliaries may be defined as linguistic items located along the grammaticalization chain extending from full verb to grammatical marker of tense, aspect and modality as well as a few other functional domains; their behavior can be described with reference to their relative location along this chain. The Lingala items presented in Table 1 are located close to Point A of Figure 2, in fact much closer than their English counterparts, like *be*, *have*, *will*, *shall*, etc., are.

Mufwene and Bokamba are right to emphasize that it is not possible to define the "modal auxiliaries" of Lingala as a discrete class of linguistic items. Considering their chain-like structure, this is to be expected. Grammaticalization theory makes it possible to predict, however, that these items will increasingly lose in lexical properties and in phonetic substance, and will develop into proclitics and eventually into prefixes of the following main verb. This has happened in many other Bantu languages, where such verbs as 'come', 'arrive', 'go', 'start', 'finish', 'end', 'be', 'be able', 'abandon', 'leave', etc., have developed into

monosyllabic verbal prefixes whose only function is that of marking tense, aspect or modality, that is, into elements that are located closely to Point B of Figure 2. For example, the Swahili verb **kw-isha** 'to finish, end' has been grammaticalized to an aspect category (the "already-aspect"), with the effect that for many speakers of modern Swahili, the three sentences of (3) are functionally largely equivalent, where (3a) is closest to Point A, (3b) intermediate between A and B, and (3c) closest to Point B.

(3) a. a- me- kw- isha ku- fika 'she has already
s/he-PERF-INF-end INF-arrive arrived'

b. a- me- kw- isha fika

c. a- me- sha- fika

The verb-to-TAM chain is but one example of a category that, because of its amphibian nature, has given rise to controversies over whether it is the source item, the target item, both, or neither which should be considered to be the basic unit of linguistic description - the available literature is in fact full of similar examples. A particularly common one can be seen in what I propose to call the *Noun-To-Adposition chain*, which has a full-fledged noun or noun phrase at one end and an invariable grammatical marker, typically a preposition, a postposition, or even a case affix, at the other (see Heine, Claudi and Hünnemeyer 1991:131-139).

A number of problems associated with auxiliaries have not been addressed in this paper. For example, I have not dealt with syntactic reanalysis, that is, with the question as to how clausal structures are reanalyzed in the process of grammaticalization (Heine & Reh 1984). In particular, it should be mentioned that in a number of languages, the transition from auxiliary verb to grammatical marker has led to a drastic restructuring in basic word order; it has been responsible, e.g., for a shift from VSO to SVO order in the development from Middle Egyptian to Coptic, or from SVO to SOV order in a number of West African Niger-Congo languages (Claudi 1990).

NOTE

I wish to express my gratitude to the *Deutsche Forschungsgemeinschaft* (German Research Society), in particular to Frau Ursula Far-Hollender, for generously sponsoring my research project on grammaticalization, on which the present paper is based. I am also indebted to Eithne Carlin and Ulrike Claudi for valuable comments on this paper.

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Tone Metathesis in the Dangme Imperative[1]

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0. Introduction

Metathesis is a well-attested process, although perhaps more so in diachronic than in synchronic analysis.[2] In the synchronic realm, it is more commonly found as a purely morphophonemic phenomenon than as a device that signals some grammatical category or function. In terms of form, the most familiar type of metathesis is, of course, transposition of segments, although transposition of syllables and other phonological units is also found.[3] This paper presents a case of metathesis which is in a sense triply rare: it is synchronic, it participates in the marking of a grammatical category, and it operates on tones rather than on segments.[4]

Our data come from Dangme, a Kwa language spoken in Ghana, and involve the formation of the imperative. In Dangme, the imperative verb may take one of several different forms, depending upon the tone of the stem, as well as upon the environment in which the stem occurs. The various possibilities are illustrated in (1-3):

			TONE MELODY	STEM
(1)	(a)	lá 'Sing!'	H	lá
	(b)	ko lá 'Don't sing!'	MH	
	(c)	kpalé lá 'Sing again!'	MHH	
(2)	(a)	yé 'Eat!'	H	ye
	(b)	kó ye 'Don't eat!'	HM	
	(c)	kpalé ye 'Eat again!'	MHM	
(3)	(a)	doó 'Dance!'	MH	dɔ̀
	(b)	kó dɔ̀ 'Don't dance!'	HL	
	(c)	kpalé dɔ̀ 'Dance again!'	MHL	

This paper gives a unified account of the surface tone patterns observed in these data. Following Kropp Dakubu (1987:25-27), we assume that the Potential marker, a floating H tone which immediately precedes the verb stem, is present in such examples. For M and L tone stems, this H tone associates leftwards when there is segmental material preceding the verb, as in the (b) and (c) forms of examples (2) and (3) above. However, when the verb stem is utterance-initial (as in the (a) forms of (2) and (3)), we argue that this floating H undergoes a rule of tone metathesis (in conjunction with other rules).[5] The picture is somewhat more complicated for H tone stems, but we argue that the same rule of tone metathesis can be appealed to in the

utterance-initial cases. This formulation allows for an elegant account of the forms of the Dangme imperative, and provides evidence that transposition of tones must be included in any inventory of metathesis types.

1. The Potential Marker

Dangme makes use of a Potential aspect marker which has only tonal features specified. This floating H tone is positioned before the main verb of the clause, and appears in a wide range of constructions, such as futures, certain modalities, and hortatives. These are illustrated in (4-6), below:[6]

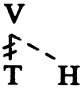
(4) na má nã lɛ̀
nà ma ´ nã̀ lɛ̀
Na FUT POT see 3SG
'Na will see it'

(5) e-sa né é-dò
e- sa né e- ´ dò
3SG-be+good that 3SG-POT dance
'He ought to dance'

(6) wá-dò
wa- ´ dò
1PL-POT dance
'Let's dance'

In each case, the floating H tone of the potential marker appears before the verb stem. It is linked to the syllable preceding the verb by a rule of H Tone Linking, as shown in (7):

(7) H Tone Linking



Examples (4-6) illustrate the behavior of M tone syllables preceding a floating H. The behavior of a H tone syllable preceding a floating H has already been illustrated in the (c) examples of (1-3) (where kpalé 'return' is underlyingly MH). When the syllable before the Potential marker is L, however, the outcome is somewhat different. Rule (7), H Tone Linking, does not apply, but instead the vowel lengthens, and the H tone is linked to the new V slot. (8) provides an example of this in the optative construction, and the rule of Vowel Lengthening is given in (9).

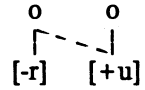
(8) naá nã lɛ̀
nà ˊ nã̀ lɛ̀
Na POT see 3SG
'May Na see it'

(9) Vowel Lengthening

V		V	V
|	-->	|	
L	H	L	H

Note, in addition, that the surface tone melody of such lengthened syllables is MH, rather than the expected LH. This is the result of a regular rule of tone assimilation, which raises L to M before either a M or a H. In order to account for this assimilation, we adopt here the model of tone found in, for example, Hyman and Pulleyblank (1988), in which the features [upper] and [raised] attach to a tonal node.[7] The assimilation rule is shown in (10), and (11) illustrates the operation of rules (9) and (10) in the derivation of (8):[8]

(10) Tone Assimilation



(11) naá nã lɛ̀ 'May Na see it'

UR	na		nã	lɛ
	|		|	|
	L	H	L	L
Vowel	naa		nã	lɛ
Length	|	ˋ ˋ	|	|
(and assoc)	L	H	L	L
Assim	naa	nã	lɛ	
	| \	|	|	
	M	H L	L	

Having examined the behavior of the Potential marker in the constructions of (4-6) and (8), we turn now to its behavior in the imperative. This will be done in two stages: first, we will discuss formation of the imperative with M and L tone verbs, and second, we will discuss formation of the imperative with H tone verbs, a task which presents considerably more problems.

2. The Imperative of L and M Tone Verb Stems

Examples (12) and (13) show that these imperatives behave exactly like the examples of the last section, as long as there is some segmental material preceding the floating H tone of the Potential marker:

(12) (a) kó ye — stem: ye
ko ye
NEG POT eat
'Don't eat!'

(b) kpalé ye
kpalé ye
return POT eat
'Eat again!'

(13) (a) kó dò — stem: dò
ko dò
NEG POT dance
'Don't dance!'

(b) kpalé dò
kpalé dò
return POT dance
'Dance again!'

In each of these examples, the floating H tone is linked to the preceding syllable by application of rule (7). The main verb retains its underlying tone in all cases.

When the imperative form of L and M tone verb stems is utterance-initial, however, we find significant differences from the data just presented. This is illustrated in (14) and (15):

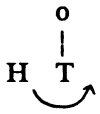
(14) yé — stem: ye
'Eat!'

(15) doó — stem: dò
'Dance!'

A first hypothesis about example (14) might be that the potential marker links to the right when there is no segmental material to the left.[9] However, there are two arguments against such an analysis. First, we have already demonstrated that Dangme has leftward linking of floating tones. This hypothesis would force us to posit an additional rule of rightward linking. All other things being equal, an analysis with linking in only one direction is preferable. A second, and conclusive argument against adding a rule of rightward linking is that this would entirely fail to account for the surface form of utterance-initial L tone verb stems, as in (15).

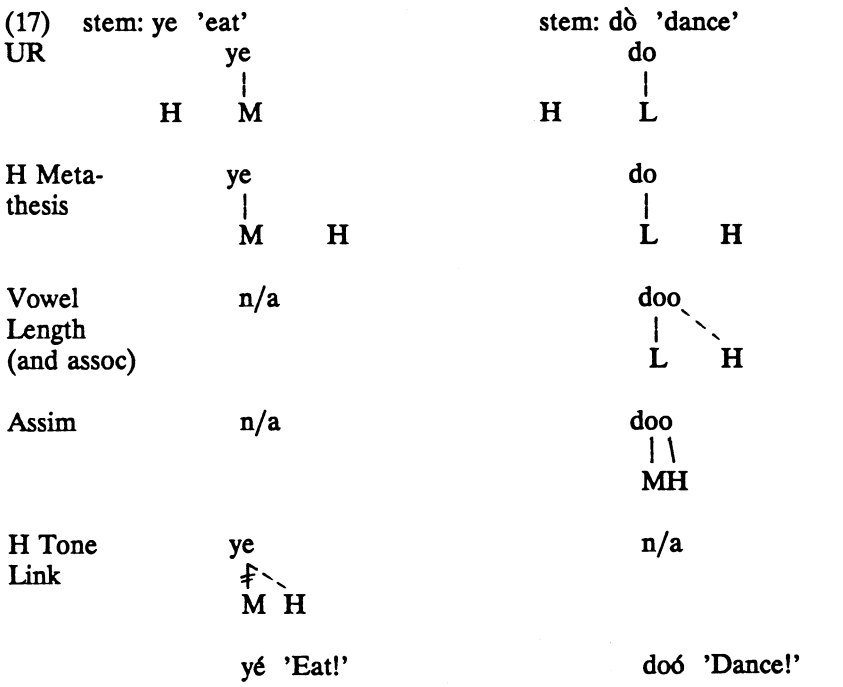
Note that the behavior of forms like (15) is reminiscent of the behavior of a L tone syllable preceding a floating H tone (as in (8)), in which we found vowel lengthening and surface MH tone. However, in the utterance-initial imperative forms, the floating H precedes the L tone syllable, rather than follows. In order to account for this, we propose that the floating tone undergoes a rule of Floating H Metathesis when there is no segmental material preceding it. Such a stem then undergoes the regular rules of Vowel Lengthening (9) and Tone Assimilation (10). The rule of Floating H Metathesis is given in (16).[10]

(16) Floating H Metathesis



(where [represents the utterance boundary)

Rules (7), (9), (10), and (16), then, provide us with an account of the behavior of utterance-initial L and M tone imperatives in Dangme. The functioning of these rules in the derivation of (14) and (15) is illustrated in (17):[11]



Up to this point, we have restricted our discussion to monosyllabic verb stems. We turn now to disyllabic verb stems, still restricting ourselves to those with M and L tones:

(18) čík͡ɔ́ stem: čik͡ɔ
'Smoke (e.g. meat)!'

(19) bɔ̀leé stem: bɔ̀lè
'Surround!'

These forms are in fact consistent with the data presented above. Since the rule of Floating H Metathesis (16) is written with reference only to the tones and the single tonal node involved, it will apply whether one or more than one tone bearing unit is linked to that tonal node. (20), then, illustrates the derivation of the forms in (18) and (19):

(20)

	stem: čik͡ɔ 'smoke'	stem: bɔ̀lè 'surround'
UR	čik͡ɔ \ / H M	bɔ̀le \/ H L
H Meta-thesis	čik͡ɔ \ / M H	bɔ̀le \/ L H
Vowel Length (and assoc)	n/a	bɔ̀lee \/ \ L H
Assim.	n/a	bɔ̀lee \/ | M H
H Tone Link.	čik͡ɔ \ \ M H	n/a

čík͡ɔ́ 'Smoke!' bɔ̀leé 'Surround!'

Finally, consider (21) and (22), which might be taken to be counterexamples to our analysis, on the grounds that they show no evidence of Floating H Metathesis:

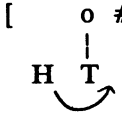
(21) sáke stem: sáke
'Pluck!'

(22) sisí stem: sisí
'Cheat!'

This behavior, however, is actually predicted by our analysis, because a stem with two distinct tones (i.e. two tonal autosegments) will not meet the conditions for the rule (since rule (16) only allows for metathesis of the floating H around a single tonal autosegment). The Potential marker, therefore, does not undergo metathesis, and is simply not realized in this situation,[12] resulting in an imperative form whose tones are identical to those of the stem form.

There is one revision we must make to (16), however, in the light of these data. This is to insert a word boundary at the right margin of the rule. This revision prevents it from moving the floating H into a position within a stem between two distinct tones. The revised rule is presented in (23):[13]

(23) Floating H Metathesis (revised)



3. The Imperative of H Tone Verb Stems

We turn now to the imperative form of verb stems with underlying H tone. While these forms introduce considerable complication into an analysis of the Dangme imperative, they do not affect our central claim that a rule of Tone Metathesis is one of the processes involved.

Consider first the utterance-inital imperative in (24):

(24) lá 'Sing!' stem: lá

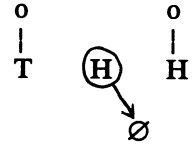
For examples such as this, we can simply say that Floating H Metathesis operates vacuously -- that is, that the floating H tone is transposed and linked to the stem, but that its effects are invisible due to the fact that the stem is already H.

However, non-utterance-initial imperatives, as in (25), do not show the expected behavior with respect to linking of the floating tone:

(25) ko lá stem: lá
ko ´ lá
NEG POT sing
'Don't sing!'

Here, apparently, the floating H tone does not link to the left, but is instead deleted. A first approximation of a rule of Floating H Deletion appears in (26):

(26) Floating H Deletion



However, this rule is too general, in that it predicts that the Potential marker will always delete before a H tone verb stem. That this is not true is illustrated by examples (27) and (28):

(27) e-sa né é-lá
e- sa né e- ´ lá
3SG-be+good that 3SG- POT sing
'He ought to sing'

(28) e-sa né ó-bá lá
e- sa né o- ba ´ lá
3SG-be+good that 2SG-come POT sing
'You (sg) ought to come sing'

In fact, we have found that there are only three morphemes which cause the floating H of the Potential to be deleted: the Negative marker ko, and the first person plural and second person plural pronouns wa- and ñɛ-.[14] The behavior of the latter two is illustrated in (29) and (30):

(29) e-sa né wa-lá
e- sa né wa- ´ lá
3SG-be+good that 1PL- POT sing
'We ought to sing'

(30) e-sa né ñɛ-lá
e- sa né ñɛ - ´ lá
3SG-be+good that 2PL- POT sing
'You (pl) ought to sing'

Furthermore, this deletion of the floating H occurs only when the main verb bears H tone. (31) and (32) illustrate the operation of regular leftward linking of the floating H to these pronouns when the verb stem is M or L, rather than H:

(31) e-sa né wá-kpɛ

e-	sa	né	wa-	kpɛ
3SG-be+good		that 1PL-	POT	sew

'We ought to sew'

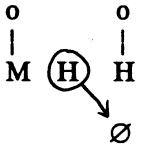
(32) e-sa né ñé-dɔ̀

e-	sa	né	ñɛ -	dɔ̀
3SG-be+good		that 2PL-	POT	dance

'You (pl) ought to dance'

At this point, we see no way to predict the loss of the Potential marker in these forms, and will tentatively write it off to lexical idiosyncracy.[15] Rule (26) can be generalized a bit, as shown in (33), but will only be triggered by this small set of morphemes.

(33) Floating H Deletion (revised)



Finally, note that (as expected) disyllabic stems behave in the same way that monosyllabic stems do; (34) illustrates the vacuous application of Floating H Metathesis, and (35) illustrates Floating H Deletion:

(34) ǰálé stem: ǰálé

'Rinse!'

(35) ko ǰálé

ko		ǰálé
NEG	POT	rinse

'Don't rinse!'

This section has shown, then, that there are certain problems with the formation of the imperative of H tone stems; specifically, that instead of linking leftwards, the Potential marker is deleted when it appears after certain morphemes and before such a stem. Satisfactory resolution of these problems is beyond the scope of the present paper. The data do not contradict our claim, however, that the rule of Floating H Metathesis is operative in the formation of the imperative when the verb stem is in utterance-initial position, even when that stem has underlying H tone.

4. Conclusion

Formation of the imperative in Dangme involves placement of a floating H tone marking Potential aspect in a position immediately before the verb stem. When the stem bears M or L tone, this H tone is linked leftward to the preceding syllable if one is available. When the stem bears H tone, there is some irregularity in leftward linking of the floating H. When there is no preceding syllable for the H tone to link to, however, we have shown that a rule of Floating H Metathesis moves the floating tone to the right of the stem (no matter what tone that stem bears), thus allowing normal leftward linking. In the case of L tone verb stems, this rule must operate in conjunction with a small number of other rules, which are independently motivated by cases not involving Floating H Metathesis.

Floating H Metathesis also operates in disyllabic verb stems in which the two syllables have identical tones, but it fails to operate in disyllabic stems in which the syllables have two different tones. This falls out naturally from an autosegmental account, which requires that in the former case there be only one tonal autosegment associated with the two tone bearing units, but that in the latter case there be two. That is, autosegmental representation makes it possible to include disyllabic stems whose syllables have identical tones under our statement of the rule of Floating H Metathesis, and to exclude disyllabic stems whose syllables have two different tones, which is precisely what is needed to account for the data. A linear approach would require recourse to ad hoc stipulations in order to account for these facts, whereas their behavior is not only accounted for, but is predicted by a non-linear approach.

Finally, we would like to point out that the formation of the Dangme imperative provides an example of the relatively rare use of metathesis as a regular process that participates in expression of a grammatical category, as opposed to its rather more common function as an often irregular diachronic process by which historical change is effected.[16] This case is all the more interesting in that the elements which are transposed are tones -- tone metathesis being another relatively rare phenomenon. This fact argues for the position that metathesis is a process which is not restricted solely to segments, but that it is instead a more general process with the ability to transpose various types of elements, including something as seemingly unlikely as tonal nodes.

Notes

1. Our thanks go to John Teye, a native speaker of Dangme currently residing in the United States, for his help in supplying the data used in this paper. In addition, we would also like to thank Claudia Brugman, Kathleen Hubbard, Mary Niepokuj, Joe Salmons, Ronnie Wilbur, and members of the Purdue

Linguistics Group for commenting on previous versions. All errors are of course our own.

2. Cf. Hock (1985) for discussion of the diachronic aspect, and Thompson and Thompson (1969), Okrand (1979), and Sohn (1980) for discussion of various cases of regular synchronic metathesis.

3. Cf. Ultan (1978:370).

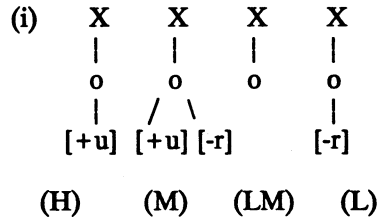
4. Goldsmith (1990:25) presents a tone metathesis rule for San Miguel El Grande Mixtec, and Maddieson (1978:352) mentions a few such cases as well (his term is "tonal displacement"). In addition, we have found mention of similar phenomena in at least a few other sources (e.g. for Nɔmaándé by Wilkendorf (1988), and for Igbo by Clark (1978)).

5. Maddieson (1978:352) notes that "tone displacement rules generally refer to location of isolated high tones," and ascribes this to the tendency for H to be the marked tone in most tone systems.

6. Abbreviations which are used in the paper are: 1,2,3 = First, second, third person, FUT = Future tense, NEG = Negative, PL = Plural, POT = Potential, SG = Singular.

Also note that example (4), as well as (8) and (12), illustrate a tone assimilation rule in which a L between a H and another L becomes M. Since this is tangential to our topic, we will just assume its operation where necessary.

7. (i) illustrates this model:



Note that in such a system either the tonal node or one of the features can undergo spreading. Rule (7) is a rule of the former type, in which the tonal node links to the left. Rule (10), the tone assimilation rule, is of the latter type; that is, it is one in which a feature spreads to the left.

8. While Dangme has a surface three tone system, data from the formation of the negative indicate that there are actually four underlying tones. The M

and LM of (i), above, are each phonetically realized as mid tone, but show different behavior with respect to negative formation (for details see Macaulay (in preparation)).

As stated in the text, Tone Assimilation operates to raise L to M before a M as well as before a H; note that our rule predicts that it would only do so before a M with the features [+u], [-r]. Whether it also operates before the other M ([-u], [+r]) is something we have yet to investigate; if it does, the formalization of this rule will have to be changed. We leave this a topic for future research.

9. It has been suggested to us that a simpler way to look at this would be to assume that a M tone stem such as ye is completely unspecified for tonal features, and that the process observed here is not linking to the right, but rather simple association of a floating tone to a toneless syllable. However, as Macaulay (in preparation) shows, only some M tone stems are of the unspecified type, while others must be fully specified (that is, the "LM" of example (i) above). Thus for approximately half of the M tone cases, this solution would not work.

10. Ultan (1978:372) distinguishes between simple metathesis, which is the transposition of one element around another (or others), and reciprocal metathesis, which is the exchange in position of two elements. Our rule of Floating H Metathesis is of the former type.

11. Note that Vowel Lengthening must be ordered before High Tone Linking in order to prevent the latter from applying to the L tone form.

12. Following Clements (1981:74-75), we will assume that a surface representation containing a floating tone is well-formed, and that such unassociated tones are not phonetically realized.

13. We have considered various ways to handle this problem, including allowing a floating H be moved into such a position, but then having it delete by a rule of Floating H Deletion (to be introduced in the next section). The solution in (23), however, seems best able to capture our sense that Floating H Metathesis respects the word boundary, and therefore cannot infix a floating H between two distinct tones.

14. Kropp Dakubu (1987:61) remarks that "the potential marker is ... not usually expressed if the verb begins with High tone." She points out cases with the first person plural pronoun wa-, but does not mention ñɛ-. Furthermore, her data concerning the tone of ko before H tone verb stems (1987:57) differs from ours, presumably because she is describing a different dialect (Ada).

15. Note that the fact that the three morphemes in question all have CV shape, while the 3SG prefix is simply V, is not the relevant factor: as shown in (28), the ingressive marker ba ('come') is CV, but it does not block linking of the Potential marker.

16. Cf. Hock 1986:110.16.

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Cyclicity and Suffix Doubling in the Bantu Verb Stem

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§1. Introduction

The Bantu languages of Central, East and Southern Africa are well-known for their complex agglutinative morphology. Noun class marking provides a pervasive prefixal morphology on nouns and agreeing elements, including verbs, which are also typically realized with inflectional prefixes marking the subject, object, and tense-aspect-mood-polarity. In this paper we are concerned with cyclic phonological and morphological effects that arise in the derivational morphology of the Bantu verb stem which, as seen in (1),

(1) Bantu verb stem: verb root + (extensions) + final vowel
CV(C) (VC)^n V

consists of an obligatory verb root and inflectional final vowel (usually -a), as well as possible extensions (e.g. derivational suffixes of the sort to be exemplified below). A Kinande example of a complex verb stem is provided in (2), whose six suffixes are identified in (3).[1]

(2) -imb-ir-an-is-ị-bu-a 'be caused to sing for each other'

(3) a. -ir- applicative ('to', 'for', 'at, in' etc.)
b. -an- reciprocal ('each other')
c. -is- long causative (with which -ị- must co-occur)
d. -ị- short causative (which may occur without -is-)
e. -u- passive (realized -bu- after a vowel < *-ib-u-)
f. -a final vowel (FV) morpheme (=inflectional)

As established by Hyman (in press), the linear ordering of verb suffixes such as in (3a-e) may depend on any of the three factors in (4).

(4) a. *the syntax/semantics:* "scope" relations (cf. Luganda in (5));
b. *the morphology:* strict linear precedence relations (cf. Kinande in (6));
c. *the phonology:* "after the last C", "before the last V^n" etc. (-ị- in (7)?)

To illustrate, the Luganda examples in (5) show that the ordering of applicative -ir- and reciprocal -agan- depends on scope.[2]

(5) a. [[[yímb] ir] agan] 'sing for e.o.' (= a reciprocalized applicative)
b. [[[kúb] agan] ir] 'hit e.o. for/at' (= an applicativized reciprocal)

On the other hand, the Kinande examples in (6) show that applicative -ir- must precede reciprocal -an- in that language, independent of scope considerations:

(6) a. [[[ímb] ir] an] 'sing for e.o.'
b. [[[hum] ir] an] 'hit e.o. for/at'

The analogous Chichewa examples in (7) provide the first case of suffix doubling:

(7) a. [[[ímb] ir] an] 'sing for e.o.'
b. [[[meny] an] ir] <u>an</u>] 'hit e.o. for/at'

As in Luganda, the ordering of -ir- and -an- is first determined by scope. However, in case scope produces an -an-ir- sequence, -an- is doubled after -ir-, thereby revealing the same -ir-an- preference as in Kinande.

Finally, the role of phonology in determining suffix order should not be overlooked. In this regard, Meeussen (1959:58) notes that "...un suffixe monophone -y- [-i̯-] ou -w- [-u-] tend à être représenté après tout autre suffixe". In (8) we see that causative -i̯- must follow reciprocal -an- in Kinande.

(8) a. -tsap- 'get wet' (intr.)'
-tsap-i̯- 'wet [something]' (=cause to get wet)
-tsap-an-i̯- 'wet each other'

b. *-song-
-song-i̯- 'gather' (tr.)
-song-an-i̯- 'gather each other'

In (8a) causative -i̯- must be added first, since -an- cannot reciprocalize an intransitive verb. In (8b), -i̯- is presumably lexicalized with the root -song-, since the latter does not occur independently. If we assume a derivation of (8a) by scope, -an- must not be suffixed outside -tsap-i̯-, as in (9a), but rather between -tsap- and -i̯-, as shown in (9b).

(9) a. -tsap- → -tsap-i̯- → *-tsap-i̯-an- [[[tsap] i̯] an]
'get wet' 'wet (tr.)' 'wet each other'

b. -tsap- → -tsap-i̯- → -tsap-an-i̯-
'get wet' 'wet (tr.)' 'wet each other'

One might thus conclude that the -V- suffixes occur after -VC- suffixes (followed only by the FV) because of their phonological shape, i.e. there is a tendency to pile up "monophone" suffixes at the end of the verb stem. In any case, there is a clear need for *internal* suffixation, as in (9b), a conclusion that is further documented in the following sections on Cibemba and Luganda.

§2. Cibemba

In this section we shall present the case for cyclicity and suffix doubling in Cibemba. We begin by considering the interaction of the causative -i̯- and reciprocal -an- suffixes in (10).

(10) a. -fúm- → -fúm-i̯- → -fúm-i̯-an-i̯- [-fúm-y-aan-y-][3]
'go out' 'take out' 'take each other out'

b. -kóm- → -kóm-i̯- → -kóm-i̯-an-i̯- [-kóm-y-aan-y-]
'reach, relate to' 'touch' 'touch each other'

As seen, we first transitivize the verb roots in (10) with the -i̯- suffix and then reciprocalize the resulting forms by adding -an-. Substantiating Meeussen's observation that -V- suffixes tend to occur after -VC- suffixes, Cibemba requires that the causative suffix -i̯- be doubled after reciprocal -an-, as shown. This doubling of -i̯- is extremely pervasive in Cibemba. In order to appreciate this fact, we note the following (lexical) process of consonant mutation (CM) that conditions the following alternations before causative -i̯-.[4]

(11) a. p, b → f
b. t, d, l, k, g → s

Except for CM, the derivations in (12) are completely parallel to those in (10).

(12) a. -lub- → -luf-ị- → -luf-ị-an-ị- [-luf-y-aan-y-]
'be lost' 'lose' 'lose each other'[5]

b. -lil- → -lis-ị- → -lis-ị-an-ị- [liš-(y)-aan-y-][6]
'cry' 'make cry' 'make each other cry'

Doubling of -ị- is thus firmly established.

Now consider the interaction of causative -ị- with the applicative suffix. As seen in (13),

(13) a. -lub- → -lub-il-
'be lost' 'be lost at/for'

b. -lil- → -lil-il-
'cry' 'cry at/for'

c. -lob- → -lob-el-
'be exterminated' 'be exterminated at/for'

d. -end- → -end-el-
'walk (intr.)' 'walk at/for'

the applicative is realized as -il- when the preceding vowel is /i/ or /u/ (or /a/, though not shown), and as -el- when the preceding vowel is /e/ or /o/. In (14) we see how the verb roots in (13) are realized when they are first causativized and then applicativized:

(14) a. -lub- → -luf-ị- → -luf-il-ị- → -luf-is-ị- [-luf-iš-(y)-]
'be lost' 'lose' 'lose at/for'

b. -lil- → -lis-ị- → -lis-il-ị- → -lis-is-ị- [-liš-iš-(y)-]
'cry' 'make cry' 'make cry at/for'

c. -lob- → -lof-ị- → -lof-el-ị- → -lof-es-ị- [lof-eš-(y)-]
'be exterminated' 'exterminate' 'exterminate at/for'

d. -end- → -ens-ị- → -ens-el-ị- → -ens-es-ị- [ens̲-eš-(y)-]
'walk' 'make walk' 'make walk at/for'

In these examples we see that both the final root consonant *and* the /l/ of the applicative suffix have undergone CM. Unlike the derivations in (10) and (12), there are two reasons why we cannot propose a doubling of -ị-: First, the -ị-il- sequence of a putative intermediate form such as -luf-ị-il-ị- for (14a) would result in a surface long vowel by the regular rules of Cibemba phonology (cf. (12b)). As seen, however, the post-radical vowel is short in all the examples in (14). A second argument comes from the (postlexical) rule of s-palatalization in (15).

(15) *s*-Palatalization: s → š / ___ { ị, i }

As stated, /s/ palatalizes to [š] before both mutating /ị/ and non-mutating /i/. Crucially, *s*-palatalization does not apply before [e]. As seen in the output of (14d), the /d/ of -end- 'walk' mutates to [s] but does not palatalize to [š]. From this we safely conclude that it could not derive from intermediate -ens-ị-el-ị-, i.e. with doubling of -ị-.

The means by which we propose that CM applies both to final C of the verb roots and to the [l] of the applied suffix in (14) is cyclically: Causative -ị- is first added, triggering CM. This is followed by internal suffixation of applicative -il-/-el- before the causative suffix, which then mutates the /l/ to [s]. Finally, s-palatalization applies to the -is-ị- and -es-ị- sequences, deriving -iš-ị- and -eš-ị- (and also to the verb root in (14b) to derive -liš̲-iš-ị-).

While cyclicity in itself is not a surprising discovery, given its special role in lexical phonology, internal suffixation may be of some concern.[7] We thus now consider two alternatives to cyclicity that might seem plausible. The first is to attempt a non-cyclic, iterative application of CM. As illustrated in (16),

(16) a. -lub-il-į- → -lub-is-į- → -luf-is-į- 'lose at/for'
b. -lil-il-į- → -lil-is-į- → -lis-is-į- 'make cry at/for'

affixation here is non-cyclic, after which CM applies right-to-left, first hitting the applicative suffix, then the final consonant of the verb root.[8] Though the correct outputs are derived in (16), this non-cyclic account cannot be generalized to forms such as in (17).

(17) a. -punk- → -punk-an- → -punk-an-į- (*-puns-an-į-)
'bump into' 'bump into e.o.' 'cause to bump into e.o.'

b. -táluk- → -táluk-į- → -tálus-į- [-táluš-y-] (*-tásus-į-)
'be apart' 'make apart' (= -tál-uk-į- ?)

c. -kak- → -kak-uk- → -kak-ul-į- → -kak-us-į- (*-kas-us-į-)
'tie' 'become untied' 'cause to become untied'

d. -sek- → -sek-es-į- [-sek-eš-y-] (*-ses-eš-y-)
'laugh' 'make laugh'

All of these examples have in common that the causative suffix -į- is unambiguously added at the end of the derivation (i.e. on what would be the last cycle in a cyclic analysis). As seen, -į- conditions CM only on the immediately preceding consonant—not on any earlier consonant: In (17a) we have a causativized reciprocal; in (17b) a bisyllabic verb base that might be monomorphemic; in (17c) a causativized reversive; and in (17d) a "long causative" which, as pointed out in (3c), requires an -į- to accompany the -is- formative. In no instance is there "long distance" CM. Of course, one might seek individual explanations for the non-iteration of CM in each example: Perhaps the [k] in (17a) is not affected because the non-mutating nasal of reciprocal -an- effectively blocks CM. Or perhaps the non-mutation of [l] in (17b) is accounted for on the basis of its not being at the end of a morpheme. (17c,d) would require this latter explanation to be extended in possibly ad hoc ways: The root-final [k] might be exempt from CM in (17c) because (for some unknown reason) the morpheme break in -kak-uk- is not visible when -į- is added.[9] Similarly, the [k] in (17d) is exempt, because the morpheme break in -es-į- is not visible, and hence -į- cannot have its long-distance effect. Whether one finds these individual "explanations" convincing or not, the examples such in (17) and many others like them, taken together, would be much more straightforwardly accounted for if we assumed that CM is non-iterative, instead applying cyclically, as we saw in (14).

A second alternative possibly worth pursuing would require CM to reference either of two parallel representations: a morphosyntactic representation (indicating the scope of each suffix) vs. a phonological representation (indicating the *surface* order of the individual formatives or morphs). The applicativized causative in (14a), for example, would have the morphosyntactic representation in (18a) and the phonological representation in (18b).[10]

(18) a. [[lub] CAUS] APP] b. [lub - il - į -] (= 'lose at/for')

With these two representations distinguished, one could establish CM as an allomorphy rule conditioned either by morphosyntactic adjacency to the feature CAUS or by phonological adjacency to the formative -ɨ-. A re-examination of the forms in (17) reveals that in each case the same consonant is adjacent both to CAUS and to -ɨ-. Thus, the form in (17c) would be represented as in (19).

(19) a. [[kak] REV] CAUS] b. [kak - uk - ɨ -] (= 'cause become untied')

As a result, only the [k] of the reversive suffix -uk- can mutate. While such a dual representation is independently motivated, it is not clear whether phonological rules or statements of allomorphy should be allowed to be indifferent as to which of the two environments conditions them. One important issue would be to evaluate the possibly different predictions global references such as (18a) may have from cyclic rule application. Pending future research, we simply note this alternative means of encoding cyclic effects such as the ones we have just seen in Cibemba—and will now observe in Luganda as well.

§3. Luganda

We begin our discussion of Luganda by showing the same doubling of causative -ɨ-, when reciprocalized (here, by -agan-) as was observed in Cibemba. Thus, compare the forms in (20) with those seen earlier in (10).

(20) a. -lim- 'cultivate' → -lim-ɨ- 'cause to cultivate' → -lim-ɨ-agan-ɨ- 'cause e.o. to cultivate' [-lim-y-agaŋ-(y)-][11]

b. -kúb- 'hit' → -kúb-ɨ- 'cause to hit' → -kúb-ɨ-agan-ɨ- 'cause e.o. to hit' [-kúb-y-agaŋ-(y)-]

The data in (21) show the same doubling along with the by now familiar CM effects:

(21) a. -sek- 'laugh' → -sek-ɨ- 'cause to laugh' → -ses-ɨ-agaŋ-ɨ- 'cause e.o. to laugh' [-ses-(y)-agaŋ-(y)-][12]

b. -léet- 'bring' → -léet-ɨ- 'cause to bring' → -lées-ɨ-agaŋ-ɨ- 'cause e.o. to bring' [-lées-(y)-agaŋ-(y)-]

As summarized in (22), CM again applies before causative -ɨ-, though the details differ:[13]

(22) a. t, c, k → s
b. d, l, j, g → z
c. n → ŋ
d. w → y[14]

Since /n/ also mutates in Luganda, we see two applications of CM in (21): one to the final consonant of the verb root, one to the /n/ of the reciprocal suffix -agan-. Now consider the data in (23), which are similar to the Cibemba forms in (14).

(23) a. -sek-ɨ- 'cause to laugh' → -ses-ɨ- (CM) → -ses-el-ɨ- 'cause to laugh at/for' → -ses-ez-ɨ- (CM) [-ses-ez-(y)-]

b. -léet-ɨ- 'cause to bring' → -lées-ɨ- (CM) → -lées-el-ɨ- 'cause to bring at/for' → -lées-ez-ɨ- (CM) [-lées-ez-(y)-]

As before, the question is how to get CM to apply both to the final consonant of the verb root and to the [l] of the applicative suffix. As seen in the derivations in (23),

cyclic application of CM works quite well, as would the following iterative right-to-left applications of CM in (24).

(24) a. -sek-el-ɨ- → -sek-ez-ɨ- → -ses-ez-ɨ- 'cause to laugh at/for'
b. -léet-el-ɨ- → -léet-ez-ɨ- → -lées-ez-ɨ- 'cause to bring at/for'

However, the following causativized reciprocals in (25) and (26) show that a non-cyclic right-to-left application of CM cannot be generalized:

(25) a. -áwuk- → -áwuk-an- → -áwuk-aŋ-ɨ- (*-áwus-aŋ-ɨ-)
'be different' 'differ from e.o.' 'distinguish from e.o.'

b. -túuk- → -túuk-an- → -túuk-aŋ-ɨ- (*-túus-aŋ-ɨ-)
'arrive, reach' 'meet, be in accord' 'harmonize, put into contact'

(26) a. -kwáat- → -kwáat-agan- → -kwáat-agaŋ-ɨ-
'seize, hold' 'seize, hold e.o.' 'unite hands of'

b. -kyaaw- → -kyaaw-agan- → -kyaaw-agaŋ-ɨ-
'hate' 'hate e.o.' 'cause mutual hatred'

These forms, taken from Snoxall (1967), show the causative occurring outside the reciprocal suffixes -an- and -agan-, whose final /n/ undergoes mutation. Crucially, the root-final consonants are not affected. The same absence of cyclic CM is in the causativized reversives in (27).

(27) a. -wet- → -wet-uk- → -wet-us-ɨ- (*-wes-us-ɨ-)
'bend (tr.)' 'warp (intr.)' 'warp (tr.)'

b. -satt- → -satt-ul- → -satt-uz-ɨ- (*-sass-uz-ɨ-)
'stitch' 'unstitch' 'cause to unstitch'

As we did for Cibemba, we might again consider an analysis whereby CM would refer indifferently to either to morphosyntactic or phonological adjacency to CAUS or its realization -ɨ-. Otherwise, cyclic application seems unavoidable.

In Luganda, unlike Cibemba, there is however one major stumbling block that either means of encoding cyclic effects must overcome. As seen in (28a),

(28) a. -gul- → -gul-ɨ- → -guz-ɨ-
'buy' 'sell' (=cause to buy)

b. -guz-ɨ- → -guz-il-ɨ- → *-guz-iz-ɨ-
'sell' 'sell at/for'

c. -gul-il-ɨ- → -gul-iz-ɨ- 'sell (=cause to buy) at/for' (≠ (23))

the verb 'sell' is derived from -gul- 'buy' plus causative -ɨ-, which mutates the preceding [l] to [z]. The problem is that if we proceed in a cyclic fashion to derive the applicative form in (28b), as we have done up to now, we incorrectly derive the starred form. A non-cyclic analysis such as in (28c) appears to be needed whenever the verb root ends in [l]! There is a further relevant complication. While standard sources on Luganda (e.g. Ashton et al 1954) note only forms such as in (23), where more than one mutation has occurred, some Luganda speakers accept the alternants in (29).

(29) a. -sek-ez-ɨ- (cf. (23a)) b. -léet-ez-ɨ- (cf. (23b))
'cause to laugh at/for' 'cause to bring at/for'

Here, when the verb root ends in a consonant other than [l], a non-cyclic derivation is a viable option (though not in Cibemba!). Starting with the the morphosyntactic representation in (30), we propose the two-part spell-out in (31).

(30) [[.... C]$_{root}$ CAUS] APP]

(31) a. Non-cyclic spell-out: CAUS + APP ⇒ - il - i -
CONDITION: obligatory if C = [l]; otherwise optional

b. Cyclic [elsewhere; default] spell-out (as in (23), etc.)

As stated in (31a), the spell-out of (30) will be obligatorily non-cyclic if the root ends in [l], otherwise optional. The most effective way to do this is to consider -il-i- to be a portmanteau form, rather than the compositional sequence it appears to be.[15] Cyclic spell-out is however the default option (and the only one possible in Cibemba).

While (31) works, the question we must address is whether pre-emptive spell-outs such as in (31a) ought to be allowed in morphology. To support our analysis, we now present a different case from Luganda where another phonologically-driven morphological spell-out is required. Consider the forms in (32).

(32) a. [[sib] CAUS] REC] → -sib-i-agan-i- 'cause e.o. to tie (sth.)'
b. [[sib] REC] CAUS] → -sib-agan-i- 'cause to tie e.o.'

As expected, the reciprocalized causative in (34a) is realized with -i- both preceding and following -agan-: The first -i- is the spell-out of CAUS, while the second -i- is a copy conditioned by the presence of the -agan- suffix. In the causativized reciprocal in (34b), the spell-out is again cyclic, and this time there is only one -i- suffix. What is important for our present purposes is the fact that the features CAUS and REC are generally spelled out in different orders, according to scope.

Now consider the causative and reciprocal forms of a -CV- verb root such as -mo- 'shave' in (33).

(33) a. [[mo] CAUS] → -mo-es-i- 'cause to shave' (*-mo-i-)
b. [[mo] REC] → -mo-annan- 'shave each other' (*-mo-agan-)

In Luganda, as in Bantu generally, -CV- verb roots place special requirements on the spell-out of various suffixes that immediately follow them. In (33a) we see that the "long" causative form -es-i- is required, while in (33b), we see that REC is exceptionally spelled out as -annan- after a -CV- verb root. Important for us is what happens when a -CV- verb root is both causativized and reciprocalized. As seen in (34a), and in contradistinction to (32),

(34) a. [[mo] CAUS] REC] → -mo-es-agan-i- 'cause e.o. to shave' /
[[mo] REC] CAUS] 'cause to shave e.o.'

b. CAUS + REC / REC + CAUS → -is-agan-i-
CONDITION: obligatory after a -CV- verb root

c. [[mo] REC] CAUS] ↛ *-mo-annan-i- / *-mo-annan-is-i-

both morphosyntactic representations are realized identically as a result of the pre-emptive spell-out rule in (34b).[16] What is important is that (34b) must block the cyclic spell-out of REC followed by CAUS in (34c). What we suggest is that (34b) is to (32) as (31a) is to (31b). In other words, both cases are instances whereby a

more specific rule spells out a combination of morphosyntactic features (sensitive to a phonological condition) and thereby blocks the default cyclic spell-out.

§4. Conclusion

A basic conclusion of this paper, based both on Cibemba and Luganda, is that in these—and other—Bantu languages, the spell-out of derivational verbal morphology is cyclic in the default case, though it can be overriden by phonological conditions on specific combinations of morphosyntactic features. The other major observation we have made is that both of these languages (as well as Chichewa in (7b)) sometimes require the doubling of an earlier suffix to the right of a later suffix, thereby creating sequences such as -an-ir-an- and -ị-(ag)an-ị-. The major question we are left with is how to predict when suffix doubling will be required. For this it is necessary to understand its cause. We suggest that suffix doubling is the result of a conflict between two different aspects of concatenative morphology: the default cyclic spell-out that we have established vs. the linear ordering restrictions on specific morphemes. For example, in (7a) the cyclic spell-out of APP followed by REC produces the sequence -ir-an- without event, while the cyclic spell-out of REC followed by APP in (7b) produces the problematic sequence -an-ir- in Chichewa. The reason why this sequence is problematic is that there is a separate condition according to which -an- should *follow* -ir-. In a morph-based approach, this condition might be placed on the -an- formative itself, whereas in a realizational view of morphology such as Anderson's (1991) "a-morphous morphology", it could derive from the ordering of the two spell-out rules, with APP-spelling preceding REC-spelling. In the latter case the derivations needed for (7a,b) would proceed as in (35).

(35) a. [[[ímb] APP] REC] 'sing for each other'

		Cycle 1:
-ir-		APP → -ir-
---		REC → -an-
		Cycle 2:
	---	APP → -ir-
	-an-	REC → -an-

b. [[[meny] REC] APP] 'hit each other for/at'

		Cycle 1:
---		APP → -ir-
-an-		REC → -an-
		Cycle 2:
	-ir-	APP → -ir-
	-an-	REC → -an-

In (35a) APP is spelled on the first cycle and REC on the second. In (35b), REC is spelled on the first cycle and APP on the second. As seen, because of rule ordering (APP > REC), REC-spelling reapplies on the second cycle. In other words, REC is spelled out first based on the representation [[meny] REC] and then again based on the representation [[[meny] REC] APP]. This account is possible only if we assume (a) that the REC feature is visible on the second cycle, and (b) that the same morphosyntactic feature cannot be spelled out twice in a row—or else (35a) would surfice as *ímb-ir-ir-an-. This latter assumption is well-founded in Bantu

languages, which generally require another suffix to intervene between identical occurrences of the same suffix, or which outlaw double representations outright.[17]

The same account can be extended to -ị-(ag)an-ị- sequences in Cibemba and Luganda, if we assume that the spell-out rule ordering is REC > CAUS. Thus, compare the following cyclic derivations of the Cibemba verbs seen earlier in (17a) and (10a):

(36) a. [[[punk] REC] CAUS] 'cause to bump into e.o.'

	Cycle 1:	
-an-	REC →	-an-
---	CAUS →	-ị-
	Cycle 2:	
---	REC →	-an-
-ị-	CAUS →	-ị-

b. [[[fúm] CAUS] REC] 'take each other out'

	Cycle 1:	
---	REC →	-an-
-ị-	CAUS →	-ị-
	Cycle 2:	
-an-	REC →	-an-
-ị-	CAUS →	-ị-

Again, the cyclic derivation goes through without complication in (36a), where the cyclic spell-out of the bracketed morphosyntactic structure is mirrored by the linear order of the spell-outs (REC > CAUS). In (36b), CAUS is spelled out in the first cycle, followed by the spell-out of REC on the second cycle. This produces a situation where CAUS can be spelled-out a second time, as seen.

What we are suggesting is that the cyclic phonological effects involving CM are mirrored by cyclic effects that are strictly morphological in nature—specifically, the phenomenon of suffix doubling. The alternative is to have non-cyclic spell-out of APP, REC, CAUS etc., and to place specific temporal constraints on individual morphs, e.g. -an- follows -ir- in Chichewa, -ị- follows -an- in Cibemba and Luganda. The alternative we have illustrated in (35) and (36) involves what might be terms "conjunctive rule blocks", in contradistinction to Anderson's (1986) disjunctive rule blocks. We acknowledge that this enrichment of the formal devices available to morphological theory requires further scrutiny and must be tested against the full morphological system of each language.

On the other hand, the question of whether the proper account ought to be a morphous vs. a-morphous one may be secondary compared to the striking fact that we get suffix doubling at all. Above, we attributed suffix doubling to the presence of a conflict, viz. scope vs. linear ordering. Suffix doubling might be seen to be a "repair" of the violation of surface ordering constraints. In this case, they could not be seen to be of an absolute nature ("-an- must follow -ir-"), but rather of a subordinated kind: "If both APP and REC occur on the same verb form, then there must be an -an- that follows -ir-". It is hard to see this as an actual resolution of the stated conflict. In fact, we might have expected one of two other results from such a conflict: (a) One condition wins out over the other—e.g. -ir-an- expresses both reciprocalized applicatives *and* applicativized reciprocals, as in Kinande (Hyman, in press). In this case, the linear order APP > REC wins out over scope and cyclic

spell-out. (b) The combination is not possible (i.e. there is no way to "unify" the conflicting requirements). In this case a language may find it impossible to express an applicativized reciprocal. While we have not yet found any Bantu language with this property, this may be because of our rather limited data base (about six Bantu languages we have studied in some depth). On the other hand, there may be reason to believe that the semantic needs figure more importantly in such conflicts. Limited as it is, this paper is intended only as a progress report on our continuing search to discover—and explain—the general phonological and morphological properties of the Bantu verb stem.

Notes

[1]The Kinande and Chichewa examples in this paper were graciously provided by Drs. Ngessimo Mutaka and Sam Mchombo, respectively, while the Luganda material results from our joint research, supported in part by NSF grant #BNS89-96111. The Cibemba materials were collected by the first author with Mr. Lawrence Mukuka, support by a U.C. Berkeley Faculty Research Grant. We are grateful to the above consultants and to Sharon Inkelas for discussions of the contents of this paper.

[2]Throughout this paper, verb stems are cited without an inflectional FV.

[3]When -į- glides to [y], there is the typical compensatory lengthening of the following vowel; hence, with a FV -a: -fúm-y-aan-y-aa, -tíin-y-aan-y-aa. If not followed by an enclitic, the lengthened FV -aa undergoes a rule of final vowel shortening, as in Luganda.

[4]Since not all instances of /i/ trigger CM, the symbol "į" is used to denote those that do, e.g. also the deverbal agentive noun suffix -į (cf. -lind- 'protect', mu-lins-i 'guardian', which undergoes *s*-palatalization in (15) to become mu-linš-i). Unlike many other Bantu languages, CM does not apply before the perfective ending -il-e, which undergoes height harmony to -el-e when the preceding vowel is mid. Finally, note that nasals do not undergo CM.

[5]This reciprocalized causative may also mean 'do something wrong'.

[6]The derived [s] of -lis- undergoes the *s*-palatalization rule in (15). One has the impression that [š] is followed by a palatal offglide, i.e. [š^{y}], especially when followed by a non-front vowel, e.g. the FV -a. We assume that the absence of this [^{y}] is due to a rule of palatal absorption (cf. the similar situation in Luganda below).

[7]Both Aronoff (1988) and Anderson (1991) accept internal affixation, if the base to which affixation applies is the "head" of the form, e.g. the root or stem, and Anderson as well as McCarthy and Prince (1990) allow for a phonologically conditioned "infixation". The "interfixing" shown here could be accounted for by marking off a vowel suffix as invisible and then suffixing the applicative to what remains. Since the reciprocal is added *after* causative -į- , this analysis would require that "invisibility" be a property of specific morphemes (or the rules that introduce them), rather than being a property of the domain (as proposed by Inkelas 1989, for instance).

[8]In this case it would work like labial palatalization in Xhosa (Louw 1975-6).

[9]The intransitive reversive 'become un-VERBed' is expressed by the suffix -uk-, whose corresponding transitive is expressed by the suffix -ul-, e.g. -kak-ul- 'untie'. In some cases it is possible to causativize the -uk- form, which we have done in (17c).

[10]We have assumed that such a "morphosyntactic representation", taken from Anderson's (1991) approach to inflectional morphology, is applicable as well to the expression of argument structure within the derivational morphology of verb forms.

[11]Unlike Cibemba, when the first (immediate-postradical) -į- suffix glides to [y], there is no compensatory lengthening of the following vowel. Within the stem domain (=stratum 1 phonology), such compensatory length deriving from Vi + Vj is observed only when Vj is in either the second- or final-mora position of the verb.

[12]The glided [y] from causative -į- is obligatorily absorbed into a preceding [s], [z] or [ɲ].

[13]Specifically, labial stops do not mutate in Luganda, and the underlying voicing opposition is preserved. (Also, the one nasal /n/ mutates to [ɲ].) CM in Luganda also applies before the deverbal

agentive noun suffix -ɨ, as in Cibemba, and (as is typical of Bantu) before the *-ɨd-e perfective ending (aka the "modified base").

[14]Strictly speaking, [w] becomes [y] before both the mutating /ɨ/ and non-mutating /i/, but is listed here since it is relevant to the example in (26b) below. In Luganda, as in Chichewa, /ɨ/ and /i/ are phonetically identical, though the former conditions CM, while the latter does not.

[15]Perhaps the non-cyclic spell-out can be conditioned by a "readjustment rule" that would combine CAUS + APP into a single suffixal cycle, e.g. by removing the right bracket after CAUS.

[16]In this case it is possible that a -CV- verb root actually requires that CAUS be spelled out first, followed by the spelling of REC. This would produce the form: -mo-es-ɨ-agaŋ-ɨ-, i.e. with an -ɨ- suffix occurring between -es- and -agaŋ- (which then copies to the right of the latter). Since this vowel would glide to [y] and then be absorbed into the preceding [s], there is no way to be sure it is there. With respect to (34b), recall that there is a height harmony that is responsible for the alternation between -is- and -es-.

[17]This is not to be confused with cases of where a single morphosyntactic feature is spelled out with the so-called "augmentative applied suffix -irir- (Ashton et al 1954:332-3). This suffix, frequently used to indicate that an action is extended over time, repeated, or done to completion, even occurs as -irir- on -CV- roots. Here, however, we would not claim a cyclic spell-out of more than one APP, but rather a double/triple form realizing a single APP feature.

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Articulatory phonology and Sukuma "aspirated nasals"*

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1. Articulatory phonology

A common way of viewing the phonological component of a grammar is to regard it as producing, through a set of operations or derivations, a final representation that consists of a set of categorial elements (such as features) and a network of relationships between them. This representation serves as the input to rules of phonetic implementation that express a mapping between the categorial elements and the realm of phonetic properties that are gradient rather than categorial in their nature. Rules of 'phonetic implementation' deal with these gradient phenomena, in particular with all details of timing. In a series of papers in the last several years, Browman and Goldstein (1986, 1989, 1991) have put forward a challenge to this view. Stated very tersely, they propose that the basic elements of phonology are articulatory gestures and their relative timing with respect to each other. The gestures are abstractions but they are individually specified in ways that contain information about their magnitude and duration, and their relative timing is explicit. In this way, much that is more usually treated as part of the domain of phonetic implementation is incorporated into the phonology. Browman and Goldstein suggest that the standard view makes the wrong distinction between categorial and gradient processes; many apparently categorial processes in phonology are the result of processes that are actually gradient. We will illustrate this point briefly with an example based on one used by Browman and Goldstein (1989).

Figure 1 (a) shows the movement trajectory over time of a sensor attached to the lower lip during an utterance of the nonsense word /aba/. In this particular utterance the lower lip reached closure against the upper lip at the moment shown by the intersection of the trajectory with the horizontal line labeled 'closure' (upward movement continues beyond this point because the lips compress). The acoustic duration of the closure for /b/ is the interval that the trajectory remains above the line where closure occurs. Now, the time course and shape of the lip movement trajectory can remain identical to that observed in Figure 1 (a) but have a lesser magnitude, as in 1 (b), resulting in a considerably shorter closure duration. If the magnitude of the lip movement is again reduced, as shown in 1 (c), then closure will not be achieved and the sound produced will be a bilabial fricative or approximant. Although the differences between 1 (a) and 1 (b) and between 1 (b) and 1 (c) both involve similar changes in the magnitude of a movement, because of the acoustic consequences it would be customary to regard the difference between (a) and (b) (shortening of closure duration) as a matter of phonetic variability, but to regard the difference between (b) and (c) (variation between /b/ and /β/) as a phonological process involving a change of features. However, from the articulatory point of view, shortening a closure and fricating it result from steps along the same continuum, a phonological continuum of lenition.

In this example, the timing of the articulatory gestures themselves doesn't undergo any change from 1 (a) to 1 (c), although there are consequences for the acoustic durations. In fact, Browman & Goldstein argue that acoustic durations can often give a misleading impression of the articulatory organization of an utterance (see especially Browman & Goldstein 1991).

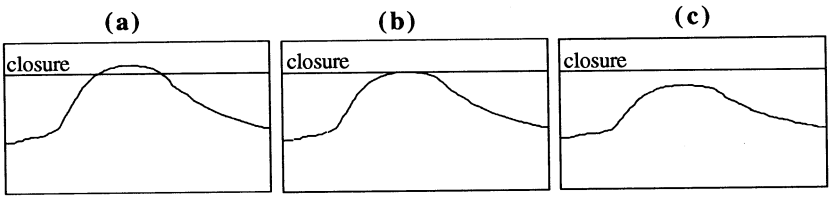

Figure 1. Trajectory of lower lip movement over time: (a) as measured in [abə], and (b), (c) modified in amplitude of the labial closing movement.

An actual articulatory trajectory such as that shown in 1 (a) is the result of the combined action of several underlying controlling gestures that are active over specified time intervals and are coordinated in time with each other in a particular way. Browman and Goldstein suggest a 'box' notation to represent the activation intervals and the relative phasing of these underlying gestures. A simplified representation of the English word 'palm' in this notation is shown in Figure 2. The activation intervals of gestures in four major 'control channels' are shown by the small boxes. (The generation of articulator movement trajectories from these abstract gestures will not be discussed here). The word includes labial closure gestures at the beginning and end, with the final one coinciding with velic opening. Between these two gestures the tongue body forms a low back constriction. Note that the default position of the glottis is assumed to be that for voicing; an active gesture is required to devoice. This devoicing gesture extends throughout the initial labial gesture and into the beginning of the tongue body gesture for the vowel. The aspiration of the initial consonant is thus modeled not as an attribute of the stop or the vowel, but as resulting from the particular timing of the gestures in the phonological representation. In what follows, we will use the insights provided by Browman and Goldstein's articulatory perspective to examine an important phonological feature of the Bantu language Sukuma.

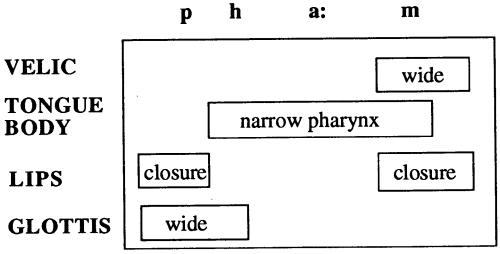

Figure 2. Articulatory notation for the major phonological components in "palm".

2. Sukuma aspirated nasals

Sukuma is among those Eastern Bantu languages in which original voiceless prenasalised stops (including those resulting from the class 9/10 nasal prefix) have become what are here called

"aspirated nasals" (Kerremans 1980). We will describe the phonetic nature of these "aspirated nasals" and compare them with the more recently derived voiceless prenasalized segments which occur in Sukuma. These result from syncope of class 1 and 3 prefixes and other cases of syncope. The objectives are to better understand the diachronic process by which these sounds originated and to provide insights into their appropriate phonological description.

The sounds in question will be written using a digraph of a nasal symbol and 'h'. There are stops and nasals at four places of articulation in Sukuma, namely, bilabial, alveolar, palatal and velar, and correspondingly there are four aspirated nasals. The great majority of occurrences of the aspirated nasals derive from earlier voiceless prenasalized stops. Some of these were stem-internal, as in the stems of nouns like /muunhʊ/ "person", /ndɪɪnhɔ/ "ladle" and /giiŋhi/ "owl", or the stems of verbs like /kʊbɔɔmha/ "to freeze", /kʊiinha/ "to give" /kʊnuuɲha/ "to feel", and /kʊnuuŋha/ "to smell". A very large number of the original voiceless prenasalized stops arise from prefixation of the class 9/10 marker, a nasal, to noun stems that had original voiceless initial stops. Examples are /mhala/ "gazelle", /nhaawa/ "spotted hyena", /ɲhɔɔɟi/ "detective" and /ŋhɔlɔ/ "sheep". Thus, /mhala/ derives from class 9 prefix /N/ + stem /*-pala/ and so on. The place of the nasal is determined by the historic underlying stop, in the way that place usually is in the case of nasals before stops.

For a proportion of these nouns in class 9 or 10, a range of different prefixes with CV-structure may occur and in this case the original consonant can still be recovered. For example, diminuatives with /ka-/ (singular, class 12) and /tʊ-/ (class 13, plural) and augmentatives with /li-/ (singular, class 5) and /ma-/ (class 6, plural) can be formed with some nouns. So, in addition to /mhala/ "gazelle", we also find /kapala/ "little gazelle", /tʊpala/ "little gazelles", /lipala/ "big gazelle", and /mapala/ "big gazelles" with the historic stem-initial consonant. In addition, there are a number of forms with a singular in class 11 (/lʊ-/) which form their plural in class 10. Examples include /lʊkʊba/ "thunder" with plural /ŋhʊba/ and /lʊkumɔ/ "reputation" with plural /ŋhʊba/. Adjectival forms and other nominal modifiers that take a concordial prefix determined by the class of the noun also show this alternation between aspirated nasals in class 9 or 10 and a voiceless stop when other prefixes occur; for example, compare the class 9/10 adjectival forms in /mhala mhaaŋga/ "living gazelle" and /mhala nhaale/ "small gazelle" with the class 1 forms /muuɲha mpaaŋga/ "living girl" and /muuɲhantaale/ "small girl".

The final source of aspirated nasals are verbal derivatives and other roots in class 1 or class 3 with stem-initial /-h/. The underlying shape of the prefix for these classes can be taken as /mu-/, but this surfaces in relatively few forms. If the stem begins with a stop, the vowel in the prefix is usually syncopated, and the nasal assimilates to the place of articulation of the stop which remains a stop. The class 1 adjectival cases cited above illustrate this process with adjectival stems beginning with /-p-/ and /-t-/. Both voiced and voiceless prenasalized stops are derived in this way. Some examples among class 1 nouns are /ntɛmi/ "chief" (plural /batɛmi/), /ŋkɛ/ "wife" (plural /bakɛ/), and /ŋgɔɔsa/ "man" (plural /bagɔɔsa/), and among class 3 nouns /mpɪni/ "hip" (plural /mipɪni/), /ntɪ/ "tree" (plural /mitɪ/), /ndɪɪnhɔ/ "wooden spoon" (plural /midɪɪnhɔ/), and /ŋgɔɔŋgɔ/ "back" (plural /migɔɔŋgɔ/). However, when the initial consonant of the stem is /-h/ the same syncope takes place, creating a bilabial aspirated nasal, as in /mhayɔ/ "word" (pl. /mihayɔ/), formed from the verb stem /-hay-/ "speak," infinitive /kʊhaya/.

Now that we have described the occurrence of aspirated nasals, we may inquire more closely into what kind of sounds they are. Batibo (1967 [1986]), a speaker of the northern (kemunasukuma) dialect, classifies them as voiceless nasals, but notes that they are pronounced with accompanying "strong," "very strong" or "very noticeable" aspiration. In his pioneering work on Sukuma tone, Richardson (1959) transcribed the corresponding sounds, as pronounced in the eastern, kemunakeeya, dialect as voiceless nasals followed by [h], i.e. [n̥h] etc. Since 'aspiration' is a rather ambiguous term, and since voiceless nasals more commonly arise from perseveration of voicelessness from a preceding voiceless segment rather than from anticipation of a following voiceless consonant, analysis of the phonetic nature of these consonants can provide significant new information of general phonetic interest, as well as serving as a basis for a phonological interpretation.

3. Phonetic investigation

Audio recordings were made of wordlists containing aspirated nasals and prenasalized stops and fricatives spoken by a native speaker of Sukuma. The speaker was Herman Batibo, who very graciously consented to take part in this experiment while he was a visiting scholar at UCLA. He also generously compiled the wordlist used. For a subset of this wordlist, simultaneous records of nasal air-flow, oral air-flow and intra-oral air pressure were also obtained. In the experimental setup used, the air flowing from the mouth is collected in a shaped mask which fits quite closely around the mouth. A thin tube inside the mask is passed between the lips so that the air pressure inside the mouth can be sensed. Another tube with a wide termination is fitted inside one nostril to record when air is passing through the nasal airway. A microphone inside the mask also records a (degraded) audio signal. These four channels are digitized directly onto a computer; the audio signal at 11 kHz, and the three channels of aerodynamic data at 480 Hz. This setup is described more fully in Ladefoged (1990).

The resulting traces look like that in Figure 3, which shows a record of the word /mpanga/. The top trace is the radiated pressure wave (the audio signal recorded within the oral mask). The enclosed space of the mask distorts the sound, making this audio signal unsatisifactory for acoustic analysis. However, the audio signal is helpful in segmenting the sound and in determining such matters as the onset and offset of phonation. Acoustic analysis is made from other recordings. The second trace is the oral flow. Since the lips are closed at the beginning of this word, there is no oral airflow. Flow starts at the release of the labial closure, at about the 150 ms time-point in the signal, and very rapidly reaches its maximum. There is considerable flow for a period of about 50 ms before the first clear signs of vocal cord vibration are apparent in the flow record, in the form of fluctuations around the baseline of the trace. That is, there is a period of voiceless aspiration after the release. Study of other tokens of the same type indicates that there is always a period of strong aspiration, but that vocal cord vibration may start soon after the oral release. In these cases the period of aspiration can be described as breathy voiced.

The third trace shows intraoral pressure at a point behind the lips. The lips are closed at the onset of this word and the pressure transducer records the pressure fluctuations in the oral cavity due to the vibration of the vocal cords during the nasal. Note that baseline pressure increases during the nasal and reaches a plateau during the hold of the voiceless stop. Naturally, when the oral occlusion is released there is a rapid drop in the pressure in the intraoral cavity. Since the remainder of this word is produced with the lips open, there is little further pressure variation that is sensed at the location being monitored in this experiment. The final trace is the nasal flow

channel. Since this is monitored by a tube in one nostril only, there is more impedance to flow through that nostril than through the other one. For this reason, this signal appears more sensitive to the pressure fluctuations resulting from voicing than to net airflow volume. It serves very well to monitor the coupling of the nasal passage to the oral tract, since these pressure fluctuations are isolated from the air in the nasal passage when the velum is raised and the velopharyngeal port consequently is closed. We can thus detect when the nasal passage is closed and the fully oral stop /p/ begins. In this token this is shortly before vocal cord vibration ceases, as pressure fluctuations can still be seen in the intraoral pressure trace after the nasal airflow trace has become flat.

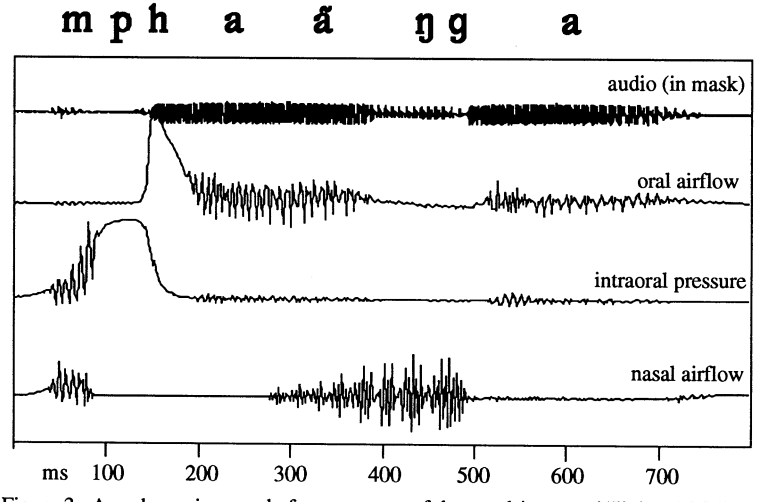

Figure 3. Aerodynamic record of an utterance of the word /mpaŋga/ "living (cl.3)".

Note that there is a second prenasalized stop in this word and that nasal coupling is initiated well in advance of the nasal component of this stop. The onset of nasalization occurs before the 300 ms time-point, about midway through the vowel, whereas the onset of the oral closure for the nasal, detectable by the cessation of oral flow and the reduction of amplitude in the audio signal, occurs at about the 400 ms point. The oral closure for this voiced prenasalized stop is about 125 ms long, but, as can be judged from the interval between the offset of nasal flow and the onset of oral flow for the following vowel, only a very brief portion is an oral stop. A phonetic transcription of the word, marking aspiration and vowel nasalization, is aligned approximately with the appropriate portions of the signal.

Now let us look at a word with an aspirated nasal in initial position. A record of the word /mhala/ "gazelle" is shown in Figure 4. The record shows that an aspirated nasal consists of an initial plain nasal portion with modal phonation, up to about the 130 ms time-point. This is followed by an interval during which both intraoral pressure and nasal flow rise, indicating for this interval both continued oral closure and nasal coupling. Since the vocal cords continue to vibrate

during this period, it seems unlikely that this pattern is achieved simply by opening the glottis wider. It seems probable that the production of this sequence also involves an increase in subglottal pressure. However, to simplify matters we will describe the situation as if just a glottal adjustment was involved. When the oral closure at the lips is released, shortly before the 200 ms time-point, a period of high oral air-flow follows which overlaps with the onset of the following vowel; that is, there is aspiration. Note the similarity in the relationship between the oral flow and the intraoral pressure to that observed with the voiceless prenasalized stop in Figure 3, once allowance is made for the fact of continuing coupling to the nasal passage.

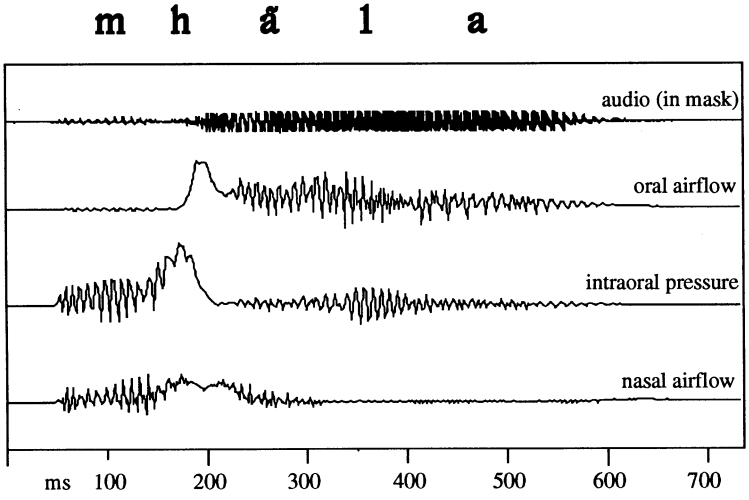

Figure 4. Aerodynamic record of an utterance of the word /mhala/ "gazelle".

Note that nasal flow continues through much of the following vowel, but ceases (just after the 300 ms timepoint) before the following oral consonant is initiated (at about 350 ms). From examination of other tokens we can generalize that a vowel after an aspirated nasal is partly or weakly nasalized if an oral consonant follows and quite strongly nasalized throughout if another nasal consonant follows. The same pattern holds for the spread of nasalization from plain nasals, as may be seen in the word /namhala/ "with a gazelle" in Figure 5. Here we see nasal coupling from the onset of the word right through to the middle of the vowel before the /l/, where it dies out. In this token, the magnitude of the increase in oral airflow at the release of oral closure for the non-initial aspirated nasal is considerably less than that seen in the initial position in Figure 4. The post-release aspiration portion has relatively strong nasal airflow, and the audio signal indicates that this portion is relatively noisy. From examination of all traces in this figure, the aspiration portion appears to be almost completely voiceless.

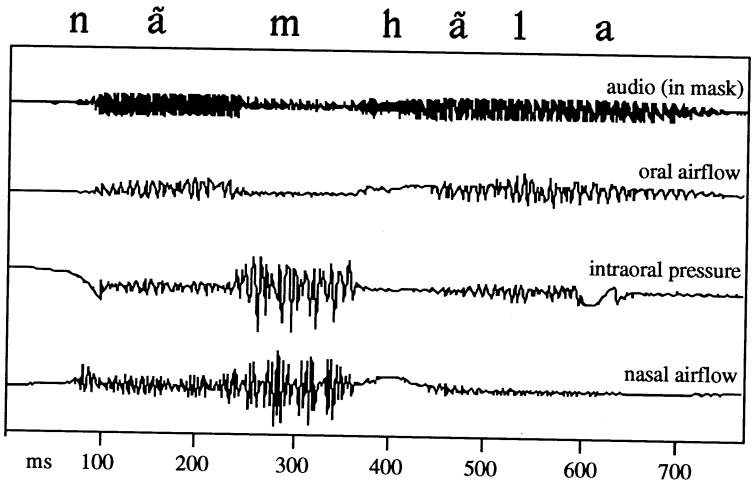

Figure 5. Aerodynamic record of an utterance of the word /namhala/ "gazelle (+ comitative prefix)".

Variation in amount of voicing in aspirated nasals is typical. Figure 6 shows waveforms of two tokens of the word /mhala/ recorded with no facemask. The first is the more frequent type, with vocal cord vibration throughout the aspiration portion and significant acoustical noisiness superimposed on the voicing for a short time. In the second, vocal cord vibration ceases at about the time of oral release, and the aspiration portion is entirely voiceless. In this case the voiced portion of the following vowel is truncated, resulting in almost identical durations of the interval from oral release for [m] to the onset of oral constriction for /l/ in the two tokens. When the values of glottal opening, pulmonic pressure and other variables fall within particular ranges, voicing will cease, but devoicing does not appear to be a planned part of the articulation of aspirated nasals.

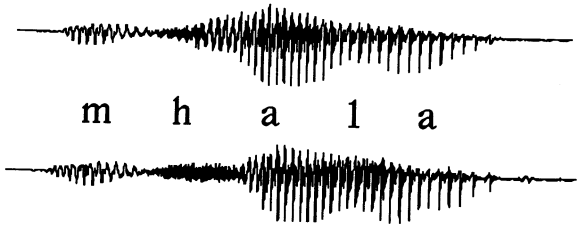

Figure 6. Waveforms of two utterances of /mhala/ "gazelle".

4. Discussion

Our phonetic observations indicate that the use of the term "aspirated nasal" to describe the type of sounds involved in Sukuma appropriately captures a similarity between these sounds and the derived prenasalized voiceless aspirated stops in Sukuma as well to other aspirated sounds in other languages. However, contrary to earlier descriptions, the nasal portion of aspirated nasals is not voiceless. In fact the aspiration portion is itself usually voiced, and the voiced nasal portion is usually two to three times longer than it is in the prenasalized voiceless aspirated stops. That means that when comparing, say, /mp/ and /mh/, the duration of the total oral closure is similar. Moreover the glottal gesture involved in producing the accompanying aspiration in both these sounds is timed in a similar way in relation to the release of the oral closure.

These phonetic characteristics also suggest that the diachronic development of aspirated nasals did not involve any stage in which the nasal portion became devoiced, as has sometimes been proposed (Kerremans 1980, Hinnebusch & Huffman, ms). If it is assumed that the original voiceless prenasalized stops from which they derive were aspirated, the diachronic process can be well characterized in gestural terms. It can be modeled as the extension of active duration of the velic opening gesture while the relative timing of the oral gesture and glottal spreading gesture remain undisturbed. Vocal cord vibration now typically persists during the entire complex, since impedance to transglottal airflow is low due to the escape of air through the nasal passage. We assume that cessation of voicing in /mp/ results passively because transglottal airflow cannot be sustained while both oral and nasal escape of air is prevented.

Using a notation like that in Figure 1, the initial CV of a word like /mpaŋga/ would be represented as in Figure 7 (a), while the initial CV of /mhala/ would be represented as in 7 (b). All components in the two representations are the same, apart from the longer activation interval for the velic gesture in 7 (b). The diachronic change of */mpala/ to /mhala/ involves simply this timing rearrangement among elements already present.

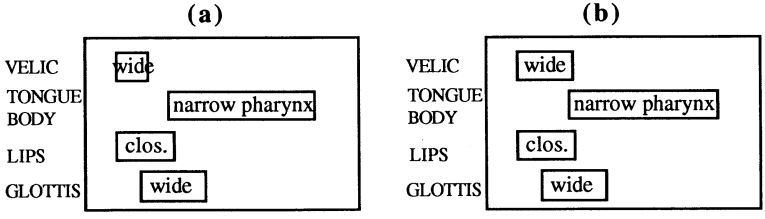

Figure 7. Articulatory notation for (a) the initial CV /mpa../ as in /mpaŋga/ or */mpala/ and (b) the initial CV /mha../ as in /mhala/.

The synchronic derivation of /mhala/ from /-pala/ and a nasal 'prefix' is simply the addition of the velic gesture, timed as in 7 (b), to a structure which is identical to 7 (b) except for the absence of that gesture (cf. "palm" in Figure 2). A more conventional phonological description would perhaps posit a floating nasal prefix, which docks to a root node specified for the place, manner and laryngeal features characterizing an initial stop. This operation would change the stop to a nasal (assuming stops and nasals share manner features) and provide for the place of the nasal,

as sketched in Figure 8. However, note that this account requires several additional statements of 'phonetic implementation' before it would fully characterize the aspirated nasals. Modal voicing must be assigned to the onset of the nasal portion and the realization of the laryngeal feature [spread glottis] extended to the onset of the following vowel. In the articulatory phonology model, these properties are built into the phonological representation itself.

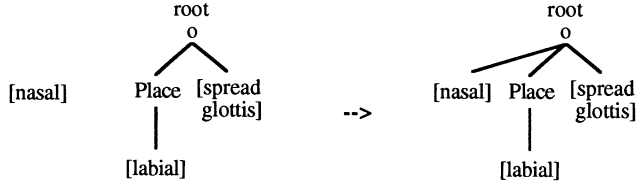

Figure 8. Sketch of a 'nasal docking' account of the derivation of aspirated nasals.

By focussing attention on the productive control of speech, an articulatory phonology perspective can draw our attention to regularities that might escape notice in other paradigms (cf Steriade 1991). It still draws a distinction between phonological and phonetic processes: in the Sukuma examples discussed, the extent of devoicing and the extent that nasality spreads from nasal consonants into adjoining vowels are not phonologically significant. But recognizing the relative temporal constancy between major articulatory components can be seen to simplify both diachronic and synchronic accounts of the interesting and comparatively rare phenomenon of aspirated nasals in this language.

Footnote

* The present text is closer to that presented at the 22nd Annual Conference on African Linguistics in Nairobi, July 1991, rather than to the earlier version actually presented at the Berkeley Linguistics Society conference.

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Facts Count: An Empiricist Looks at Indirect Objects in Hausa

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There are a variety of different data-intensive approaches that characterize the work of empiricist Africanist linguists. One involves looking at data from large numbers of different languages, sometimes for the purpose of genetic classification or historical reconstruction, sometimes for typological study. The second involves delving into some particular language in depth, usually over long periods of time, and usually with considerable amounts of time spent working in Africa itself. If we can take Bernd Heine's paper presented at this meeting as exemplifying the former approach, I would like here to illustrate the second approach. My purpose is to show how complex and interesting problems can get when one goes beyond generally known surface facts and truly digs into the details of a language.

The specific problem that I shall be discussing is that of Indirect Objects in Hausa. Simple sentences with IOs are shown in 1. (For the range of meanings indicated by IOs in Hausa, see Newman 1982).

(1) Standard IO construction. (Tone marking: Lo is à ; Falling is â ; Hi is unmarked.)
a. Audù yaa faɗàa wà Laadì làabaarìi Audu told Ladi the news.
b. Audù yaa faɗàa matà làabaarìi Audu told her the news.

As is well known, the IO marker, which I shall be representing by WA, has two different forms depending on whether its complement is a personal pronoun or not, namely,

(2) WA = ma- when attached to a personal IO pronoun, wà or mà, depending on dialect, elsewhere.

1. The particular analytical question that has interested Hausaists for some time has had to do with the status of the IO markers in relation to the preceding verb. Some twenty years ago, Parsons (1971/72) proposed that WA should be thought of as being part of the verb: "Indeed, though it [WA] is always written disjunctively (from the verb), there is a case for regarding it as some sort of verbal suffix or extension . . . " (p. 64). Gouffé (1981:49) adopted this same position but in even stronger terms: "[I]l est essentiel de rappeler que la marque /wà/ se comporte comme un morphème enclitique du verbe; plus précisément, elle fonctionne comme un véritable suffixe de ce verbe." The view that WA belongs to the verb has been taken up recently in a number of theoretically oriented works by Halpern (1989), Abdoulaye (1990), Bature (1990), Munkaila (1990), and most especially by Tuller (1984, 1990), for whom this view is central to a number of other analytical questions. The authors differ on the narrow issue of whether WA should be treated as an affix or a clitic, but they all seem to agree that WA "is not a preposition-like particle, but rather an element . . . which [in some way or other] is bound to the verb" (Abdoulaye 1990:15). The enclitic nature of WA is generally argued for on the basis of evidence such as the following: (a) One cannot insert a modal particle between the verb and WA; (b) one cannot move a WA+NP phrase away from its normal syntactic position immediately after the verb; (c) one *can* leave WA

stranded, which is not normally possible with true "prepositions"; and (d) WA is prosodically unstressed, no pause being allowed between WA and the preceding verb.

We thus have an analysis which appears to be empirically well supported and which has been endorsed by Parsons and Gouffé, the two leading Hausaists of our time, plus a number of younger, theoretically sophisticated linguists, including three who are native Hausa speakers. One would think that the matter should be settled. But when one retains one's scientific skepticism and probes deeper, one discovers that the matter is not so simple.

2. Let us take up some of the factors commonly cited as proof that WA is an intrinsic part of the verb. First there is the matter of the "modal particles", small words indicating 'indeed, really, moreover, etc.' which are often taken as tests of constituency because of their general freedom of placement.

(3) Emphatic "modal particles" (e.g. dai, fa = hwa, kòo = kùwa, maa, kuma)
a. bèi faɗàa *maa wà màatarsà ba He didn't even tell his wife.
b. bèi faɗàa *maa matà ba He didn't tell even her.

From the few examples such as those in 3a and 3b, cited by Tuller (1984), unqualified general statements have been made that one cannot insert a modal particles between the verb and WA. But is this really true?

2.1. The first question is: not allowed by whom? Whereas it may be true of some speakers, it is not true of all. One native Hausa speaker from Kano [MK] with whom I worked recently did reject all attempts to insert a modal particle; but another Kano speaker [MA] accepted them as fine.

(4) [MA] a. sun rufèe fa wà maalàm ƙoofàa They closed the door for the teacher.
b. zân sayar fa mikì (dà) zanèe I shall sell you a wrapper.

A Hausa speaker from Niamey easily produced sentences with a modal particle between the verb and WA, and felt that these were quite normal.

(5) [OA] a. Abdù yaa aikàa hwa mà Laadì wàsiiƙàa Abdu sent a letter to Ladi.
b. Abdù yaa aikàa hwa matà wàsiiƙàa Abdu sent her a letter.
c. naa yi hwa mà Abdù màganàa I spoke to Abdu. (lit. 'did to A. speaking')
d. naa sayoo hwa mikì rìigâh hwa I bought the gown for you.
e. mun tàmbàyi hwa matà kuɗii We requested money for her.
f. naa nèemi hwa mà uwàayeenaa àlheerìi I sought good things for my parents.

Interesting in this connection is an older example from Abraham (1959:174), which I stumbled on by accident.

(6) gàrin nàn shii nèe ya hau maa wà It is this very town which he attacked.

In short, while modal particles between the verb and the IO may not be common, they are not impossible as has been claimed.

2.2. The next question is: which particle? Although it is true that most modal particles cannot be inserted between a verb and WA , it doesn't follow that none can. To generalize from the supposedly ungrammatical examples in 3 to all modal particles is not valid. The evidence shows clearly that the particles are not all of the same status and that fa (= hwa) is more readily accepted than any of the other particles. Speaker [LD], for example, only accepted fa.

(7) [LD] naa gayàa fa makà I told you. But not naa gayàa *dai makà

Similarly speaker [MA], also from Kano, tended to rejected modal particles other than fa, although in a few instances he did allow dai.

(8) [MA] a. naa sayaf̃ fa wà Audù rìigaa I sold Audu a gown.
But not naa sayaf̃ *maa wà Audù rìigaa.
b. sun yi fa minì aikìi ; sun yi dai minì aikìi They did work for me.

[OA], who, as I mentioned earlier, generally felt quite comfortable with modal particles between the verb and WA , had reservations when particles other than hwa were used, e.g.

(9) [OA] yaa kooyaf̃ hwa musù dà yâarân He taught the children for them.
But not yaa kooyaf̃ *kòo musù dà yâarân.

It should be pointed out that fa (or hwa), the particle most readily accepted, is the only modal particle consisting of a single light syllable. All the others contain two moras. This suggests strongly that the restriction on modal particle placement may depend more on prosodic than on grammatical factors, an interpretation already suggested by Inkelas (1988). As we shall see, other evidence also supports this view.

2.3. The next question is: which verb form? As far as I am aware, none of the authors who have claimed that WA belongs to the verb have explicitly looked at different kinds of verb forms. This, however, turns out to be an important variable, as seen, for example, in the behavior of verbs in different "grades". (These are lexico-derivational classes marked by distinct tone patterns and verb endings, see Parsons 1960; Newman 1987). Speaker [MA], for example, tended to reject a modal particle between WA and a gr. 1 verb, see 10a-b, but generally accepted these in the case of other grades, see 10c-f.

(10) [MA] a. taa gasàa *fa wà mijìntà naamàa (gr. 1) She roasted meat for her husband.
b. naa kaf̃àntaa *fa musù wàsiiƙàa (gr. 1) I read them the letter.
c. yaa neemoo fa masà màì aikìi (gr. 6) He sought a worker for him.
d. kà rufèe fa wà maalàm ƙoofàa (gr. 4) Close the door for the teacher.
e. yaa shaa fa minì kâi (gr. 0) It bothered me. (lit. 'drank fa to-me head')
f. yaa fitaf̃ fa wà yaaròo ƙayàa (gr. 5) He took out the thorn for the boy.

Speaker [MA] seemed most comfortable using modal particles with the monosyllabic verbs (gr. 0) and particularly with the gr. 5 "efferential" verbs. The judgments were not, however, totally consistent simply on the basis of grade; thus, for reasons that I cannot explain, [MA] easily accepted sentence 11a but felt that 11b was marginally possible at best, although the verb in both cases was gr. 6.

(11) a. yaa zaaburoo fa masà (gr. 6) It jumped up at him.
b. ?*yaa tattaroo fa masà itàacee (gr. 6) He collected firewood for him.

Independent evidence for the special status of gr. 5 comes from speaker [LD], who allowed fa between the verb and WA both with gr. 1 and gr. 5 verbs. When a different modal particle, dai, was tried, it was totally rejected with the gr. 1 verb, but treated as questionable but possible with the gr. 5 verb.

(12) [LD] a. *naa gayàa dai makà (gr. 1) I told you.
b. ??naa gayař dai makà dà Audù (gr. 5) I greeted Audu for you.

The examples in 13 illustrate another matter.

(13) [OA] a. muntambayam (*hwa) matà kuřii (HiHi D-form) We asked for money for her.
b. naa neemam (*hwa) mà uwàayeenaa àlheeřìi (HiHi D-form) I sought good things for my parents.
c. kù hutam minì (dàc cikin) ɗaakìi, but not *kù hutah hwa minì (dàc cikin) ɗaakìi (HiHi D-form) Get out of my room!
d. kù hutam minì dà kaayân or kù hutah hwa minì dà kaayân (gr. 5) Take out the goods for me!
e. yaa kooyah hwa mà Abdù yâarân (gr. 5) He taught the children for Abdu.

Speaker [OA] from Niamey freely accepted the use of the modal particle hwa between a verb and WA , but even she wouldn't allow it with one particular verb type, namely the distinct pre-dative "D-form" that replaces grade 2, 3, and 7 verbs before IOs. This form, which is characterized by HiHi tone and an ending -am or -ař (which normally forms a geminate with the immediately following consonant), is phonologically (almost) identical to gr. 5 verbs. However, as seen in 13a-c, this D-form cannot be separated from the IO by hwa; to do this, one has to use a non-extended gr. 2 form (see examples cited earlier in 5). Insertion of a modal particle between a gr. 5 verb and the IO, on the other hand, is fully allowed, see 13d-e. The reason this is important is that Parsons (1971/72), and others following him (e.g. Frajzyngier 1985), have argued that the special HiHi D-forms were nothing other than gr. 5 verbs used in a special context. The difference in modal particle use seen clearly in examples 13c and 13d adds further evidence in favor of my view (Newman 1977, 1983; supported by Munkaila 1990) that these D-forms are synchronically and etymologically totally distinct from the gr. 5 verbs.

2.4. The next question is: what kind of IO? Up to this point, we have been using the cover symbol WA , as if it didn't matter whether the surface IO were wà (or mà) plus a noun or ma- plus a pronoun. This is in line with all the previous studies on

the status of WA, where the distinction between the two kinds of IOs has been totally ignored. In actual practice, most of the examples cited have been of wà plus a noun, but the assumption has been that all of the arguments presented in favor of WA being attached to the verb would hold in the case of pronoun IOs as well. Again we find that a critical variable has been neglected. Speaker [LD], for example, only allowed modal particle insertion if the IO was pronominal:

(14) [LD] a. naa gayàa fa makà I told you. But not *naa gayàa fa wà Audù I told Audu.
b. kà zubaɾ̃ fa minì dà mâi Pour out the oil for me. But not *kà zubaɾ̃ fa wà Audù dà mâi Pour out the oil for Audu.

This restriction held partially in the case of [MA]. Thus in 15a with the gr. 6 verb, use of the modal particle was limited to the sentence with a pronoun IO, whereas in 15b with the gr. 5 verb, both types of IOs were allowed.

(15) [MA] a. yaa neemoo fa masà mài aikìi He sought a worker for him.
But not *yaa neemoo fa wà bàtuuɾ̃èe mài aikìi He sought a worker for the European.
b. yaa fitaɾ̃ fa masà/wà yaaròo ƙayàa He took out the thorn for him / for the boy.

I should mention here that from a historical perspective, one would expect the noun and the pronoun IOs to behave differently. The simple synchronic statement presented earlier and commonly repeated in pedagogical grammars and elsewhere that WA has the two allomorphs wà and ma-, implying that they are phonological variants of one another, ignores the fact that historically they are unrelated morphemes with distinct historical origins: the marker wà most likely derives from a preposition-like particle, perhaps *gà, whereas ma- originally was a formative used in independent possessive pronouns (Newman 1982).

2.5. The examples in 16 point up something else of interest.

(16) [MA] a. sun sayoo fa minì rìigaa They bought me a gown.
But not *sun sayoo fa mînrìigaa
b. yaa aukaɾ̃ fa minì It happened to me. But not *yaa aukaɾ̃ fa mîn
c. sun saacèe fa makà kuɾ́în They stole the money from you.
But not *sun saacèe fa mâa kuɾ́în

In Hausa a number of the indirect object pronouns, all of which underlyingly are CVCV, have reduced monosyllabic variants. When the reduced forms are used, the modal particle is not allowed. For example, in 16a the modal particle was accepted with the full form minì but not with the short form mîn. This again illustrates the prosodic character of the restrictions on modal particle use.

2.6. At this point, I need to be explicit about the nature of the native speaker judgments that I have drawn on, a factor that doesn't show up in written examples where particular sentences are simply marked either as grammatical or ungrammatical. In the first place, in studying modal particle use, there was much

greater indecision by individuals and more inconsistencies from speaker to speaker than is normally the case. Second, when modal particles were at issue, Hausa speakers often could not make a firm judgment just by looking at a sentence, something that is normally possible with other morphological and syntactic constructions. Rather, they had to repeat the sentences to themselves, whereupon they could decide not so much whether the particular sentences were right or wrong, but whether they *sounded* natural or not.

3. Let's turn now to the position of the IO. As all Hausaists know, this is totally fixed, the IO occurring immediately after the verb before the DO, as seen in all of the examples presented so far. Whereas it may be true that IO word order is indeed fixed in Standard Hausa, this is not the case for all dialects. In the Bauchi dialect (information from Gital 1987 and Zaria 1982) noun IOs behave differently from pronoun IOs—a common Chadic characteristic (Newman 1982) - and occur separated from the verb after the DO, a syntactic order that would be impossible if WA were truly a part of the verb.

(17) Position of noun IO *after* the DO (Bauchi dialect)
a. Muusaa yaa wankè rìigaa wà Sulè Musa washed the gown for Sule.
b. Muusaa yaa wankèe masà rìigaa Musa washed the gown for him.
c. taa gasà naamàa wà mi jìntà She roasted the meat for her husband.
d. taa gasàa masà naamàa She roasted the meat for him.

The position of the noun IO seems to be due to an extraposition rule. Note in 18 that if the complement of wà is not in place, i.e. if wà is stranded, then it must stay next to its verb host and cannot be moved.

(18) a. mi jìntà nee ta gasàa wà naamàa It was her husband she roasted the meat for. Not *mi jìntà nee ta gasà naamàa wà
b. yaaròn dà sukà nuunàa wà hòotoo The boy that they showed the photo to. Not *yaaròn dà sukà nuunà hòotoo wà

Looking at other non-standard dialects turns up other examples of displaced IOs that are not possible in SH. As shown in 19, the normal means of IO focus is by fronting not the phrase as such but rather the noun or pronoun IO, the marker wà being left behind.

(19) Focus fronting (Standard Hausa)
a. Laadì akà wankoo wà rìigâr̃ It is Ladi they washed the gown for.
Not *wà Laadì akà wankoo rìigâr̃
b. ita akà wankoo wà rìigâr̃ It is her they washed the gown for.
Not *matà akà wankoo rìigâr̃

Much to my surprise, [OA], and other Hausa speakers from Niger, permitted the sentences in 20 in which mà + NP is fronted just like a prepositional phrase. The redundant WA after the verb (= mà or mâa) was considered optional but preferred.

(20) Focus fronting ([OA] Niamey dialect)
a. mà Laadì ankà wankoo (mà) rìigẫ It is Ladi they washed the gown for.
b. mà ita ankà wankoo (mà) rìigẫ It is her they washed the gown for.
c. mà Muusaa ta dahwàa mà/mâa àbinci It is Musa she cooked the food for.
d. mà nii ta dahwàa mà/mâa àbinci It's me she cooked the food for.

It's hard to know at this point exactly what significance to place on these unusual findings from Bauchi and Niamey, areas located on the southeast and northwest fringes of Hausaland; but one can't simply discount dialectal evidence just because it is inconvenient for one's analytical viewpoint. It is worthwhile remembering here Parsons' own comments regarding his study of the Hausa verbal system (Parsons 1971/72:207): "I am, however, aware of the limitations of my treatment of the Hausa verb, viz. that it is a treatment of the verb as used only in the standard form of Hausa as spoken and written in Nigeria . . . ." He then urges dialect studies which should "shed much light on the history of the Hausa language and lead to a more comprehensive and diachronic statement of its verbal system than the present synchronic and geographically limited one" (p. 208).

4. One of the major reasons given for rejecting the idea of WA as an autonomous preposition-like word, especially in the case of earlier scholars such as Parsons and Gouffé, was that phonologically it was attached to the preceding verb, i.e. the extended verb made up of the stem + WA prosodically constituted a single word. In Newman (1982) I raised some questions about the tonal behavior of WA if thought of as a verb attachment, and more recently Bature (1990:18–19) has shown clearly that verb+WA does not constitute a phonological word for purposes of imperative tone assignment.

Here I would like to present some new, previously unreported information about the dialect of Maradi which further shows that WA prosodically constitutes a separate word and is not an integral part of the verb. It is worth mentioning here that unlike Bauchi and Niamey, which could be considered marginal, untypical dialects, Maradi constitutes a part of traditional, core Hausaland.

The Maradi rule that relates to the status of WA is an optional, but apparently preferred, tone rule that simplifies falling tones to Lo when immediately preceded by a Hi.

(21) Maradi contour tone simplification: F (= HÛL) → L / H___.

The operation of this very natural rule is illustrated in 22.

(22) [MLA] a. yaa cikà sôo He filled the bucket. kàawoo sòo Bring the bucket!
b. gishirii dà mâi Salt and oil. gishirii koo màì Salt or oil.
c. yà sâa shi He should put it. yaa sàa shi He put it.

There is, however, an important restriction on the rule: it only applies to monosyllabic words. If the falling tone is on some syllable in a polysyllabic word, the rule does not apply, e.g.

(23) kiihîn The fish. Not *kiihìn; raanâi The day. Not *raanài;
yaa shânyee He drank it up. Not *yaa shànyee

It follows, of course, that if WA were lexically and phonologically integrated into the verb, as has been argued, this tone rule would not be applicable. But look at what happens. The 2nd masculine singular IO pronoun makà has a contracted form mâa with falling tone. When preceded by a Lo tone, as in 24a, the falling tone remains. When preceded by a Hi tone, however, mâa simplifies to màa with Lo tone in accordance with the general rule affecting monosyllabic words, see 24b.

(24) a. naa gayàa mâa làabaaĩìi I told you the news.
b. naa aikoo màa takàĩdaa I sent you a letter.

The rule operates similarly with a homophonous form mâa, which exists as an IO particle in Northern dialects in addition to the more well-known markers wà/mà. [There is also a variant wàa, found in Bature (1990), but never previously reported in the literature, which is used by some Kano speakers in phrase final position.] (The short vowel allomorph mà is generally preferred when there is an immediately following noun IO; when the IO marker has been stranded, mâa is much preferred.) As seen in comparing 25b and 25c, we again find that mâa undergoes the tone rule, i.e. it is treated like a monosyllabic word and not like the last syllable of a polysyllabic verb.

(25) a. sun gayàa mà Sulè = sun gayàa mâa Sulè They told Sule.
b. yaaròn dà sukà gayàa mâa The boy they told it to.
c. Sulè sukà aikoo màa It was Sule they sent it to.

5. *Analysis*. What I have shown is that the claim that the indirect object marker WA is attached to the verb, which has been repeated for some twenty years on the basis of minimal and narrow evidence, suddenly begins to crumble as soon as one starts to investigate Hausa facts more carefully, looking at more variables, more speakers, and more dialects. From the work that I have done, I think it is clear what is *not* the answer. What *is* the correct analysis requires considerably more study. Let me at this point, however, just provide a proposal of what I think is the best way to approach the matter.

The essential first step is to separate pronominal from non-pronominal IOs. Pronominal IOs make use of a distinct pronoun paradigm characterized by ma- (the vowel of which undergoes anticipatory assimilation) + a bound CV pronoun + HiLo tone (i.e. minì 'to me', makà 'to you (masc.)', musù 'to them', etc.). There is no reason to believe that this ma- is (or ever was) a part of the verb in any sense of the term. Gouffé (1981:48) has written, "Le syntagme /ma-tà/, au sein duquel /tà/ se comporte comme un enclitique de /ma/, est lui-même enclitique du verbe; en effet, après celui-ci, une pause n'est pas . . . admissible . . . . " I would contend, to the contrary, that the IO pronouns are quite distinct from the verb phonologically and morphologically and, moreover, that their interpretation as separate words is fully in keeping with the intuition of native Hausa speakers.

The pre-noun marker wà /mà is also not an integral part of the verb, i.e. it is not a true verbal suffix as sometimes described. The labelling of wà as a bound *clitic* also doesn't fit with the facts presented here. A better way is to view the situation in terms of a *process*, cliticization, rather than in terms of a rigid category, clitic. With this small, but important adjustment, what we can say is that *if* wà (or mà for

that matter) ends up on the surface immediately next to the verb (i.e. the verb hasn't been deleted, a modal particle hasn't been inserted, or the wà + NP phrase hasn't been moved), *then* wà tends to attach itself prosodically to the preceding verb. How much pressure there is for the cliticization to take place and at what stage in the derivation appears to vary from dialect to dialect and speaker to speaker. One must understand, however, that wà starts out as a free particle and may end up as such. That is, wà attachment is a late phonological phenomenon having nothing to do with lexical word formation or syntactic constituency.

There is, by the way, one verb in the language where the marker wà (but not pronominal IOs) has truly been incorporated, namely the verb baa/bâa 'to give to', compare 26a and 26b. This one case is instructive since it can be contrasted with all the other cases in the language where wà still exists as a distinct (if sometimes phonologically dependent) particle. Interestingly, the historical incorporation of wà in this word has become lexically so fixed (and so invisible!) that many Hausa speakers are now beginning to use the overt marker with one or another form of this verb, see 26c.

(26) Verb-wà fusion.
a. sun bâa yaaròn fensìr̃ (bâa < *baa wà or *bai wà) They gave the boy a pencil.
b. sun baa shì fensìr̃ They gave him a pencil.
c. sun bâa wà (= baa wà) yaaròn fensìr̃ They gave the boy a pencil.

6. *Conclusion.* Parsons, the world's leading expert on the Hausa language, has complained at various times that one of the problems with a well-known language like Hausa is that we think that the facts have already been described and thus we fail to look into all the nooks and crannies for details; we overlook phonetic matters of a subphonemic nature, and we fail to pay attention to the considerable individual and dialectal variation that exists. In this paper, I have tried to show that by looking beyond the received knowledge about Hausa as found in standard textbooks, we discover that the situation with regard to indirect objects is much more complex and much more varied than we had ever imagined. If the new facts discovered pose analytical problems for the theoretically oriented linguist, then I as an unrepentant empiricist have done my job.

* * * * * * * * * *

Postscript

While the focus of this paper has been on the IO markers, recent studies have raised important questions about the nature of the pre-dative verb. Both Bature (1990) and Abdoulaye (1990) have used the term "applicative" in describing the attachment of WA to the verb. Although I do not accept the specifics of their analyses, their papers have stimulated me to go back and expand on an idea that I first proposed almost twenty years ago (Newman 1973), namely, that some pre-dative verbs do require an applicative suffix. The applicative element is not, however, WA, but rather a "tone integrating" suffix -aa hidden in what look like basic gr. 1 verbs. This is shown in the examples in 27, where the gr. 2 verb 'to tell' appears to switch to a simple gr. 1 form in pre-dative position, but actually has added an applicative

extension in the environment of the IO. (The vowel alternation before the pronoun DO is due to other causes that can be ignored for our purposes here.)

(27) [i] an fàɗi làabaaɾ̃ìi They related the news.
[ii] an fàɗee shì They related it.
[iii] an faɗàa masà/wà Muusaa They related (it) to him/Musa.

If we think carefully about what happens with gr. 2 verbs, it allows us to explain a nagging problem concerning the length of the final vowel of gr. 1 verbs. This vowel undergoes alternations in syntactically determined frames as illustrated in 28.

(28) [i] an dakà hatsii They pounded corn.
[ii] an dakàa shi They pounded it.
[iii] an dakàa masà/wà Muusaa They pounded (it) for him/Musa.

It is probably fair to say that most Hausaists assume that the underlying form of the verb has a long final vowel and that there is a rule shortening the vowel before noun direct objects. This is explicitly argued in Leben and Bagari (1975), for example. In Newman (1979) I suggested, primarily on historical grounds, that the traditional analysis was fallacious and that the underlying form of the verb was short. As critics have pointed out, my analysis required having lengthening in a number of different environments instead of having a single shortening rule. I am now prepared to reaffirm that, although having a number of different lengthening rules is uneconomical, this is in fact the correct explanation, i.e. the long vowels in 28[ii] and those in [iii] are due to totally different processes. The lengthening before pronoun DOs is due to a regular, morphophonemic rule that lengthens the final vowel of all verbs before object pronouns. The apparent lengthening before IOs results not from the modification of an underlying stem vowel, but rather from the addition of the same applicative suffix **-aa** that we saw added to the gr. 2 verb in 27[iii]. This is schematized in 29.

(29) [i] dakà Historically underlying form.
[ii] dakà → dakàa by pre-pronoun vowel lengthening rule.
[iii] dakà ⇒ dakàa by addition of applicative morpheme {-aa}.

Thus, although the verb forms in dakàa shi and dakàa masà look identical, morphologically they are not the same. The former is monomorphemic, the latter is dimorphemic. In the case of fàɗee shì and faɗàa masà it is easy to see that there has been a change in grade, i.e. that an applicative suffix has been added; in the case of grade 1 verbs, the change between basic verb and verb + applicative is disguised; nevertheless, I would contend that morphosyntactically the two cases are parallel.

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Feature-changing Harmony in Turkana

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1. Introduction

In this paper I will analyze the vowel harmony system of Turkana, an Eastern Nilotic language spoken in northern Kenya. I will explore what consequences Turkana vowel harmony has for the theory of radical underspecification and for the treatment of opaque vowels in that framework. The aim of this paper is to provide empirical evidence against the claim that only one value (either the plus or the minus value) of a distinctive feature is present in the underlying representation. Turkana vowel harmony provides evidence that both the plus and the minus value of the harmony feature [Advanced Tongue Root] are specified underlyingly.

I will first show why both values of the feature [ATR] have to be present in the underlying representation in Turkana, and why harmony is a feature-changing process. I will then analyze the behavior of the low vowel which is opaque to [+ATR] spreading, and the behavior of high vowels which are opaque to [-ATR] spreading, using an idea which was first put forth in Cole's (1987) dissertation, namely that [-ATR] spreading is subject to the restriction that both trigger and target be linked to a single contextual feature. Since this idea can only be implemented if both values of the contextual feature are present in the representation, I will take this as further evidence against the basic assumption of radical underspecification.

2. Description of the Vowel Harmony System

Turkana has nine vowels which can be divided into two sets on the basis of the feature Advanced Tongue Root ([ATR]). The Turkana vowel system is asymmetrical since the low vowel /a/ always patterns with the [-ATR] vowels and does not have a [+ATR] counterpart. Since /a/ has a predictable value for [ATR], I will assume that this feature is redundant with the low vowel.

(1)

[+ATR]		[-ATR]	
i	u	i̲	u̲
e	o	e̲	o̲
		a̲	

In general all vowels in a word must agree in the feature [ATR]. The examples in (2) show that the [ATR] value of suffixes depends on the [ATR] category of the root. Since vowel harmony in Turkana is controlled by the root, the suffixes in (2) alternate.

(2)

[+ATR] verb roots		[-ATR] verb roots	
a̲-limw-uni	'to tell'	a̲-ze̲-u̲ni	'to choose'
a̲-gol-uni	'to close in'	a̲-do̲k-u̲ni	'to climb down'
ngi-rot-in	'road, pl.'	a̲-ide̲s-i̲[1]	'I am beating'

In some cases, however, it is the [ATR] quality of the suffix vowel which determines the quality of the root vowel. If a dominant [+ATR] suffix is added to the verb root it will surface with [+ATR] vowels, and if a dominant [-ATR] suffix is attached, the verb root will surface with [-ATR] vowels. Dominant suffixes therefore not only fail to undergo

harmony, but in addition cause the preceding vowels to harmonize. Examples of dominant suffixes are given in the first two columns in (3).

(3)

		dominant [+ATR] suffix /-e/	dominant [-ATR] suffix /-ere/[2]	alternating suffix /-UnI/
[+ATR] root	/-gol/	e-gol-e	a-gol-ere	a-gol-uni
	/-rem/	e-rem-e	a-rem-ere	a-rem-uni
[-ATR] root	/-dok/	e-dok-e	a-dok-ere	a-dok-uni
	/-gyel/	e-gyel-e	a-gyel-ere	a-gyel-uni

In these examples, the category of the root vowel is determined by the [ATR] quality of the suffix vowel. The underlying contrast between a [+ATR] and a [-ATR] root surfaces only when an alternating suffix is added to the root, as can be seen in the last column in (3). If a dominant suffix is added, the existing contrast in the root is neutralized.

For each process of ATR-harmony there exists a complementary class of opaque vowels. The low vowel /a/ blocks [+ATR] harmony, while the high vowels /i/ and /u/ block [-ATR] harmony. As already mentioned above, in roots the low vowel /a/ does not alternate, but always surfaces as [-ATR] [a]. Morpheme-internally only [-ATR] vowels precede the low vowel. In addition, roots with a low vowel in initial position always take [-ATR] prefixes. If a dominant [+ATR] suffix is added to a low vowel root, the low vowel will block spreading of the [+ATR] feature to any vowel to its left. The low vowel is therefore opaque in the vowel harmony system of Turkana.

(4) Morpheme-internally only [-ATR] vowels precede the low vowel /a/.[3]

nga-kimak	'old woman, pl.'
e-sikarangur	'molasses'

(5) Only [-ATR] vowels occur if a prefix is attached to a low vowel root.

e-kalees	'ostrich, sg.'
e-maanik	'bull, sg.'

(6) The low root vowel blocks [+ATR] suffix harmony.

a-na-ikin	'to give'	e-na-ikin-e	'way of giving'
aki-ram	'to beat'	e-ram-e	'way of beating'

High vowels, on the other hand, occur with either value of [ATR] in both root and suffix position. In contrast to the low vowel, a [-ATR] high root vowel becomes [+ATR] if followed by a dominant [+ATR] suffix. They do, however, block [-ATR] spreading. When a [-ATR] suffix is added to a [+ATR] high vowel root, the high vowel will block spreading of this feature. The high vowel and all vowels preceding it will surface as [+ATR]. High vowels are therefore opaque to [-ATR] suffix harmony, although they can undergo [-ATR] harmony in roots.

(7) [+ATR] and [-ATR] high vowels occur in roots.

aki-buk	'to pour'
aki-duk	'to build'

(8) [+ATR] high vowels block [-ATR] suffix harmony.

		dominant [+ATR] suffix /-e/	dominant [-ATR] suffix /-ɛrɛ/	alternating suffix /-UnI/
[+ATR] root	/-buk/	e-buk-e	a-buk-ɛrɛ	a-buk-uni
[-ATR] root	/-dʊk/	e-dʊk-e	a-dʊk-ɛrɛ	a-dʊk-ʊni

3. Analysis

In this section I will analyze the vowel harmony system of Turkana within the framework of radical underspecification, as outlined in Kiparsky (1981, 1982) and further developed by Archangeli (1984) and Archangeli and Pulleyblank (1986). I will show that radical underspecification needs to invoke *ad hoc* devices such as diacritic marking, feature deletion rules or extrinsic rule ordering to account for the vowel harmony system of this language. I will argue that by assuming that only one value of a distinctive feature is specified underlyingly, radical underspecification obscures an important generalization about the workings of this vowel harmony system. I will conclude by rejecting such an approach.

Archangeli (1984) presents the most thoroughly developed account of the use of underspecified feature matrices in current phonological theory. Building heavily on previous works by Chomsky and Halle (1968), Kean (1975), and Kiparsky (1981), she develops a framework in which universal markedness considerations combine with language-specific phonological rules to govern a set of minimally specified feature matrices. The underlying representation of a segment is determined by two principles: first, underlying representations include the minimal number of features necessary to distinguish the different phonemes of a language, and second, only the marked value of a distinctive feature is present underlyingly, while the unmarked value is filled in by a redundancy rule. While the first principle which excludes non-distinctive or redundant information from the underlying representation is part of almost any phonological theory, it is the second principle which distinguishes the theory of radical underspecification from most current theories of phonology. I will examine this claim of radical underspecification in more detail before turning to the vowel harmony system of Turkana.

Which feature value is specified underlyingly and which value is supplied by rule depends on universal and language-specific considerations. Archangeli (1984) assumes that every grammar is equipped with a set of universal default rules which equal the markedness conventions in SPE and which create required or preferred feature configurations. A feature configuration which is universally required is, for example, the combination of the features [+high] with [-low], while the combination of [-low] with [-round] and [-back] is preferred but not required in languages. Each universal default rule corresponds to one of these feature configurations, supplying the required or preferred value. However, the universal default rules alone cannot fill in all the missing information. An additional set of language-specific redundancy rules, the complement rules, is needed to fulfill this task. The complement rules are not part of the grammar itself, but they are formed using information about the existing universal default rules and information about the particular phonological system, such as the quality of epenthetic vowels and phonological alternations. The two sets of rules work *in tandem* to specify all the non-redundant information.

The claim that there are universal and language-specific redundancy rules which supply non-redundant feature specifications is by itself unfalsifiable. It is only of consequence if it can be shown that these rules interact in a meaningful way with the phonological rules of a language. Only if it can be shown that the absence of certain feature

specifications helps simplifying the phonological rules, is the claim that distinctive information is missing at the underlying level of any interest. In Yawelmani, for example, the fact that the feature [-round] is filled in by a redundancy rule is only of importance if the harmony rule which spreads the feature [+round] applies before the redundancy rule, making [+round] spreading a feature-filling and not a feature-changing process. If the [-round] redundancy rule applied before [+round] spreading, the latter rule would be feature-changing and there would indeed be no proof or motivation for the existence of such a redundancy rule. Instead it can be assumed that [-round] is present in the underlying representation.

The interaction between redundancy rules and phonological rules is governed by the Default Ordering Principles, the Redundancy Rule Ordering Constraint (RROC), the Elsewhere Condition, or extrinsic ordering. Two formulations of the RROC exist (Archangeli 1984, and Archangeli and Pulleyblank 1986), and I will examine each of the formulations, as well as the Default Ordering Principles, as I analyze the vowel harmony system of Turkana, showing that neither the old version of the RROC, nor the Default Ordering Principles together with the revised form of the RROC make the correct predictions for this language.

In (9) I have given the surface specifications of the Turkana vowels, using the features [ATR], [high], [low] and [round].

(9)

	i	e	o	u	ɨ	ɛ	a	ɔ	ʊ
high	+	-	-	+	+	-	-	-	+
round	-	-	+	+	-	-	-	+	+
low	-	-	-	-	-	-	+	-	-
ATR	+	+	+	+	-	-	-	-	-

Assuming with Archangeli and Pulleyblank (1986) that there is a set of universal default rules which supplies the feature values [-ATR], [+high], [-back], and [-low], only the opposite values are specified underlyingly. For purposes of exposition I will ignore the default rules assigning the feature values [+high], [-low] etc., and concentrate my analysis on the interaction of the rules of vowel harmony with the rule that supplies the redundant [-ATR] value.

(10)

	i	e	o	u	ɨ	ɛ	a	ɔ	ʊ
high		-	-			-		-	
back			+	+				+	+
low							+		
ATR	+	+	+	+					

The harmony rule in (11) spreads the feature value [+ATR] to all vowels which do not bear a specification for this feature. If no [+ATR] specification is present, the default rule in (12) will fill in the [-ATR] value. I assume that spreading is bidirectional.

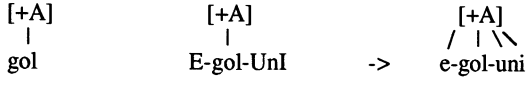
(11) [+ATR] spreading:

(bidirectional)

(12) Complement [-ATR] assignment: [ ] -> [-ATR]

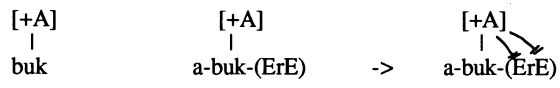
An example of [+ATR] spreading is given in (13).

(13)



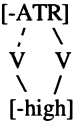
The question is how the behavior of the [-ATR] suffixes can be analyzed. Assuming that only [+ATR] is specified underlyingly, we have to explain why [+ATR] does not spread to the suffix vowels in the second column in (8). Since mid vowels can regularly undergo harmony in roots, it is impossible to formulate a configuration constraint which prohibits the association of the feature [+ATR] with the feature [-high]. For the same reason a positive feature constraint which states that [+ATR] can only co-occur with [+high] is excluded. The only solution is therefore to mark this suffix diacritically for not undergoing [+ATR] harmony.

(14) Invariant [-ATR] suffix attached to a [+ATR] root.



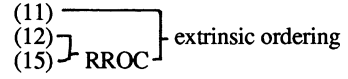
Furthermore, we have to account for the spreading of the feature [-ATR] to the root vowels in the second column in (3). Since [-ATR] spreads, a rule of regressive [-ATR] spreading needs to be formulated, which applies only to mid vowels. I will assume that [-ATR] spreading in (15) is feature-changing.

(15) [-ATR] spreading:



If [-ATR] is absent from the underlying representation, then the redundancy rule in (12) which assigns the value [-ATR] has to be ordered prior to [-ATR] spreading by virtue of the RROC. Informally, the RROC as formulated in Archangeli (1984: 85) states that if a rule refers to a specific feature value in its structural description, a redundancy rule which fills in the feature value is automatically ordered before that rule. Since Archangeli (1984) assumes that redundancy rules apply as late as possible, this constraint is to make sure that all the relevant information is available in the representation when the phonological rules apply. Complement [-ATR] assignment is therefore ordered prior to [-ATR] spreading by the RROC. The rules are now ordered in such a way that [+ATR] spreading applies first, followed by complement [-ATR] assignment and [-ATR] spreading. Note, however, that the Elsewhere Condition should order the more restricted rule of [-ATR] spreading before [+ATR] spreading. [+ATR] spreading can only apply first, followed by the redundancy rule in (12) and [-ATR] spreading, if these rules are extrinsically ordered.

(16) Possible order of application:



Since extrinsic rule ordering is incompatible with the spirit of radical underspecification and undesirable on independent grounds, we should search for an alternative solution which makes use of the restrictive principles of rule ordering that radical underspecification claims to adhere to.

A more appealing solution would be to order [-ATR] spreading before [+ATR] spreading by the Elsewhere Condition. The redundancy rule in (12) would then apply before [-ATR] spreading by virtue of the RROC, filling in the feature value [-ATR]. The undesirable consequences of this approach should be clear: if the redundancy rule in (12) applied before [+ATR] spreading, then it would bleed the application of [+ATR] spreading,

by assigning the value [-ATR] to all unspecified vowels. Ordering by the Elsewhere Condition and the RROC therefore gives the wrong output.

(17) Possible order of application: (12), (15) ordered by RROC; (12) bleeds (11); (11) ordered by Elsewhere Condition

Instead we would like the redundancy rule to hold back until after [+ATR] spreading has applied. The desired solution in which the redundancy rule applies last, and the rule of [-ATR] spreading applies before [+ATR] spreading requires a special redundancy rule which fills in the feature value [-ATR] only to the suffixes in (18).

(18) [ ] -> [-ATR] suffixes /et/, /ere/, /ari/

(19) Possible order of application: (18), (15), (11), (12) ordered by Elsewhere Condition

This solution has the advantage over the solution in (16) that we do not need to make [+ATR] spreading sensitive to diacritic markings and that we do not have to order [+ATR] and [-ATR] spreading extrinsically. But note that in this solution the RROC has absolutely no function. Since the last approach is the lesser of two evils I will prefer it over the solution in (16). The only question that remains is, should we allow the application of an idiosyncratic redundancy rule as in (18)? On the one hand, the existence of an idiosyncratic redundancy rule increases the power of the theory beyond the desirable limits. On the other hand, the existence of redundancy rules which apply before phonological rules cannot be verified. I will therefore take the arguments presented here as evidence for the claim that [-ATR] is indeed present in the underlying representation. However, before making such a strong claim I will examine whether the revised version of the RROC together with the Default Ordering Principles helps to remedy the situation.

Archangeli and Pulleyblank (1986) distinguish between two kinds of redundancy rules: those which assign non-distinctive feature values and which apply as late as possible (first Default Ordering Principle), and those which assign distinctive feature values and which apply early, before the phonological rules of a language (second Default Ordering Principle). It is the task of the revised RROC to insure that the redundancy rules which supply distinctive feature values are assigned to the first component of the grammar in which reference to that feature value is made, i.e., the revised RROC guarantees that distinctive feature values are assigned to the same stratum as the phonological rules which manipulate them. This formulation of the RROC no longer makes any predictions about the absolute ordering of redundancy rules and phonological rules, but simply requires that a redundancy rule provides a distinctive feature value in the same stratum, although not necessarily before, the rule which makes reference to that feature. It is the task of the second Default Ordering Principle to make sure that the redundancy rules apply before the phonological rules of a language. The revised RROC assigns the redundancy rule so to say to the right slot, while the second Default Ordering Principle determines when the redundancy rule applies.

In some cases, however, a redundancy rule can apply after a phonological rule, namely if the phonological rule and the redundancy rule are in an Elsewhere relationship. Archangeli (1984:83) interprets the Elsewhere Condition in such a way that if a language-particular rule supplies a feature value for some unspecified feature, then the language-specific rule has precedence over the redundancy rule. In Yawelmani, for example, the harmony rule which supplies the feature value [+round] and the redundancy rule which supplies the feature value [-round] are ordered by the Elsewhere Condition in such a way,

that the language-specific rule applies before the redundancy rule. If only the second Default Principle applied, then the redundancy rule would apply before [+round] spreading, and thereby bleed its application.

It is by adopting the second Default Ordering Principle that radical underspecification becomes significantly less radical. By dividing redundancy rules into those which apply late and provide non-distinctive, redundant information, and those which apply early and supply distinctive feature values, radical underspecification comes remarkably close to what most theories assume about the structure of phonology. The only difference is that radical underspecification allows some redundancy rules to apply late, after the phonological rules of a language, and that it invokes the Elsewhere Condition to achieve this goal. The assumptions in Archangeli and Pulleyblank (1986) are in direct opposition to earlier claims about the application and ordering of redundancy rules and phonological rules. Do these revisions help to account for the ordering paradox in Turkana?

In the 1986 version of radical underspecification, the redundancy rule in (12) applies in the same stratum, but not necessarily before the rule of [-ATR] spreading by virtue of the revised RROC. While [-ATR] spreading is ordered before [+ATR] spreading by the Elsewhere Condition, the [-ATR] redundancy rule applies after [+ATR] spreading by the same principle. However, this is still no solution to our problem. If the rule in (15) spreads the feature value [-ATR], and if [-ATR] is inserted only after [+ATR] spreading, then where does this feature specification come from? If the feature value [-ATR] spreads then it must either be inserted by a special redundancy rule (solution (19)), or it must be present in the underlying representation. For reasons outlined above, I will choose the second option and assume that [-ATR] is specified underlyingly. We can conclude that even with the new version of the RROC and the Default Ordering Principles the ordering paradox in Turkana cannot be solved.[4]

4. Opacity

In this section I will discuss how the opacity of the low vowel /a/ on the one hand, and the high vowels /i/ and /u/ on the other hand, can be analyzed. There are various suggestions as to how opaque vowels in harmony systems should be treated. It is frequently assumed that opaque vowels bear a specification for the opposite value of the harmony feature before spreading applies. Opaque vowels can either be underlyingly specified for the harmony feature or receive such a specification by rule. In Turkana we could say that the low vowel is underlyingly specified as [-ATR], and that spreading of the feature [+ATR] is blocked by virtue of the Well-formedness Condition which prohibits the crossing of association lines.

(20) * [-A] [+A]

V V V

However, if we analyze Turkana vowel harmony within radical underspecification the low vowel cannot be specified as [-ATR] underlyingly, since only one value, the spreading value, is present in the underlying representation. Similarly, an approach in which /a/ receives a [-ATR] specification by rule before [+ATR] spreading is problematic, since [-ATR] is redundant with the low vowel and should therefore be assigned in the latest stratum of the phonology. Positing such an idiosyncratic redundancy rule would weaken the theory of radical underspecification considerably. Moreover, in this solution the property of blocking does not derive from the phonological representation as such, but is a primitive feature of the system. Any vowel and not only the low vowel can be specified by rule for the opposite value of the harmony feature.

In addition, there is language-specific evidence that the low vowel is unspecified for [ATR] when [+ATR] spreading applies. In suffixes /a/ is subject to a morpho-phonological rule which raises it to a mid back vowel if it is preceded by a [+ATR] root. The [+ATR] feature subsequently spreads to the raised vowel which surfaces as a [+ATR] mid back vowel [o].[5]

(21)	a-buk-okin	'to pour for s.o.'	a-duk-akin	'to build for s.o.'
	a-gol-okin	'to close for s.o.'	a-dok-akin	'to climb for s.o.'
	a-rem-okin	'to spear for s.o.'	a-gyel-akin	'to buy for s.o.'

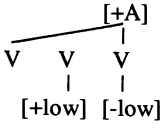
If we assume that /a/ is unspecified underlyingly, then the rule in question only needs to change the height specification of the low vowel. If, on the other hand, we assume that the low vowel is [-ATR] underlyingly, then the [-ATR] specification has to be changed into [+ATR], in addition to a change in vowel height. The simplest solution is therefore to assume that /a/ is not specified for [-ATR] underlyingly.

Instead, the opacity of the low vowel can be expressed with the help of a configuration constraint, which prohibits the association of the feature [+ATR] with the low vowel.

(22) * [+A]
|
V
|
[+low]

I will assume that Turkana has a constraint which keeps a vowel from being skipped in the association process. Spreading is blocked if the spreading feature cannot associate with every vowel in the word. The existence of such a constraint is enough to explain the opacity of /a/.

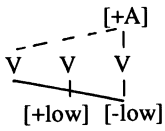
(23) *



Cole (1987) argues that we need a third account of opaque vowels. She provides examples in which the opaque vowel does not have a specification for the harmony feature, and yet blocks spreading. Since for one reason or another no configuration constraint can be formulated to account for these cases, she assumes that harmony in these languages is dependent on the presence of a contextual feature. A harmony feature can only spread if trigger and target are linked to an identical contextual feature. In Yawelmani, for example, [+round] spreads only if trigger and target share a specification for [ßhigh]. Spreading is blocked if trigger and target are not linked to the same feature. In this account any vowel which is specified for the opposite value of the contextual feature blocks harmony, since trigger and target are not associated with one and the same feature. Blocking in these cases results from a violation of the Linked Structure Constraint.

To derive the blocking effect of /a/ in Turkana, [+ATR] spreading can be made dependent on the feature [-low]. If we assume that [+ATR] spreads on the feature [-low], then the low vowel would block [+ATR] spreading by virtue of being specified as [+low].

(24) *

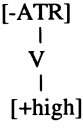


Although this is an appealing analysis, it has its shortcomings. Making [+ATR] spreading dependent on the feature [-low] forces us to assume that all vowels, except the low vowel, are specified for this feature value before harmony applies. [-low] is, however, a redundant specification in high vowels. There is no reason to assume that this value is filled in during the lexical component of the grammar. The disadvantage of this approach is that it makes harmony dependent on a redundant feature value. I therefore conclude that the blocking property of the low vowel is best explained if we assume that Turkana has a configuration filter as in (22) which prohibits the association of the feature [+ATR] with the feature [+low].

In contrast, the behavior of high vowels in Turkana lends strong support to the idea that blocking results from a violation of the Linked Structure Constraint. What makes the behavior of the high vowels in Turkana interesting is that they represent a case of unpredictable neutrality. In most languages neutral vowels are recruited from the class of vowels which do not have a harmonic counterpart. The low vowel /a/ in Turkana, for example, is predictably neutral, since it is the only vowel in the system which lacks a [+ATR] counterpart. The high vowels /i/ and /u/, on the other hand, can occur with both [ATR] specifications, and their neutrality is therefore unpredictable. Their behavior can neither be accounted for with the help of a configuration constraint nor by assuming that they are underlyingly linked to the opposite value of the spreading feature.

Although high vowels in roots are specified as [+ATR], the [+ATR] specification cannot be the cause of their opacity, since [-ATR] spreading is a feature-changing process. Not only high vowels, but also mid vowels are specified as [+ATR], when [-ATR] spreading applies. But while [-ATR] spreading affects mid vowels, it is blocked by high vowels. The blocking effect of high vowels can therefore not result from their [+ATR] specification. Note also that it is impossible to formulate a configuration constraint which prohibits the association of [-ATR] with these vowels, since high vowels occur with both specifications of [ATR] in roots and suffixes.

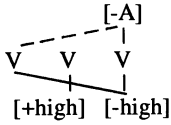
(25)



is a possible configuration

Since it is not the [+ATR] specification that explains the blocking behavior of high vowels, [-ATR] spreading must be dependent on a contextual feature. If we assume that [-ATR] spreads on the feature [-high], then any segment which is specified as [+high] will block [-ATR] spreading.

(26) *



Note that of the three explanations of opacity, this is the only possible account of the blocking behavior of the high vowels in Turkana. And note further that this solution requires that both values of the feature [high] are present when [-ATR] spreading applies.

If we assume that only [-high] is specified in the underlying representation, then the redundancy rule which fills in [+high] must apply before
[-ATR] spreading. However, if [+high] is inserted before [-ATR] spreading, what evidence is there that [+high] was ever absent from the underlying representation? Again, since the claim that the feature value [+high] is absent from the underlying representation cannot be falsified, and since the feature value [+high] crucially needs to be present before [-ATR] spreading applies, I will assume that [+high] is indeed specified in the underlying representation of Turkana. I will furthermore conclude that only in cases of unpredictable neutrality can the Linked Structure Constraint be invoked as an explanation of opacity. In cases in which the opaque vowel does not have a harmonic counterpart, a configuration constraint has to be assumed, if we want to avoid the negative consequences of making autosegmental spreading dependent on a redundant feature value.

5. Conclusion

In this paper I have shown that both values of the feature [ATR] need to be present in underlying representation of Turkana. The claim that only [+ATR] is present underlyingly forces us to assume that a language-specific redundancy rule operates in this language, which supplies a subgroup of morphemes with the feature value [-ATR]. But if we acknowledge the existence of such rules, then the claim of radical underspecification that redundancy rules "do not exhibit language-specific idiosyncracies of form and function" (Archangeli and Pulleyblank 1986: 8) is false. The ordering paradox in Turkana forces us to the conclusion that [-ATR] is present in the underlying representation. Since no evidence can be found for the existence of early redundancy rules and since their existence can only be motivated on theory-internal grounds, I will conclude that, unless there is evidence to the contrary, both values of a distinctive feature are present underlyingly.

The examples presented by Archangeli and Pulleyblank (1986) seem to suggest that languages may optionally specify only one value of a distinctive feature, while the opposite value is filled in by a late redundancy rule. However, acknowledging the possibility that some languages may be only partially specified at the underlying level does not force us to conclude that only one value of every distinctive feature is present in the underlying representation of every existing language. Empirical evidence for such a claim still needs to be brought forth.

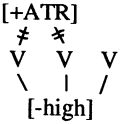
Notes

[1]The prefix /a-/ denoting first person singular and the root initial vowels /i/ are contracted to a mid front vowel, cf. [edesi] 'I am beating'.

[2]The suffixes /-et/, /-ere/, and /-ari/ show the same behavior.

[3]I do not have any examples of a trisyllabic morpheme with a [-ATR] vowel in initial position, followed by a low vowel and a [+ATR] vowel. Hence all examples in (4) consists of [-ATR] vowels only.

[4]Another solution to the phenomenon described here is to make the suffixes in (3) exceptions to [+ATR] spreading, and to formulate a rule which deletes the [+ATR] specification of a root vowel in front of these suffixes. I reject such an approach for two reasons: first there is no natural way of expressing such a rule, and second it would make any theory of phonology unconstrained. In a rule such as the following

(i)


there is no connection between the trigger and the target of the process. Rule (i) obscures the fact that we are dealing with a common phonological process: regressive assimilation between vowels of the same height. A rule in which [+ATR] is deleted in front of a [+anterior] consonant would be just as plausible. Second, permitting rules such as in (i) amounts to making reference to a feature value, without that that value is explicitly mentioned in the rule. I will not discuss here what consequences the integration of such rules would have for the theory of phonology.

[5]Not all low vowels in suffixes surface as a [+ATR] mid back vowel [o]. The low vowel in the suffix /-ari/, which denotes a motion away from the speaker, surfaces as a [-ATR] mid back vowel [o̲]. The [-ATR] specification of this suffix spreads backwards to the root, cf. /a-gol-ari/ -> [agolo̲r] 'to close out'.

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Language contact, creolization, and genetic linguistics: the case of Mwiini

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1.0 Introduction

Historical linguistics has traditionally distinguished between two types of change. One is internal change, the other externally motivated change, equated by most practitioners with "borrowing". Over the last several decades the possibility of new models of externally motivated change has slowly gained wider acceptance. These have been brought together and given explicit form in Thomason and Kaufman 1988 (henceforth TK). To many historical linguists who have long felt the inadequacy of the existing models, the appearance of TK is indeed welcome.

Under externally motivated models TK recognize borrowing, language shift, pidginization, and abrupt creolization, although, as will be seen, the distinction between the latter two is hardly relevant for this article because they are probably indistinguishable retrospectively.

I assume the validity of these models and of the widely available details of how they work, and am not particularly concerned with such issues here. Rather I am interested in how to recognize their operation retrospectively, in the kinds of traces they leave behind, in how they might be used as tools for revealing the past. In their last chapter, TK examine eight language case studies in detail, and in the rest of the book they deal in less detail with over fifty other cases. In most of these, they know, on the one hand, the sociohistorical circumstances more or less well, and, on the other hand, the linguistic outcome of the circumstances. On the basis of this material, they are able to advance proposals about the linguistic features likely to result from each of the models mentioned. What follows is an attempt to test the predictive value of TK's proposals by applying them to Mwiini (henceforth Mw, which is Kisseberth's Chi-mwi:ni of the 1970s). This is a small, isolated, northern Swahili community of 12,000-15,000 people, located mainly at Barawa on the southern Somali coast. Whereas comparison with Mw's closest relatives establishes the linguistic changes it has undergone since it split from them approximately 900 years ago, we know only in a general way the sociohistorical circumstances of the community over that period. It thus provides a good test case for TK's models, in that we can set what we know of the sociohistorical background against the linguistic changes undergone by Mw, apply the models, and gauge the extent of the fit, but at the same time we can see if the models will offer additional suggestions about possible sociohistorical conditions or events.

2.0 Characteristic features of Thomason and Kaufman's models

A set of linguistic features characterizes each of TK's models of change. As these then become part of the language affected, they would be expected to remain in the language and be available for retrospective examination. For the details of pidginization/(abrupt) creolization, TK's proposals are supplemented by Heine 1979 (whose data is Bantu-based), Polomé 1980, and Holm 1989.

2.1 Borrowing (TK Chapter 4)

TK define borrowing as "the incorporation of foreign features into a group's native language by speakers of that language: the native language is

maintained but is changed by the addition of the incorporated features". They propose a borrowing scale with five levels:

2.1.1 Level 1. Casual contact: lexical borrowing only
Content words, non-basic then basic.

2.1.2 Level 2. Slightly more intense contact: slight structural borrowing
Lexicon: as above, plus function words (adverbials, conjunctions, etc).
Structure: minor phonological (e.g. new phonemes via loanwords), syntactic (e.g. new functions or orderings causing little or no typological disruption), lexical semantic features.

2.1.3 Level 3. More intense contact: slightly more structural borrowing
As above, plus:
Lexicon: adpositions, derivational affixes productive in new language, inflectional affixes only in borrowed items, personal/demonstrative pronouns and low numerals.
Structure: phonemicization, even in native lexicon, of previously allophonic alternations, easily borrowed prosodic and syllable structure processes (e.g. stress phenomena). No change as major as e.g. SOV to SVO, but e.g. borrowed postpositionals in an otherwise prepositional language (or vice versa).

2.1.4 Level 4. Strong cultural pressure: moderate structural borrowing
As above, plus major structural features that cause relatively little typological change.
Phonology: new distinctive features in native language, maybe loss of contrasts, new syllable structure constraints, a few natural and automatic morphophonemic rules (e.g. palatalization, final obstruent devoicing).
Morphology: borrowed inflectional affixes/categories added to native words, esp. if there is a good typological fit.
Syntax: fairly extensive word order changes.

2.1.5 Level 5. Very strong cultural pressure: heavy structural borrowing
As above, plus major structural features that cause significant typological disruption.
Phonology: new morphophonemic rules, new phonetic changes, loss of phonemic contrasts, loss of morphophonemic rules.
Morphology: changes in word structure rules.
Syntax: categorial/extensive ordering changes in morphosyntax, added concord rules.

2.2 Shift scale (TK Chapter 5)
Shift is defined thus: "In this kind of interference a group of speakers shifting to a Target Language (henceforth TL) fail to learn the TL perfectly. The errors made by members of the shifting group in speaking the TL then spread to the TL as a whole when...imitated by original speakers of that language." Shift with no interference is common, and likely if a) the shifting group is small relative to the TL community, and b) it takes several generations to complete, implying the availability of the TL, and considerable bilingualism. On the basis of significantly fewer cases than for borrowing, TK then recognize:

2.2.1 Level 1. Slight interference from shift: phonological and syntactic features, not lexical

Phonology: e.g. new accent rules, phonemicization of allophonic rules.

Syntax: e.g. a few derivational affixes, word order rules.

While one difference between borrowing and shift is that the former typically involves early and/or major lexical transfer while the latter does not, T. Schadeberg has pointed out one set of circumstances where shift would likely entail lexical transfer. Where the shifting population did not have regular access to the TL words for certain specialized semantic areas, or where the shifting population had a specialized lexicon for some area not part of the TL community's culture, then the shifters would transfer lexis to the TL. The Elmolo of Kenya's Rift valley would exemplify the latter (Heine 1982).

2.2.2 Level 2. Moderate to heavy interference: more examples of phonological and syntactic features, plus some interference in inflectional morphology (derivational morphology more likely to accompany lexical and possibly syntactic interference)

Phonology: e.g. etic replacements, emic mergers, new marked phonemes (e.g. clicks)

Morphology: e.g. some interference in inflectional morphology; loss or merger of categories, their replacement by analytic and syntactic patterns, native TL morphemes combined and used in shifting patterns (whereas in borrowing borrowed morphemes are thus used), new types of morphology (agglutinating vs. flexional etc), new morphological distinctions (case, gender, aspect...).

Syntax: as above, but more, new morphosyntactic patterns, word order and associated patterns.

It can be seen that the shifting scale is less well elaborated than for borrowing as are the details of the stages, because there are less clear and detailed cases of shift known.

2.3 Pidginization and "abrupt creolization" (TK Chapters 7 and 6)

Most scholars recognize a pidgin as an initial stage which, if it survives, is followed by a creole. TK want an additional route, namely an "abrupt" (i.e. instantaneous) creole, because they see no evidence for a pidgin stage in the early history of some creoles in West Africa, the Indian Ocean, and the Caribbean. They then however say (211): "From a retrospective viewpoint...abrupt creoles and pidgins...can be collapsed into...one.., because a longlived pidgin that...survives...will present essentially the same sorts of evidence for historical interpretation as an abrupt creole." Since the concern here is retrospective recognition of traces, in what follows pidgin and abrupt creole are therefore treated as one and referred to as 'pidgin'.

Typically, the lexicon of a pidgin is basically (= ?) that of a single source language, the vocabulary base language, whereas its other linguistic subsystems will be a function of its developers' various languages. The latter involves simplification of the various contact languages. The outcome of the simplification is determined partly by the grammars of the languages involved, partly by universal linguistic considerations. The final structures of a pidgin will be based partly on those of the vocabulary base language, partly on those of the other languages

involved, the latter being in time learned by speakers of the vocabulary base language. In contrast to borrowing, where non-TL structures usually specifically match those of some other language, the bulk of the structures in a pidgin will derive from a variety of source languages and not necessarily directly.

Lexicon: Usually that of the vocabulary base language and often restricted. The range of meaning in various lexical items is greater than in the source languages. There is a tendency to the multifunctionality of lexis (e.g. in adpositions).

Phonology: Non-systematic change in the lexicon leads to a considerable level of phonological irregularity. Typically there is reduction of the inventory and clear typological influence from the substrate languages.

(Specific kinds of phonological change are found in observing certain Bantu-based pidgins (Heine 1979): voiced merging with voiceless fricatives, plosives replacing implosives, loss of aspiration, drift to bisyllabic word structure, replacement of context-sensitive by context-free rules, reduction to five vowels, loss of distinctive length, replacement of palatal by alveolar fricatives, loss or reduction of tonal contrasts).

Morphology: Simplification. Reduction of number and gender distinctions. Loss of concord. Loss or reduction of inflection. Loss or reduction of TMA categories. New TMA markers from auxiliaries. Reanalysis of morpheme boundaries. Some structures those of TL, some those of the other languages, some not clearly either.

Syntax: Simplification. Analytic forms replacing synthetic. (See morphology)

2.4 A caveat

TK are emphatic that "it is the sociolinguistic history of the speakers, not the structure of their language, that is the primary determinant of the linguistic outcome of language contact". Relevant sociolinguistic factors include: degree of bilingualism; attitude towards, and relative prestige of, the languages involved; length, circumstances and intensity of contact; size and number of groups involved. Since in a historical situation these are never all completely known, there will always be surprises in the outcome of such contact.

3.0 The non-inherited component of Mwiini

3.1 From (southern) Somali

(Today's Standard Somali is based on northern Somali, large communities of whose speakers moved south only in the nineteenth century. Mw is spoken in and around Barawa, in the midst of southern-Somali speaking communities.

Like other eastern Bantu languages, Mw is SVO, NA, NG, prepositional, and prefixing, although some derivational suffixes occur).

3.1.1 Lexicon

Core lexis: In a modified Swadesh 100-word list, 4% (?) is from Somali, a much higher figure than for other closely related northern Swahili dialects.

General lexis: In a 500-page lexicon containing several thousand items, it has been estimated that "20%" is from Somali. Of these very few appear in other northern Swahili dialects. Many are everyday items, most obviously verbs, but there is also cultural material (agriculture, food, etc). They also include adjectives, for which the limited available data suggests non-concord with the noun, thus behaving unlike inherited adjectives.

3.1.2 Phonology

/h, q, ʔ, b, d, j, β, ð, r/ appear largely or exclusively in words of Somali origin. Not clear if this list is complete.

Syllable structure: In inherited words Mw has regularly deleted certain high vowels in certain contexts, resulting in consonant sequences which are not found elsewhere in Swahili and are more like those of Somali and Arabic. More work is needed to determine if they are specifically Somali- or Arabic-like. Words of Somali and Arabic origin do not appear with epenthetic vowels, as they do elsewhere in Swahili.

Palatalization of *k before high front vowel: Similar in Somali and Aweera.

3.1.3 Morphology

Noun: *-le* (Somali *-leh*), a derivational suffix forming adjectives from nouns (a man beard-le = a bearded man). *-dara* (St. Somali *-darro*), as preceding, but opposite meaning (a person *adaba-dara* = a person with no manners). Both apparently occur with Somali and non-Somali nouns.

Verb: One verb suffix *-aṯa*. In Somali this forms a past. The Mw data is limited and opaque, but it seems to be derivational and to co-occur only with verbs of Somali origin with a role other than past.

One auxiliary verb *-sula* 'want', used with any verb, regularly expressing conditional.

3.1.4 Verbal categories

Morphological simplification is not hard to discern. In Bantu languages the two main areas of morphological complexity are in the noun and the verb. In Mw the noun class system is not obviously simplified in ways different from the rest of Swahili, other than that concord between noun and adjective does not work at all or only partially in nouns of both Arabic and Somali origin, which represent a large percentage of all nouns.

More obvious is simplification in the verb. It has frequently been observed (e.g. Dahl 1985) that Bantu tense/aspect systems are among the most morphologically and categorially elaborate in the world. On the Bantu spectrum, Swahili dialects in general are toward the reduced end, and on the Swahili dialect spectrum, the tense system of Mw is one of the two most reduced: future, "progressive" = present, past = perfect. Simplification of the inherited tense system in Swahili in general was an early phenomenon (approximately mid-first millenium AD), and predates the emergence of individual dialects. Tense systems in most Swahili dialects later became more elaborated. But not apparently in Mw.

In fact, in Mw the system apparently underwent further restructuring and simplification. Most striking is the neutralization of the distinction perfect versus non-perfect/past, found nowhere else in Swahili or related languages, and brought about by extending the range of the old perfect suffix to also cover past. Information on aspect is incomplete, but for most (all?) of the tenses, there is a

distinction of 'progressive' ("I am eating") versus 'non-progressive' ("I eat"). This distinction obtains in both positive and negative tenses, a distinction rare in Bantu. Reduction and simplification of the inherited tense system is a common pidginization feature. If Mw had been for example used as a lingua franca by speakers of early related and typologically similar Bantu languages a millenium or so ago (see 3.3.2 below), one would expect it to have become more elaborated in the meantime. Neither the nature of the Somali and Arabic material in Mw nor what we know of the sociohistorical situation suggests that Mw was used as a lingua franca in recent centuries. The Somali and Arabic material is mostly simply explained as resulting from borrowing and/or shift directly from the source language(s). The sociohistorical situation appears to have been fairly stable, with Mw spoken in and around Barawa, Somali spoken in the entire hinterland, and seaborn contacts with Arabic and Bajuni communities. If this analysis is true, then the Mw tense system has remained reduced for nearly a thousand years. There are two problems with this view: why was it reduced in this particular direction by this possible use as a lingua franca, and why did it stay thus reduced ?

There is a better, explanation. After the period when the inherited tense /aspect system became reduced in early general Swahili, and after individual Swahili dialects emerged, the Mw community came to be surrounded by southern Somali communities, which lasted for 900 years or more down to the present. Although we have no information about the dialects spoken by these Somali communities, Standard Somali distinguishes future, 'present', and past. It also distinguishes 'continuous' from 'non-continuous/habitual' (but not 'perfect' from 'non-perfect'): as far as I can gather, the semantic range of this 'continuous /non-continuous' is essentially the same as what I have referred to as 'progressive /non-progressive' in Mw. It does not distinguish 'perfect' from 'non-perfect', a distinction Mw has done away with. In other words, by restructuring as it has done, Mw has evolved a tense-aspect system very similar to Somali. Despite the lack of information on southern Somali dialects, I am assuming they behave similarly to Standard Somali. In this explanation, both the initial restructuring and its subsequent maintenance would be due to pressure from the surrounding Somali dialects. It ought to be made clear that this restructuring is primarily categorial, not morphological. Mw has restructured its tense and aspect categories in the direction of Somali, but the two languages use their own morphology and morphemes to express these categories. This is similar to what happens in Chinook Jargon (Silverstein 1974).

Another feature probably related to this Somali presence is partial loss of concord. Verbal concord with the noun is a general Bantu feature, but Mw has lost 2/3 sg concord. To distinguish the two, either context or an independent pronoun is necessary. These strategies for disambiguation are also necessary in Somali, where some certain verbal inflections for person and number are isomorphic. This is not necessarily connected to the simplification of the tense system, just mentioned, but it does seem to be Somali-related.

3.1.5 Syntax

No specific data, but a reading of a few pages of Mw text did not suggest major differences from other Swahili.

3.1.6 Background

Somali speakers have likely been in the area since at least AD 1100. Today some 20% of the population is bilingual in Tunni, a Somali dialect, and presumably

(?) in process of shifting to Mw. Certain bits of evidence make it likely that similar shifts from Somali have been taking place over the centuries, especially earlier when Barawa was more prestigious as a town. During the same 900 years Mw has been an island in a sea of Somali speakers.

Typologically, Somali is SOV, NA, NG, postpositional, and suffixing. Somali adjectives and suffixes appear in Mw, even though Mw itself has few inherited suffixes, especially in the noun.

3.1.7 Interpretation

The most plausible explanation for the data would involve both borrowing and shift. One of the crucial differences between borrowing and shift is lexical: in borrowing, lexis is the first component to be transferred, whereas in shift it does not occur at all, or only in a later stage and on a lesser scale. Mw has absorbed a mass of Somali lexis, thus borrowing was involved. Phenomena such as e.g. new phonemes, derivational suffixes, syllable structure rules, and palatalization, assuming the last two are of Somali origin, could be predicted by borrowing (Level 4) or shift. But the verb restructuring suggests shift, and for a particular reason. In borrowing, new categories and restructuring such as those discussed above are expressed by borrowed morphemes and morphology, whereas in shift they are achieved through restructuring inherited material. That is exactly what has happened in Mw.

Today's situation in Barawa with Tunni attests to the fact of shift, which can likely be projected into the past, given a number of non-linguistic facts such as the large number of Somali clan names among the Mw. 900 years as an island in a sea of Somali speakers would provide the backdrop for borrowing. Thus this dual interpretation fits with the likely historical scenario.

3.2 From Arabic

3.2.1 Lexicon

Core lexis: In the modified Swadesh list, 5% is from Arabic, which is slightly higher than in other northern Swahili dialects.

General lexis: In the 500-page lexicon "25% plus" is from Arabic, which is comparable to other northern Swahili dialects, although there are apparently a few items they do not attest. Most are the same items and in the same semantic areas, rather specialized, as in other Swahili. Most cannot be assigned to proto-Swahili. They include function words (adverbials, conjunctions, etc.) and many adjectives, as in other Swahili. For some adjectives there appears to be limited concord with nouns.

3.2.2 Phonology

/θ, h, x, q, ʔ, b, d, j, ð, r/ appear largely or exclusively in words of Arabic origin. Not clear if this list is complete.

Syllable structure: In inherited words Mw has regularly deleted certain high vowels in certain contexts, resulting in consonant sequences not found elsewhere in Swahili and more like those of Arabic and Somali. More work is needed to determine their exact origin. Words of Arabic and Somali origin do not appear with epenthetic vowels, as elsewhere in Swahili.

Phonological integration: Arabic lexical items are better integrated phonologically than in other Swahili dialects. So, for example, verbs of Arabic

origin have irregular stem shapes in the rest of Swahili (e.g. *-jibu* 'answer', where /u/ is irregular) but have a regular shape in Mw (*-jib-a*).

3.2.3 Morphology

The Mw reflexive is formed by 'soul+possessive' ('I cut myself' = 'I cut soul-my'), where not just the construction but also the word 'soul' is from Arabic, apparently specifically from Omani. It is not clear that 'morphology' is the most appropriate label for this, perhaps 'idiom' would be better.

3.2.4 Syntax

(In certain minor ways nominal strategies (Arabic) replace verbal strategies (Bantu) in discourse, but this is pan-Swahili.) Otherwise no data.

3.2.5 Background

Arabic speakers have been coming to Barawa since at least AD 1100. Present or past degree of bilingualism not known. In other Swahili communities, a mere trickle of Arabic speakers shifted to Swahili over the centuries, but Mw seems (?) more Arabized than other Swahili communities.

Typologically, (Omani and Gulf) Arabic is SVO, NA, NG, strictly prepositional: both nouns and verbs have both prefixes and suffixes. Arabic adjectives, prepositions, and conjunctions appear in Mw.

3.2.6 Interpretation

The quantity of the Arabic lexical and phonological material in Mw is comparable to that from Somali, but there is a lack of morphological material and morphological restructuring. The sociohistorical circumstances are different in that Somali communities have totally surrounded Barawa for nearly a millenium, whereas Arabic speakers have mainly or exclusively been traders or missionaries over the same period. If the example of Swahili communities elsewhere is relevant, it is not likely that large numbers of Arabic speakers settled and shifted at any one time. Typologically Arabic appears a better fit with Mw than does Somali, and yet there is more non-lexical material from Somali than Arabic.

All this suggests that the Arabic material in Mw can be best accounted for as resulting from borrowing, at a somewhat lower level than for Somali, perhaps Level 2 (although the boundaries between the levels are relatively fluid). Arabic, not Somali, was also a language of prestige, the carrier of Islam, the language of an influential and important community. Thus while Somali lexis in Mw contains many everyday words, this is less obvious for the Arabic material.

3.3. Known or likely historical events sparsely attested in the linguistic record

3.3.1 Contact with other northern Swahili dialect communities to the south

During the last several centuries at least, and probably since the establishment of the Mw community, there was some contact with Swahili communities to the south, either from trading or shared political rulers. The political contact was likely greater at the start of the second millenium. The nearest of these communities is Bajuni=Tikuu.

A few Mw content words must be of Bajuni origin, because of their shape. These words are apparently scattered through the lexicon. They include phonological changes that have occurred in Bajuni but not Mw, or don't include

changes that have occurred in Mw, so falsely giving Mw the impression of irregular phonological change.

Such minor lexical traces are unambiguously assignable to borrowing from Bajuni over the last several centuries.

3.3.2 Contact with early and related Bantu communities ?

Oral traditions and scattered place names suggest that speakers of Lower Pokomo and Mijikenda, closely related and typologically similar languages whose communities now live near the northern and southern Kenya coast respectively, may once have lived around and to the north of Barawa, for a period of unspecified length at an unspecified point between ca. AD 700 and AD 1600.

At that time the relationship between the coastal town of Barawa and the Lower Pokomo and Mijikenda living just inland may have resembled that between Lower Pokomo and Mijikenda and neighboring Swahili towns in more recent centuries. The recent relationship had a linguistic and a socioeconomic side: there was some transfer of linguistic material, deriving from trading and cultural exchange, whereby the coastal towns provided imported trade goods and, in some cases, religion, in exchange for goods from the interior.

The linguistic evidence for any such possible early contact is sparse. It consists of a small number of uniquely shared lexical items, mainly of Somali origin, and three shared verbal inflections (*w-* '3 sg', *-na-* 'progressive', *nta-* 'negative').

4.0 Conclusions

4.1 About Mwiini: Many of the linguistic features differentiating Mw from its closest relatives, not mentioned here (see Nurse and Hinnebusch, forthcoming), cannot be obviously attributed to external contact.

Certain things can be attributed to such contact with Somali and/or Arabic. More than half of Mw's content vocabulary, more specialized in the case of Arabic, more everyday for Somali, derives from one or other of these languages, and this includes a large number of adjectives, which have disrupted inherited automatic concord, and a few function words. Phonologically, part of today's Mw consonant inventory and syllable structure derives from Somali and/or Arabic, and possibly palatalization from Somali. Morphologically, the restructuring of the inherited tense/aspect system, and a number of derivational suffixes, derive from Somali, and one or two other minor features from Somali and/or Arabic: derivational markers might be treated as a subset of lexis. Syntactic details are missing. For Somali the best explanation is a mixture of borrowing and shift. From Arabic borrowing is most likely.

Other features are minor or ambiguous. Limited lexical transfer indicates casual contact with other Swahili communities to the south, particularly Bajuni. The explanation for certain limited lexical innovations and possibly some verbal inflections shared with two local, related, Bantu languages is not clear: they might be due to use of Mw as an early contact language or to even earlier inheritance or to later diffusion.

4.2. General

TK's proposals carry optimism, offer hope for progress in interpretation to historical linguists, and a specific set of suggestions. Their application to a specific set of data suggests this:

4.2.1 Elaboration of the models needed

This study was intended as a trial application of the models. In general, they have worked well, but they need refinement. Any language examined will generally offer only a part of the range of possible features needed for identification of the models. Since some characteristic features of the models overlap anyway, this leads to difficulties and ambiguities of interpretation. While TK's borrowing scale offers adequate details for application and diagnosis, the details of the shift scale and of pidginization are rather general and lacking in specifics, making it hard to apply them or to compare them to details of the borrowing scale. Other projects for setting up universals in recent decades have been based on hundreds of case studies. We need more work here. Particularly lacking are details of syntax, and of general, as opposed to regional, "simplification". It would also be useful to have a continuum of 'content' and 'function' lexis (e.g. where do adjectives fit ?).

4.2.2 The passage of time

The Somali and Arabic material, especially lexical, in Mw is substantial and not obscured by the passage of the centuries. Even the few (lexical) traces left by casual contact with Swahili communities to the south are unambiguous and plausible enough. But the evidence for use of Mw as a lingua franca by Pokomo and Mijikenda speakers a millenium or so ago is hard to evaluate: the vocabulary base language would have been Mw - clear enough - but the possible lexical and morphological transfers from the other two languages are so fragmentary and probably eroded by time, that it is not clear that linguistic evidence alone will unambiguously elucidate such a sociohistorical situation. How long does simplification such as that induced by pidginization last ?

4.2.3 Typological factors It may seem anomalous that a possible and fairly brief period of coexistence with early Bantu relatives could have led to the transfer of certain inflectional morphemes, normally a comparatively late feature to be transferred, and a little vocabulary , whereas the most obvious results of a thousand years of contact with Arabic are in the lexicon and borrowed phonemes, which are lower-level transfer features. Apart from the difference in the models involved, typological factors appear to have played a role here.

At the time of any possible early contact with its Bantu relatives, Mw would have been very similar to them at all levels. Lexically and syntactically, there would hardly have been a need to transfer anything. Familiarity with the emerging systematic phonetic code distinguishing close relatives might have obviated the need to use each other's sounds. Differences in the tense/aspect system are however common between related Bantu languages and dialects, and not always at the conscious level. Since the basic structure of the verb would have been identical, it would not have been hard for Mw to incorporate some of its relatives' inflections.

The typological differences between Mw and Arabic (also Somali) were and are much greater. It is true that similarities exist at some levels (all three NA, NG; Arabic and Mw SVO). But categorially and morphologically, Mw nouns and verbs function very differently from those in Somali and Arabic. H. Paddock has suggested to me that contact with related and typologically similar languages tends to reinforce shared subsystems and undermine non-shared systems, whereas contact with unrelated and dissimilar languages involves new features, which are inevitably harder to transfer. Hence the main effect of a millenium of Arabic presence and prestige is a mass of lexis and some borrowed phonemes.

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The Intersection of Syntax, Semantics and Phonology in Kikongo*

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This paper looks at tonal alternations in the Kimanyanga dialect of Kikongo, which bear on the theory of how phonology, syntax, and semantics interact, and focuses on the question of what kinds of syntactic and semantic properties can be relevant to phonology. We will see that phonology can indeed be sensitive to properties of the semantic representation, a result which is not predicted from models of grammatical organization that derive phonological and semantic representations as separate paths descending from syntactic surface structure.

Space limitations preclude a complete analysis of tone in nouns, so we will just sketch the tonology of the noun, forgoing an in-depth analysis until later. Most nouns in Kikongo fall into one of three tone classes. In the first class (*muteté*) there is one H, always on the final vowel. In the second (*dókotóólo*), there is one H on the initial stem mora, and one on the penult. In the third (*mafúngúnúnú*), there is a plateau of H's across the stem.

(1)

mu-teté	"box"	kokotí	"coconut"
dókotóólo	"doctor"	mfúlutútu	"tortoise"
ma-ghááálá	"branch"	ma-fúngúnúnú	"bee (sp.)"

Underlyingly, nouns have one or two H tones. If there is one H it is final. If there are two H's, the first is on the initial stem vowel. The second may unpredictably appear on the final or the penult. Thus, surface *mafúngúnúnú* is underlying *mafúngununú*.

The surface form of nouns like *mafúngúnúnú* comes from applying the rule Plateauing (2).

(2) *Plateauing*

Finally, if a stem has two adjacent H's (*bikúní* "farmers"), they fuse into one multiply-attached H. Bearing all these facts in mind, we now consider the phonological effect of H Effacement, which applies to nouns in subject position inter alia. Effacement deletes the leftmost stem H. In nouns with one H (*mankondé*), this is the only H. In nouns of the initial and penult class (*dókotóólo*), this is the first H. In the H plateauing nouns (*mafúngúnúnú*), Effacement seems to delete the initial string of H's; recall that the underlying form of this noun is *mafúngununú*. In dimoraic nouns like *bikúní*, the two adjacent stem H's undergo tonal fusion (unlike *mafúngununú*), so the H is linked to two vowels, and on the surface both vowels lose their tone.

(3)	ma-nkonde$_e$	mabódidi	"the bananas rotted"
	ma-dokotóólo$_e$	mafwíídí	"the doctors died"
	ma-fungununú$_e$	mantátíkídí	"the bees bit me"
	bi-kuni$_e$	bifwíídí	"the farmers died"

Nouns are marked with a subscript *e* if they undergo Effacement.

A further phrase level complication must be considered. In (4) we see nouns which are direct objects standing after the verb. This too is one of the contexts where Effacement applies, so the final H of *mankondé*, or the initial string of H's in *mafúngúnúnú* are missing. We also find H on the word initial vowel or vowels.

(4)	ma-nkondé	mboongidí má-nkónde$_e$	"I took bananas"
	bi-kúní	tumweení bí-kuni$_e$	"we saw farmers"
	ma-láálá	díídí má-laalá$_e$	"he ate oranges"

This H comes from a later rule which assigns H to the left edge of a phrase preceded by some word. These H's are a later complication, which renders Effacement opaque.

With this background, we turn to the conditions on the two rules of H deletion. The first rule deletes the first H of nouns in isolated NP's containing a universal quantifier. Consider the data in (5). Here, nouns have the same tone pattern in isolation as they have when followed by various modifiers.

(5)	bikúní byabíingi	"many farmers"
	bikúní byáBánduundu	"farmers of B."
	bikúní byabínéne	"large farmers"
	binyónya byámbóte	"good termites"
	binyónya byamuloongí	"the teacher's termites"
	binyónya bitatú	"three termites"
	binyónya byánáni	"whose farmers?"

These examples contrast with those in (6), which are nouns followed by universal quantifiers. Here the first stem H deletes.

(6)	mankonde$_e$ mámánsó	"all bananas"
	binyonya$_e$ byábínsó	"all termites"
	madokotóólo$_e$ máwóonsono	"all doctors"
	bikuni$_e$ byábínsó	"all the farmers"

This can be accounted for by a rule which deletes the first H if a universal quantifier follows. Additional data show that listing the lexical items which trigger the rule is not sufficient. There is a construction in Kikongo used for "All X things", where X is some number. The construction is formed by prefixing the associative prefix (e.g. *bya*) to the numeral (e.g. *bítatú*).

(7)	bikuni$_e$ byáabyóóle	"all two farmers"
	bikuni$_e$ byábítatú	"all three farmers"
	malaalá$_e$ mánsámbwáádi	"all seven oranges"
	malaalá$_e$ makumí ná matatú	"all 13 oranges"

As the examples of (5) show, deletion of H is not triggered by the associative *bya-* alone, nor by the numeral alone. What triggers deletion of H is the semantic property of the construction.

We cannot attribute this behavior to a special constituent relationship between quantifiers and the noun. Such an approach might be plausible if the order of universal quantifiers and other modifiers were circumscribed, but as seen in (8), quantifiers and other modifiers co-mingle freely, and there is no difference between universal and non-universal quantifiers in this respect. The stem H is still deleted from the head noun whenever there is a universal quantifier, no matter where it stands.

(8) bikúní byabííngi byáBánduundu "many farmers of B."
bikúní byáBánduundu byabííngi =
bikuni$_e$ byábínsó byáBánduundu "all farmers of B."
bikuni$_e$ byáBánduundu byábínsó =

Since there is no reconstruction of the property "modified by a universal quantifier" in syntax, we need rule (9), which refers to a property of semantic representations.

(9) *Universal Effacement* $H \rightarrow \emptyset \; / \; [_{NP} \; [_N \; \text{—} \;] \; ... \; \forall \; ... \;]$

We now turn from the semantically conditioned rule to the rule Argument Effacement which deletes H from heads of phrases in certain sentential positions. In (10) we see examples of the noun *bikúní* and the time adverb *lúmbúkí*, which can be treated as a noun, undergoing deletion of H. (The left edge of the VP is marked with a bracket as an aid to parsing sentences.)

(10) bikuni$_e$ [bifwíídí "the farmers died"
farmers they-died

[mweení bíkuni$_e$ "I saw the farmers"
I-saw farmers

bikuni$_e$ [tubavoondidí — "we killed the farmers"
farmers we-them-killed

[kátukidí lúmbukí$_e$ — "he left today"
he-left today

lumbukí$_e$ [tudiidí — "we ate today"
today we-ate

In (11) is a list of contexts where nouns lose their H.

(11) Subject (before VP).
Immediately postverbal object, indirect object or adverb. Any object, indirect object or adverb precededed by an object, indirect object or adverb.
Preposed object, indirect object or adverb immediately before VP.
Preposed object, indirect object or adverb separated from VP by subject or by another preposed object, indirect object or adverb.

We have seen examples of single preverbal adverbs, NP subjects, and NP objects in (10). In (12) we see examples of Effacement applying to two postverbal NP's.

(12) [ndaambidí kíkuni$_e$ mádéeso$_e$
I-cooked-for farmer beans
"I cooked the farmer beans"
mfumu$_e$ [wunámfíla mbóongo$_e$ lúmbukí$_e$
chief he-will-me-give money today
"the chief will give me money today"

Argument Effacement can apply to three phrases in a row, as shown by the double object constructions with an adverb in (13).

(13) [ndaambidí kíkuni$_e$ mádéeso$_e$ lúmbukí$_e$
I-cook-for farmer beans today
"I cooked the farmer beans today"

[twanywiisa bákeentó$_e$ máláfu$_e$ mázoono$_e$
we-cause-drink women wine yesterday
"we had the women drink wine yesterday"

In short, we find that all postverbal phrases within the VP are subject to Argument Effacement.

Argument Effacement applies to preposed objects and adverbs, and will apply to these phrases across a full NP subject. In (14) the preposed adverb *lúmbúkí* precedes the subject *baana*, and undergoes Argument Effacement.

(14) lumbukí$_e$ báana$_e$ [ka badíídi mádéeso$_e$ kó
today children not they-ate beans not
"Today, the children didn't eat beans"

Effacement applies to multiple preverbal objects and adverbs in (15).

(15) mazoono$_e$ málaalá$_e$ [twasuumbidí
yesterday oranges we-bought
"yesterday we bought oranges"

At this stage, there seems to be only one context where Argument Effacement does *not* apply, and that is to the citation form. This brings us to the focus position for Kikongo: nouns in that position also do not undergo Effacement. What is special about the focus position is that it is still within the VP. To see this, we must consider certain facts about word order and morphology.

The leftmost element in the VP is usually the verb. Two things can come before the verb in the VP. The first is the negative *ka*, and the second is an object pronoun such as *ya*, which happens to be focused. When both *ka* and a pronoun are present, *ka* precedes the pronoun. This construction also reveals another morphosyntactic property: the Class 1 subject prefix has a syntactically conditioned allomorph. When preceded by something within the VP, the prefix

takes the form *ka* or its phonetic variants. Otherwise, the prefix is *wu* or ∅ as is appropriate for the verb tense.

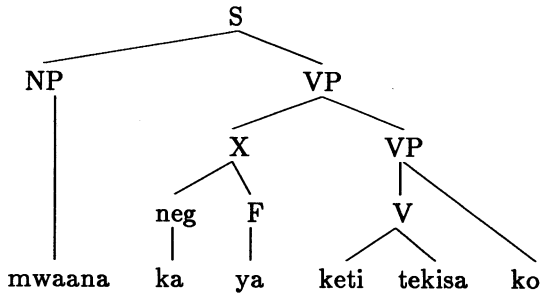
(16)

[twéti tékísá we-be sell	"we are selling"
[ka twéti tékísá kó not we-be sell not	"we are not selling"
[yá twéti tékísá it we-be sell	"we are selling *it*"
[ka yá twéti tékísá kó not it we-be sell not	"we are not selling *it*"
[wéti tékísá	"he is selling"
[ka kéti tékísá kó	"he is not selling"
[yá kéti tékísá	"he is selling *it*"
[ka yá kéti tékísá kó	"he is not selling *it*"

The contrast *mwaana* [*wéti tékísá* "the child is selling" versus *mwaana* [*yá kéti tékísá* "the child is selling *it*" shows that it is initiality in the VP, not initiality in the S, which determines the choice of *ka* versus *wu*.

The negative and the slot for the pronoun need a special constituent relationship with the VP, to make them distinct from the subject NP, which also precedes the verb. There are many structures which could capture this relation, so I will somewhat arbitrarily select the one in (17).

(17)



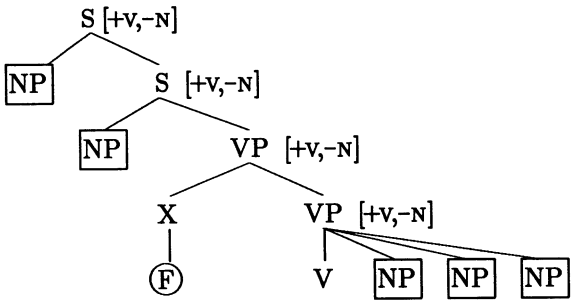
A full phrase can stand in the focus position, in which case the Class 1 subject prefix takes the VP-medial variant marked "med". Furthermore, a phrase in the focus position does not undergo Argument Effacement.

(18) mwaana$_e$ [vóóndídí bíkuni$_e$ "the child killed the farmers"
child he-killed farmers

mwaana$_e$ [bíkúní kavóóndídí
child farmers (med)he-killed
"the child killed the *farmers*"

To summarize, Argument Effacement applies to a noun which is the head of a phrase in any of the boxed positions in (19), but not when the phrase is in the focused slot, which is circled, nor does the rule apply to phrases in isolation.

(19)



There is a generalization to be captured here, and that is that the head of an NP undergoes Argument Effacement if it is immediately dominated by S or VP. If we give a feature analysis of S and VP such that both are [+V,-N] and differ only in the feature [SUBJ], we can state the rule as applying to NP's immediately dominated by maximal projections of [+V,-N].

(20) *Argument Effacement*

$$H \rightarrow \emptyset \; / \quad [_{[+V,-N]^{max}} \ldots [_{NP} [_{N} \ldots \underline{\quad} \ldots] \ldots] \ldots]$$

Although it isn't clear what X *is*, it is clear that it *isn't* a VP or an S, so nouns in the focus position do not undergo Effacement because they are not immediately dominated by the proper category.

So far we have only considered nouns which are the sole word in their phrase. We now consider the presence of other modifiers. We see in (21) that the rule generally applies if modifiers follow the noun within the phrase.

(21) bikuni$_e$ byámbóte bifwíídí "good farmers died"
farmers good they-died

mweení bíkuni$_e$ byáBánduundu "I saw farmers of B."
I-saw farmers of Bandundu

If the phrase contains a non-universal quantifier, Argument Effacement is blocked. Consider first the postverbal examples in (22). Objects after the verb normally undergo Effacement, but if the

phrase contains quantifiers, there is no deletion of H.

(22) tubweení bikúní bítaanú "we saw five farmers"
we-saw farmers five

tubweení bikúní byánkáka "we saw other farmers"
we-saw farmers other

tubweení bikúní byabíingi "we saw many farmers"
we-saw farmers many

Others examples show that the blocking effect of a quantifier affects only the phrase containing the quantifier, and that blocking holds whether the quantifier immediately follows the head noun or is separated from the head by another modifier.

(23) "we saw many teachers of Kinshasa today"
tubweení miloongí myamíingi myáKínshasa lúmbukí$_e$
we-saw teachers many of Kinshasa today

tubweení miloongí myáKínshasa myamíingi lúmbukí$_e$
we-saw teachers of Kinshasa many today

"yesterday three children went to school"
mazoono$_e$ báaná bátatú báyelé kúlúkoolo
yesterday children three they-went(RC) to school

In (24) we see examples of preverbal subjects which contain quantifiers, which are also immune to Effacement. The verb following a finitely quantified subject is in the relative clause form, indicated in the examples as "RC".

(24) bikúní bítatú bíkinini "three farmers danced"
farmers three they-danced(RC)

bikúní byafyóotí bíkinini "some farmers danced"
farmers few they-danced(RC)

In addition to the obvious quantifiers, WH-words in the phrase block Effacement.

(25) bikúní bíkwa bíkinini "how many farmers danced?"
farmers how many they-danced(RC)

bikúní byánáni bíkinini "whose farmers danced?"
farmers of-who they-danced(RC)

Finally, we see examples of object NP's with WH words in (26). WH objects are moved from postverbal position to the preverbal focus position, and then move to the front of the sentence, leaving a trace in the focus position which triggers the selection of the VP-medial subject marker *ka*. We see that (fronted) objects containing WH words do not undergo Argument Effacement.

(26) bikúní bíkwa mwaana$_e$ $\underset{\uparrow}{\underline{\quad}}^{t}$ kamwéénì ___
farmers how many child (med)he-saw
"how many farmers did the child see?"

bikúní bíkwa byáBánduundu múlóongi$_e$ kazóónsidí yébyó
farmers how many of B. teacher (med)he-speak with-them
"how many farmers of Bandundu did the teacher speak with?"

There is another line of evidence showing that the presence of a semantic quantifier in the phrase blocks Argument Effacement. In (27) we see examples of two kinds of associative construction. In the first examples, we find the associative construction used to indicate a quantity of the substance in question, where Effacement is blocked. In the second examples, with the possessive genitive, Effacement is not blocked.

(27) nsuumbidí muteté wabyáási "I bought a box of palm fruits"

mweeni mbwaatá yamalafú "I found a bottle of wine"
ntekisí mútété$_e$ wampángyáámí "I sold my brother's box"
nziimbisí mbwáata$_e$ yakíkúni "I lost the farmer's bottle"

This distribution is predicted by the hypothesis that Argument Effacement is blocked by a quantifier in the phrase.

It is clear that we must also refer to the presence of a

quantifier to state where Argument Effacement is blocked. We symbolize the class of quantifiers with $\mathcal{Q}$ in this rule.

(28) *Argument Effacement* (revised)

$$H \rightarrow \emptyset \,/\, [_{[+V,-N]^{max}} \ldots [_{NP} [_{N} \ldots \underline{\quad} \sim \mathcal{Q} \ldots] \ldots] \ldots]$$

We have seen that sentence level phonological rules of Kikongo can be sensitive to the feature representation of syntactic nodes, as well as to semantic properties, in particular the presence of quantifiers. This latter conclusion is no doubt the more startling one, and it raises the question of what other semantic properties phonological rules might be sensitive to. It is obviously too early to speculate about what kinds of other cases there might be, so I will leave the answer to this question to future research.

Notes

* I would like to thank Kufimfutu Bakelana for the data on Kikongo, and Peter Culicover, Larry Hyman, Bob Levine, Shigeru Miyagawa, Carl Pollard, Craige Roberts, and Thilo Schadeberg for helpful suggestions and questions.

WHAT IS A SYMMETRICAL LANGUAGE? MULTIPLE OBJECT CONSTRUCTIONS IN BANTU

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Introduction

There exist in Bantu languages constructions with usually two and possibly three postverbal noun phrase arguments. Such constructions are usually called 'double object' constructions. Example 1 from Runyambo is typical.

1 omukázi akasiigá abáána amajúta
woman smear children oil
'the woman smeared the children with oil'

The number of ditransitive verbs that behave like 'siiga' is fairly small. They include:

-ha	*give*	-ima	*deny*	-aka	*deprive*
-iba	*steal*	-oreka	*show*	-teera	*hit*
-juura	*undress*	-jweeka	*dress*	-nyaga	*cheat*

Most double object constructions are obtained by 'extending' the verb with the applicative or causative extensions, or occasionally, by a combination of the two. The Runyambo data in 2-4 illustrate each of the three possibilities.

2 omukázi a - ka - hemb - er - á abáána omuriro
woman she -PAST- light-APP -FV children fire
'the woman lit a fire for the children'

3 omukázi a - ka - hemb - es - á abáána omuriro
woman she-PAST- light-CAUS-FV children fire
'the woman had the children light a fire'

4 omukázi a - ka - son - es - ez - á abáána emyéenda
woman she -PAST- sew -CAUS-APP -FV children dresses
'the woman had someone sew dresses for the children'

The applicative construction is represented in 2 and the causative in 3; in 4 the causative and applicative co-occur. Note that in 4 an extra noun phrase to represent the tailor cannot be accommodated in this construction -- though a locative expression would be acceptable. Incidentally this verb, *-sona* 'sew',

is one of a small group of Runyambo verbs whose causatives allow the deletion of the causee.

The major issue about Bantu object constructions revolves around the relative status of the two post verbal noun phrases in 1-4: are they objects with equal status or is one of them more object-like than the other? Bresnan and Moshi (1990) seek to show that some of the languages treat the objects as equal (hence symmetrical languages) while other languages treat the objects as unequal (hence asymmetrical languages). This decision crucially depends on the application of three traditional tests of objecthood:

a) Word order - which of the two noun phrases is closer (adjacent) to the verb;
b) Agreement - which of the noun phrases is marked on the verb by an affix;
c) Subjectivization - which of the noun phrases can become subject of the passive construction.

In this paper I show, first, that these formal tests of objecthood cannot be relied upon because not every test may be applicable in every language and because the tests may give contradictory results. Second, I show that there exists a larger set of formal and semantic strategies in these languages for keeping the objects separate, and that from this perspective there is no symmetrical language.

The data are drawn from two Eastern Bantu languages, Runyambo and Kiswahili, E21 and G42 respectively in Guthrie's classification. First the problems related to the use of the test are presented. Then follows a discussion of the various strategies and their mutual interaction. The final section gives a summary of the strategies and draws implications for linguistic theory.

Problems with the tests

a) Word order: In Runyambo the word order test applies and consistently places one of the postverbal noun phrases immediately after the verb. As a general rule the human object precedes the non-human one, and the animate object precedes the inanimate one. This is illustrated in 5.

5 a a - ka - teec - er - a katό ebitooce
she -PAST - cook -APP -FV Kato bananas
'she cooked bananas for Kato'

b *a - ka - teec - er - á ebitooce káto

Only one ordering of the postverbal noun phrases is acceptable, i.e. 5a which puts the human participant, *Kato*, before the non-human, *bananas*. The reverse order in 5b is not acceptable.

This test, however, cannot be applied in Kiswahili where order is irrelevant. This is shown in 6.

6 a * a - li - pik - i - a kato ndizi
she -PAST-cook -APP-FV Kato bananas
'she cooked bananas for Kato'

b * a - li - pik - i - a ndizi kato

c a - li - m - pik - i - a kato ndizi
she -PAST-him-cook -APP-FV Kato bananas
'she cooked bananas for Kato'

d a - li - m - pik - i - a ndizi kato

Neither order of the object noun phrases is acceptable without object agreement (6a,b). But with this agreement either order is acceptable (6c,d).

b) Contradictory results: The passive and agreement tests in Runyambo give conflicting results. This is shown in 7.

7 a omuseija a - ka - reet - er - á omwáána ebiráatwa
man she-PAST-bring -APP -FV child shoes
'a man brought shoes for a child'

b omwáána (ebiráátwa) a - ka - bi - reet -er - w - á omuséija
child (shoes) she-PAST-them-bring -APP-PASS-FV man
'the child was brought them (the shoes) by a man'

c *ebiráátwá (omwáána) bi - ka - mu-reet -er - w - á omuséija
shoes (child) they-PAST-her-bring-APP-PASS-FV man
'shoes were brought for her (child) by a man'

d omuséíjá a - ka - bi - mu - réét - er - a
man he-PAST-them-her -bring -APP -FV
'the man brought them for her'

While only one of the noun phrases can become subject of the passive construction (7b,c), both of them can be marked on the verb (7d). Note that

in 7b even the non-subjectivizable noun phrase has to undergo left-dislocation and, therefore, obligatory object agreement as well. And as 8 shows, up to three objects may be marked on the Runyambo verb.

8 a - ka - ga - mu - m - pé - er - a
she-PAST- it - him- me-give-APP -FV
'she gave it to him for me'

In a framework where the formal tests are supposed to be necessary and sufficient criteria, as is the case in Lexical Mapping Theory (cf. Bresnan & Moshi 1990, Alsina & Mchombo 1990), these results are clearly contradictory. However it might be argued that a prototype framework could handle these results by appealing to a notion of degrees of objecthood. In such a framework, a noun phrase is more of an object the more object properties it has. Thus a noun phrase that was closer to the verb, could become subject of the passive construction, and could trigger agreement would be a 'primary object', while a noun phrase that displayed only object agreement would be a 'secondary object'. The problem with such an approach, however, is that given the fact that some tests may be inapplicable in certain languages, there is no basis for deciding on the 'canonical' set of criteria for objecthood. Even the three tests under discussion are no more than an arbitrary collection of unrelated linguistic features with which a person may decide to define the category 'object' (cf Baker 1988:431). An open list of such features with equal weight does not help us identify any 'objects' objectively.

In this discussion the term 'object' is retained as a useful descriptive label applied to postverbal noun phrases and to agreement prefixes other than that for the 'subject'. The focus of attention will be on the means by which the participants in an event are kept distinct, i.e the means of differentiation among the object arguments of the verb.

Strategies for argument differentiation

The strategies discussed here include animacy, word order, agreement, definiteness, person and number, and their mutual interaction. Two points need to be kept in mind. First, with respect to Runyambo, word order applies to both the postverbal noun phrases and to the object markers. Second, a mix of object markers and noun phrases is the norm. In particular, three postverbal noun phrases are not allowed.

The chief strategy combines animacy with word order. This is shown in 9.

9 a a - ka - ga - mú - ha
she-PAST- it - him-give 'she gave it to him'

b *a - ka - mu - gá - ha
she-PAST-him - it - give 'she gave it to him'

c a - ka - ga - zí - ha
she-PAST- it -them-give 'she gave it to them'
them=cattle, it=water

d *a - ka - zi - gá - ha
she-PAST-them- it -give 'she gave it to them'

Each of the constructions in 9 has two object markers. Those constructions that place inanimate object markers closer to the verb (9b,c) are not acceptable.

There is potential ambiguity if both arguments are human, as 10 shows.

10 a - ka - mu - reet - er - á abakázi
she-PAST-him - bring-APP -FV women
'she brought him to women' / 'she brought women to him'

Indeed if the language were symmetrical this is what would always happen: every construction with double objects would be ambiguous.

By the logic of the foregoing argument, a construction with two inanimate objects should be ambiguous too. But the interaction of animacy, word order, and semantic roles disposes of the potential ambiguity. The basic idea is that a participant in an event is conceived as assuming either a human or a non-human role; and more generally, an animate or an inanimate role. Animate roles include what are often called beneficiary, maleficiary, recipient, causee, affected, etc. Inanimate roles include instrument, locative, reason, theme, manner, etc. Note that the list is open-ended and the labels merely suggestive of the binary contrast between animate and inanimate roles. Now when two inanimate noun phrases co-occur in a construction, their order is based on this binary contrast between possible roles: by analogy one of the noun phrases takes the position of the typically animate role for that particular verb, and the other noun phrase follows. This is illustrated in 11.

11 a a - ka - haat - is - á omusyó ebitooce
she-PAST- peel -CAUS-FV knife bananas
'she peeled bananas with a knife'

b *a - ka - haat - is - á ebitoocé omúsyo

c a - ka - teec - er - á obujenyí ebitooce
she-PAST- cook -APP -FV feast bananas
'she cooked bananas for the feast'

d *a - ka - teec - er - á ebitoocé obujenyi

Both 'peel' and 'cook' have typically inanimate objects. Any second object introduced by the causative or the applicative is thus typically animate and closer to the verb. So both 'knife' and 'feast' have, in this sense, acquired a semblance of animacy.

Earlier it was shown that a construction with two human objects is potentially ambiguous (10). There is another combination of strategies which is designed to reduce such ambiguous constructions and produce one interpretation in a construction like (8). This combines person and number distinctions, agreement, and word order. In general the first person object marker is closer to the verb than second and third person object markers, as in 12.

12 a a - ka - kú - m - pa
she-PAST-you - me-give 'she gave you to me'

b *a - ka - n - kú - ha *'she gave you to me'
she-PAST- me -you -give *'she gave me to you'

Particularly worth noting about 12b is the fact that there is no combination of the items that can give the interpretation 'she gave me to you'. In general, if a construction already has a first person object marker (*me, us*), no other animate role can be introduced without changing the original role of the first person. Consider 13.

13 a a - ka - ci - tú - ha
she-PAST- it - us -give 'she gave it to us'
it=theme, us=recipient

b a - ka - ci - tu - he - er - á omu- nju
she-PAST- it - us -give-APP -FV in- house
'she gave it to us in the house'

c a - ka - ci - tu - he - er - á abáana
she-PAST- it - us -give-APP -FV children
'she gave it to the children for us'
it=theme, us=beneficiary, children=recipient

In 13b the inanimate role, locative, does not affect the existing roles when it is added to the construction by the applicative extension. But in 13c the new animate participant requires a reassignment of roles: the first person must be the beneficiary (more on this below).

The acceptable combinations of person, number and order in object marker positions are shown in 14 where position X is closer to the verb root than position Y.

14	Y	X	VERB
a	3rd Plural	1st,2nd,3rd:Plural & Singular	V
b	3rd Singular	1st Singular & Plural 2nd & 3rd Singular *2nd & 3rd Plural	V
c	2nd Plural & Singular	1st Singular *1st Plural; 2nd & 3rd	V
d	*1st	*1st, 2nd, 3rd	V

Anything is possible in position X as long as position Y has a 3rd person plural object marker (14a). If position Y has a 3rd person plural, then position X cannot have 2nd and 3rd person plural forms (14b). Only 1st person singular in position X allows a 2nd person in position Y (14c). The first person can never occupy position Y (14d).

A summary of these combinations is presented in 15.

15 a 1st person > 2nd person > 3rd person
b singular > plural

In filling position X the first person has priority over the rest, and the second person has priority over the third person (15a). Similarly, singular person object markers have priority over plural markers.

Given the foregoing data, it is not surprising that if a Runyambo construction has three objects, one is likely to be a first person object marker. Givon (1976:151) has rightly argued that 15a reflects the fact that speech is self-centered. Note the self-centeredness of the 'beneficiary' role assigned to the first person in 13c. But besides this ego-centrism, the interaction of person and number points to a significant distinction between definite and indefinite

participants (or between specific and non-specific participants). What can be more definite (given, identifiable) than the speaker? In this context 16 is not acceptable because the first person plural is less specific than the second person singular.

16 *a - ka - ku - tú - ha
she-PAST- you- us -give
'she gave you to us' / 'she gave us to you'

The rule is that the specific has priority over the non-specific for occupying position X.

The definiteness strategy is more clearly demonstrated in Kiswahili where it is signalled by agreement, as illustrated in 17.

17 a a - li - meny - e - a kisu
she-PAST- peel -APP-FV knife
'she peeled with a knife'

b (kile kisu) a - li - ki - meny - e - a ndizi
that knife she-PAST- it - peel -APP-FV bananas
'that knife, she peeled bananas with it'

'Knife' is indefinite in 17a, but definite in 17b. The Runyambo parallel to 17 was noted earlier and referred to as left-dislocation (7b). In both Runyambo and Kiswahili the constructions encode a definiteness distinction.

Finally, in Kiswahili, as already noted, animacy interacts with object marking. In a double object construction, object marking is required of the animate object.

Summary and conclusion

In this paper I have identified a number of strategies that serve as means of differentiation among the arguments of the verb. These strategies are listed in 18.

18 a Formal strategies:
- 'word order' (noun phrases, object markers)
- object agreement

b Semantic strategies:
- animacy (human vs non-human; animate vs inanimate)
- person (1st vs 2nd & 3rd; 2nd vs 3rd)
- number (singular vs plural)
- definiteness (definite vs indefinite; specific vs non-specific)
- semantic roles

I have shown that there is a high degree of interaction among these strategies.

From the foregoing discussion it would appear that languages cannot be neatly classified as either symmetrical or asymmetrical. More generally, languages have a vested interest in keeping a degree of inequality among the arguments of predicates so as to facilitate interpretation. Languages differ in the types of strategies they use to maintain this inequality, and in the ways these strategies are combined. Within Bantu languages it seems safe to say that animacy, word order, and agreement are shared by all.

In the course of the discussion I have touched, only in passing, on two issues of crucial importance in current work in linguistic theory. I have indirectly suggested that, contrary to the assumptions of Lexical Functional Grammar, there does not exist a universal hierarchy of semantic roles which plays a crucial role in assigning the arguments of the verb to grammatical functions. I have further cast doubt on the relevance of the category 'object' in a formal linguistic theory. On a separate occasion I will be investigating the full implications of this line of argument.

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High Tone Shift in KiNyamwezi

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1. INTRODUCTION

KiNyamwezi is a member of a large Bantu dialect cluster, the largest one in Tanzania. It stretches from Lake Victoria in the north to Lake Rukwa in the south, a distance of about 700 km. The northernmost and by its number of speakers most important member of this cluster is KiSukuma; the other members are less well described. In Guthrie's referential classification the Sukuma-Nyamwezi group has the cipher F.20 and comprises the following members:

F.21 Sukuma
F.22 Nyamwezi
F.23 Sumbwa
F.24 Kimbu
F.25 Bungu

"High Tone Shift" (HTS) is the name of a process by which a high tone is delayed, or "displaced to the right". HTS is the major, general tone rule of KiNyamwezi. In this paper, I describe what I have come to understand about this process as it occurs in KiNyamwezi. The data on which this paper is based were established in cooperation with Clement Maganga, of the University of Dar es Salaam.

2. THE FACTS OF HIGH TONE SHIFT PROPER

Within a word, a high tone is generally realized not on the vowel to which it inherently belongs, but one mora later (1a). This is also true for each high tone in a sequence (1b). When a high tone is shifted out of the word-initial position, the word-initial syllable is realized with a low tone (1c). A single high tone in word-final position is also shifted to the right, which results in a word-final rising tone with concomitant vowel length (1d). No such vowel lengthening occurs when there is a word-final sequence of two (or more) high tones; in fact, it is impossible to distinguish a word-final sequence of basic °HH from °HL (1e).

(1)	a.	**°ku-lol-a**	> **kulola**	'to look'
		°ku-ßá-lol-a	> **kußalóla**	'to look at them'
		°ku-láßul-a	> **kulaßúla**	'to hurt'
	b.	**°ku-ßá-láßul-a**	> **kußaláßúla**	'to hurt them'
	c.	**°ßá-ku-lola**	> **ßakúlola**	'they will look'
	d.	**°a-laa-lol-é**	> **alaaloleé**	's/he will look'
	e.	**°a-laa-ßón-é**	> **alaaßoné**	's/he will see'
		°ku-ßón-a	> **kußoná**	'to see'

KiNyamwezi has two kinds of long vowels. The first kind results from vowel sequences, which turn out either as just a long vowel or as a glide-plus-long-vowel sequence, depending on the quality of the two vowels involved. However, there are no long vowels in word-final position unless there is also a contour tone. The second kind results from automatic lengthening before a prenasalized consonant, except in word-initial position. HTS operates as expected on two-vowel sequences: a basic high tone on the first vowel is realized on the second (2a). A basic high tone on a vowel which is followed by a prenasalized consonant produces a different result: there is a rising contour on the lengthened vowel, and in addition the vowel of the next syllable also carries a high tone (2b).

(2) a. **°ku-léet-a** > **kuleéta** 'to bring'
°ku-lóal-a > **kulwaála** 'to fall ill'
b. **°ku-ßínzık-a** > **kußıínzíka** 'to break' (itr)

It has been said that a word-initial vowel is not lengthened when followed by a prenasalized consonant. In this environment, there is also no rising contour (3a). More revealing is what happens in a sequence of two adjacent vowels followed by a prenasalized consonant. Such sequences are excluded within a morpheme but do occur across morpheme boundaries. Two things can be noted in such cases. First, there are no triple-long vowels, and second, a basic high tone preceding the prenasalized consonant is realized not as a rise but only on the next syllable (3b).

(3) a. **°ímb-ag-á** > **ımbágaá** 'sing!'
b. **°ku-ímb-a** > **kwıumbá** 'to sing'

When a high tone is shifted onto a syllable with a long vowel, the general rule is that both moras become high. The examples in (4) show the long vowel as part of the progressive TAM-marker **°-lu-**, as the lengthened vowel of the (rare) extension **°-ıng-**, and as the lengthened root vowel of **°-lond-**.

(4) **°ßá-lu-lol-a** > **ßalíílola** 'they are looking'
°ku-ßílıng-a > **kußilíínga** 'to assemble'
°ku-ßá-lond-a > **kußalóónda** 'to follow them'

However, HTS is blocked when it would place the high tone onto a basically low radical vowel of a CV-root, or a stem starting with CVVC. (Many CVVC-stems are transparently derived from CV-roots, others may be analysed analogically.)

(5) **°ku-yí-sh.-a** > **kuyísha** 'to grind it'
°ku-ßá-sh.-el-a > **kußásheela** 'to grind for them'
°ku-ßá-kooß-a > **kußákooßa** 'to search for them'
°ku-ßá-saagul-a > **kußásaagula** 'to choose them'

The blocking of HTS can have consequences earlier on in the same word. A sequence HLH!, where ! indicates blocking of HTS, is the only environment producing either a downstep or a falling tone, depending on whether the intermediate low-toned syllable is either short or long.

(6) **°Bá-ku-yí-kooß-a** > **ßakú!yíkooßa** 'they will look for it'
°Bá-lɪɪ-yí-kooß-a > **ßalíɪyíkooßa** 'they are looking for it'

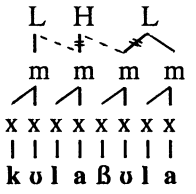
3. FORMULATION OF HIGH TONE SHIFT PROPER

We are now ready to suggest a formulation of HTS. We select the mora as the Tone Bearing Unit because the behaviour of two-vowel sequences suggests that the basic TBU is smaller than the syllable, and tonal contours on long vowels (of either kind) demand that the TBU be a rhythmic unit rather than the vowel itself. The mora-building algorhythm is simple: any CV is a mora, and any remaining weight unit is also a mora.

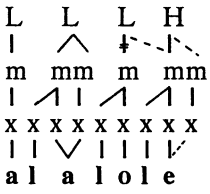
(7) HTS: A high tone is delinked from its leftmost mora and spreads to the next V-based mora, which in turn is delinked from its tone. HTS is blocked when the next mora is a low-toned CV(VC)-root.

The following examples demonstrate the application of HTS. (8a) presents the simplest case; note that the extension **-ʊl-** is linked to the tone of the Final infinitive morpheme **-a.** (8b) shows the creation of an extra mora in final position by a stranded (floating) high tone.

(8) a. **[kʊlaßʊ́la]**



b. **[alaaloleé]**



In (9), we see the HTS applied to two-vowel sequences. (9a) may be analysed as having a sequence of two identical vowels. (9b) has two different vowels; the first one loses its weight (it is pronounced as a glide), and there is compensatory lengthening of the second vowel. After HTS, the long vowels in (9a) and (9b) are both linked to tonal sequences LH. Note that the second stem vowel behaves tonally just like an extension: it takes its basic tone from the Final morpheme.

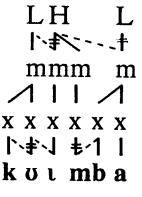
(9) a. **[kʊleéta]**

b. **[kʊlwaála]**

HTS involving long vowels before prenasalized consonants is shown in (10). It seems reasonable to derive the length of such vowels from the weight of the following nasal. (10a) represents the simple case. (10b) shows the case of an underlying sequence of three moras which end up as a single, two-mora syllable. The proposed derivation identifies the nasal-based mora (with its associated high tone) as the one that is left out because it has no segmental support.

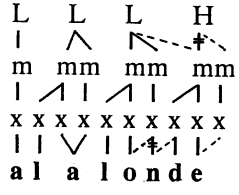
(10) a. **[kʊßɪínzá]**

b. **[kwɪmbá]**



Since nasal-based moras never carry a lexically distinctive tone we have to decide from where such moras receive their tonal specification once that mora is transferred to the adjacent vowel. The example in (11) shows that the tone of this mora is taken from the adjacent vowel to the left, i.e., from the tauto-syllabic vowel. If it were taken from the vowel in the next syllable, the form would surface not with a rising but with a level-high tone on the final vowel. This shows that nasal-based moras do not behave as verbal extensions.

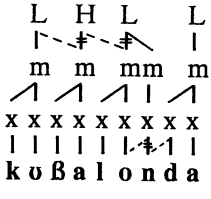
(11)



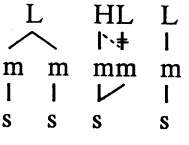
[alaaloondeé] 's/he will follow'

The examples in (12) concern cases where HTS places a high tone onto the first mora of a long vowel. In (12a), HTS alone produces the wrong output in the form of a falling high-low contour on the long stem vowel. We therefore need to introduce another rule which is known as "absorption" or "contour simplification". This rule, which I call NO-FALL, reduces a HL-contour on a single syllable to H. (12b) demonstrates the application of NO-FALL to the output of (12a).

(12) a. HTS > **[*kʊßalóonda]**



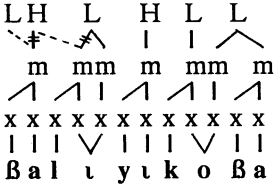
b. NO-FALL > **[kʊßalóónda]**



NO-FALL – as (13a) below shows – depends on the presence of a following linked low tone. NO-FALL is different in kind from HTS. First, it depends crucially on the structure of the syllable. Second, and again quite unlike HTS, NO-FALL eliminates a non-permitted surface structure and hence qualifies as a repair rule, or rather a structure condition with an associated automatic rule (cf. Stewart 1983).

HTS is blocked by the low-toned CVVC-stem in (13). However, HTS does apply to the high tone of the initial °**ßá-**. In (13a) this results in a falling tone on **-líɪ-**; NO-FALL cannot apply since the next TBU has a high tone. In (13b), HTS itself creates a floating low tone which is realized as a downstep.

(13) a. **[ßalíɪyíkooßa]**



b. **[ßakó!yíkooßa]**

The examples in (13) also show the creation of a default low tone in initial position. Note that other low tones have to be present prior to HTS; I see no reason to accord any kind of default status to low tones in general.

4. NO HL#

Still, there are consistent differences in the way that high and low tones behave. In (14) we see words whose final tone is delinked by HTS. In (14a), the basic final tone is low, and after being dislodged and losing its segmental support it disappears without a trace. In (14b), the basic final tone is high, and when it is shifted to the right it is not lost but relinks to the end of the word, and even creates its own mora.

(14) a. °**mu-súl-i** > **m̀suzí** 'blacksmith'
b. °**ßʊ-seß-ú** > **ßʊseßuú** 'heat'
c. °**ßʊ-hól-ú** > **ßʊhozú** 'peace'

In derived words such as those used in (14), the underlying tones of each morpheme and hence each vowel are known by substitution. Thus, the inherent low tone of the agent noun suffix **-i** can be seen unambiguously in a word such as **m̀lɪmi** 'farmer', derived from °**mu-lɪm-i**. However, underived stems of two or more syllables with a LH melody on the last two syllables are ambiguous as to their underlying tone: it could be either °HL or °HH; compare (14a) and (14c) above. To avoid this ambiguity, which is, I believe, unsustainable not just by linguists but also by the speakers, I suggest that there is a word structure condition which rules out word-final °HL (prior to HTS) in favour of °HH. Below I will give reasons why I choose this rather than the other logical possibility to resolve this ambiguity.

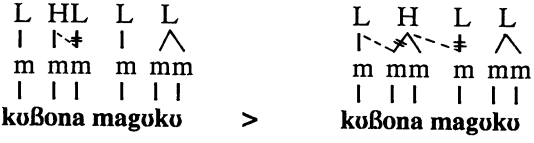
5. HIGH TONE DOUBLING

Within a phonological phrase, a word-final (surface) high tone spreads to the first syllable of the next word. High Tone Doubling (HTD) differs from HTS in that it not merely shifts the melody one mora to the right but creates one extra high tone. The simple, regular case of HTD is shown in (15a). The two examples in (15b) show that the derivational history of the word-final high tone is not relevant; it may be inherently high or it may be due to the NO-HL# condition. A word-final rising tone is simplified to low before an initial high tone in the next word. In (15c), this word-initial high tone is the result of HTD. This is not a necessary condition, however, since the rising contour is also simplified to low in (15d), which is one of the special cases of a word-initial (surface) high tone even without the influence of HTD.

(15) a. **mikɩlá míliihú** 'long tails'
compare: **mikɩlá** 'tails'; **miliihú** 'long'
b. **°kʊ-ßón-a ma-gʊkʊ > kʊßoná mágʊkʊ** 'to see baboons'
°a-laa-ßón-é ma-gʊkʊ > alaaßoné mágʊkʊ 's/he will see baboons'
c. **matwi máliihú** 'long ears'
compare: **matwií** 'ears'; **maliihú** 'long'
d. **itwi límo** 'one ear'
compare: **itwií** 'ear'; **límo** 'one'

If we accept the working of the NO-HL# word structure condition, and if we assume that HTS operates post-lexically on the phonological phrase, then we do not need a separate rule of HTD, nor do we need to apply another contour simplification rule operating on rising contours in word-final position. The derivation of the first example from (15b) is shown in (16).

(16) NO HL#: HTS:



HTD, i.e., HTS across a word boundary, is blocked in certain environments. Phonologically, the motivating principle appears to be "melodic stability", in other words, HTD does preserve the number (though not the position) of ups and downs. However, morphological information also enters into the description of the blocking environments.

HTD is blocked in three specific environments. First, blocking results from a word-initial LHl sequence, i.e., a low tone followed by a high tone which itself cannot be shifted. An example is given in (17a). Second, blocking results from a word-initial underlying LH sequence on a single syllable. HTS converts such a sequence into a two-mora low syllable followed by a high tone. Two examples are given in (17b). In both cases, if HTD were to apply, it would obliterate the melody. The word-internal procedures of preserving the dislodged low tone either by creating a falling contour on a long syllable or by

realizing a floating low tone as a downstep appear not to be available after HTS across a word boundary.

(17) a. **ndimú yɪkápeelíle** 'the animal did not run'
compare: **ndimú yíkaló!líle** 'the animal did not look'
b. **ndimú yaalóla** 'the animal looked' (< °... **yɪ-á-lol-a**)
lolagá lwaalá 'look at the finger' (< °... **lʊ-álá**)

The third blocking environment for HTD is more complex. It involves verbs starting with two low tones on one syllable; see (18a). Non-verbs of identical phonological shape do not block HTD; compare the examples in (18b) which also show that NO-FALL does apply to the output of HTD.

(18) a. **ndimú yʊʊlola** 'the animal will look'
cf. the fuller form of the same tense: **ndimú yíkʊlola**
b. **ndimú yáá-kʊmapoólú** 'the animal of (in) the bush'
lolagá lóóyaá 'look at the feather' (< °... **lʊ-oyá**)

The question arises whether HTD is blocked or applied vacuously in those environments where the next word begins with a high tone for which HTS is blocked; for an example see (15d). The answer is: it does apply vacuously. That this is so can be seen when looking at words with final (surface) rising tone. Blocking of HTD preserves the final high tone in its underlying position; vacuous application of HTD results in a merger of the two adjacent high tones: °H#H! > L#H. The two cases are exemplified in (19a) and (19b). In fact, the same thing happens to a sequence HH! without an intervening word boundary; see (19c).

(19) a. **mbogó yʊʊlola** 'the buffalo will look'
ɲaá!ßó yʊʊlola 'the cat will look'
compare: °**mbogó** > **mbogoó** 'buffalo'
°**ɲáaßó** > **ɲaáßʊó** 'cat'
b. **mbogo yímo** 'one buffalo'
ɲaáßʊ yímo 'one cat'
c. °**ßá-í-suúhíjé** > **ßiísuuhíjé** 'they have rested'

The facts about blocking of HTD, in as far as they differ from the environtment in which HTS is blocked, pose a problem to the proposal to regard HTD simply as a part of (post-lexical) HTS. The best I am able to suggest is to accept that HTS is sensitive to the position of the word boundary, while maintaining the analysis that there is but a single process of HTS which operates on the phonological phrase rather than on single words.

6. TONAL LIAISON

Liaison occurs when a word ends in a vowel (which all words do), and when the next word begins either with a vowel or with a prenasalized consonant. Liaison affects consonants, vowels, and also tone in a way which is different from what happens at otherwise comparable morpheme junctures within the word.

Liaison may produce sequences of consonants and glides which are not found elsewhere in the language. This is the case for the CGV sequences **ßwV**, **mwV**, **syV** and **zyV**, as in (20a) and (20b), and also for the CGGV sequences **CwyV** and **CywV**, as in (20c).

(20) a. **ɲaáßuó + ɪyɪ > ɲaáßw'ɪíyɪ** 'this cat'
ndimú + ɪyɪ > ndimw'ííyɪ 'this animal'
compare: **°ßu-átó > waató** 'boat'
°mu-íló > ŋwɪɪló 'light-coloured person'
b. **mkáasi + ugu > mkáasy'uugu** 'these scissors'
mgazi + ugu > ngazy'uugu 'this blood'
ßuuki + ußu > ßuuk'úúßu 'this honey'
compare: **°ku-lás-i-a > kulashá** 'to make shoot'
°ɪ-zi-o > ɪjo 'these' (class 10)
°ɪ-kɪ-o > ɪcho 'this' (class 7)
c. **matwii + aßílí > matwy'aaßílí** 'two ears'
ßanhu ßáa-ßólyw'aaßa (cf. **ßólyo**) 'right-handed people'

Liaison produces long vowels, which is not surprising given that it occurs in the same environments, CVV and VNC, which word-internally trigger compensatory lengthening. This is shown in (21a) and (21b). Note that, without liaison, no long vowels are admitted in word-final position (unless coupled with a contour tone), even when there is a CGV-sequence. This constraint holds true not just for isolated words but also when such words are used in connected speech; there is no way to pronounce the final vowel of the first word in (21c) long, no matter how fast the speech and how closely the two are connected.

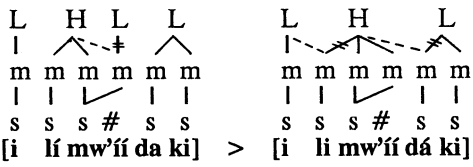
(21) a. **nzoká + ɪyɪ > nzok'ííyɪ** 'this snake'
ndimú + ɪyɪ > ndimw'ííyɪ 'this animal'
b. **nguku + ndaki > ngukuu ndaki** 'a brave baboon'
c. **maswa maliihú** 'long grass'

Tonal Liaison (TL) is particularly interesting since it clearly involves more than just combining the tones of the two merging syllables. In (22), four nouns with different tonal shapes are combined with an all-low adjective, **idaki**. The plural forms, which have the same basic tones but are not subject to liaison, are added for comparison.

(22) a. **igukw'iidaki** 'a brave baboon' (cf. **maguku madaki**)
b. **ilimw'íídáki** 'a brave animal' (cf. **malimú mádaki**)
c. **ißugw'iidáki** 'a brave buffalo' (cf. **maßugo mádaki**)
d. **lɪɲaáßw'iidáki** 'a brave cat' (cf. **maaɲaáßu mádaki**)

The most surprising effect of TL is the spreading of the word-final high tone up to the second syllable of the next word. If we assume that non-TL forms are derived prior to TL then, superficially, it appears as if either a second application of HTS was taking place, or as if the word boundary had moved to the right. However, it is possible to include TL into (post-lexical) HTS if we assume that syllabification is also a phrasal rather than a word level process. The proposed derivation of the example in (22b) is given in (23).

(23) NO HL#: HTS:

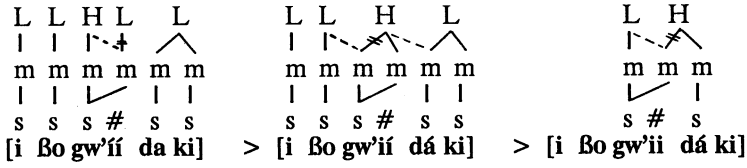


[i lí mw'íí da ki] > [i li mw'íí dá ki]

It is crucial that the NO-HL# condition re-apply at the phrase level. This is what creates the third high-toned mora, whereas there are but two high moras in the underlying form. The position of the word boundary is determined at the level of the syllable. We may say that part of the syllabification process consists in realigning the word boundary with the syllable boundary. Otherwise, the syllabification algorithm is simple: Any branching mora builds a syllable; any non-branching mora joins the preceding syllable, except that a phrase-initial non-branching mora must form a syllable by itself.

There is one more complication. The proposed mechanism, consisting of the (recurring) NO-HL# condition plus phrasal HTS, does not yet produce the correct output for the forms given in (22c) and (22d) where the first word ends in LH. Here we need an additional process of word-final contour simplification, this time excluding a rising contour. NO-RISE is a condition with an associated automatic rule which replaces a word-final rising contour tone by a level low tone when it is followed by another high tone. We have tentatively described such a "process" in the context of HTD; compare (17c) and (17d). However, at that point, its formulation was made redundant by positing HTS as a phrasal process. Now, in the context of TL, the introduction of NO-RISE becomes a necessity. The proposed derivation of the example in (22c) is shown in (24).

(24) NO HL#: HTS: NO-RISE:



[i ßo gw'íí da ki] > [i ßo gw'íi dá ki] > [i ßo gw'ii dá ki]

As far as I can see, the proposed formulation of HTS and its associated ramifications of blocking and conditions restricting contours account also for other cases of liaison. Some relevant data are provided in (25). The same nominal stems are used as above; the class 5 forms in (a) and (b) provide the liaison environment V#V, the class 9/10 forms in (c) through (g) create the other setting for liaison in the environment V#NC. In addition to the all-low adjective stem **-daki** 'brave' I use the stems **°-bótú > -botú** 'strong' and **-háŋa** 'big'. The latter is the only adjective stem that starts with a high tone on the surface; I assume that it has the (exceptional) underlying form **°-ꜜhaŋa**. The examples in (f) and (g) add two types of forms with CV(VCV)-stems **°-gééhú > -geéhú** 'few' and **°-dó > -doó** 'small'.

(25)

a.	b.
igukw'iibotú **ilimw'íibotú** **ißogw'iíbotú** **lıŋaáßw'íibotú**	**igukw'iihápa** **ilimw'íihápa** **ißogw'íihápa** **lıŋaá!ßw'íihápa**

c.	d.	e.
ngukuu ndaki **ndimúú ndáki** **mbogoo ndáki** **ɲaáßuu ndáki**	**ngukuu mbotú** **ndimúú mbotú** **mbogoó mbotú** **ɲaáßuó mbotú**	**ngukuu ŋhápa** **ndimúu ŋhápa** **mbogóo ŋhápa** **ɲaá!ßóu ŋhápa**

f.	g.
ngukuu ngeéhú **ndimúú ngeéhú** **mbogoó ngeéhú** **ɲaáßuó ngeéhú**	**ngukuu ndoó** **ndimúú ndoó** **mbogoó ndoó** **ɲaáßuó ndoó**

7. CONCLUSIONS

The present account includes a number of proposals, some new and some already made earlier, which may be significant in a more general perspective.

(i) A distinction is made between proper phonological rules and conditions with associated automatic rules. A-rules were introduced by Stewart (1983); I have combined them with specific proposals about redundancy conditions (Schadeberg 1986). The difference between P-rules and A-rules has some bearing on the phoneme issue. Redundancy conditions and their A-rules determine and correct an unadmissible phonological structure, and by implication define what is admissible. P-rules have no such relation to the general phonological structure of the language.

The present analysis proposes one P-rule, HTS, and three conditions correcting unadmissible tonal contours: NO-HL#, NO-FALL (NO HL.L), and NO-RISE (NO LH#H). NO-FALL and NO-RISE refer to the syllable structure and (I would like to add: hence) are only applicable at the phrasal surface level. NO-HL# has no specific reference to the syllable, and it applies and re-applies in the underived lexicon, in the derived lexicon, and at the phrase level. These three cases are shown in (26); the correct surface forms after the application of HTS are given below in square brackets.

(26) a. L H
m mm#
°i- li mu

[i li mú]

b. L H L
m m m#
°ku-ßon-a

[ku ßon á]

c. L H L L
m m mm mm
s s s # s s
°ku-ßon-a i-guku

[ku ßon' íí góku]

(ii) Throughout this paper I have found it appropriate to use the XMS-model for presentation. This model combines ideas taken from Clements and Keyser 1983 and from Hyman 1985. In this model (cf. Schadeberg 1987)

there are three hierarchical levels: the basic weight unit (X), the mora (M), and the syllable (S). While the description of tone in KiNyamwezi must refer to each of these three levels, and in addition to the major segment classes C, V and N, it is apparent that the mora is the true bearer of tone (TBU). In particular, the syllable cannot be the TBU, at least not until HTS has applied, since HTS can only be stated properly at the level of the mora. After HTS has applied, the syllable seems to be the reference unit for the two conditions on contours: NO-FALL and NO-RISE.

(iii) KiNyamwezi offers new insights into the nature of "liaison". There is more involved than just producing "closed junctures" across word boundaries. The facts that word-final CGV-syllables have short vowels even in closely connected speech, and that HTS (including HTD and TL) crucially follows liaison, make it possible to define liaison as precisely those cases where syllabification joins phonic material from two adjacent words in one syllable. We have also seen that syllabification makes the word boundary percolate "upward" to the syllable level, and that liaison restores the synchrony between word and syllable boundaries.

(iv) We have seen that KiNyamwezi takes great trouble – to the extent of creating the two otherwise unused tonal configurations of falling contours and downsteps – in order to preserve as well as possible the basic melody. I think that this "melodic stability" is a widespread tendency; it might be worthwhile to reconcile it with Hyman's "principle of ups and downs" (1978:261): "Tonally induced changes tend to minimize the number of ups and downs over a given stretch."

(v) According to Hyman (1978:260), HTS is a complex process in historical perspective. It involves first two applications of (high and low) tone spreading, and then two applications of contour absorption.

(27)

base form:	L	H	L	L
by spreading >	L	LH	HL	L
by absorption >	L	L	H	L

The base form and the final result in (27) are exactly what can be postulated for and found in KiNyamwezi: the basic high tone is shifted one position to the right. In KiSukuma (Batibo 1985), HTS results in the displacement of the basic high tone by two positions.

(28) KiNyamwezi **°kudégeleka > kudegéleka** 'to hear a case'
KiSukuma **°kudókanana > kudukanána** 'to insult each other at length'

So far, no dialectal evidence has been reported attesting any contour tone stage either prior to the first HTS as evidenced in KiNyamwezi, or preceding the second HTS of KiSukuma. I plan to carry out a survey on the dialectal variations of HTS in the whole Sukuma-Nyamwezi language group. From this I hope to draw conclusions about the historical development of this process, and also to find arguments for the most appropriate synchronic account.

(vi) Finally, it occurs to me that the phrasal nature of HTS on the one hand, and the detailed morphological information which is necessary for the formulation of the blocking of HTS on the other, will make it difficult to reconcile the present account with the spirit of lexical phonology.

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Category asymmetries in Hausa Asymmetric Coordination*

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1 *Asymmetric coordination.* In Hausa,[1] expressions of thematic coordination (i.e., coordination of two (or more) participants necessarily bearing the same thematic role in a state or event) can take several forms, including the 'asymmetric' coordination[2] in (1), where a plural pronoun associated with a certain thematic role has one syntactic relation, and another of the participants in that same role appears in a *da*-phrase adjunct. Diagnostic of asymmetric coordination are a dependent plural pronoun with anaphoric function and the dual interpretation given in (1a). The marker *da* will be represented throughout the glosses as '&'; it functions in Hausa like English *and* and *with* in their use with NPs. The English readings in (a-c) are labeled with the terms I will use to refer to them in the discussion. As much as possible, only readings crucial to the discussion will be included in the glosses. It is the dual asymmetric coordinate reading which I will concentrate on because of its diagnostic function; the components of this reading will be underlined in the English glosses. Throughout the paper, I will assume that the structure at issue is essentially that of the surface syntax: that there is no abstract syntactic coordination of which the *da*-phrase is a subpart (as proposed in Aissen 1989 for Tzotzil asymmetric coordination), but rather that it is an adjunct to (a projection of) V or N. Arguments for the plausibility of this assumption are found in Schwartz 1989b.[3]

1) mun je Kano da Audu
   1PLsubj+COMPL go Kano & Audu
   a 'Audu and I went to Kano.' (dual asymmetric coord.)
   b 'We and Audu went to Kano.' (plural asymmetric coord.)
   c 'We went to Kano with Audu.' (plural comitative)

The contrast between a standard (or symmetric) coordinate interpretation and an asymmetric coordinate interpretation in Hausa (and other languages with this construction) corresponds to English 'we and John' (symmetric) vs. 'we including John' (asymmetric). Syntactic and semantic criteria clearly distinguish asymmetric coordination from other coordinate and comitative expressions; for exemplification and discussion of these criteria, see Schwartz 1989b.

2 *Category asymmetry of plural pronoun host.* This paper examines asymmetric coordination in four distinct structures, based on the category of the constituent which hosts the dependent plural pronoun. The host category may be a tense/aspect marker (TAM), as in (1), a main verb, as in (2), a verbal noun as in (3), or a noun, as in (4).

2) Bala zai taimake+mu da Audu
   Bala 3+FUT help+1PLobj & Audu
   'Bala will help me/us and Audu.'

3) Bala zai iya taimako+n+mu da Audu
   Bala 3+FUT MODAL help$_{VN}$+LINK+1PLposs & Audu
   'Bala will be able to help me/us and Audu.'

4) Bala ya ga doki+n+mu da Audu
Bala 3+COMPL saw horse+LINK+1PLposs & Audu
a 'Bala saw the horse belonging to me/us and Audu.'
b 'Bala saw our horse and saw Audu.'

These constructions show three different syntactically dependent pronoun paradigms: subject pronominal markers are dependent on (and sometimes phonologically fused with) TAMs and are referred to as 'tense-aspect pronouns' (Newman 1987), object pronouns are dependent on main verbs, and possessive pronouns are dependent on nouns, including verbal nouns, as shown in (3). As the examples in (1-4) show, plural pronouns from any of the dependent paradigms can participate in asymmetric coordination. However, these four construction-types do not show homogeneous behavior under all circumstances. Rather, they split into two groups in terms of whether or not they support an asymmetric coordinate interpretation when the *da*-phrase is not adjacent to the host of the dependent plural pronoun. Under nonadjacency, plural dependent pronouns hosted by TAMs, main verbs and verbal nouns support such an interpretation, and plural dependent pronouns hosted by nouns generally do not (the qualification will be made explicit later). This split is illustrated using three criteria: separability of the *da*-phrase from the dependent plural pronoun by other material of a simple clause, and focus or topic constructions without resumptive pronouns.

2.1 *Clause-internal discontinuity.* The example in (1) shows that the *da*-phrase need not be adjacent to the TAM which hosts the dependent plural pronoun. These are, in fact, always discontinuous. The examples in (5) and (6) show that an adverb may appear between the object pronoun dependent on the main verb and the *da*-phrase that is associated with it in asymmetric coordination.

5) Bala zai taimake+su gobe(,) da Audu
Bala 3+FUT help+3PLobj tomorrow, & Audu
'Bala will help him/her/them and Audu tomorrow.'

6) Audu ya gan+mu jiya da Binta
Audu 3+COMPL see+1PLobj yesterday & Binta
'Audu saw me/us and Binta yesterday.'

The example in (7) shows that the dependent pronoun hosted by a verbal noun also may be separated from the *da*-phrase without destroying the dual interpretation.[4]

7) Bala zai iya taimako+n+su gobe(,) da Audu
Bala 3+FUT MODAL help$_{VN}$+LINK+3PLposs tomorrow & Audu
'Bala can help him/her/them and Audu tomorrow.'

On the other hand, the examples in (8-11) show that if the *da*-phrase is not adjacent to the dependent plural pronoun hosted by a noun, the dual interpretation is not possible (9) or is only marginally possible and is not the preferred interpretation (11).[5]

8) doki+n+mu da Audu ya gudu
horse+LINK+1PLposs & Audu 3+COMPL run
'The horse belonging to me/us and (to) Audu ran away.'

9) doki+n+mu ya gudu da Audu
horse+LINK+1PLposs 3+COMPL run Audu
a 'Our horse ran away with Audu.'
b ≠'The horse belonging to me/us and (to) Audu ran away.'

10) Musa ya ga doki+n+mu da Audu jiya
Musa 3subj+COMPL see horse+1PL & Audu yesterday
a 'Musa saw our horse and (also saw) Audu yesterday.'
b 'Musa saw the horse belonging to me/us and (to) Audu yesterday.'

11) Musa ya ga doki+n+mu jiya da Audu
Musa 3subj+COMPL see horse+1PL yesterday & Audu
a 'Musa saw our horse yesterday, and (also saw) Audu.'
b ≠?'Musa saw the horse belonging to me/us and (to) Audu yesterday.'

2.2 *Displacement in topic and focus constructions.* The same pattern emerges when the *da*-phrase appears in topic or focus position, illustrated in (12) and (13). These examples show that when the *da*-phrase associated with a dependent plural pronoun hosted by a TAM occurs in topic or focus position, the dual asymmetric coordinate interpretation is possible.

12) da Audu kam, mun je Kano
& Audu TOP 1PL+COMPL go Kano
'As for Audu, he and I/we went to Kano.'

13) da Audu ne, muka je Kano
& Audu FOC 1PL+RELCOMPL go Kano
'I/we and AUDUwent to Kano.'

The same pattern of structure and interpretation occurs with *da*-phrases associated with plural pronouns hosted by main verbs and verbal nouns, as shown in (14-19).

14) da Audu kam, Bala zai taimake+mu
& Audu TOP Bala FUT+3msubj help+1PLobj
'As for Audu, Bala will help me/us and him.'

15) da Audu ne, Bala zai taimake+mu
& Audu FOC Bala FUT+3subj help+1PLobj
'Bala helped me/us and AUDU.'

16) da Audu kam, Bala ya gan+mu
& Audu TOP Bala 3msubj+COMPL see+1PLobj
'As for Audu, Bala saw me/us and him.'

17) da Audu ne, Bala ya gan+mu
& Audu FOC Bala 3msubj+RELCOMPL see+1PLobj
'Bala saw me/us and AUDU.'

18) da Audu kam, Bala zai iya taimako+n+mu
& Audu TOP Bala FUT+3msubj MODAL help$_{VN}$+LINK+3PLposs
'As for Audu, Bala will be able to help me/us and him.'

19) da Audu ne, Bala zai iya taimako+n+mu
& Audu FOC, Bala FUT+3msubj MODAL help$_{VN}$+LINK+3PLposs
'Bala will be able to help me/us and AUDU.'

On the other hand, a similar displacement of the *da*-phrase associated with a plural pronoun hosted by a noun does not support the dual interpretation diagnostic of asymmetric coordination, as shown in (20) and (21).

20) da Audu kam, Bala ya ga doki+n+mu
& Audu TOP Bala 3msubj+COMPL see horse+LINK+1PLposs
a 'As for Audu, Bala saw our horse and (also saw) him.'
b ≠'As for Audu, Bala saw the horse belonging to me/us and him.'

21) da Audu ne, Bala ya ga doki+n+mu
& Audu FOC Bala 3msubj+RELCOMPL horse+LINK+1PLposs
a 'Bala saw our horse and (also saw) AUDU.'
b ≠'Bala saw the horse belonging to me/us and (to) AUDU.'

All of the evidence presented here indicates that TAMs, main verbs and verbal nouns pattern together with respect to allowing an asymmetric coordinate interpretation under displacement while nouns pattern differently. This leads to two questions. First, why do other elements which host the plural pronouns that support an interpretation of asymmetric coordination pattern together to the exclusion of (non-derived) nouns -- i.e., what property do they have in common which makes them different from nouns in this regard, or, conversely, what property do nouns have to the exclusion of these other categories? Second, why does this property make it possible for TAMs, main verbs and verbal nouns to support asymmetric coordination of nonadjacent elements, while nouns can support asymmetric coordination only (or preferably) of adjacent elements? In this paper, I will focus primarily on the first question. Before addressing these questions, however, it must be established that what I have called here 'verbal nouns' are in fact nominal in category.

3 *The nominal status of verbal nouns.* In Hausa grammars, the term 'verbal noun' refers to a number of different derivational formations. I will be concerned here with only two types: (i) 'primary verbal nouns' formed by regular derivation from Grade 2, 3 or 7 verbs, or from monosyllabic verbs, and (ii) 'secondary verbal nouns' which are nominalizations that do not bear a regular and predictable derivational relation to their verbal bases and which have in some cases replaced the corresponding primary verbal nouns in their use as complements to the continuous TAM and modals. (See Abraham 1959 and Newman 1987 for a discussion of the derivation of verbal nouns.) The reason for focusing on these two types is their clear nominal behavior according to three diagnostic tests: (1) the presence of a 'linker' morpheme between stem and possessive pronoun (manifested in a 'short' or 'suffixed' form as *-r* for feminine singular nouns ending in *-a*, *-n* elsewhere); (2) the ability to host dependent pronouns from the possessive paradigm; and (3) the ability to cooccur with demonstrative articles.[6]

The presence of the linker morpheme between noun or verbal noun and dependent possessive pronoun is shown in examples (7-11) and (18-21) above; these examples would be ungrammatical without this morpheme. These examples also illustrate that nouns and verbal nouns both host dependent pronouns from the possessive paradigm; where the paradigms do not overlap, substitution of pronouns from another paradigm is ungrammatical.

The sentences in (22-25) illustrate that both nouns and verbal nouns may occur with demonstrative articles.

22) doki+n+nan ya gudu
horse+LINK+DEM 3msubj+COMPL run-away
'This horse ran away.'

23) Bala ya ga doki+n+nan
Bala 3msubj+COMPL see horse +LINK+DEM
'Bala saw this horse.'

24) tamabaya+r+nan ta dame+ni
asking$_{VN}$+LINK+DEM 3fsubj+COMPL bother+1obj
'This questioning bothered me.'

25) na gaji da tambaya+r+nan
1subj+COMPL tired with asking$_{VN}$+this
'I'm fed up with this questioning.'

The sentences in (24) and (25) further demonstrate the ability of verbal nouns to appear in typical nominal positions, such as subject and object of preposition, respectively.

4 *Common properties of TAMs, main verbs and verbal nouns.* Verbal nouns and (non-derived) nouns thus share a number of morphosyntactic properties which collectively justify the syntactic classification of Hausa verbal nouns as a subclass of nouns. There is, on the other hand, little if any reason to justify classifying TAMs, main verbs, and verbal nouns together syntactically. TAMs are the first obligatory element of all verbal clauses and host dependent elements carrying pronominal information either functioning as subject agreement markers when an independent subject is present or functioning anaphorically when an independent subject is absent. These pronominal elements belong to the dependent subject paradigm (the 'tense-aspect pronouns'). Main verbs immediately follow TAMs and host dependent pronominal elements with anaphoric function only (i.e., no agreement function) selected from the object pronoun paradigms. Verbal nouns immediately follow the progressive TAM or a member of a set of modality markers or else they appear in noun phrase positions, and they select dependent pronouns from the possessive paradigm. It thus seems reasonable to conclude that the common property which is shared by TAMs, main verbs and verbal nouns is not syntactic category membership.

Rather, I claim first of all that their common property (or set of properties) is semantic and second that its semantic nature is compatible with the nature of asymmetric coordination in Hausa (and perhaps universally). It is first important to note the semantic function of main verbs and verbal nouns as functors. Verbal

nouns and main verbs which share a common base have the same argument structure, as illustrated in (26-27).

26) Bala ya taimaki Audu
Bala 3msubj+COMPL help Audu
'Bala helped Audu.'

27) Bala ya iya taimako+n Audu
Bala 3msubj+COMPL MODAL help$_{VN}$+LINK Audu
'Bala was able to help Audu.'

TAMs are operators relating tense/aspect/modality-unspecified event schemata to tense/aspect/modality-specified event subschemata (this is not to say that tense, aspect and modality are semantically operators over the same scope). They do not affect the argument structure of the functors within their scope. These elements all host plural pronouns functioning as arguments of lexical elements which are the manifestation of functors specifying the event structure of a clause. On the other hand, in a noun phrase that expresses a possessive or associative relation, the head noun is not a functor but rather is one of the arguments of this relation,[7] and the pronoun which it hosts represents the other argument of the relation, not a clause-level argument. Thus, the function and relation of the host and the dependent pronoun of a possessive construction differs semantically from the other pronoun-host combinations considered here.

5 *A syntactic alternative.* One objection to the claim that it is semantic characteristics of the categories under investigation which determine their grouping with respect to asymmetric coordinate interpretation involving nonadjacent *da*-phrases must be addressed. It could be argued that there is a structural distinction between verbal nouns and their associated *da*-phrases and (non-derived) nouns and their associated *da*-phrases. Specifically, in verbal noun constructions of the type we have been considering, such as those illustrated in (3), (7), (18) and (19), the *da*-phrase (or its trace) is an independent constituent of the verb phrase (or perhaps the INFL-phrase) and thus can freely occur in focus and topic constructions. This analysis is very plausible and would seem to be confirmed by the acceptability of structures in which the host constituent of the dependent plural pronoun is discontinuous with the *da*-phrase in simple clauses, as in examples (1) or (5-7). Further evidence for this analysis is given in Schwartz 1989. In the case of nouns, however, the *da*-phrase could be analyzed as a constituent of the phrase headed by the noun or its projection and be assumed to be subject to a condition on extraction from NP. This would seem to be confirmed by the relative unacceptability of NP-external material intervening between the host constituent and the *da*-phrase in a simple clause, as shown in (8-11). (There are two potential problems with this part of the analysis. The first is that, as observed in example (11) and footnote 5, it's not clear that such an extraction constraint is absolute. The second is that it has been claimed in Junaidu 1987 and Ahmad 1990 that the Complex NP Constraint is systematically violated in Hausa, so it would not be a trivial matter to invoke an extraction constraint as part of this hypothetical account. Since there is another strong reason for rejecting the account, I will not pursue these points further.)

Under this analysis, then, the use of verbal nouns which function as heads of NPs, rather than as complements to modal verbs, should show the same behavior as nouns functioning as heads of NPs do, since their associated *da*-

phrases would be structurally NP-internal. Specifically, they shouldn't allow an asymmetric coordinate interpretation with a *da*-phrase which appears outside of the NP position, since this would violate the hypothesized condition on extraction from NP. However, (29) and (30), compared to (28), show that this is not the case:

28) taimako+n+su da Audu yana da wuya
helpVN+LINKER+3PLposs & Audu 3msubj+COMPL & difficulty
'Helping him/her/them and Audu is difficult.' (lit. '...is with difficulty')

29) da Audu kam taimako+n+su yana da wuya
& Audu TOP helpVN+LINK+3PLposs 3msubj+CONT & difficulty
'As for Audu, helping him/her/them (and Audu) is difficult.'

30) da Audu ne taimako+n+su yake da wuya
& AUDU FOC helpVN+LINK+3PLposs 3msubj+RELCONT & difficulty
'Helping him/her/them and AUDU is difficult'

Rather, in (29) and (30), the *da*-phrase in topic or focus position can still participate in an asymmetric coordinate interpretation with the dependent possessive pronoun hosted by the verbal noun in subject position. This evidence refutes the argument that it is solely the different syntactic structure of verbal nouns and nouns which determines their ability to support an asymmetric coordinate interpretation with a discontinuous *da*-phrase.

6 *The naturalness of a semantic category distinction.* It is natural that the properties which unify these constructions are of a semantic nature rather than of a syntactic nature, since the issue here is the conditions under which a *da*-phrase can have a certain semantic interpretation -- i.e., when it can be interpreted as a member of a group specified by a plural pronoun. If we make the assumption that interpretation of pronouns is a semantic phenomenon, then it's not surprising that semantic properties of the construction involved should be relevant. Kathman 1991 argues that a consideration of the behavior of verbal nouns in Welsh requires that both semantic and syntactic categorial status of these be acknowledged, with semantic properties such as argument structure, selectional restrictions and adverbial modification correlating with the semantic categorization of verbal nouns as functors, grouping them at this level with main verbs, while syntactic distributional and cooccurence properties correlate with their syntactic categorization as nouns. Taken together, these investigations support the straightforward principle that semantic phenomena are correlated with semantic category status and syntactic phenomena are correlated with syntactuc category status, rather than vice versa.

A second question posed earlier remains to be addressed: why do the common semantic properties of structures involving TAMs, main verbs and verbal nouns make them compatible with an asymmetric coordinate interpretation of nonadjacent elements while structures involving nouns are incompatible with this interpretation of nonadjacent elements rather than vice versa? This question deserves serious discussion and justification of the answer beyond what I am able to give at this time, but I suggest that the crucial factor may be that the verbal predicates host pronouns which function as arguments in event structure and are thus subject to backgrounding and foregrounding processes in discourse, while the

pronouns hosted by nouns are not arguments in event structure and are thus not subject to these processes. Since the *da*-phrases are interpreted as members of the set of participants specified by the plural pronouns, they therefore are subject to the same backgrounding and foregrounding processes, and furthermore, since they are manifested as syntactically independent of the plural pronoun representing the group in a language such as Hausa, they are thus independently manipulable in this regard. In Schwartz 1988b, I suggest that this independent manipulability functions in an important way to establish background and foreground in discourse in a language (like Hausa) where independent pronouns lexically carry a high degree of discourse prominence and thus where a syntactically symmetric coordinate structure like *ni da Binta* 'Binta and I' may in certain discourse contexts be out of balance with the prominence of the previously mentioned (=pronominal) members of the group being referred to. To establish this, however, and to answer more fully the question of why functors and operators over functors and their arguments can support an interpretation of asymmetric coordination when they host plural pronouns requires a more extensive study of the usage of these constructions in discourse than has yet been done.

Notes

*The data gathered for this paper was supported in part by an Indiana University grant-in-aid. Primary language consultant for the data included here was Mustapha Ahmad, a native speaker of Nigerian Hausa. I am grateful to Mr. Ahmad for reading a draft of this paper and commenting on the examples included here, and to Paul Newman for sharing his knowledge of Hausa verbal nouns with me.

[1]The phenomenon to be discussed is found among all speakers of Nigerian Hausa whom I have consulted, but not all Hausa speakers from Niger allow the interpretation at issue.

[2]See Schwartz 1988a,b for a discussion of the general properties of asymmetric coordination and Schwartz 1989a for a discussion of asymmetric coordination in African languages.

[3]The transcription used in this paper is that of standard Nigerian Hausa, with the exception of some morpheme divisions represented by '+', to indicate the syntactic dependence of a plural pronoun on its 'host'. In the glosses, a '+' is used to represent the meaning components of morphophonologically fused elements as well as syntactically dependent elements. Since some pronoun paradigm distinctions are made with vowel length and tone, which are not represented in the standard orthography, paradigm distinctions may only be apparent in this transcription from the morpheme glosses which label the distinct paradigms. The following abbreviations are included in the glosses: subj=subject, obj=object, poss=possessive, COMPL=completive, RELCOMPL=relative completive, CONT=continuous, RELCONT=relative continuous, FUT=future, LINK=linker, VN=verbal noun, m=masculine gender, f=feminine gender, 1=first person, 2=second person, 3=third person.

[4]Mr Ahmad sometimes preferred a pause before the *da*-phrase in examples like (5) and (7) and suggested that this might be related to appositives like *Bala zai iya taimakonsu gobe, shi da Audu* 'Bala will be able to help them tomorrow, him and Audu'. In Schwartz 1989b I rejected this structure as a general synchronic source of asymmetric coordination because asymmetric coordination in general doesn't have either the typical intonation contour or the appositive semantics of

these structures, but Mr. Ahmad's observations nonetheless may cast doubt on whether structures like (5) and (7) represent simple clauses.

[5]Judgements on the interpretation of sentences like (11), where the dependent object pronoun is hosted by the main verb, are less clear than those for sentences like (9), where the dependent subject pronoun is hosted by the TAM. Sentences like (9) were never interpreted by Mr. Ahmad as asymmetric coordinations, but sentences like (11) were on rare occasions given this interpretation, with the added statement that this was the least likely interpretation.

[6]I am grateful to Paul Newman for clarifying the distinctions among verbal noun types in Hausa for me; in the analysis of Hausa 'verbal nouns' proposed by Newman (p.c.), only these two types would be considered nominals.

[7]It may be relevant that possessive relations in Hausa are not expressed with verbal predicates (as they are, for example, in English, which uses such transitive verbs as have or own to express posession). Instead, they are expressed with a nonverbal construction as a main clause, as in ***Audu yana da kud'i*** 'Audu has money' (lit. 'Audu he-is with money'), or by juxtaposition of possessed and possessor as in *dokin Audu* 'Audu's horse' (lit. 'horse+LINK Audu').

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Two Subject Positions in Lango

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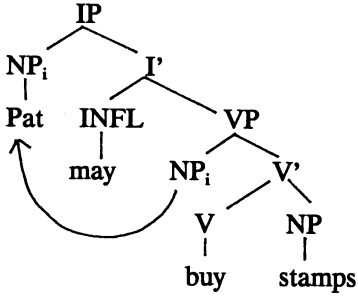
Data from Lango (a Western Nilotic language spoken in Uganda) suggests that this SVO language generates its thematic subject inside the VP, supporting the proposals of Kuroda (1988) and Koopman and Sportiche (1988) that SVO languages have VP-internal subjects at D-Structure.[1] Lango may, in fact, provide more direct evidence for this proposal than more familiar SVO languages like English which require the thematic subject to occupy the external subject position (Spec of IP) at S-Structure so that the observed word order does not reflect the proposed underlying structure.[2]

(1)



Lango appears to allow its thematic subject to remain inside the VP at S-Structure while another NP moves to the Spec of IP. Noonan and Bavin Woock (1978) argue that Lango examples like (2b) and (3b) are not derived by Topicalization, but rather by a process they term "NP-Fronting". This is described as a passive-like clause-internal movement to a sentence-initial slot, which is to the left of "the subject slot in immediate preverbal position" (Noonan and Bavin Woock (1978, 138)). While they do not show a formal structure for this process, their description suggests a structural derivation like that shown in (4).[3]

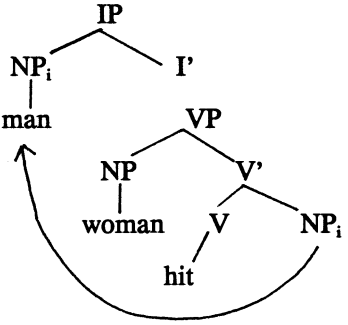
(2) (Noonan and Bavin Woock (1978 (1)))
a. dákó ò-jwát-ò lócà
woman 3sg-hit man
'The woman hit the man.'

b. lócà dákó ò-jwát-ò
man woman 3sg-hit
'The woman hit the man.'

(3) (Noonan and Bavin Woock (1978 (3)))
a. dákó òtámò ní àtín òjwátò lócà
woman thought that child hit man
'The woman thought that the child hit the man.'

b. dákó òtámò ní lócà àtín òjwátò
woman thought that man child hit
'The woman thought that the child hit the man.'

(4)



This paper will discuss a range of data supporting this conclusion. Data involving relativization shows that NP-Movement must be available as at least one option for fronting NPs in Lango, although it does not rule out the possibility that Lango allows other ways of fronting NPs as well, such as Topicalization or Left Dislocation. However, additional data shows that the behavior of constructions with fronted NPs is very different from what one would expect to find if either Topicalization or Left Dislocation were allowed in Lango. This suggests that NP-Movement to the Spec of IP may be the only possible derivation that Lango allows for examples like those in (2) and (3).[4]

The second part of this paper will focus on the properties of these two 'subject' positions, the Spec of IP and the Spec of VP. Noonan and Bavin Woock (1978) show that the NP that fronts can usurp some, but not all of the properties normally reserved for subjects in Lango. Properties such as the ability to trigger agreement, to be a controlled PRO, and to be the antecedent of a subject-oriented reflexive remain the exclusive domain of the thematic subject, even when another NP fronts to the Spec of IP. This indicates that the relevant notion of 'subject' with respect to these properties is not the Spec of IP. In contrast, other 'subject' properties such as the ability to launch floated quantifiers and the ability to be the antecedent of a logophoric pronoun subject of an embedded clause are not the exclusive domain of the thematic subject. These properties are preferentially linked to the Spec of IP, even when this node is not occupied by the thematic subject.

1. Evidence of NP-Movement in Lango

The strongest evidence that NP-Movement is possible in active clauses in Lango comes from relativization. In example (5b), the object, 'man', has fronted, but this does not create an island for relativization. This contrasts with the example in (5c) which shows that a cleft construction does create an island, blocking relativization.

(5) (Noonan and Bavin Woock (1978 (23)))

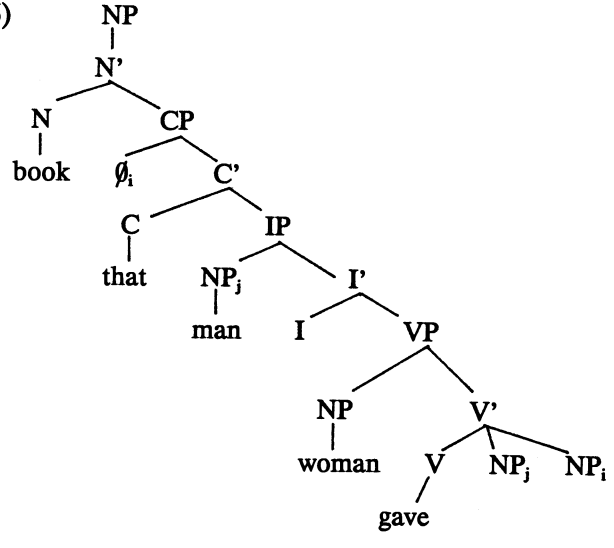
a. búk á'mɛ́ dákó ɔ̀mí lócà dwóŋ
book rel woman gave man big
'The book that the woman gave the man is big.'

b. búk á'mɛ́ lócà dákó ɔ̀mí dwóŋ
book rel man woman gave big
'The book that the woman gave the man is big.'

c. *búk á'mɛ́ lócà ɛ́n á'mɛ́ dákó ɔ̀mí dwóŋ
book rel man it rel woman gave big
'The book that it is the man that the woman gave is big.'

We expect (5b) to be grammatical if the object fronts by NP- Movement to the Spec of IP, creating no more structure than is already present in an ordinary relative construction like (5a).

(6)



In contrast, we expect (5c) to be ungrammatical because the additional structure involved in a cleft creates an island for relativization. Such constructions are absolutely unacceptable in English, for example.

(7) *The book that it is the man that the woman gave is big.

If (5b) were derived by Topicalization or Left Dislocation, rather than by NP Movement, we would expect this example to be as bad as (5c) because such constructions also involve extra structure that creates an island with respect to relativization. Compare the impossibility of relativizing out of the English Topicalized construction in (8a) and the Left Dislocated construction in (8b).

(8) a. *The book that the man the woman gave is big.

b. *The book that (as for) the man the woman gave him is big.

This argument for the possibility of NP-Movement in active clauses in Lango would be valid even if Lango allowed other fronting processes such as Topicalization or Left Dislocation. However, the data considered below suggests that NP-Movement may be the only means available for fronting bare NPs in Lango. These constructions are somewhat difficult to analyze, but they do show that the behavior of this NP-Fronting construction differs markedly from the behavior of clefts and relative clauses. In (9b), we see that it is ungrammatical to front the object NP of the lower clause across a clause boundary to the sentence-initial position of the matrix clause. This contrasts with (9c) where clefting the object in this same context is grammatical.

(9) (Noonan and Bavin Woock (1978 (22)))
a. dákó òdíɔ́ lócà 'ní 'kwál gwènò
woman forced man that steal chicken
'The woman forced the man to steal the chicken.'

b. *gwènò dákó òdíɔ́ lócà 'ní 'kwál
chicken woman forced man that steal
'The chicken the woman forced the man to steal.'

c. gwènò én ám'é dákó òdíɔ́ lócà 'nì 'kwál
chicken it that woman forced man that steal
'It's the chicken that the woman forced the man to steal.'

If Lango allowed either Topicalization or Left Dislocation, we would expect examples like (9b) to be grammatical (unless there are additional non-structural constraints on these rules that do not hold of clefts). Topicalization should be subject to the same syntactic constraints as clefts are, and Left Dislocated constructions should be even freer, since no gap is involved. Thus this data suggests that neither Topicalization nor Left Dislocation is available in Lango.

Examples like (9b) are interpreted in Noonan and Bavin Woock (1978) as evidence that NP-Fronting cannot cross a clause boundary. However, this claim is contradicted by data in Noonan (1981).[5]

(10) (Noonan (1981, 51))
àbwòr rwòt támó 'ní Ènékò
lion king think that 3-killed
'The lion, the king thinks that he killed it.'

(11) (Noonan (1981, 175))
ògwàng àwínyò ní àlábà àkòbbò ní òcwê
O. 1s-hear-perf that A. 3s-say-perf that 3s-become-fat-perf
'Ogwang, I heard Alaba was saying that he was fat.'

While the idea that NP-fronting is clause-bounded is a key argument in Noonan and Bavin Woock (1978) that this movement is not Topicalization, the fact that it turns out not to be clause-bounded is not inconsistent with the hypothesis that it is NP-Movement.[6] NP-Movement can cross clause boundaries, if conditions are right, as in Raising constructions.

(12) The lion_i seems [t_i to have been expected [t_i to be asleep].

If examples like (10) and (11) are derived by successive applications of NP-Movement to the Spec of IP, the derivation would be as follows. In (10), the object would first move to the Spec of IP of that same clause, paralleling the movement that we have seen is possible in embedded clauses like (3b). Then this NP would move again, from the Spec of IP of the lower clause to the Spec of IP of the upper clause, as in Raising constructions in English.

(13) [$_{IP}\text{lion}_i$ king_j think that [t_i pro_j 3-killed t_i]]

Under the assumption that what makes NP Movement possible at all in active clauses in Lango is that case assignment is optional, the lower two traces could be left caseless. This optionality of case assignment in Lango, in contrast to English, would account for why NP Movement would be possible out of a tensed clause in Lango, but not in English.

(14) *The lion seems that t_i is asleep.

This leaves the question of whether we expect the presence of the complementizer in the Lango example to create any problem for NP-Movement. This complementizer would not prevent this trace from being governed because it would still be governed by the INFL of this tensed clause, even if INFL takes the option of not assigning case to this NP. This contrasts with the situation in Raising constructions in English like (14) where, in the absence of government from to, exceptional government by the matrix verb is required, which might be blocked by a complementizer.[7]

Thus we see that an NP-Movement account of examples like (10) is possible in Lango and examples like (11) would work in a similar manner. As for why NP-Movement is not allowed across a clause boundary in examples like (9b), we can only speculate that the particular type of clause boundary in this example does not allow NP-Movement to cross it.[8] We don't fully understand the conditions necessary to allow NP-Movement to cross clause boundaries even in English. Even verbs that are exceptional case markers in active constructions, and should therefore still govern across the clause boundary in a passive construction, do not always allow NP-Movement out of the subordinate clause.

(15) a. They want [you to leave].
b. *You are wanted [to leave].

(16) a. They want you on the telephone.
b. You are wanted on the telephone.

Thus it would not be surprising to find that NP-Movement is allowed over some types of clause boundaries in Lango, but not others.

The next set of examples also demonstrates that the behavior of NP-Fronting differs markedly from that of clefting and relativization. However, in this instance we find that the NP-Fronting construction is less restricted than either clefting or relativization. These examples involve a paratactic construction (Noonan (1981)).[9] It is grammatical to front an NP out of the second clause of a paratactic construction, as in (17a), but it is ungrammatical to cleft or to relativize out of this construction, as shown in (17b) and (17c).[10]

(17) a. (Noonan (1981, 176))
kál dákó òdĬò ìcó òpyÈtò
millet woman 3sg-press-perf man 3sg-winnow-perf
'Millet, the woman pressed the man, he winnowed it.'
'Millet, the woman pressed the man to winnow it.'

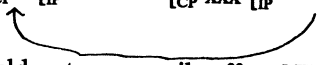
b. (Noonan (1981, 177))
*òg wàng Én àmÉ àdĬò òkélò òjwàtÉ
O. it rel 1sg-press O. 3sg-hit-perf-3sg
'It's Ogwang that I forced Okelo to hit.'

c. (Noonan (1981, 144))
*lócà àmÉ òkélò òdĬò ògwàng òjwàtò/òjwàtÉ
man rel O. 3sg-press-perf O. 3sg-hit-perf/
3sg-hit-perf-3sg
'The man that Okelo forced Ogwang to hit'

Since both clefting and relativization are blocked in this construction, it is reasonable to conclude that any sort of COMP to COMP movement would be blocked, including Topicalization. The grammaticality of (17a) in isolation might suggest that this example involves Left Dislocation (with a resumptive pronoun), since this process is known to be freer than clefting or relativization, but we have already seen one argument against the possibility of Left Dislocation in Lango involving the examples in (9). Moreover, Noonan (1981, 176) states that this NP-fronting construction obeys the island constraints, including the Complex NP Constraint and the Coordinate Structure Constraint. Thus it appears that we can exclude the possibility that Left Dislocation is what produces examples like (17a).

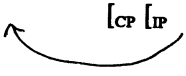
If neither Topicalization nor Left Dislocation is available in Lango, NP-Movement is left as the only remaining option for the identity of the NP-Fronting process in examples like (17a). This would mean that there is something about the paratactic construction that allows movement from Spec of IP to Spec of IP, but blocks COMP to COMP movement. Although we generally think of NP-Movement as more restricted than A'-Movement (since we have no parallel construction in English that allows NP-Movement but blocks A'-Movement), such a situation is not ruled out in principle. All that is required is for the intermediate COMP not to be available as a stop-off point for COMP to COMP Movement. As a result, A'-Movement in an example like (17b) or (17c) would have to involve movement directly to the top COMP, violating subjacency.

(18) * [$_{CP}$ [$_{IP}$ [$_{CP}$ XXX [$_{IP}$]]]]



This would not necessarily affect NP-Movement, however. NP-Movement in such a construction would not be long-distance movement, but only the ordinary sort of NP-Movement from the Spec of IP of the lower clause to the Spec of IP of the upper clause.

(19) [$_{CP}$ [$_{IP}$ [$_{CP}$ [$_{IP}$]]]]



There are two additional types of data that might initially make one doubt that all NP-Fronting in Lango involves NP-Movement to the Spec of IP. The first of these is the fact that this movement is not limited to object NPs. A wide range of NP arguments can front, including NPs inside PPs. Moreover, fronting such NPs leaves behind an agreement marker/resumptive pronoun.

(20) (Noonan and Bavin Woock (1978 (5)))
a. lócà òmíɔ̀ mɔ̀t bɔ̀t àtín
man gave gift to child
'The man gave a gift to the child.'

b. àtín 'lócà òmíɔ̀ mɔ̀t bɔ̀tɛ̀
child man gave gift to-3sg
'The man gave a gift to the child.'

One might assume that NP-Movement cannot move an NP out of a PP unless there has been reanalysis (given that this is true of English, as in 'This bed has been slept in'). However, this restriction is expected in English if case assignment is obligatory and NP-traces cannot occupy cased positions. If case assignment is optional in Lango, as assumed here, a preposition need not assign case and NP-Movement should be possible out of a PP. As for the agreement/resumptive pronouns left behind by this movement, this is a problem for the hypothesis that this is NP-Movement only if one assumes (based on the behavior of resumptive pronouns in English) that only A'-type movements can leave resumptive pronouns. However, Sells (1987, 274) argues that English does not have true resumptive pronouns and that true resumptive pronouns (which occur in Celtic languages, for example, and which look very much like what occurs in Lango) are the result of A-Movement/Binding, not A'-Movement/ Binding.

The second type of construction that could be taken as evidence that Lango allows Topicalization involves what looks like an overt auxiliary. When the object fronts in the example below, the resulting word order appears to be O S INFL V, which is what one would expect following Topicalization, instead of the O INFL S V that would be expected if the subject remained in the Spec of VP while the object fronted by NP-Movement.

(21) (Noonan and Bavin Woock (1978 (16)))
a. dákó 'bínó nènnò lócà
woman will see man
'The woman will see the man.'
b. lócà dákó 'bínó nènnò
man woman will see
'The woman will see the man.'

However, Noonan (1981, 35) states that the form translated here as 'will' is actually the verb 'come'. If this is a main verb rather than an auxiliary, then the word order in such constructions is consistent with an NP-Movement analysis and no longer constitutes evidence for Topicalization. If 'woman' is the thematic subject of 'come', it is expected to precede 'come' even if it occupies the Spec of the VP dominating 'come'. Under this account, the verb 'see' would occupy a separate complement VP (or a complement IP whose subject is controlled by the matrix thematic subject) embedded under 'come'.

(22) $[_{IP}$ $[_{VP}$ woman $[_{V'}$ come $[_{VP}$ $[_{V'}$ see man]]]]]

To sum up this section, there is good evidence that Lango allows NP-Movement to the Spec of IP in active clauses and that this movement is not limited to the thematic subject. This indicates that Lango does not generate the thematic subject in the Spec of IP, but in some lower position such as the Spec of VP. A survey of the behavior of such NP-fronting constructions in Lango suggests that Lango probably does not allow Topicalization or Left Dislocation as alternate means of fronting NPs. Lango does allow clefting and relativization, but the behavior of these constructions is very different from that of NP-fronting constructions.

Now let us turn to some related theoretical implications of this analysis involving the distribution of 'subject' properties.

2. Properties of the Two 'Subject' Positions

Noonan and Bavin Woock (1978) show that some, but not all of the properties of 'subjects' can be taken over by a fronted NP.
The fronted NP preferentially usurps the ability to be the antece-dent of a logophoric pronoun subject of an embedded clause as well as the ability to launch floated quantifiers. However, the thematic subject retains the ability to trigger subject agreement on the verb, the ability to be a controlled PRO, and the ability to be the antecedent of a reflexive, even if another NP fronts.

Assuming that NP-fronting can move an NP to the Spec of IP in Lango while the thematic subject remains in its base position, this data is relevant to our understanding of precisely what notion of 'subject' is actually relevant for these properties. In a language like English where the thematic subject is forced to move to the Spec of IP, it is difficult to determine whether properties of 'subjects' are properties of the Spec of IP, or of something else such as AGR (subject agreement) or the thematic subject itself. For example, the fact that only a subject can be a controlled PRO in English is derived in Chomsky (1981) from the fact that only the subject position (Spec of IP) can provide the ungoverned environment that PRO needs. In contrast, Borer (1989) argues that PRO in control constructions is limited to subjects because

what is actually controlled is not PRO itself, but AGR. The Lango data is relevant to this debate because it shows that occupying the Spec of IP is not sufficient to enable an NP to be a controlled PRO. Only the thematic subject can be a controlled PRO, even if some other NP fronts to the Spec of IP. (23) shows an ordinary control construction without NP-fronting where the PRO in the lower clause is the thematic subject of that clause. In (24), the PRO is the object of the lower clause which has been fronted to the Spec of IP of that clause. The thematic subject of that clause is the overt NP, 'the man'. The ungrammaticality of this example indicates that an NP other than the thematic subject cannot be a controlled PRO, even if it occupies the Spec of IP.

(23) (Noonan and Bavin Woock (1978 (17b)))
a. dákó òmítɔ̀ jwàttò lócà
woman wanted to-hit man
'The woman wanted to hit the man.'

b. woman$_i$ wanted [PRO$_i$ to hit man]

(24) (Noonan and Bavin Woock (1978 (17d)))
a. *dákó òmítɔ̀ lócà jwàttò
woman wanted man to-hit
'The woman wanted the man to hit her.'

b. woman$_i$ wanted [PRO$_i$ man to hit t_i]

As expected under Borer's (1989) account, the ability to be a controlled PRO correlates with the ability to trigger subject agreement.[11] That is, only the thematic subject can trigger subject agreement on the verb in Lango, just as only the thematic subject can be a controlled PRO. In (25b), we see that the fronted object is first person, but the agreement on the verb remains third person, matching the thematic subject 'stone'.

(25) (Noonan and Bavin Woock (1978 (14)))
a. gwén òcélá
stone 3sg-hit-1sg
'The stone hit me.'

b. án gwén òcélá
1-sg stone 3sg-hit-1sg
'The stone hit me.'

The third property that is retained by the thematic subject even if some other NP fronts is the ability to be the antecedent of a (subject oriented) reflexive. In the example below, the fronted object NP cannot be interpreted as the antecedent of the reflexive; only the thematic subject can.

(26) (Noonan and Bavin Woock (1978 (18)))
a. loca òkwáò dákó pìré kènè
man asked woman about self
'The man asked the woman about himself (*herself).'

b. dákó 'lócà òkwáò pìré kènè
woman man asked about self
'The man asked the woman about himself (*herself).'

This indicates that the external subject position (Spec of IP) is not the notion of 'subject' that is relevant for subject-oriented reflexives.

In contrast to these three 'subject' properties that cannot be usurped by a fronted NP, there are two other 'subject' properties that are preferentially taken over by a fronted NP. The first of these is the ability to be the antecedent of a logophoric pronoun subject of an embedded clause. The ordinary form of the subject agreement in Lango is interpreted as indicating switch-reference, according to Noonan and Bavin Woock (1978). That is, the null subject of an embedded clause in an example like (27) has to be interpreted as disjoint in reference to the subject of the matrix clause.

(27) (Noonan and Bavin Woock (1978 (9a)))
dákó òkóbò ní òcámò rìŋó.
woman said that 3sg-eat meat
'The woman$_i$ said that he/she$_j$ would eat meat.'

To indicate coreference between these subjects, a different form of the subject agreement marker must be used on the lower verb. When this non-switch reference marker (logophoric pronoun) is used, the subject of the lower clause must be interpreted as coreferent with the thematic subject of the upper clause in examples like (28).[12]

(28) (Noonan and Bavin Woock (1978 (10a)))
dákó òkóbbì lócà ní é'bínó dɔ̀k
woman told man that 3sg-go back
'The woman$_i$ told the man that she$_i$ will go back.'

What is interesting is the fact that if some other NP fronts to the Spec of IP, it is the fronted NP that is interpreted as coreferent with the subject of the lower clause.[13]

(29) (Noonan and Bavin Woock (1978 (10b)))
lócà dákó òkóbbì ní é'bínó dɔ̀k
man woman told that 3sg-go back
'The woman told the man$_i$ that he$_i$ will go back.'

This data shows that the thematic subject does not retain the exclusive right to be the antecedent of a logophoric subject pronoun/agreement marker in Lango.

The second 'subject' property that is preferentially usurped by a fronted NP is the ability to launch floated quantifiers. When no other NP has fronted, a floated quantifier is interpreted as modifying the thematic subject, as in (30b). Inside an NP, a quantifier follows the head noun, as in (30a). The quantifier occurs in immediate postverbal position when it has been 'floated', as in (30b).

(30) (Noonan and Bavin Woock (1978 (11)))
a. àwóbé dúcú òcémɔ̀
boys all ate.
'All the boys ate.'

b. àwóbé òcémɔ̀ dúcú
boys ate all
'The boys all ate.'

When another NP fronts, however, that fronted NP is interpreted as modified by the quantifier.

(31) (Noonan (1981, 77))
a. rwòt ònÉnò gwóggí 'dúcú
king 3sg-see-perf dogs all
'The king saw all the dogs.'

b. gwóggí rwòt ònÉnò dúcú
dogs king 3sg-see-perf all
'The king saw all the dogs.'

The thematic subject cannot be interpreted as having floated the quantifier unless it is impossible to interpret the fronted NP as being modified by the floated quantifier (Noonan (1981, 183)).

Since neither of these last two properties are exclusive to the fronted NP, it cannot be said that they are inherently linked to the Spec of IP. However, it might be correct to say that they are linked to the highest suitable NP in the clause.

3. Conclusion

This paper has argued that Lango has the structure proposed for SVO languages in work such as Koopman and Sportiche (1988). That is, Lango shows evidence that its thematic subject is not generated in the Spec of IP, but in some lower position such as the Spec of VP, while the Spec of IP is generated empty. Unlike SVO languages like English, Lango allows NP arguments other than the subject to move to the Spec of IP in active clauses. The behavior of this NP fronting construction is unlike Topicalization or Left Dislocation. This account formalizes and strengthens Noonan and Bavin Woock's (1978) claim that Lango has a rule that fronts NPs to sentence initial position inside the clause and that this process is something like a passive, although the sentence remains active.

The distribution of subject properties described by Noonan and Bavin Woock (1978) indicates that the Spec of IP is not the relevant notion of subject for three 'subject' properties: the ability to trigger subject agreement, the ability to be a controlled PRO, and the ability to be the antecedent of a subject oriented reflexive. These properties are linked to the thematic subject. In contrast, the Spec of IP is the preferred location in Lango for the antecedent of a logophoric pronoun subject of an embedded clause and for floating quantifiers.

Notes

[1]Kuroda (1988) generates the thematic subject in the Spec of VP. The structure proposed in Koopman and Sportiche (1988) is slightly more complex. The thematic subject is generated as the subject of a small clause whose predicate is the VP. This small clause is dominated by an additional node, V^n. For simplicity, it will be assumed here that the thematic subject is generated in the Spec of VP in Lango.

[2]Under the proposal in Koopman and Sportiche (1988), the thematic subject is forced to move to the Spec of IP because it cannot get case in its base position. The standard definition of an A-Position (see Chomsky (1981)) is revised so that the Spec of IP qualifies as a potential target of NP-Movement, even though it is not a potential theta position under their proposal.

[3]Noonan (1981, 55) notes that bilingual Lango-English speakers translate such NP-Fronting examples into English, not as Topicalized constructions, but rather as passives, even though this construction is clearly active in Lango. This supports the view that such constructions in Lango involve movement to the Spec of IP, as in the English passive.

(i) (Noonan (1981, 55))
án rwòt ònÈná
I king 3sg-see-perf-1sg
'I was seen by the king.'

[4]An NP-Movement account of examples like (2) and (3) raises questions about how case is assigned in Lango. If Lango allows the thematic subject to remain in its base position at S-Structure, case must be assigned to this position, in contrast to English (see note 2). Under the standard view of NP-Movement (see Chomsky (1981)), NP traces cannot occur in case-marked positions; thus, if Lango allows NP-Movement in active construc-tions, case assignment must be optional in this language. In addition, Lango must have the ability to assign case to the NP in Spec of IP and to the thematic subject NP at the same time. This analysis is assumed here, but the possibility exists that Lango allows movement from a cased position to a caseless Spec of IP. Under that view, the Spec of IP would be viewed as an A'-position.

[5]Noonan (1981, 204) notes, however, that fronting an NP out of subordinate clauses is somewhat less acceptable than fronting within a clause.

[6]Noonan (1981) refers to this construction as Topicalization.

[7]Moreover, examples like the following show that the complementizer does not block the extraction of subjects in cleft constructions in Lango.

(i) (Noonan (1981, 177))
òg wàng Énn àmÉ àwínyò ní àlábà àkòbbò ní òcwê
O. it rel 1s-hear-perf that A. 3s-say-prog that 3s-become +fat-perf
'It's Ogwang that I heard Alaba was saying (that) was fat.'

[8]This form of the verb 'steal' is labeled subjunctive in examples in Noonan (1981, 180).

[9]In the paratactic construction, both clauses are fully inflected, but there is no complementizer or conjunction. The subject of the second clause must be non-overt and identical in reference to an argument of the first clause (Noonan (1981, 116)).

[10]Note that the presence or absence of object agreement on the verb has nothing to do with this contrast. In (17c), forms with and without object agreement are shown and both are ungrammatical.

[11]However, in languages with dative subjects, the ability to be a controlled PRO does not always correlate with the ability to trigger subject agreement (see Cole, et al. (1978)). This may indicate that only the thematic subject (the most prominent argument in the argument structure in Grimshaw's (1990) terms) can be a controlled PRO.

[12]While Noonan and Bavin Woock (1978) describe this as switch reference, this type of agreement is referred to as a logophoric pronoun in other African languages (see Clements (1975)).

[13]The thematic subject can be the antecedent only if the fronted NP cannot be (e.g. because of a feature mismatch) Noonan (1981, 182).

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The Berkeley Linguistics Society is a graduate student organization at the University of California, Berkeley. The Society holds its annual meeting during Presidents' Day weekend in the middle of February. The meeting consists of three parts: a General Session on topics of varied linguistic interest, a Parasession on a particular linguistic topic, and, beginning in 1990, a Special Session on general linguistic topics of a certain geographic area. Around the middle of September, a Call-for-Papers is sent to those on our mailing list, and abstracts of papers are due around the middle of November. After reviewing and selecting the abstracts, the Society sends out the conference program in early January. The Proceedings of the conference are published yearly by the Society and become available in the fall. Order forms for proceedings are mailed with the Call-for-Papers and can be obtained from the above address. All orders require prepayment.

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