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ABSTRACT ANALYSIS AND BANTU RECONSTRUCTION: A LUGANDA EXAMPLE

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1. Introduction

The pioneering work done by European linguists in comparative Bantu phonology provides a solid foundation on which present-day generativists can build. The traditional comparative method used in these studies, however, leaves a number of questions unanswered concerning such problems as the exact form of phonological rules, their relative ordering, and so forth. What I hope to do in the present paper is to show how the types of problems which theories of comparative Bantu are capable of handling can be expanded by incorporating into the comparative method abstract levels of analysis adapted from the theory of generative phonology. This welding of traditions can contribute new and deeper insights, while affirming what is sound in the early work.

An example of the thoroughness of the pioneering studies in the Bantu family is Malcolm Guthrie's Comparative Bantu [1967-71]. However, it is not clear from the presentation of forms where Guthrie's starred items fit into the over-all grammatical description of the hypothesized proto-language, in terms of such problems as allomorphy and phonemic distribution. For example, he frequently supplies two or more reconstructions where it looks obvious that we would want to trace all the entries to a single source item, e.g. *-joka, *-yoka.. 'snake'; *-nama, *-yama .. 'meat'. Although Guthrie provides some discussion of the relationships of such pairs in his notes, this is not an integral part of his method and the original distinctions are poorly motivated. Another set of generalizations which Guthrie's system fails to capture is the distribution of phonological segments within the reconstructed list. For example, the segment *j is found only in nasal clusters, while *y occurs intervocalically; consequently, the apparent contrast between the initial consonants of the stems *-jobe 'antelope' and *-yoyo 'heart' is really a function of the fact that *-jobe normally takes the Class 9 prefix

*N- (a homorganic nasal), while *-yoyo takes the Class 3 prefix *mu-.

In brief, then, Guthrie's methodology for comparative Bantu work fails to characterize the phonological system of the parent language, and the details of development in the individual daughter languages. This may not have been a specific goal of his four-volume study, but it is certainly one that linguists have to deal with at some point. The purpose of this essay is to tackle that problem through a reconstruction based on the morphophonemic alternations within a single Bantu language, Luganda. The analysis is consistent with the reconstruction of Luganda presented in Meeussen [1955], but goes beyond that study through the introduction of generative-type rules written in a sequence ordered across time.

2. Phonological Rules

2.1 Luganda j and y. As noted above for Proto-Bantu, we find in Luganda that the affricate j occurs in nasal clusters, while the palatal glide y occurs intervocalically (and initially; these environments are pretty well exhaustive, since a nasal-plus-obstruent is the main consonant cluster in Luganda). This gives rise to the following phonological alternations when there is a change in the nominal prefix of certain stems (the surface break between prefix and stem is marked by a hyphen):

(1)	eñ-jovu[1]	'elephant'	DIM	aka-yovu	'little elephant'
	eñ-julu	'reeds for making baskets'	sg.	olu-yulu	

The alternation also occurs in verb stems, in the contrast of the infinitive prefix oku- and the first person, singular marker N-. For example:

(2)	oku-yiga	vs.	ñ-jiga	'I learn'
	oku-yita		ñ-jita	'I call'

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[1]Tone is not marked since it is not relevant to the concerns of this paper. The initial vowel of all nominal prefixes can be deleted, for syntactic reasons.

The main source of data was: E. Ashton, E. Mulira, E. Ndawula, and A. Tucker [1954].

The change can be described-by a rule of the form:

R.1 y-Formation

$$j \rightarrow y \;/\; [-nas]\ \_\_\_$$

When y is followed by a non-high vowel (e, a, o), it is generally deleted (there are some exceptions such as okuyaamba 'to help', for which I can provide no principled explanation). For example:

(3)	eñ-jala	'finger-nails'	sg.	olw-aala
	eñ-jeyo	'brooms'		olw-eeyo
	ñ-jagala	'I love'	INF	okw-aagala
	ñ-jera	'I sweep'		okw-eera

The above data call for a rule of the form:

R.2 y-Loss

$$y \rightarrow \emptyset \;/\; [+syll]\ \_\_\_ \begin{bmatrix} +syll \\ -hi \end{bmatrix}$$

Note that after y-Loss has applied, a rule of Devocalization applies to the u of the prefix olu- or oku-, with compensatory lengthening of the following vowel. Thus, olwaala can be derived synchronically from underlying olu-jala, by the successive application of y-Formation, y-Loss, and Devocalization (olu-jala → oluyala → oluala → olwaala).[2]

2.2 Meinhof's Rule. In some stems in which, according to the above rules, we would expect to find a j, we in fact find ñ. For example:

(4)	eñ-ñuumba	'house'	DIM	aka-yuumba
	ñ-ñiimba	'I sing'	INF	oku-yiimba
	ñ-ñoongera	'I add to'		okw-oongera

What the stems above have in common is that the initial j segment is followed by a nasal consonant in the next syllable; it is in this environment that 'Meinhof's Rule' applies, a process whose form and distribution has been described in a preliminary way in Meeussen [1962]. Meinhof's

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[2]Rules governing the initial vowel o and the consonant l have been ignored.

Rule converts a nasal cluster whose second member is a voiced non-continuant to a geminate nasal cluster, whenever a nasal consonant follows in the next syllable. For example:

(5)	em-maambo	'peg'	DIM	aka-baambo
	eŋ-ŋoombe	'horn for blowing'		aka-goombe
	en-nimiro	'(garden) plot'		aka-limiro
	n-niinda	'I wait'	INF	oku-liinda
	ŋ-ŋaamba	'I say'		oku-gaamba
	m-muumba	'I mould clay'		oku-buumba

Note that where we expect d above, we find l. The alternation of d and l is illustrated more clearly in stems such as:

(6) n-deeta 'I bring' INF oku-leeta

The rule that converts d to l is parallel to y-Formation, and has the form:

R.3 Lateralization[3]

$$d \rightarrow l \;/\; [-nas] \_\_\_$$

To return to Meinhof's Rule, the form of that rule is:

R.4 Meinhof's Rule

$$\begin{bmatrix} -cnt \\ +voi \end{bmatrix} \rightarrow [+nas] \;/\; [+nas] \_\_\_ [+syll]_1^2 [+nas]$$

Given these rules, the forms eññuumba and akayuumba (cf. (4) above) can be derived from the underlying forms eN-juumba and aka-juumba respectively, with application of Meinhof's Rule in the former case and y-Formation in the latter.

2.3 Consonant Gemination. The next problem we need to consider is the form of the Consonant Gemination rule in Luganda. Obstruents and nasals can all occur in geminate clusters, which are predictable by a general

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[3] The segments l and r are in complementary distribution. In general, r occurs after front vowels, l elsewhere.

rule.[4] The major clue to this process is found in verb stems with initial geminate clusters. When the first person, singular marker is added to stems of this type, the following changes take place:

(7)	n-zíta	'I kill'	INF	oku-tta
	n-zíba	'I steal'		oku-bba
	n-zígala	'I shut'		oku-ggala

Note that when the nasal prefix is added, the CC cluster is replaced by a sequence zíC. The underlying source of this z segment is suggested by stems with an initial nasal:

(8)	ñ-ñíma	'I begrudge'	INF	oku-mma

The appearance of ñ in the place of z in this verb indicates the operation of Meinhof's Rule on an underlying j (that is, N-jíma -> ñjíma -> ññíma). Suppose now that we started out in the infinitive form as well with -jíma. According to the rules already developed, j would be in inter-vocalic position and y-Formation would apply. Since y-Loss does not apply when there is a following high vowel, the form would have been realized as *okuyíma at the time that Consonant Gemination was introduced into the language. In other words, we would have the development: *okuyíma > okumma; in more general terms, yíC > CC. This is the form of the Gemination rule which I will propose here,[5] with one important modification. It is necessary in modern Luganda to distinguish two types of high front vowels, according to the rules which these segments undergo (rather than by any phonetic distinction). For example, the (underlying) í of the Causative extension (/-í-/) in verbs causes spirantization of a preceding non-continuant (with fronting to the position of s or z), whereas the í of the Applicative extension (/-íd-/) does not cause spirantization but does undergo vowel harmony, that is:

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[4]Although most geminate consonants arise from the Consonant Gemination rule (cf. Mould 1974) nasal geminates also arise from the operation of Meinhof's Rule. Cf. the forms in (4) and (5).

[5]The form of this rule follows both Guthrie and Meeussen.

(9)	-lima	'cultivate'	Cs.	-limya	Ap.	-limira
	-siga	'plant'		-siza		-sigira
	-genda	'go'		-genza		-gendera
	-weta	'bend'		-wesa		-wetera
				(<-wet-i-a)		(<wet-ir-a)

(In the Causative forms, the devocalized i is deleted after s or z; the clusters sy and zy do not occur in Luganda.) The two i's of the synchronic grammar reflect the Proto-Bantu phonetic contrast between 'close' *ɩ and the more open high front vowel *i (this fact is well established in the literature on the basis of comparative studies). Since the i involved in the Gemination rule also triggers Spirantization (cf. (7) above), it can be identified historically with *ɩ. The diachronic description of the Gemination rule is therefore:

R.5 Gemination

$$yɩC \rightarrow CC$$

The historical contrast of *ɩ and *i thus accounts for the present difference between forms such as okutta 'to kill' (*okujɩta) and okuyita 'to pass' (*okujita).

The relevant form of the Spirantization rule illustrated in (9) is:

R.6 Spirantization

$$[-cnt] \rightarrow \begin{bmatrix} +cnt \\ +ant \\ +cor \end{bmatrix} / \_\_\_ \ ɩ$$

Given all of the foregoing rules, the stages in the historical development of the forms kumma, kubba, ññima, and nziba can be schematized as below:

(10)	*kujɩma	*kujɩba	*ñjɩma	*ñjɩba
y-For	kuyɩma	kuyɩba		
M's R			ññɩma	
Spir				nzɩba
Gem	kumma	kubba		
Vow-Lax			ññima	nziba

There are a number of interesting points in the chronological ordering of the consonant rules above. For example, y-Formation blocks the later application of Spirantization to intervocalic j's, because their surface realization when the spirantizing rule was introduced was a glide y and not a non-continuant. At the same time, y-Formation preserves (and creates) historically the environment for the later development of Gemination. Moreover, note that Meinhof's Rule takes precedence over Spirantization (thus, ññima, NOT nzima --because the earlier rule blocks the later one). Thus, the analysis suggests that Meinhof's Rule is a very old process, and thereby gives independent support to a hypothesis put forward by Meeussen [1962], on the basis of comparative work: "Reviewing all the evidence, one gains the impression that Meinhof's rule dates back to Proto-Bantu, at least for the eastern half of its distribution."[6]

2.4 Palatalization. I would now like to turn to the recovery of a historical rule for Luganda which is no longer productive of any surface alternations in the language. I will try to show that by inferring such a (completely abstract) rule, we can provide a simple and natural explanation for a number of linguistic facts.

Class 5 nouns with simple initial consonants have, in place of a prefix of the form (V)CV-, a gemination effect on the initial segment. For example:

(11)	eppeesa	'button'	pl.	ama-peesa
	ettabi	'branch'		ama-tabi
	effumu	'spear'		ama-fumu

However, stems in this class with an initial vowel or geminate cluster take the prefix eri-, as the following examples show:

(12)	eri-ñña	'name'	pl.	ama-ñña
	eri-ññó	'tooth'		ama-ññó

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[6] A. E. Meeussen [1962:27].

ery-aato	'canoe'	ama-ato
ery-eemvu	'banana'	ame-emvu[7]

On the basis of the Gemination rule we already have, we would want to derive the stem -ññа from *-j|ña (cf. Swahili jina, majina 'name(Xs)'), in the derivation: *edij|ña > eriy|ña > eriñña. In a parallel manner, ettabi 'branch' could be derived from *ej|tabi -- that is, if the prefix were *ej|- rather than *eri-, the behaviour of stems with an initial simple consonant would be straightforward. I propose to reconstruct this prefix as *(e)d|-, and add a Palatalization rule, ordered before y-Formation, of the form:

R.7 Palatalization

$$d \rightarrow j \;/\; \_\_\_\; |$$

The steps in the derivation of ettabi will then be: *ed|tabi > ej|tabi > ey|tabi > ettabi. (The fact that Palatalization has not applied to the prefix in forms such as eriñña and eryaato will be discussed below.)

Evidence that Proto-Bantu *| has exerted a palatalizing influence on consonants is not lacking within Luganda, nor in comparative Bantu studies. For example, the Spirantization rule incorporates a process of assimilation, so that the following changes take place:

(13) $\begin{matrix} p & t & c & k \\ b & d & j & g \end{matrix} \rightarrow \begin{matrix} s \\ z \end{matrix} \;/\; \_\_\_\; |$

Meeussen[8] notes as well the development n > ñ under the influence of *|, in forms such as:

(14) omugeñi	'stranger'	-gen|	Gr
ensoñi	'shame'	-con|	Gr

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[7]The second vowel of the prefix assimilates to the following vowel (that is, ama-emvu --> ameemvu).

[8]Meeussen [1955:173]. The abbreviation Gr indicates that the reconstruction is from Greenberg.

A Palatalization rule would help to explain another observation by Meeussen, namely:[9] "Le grand nombre de thèmes verbaux commençant par *j| en bantou commun est assez surprenant; la même chose vaut pour le thème nominal...;" the proposed Palatalization provides at least two underlying sources for *j|- that is, *d| and *j|. Furthermore, the rule gives one clue to the relationship among the four forms of the Class 5 prefix that Guthrie reconstructs: *d|-, *dl-, *y|-, *yl-. There is independent support in the residual form j|- of the Class 5 prefix in Swahili (j|- is found before monosyllabic stems of this class).[10] And finally, the Palatalization rule provides a simple and natural explanation for the behaviour of d and j in Luganda, and greatly simplifies the grammar.

2.5 'Perfect' stem. To see how that works, we need to consider another set of alternations in verb stems. Besides a Causative and an Applicative extension, every verb stem has a modified or 'Perfect' form that derives originally from the stem plus the suffix *-|de (this is clear from comparative evidence).[11] In Luganda, however, a number of phonological processes have affected this suffix, producing considerable surface allomorphy. The stem alternations that interest us here are those that affect stems with final l. For example:

(15)	-lokola	'save'	Cs.	-lokoza	Pf.	-lokodde
	-kebera	'look at'		-kebeza		-kebedde

The rules (R.7, R1-6) presented above, give the following derivation for -lokoza: *-dokod|a > -dokoj|a > -lokoy|a > ?. The problem here is that y-Formation has been allowed to apply in a place where we want to preserve j so that Spirantization can apply. A simple remedy that is consistent with all other cases of a similar sort is to constrain the environment of y-Formation so that it only applies if there is a following

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[9] Meeussen [1955:177].

[10] Cf. Hinnebusch [1973] for further discussion concerning the derivation of Class 5 prefix forms from *d| (or conversely *l|).

[11] Cf. Mould [1972] for a somewhat different view of the 'Perfect' stem.

vowel and a consonant (the constraint is relevant only to verbs, however; cf. omwooyo 'heart' > *omujojo). It is then possible to derive -lokoza and -lokodde historically in the following way:

(16)

	*-dokod|a	*-dokod|de
Palatal.	-dokoj|a	-dokoj|de
y-For/Lat	-lokoj|a	-lokoy|le
Spir	-lokoz|a	---
Gem	---	-lokodde[12]
Devoc, etc.	-lokoza	---

Note how the operation of Spirantization will in every case wipe out the evidence for the Palatalization rule, since the environments for the two are the same. Moreover, note how Palatalization prevents Lateralization from applying to the second underlying d in -lokoza; if this d had not palatalized, we would have been forced either to incorporate l into the Spirantization rule, or to prevent Lateralization from applying in an ad hoc manner, or to claim that Spirantization has been inserted into the grammar ahead of Lateralization. None of these solutions is as simple or effective as the Palatalization rule.[13]

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[12]The fact that l geminates as dd is considered here as a phonetic fact.

[13]A slight complication with mono-syllabic l-final stems involves the loss of the consonant of the suffix and the retention of the second consonant of the stem. The Perfect form of these stems is parallel to stems such as -lima and -leeta; that is:

-lima	'cultivate'	Cs.	-limya	Pf.	-limye
-leeta	'bring'		-leesa		-leese
-kola	'work'		-koza		-koze
-gera	'weigh'		-geza		-geze

The Cuasative forms are regular, but the Perfect forms indicate a loss of the consonant suffix (a change that appears to be morpheme-specific). All of the stems above can be derived correctly, however, if we include a step that deletes the consonant at the proper point, and if we add a constraint to y-Formation to the effect that it cannot apply to the second consonant of a monosyllabic verb stem. The historical development of -leese, -limye, and -koze will then be represented as:

2.6 Class 5 prefix. Let's return finally to the question of the Class 5 prefix in Luganda. The three types of stems in this class are illustrated again below:

(17) eri-ñña 'name' pl. ama-ñña
ery-aato 'canoe' ama-ato
ejjiba 'dove' ama-yiba

Some stems that are similar to ejjiba have an alternate form parallel to eryaato. For example:

(18) ejjovu OR eryoovu 'foam'

Certain adjective stems also have alternate forms with the Class 5 prefix:

(19) ejjiinsi ejjatifu OR eryaatifu 'cracked stone'
cf. entamu eñjatifu 'cracked cooking-pot'
ejjeembe ejjole OR eryoole 'carved horn'

If we reconstruct ejjovu 'foam' as *ed|jovu, we can derive it in two ways. In one derivation, we allow Palatalization and y-Formation to apply to the first consonant (d), but suppress them in the second consonant because they have already applied in a neighbouring segment. Thus: *ed|jovu > ej|jovu > ey|jovu > ejjovu. In the other derivation, we reverse the situation: y-Formation applies to the second consonant, and both Palatalization and y-Formation are suppressed in the first, giving Lateralization a chance to operate. Thus: *ed|jovu > er|yovu > er|ovu > eryoovu. In each case, a similar principle is at work; that is, the behaviour of one consonant with respect to certain rules is influenced by the rules that a consonant immediately to the right or left is subject to. Note that in the first derivation, the principle of suppression makes the operation of Gemination straightforward, by eliminating

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	*deet|de	*dim|de	*kod|de
Palat.			koj|de
y-For/Lat	leet|le	lim|le	koj|le
Spir	lees|le		koz|le
l-Delet	lees|e	lim|e	koz|e
Devoc.	leese	limye	koze

the necessity of deriving ejjovu historically from *ey|yovu (thus, new rules are always allowed to operate on surface strings). On the other hand, the suppression of Palatalization in the prefix allows Lateralization to apply, and this in turn blocks Spirantization. This provides further evidence that Spirantization did <u>not</u> apply to those (underlying) d's that were realized as l's at the time of the introduction of Spirantization; and therefore, there must have been a Palatalization rule which converted d to j and so preserved it as a candidate for the spirantizing rule in forms such as -lokoza, -kebeza, etc. (cf. (15) above).

The notion of rule suppression was first suggested to me by the following pair of forms presented in Meeussen [1955]:

(20)	empisi	'kidney'	-p|t|	Mh[14]
	emfudu	'tortoise'	-kudu	Gr

In each case, Spirantization has been suppressed in one segment, after having applied in a neighbouring one. In empisi, the consonant that precedes is affected; in emfudu, the consonant that follows.

3. Conclusion

The use of abstract rules in the foregoing analysis has, in effect, added to Meeussen's description of Luganda history a third dimension. The technique proves to be a powerful tool, for it makes possible inferences about phonological processes which are only indirectly attested by the information in the surface phonological strings of the modern language. The use of abstract rules, ordered across time, can thus help to recover considerably more information concerning the history of the Bantu languages than the simple comparative method. Moreover, such rules are capable of revealing many of the fundamental grammatical regularities of a language such as Luganda.

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[14] Mh = Meinhof, Gr = Greenberg.

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