STUDIES
in
AFRICAN LINGUISTICS

JULY 1977
Volume 8, Number 2

Published by the Department of Linguistics
and the African Studies Center
University of California Los Angeles

STUDIES IN AFRICAN LINGUISTICS

Published by the Department of Linguistics
and the African Studies Center
The University of California, Los Angeles

Editorial Board

Baruch Elimelich
Victoria Fromkin
Talmy Givon
Jean-Marie Hombert
Leon C. Jacobson
Masizi Kunene
Peter Ladefoged
Carol Lord
Thomas Penchoen
Paul Schachter
Benji Wald
William E. Welmers

Associate Editors

John Eulenberg, Michigan State
Robert Hetzron, UCSF
Larry Hyman, USC
William R. Leben, Stanford
A. E. Meeussen, Tervuren
Martin Mould, USC
Paul Newman, Leiden
Thomas H. Peterson, CSULA
Carol Myers Scotton, Michigan State
Herbert Stahlke, Georgia State
Erhard Voeltz, Honolulu, Hawaii

Joint Editors

Thomas J. Hinnebusch
Russell G. Schuh

Editorial Assistance

Alice McGaughey
John Singler
Ann West

Subscription: Individuals: $ 8.00 per volume

Institutions: $12.00 per volume

Single issues: $ 4.00

Supplements: $ 8.00 (if ordered separately or in back order)

(Air mail rates are available upon request)

Make checks payable to: African Studies Center

Studies in African Linguistics is published three times a year. Supplements are independently financed and are sent free of charge with current subscriptions. Authors receive 25 free offprints of published articles. Papers submitted to the journal should be sent in triplicate.

For subscriptions and editorial information, please write:

The Editors, Studies in African Linguistics
Department of Linguistics
University of California
Los Angeles, CA 90024

Volume 8, Number 2, July 1977

Copyright 1977
By the Regents of the University of California

STUDIES IN AFRICAN LINGUISTICS

Volume 8, Number 2
July, 1977

TABLE OF CONTENTS

Articles

Gerard M. Dalgish, PERSONAL PRONOUNS, OBJECT MARKERS, AND SYNTACTIC EVIDENCE IN DHO-LHO 101

Mirjana Trifković, TONE PRESERVING VOWEL REDUCTION IN LENDU 121

John Kalema, ACCENT MODIFICATION RULES IN LUGANDA 127

Robert K. Herbert, MORPHOPHONOLOGICAL PALATALIZATION IN SOUTHERN BANTU: A REPLY TO SEGMENTAL FUSION 143

Jean-Marie Hombert, CONSONANT TYPES, VOWEL HEIGHT AND TONE IN YORUBA . 173

Conference Report

COLLOQUE INTERNATIONAL DU CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE: EXPANSION BANTOUE 191

Announcements

Discourse across Time and Space and *Haya Grammatical Structure* 195

Corrigenda 197

Studies in African Linguistics
Volume 8, Number 3, July 1977

PERSONAL PRONOUNS, OBJECT MARKERS, AND SYNTACTIC EVIDENCE IN DHO-LUO

Gerard M. Dalgish
University of Dar es Salaam

This paper discusses the behavior of personal pronouns and the corresponding personal pronoun object markers in Dho-Luo. When pronouns and NP's are the targets of certain syntactic rules, they trigger different verbal coding properties. These differences are shown not to be based on grammatical relations, since in all cases pronouns and NP's of equivalent grammatical status are compared. A constraint against preposition stranding is also discussed. In the second section, the analysis of verbal coding triggered by pronouns, and the constraint against preposition stranding are combined to account for certain grammaticality judgments; an explanation for these results is based on the notion of contradictory verbal marking vis-à-vis the intended strategy or function of the rules in question. The paper concludes with a discussion of passive in Dho-Luo, in which the appearance and behavior of object markers provide evidence pertaining to recent claims in the theory of Relational Grammar.

0. Introduction

This paper discusses a number of syntactic phenomena in Dho-Luo, a Nilo-Saharan language spoken in Tanzania and Kenya[1] with special emphasis on the behavior and characteristics of personal pronouns (pro's) and the corresponding pronominal object markers (OM's). The first section discusses the differences between pro's and non-pronominal noun phrases (NP's) when these are targets of the rules of Topicalization (TOP), Passive (PSV), Clefting (CLF), and the rule or rules presumed to derive sentences like 'X is good/bad/etc. to VERB' from underlying structures resembling 'to VERB X is good/bad/etc.'.

---

[1] I would like to thank the speakers of Dho-Luo I consulted in gathering the data for this paper: Mr. M. Yambo from Kenya and Mr. Osoro of Tanzania. In addition I am grateful for the funds provided by the Illinois Project on Universals of Grammatical Organization and Rule Interaction, and for funds provided by Mr. E.D. Elderkin of the Department of Linguistics here at Dar es Salaam. Instruction, criticism, and other helpful comments from A. Gebeyen, C. Kisseberth, J. Morgan, G. Sheintuch and E.C. Morava are gratefully acknowledged.

Since the latter rule will be shown to differ significantly from Tough-Movement (TGH), it will be referred to as TGH-2.

The second section discusses the rules of TGH, TGH-2, and PSV. Arguments based on the behavior of pro's and OM's are crucial in this discussion, since these elements provide evidence for the establishment of grammatical relations and, by implication, evidence for relation-changing processes. TGH and TGH-2 are shown to differ in their effects on grammatical relation change. This difference--in conjunction with other conditions concerning verbal marking and preposition-stranding--helps to account for certain otherwise puzzling grammaticality judgments. The data and analysis of Dho-Luo PSV provides empirical evidence testing two recent proposals formulated in the context of the theory of Universal or Relational Grammar.

A simplified[2] sketch of the morpho-syntax of Dho-Luo is given below. The SVO word order appears to be the neutral pattern, and various permutations dependent on emphasis are also allowed. Prefixal subject markers (SM's) appear in agreement with self-standing pro's, but the appearance of the latter seems to be optional. When NP's are subjects, SM's do not appear.[3] OM's appear as suffixes under pronominalization and as the result of other processes to be discussed. In addition to verbs which allow no direct objects, and verbs which allow one direct object, there are a few "double object" verbs which permit two non-prepositional NP's (or OM's) to follow. Indirect objects may be preceded by ni[4], 'for, to', and may appear with intransitive and transitive verbs. OM's corresponding to these object types

---

[2]Simplification for the purposes of presentation in this paper involves the omission of tonal data and close phonetic transcription. I have also not indicated the phonetic dialectal differences between Kenyan and Tanzanian Dho-Luo. In some cases I have not indicated vowel deletion phenomena because the loss of such information might be confusing to the reader. Self-standing pro's are simply indicated by 'I', 'you', etc. in the morpheme by morpheme descriptions.

[3]One morpheme appears before the verb root even when NP's are subjects. This is the morpheme o-, but it marks one of the perfect tenses and should not be confused with the 3 sg. SM o-. To avoid any confusion, I have restricted data to sentences in present tenses throughout the paper.

[4]A dialectal difference here is that Kenyan Dho-Luo pronounces this element with a higher vowel than in Tanzanian Dho-Luo.

are subject to various conditions concerning clitic order and co-occurrence. Though not the major topic of this paper,[5] these conditions will nevertheless prove useful in providing arguments in later disucssions. In many of the sentences to be cited below, a verbal suffix -nga optionally appears, indicating a type of habitual/continuous activity (H/C).[6] This suffix—indisputably part of the verbal word--apears *after* various direct and indirect OM's, and therefore adequately demonstrates that certain of these OM's are not be analyzed as independent words, but as true clitics. This finding is matched by native speaker intuitions, and is reflected in the orthography,

1. Pro's vs. NP's

This section discusses certain anomalies found to obtain when pro's as opposed to NP's of equal grammatical status are the targets of various syntactic rules. We find that rules affecting pro's and NP's of equivalent grammatical status result in the obligatory appearance of OM's agreeing with these pro's, whereas NP's as targets of these same rules must *not* trigger the appearance of agreeing OM's. An explanation for these coding differences based on grammatical status cannot be maintained, since in all cases pro's and NP's of equivalent grammatical status are compared. A constraint against preposition-stranding is also illustrated; this constraint is of considerable importance in later discussions of section 2.

In the following sentences, the rules indicated have applied to pro's and NP's of equivalent grammatical status, yet we find that OM's appear obligatorily when pro's are targets, whereas (third person) OM's must not appear when NP's are targets of these rules.

	TOP		
(1)	nyithindo	Otieno	goy--o-(nga)
	children	O.	beat V (H/C)

'the children Otieno beats (is beating)'

---

[5] I hope to provide a treatment of such markers in the future.

[6] Found in OluLuyia, a neighboring Bantu language, this suffix may have been borrowed into Dho-Luo, since it is recognized by Tanzanian Dho-Luo speakers as a Kenyan innovation (cf. Dalgish [1976a]).

(TOP cont.)

(2) an Otieno goy--a------(nga)
I O. beat Om lsg (H/C)

'me Otieno beats (is beating)'

PSV

(3) nyithindo i[7]--goy--o-(nga) gi Otieno
children PSV beat V (H/C) by O.

'children are (being) beaten by Otieno'

(4) an i---goy--a------(nga) gi Otieno
I PSV beat OM lsg (H/C) by O.

'I am (being) beaten by Otieno'

TGH-2

(5) nyithindo ok ber goy--o
children not good beat V

'children are not good to beat'

(6) an ok ber goy--a
I not good beat OM lsg

'I am not good to beat'

CLF

(7) nyithindo e--ma Otieno goy--o
children is REL O. beat V

'it's the children Otieno beats'

(8) an e--ma Otieno goy--a
I is REL O. beat OM lsg

'it's I Otieno beats'

For the above odd-numbered sentences, the presence of a 3pl OM gi agreeing with nyithindo 'children' would render these sentences ungrammatical. On the other hand, in the even-numbered sentences, the absence of the lsg OM -a would also result in ungrammaticality. Thus it appears that when pro's are targets of the above rules, they obligatorily trigger the appearance of agreeing OM's, whereas when NP's of equivalent grammatical status are the targets of these same rules, no OM can appear.

---

[7]The passive marker i segmentally resembles the second person singular subject (and object) marker, but is distinguished from both tonally.

The preceding statement turns out to be too strong, however, since we do find examples in which the NP nyithindo is the target of the above rules, but an OM gi agreeing with nyithindo appears.

TOP
(9) nyithindo Otieno wach-o-ni-----gi-----(nga) wechego
children O. tell V to/for OM 3pl (H/C) news
'the children Otieno tells (is telling) the news to'

PSV
(10) nyithindo i---ndik--o-ni-gi-----(nga) barua gi an
children PSV write V to OM 3pl (H/C) letter by I
'the children are (being) written a letter to by me'

TGH-2
(11) nyithindo ok ber ter---o chiemo ir-gi
children not good bring V food to OM 3pl
'children are not good to bring food to'

CLF
(12) nyithindo e--ma Otieno chung' but--gi
children is REL O. stand near OM 3pl

It turns out that the underlined OM gi must appear in all such cases. But the absence of an OM in the above cases would result in preposition stranding; such a result is not tolerated and has not been encountered elsewhere in Dho-Luo syntax. Thus, sentences (9-12) do not really affect the validity of the claim above concerning NP's (as opposed to pro's) as targets of certain rules, since the appearance of OM's in (9-12) should be viewed as the result of an independent and not unique syntactic principle concerning bare prepositions, and not grammatical relations.[8] So, it is now clear that when pro's of a given grammatical status are the targets of certain movement rules illustrated above, they trigger the appearance of OM's. But when NP's of the same grammatical status are the targets of these rules--and when no preposition-stranding is involved--the OM's do not appear. Thus, pro's and NP's of equivalent grammatical status do not trigger the same verbal coding processes. Obviously, then, an attempted explanation of these differences in verbal coding properties cannot be based on a consideration of grammatical relations

[8] See Bayish (1978) for a brief discussion.

alone. Since there seems to be no apparent functional explanation for these differences, it might be that a diachronic account is more suitable.

2. Pro's, OM's, and Putative Grammatical Relation-Changing Rules

Although relational grammar does not provide a ready explanation for the differences in verbal coding discussed in section 1,[9] the behavior of pro's as targets of putative grammatical relation-changing rules can be investigated, and used further as the basis for conclusions concerning the effects of such rules on grammatical relations. It is the intention of this section to examine three syntactic rules--TGH, TGH-2, and PSV--in the context of grammatical relations and relation-changing rules. Sub-section 2.1 will discuss TGH and the evidence to demonstrate that it is a relation-changing process. With this in mind, we shall develop an explanation for the unexpected ungrammaticality of certain sentences. This explanation is based on the interplay of several of the factors and conditions elucidated in section 1, with the notion of TGH as a grammatical relation-changing rule. In sub-section 2.2, TGH-2 is analyzed and shown to be a rule which does *not* change grammatical relations. This fact, combined with the same factors and conditions discussed above, provides an interesting account for additional phenomena related to the above TGH data. In sub-section 2.3, PSV is discussed in the context of relation-change. There is clear evidence from Dho-Luo (1) that PSV sentences do not involve promotion of underlying objects to subjects and (2) that they contain transitive verbs, not intransitive verbs. These results are discussed in light of recent claims by proponents of relational grammar.

2.1. TGH as a relation-changing process. The following examples are both attested superficially, and it seems reasonable to derive (13b) from (13a) by a process similar to English TGH, which we may state informally as: promote the non-subject of the lower clause to subject of the higher clause and extrapose the remainder of the lower clause to the right. Thus:

---

[9]It might even be maintained that relational grammar should not be concerned with these matters at all.

(13) a. goy--a------tek
beat OM 1sg be hard
'to beat me is hard'

b. (an) a------tek goy--o
(I) SM 1sg be hard beat V
'I am hard to beat'

It seems clear that TGH is a rule which changes grammatical relations. The 1 sg SM a- before the higher verb -tek in the TGH moved example of (13b) shows clearly that the object of the lower verb in (13a), -a , has been promoted to subject. Furthermore, the *absence* of an OM a on (13b) is clear evidence that there is no longer a grammatical relation between the first person singular pro and the verb 'to beat'. As mentioned in section 1, (13b) with an OM -a would be ungrammatical.

Similar results obtain for double-object verbs. Notice that here the semantic indirect object pro may be moved:[10]

(14) a. miy--a pesa tek
give OM 1sg money be hard
'to give me money is hard'

b. (an) a------tek miy--o pesa
(I) SM 1sg be hard give V money
'I am hard to give money to'

The following data is surprising. Consider the situation in which TGH applies to the object of the preposition ni 'for, to'. We find that NP's can be moved by this rule, but that pro's may not--even though it would not be disputed that both NP and pro are of equivalent grammatical relation to the verb, i.e. that they are both objects of ni . Consider first the example below in which an NP object of ni is moved by TGH:

---

[10]The direct object pesa can be moved by TGH as well:

(14c) pesa tek miy---- a
money be hard give OM 1sg
'*money* is hard to give me'

(15) a. ndik--o ni Mary barua ŧek
write V to M. letter be hard

'to write to Mary is hard'

b. Mary ŧek ndik--o-ni-e barua
M. be hard write V to OM 3sg letter

'Mary is hard to write a letter to'

The appearance of the 3 sg OM -e in (15b) clearly replaces Mary, since a plural NP in the same slot would be replaced by the 3 pl OM -gi . The OM in (15b) is clearly there to prevent preposition-stranding; we have discussed this device earlier (cf. (9-12)). Thus, (15b) is fully grammatical.

But now consider the following:

(16) a. ndik--o-ni-a barua ŧek
write V to OM lsg letter be hard

'to write to me a letter is hard'

b. *(an) a------ŧek ndik--o-ni-(a) barua
(I) SM lsg be hard write V to (OM lsg) letter

'I am hard to write a letter to'

If (16b) were to parallel (15b)--in both cases we attempt the movement of the object of ni --we would expect full grammaticality for (16b). Notice that in (16b) we seem to have promoted the former object of the lower verb to subject of the higher verb--the SM a- preceding -ŧek shows this--and at the same time we have *not* stranded a preposition, since -a appears after ni (of course, a sentence without -a in (16b) would still be ungrammatical). The question then is: why should (16b) be ungrammatical, while (15b) is grammatical?

The answer to this puzzling question is found upon an examination of the interplay of the following conditions in Dho-Luo: (1) the nature of verbal subject marking, (2) the constraint against preposition-stranding, (3) the signalling of grammatical relations and grammatical relation changes by means of verbal marking vis-à-vis the strategy of the rule in question (in this case TGH). In what follows, I shall develop each of these conditions in more detail.

Consider first condition (1). It has already been shown that subject pro's *require* verbal subject marking, whereas subject NP's do not. Condition

(2) concerning preposition-stranding is equally straightforward: no preposition may be left "unattended"--they must be followed by an OM or NP. Condition (3) is concerned with the strategy of the rule in question, TGH. As we have seen from an examination of the non-controversial examples of TGH-sentences (13b-14b) the strategy of TGH with respect to grammatical relation change (and verbal marking) is to indicate (i) that promotion of grammatical relation takes place, signalled by the appearance of a SM on the higher verb; (ii) that the former object of the lower verb no longer bears a grammatical relationship to that verb, signalled by the absence of an OM on the lower verb. In what follows, we shall see how the above three conditions may overlap and contradict each other. It will be an appeal to such a contradiction that will help to provide an explanation for why (15b) is acceptable but (16b) is not.

Consider sentence (15b) in light of the above conditions. Note that in accordance with condition (1), no subject marker appears on the higher verb *tek*. Condition (2) is met, since the appearance of the OM *-e* after *ni* derived from the NP *Mary* serves to prevent preposition-stranding. Let us now consider the resultant verbal marking vis-à-vis the intended strategy of TGH. In (15b) it is clear that the former object of the lower verb, the NP *Mary*, has been promoted, since it appears to the left of the higher verb in subject position[11] while it no longer appears as the object of the lower verb. Although it is true that the OM *-e* appears on the lower verb to prevent preposition-stranding, this should not be construed as evidence that NP *Mary* has not been promoted. The only way to demonstrate that would be for the NP *Mary* to be left behind on the lower verb, but as expected this result is also ungrammatical:

(15) c. *Mary tek ndik--o ni Mary barua
M. be hard write V to M. letter
'Mary is hard to write a letter to'

[11] Of course, many elements can appear to the left of the verb and not be subjects. The point here is that the appearance of the NP to the left of the verb is at least compatible with claiming it is the subject, it is not intended to be definitive.

Thus although the OM -e in the grammatical (15b) "substitutes" for Mary , -e is not Mary , and so it cannot be inferred that Mary is left in the lower clause. Since Mary is not left in the lower clause--and since there is no verbal marking to the contrary--it appears that the strategy of TGH has been realized, since, as in clear cases, former objects become subjects while ceasing to bear a grammatical relation to the lower verb. Since the verbal marking of (15b) is compatible with the strategy of the TGH rule, the sentence is grammatical.

Let us now consider (16b) in greater detail. Since it is a sentence in which TGH is to have applied, we expect the strategy of the rule to result in the promotion of the underlying lower verbal object to derived subject of the higher verb, and the cessation of grammatical relations between the promoted element and the lower verb. Since condition (1) stipulates that (promoted) subject pro's trigger obligatory subject agreement, the SM a- should appear on the higher verb -tek ; this is what we attempt in (16b). However, condition (2), the constraint against preposition-stranding, would require that the OM -a appear (or remain) on the lower verb. But if we now turn to a consideration of the verbal marking vis-à-vis the strategy of the rule, we see that the resultant verbal marking signals simultaneously that (a) the first person singular pro has been promoted (as evidenced by the SM on the higher verb), and (b) the first person pro has *not* been promoted (as evidenced by the fact that there is an OM -a on the lower verb). Thus, in order to satisfy conditions (1) and (2), the grammatical relation-changing process of TGH must result in verbal marking as in (16b) which signals effects (on grammatical relations) which are contradictory to the strategy of the rule. The contradiction is that the first person singular pro seems to be simultaneously promoted and not promoted. Such contradictory verbal marking would seem to be a reasonable culprit for the ungrammaticality of such sentence types.

Now it might be thought that the OM -a appearing on the lower verb in (16b) is, like the OM -e in (15b), simply the result of the constraint against preposition-stranding, and does not signal the retention of a grammatical relation with the lower verb. Therefore the appeal to contradictory verbal marking to account for the ungrammaticality of (16b) we have made

would have no basis. It seems, however, that speakers have no way of knowing whether the -a OM in (16b) is there to prevent preposition-stranding or whether it has been—incorrectly--left behind on the lower verb. In the case of full NP's (not pro's) like Mary in (15b), speakers can tell immediately that the OM -e *replaces* Mary , and that therefore Mary is not left behind on the lower verb. Thus, the strategy of the TGH rule is satisfied. But on what basis can speakers make a similar conclusion about -a , the OM, in (16b)? That is, what would be the evidence that an -a OM *replaced* an -a OM in the derivation of (16b), parallel to the -e OM replacing Mary in (15b)? The former "replacement" process could never be independently verified, since there is no difference between the proposed "underlying" OM -a and the "replacement" OM -a . This alleged "replacement" process would clearly be ad-hoc, and I can find no evidence in Dho-Luo which would support it.

But now, if it cannot be motivated that the OM -a appearing on the lower verb in (16b) is the result of a replacement process (to satisfy condition (2), the constraint against preposition-stranding), then its appearance on the lower verb must be due to something else. If speakers avoid other exotic or fanciful derivations, the only other reasonable alternative would be to assume that the OM -a on the lower verb has simply been left there in the course of the derivation. But if -a has been left on the lower verb, this signals that -a has not been promoted, since it still bears a grammatical relation to that verb. This of course violates the strategy of the TGH rule, which requires promotion of underlying objects and the cessation of previously held grammatical relations with the underlying lower verb. It seems reasonable to conclude that if the strategy of this rule is contradicted by verbal marking, a sentence containing such contradictory marking would be judged ungrammatical. This would therefore account for the ungrammaticality of (16b).

2.2. The analysis of TGH-2. The preceding analysis, which has been shown to depend on the interplay of three conditions concerning (1) verbal subject marking, (2) the constraint against preposition-stranding, and (3) the resultant verbal marking vis-à-vis the intended strategy of the rule in question finds further support when considered with data from the syntactic

process labelled TGH-2. We shall see first that this process in Dho-Luo differs significantly from TGH; such differences are best stated in terms of grammatical relations and not in terms of structural changes alone. After this, we shall be able to explain additional facts about the differences between TGH and TGH-2 drawing on the analysis developed earlier involving the interplay of the above three conditions.

Recall that in section 1 we discussed the sentences (repeated below for convenience) comparing TGH-2 movement of NP's as opposed to pro's. Here we include superficially attested source forms (a) and TGH-2 derived forms (b).

(17) a. goy--o nyithindo ok ber
beat V children not good
'to beat children is not good'

b. nyithindo ok ber goy--o
children not good beat V

=(5) 'children are not good to beat'

(18) a. goy--a ok ber
beat OM 1sg not good
'to beat me is not good'

b. (an) ok ber goy--a
(I) not good beat OM 1sg

=(6) 'I am not good to beat'

Concentrating our attention on (18b), we see that TGH-2 apparently does not promote the underlying object of the lower verb (goy) to the subject of the higher verb (ok ber). The evidence for this is of course the verbal marking in (18b), in which no SM appears on ok ber (hence no promotion) while the OM -a is still found on the lower verb (indicating that there has been no cessation of grammatical relations). This surface result is completely different from that of TGH, which involved the appearance of subject markers on the higher verb (indicating promotion) and the absence of an OM on the lower verb (indicating cessation of previously held grammatical relations). Yet these differences follow from an analysis of each rule based on grammatical relation change: TGH is analyzed as a rule changing grammatical relations,

while TGH-2 is analyzed as a rule not changing grammatical relations. The important differences between these rules are obscured by an analysis which relies exclusively on structural descriptions and structural changes, since TGH and TGH-2 both involve (a) the movement of an underlying object of a lower verb to the left of the higher verb and (b) the extraposition of the lower verb to the right of the higher verb. Although such a statement of these rules would account for sentences like (17b), (14c), and (15b), all of which involve movement of NP's, it would fail to explain why TGH and TGH-2 sentences have different verbal marking when pro's are the targets of these rules. An analysis based on grammatical relations *predicts* this difference exactly in the crucial cases involving the movement of pro's. The prediction is that any difference in the strategies of the two rules in terms of effects on grammatical relations will be illuminated most clearly by those elements which serve to signal grammatical relations. In Dho-Luo such elements are the pro's and corresponding OM's, and this is precisely where we find the differing verbal surface morphology.

Of further interest are the predictions of grammaticality which result from the foregoing analysis. We shall now consider TGH-2 sentences involving objects of the preposition ni , and compare the results with similar cases involving TGH. Consider first the following TGH-2 example:

(19) a. ndik--o ni Mary barua ok ber
write V to M. letter not good
'to write a letter to Mary is not good'

b. Mary ok ber ndik--o ni e barua
M. not good write V to OM 3sg letter
'Mary is not good to write a letter to (her)'

Sentence (19b) parallels the TGH example (15b) perfectly. Notice also that the grammaticality of this sentence is as expected, since none of the three conditions discussed above is violated, and there are no contradictions in verbal marking. First, there is no subject marker on the higher verb. Second, no preposition is stranded, since the -e OM appears after ni . The verbal marking vis-à-vis the strategy of TGH-2 satisfies the third condition in the following way: the absence of a SM on the higher verb and the

presence of an OM on the lower verb are compatible with the characterization of TGH-2 as a rule which does *not* change grammatical relations, since there is not sufficient evidence to suggest that Mary has been promoted.

Consider now a TGH-2 example in which we parallel the TGH examples (16a-b):

(20) a. ndik--o-ni-a barua ok ber
write V to OM 1sg letter not good
'to write me a letter is not good'

b. (an) ok ber ndik--o-ni-a barua
(I) not good write V to OM 1sg letter
'I am not good to write a letter to (me)'

The grammaticality of (20b) does not of course parallel the ungrammaticality of (16b). Consider (20b) now in light of the three conditions: (1) a SM does not appear on ok ber , the higher verb. Since pro's trigger obligatory subject marking, then the absence of a SM here should be taken as evidence that the 1 sg pro is not a subject of ok ber ; (2) no preposition is stranded, since ni is not left unattended; (3) the verbal marking is such that no SM appears on the higher verb, while an OM appears on the lower verb. This result is compatible with the strategy of TGH-2 and its analysis as a rule not changing grammatical relations. That is, the absence of a SM on the higher verb indicates that no promotion has taken place; the retention of the OM on the lower verb signals the same thing. The three conditions are met, there are no contradictions among them, and so the sentence is grammatical.

The situation can now be profitably contrasted with (16b), the ungrammatical TGH sentence. In the latter, we found that the verbal marking required to satisfy conditions (1) and (2) contradicted the strategy of the rule, which is that objects of lower verbs become subjects of higher verbs (i.e., that the grammatical relations are changed). Because of such a contradiction, (16b) is ungrammatical. In contrast, TGH-2 is analyzed as a process whose strategy does not affect grammatical relations; sentences like (20b) satisfy conditions (1) and (2) and do not contradict this strategy in resultant verbal marking. Thus, (20b) is fully grammatical.

In conclusion, we have compared two syntactic processes, TGH and TGH-2. The strategy of each rule was established on the basis of relatively clear-cut

examples: TGH is a relation-changing process, TGH-2 is not, although both rules involve highly similar movement processes. From the discussions of section I we were able to establish the existence of certain conditions concerning verbal marking and preposition stranding. Drawing on these conditions, and their interaction with the differing strategies of TGH and TGH-2, we have been able to account for the differences in grammaticality found to obtain between TGH sentences (15b) and (16b) as well as differences between TGH and TGH-2 sentences (16b) and (20b), respectively. Instead of idiosyncratic and ad hoc conditions on rules or on pro's, we have a unified and potentially illuminating account of otherwise confusing but interesting data.

2.3. The rule of PSV. The rule of PSV in Dho-Luo is of special importance for the study of grammatical relations and grammatical relation-changing processes. Since pro's provide the best evidence (in terms of verbal marking) for this process, we shall restrict our attention to them in the following discussion.

Consider the following pair of sentences, in which the (a) form is the active and presumed underlying source for the (b) PSV:

(21) a. Otieno goy--a------(nga)
O. beat OM lsg (H/C)
'Otieno beats (is beating) me'

b. (an) i---goy--a------(nga) gi Otieno
(I) PSV beat OM lsg (H/C) by O.
'I am (being) beaten by Otieno'

Note that, as in sentences (3), (4), and (10) above, (1) Otieno , the subject of the underlying active sentence, becomes the object of the preposition gi 'by' in the corresponding PSV sentence. Thus it is clear that former subjects are demoted, and that PSV is a rule changing grammatical relations; (2) underlying objects may be moved to the left of the verb in PSV sentences, into what is usually subject position; (3) the verbal marking involves an OM on the passive verb. We have therefore prima facie evidence that underlying objects are not promoted to subjects in Dho-Luo PSV, and that underlying subjects are demoted. The conclusion is therefore that

Dho-Luo PSV is primarily a demotional rule. This was, to my knowledge, first proposed by Keenan [1975] and will be verified with additional examples below. In addition, this analysis of Dho-Luo will show that the passivized verbs should be considered transitive verbs. In the same article, Keenan proposed that passivized verbs are intransitive, a claim that is therefore to be refuted by this analysis.

The following arguments are provided to support the position that objects are not promoted to subjects in Dho-Luo PSV sentences. These arguments are based on the nature, order, and co-occurrence restrictions found to obtain for OM's in both active and passive sentences. In each case, OM's in active sentences behave exactly like the verbal markers in PSV sentences; one would miss obvious generalizations with an analysis which denies that the markers in PSV sentences are OM's. But if these are in fact OM's, then it is clear that objects cannot have been promoted (to subject) and that verbs in passive sentences with such object markers cannot be analyzed as intransitive verbs.

(1) The first argument involves the nature of subject and object markers. Subject markers and corresponding object markers are phonologically identical, except in the third person singular form, which has o- for the SM and -e for the OM in active sentences. In examples involving an underlying 3 sg object pro, the corresponding PSV sentence has -e , the OM, and not o- , the SM. Furthermore, the SM's are prefixes and the OM's are suffixes; the PSV verb surfaces with changes according to person and number indicated by suffixes.

(2) The second argument involves the order of verbal OM's which is fixed in active sentences. In general, the indirect OM precedes the direct OM.[12] Consider the following active sentences involving double object verbs with two OM's:[13]

---

[12]There are some counter-examples to this postulated clitic order which are currently being investigated and are not discussed here. But even these problematic examples show the same (aberrant) order for OM's in active and PSV sentences, further strengthening the point of the argument.

[13]We assume that previous discourse has established the reference of these OM's.

(22) a. Otieno miy--a------gi
O. give OM 1sg OM 3pl

'Otieno gives me them'

(23) a. a------chik----o-gi-----e
SM 1sg promise V OM 3pl OM 3sg

'I promise (to) them him/her/it'

We find that PSV sentences derived from these active sentences maintain the same order of verbal markers (indirect OM preceding direct OM). This is true whether we "move" either the direct or indirect pro to the left of the verb. In the PSV examples, then, we have either of the pro's appearing before the verb:

(22) b/c. (an/gin) i---miy--a------gi-----gi Otieno
(I/They) PSV give OM 1sg OM 3pl by O.

'I am given them by Otieno'
'they are given to me by Otieno'

(23) b/c. (gin /en) i---chik----o-gi-----e gi an
(they/he,she,it) PSV promise V OM 3pl OM 3sg by I

'they are promised him/her/it by me'
'he/she/it is promised to them by me'

The order of the markers in the PSV sentences must be fixed as they appear; notice that this order corresponds completely to the order of OM's in active sentences.

When we examine a combination of direct objects and objects of the preposition ni , we find that the order of verbal markers in active sentences is fixed, and that same order must occur in PSV sentences:

(24) a. Otieno chwad-o-ni--e------gi
O. beat V for OM 3sg OM 3pl

'Otieno beats them for him/her'

Reversing the order of these elements results in ungrammaticality:

(24) a'. *Otieno chwad-o-gi-----ni--e
O. beat V OM 3pl for OM 3sg

In the PSV sentences potentially deriveable from (24a), the same order of elements must obtain:

(24) b/c. (en /gin) i---chwad-o-ni--e------gi gi Otieno
(he,she/they) PSV beat V for OM 3sg OM 3pl by O.

'he,she is benefitted from the beating of them done by Otieno'[14]
'they are beaten for him/her by Otieno'

Reversing the order of the two verbal OM's in these PSV sentences results in ungrammaticality exactly parallel to the active ungrammatical sentence (24a'), in which the same reversal was was attempted.

(3) The third argument comes from a consideration of a constraint on third person object markers. We find that phonologically identical OM's may not co-occur, even though they are understood in discourse to be referentially distinct (this is indicated by using subscripts). Consider first active sentences with double object verbs:

(25) a. *Otieno miy--o-gi$_1$-----gi$_2$
O. give V OM 3pl$_1$ OM 3pl$_2$

'Otieno gives them$_1$ them$_2$'

(26) a. *Otieno chik----e$_1$------e$_2$
O. promise OM 3sg$_1$ OM 3sg$_2$

'Otieno promises him/her it '

We find that this ungrammaticality is matched for corresponding PSV sentences involving these markers:

(25) b/c. *(gin$_1$ /gin$_2$) i---miy--o-gi$_1$-----gi$_2$ gi Otieno
(they$_1$/they$_2$) PSV give V OM 3pl$_1$ OM 3pl$_2$ by O.

'they$_1$ are given them$_2$ by Otieno'
'they$_2$ are given to them$_1$ by Otieno'

(26) b/c. *(en$_1$ /en$_2$) i---chik----e$_1$------e$_2$ gi Otieno
(he,she$_1$/it$_2$) PSV promise OM 3sg$_1$ OM 3sg$_2$ by O.

'he, she$_1$ is promised it$_2$ by Otieno'
'it$_2$ is promised to him/her$_1$ by Otieno'

---

[14]The translation here is the best under the circumstances. It resembles the Bantu examples in which "beneficiary" objects of underlying active sentences become the subjects of passivized sentences; an English straight gloss is usually confusing. Therefore, I have resorted to a bit of circumlocution to retain the correct semantic interpretation.

The point here is not to account for the ungrammaticality of the above active sentences,[15] but merely to point out that the ungrammaticality of the corresponding PSV sentences seems closely related. Since some constraint concerning identical 3 person OM's in active sentences is needed in the grammar independently, it would seem overly repetitious to require an additional constraint for completely parallel data in corresponding passive sentences. Yet this is exactly what would be required if we failed to consider the markers in passive sentences as *object* markers.

In summary, then, we have examined three separate cases comparing active sentences containing OM's with corresponding PSV sentences containing similar markers. In each case, the nature, order, and co-occurrence restrictions found to obtain for OM's in active sentences was systematically paralleled in the behavior of verbal markers in PSV sentences. To deny that these verbal markers in PSV sentences are OM's would necessitate that clearly related phenomena be treated repetitiously and separately. The conclusion is then that the verbal markers appearing in PSV sentences are in fact OM's. If they are OM's in PSV sentences, then two things must follow. First, it is clear that the OM's represent instances in which objects have not been promoted to grammatical subjects (note that in (21b) no appeal to preposition stranding can possibly be maintained). This then supports Keenan's claim that PSV is primarily a demotional process, since Dho-Luo clearly shows that underlying subjects are demoted to the objects of the preposition gi 'by'. Secondly, the appearance of OM's on the passive verb must surely constitute evidence that these passivized verbs are transitive, which in turn vitiates Keenan's second claim that all passivized verbs are intransitive.

3. Conclusion

In the first section we examined the behavior of pro's and OM's as targets of various rules in Dho-Luo. We first found that pro's and NP's triggered differences in verbal coding when targets of certain rules, even when grammatical relations of pro's and NP's to verbs were held constant. In the second section, we examined the behavior of OM's and pro's as targets

[15]Mr. [illegible] reports similar problems in Pashto (personal communication) [illegible] there is the *se se example in Spanish discussed by [illegible]

of putative grammatical relation-changing rules. We found evidence that TGH, but not TGH-2, is a relation-changing process. We also accounted for differences in grammaticality for pro's as targets of first TGH and then TGH-2 by an appeal to contradictory verbal marking. Finally we provided three arguments to suggest that the markers in Dho-Luo PSV sentences are OM's, and that therefore PSV is primarily demotional, and involves transitive and not intransitive verbs.

BIBLIOGRAPHY

Dalgish, Gerard M. 1976a. "The morphophonemics of the OluTsootso dialect of (Olu) Luyia: issues and implications." Doctoral dissertation, University of Illinois.

Dalgish, Gerard M. 1976b. "Passivizing locatives in OluTsootso." In Charles W. Kisslberth, et al. (eds.), ***Studies in the Linguistic Sciences***, 6:1, pp. 57-67. Urbana, Illinois: University of Illinois Department of Linguistics.

Garcia, Erica. 1975. ***The Role of Theory in Linguistic Analysis.*** Amsterdam: North-Holland.

Keenan, Edward. 1975. "Some universals of passive in relational grammar." In Robin E. Grossman, et al. (eds.), ***Papers from the Eleventh Regional Meeting, Chicago Linguistics Society***, pp. 340-52. Chicago: University of Chicago Department of Linguistics.

Studies in African Linguistics
Volume 8, Number 2, July 1977

TONE PRESERVING VOWEL REDUCTION IN LENDU*

Mirjana Trifković
University of Nice, France

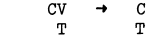
Vowels in Lendu may be reduced if the tones they bear can be preserved by being shifted to adjacent segments. In CV words this is possible only if C belongs to a class of consonants, C'. In CV_1V_2 words, V_1 may be reduced but direction of tone shifting depends on presence or absence of a morpheme boundary between the vowels.

1. Introduction

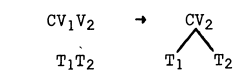
In connection with the vowel reduction, the stability of tone patterns will be tested on a series of examples taken from Lendu, a Central Sudanic language[1] spoken in North Eastern Zaire.

Two cases of tone shift[2] associated with vowel reduction are presented:

(1) Leftward tone shift onto the adjacent consonant:



(2) Rightward tone shift onto the adjacent vowel:



In both cases tone melody (in Goldsmith's sense) remains *unchanged*.

---

*An earlier version of this paper under the heading "Lendu Tones and Stability Phenomenon" was selected for presentation to the Seventh Conference on African Linguistics. I am indebted to G. Manessy, B. Vattuone and J. Voorhoeve, and to my informants M. Njabu, husband and wife. In his comment, J. Voorhoeve had a hunch that this treatment of vowel reduction "might also offer an explanation for C_2 restrictions in N.W. Bantu. N.W. Bantu often has nouns of this shape $-C_1VC_2$, in which $-C_2$ can only be a nasal, voiced consonant or glottal stop. Fricatives are excluded. The C' set would in that case be different of course. C" might be reduced to glottal stop after vowel reduction."

[1] Following J. Greenberg's [1963] classification.

[2] Here I am concerned only with "lexical" tones shifting.

Lendu presently has three level tones and one contour (Rising).[3] In CV words, vowel reduction (hereafter VR apparently restricted to [-low] vowels) may take place if and only if C belongs to a certain subset C' (of the consonantal set C = {p, b, ᵑp, ᵑb, t, d, ᵑt, ᵑd, ᵑc, ᵑj, j, k, g, kp, gb, ʔm, n, ɲ t͡ʂ, d͡ʐ, t͡ʃ, d͡ʒ, f, v, ø, ð, s, z, ʃ, ʒ, h, r, r̲, l }) characterized by the aptitude for receiving the "free" tone. C' consists of s, z, t͡ʂ, d͡ʐ, r, r̲,[4] and I don't know of any property that all and only these consonants have other than the aptitude for tone bearing.[5]

If C belongs to the complement C" of C', whose members are never toned, no VR can take place. Therefore, it seems to me a natural assumption to posit that, all vowels being basically toned (and surfacing as such), all consonants are basically toneless and only a subset C' of them may surface toned (as result of VR).

2. Tone Shifting in CV Words

In the monosyllabic pattern C_1^3,[6] which is the preferred word pattern in Lendu, VR may apply provided the rightmost consonant belongs to C'. Whenever the VR process takes place, tone shifts leftwards onto the adjacent C' consonant.

Consider the following:

(3)	sə̀	or	s̀	'to shoot'
	t͡ʂə́	or	t͡ʂ́	'underneath'
	krɔ̀	or	kr̀	'to cut'
	sí (northern variant)		ś (standard form)	'skin'

The examples in (3) support the hypothesis in (4).

---

[3]More details about Lendu tone system and tone processes can be found in Trifković [1977, forthcoming].

[4]Underscore indicates added articulatory features (here: affrication).

[5]I do not use the feature [syllabic] to characterize C' because in Lendu consonant "syllabicity" would merely mean "sometimes tone bearing" (i.e. derived tonological aptitude).

[6]More precisely, the preferred word type is CV. Occasionally also CCV occurs. Quite exceptionally, I found also CCr.

(4) Vowel Reduction for C'V

C'V → C
T T

If the adjacent consonant belongs to C", this process is blocked.

(5) C"V ↛ *C
T T

In fact, no word final C" are found in the language, whilst toned word final C' frequently occur.

3. Tone Shifting in CVV Words

Lexical formation in Lendu involves suffixation. Consider, for example, the -i , i.e. $-V_2$, suffixed to CV roots giving morpheme sequences CV+V, i.e. derived V_1V_2 sequences. If C belongs to C', the shift in (6) takes place.

(6) C'V+i → C'i , i.e. C'V+V → C'V
T_1T_2 T_1T_2 T_1T_2 T_1T_2

Examples are seen in (7).

(7) sɔ̀ + ĩ → sɔ̀ĩ 'variety of grass'
rɨ́ + ĩ → rɨ́ĩ 'ghost'

If C belongs to C", no VR takes place and both vowels are retained.

(8) C"V+i , i.e. $C"V_1V_2$
T_1T_2 T_1T_2

Examples are seen in (9).

(9) tʃɔ̀ĩ ↛ *tʃɔ̀ĩ 'bees'
nɔ́ĩ ↛ *nɔ́ĩ 'woman slave'

In fact, this is the history of derived CV_1V_2 word pattern in Lendu.
T_1T_2

The obvious generalization is: when a CV morpheme final vowel drops, the tone shifts leftwards onto the adjacent C (see (4) and (6)). If the adjacent C belongs to C", i.e. cannot receive it, VR is blocked (see (5) and (8)).

Now let us consider another process in which underlying $\overset{CVV}{TT}$ (instead of derived ones as in (8) above) are involved. This underlying pattern happens

to be the surface pattern presently exhibited by the northern variant of the language. Compare:

(10)

Northern variant	Standard language	
ɲìà	ɲà	'hippo'
kɪ̍ɪ̍e	ke̍	'man'
bàọ̀	bò	'raining season'
bàí	bɪ̌	'moon'
ˀɟàú	ˀɟǔ	'mouse'

A systematic relation between Northern and Standard forms is revealed which could be captured either by (11) below or by assuming that both forms are derived from a common source. Even if this were the case, I don't see why (11) should be excluded as an intermediate stage.

(11)
$$\begin{array}{c} C''V_1V_2 \\ T_1T_2 \end{array} \rightarrow \begin{array}{c} C''V_2 \\ T_2 \quad T_2 \end{array}$$

This relation holds with C'VV forms as well:

(12)

t͜sọ̀ọ̀	t͜sò	not	*t̀͜sò	'mouth'
rìè	rè	not	*r̀è	'bird'
sùú	sʉ̌	not	*s̀ʉ́	'slaver'

The formula in (13) is thus parallel to that in (11).

(13)
$$\begin{array}{c} C'V_1V_2 \\ T_1T_2 \end{array} \rightarrow \begin{array}{c} C'V_2 \\ T_1 \quad T_2 \end{array} \quad \text{not} \quad \begin{array}{c} {}^*C'V_2 \\ T_1T_2 \end{array}$$

Therefore, independently of the subcategorization of C, in basic vocalic sequences we can posit:

(14) Vowel Reduction for CV_1V_2

$$\begin{array}{c} CV_1V_2 \\ T_1T_2 \end{array} \rightarrow \begin{array}{c} CV_2 \\ T_1 \quad T_2 \end{array}$$

This process deletes V_1 and the tone shifts rightwards onto the adjacent morpheme-mate V_2 even if the adjacent C could receive it by leftward shift. Rightward shift being preferred (whenever possible), in order for (6) to be derivable instead of (13) we have to suppose that either tone shift is blocked across morpheme boundaries or that it takes place before V_2 is suffixed.

4. Conclusion

In Lendu, vowels can be deleted provided their tone can be preserved by shift. The condition under which tone can be shifted is statable as follows:

a. on adjacent segments

b. within morpheme boundaries

c. preferably onto following vowel

d. alternatively, onto preceding consonant, provided it belongs to C'

In short, VR may be stated as in (15).

(15) Vowel Reduction (VR)

$$V \rightarrow \emptyset / \left\{ \begin{array}{l} \#C_1^3 \text{ ——— } V+ \\ \#C_0^2 C' \text{ ——— } + \end{array} \right\}$$

If neither rightward nor leftward tone shift is possible, VR is blocked. This tone preserving condition on VR is tentatively translated in terms of phonological context in (15).

Reference to C' being necessary, the question arises whether C' is a natural class in phonology. I don't know the answer.

REFERENCES

Greenberg, Joseph H. 1963. ***The Languages of Africa***. Bloomington: University of Indiana.

Trifković, Mirjana. 1977. "Tone splitting: Lendu." Paper presented at the 8th Conference on African Linguistics, University of California at Los Angeles, April 1-3, 1977.

Trifković, Mirjana. Forthcoming. "Tone shift: Lendu." ***African Language Studies***.

Hyman, Larry M., and Russell G. Schuh. 1974. "Universals of tone rules: evidence from West Africa." *Linguistic Inquiry* 5:81-115.

Studies in African Linguistics
Volume 8, Number 2, July 1977

ACCENT MODIFICATION RULES IN LUGANDA

John Kalema
Makerere University

Most analyses of Luganda treat it as a tone language. Recent studies also show that it has features which seem to make it possible to characterize it as a "pitch accent language". Further, McCawley [1970] suggests that languages may have a pitch accent system up to some point in the ordering of its rules and thereafter have a tonal system: the claim is also made that Luganda is a tone language starting from a very early point in the ordering of its rules. This claim is re-examined and the nature of various accent modification rules in Luganda are investigated. It is concluded that McCawley's claim is acceptable only when one is accounting for pitch in words. Furthermore, it is shown that Luganda has several processes which modify accent thus postponing the stage at which the language ceases to be a pitch accent language to become a tone language.

1. Introduction

Previous studies of Luganda prosody[1] have generally been made with the assumption that Luganda is a "tone language" which, according to Pike [1948:3], is "a language having lexically significant, contrastive, but relative pitch on each syllable." Thus Luganda is a tone language since, according to the above definition, the acoustic difference between each of the pairs of words given in (1), where pitch is indicated by profile, is purely one of pitch:

(1)	i.	(a)	ku⌈bala	'to count'
		(b)	ku⌈ba⌊la	'to bear fruit'
	ii.	(a)	ku⌈wola	'to lend money'
		(b)	ku⌈wo⌊la	'to cool'
	iii.	(a)	n⌈jala	'hunger'
		(b)	n⌈ja⌊la	'nails/claws'

In the above examples an initial segment with a low pitch is followed, in the case of (a) of each pair, by high pitch throughout, while in the case

[1] See in particular Meeussen [1965, 1966]; Cole [1967]; and Stevick [1969a, 1969b].

of (b) of each pair, the initial low pitched segment is followed first by a high pitched segment and then by a low pitched segment.

More recent studies[2] on the other hand, using criteria other than the shape of the informational nature of the acoustic signal in characterizing the prosodic system of the language, have shown that Luganda possesses features that would seem to make it possible to characterize it as a "pitch accent language". The decision to characterize Luganda in this way rests, first of all, on a consideration of the kind of information that is needed, with respect to pitch, by the underlying lexical representations of morphemes in the language. McCawley [1964] says that if the underlying form of each morpheme in a language requires at most the specification of some pitch phenomenon, for example the location of a high pitch or a drop in pitch, then the language being considered has a pitch accent system. Such a language would be quite different from one where the morphemes would require an underlying representation in which each syllable must be specified for underlying pitch. So that in a pitch accent language the information which must be recorded in the dictionary is at most the location of some "accented" syllable. Such information may, of course, be even less than the marking of the accent--information as to which syllable is accented may be indicated indirectly by a morphological feature; or no information at all may need marking in languages where accent is totally predictable. In these cases a rule will then be utilized to mark some syllable as accented on the basis of other information in the dictionary entry.[3]

The second key factor in deciding whether or not a language has a pitch accent system derives from a consideration of the type of rule or

---

[2]Particularly Heny [1970]; McCawley [1970] and Kalema [1974].

[3]Languages where accent or prominence patterns can be related to pitch distinctions in one vowel of each word and where, as a result, the surface manifestation of pitch can be accounted for in a very general way, have been reported in other related Bantu languages: (Safwa) Voorhoeve [1973]; (Kinga) Schadeberg [1973]; (Haya) Byarushengo, and Hyman, and Tenenbaum [1976]; (Kinyarwanda) Kimenyi [1976].

rules that are needed to derive a phonetic representation given the information relating to pitch that is contained in the underlying representations. Thus if among the rules modifying accent are accent reduction rules with the effect of inserting accent on some syllable while reducing all other accents in the domain of that rule by one degree, this would mean that the language being considered, while it may or may not be partially tonal, has a pitch accent system at some stage in the derivation of its surface pitch. McCawley [1964] had classified languages according to their phonological rule systems into tonal languages, as those in which rules that do assimilations and dissimilations on pitch levels are to be found, and pitch accent languages, where accent reduction rules operate. McCawley [1970:529], in citing examples of languages incorporating both types of rule systems, however, dismisses the earlier classification and admits that it is impossible to make such a classification non-arbitrarily. Nevertheless, McCawley adds, "it will be possible to speak of a language as having a pitch accent system up to some point in the ordering of its rules and having a tonal system from that point onwards in the rules. Languages could then be classified according to how early in their grammars the point occurred at which they became tone languages". In the same study McCawley puts forward the view that Luganda is a tone language starting from a very early point in the ordering of its rules.

The aim of this paper is to investigate the nature of the various processes or rules that modify accent in Luganda. During the course of the investigation it will be shown that McCawley's conclusion regarding the stage at which Luganda becomes a tone language may be acceptable only when one is accounting for pitch in words. If one is dealing with stretches longer than the word, one finds that, apart from the "one very early accent reduction rule"[4] mentioned by McCawley, Luganda has other processes that modify accent, thus postponing the stage at which the language ceases to be a pitch accent one to become a tone language.

---

[4] Of this rule, McCawley [1970:529] further says, "as far as I know, the rule which deaccents a noun before a possessive is the only accent reduction rule Luganda has".

2. Accent Assignment

Talking about Luganda verb-words, Heny [1970:175] says that "there is just one fall in tone from high to low in each surface verb-word. Once the position of this drop in tone is fixed, the tone of the other syllables can be determined." This means that provided an initial marking is made to the word form, the pitches of certain segments, both before and after the accented segment, need not be determined individually syllable by syllable, but rather they may be predicted by rules: after the accented segment, everything is low pitched,[5] while everything up to the accented segment is high pitched except for certain segments occurring initially, and are themselves not accented and are specified as low pitched either in the dictionary or by rules; where in a word there is no accented segment, everything is high pitched except for the initial mora[6] which is always low. The accented segment is identified with the high pitch in a high-low pitch sequence in the pitch profiles and will be indicated informally elsewhere by an acute mark (ˊ). In this paper, we will not dwell specifically on how this initial marking to a

[5]This pitch profile is possible only when "sentence" intonation is used. With this type of intonation, for example, items such as liiso 'eye', ekibegabega 'shoulder', obumanyirivu 'expertise' would have the following pitch transcriptions respectively : lí|i so , eki|be|gabega , obu|ma|nyirivu . In making their pitch transcriptions, the majority of past studies in Luganda have marked items using a "list" intonation which means that the list of items quoted above would be transcribed as follows: li i so , eki be gabe ga , obu ma nyili vu . The use of sentence intonation is reserved for items with the potential of occurring as fully independent utterances while list intonation is used when the item involved forms part of a list of other items to be enumerated. Indeed going through a list of items with an informant, as most transcribers of Luganda pitch no doubt have done, automatically conditions the informant to render his answers with the type of intonation most appropriate for the task at hand: enumerating a list of items, actions, etc. Since in Luganda even individual words may form complete sentences on their own, it seems more appropriate that the type of pitch transcription based on a sentence intonation should be used, sentence intonation thus being regarded as the most neutral type of intonation. Accordingly all words and phrases in this paper have been transcribed on the basis of their sentence intonation.

[6]A mora is a unit of phonological distance defined in loose terms by McCawley [1968:58] as "something of which a long syllable consists of two and a short syllable consists of one". In Luganda each mora would therefore consist of either a consonant or a glide followed by a vowel, or a vowel alone, or a syllabic consonant.

Luganda word is accomplished[7] since the rules being considered, although they depend on the presence of the accent in a word, will operate irrespective of how the accent is assigned in the first place.

3. Accent Shift

One process that has been overlooked by those studies which have characterized Luganda as being, at least partially, a pitch accent language, is one which involves the shifting of the accented segment from its original position in a word to a new position in environments larger than the word. The process of accent shift, for example, occurs when an accented noun is followed by one of the following post-positional genitive pronouns: -ange 'my', -affe 'our', -ammwe 'your' (plural), -abwe 'their'. Let us consider the examples in (2):

(2)	Original accent	Accent shift	Pitch profile
	kutúu[8]	kutuú kwaange	ku|tuu|kwaange
	'ear'		'my ear'
	kibiináa	kibiinaá kyaange	ki|biinaa|kyaange
	'class'		'my class'
	kibónerezo	kibonerezó kyammwe	ki|bonerezo|kyammwe
	'punishment'		'your punishment'
	ekibégabega[9]	ekibegabegá kyaange	eki|begabega|kyaange
	'shoulder'		'my shoulder'
	obutúkuvu	obutukuvú bwaffe	obu|tukuvu|bwaffe
	'holiness'		'our holiness'

[7]This is a complex subject. Preliminary attempts to deal with it have been made by Heny [1970] and Kalema [1974] and also in my paper "On accent assignment in Luganda" (in preparation).

[8]Certain orthographic conventions regulating the non-doubling of vowels in certain contexts are deliberately ignored in this paper, representing long vowels in all contexts by doubled vowels. This facilitates, among other things, the marking of gliding pitches as sequences of level pitches distributed over the two vowels involved.

[9]This and similar items quoted with an initial vowel in this paper belong to the traditional Tone Class C in which if the noun or adjective stem is preceded by a CV-type class prefix, the presence or absence of the initial vowel leads to a change in pitch pattern, viz. eki|be|gabega as opposed to kibe|ga|bega, obu|tu|kuvu as opposed to butu|ku|vu in all other cases, the presence or non-presence of the initial vowel does not alter the pitch profile, hence our decision to exclude it in these cases.

In all the above examples the original accent of the word is shifted from its original position to the very last mora before the genitive pronoun.

There are, however, certain exceptions to this general process. The first exception is found in the case of stems which are made up of two syllables with the structure CVCV. When such stems are followed by any of the post-positional genitive pronouns, the accent does not shift from its original position as the items in (3) illustrate:

(3)	Original accent	Accent shift	Pitch profile
	mukázi	mukázi waange	mu|ka|zi waange
	'wife'		'my wife'
	bifúba	bifúba byaabwe	bi|fú|ba byaabwe
	'chests'		'their chests'
	emigúgu	emigúgu gyammwe	emi|gú|gu gyammwe
	'luggage'		'your luggage'
	omuwála	omuwála waange	omu|wá|la waange
	'girl'		'my girl'

The second case involving no accentual shift is found among nouns of foreign origin. In Luganda, nouns of foreign origin seem to sub-divide themselves accentually into two categories depending on the type of structure the accented syllable has. In all cases, it is the last but one syllable that is accented with the accent being inserted on the first mora where the affected syllable consists of a geminate vowel cluster or on the only vowel of a syllable with no geminate vowel cluster. This categorization is also reflected once such nouns are placed before the genitive pronouns under consideration: there is accentual shift in all those items originally accented on the first mora of a geminate vowel cluster and no accentual shift in items accented on the last but one vowel of syllables with no geminate vowel cluster as the examples in (4a) and (4b) illustrate respectively:

(4)	Original accent		Accent shift	Pitch profile
a.	bapulíisi	< (English:	bapuliisí bammwe	ba|puliisí|bammwe
	'policeman'	police)		'your policeman'

(4) cont.

kitaambáala 'table cloth'	< (Swahili: kitambaa)	kitaambaalá kyaffe	ki|taambaala|kyaffe 'our table cloth'
mapaapáali 'pawpaws'	< (Swahili: mapapayi)	mapaapaalí gaabwe	ma|paapaali|gaabwe 'their pawpaws'
b. baserikále 'soldiers'	< (Swahili: serikali 'government')	baserikále baffe	ba|serika|le baffe 'our soldiers'
mabalúwa 'letters'	< (Swahili: barua)	mabalúwa gaange	ma|balu|wa gaange 'my letters'
bulaangíti 'blankets'	< (Swahili: bulanketi)	bulaangíti zaabwe	bu|laangi|ti zaabwe 'their blankets'

Thus, apart from these exceptions which would have to be marked as exceptional to the rule to accent shift, we need a rule of accent shift such that before a genitive pronoun, accented nouns have their accents shifted from their original positions on to the very last mora of the stem. Before attempting to formulate this rule in more formal terms, let us examine another process that modifies accent in Luganda phrases.

4. Accent Reduction

Consider first the genitive phrases in (5) in which the possessing noun is separated from the possessed noun by a genitive particle -a :

(5) Original accent	Accent reduction	Pitch profile
kikópo ; mukázi	kikopo kyaa mukázi	ki|kopo kyaa muka|zi
'cup' 'woman'		'the woman's cup'
musáwo ; baserikále	musawo waa baserikále	mu|sawo waa baserika|le
'doctor' 'soldiers'		'the soldiers' doctor'
migugúu ; bagolée	migugu gyaa bagolée	mi|gugu gyaa bagole|e
'baggage' 'brides'		'the brides' baggage'
lubaláza ; njúu	lubalaza lwaa njúu	lu|balaza lwaa nju|u
'verandah' 'house'		'the house's verandah'

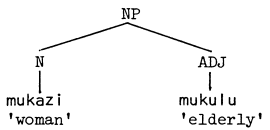
In (5), in spite of the fact that each of the constituent nouns in the genitive phrases is accented, only one accent--the right-most accent--is manifested. The same phenomenon is observable in "compound nouns" as illustrated in (6):

(6)	Original accent	Accent reduction	Pitch profile
	mukázi ; mukúlu	mukazi mukúlu	mu⌈kazi muku⌋lu
	'woman' 'elderly'		'elderly woman'
	líiso ; ddéne	liiso ddéne	liiso dde⌋ne
	'eye' 'big'		'God'
	mafúta ; míingi	mafuta míingi	ma⌈futa mii⌋ngi
	'goods' 'many'		'wealthy person'
	mutwée ; munéne	mutwe munéne	mu⌈twe mune⌋ne
	'head' 'big'		'stubborn person'

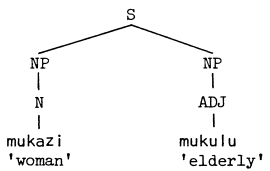
5. The Role of Syntax in Accent Modification

It is possible to assume that the accentual modification processes, that we have dealt with, will operate irrespective of syntactic environment. This, however, is not quite the case. In Luganda there is, for example, a distinction between mu⌈kazi muku⌋lu 'elderly woman' and mu⌈kazi mu⌈ku⌋lu 'the woman is old'. In both cases, we have exactly the same elementary constituents. There is, however, a difference in the way in which these constituents are combined which is reflected in the different surface structures in (7):

(7) a.



b.



In (7a) where both the noun and adjective belong to the category "Noun Phrase" the phonological rules must yield a surface pitch contour in which there is only one accented segment: mu⌈kazi muku⌋lu ; while in (7b) where both constituents belong to the category "Sentence" the phonological rules

must give a surface pitch contour in which there are two accented segments: mu[ka]zi mu[ku]lu . In fact all the examples quoted so far portray this same dependence on syntax with regard to accentual modification with the genitive constructions in section 3 having the post-positional genitive element accented on the first mora, once the constituents Noun and Genitive Pronoun both belong to the category Sentence. So, the process of accent shift and accent reduction seem to operate only when the constituents involved both come under the immediate domination of the category Noun Phrase.

6. Nature of the Rules

6.1. Accent reduction. In order to account for the state of affairs in (5) and (6) it is possible to assume that each item goes through the accent assignment processes with the result that each item would contain one primary accent. If, at this stage, we have a rule in the grammar with the effect of reducing the accent on the first item from primary to secondary, then we should end up with noun phrases manifesting both primary and secondary accents--primary accent being situated on the second accented segment and secondary accent being located on the first accented segment as in (8) where primary accent is marked as 1 and secondary accent as 2:

(8) a. mu[kǎ²zi mukú¹]lu 'elderly woman'

b. ki[kǒ²po kyaa mukǎ¹]zi 'the woman's cup'

If accent placement is one that places primary accent rather than weakening accent, and if the following convention is adopted: "when primary accent is placed in a certain position, then all other accents in the string under consideration at that point are automatically weakened by one", then the rule of accent reduction could be formulated as follows:

(9) Assign primary accent to a primary-accented mora in the context

$\overset{1}{M}$ ..... _____ .....] NP

(In this rule $\overset{1}{M}$ stands for a mora with primary accent and the dash indicates the position of the segment to which the rule applies.)

Rule (9) would assign primary accent to a primary-accented mora which is preceded by another primary-accented mora in a Noun Phrase. By the convention that we stated above, the effect of this rule would be to weaken the other accents in the string to which the rule applies. Thus, the accents in (8a) would be derived as follows:

(10)

	mukazi	mukulu	
1.	1	1	Original Accents
2.	2	1	Accent Reduction rule

An approach such as the above, however, makes claims about Luganda phrases that cannot be fully substantiated, namely that the phrases such as the ones under investigation have segments with different degrees of stress. As far as we can tell, no distinction in degrees of stress exist in these phrases. What seems to be the case though is that once the pitch rises on the first accented segment, it remains high on all subsequent segments until after the right-most accented segment when it drops to low. This means in effect that it would be a misrepresentation to continue assigning numerical values to our accented segments. Rather than having a rule such as (9), where primary accent is inserted on a particular segment with the effect of reducing the accent on all other segments in the stretch, the type of accent reduction rule that would be more appropriate for Luganda would be one which has the effect of making one element of a phrase predominant by eliminating the accentual phenomena elsewhere in the stretch to which it applies. The accent reduction rule may be formulated verbally as follows:

(11) Delete the left-most accent in the context of $\_\_\_\_\_ \ldots\ldots \acute{M} \ldots\ldots]_{NP}$

Thus, instead of the derivation (10) we would have the derivation (12) for the phrase mu[kazi muku]lu :

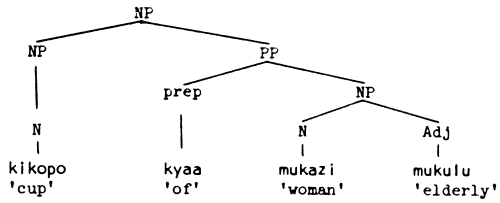
(12)

1.	mukazi	mukulu	
1.	mukázi	mukúlu	Original Accents
2.	mukázi (Ø)	mukúlu	Accent Reduction rule

In fact, the accent reduction rule deletes not just the first accent in a Noun Phrase but all accents occurring before the last accented segment in a stretch to which the rule applies. Furthermore, the accent reduction

rule applies in a cycle, first operating on the innermost bracketed or smallest constituents in a stretch and then on larger constituents, until the maximal domain of the phonological rule is reached. Thus the accents in the phrase ki [kopo kyaa mukazi muku [lu 'the elderly woman's cup', with the constituent structure shown in (13) would be derived as in (14):

(13)



(14)

	kikopo	kyaa	mukazi	mukulu	
1.	kikópo	kyaa	mukázi	mukúlu	Original Accents
					First Pass through Cycle
2.	kikópo	kyaa	mukØzi	mukúlu	Accent Reduction rule
					Second Pass through Cycle
3.	kikØpo	kyaa	mukØzi	mukúlu	Accent Reduction rule

First, accent is assigned individually to nouns and adjectives in the construction. The accent reduction rule, operating on the next largest constituent during the first pass through the cycle, deletes the left-most accent in the phrase NP [mukØzi mukúlu]. During the second pass through the cycle, the accent reduction rule operates on the phrase NP [kikópo kyaa mukØzi mukúlu] deleting the first accent in the phrase to produce NP [kikØpo kyaa mukØzi mukúlu] where there is only one accented segment.

6.2. Accent shift. With a rule such as (11) having the effect of getting rid of the accent(s) to the left of the accent which is made to predominate in a phrase, and with the right ordering of the rules, the process of accent shift in Luganda may be accounted for by a rule which assigns accent to the final mora of an accented noun followed by a genitive pronoun. If the accent shift rule, which is formulated verbally as (15) is

made to operate before the accent reduction rule, then we would have a stage in our derivation when we have two accent morae on the noun before the genitive element.

(15) Assign accent on the final mora of a noun in the context

$\acute{M}$ ..... ——— #]] GEN] NP

(where $\acute{M}$ stands for an accent mora and the dash indicates the position of the item to which the rule applies)

If, at this stage, the accent reduction rule is made to operate, then we would end up with only one accent as shown in (16) in accounting for the accent in the phrase ma paapaali gaabwe 'their pawpaws':

(16)

	mapaapaali	gaabwe	
1.	mapaapáali	gaabwe	Original Accents
2.	mapaapáalí	gaabwe	Accent Shift rule
3.	mapaapa$\overset{\phi}{}$áalí	gaabwe	Accent Reduction rule

7. Pitch Assignment

All the processes that we have dealt with in this paper are concerned only with accent and, although they affect pitch in the end, this is only indirectly. Both the accent shift and accent reduction rules are earlier operations in the grammar in comparison with pitch or tonal assignment processes which apply once the processes involving accent assignment and accent modification have operated. These are not the concern of this paper. Nevertheless, an outline of what they are is essential if only to clarify how one moves from the accent modification processes to the actual pitch contours in our phrases.

Pitch assignment rules required in the production of surface pitch in Luganda fall roughly into three categories, applying in the order given here: a) rules that insert pitch on particular segments of words or phrases, b) pitch spreading rules, and c) intonational rules. Prior to the application of these rules, we need a rule or convention that automatically assigns high pitch to any segment specified as [+Accented]. Thus in deriving the pitch contour in the phrase ma paapaali gaabwe the pitch assignment rules will utilize, as their input, the output of (16) as

illustrated in (17). The rules in the first category will insert low pitch on the initial syllable(s) of certain word forms utilizing both phonological and morphological information of the segments involved. In this case the class prefix is specified as low. Once the initial low syllable is specified, pitch spreading rules apply specifying as high everything after the initial low up to the accented segment as high and as low everything after the accented segment. At this stage everything in the phrase has been specified for pitch, as being high or low. Finally the third group of rules, which are concerned with phonetic detail, will deal with problems of downdrift and will assign scalar values to segments already specified for pitch.

(17)

	mapaapáalí gaabwe	
1.	màpaapaalí gaabwe	Low Pitch on Class Prefix
2.	màpáápáálí gaabwe	High Spreading Rule
3.	màpáápáálí gààbwè	Low Pitch Spreading Rule
4.	3 11 11 1 44 4 mapáápáálí gààbwè	Downdrift Rules

8. Conclusion

In accounting for pitch in Luganda words, the stage at which the language ceases to be a pitch accent language and converts to a tonal system is reached quite early in the derivations since all that is involved here is the specification of the accented segment (if any). Once this is accomplished, the language ceases to behave as a pitch accent system and converts to a tonal system with tonal rules to account for pitch on segments other than the accented segment. In environments longer than the word, however, accounting for the pitch that is manifested at the surface level involves more processes typical of pitch accent languages: apart from specifying the location of the accented segment, we need, before the tonal rules can apply, both an accent shift rule and an accent reduction rule, thus providing evidence to suggest that the stage at which the language switches from a pitch accent system to a tonal one is not as early as previously thought.

In investigating the nature of the various processes that modify accent this paper has also shown or revealed certain characteristics of

these processes not previously revealed or thought likely to operate in Luganda. Specifically, we have shown that the accentual make-up of an utterance in this language is determined in some manner by the surface structure of the particular utterance and that, in general, the accentual shape of a particular unit such as a phrase, is determined by the inherent complex properties of its parts and the way in which these parts are combined, with similar rules operating on units of varying levels of complexity.

REFERENCES

Byarushengo, E., L.M. Hyman and S. Tenenbaum. 1976. "Tone, accent, and assertion in Haya." In L.M. Hyman (ed.), *Studies in Bantu Tonology,* pp. 183-205. Southern California Occasional Papers in Linguistics, No. 3. Los Angeles: University of Southern California.

Chomsky, N., and M. Halle. 1968. *The Sound Pattern of English.* New York: Harper and Row.

Cole, D.T. 1967. *Some Features of Ganda Linguistic Structure.* Johannesburg: Witwatersrand University Press. [Reprint from *African Studies* 24:3-54, 71-116, 199-240, 1965.]

Heny, F.W. 1970. "Explanatory tone assignment rules in Bantu." In C.W. Kim and H. Stahlke (eds.), *Papers in African Linguistics,* pp. 175-99. Edmonton, Alberta: Linguistic Research, Inc.

Kalema, J. 1974. *Luganda Phonology and Morphology.* Doctoral dissertation, University of Reading.

Kimenyi, A. 1976. "Tone anticipation in Kinyarwanda." In L.M. Hyman (ed.), *Studies in Bantu Tonology,* pp. 167-81. Southern California Occasional Papers in Linguistics, No. 3. Los Angeles: University of Southern California.

McCawley, J.D. 1964. "What is a tone language?" Paper presented at 1964 Linguistic Society of America Summer Meeting.

McCawley, J.D. 1968. *The Phonological Component of a Grammar of Japanese.* The Hague: Mouton.

McCawley, J.D. 1970. "Some tonal systems that come close to being pitch accent systems but don't quite make it." In *Papers from the Sixth Regional Meeting of the Chicago Linguistic Society,* pp. 526-32. Chicago: Chicago Linguistic Society.

Meeussen, A.E. 1965. "A preliminary tonal analysis of Ganda verb forms." *Journal of African Languages* 4:108-113.

Meeussen, A.E. 1966. "Syntactic tones of nouns in Ganda: a preliminary synthesis." In Y. Lebrun (ed.), *Linguistic Research in Belgium,* pp. 77-86. Universa Wetteren.

Pike, K.L. 1948. *Tone Languages*. Ann Arbor: The University of Michigan Press.

Schadeberg, T.C. 1973. "Kinga: a restricted tone system." *Studies in African Linguistics* 4:23-48.

Stevick, E.W. 1969a. "Tone in Bantu." *International Journal of American Linguistics* 35:330-41.

Stevick, E.W. 1969b. "Pitch and duration in Ganda." *Journal of African Languages* 8:1-28.

Voorhoeve, J. 1973. "Safwa as a restricted tone system." *Studies in African Linguistics* 4:1-22.

Studies in African Linguistics
Volume 8, Number 2, July 1977

MORPHOPHONOLOGICAL PALATALIZATION IN SOUTHERN BANTU: A REPLY TO SEGMENTAL FUSION[1]

Robert K. Herbert
Ohio State University

Most of the Southern Bantu languages exhibit a phonological process known as "Palatalization" whereby sequences of labial consonant plus w are replaced by labialized (pre)palatal fricatives or affricates, e.g. p + w → tʃw, b + w → dʒw. Similar alternations also occur before front vowels and the labiality of the palatals cannot be attributed to an underlying w. Stahlke [1976] treats these alternations as cases of segmental fusion in which the labiality of the palatals is derived from the labiality of the original stop consonant, e.g. b + i → dʒw. After a brief examination of Stahlke's analysis, it is suggested that these alternations are not to be treated within the domain of phonological fusion but as morphophonological, i.e. morphologically conditioned, alternations. This suggestion is viewed in the light of various criteria put forward by Linell [1976] and Dressler [to appear] for determining rule status. The analysis of Southern Bantu palatalization is then set in a general discussion of a possible constraint on the theory of segmental fusion.

1. Introduction

In a recent article appearing in this journal, Stahlke [1976] takes issue with the segmental discreteness postulate of American structural linguistics, i.e. the notion that phonological segments are linearly discrete. This notion has, as Stahlke points out, a much longer history, and it has been formally incorporated into the theoretical framework of generative phonology insofar as the form of phonological rules forces the

[1]A working version of this paper appeared in *Wiener Linguistische Gazette* 14:12-40 (Working Papers of the Institut für Sprachwissenschaft der Universität Wien). I am grateful to Herbert Stahlke, Robert J. Jeffers, and Professor Wolfgang Dressler for their comments on an earlier version of this paper which was presented in a seminar conducted by Prof. Dressler at Ohio State University, Winter 1977. Naturally, all oversights and analytical errors are my own responsibility.

linguist to think in terms of segments alone. Stahlke considers several cases where a purely segmental treatment of data is inadequate on both formal and explanatory levels. In these cases, he claims, it is necessary to recognize a phonological phenomenon whereby two adjacent segments *fuse* into a single unit, which unit segment shares properties of both.

Certainly the notion of fusion (unification, coalescence) has long been recognized within the domain of suprasegmental phonology. For example, a sequence of tones may be compressed onto a single segment. In this manner, a sequence of high tone plus low tone, if realized as a unit, becomes a single falling tone. Suprasegmental fusion is symmetrical in many systems so that the reverse sequence, low plus high, is realized as a rising tone. In the case of sequences of identical tones which are realized as a single unit, whether we need to make reference to fusion or deletion is really a moot question. Similarly, although perhaps more problematic from a formal viewpoint, there are numerous cases of vocalic fusion or coalescence which are cited in the descriptive literature whereby, for example, /a+i/→[ɛ], /e+u/→[o], /i+u/→[y].[2] Bell [1971] provides a useful survey of processes which shape syllable structure. Three clearly related processes are subsumed under the general heading of *Nuclear Fusion*. These processes involve the collapse of two nuclei into one; the resultant nucleus may be long or short, have the quality of one of the original vowels or a compromise between the two, or maintain both qualities as a diphthong, e.g. Susu combinations of vowel-final nouns with suffix -i :

(1) a. /i, e, ɛ/ + /-i/ → [i, e, ɛ]

b. /a/ + /-i/ → [ɛ]

c. /u, o, ɔ/ + /-i/ → [u̯i, oe̯, ɔɛ̯] alternating with [i, e, ɛ]

Alternations between sequences of vowel plus nasal consonant and nasalized vowels are also cited by Stahlke as examples of segmental fusion.

---

[2]The formalism provided by generative phonology does not adequately allow for cases of segmental fusion. In general, a transformational rule of the form AB → C is posited in such cases or else it is necessary to posit two independent rules which are formally coupled in some manner.

Consonantal fusion, i.e. coalescence involving two consonants or one consonant plus another segment which results in a surface consonant, occurs much more rarely than either vocalic or suprasegmental fusion and has played a much lesser role within the theory.[3] There are, however, convincing cases of such fusion, which are of two main types: i) those in which the resulting segment presents a sequence of articulatory events corresponding to an original sequence of segments, e.g. prenasalized consonants, affricates, etc.; ii) those in which the resulting segment presents a superimposing of articulatory events, e.g. certain voiceless or murmured nasals which can be attributed to sequences of nasal plus h .

Sasse [1976] examines several types of consonantal fusion involving two input consonants in the setting of a general discussion of multi-columned matrices in phonological representation. Among the examples cited are long consonants which arise from a sequence of two identical consonants or two non-identical consonants, prenasalized consonants, glottalized consonants, aspirated consonants, etc. Of course, the problem here is that segments which may be phonetically identical are sometimes underlying units, and in other languages these same surface units represent underlying clusters which are fused; the differentiation of the two types is often arbitrary in analysis.

Although cases of fusion between a consonant and non-consonant are cited in the literature, these cases are much less convincingly argued than those involving two like-input segments. Stahlke's most dramatic example of consonantal fusion of this type is that of root-final palatals in Tswana, a Southern Bantu language. In this paper, we propose to examine this case in greater detail and to provide a reanalysis of these data which does not make any reference to segmental fusion. The implications of this reanalysis will be discussed in Section 5.

2. Stahlke's Analysis of Tswana

The data concerning the root-final palatals in Tswana are as follows.

---

[3] The example of nasalized vowels does not fit this schema for two reasons. First, the purely segmental status of nasality has recently been called into question. Second, the resulting segment is a vowel, not a consonant.

The passive and causative verb stems are formed by suffixing the extensions -iwa and -isa or -ya respectively to the root. For many verb stems, alternate passive forms are possible: a form in which the full suffix occurs and a form in which -i has been deleted:

(2)
-bɔniwa/-bɔnwa	(< -bɔna)	'be seen'
-ratiwa/-ratwa	(< -rata)	'be loved'
-rokiwa/-rokwa	(< -roka)	'be sewn'

The interesting forms are those which have root-final labial consonants; in the i-deleted forms, a complex series of consonant alternations occurs:

(3)
-bopiwa/-botʃwa	(< -bopa)	'be moulded'
-rɔbiwa/-rɔdʒwa	(< -rɔba)	'be broken'
-bɔfiwa/-bɔʃwa	(< -bɔfa)	'be bound'

These alternations include the following:[4]

(4)
p	> tʃ
p^h	> $tʃ^h$
b	> ʒ or dʒ
f	> ʃ or $tʃ^h$
m	> ɳ or ñ

Stahlke considers, but rejects, an analysis which palatalizes labials and then deletes i by a general rule which, he claims, the grammar must have to account for the forms in (3), i.e.:

(5)
bop + iwa		
botʃ + iwa		palatalization
botʃ + wa		i-deletion

[4]Two points need to be noted here. There is apparently rather free variation in certain cases in the realization of the palatal alternate of b, which may be a fricative ʒ or affricate dʒ. In fact, the verb ja may be [dʒa, ʒa, ja, dja, ja]. The variants of f are morphologically determined: ʃ occurs in the passive and some diminutives, $tʃ^h$ in the causative and certain front vowel diminutives. This distinction is discussed in later sections. The output alternations in other Southern languages which we cite are similar, though not identical, to these Tswana alternations.

Among the problems with such an analysis is the fact that the palatalization process leaves intact those segments which we expect to be first palatalized, viz. alveolars and velars. Further, there is the formal problem posed by the fact that i-deletion, normally an optional rule, is obligatory only after palatalization has applied.

Similar palatalizations also occur in the causative verb form and the diminutive of nouns. In these cases, the consonant which results is also labialized, but the labialization cannot be attributed to a following w, as in the passive. The diminutive suffix is -ana/-ane, which historically began with a palatal glide *y or a palatalized velar fricative *ɣʸ. Stahlke attributes to the historical palatal the alternations:[5]

(6)	kolobɛ	kolodʒwane	'pig/piglet'
	tsʰipi	tsʰitʃwana	'iron/sm. piece of iron'
	lesapɔ	lesatʃwana	'bone/small bone'
	tsɛpʰɛ	tsɛtʃwʰana	'springbok/springbok kid'
	sefɛfu	sefɛtʃwʰana	'blind person/sm. blind person'

These alternations are formally schematized by Stahlke as:

---

[5]The transcription used by Stahlke is that of the official orthography; it has been modified to conform more closely with I.P.A. and that found in the standard reference works on these languages to facilitate comparison. Apart from the simple substitution of symbols, e.g. t͡ʃ for tš ; ɔ, ɛ for ô, ê, etc., we have reordered the symbols used by Stahlke for labialized palatals with aspiration. Thus, tsêtšhwana will be transcribed as tsɛtʃwʰana in this paper. This reordering is in agreement with Tucker [1929] and others who note that the use of w in conjunction with consonant symbols represents a unit articulation, not a sequence of events. Labialization runs throughout the consonant whereas aspiration, which is unrounded, clearly follows it. Thus, the I.P.A. transcription [t͡ʃʰ] is probably the most accurate representation; it is not employed here for typographical reasons. Similarly, for typographical reasons, ñ is used to indicate the palatal nasal (I.P.A. [ɲ]) and q represents the palatal-alveolar click. In other cases, we follow the transcriptions used by authors, occasionally modifying them to fit this general schema. This paper is primarily a work of library research. All errors of interpretation of data are my own responsibility.

(7)

p^h	+	i	→	$t\int w^h$
voiceless labial aspirated stop		high palatal vowel		voiceless labialized aspirated palatal affricate
b	+	i	→	$d\check{z}w$
voiced labial stop		high palatal vowel		voiced labialized palatal affricate
f	+	y	→	$t\int w^h$
voiceless labial fricative		palatal semi-vowel		voiceless aspirated labialized palatal affricate

Palatalization always involves the deletion of the vowel or glide which conditions it, but labialization is not always attributable to a following w , e.g. /ts^hipi + ana/ → $ts^hit\int wana$. Stahlke claims, therefore, that the labial consonant itself must be postulated as the source of labialization. Palatalization is not an assimilation process in Tswana; rather, it represents the fusion of two segments so that certain distinctive articulatory properties of both original segments are still present in the fused unit.

3. Additional Background Data

In addition to the language internal types of alternation considered by Stahlke, our reanalysis will make reference to the process of palatalization within the framework of the Southern Bantu language group as a whole. Thus, in addition to determining the synchronic status of these consonant alternations within Tswana, our secondary goal is a preliminary reconstruction of the phonetic stages responsible for these alternations historically.[6] In fact, it will be shown that Tswana palatalization is

[6]Reference to phonetic processes in various other Southern Bantu languages, e.g. Pedi, is not intended to validate the analysis of Tswana alternations which will be proposed. Rather, comparative evidence is cited here only to point to the historical naturalness of the developments which we propose insofar as intermediate stages are attested in closely related

closely related to processes of labialization and velarization in other languages of the group.

3.1. Tucker's analysis of passivization. In his *Comparative Phonetics of the Suto-Chuana Group of Bantu Languages*, Tucker [1929] notes that palatalization in Tswana is a very old process related to labialization of consonants in other contexts.[7] He distinguishes labializaiton of non-labial consonants and labialization of labial consonants. The former process, also known as "back labialization", gives rise to consonants which are produced with rounded lips and the back of the tongue raised somewhat more than usual. Back labialized consonants are phonetically identical in most cases with consonants occurring before back rounded vowels. Front labialization is a more complex phenomenon. In Pedi, a Northern Sutho dialect, it affects labial consonants and effects their being produced with rounded lips and the *middle* of the tongue raised more than is usual. Tucker uses the I.P.A. symbol [ɥ] to indicate this front labiality, although he notes that it is not so palatal as the French semi-vowel [ɥ] as in |ui . Also, it is important to remember that in both cases the semi-vowel symbols w and ɥ do not represent separate semi-vowels pronounced after the consonants, but w- or ɥ-like elements running throughout the articulation.

The corresponding process to Pedi front labialization is palatalization in S. Sutho and Tswana, i.e. front labialization is carried one step further in these languages. Instead of [fɥ, βɥ, pɥ, pɥʰ], we find [ʃw, ʒw, tʃw, tʃwʰ]. Tucker cites the following comparative forms showing these correspondences [1929:79-80]:

---

languages. While we claim that these stages do not occur in Tswana synchronically as the alternations are no longer phonological in character, they do lend some credence to what appears initially to be a rather suspect phonetic development. Comparative evidence also points to the natural development of phonological rules into morphophonological and morphological rules which is discussed in Section 4.

[7] Tucker's work is very useful insofar as the consonants are concerned, but his interpretation of vowels is less reliable.

(8)	Pedi	S. Sutho	Tswana	
	bofɥa	boʃwa	boʃwa	'be tied on back'
	ɬaβɥa	ɬaʒwa	tɬʰaʒwa	'be stabbed'
	tʰupɥa	tʰotʃwa	tʰotʃwa	'be captured'
	ɬɔpɥʰa	ɬotʃwʰa	tɬʰɔtʃwʰa	'be heaped up'
	βopɥa	botʃwa	botʃwa	'be created'

Unlike Stahlke, Tucker attributes palatalization of labial consonants in the formation of the passive to the extension -wa directly. Although he notes that the passive may also be formed by suffixing -iwa , the two are synchronically unrelated, i.e. one form does not derive from the other. Tucker's analysis might be schematized as:

(9) bop + wa
bop + ɥa
botʃ + wa

i.e. back labialization becomes front labialization after labial consonants, as in Pedi. The front-labialized consonant, in which a ɥ-like element is superimposed on the consonant, is palatalized and therefore receives surface back labialization in Tswana and S. Sutho.

3.2. Diminutives. Accepting for the moment the phonetic plausibility of an analysis such as the above, we still need to explain exactly those forms which lead Stahlke to his fusion analysis, i.e. those in which no underlying labial glide can account for the labialization of the palatalized consonants. The diminutivization of nouns is phonetically more transparent in Pedi than in either S. Sutho or Tswana. The general suffix is -ana/-ane , which functions in three processes to form the diminutive, varying with the final vowel of the noun:

(10) a. Ca + -ana/-ane → Cana/Cane

nɔɥa	nɔɥana	'snake'
leβa	leβana	'dove'
mpʃa	mpʃana	'dog'

b. Ci, Ce, Cɛ + -ana/-ane → Cjana/Cjane

lenti	lentjana	'string'
moɬoki	moɬokjana	'poor man'

more commonly, however, palatalization occurs:

moriri	moriʃana	'hair'
βoɬale	βoɬaʒana	'wisdom'
tʃwʰene	tʃwʰeñana	'baboon'
lenoŋ	lenoñana	'vulture'
leʃupi	{leʃutswana / leʃupɥana}	'indicator'
moɬape	moɬatswana	'herd'
leɣofi	leɣofsana	'palm of hand'
koloβɛ	{koloβzana / koloβɥana}	'pig'

c. Cu, Co, Cɔ + -ana/-ane → Cwana/Cwane or Cɥana/Cɥane with labials

kxʰoɣo	kxʰoɣwana	'fowl'
maru	marwana	'clouds'
leoto	leotwana	'foot'
kɛpɔ	kepɥana	'spade'
kuβu	kuβɥana	'hippo'
leɣapu	{leɣapɥana / leɣatswana}	'watermelon'

In Tswana and S. Sutho, front vowel nouns exhibit palatalization of stem-final consonants:

(11)

Pedi	S. Sutho	Tswana
moriʃana	moritsʰana	moritsʰana
βoɬaʒana	boɬaʒana	botɬʰaʒana
tʃwʰeñana	tswʰeñana	tʃwʰeñana
lenoñana	lenoŋñane	lenoñana
{leʃutswana / leʃupɥana}	mosutswana	moʃutʃwana
moɬatswana	moɬatswana	motɬʰatʃwana
{koloβzana / koloβɥana}	(kolobɛnana)	koloʒwana
leɣofsana	lefhotswʰana	lexoʃwana

Back vowel stems, which receive back labialization in Pedi, are also back palatalized in Tswana and S. Sutho, but front labialization is again carried a step further.

(11)	Fedi	S. Sotho	Tswana
	kapyana	ket∫wana	ket∫wana
	kupyana	ku∫wana	ku∫wana
	{leyapyana / leyatswana}	lehat∫wana	lexat∫wana

It is important to note here that the labiality of palatals derived from labial consonants can be attributed to a stem-final u , o , ɔ . The treatment of labial consonant stems in the diminutive thus parallels exactly the treatment of labials in the passive. Such an analysis is not possible for the forms in (11). However, note that the process of front-vowel labialization is much more pervasive; it affects not only labial consonants, but all stem-final consonants. Thus, alveolars and velars are palatalized before i , e , ɛ , but labials are palatalized before all vowels except a . The process of palatalization in the causative behaves similarly. This is an important distinction to which we shall return below.

4. Reanalysis in the Setting of Southern Bantu

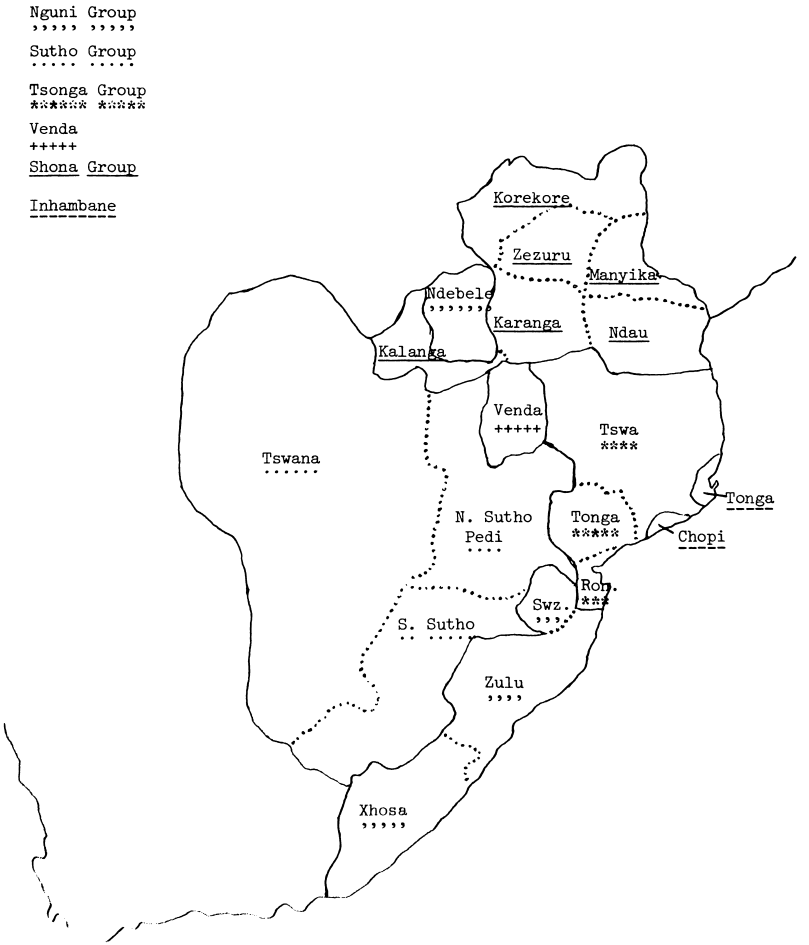
The analysis which we shall propose for palatalization in Southern Bantu passives is that it is a morphophonologically conditioned process synchronically. That is, we agree with Tucker's analysis of two suppletive extensions -wa and -iwa .[8] The -wa extension has, through the course of time, come to be associated with a series of complex consonant alternations. There is a great deal of evidence which suggests, however, that these alternations are no longer fully phonological in character as Stahlke claims, but rather are conditioned by category membership and juxtaposition with a particular morpheme.

Doke [1967] points out that "palatalization" is actually a misnomer since prepalatals are used in most languages, although Xhosa exhibits

[8]Meinhof [1932:45] also treats the two passive extensions as independent. He notes, however, that -wa is probably derived historically from *-iɣwa . We assume that the original distribution of -wa/-iwa among the Southern languages was that -iwa occurred with monosyllabic stems. Its use with vowel-initial stems in Zulu is probably an innovation.

The Southern Bantu Languages

(after Doke [1967])



both palatals and prepalatals. There is no doubt that palatalization arises historically from a general incompatibility of labial consonants and w . Comparative forms such as the following show the far-reaching effects which this incompatibility has had among the Southern languages:

(13)	Xhosa	S.Sutho	Shona	Venda	Tsonga	Lenge	
*mu-ana	uñana	ŋwana	mŋana	ŋwana	ŋwana	mwanana	'child'
*imbwa	iñdʒa	nt͡ʃa	imbɣa	mbɣa	mbjana	imbwa	'dog'
*bu-ala	ucwala	dʒwala	bɣabɣa	(halwa)	bjala	wadwa	'beer'

Lenge, a Chopi dialect, conforms rather closely to the reconstructed forms in all cases. Xhosa exhibits palatalization in all three cases whereas S. Sutho has palatalization in the last two, but velarization of m in the first as does Tsonga. Shona and Venda have velarization throughout. The Tsonga forms mbjana and bjala show palatalized labials which recall Tucker's analysis proposed in Section 3.1. We note that, on its own merit, a process of "palatalization by w" would be extremely unnatural and suspect.

Doke [1967:40] describes the complementary process of velarization as "an abnormal raising of the back of the tongue towards the soft palate (velum) instead of the usual slight raising effected in pronouncing the velar semi-vowel w ." Velarization actually involves three subcomponents as the following examples from Shona demonstrate:

(14) a. the substitution of a velar fricative or plosive for w after labial consonants: [pxa, bɣa, mŋa]

b. the insertion of a velar fricative or plosive between post-labial pre-velar consonants and w : [txwa, sxwa, rɣwa]

c. the maintenance of w after velar and post-velar consonants: [kwa, gwa, ŋwa, ɦwa].

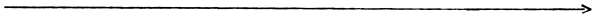
The processes are similar, but less regular, in Venda. This pervasive velarization must be distinguished from what Doke terms "Velarization by Substitution", which is more widespread and effects the replacement of m (and occasionally ñ) by ŋ in passives, noun diminutives, and the prefix of some Class 1 and 3 nouns, e.g. S. Sutho:

(15)	roma	roŋwa	'send/be sent'
	seña	seŋŋwa	'spoil/be spoiled'
	k^homo	k^hoŋwana	'ox/small ox'
	leleme	leleŋwana	'tongue/small tongue'
	*mu-etsi	ŋwetsi	'daughter-in-law'

The patterning of nasals within the system of consonant alternations is discussed in Section 4.4.

Dressler [to appear] makes a four-way distinction among rule types which are appropriately represented on a scale:

phonetic phonological morphophonological morphological



1 2 3 4

This contrasts with other theories which recognize only phonological and morphological components of a grammar. Phonetic rules are treated as a subcomponent of phonology, and morphophonology as part of phonology or morphology proper. Linell [1976], as a reaction to the widespread use of phonological formalism for morphophonological and morphological purposes, proposes that morphophonology is part of morphology. This follows earlier structuralist theories. The absolute distinction is difficult to maintain, however, as there are no unambiguous criteria which can be used to distinguish between the two.

In very broad terms, we shall follow Dressler in distinguishing between phonological, morphophonological, and morphological rules as follows:[9] phonological rules are of the form A→B/C in which both the change and the environment in which it occurs are phonetically plausible whereas morphological rules often involve quantal leaps and implausible environments. Morphological rules are often context-free in the sense that the rule can be stated without reference to any phonological environment although it occurs systematically within a category such as [PLURAL]. Morphophonological rules share characteristics of both phonological and morphological

[9]Phonetic rules are the "automatic rules" of generative phonology.

rules in that although they serve morphological functions, they may be (partially) plausible phonological rules. These distinctions are not absolute. We cite below some types of evidence which are conveniently used to argue for the assignment of a rule to any one particular category.

4.1. Evidence for morphophonologization: Passive. There are several types of evidence which could be cited in defense of a morphophonological analysis of palatalization in Southern Bantu. Among those criteria discussed by Linell [1976] and Dressler [to appear] is the phonetic non-naturalness of the synchronic alternations. That is, although it is possible to recover the intermediate stages of palatalization, which stages are attested in various languages and dialects, synchronic alternations of the sort p + i → tʃw f + i → tʃwʰ, etc. are phonetically radical and unnatural. Also, although the historical effects of palatalization and velarization are evidenced throughout the lexicon, the fact that they are synchronically associated with particular grammatical categories makes them good candidates for morphophonologization. That there are many exceptions and idiosyncracies in the workings of palatalization also points to non-phonological conditioning. There is further a tendency among some speakers to use alternate suffixal forms which avoid palatalization. For example, Tucker [1929:81] noted an increasing tendency among younger speakers of Tswana for passives with -iwa rather than -wa plus palatalization. The same tendency is exhibited in the formation of diminutives where a suffix -ñana replaces -ana . In some languages, e.g. Tsonga, the -iwa passive has replaced -wa almost completely. It is important to note that -iwa replaces -wa in all contexts, not only after labial consonants.[10]

Another important type of evidence which points to non-phonological conditioning of palatalization is the association of the alternations

[10]The spread of -iwa and -ñana at the expense of -wa and -ana follows Kuryłowicz' general principle that the longer of two competing forms tends to replace the shorter. There are clearly other factors operating here which also contribute to an explanation of the extension/origin of the longer forms.

with particular categories, i.e. the alternations are indexical and act as a semiotic signal of category membership.[11] There are two subtypes of this sort. First, there are examples where the palatalized consonant is added to the labial consonant rather than replacing it. Tucker, in his 1969 addenda to the 1929 edition, notes that there is a growing preference among Lesutho for forms such as bɔʃʃwa , leʃʃwa , tʰopʃwa , ɬɔpʃwʰa , etc. over older boʃwa , leʃwa , tʰotʃwa , ɬotʃwʰa (< -bɔfa , -lefa , -tʰopa , -ɬɔpʰa). That is, transparency of derivation is increased by suffixing ʃwa to the verb stem directly. In some Northern Sutho dialects [Ziervogel 1960], the morphologization of palatalization is demonstrated by the fact that w never occurs with the palatalized alternants: ba , pa , pʰa, fa become bʒa , pʃa , pʃʰa , fʃa , i.e. ʒa or ʃa are suffixed directly to labial stems although non-labial consonants show -wa : bopa , bopʃa ; bɔfa , bɔfʃa ; rata , ratwa .[12] The bilabial nasal does not follow this pattern as ma > ŋwa : roma , roŋwa (cf. Section 4.4). Similarly in Tswa b becomes bj even before -iwa , e.g. laba , labjiwa 'see, be seen'.

Second, there are examples where the labial consonants are palatalized even when they are no longer stem-final. Doke [1926:140] cites the following forms from Zulu:

(16)	ɓɔpʰela	(< ɓɔpʰa)	ɓoʃɛlwa	'tie for'
	bubisa	(< buba)	budʒiswa	'kill'
	lumisisa	(< luma)	luñisiswa	'bite hard'

That is, even when other extensions intervene between the bilabial and the palatalizing -wa suffix, palatalization occurs. Obviously, it is not possible to salvage a phonological conditioning in these cases with-

---

[11] Hooper [1976:89] notes that the morphologization tendency is in part motivated by a desire to establish a one-to-one correspondence between sound and meaning, especially when there is an accidental close correspondence between an alternation and a particular grammatical category.

[12] Cole [1955:xix] notes a similar tendency in N. Tswana dialects. These tendencies not only increase derivational transparency, but they also more closely mirror historical forms, e.g. ntʃa 'dog' (*mbwa) is mpsa, mpʃa ; ntʃʰe 'ostrich' is mpʃʰa, mpsʰa in these dialects.

out an otherwise unmotivated appeal to rule ordering. The other alternative is to treat passive stems as synchronic suppletives, an analysis which is not altogether unattractive.

The tendency to associate these consonant alternations with particular grammatical categories is demonstrated in several languages. For example, in Venda velarization is an active process only in the formation of passive stems. The pattern of diminutive formation is no longer by suffixation; even in the few forms with -ana which do survive, there is no consonant alternation.

To summarize our analysis of passivization to this point: there are certain alternations between labial and palatal (or prepalatal) consonants which occur when the extension -wa is suffixed to a verb stem, but not when an alternate suffix -iwa is used. The alternate suffixes are analyzed as formally independent units synchronically, i.e. -wa is not derived from -iwa via a rule of i-deletion.[13] Further, there are numerous facts which point to the morphophonological status of these consonant alternations in many languages, including Tswana. It may be that conditioning is fully morphological in some languages, e.g. Zulu. Therefore, we do not feel that Stahlke's fusion analysis of these alternations can be accepted. Morphophonologization of the passive alternations appears to have occurred in the Nguni group, the Sutho group, and in Venda. In the Tsonga group, these alternations have generally been lost through the spread of passivizaiton with -iwa . The situation with respect to velarization in Shona, which is not strictly speaking Southern Bantu, is

[13]Stahlke [personal communication] has pointed out that the demonstration of the non-relatedness of -wa/-iwa is crucial to the arguments and analysis proposed in this paper. There are a number of factors which can be used to argue for such a formal independence. First, the patterning with monosyllabic stems mirrors other phonological developments which are directly conditioned by stress considerations. Evidence for the spread of an unrelated -iwa suffix is supplied by the parallels with the spread of the -ñana diminutive suffix (see below) which cannot be derived by general rule. Further, there are cases where consonant alternations cannot be derived by general rules of i-deletion, e.g. *imbwa > ñtʃa in Sutho. There is also the more formal problem that i-deletion, a phonological rule, applies only at a morpheme boundary in certain grammatical categories. We believe that a morphophonological analysis of the alternations is more plausible than a fusion analysis which attempts to make them natural phonological phenomena.

less clear, especially in the Zezuru, Karanga, and Ndau dialects where either explosive [pka , bga , mŋa] or fricative velarization [pxa , bɣa , mŋa] occurs. In Manyika and Korekore dialects, the process is sharply diminished, to the extent of practically disappearing in certain areas where [pwa , bwa , mwa] occur. These facts are summarized in Table 1.

4.2. Noun diminutivization. The second most frequent category in which the consonant alternations under discussion occur is the diminutive of nouns and adjectives. We have already mentioned, however, that in some languages, e.g. Venda, the typically Southern Bantu suffixation of -ana does not occur. As in the passive -wa/-iwa alternation, several languages also exhibit -ana/-ñana alternations in which the suffixation of the latter avoids the series of consonant alternations.[14] The historical development of these alternations in the diminutive forms parallels their development in the passive. The problematic cases discussed in Section 2 were those nouns which do not end in a back round vowel and which therefore have no source for the triggering of the palatalization process, e.g. Zulu:

upʰapʰɛ	upʰaʃana	'feather'
iŋkaɓi	iŋkatʃana	'ox'
intaɓa	intatʃana	'hill'
intsumpa	intsuñtʃana	'wart'

The important fact here is that palatalization of labials occurs irrespective of the final vowel. Rather than arguing for a synchronic analysis which postulates an initial glide *-yana , these forms point again to the morphological status of palatalization in Zulu. At the point where the phonetic conditioning was lost, the pattern of alternations was extended to include all diminutive forms. Whereas the

[14] In most languages, the two diminutive suffixes are completely synonymous. However, in Tswana they are different in nouns referring to animals. -ñana indicates an animal of small size whereas -ana refers to a young, immature animal, e.g. podi 'goat', podiñane 'small goat', potsana 'kid'.

TABLE 1

Group	Major dialects/ languages	Passivization	Conditioning
Nguni	Zulu Xhosa	-wa with palatalization of labial consonants	morphophonological (morphological Z.)
	Swazi	-iwa with monosyllabic and vowel-initial stems	
Sutho	S.Sutho Tswana	-wa with palatalization of labial consonants	morphophonological
	Pedi	-iwa	
Venda		-wa with Velarization	morphophonological
		-iwa	
Tsonga	Tonga Tswa Ronga	-iwa (occ. with -wa in Ronga)	
Shona	Zezuru Karanga Ndau	-wa with Velarization	?
	Manyika Korekore	-wa	

bilabial is always affected in the passive, since the underlying w which conditions the alternation is part of the passive extension, the extension of palatalization in the diminutive is historically unjustified. The extension of pattern clearly indicates, however, the morphological character of these alternations.

Palatalization has been further extended in the formation of diminutives in Zulu. Doke [1926] notes that alveolar consonants are optionally affected:

(18) t^h > t^h or ʃ
d > d or dʒ
nd > nd or ñdʒ

and t and n are always affected:

(19) t > tʃ
n > ñ

(21)	$ut^hɔ$	ut^hwana or uʃwana	'thing'
	$isik^hat^hi$	$isik^hat^hana$ or $isik^haʃana$	'time'
	ikati	ikatʃana	'cat'
	imiɱfinɔ	imiɱfiñwana	'vegetables'

Note that w is retained even if the alternation occurs as in uʃwana and imiɱfiñwana . It is perhaps significant that this extension of palatalization occurs in the diminutive, a category which is associated with palatal consonants in other languages, e.g. some Amerindian languages, some Slavic languages, etc. The alternation also occurs in reduplicated diminutive forms:

(21)	indʒa	'dog'
	indʒana	'small dog'
	indʒañana	'very small dog'
	indʒañañana	'tiny dog'

This situation must be distinguished from that which obtains in Sutho, Tswana, etc. where another type of pattern extension has occurred. Stems which end in back vowels follow the historical pattern described in Section 3.2, but palatalization has been extended throughout the front

vowel stems. Again, this palatalization differs from that found in the passive in that not only labial consonants are affected:

(22)	Sutho	S. Sutho	Tswana	
	nare	natʃana	natʃana	'buffalo'
	kxʰalɛ	kxʰaʒana	kxʰaʃana	'long ago'
	podi	potsane	potsane	'goat'
	lemati	lematʃana	lematʃana	'door'
	tswʰene	tswʰeñana	tʃwʰeñana	'baboon'
	lenoŋ	lenoŋñane	lenoñana	'vulture'
	leñofi	leñotswʰana	lexoʃwana	'palm of hand'
	selɛpɛ	seletswana	selɛtʃwana	'axe'
	seɬopʰa	seɬotswʰana	setɬʰɔtʃwʰana	'troop'
	tʰɛbɛ	tʰeʒana	tʰɛʒana	'shield'
	kolobɛ	(kolobɛñana)	koloʒwana[15]	'wild pig'

These are the same alternations which occur in the causative, in some Class 5 forms with prefix le- , and in a few perfect tense forms. This situation is rather complex as the actual consonant alternations are palatalizations due to front vowel, *not* to a w as in the passive. This explains why the whole range of consonants is affected, not only the labials. However, we still need to explain the labiality of the palatals which result from labial consonants as in koloʒwana , lexoʃwana , etc. It is the labiality of these forms which leads Stahlke to his fusion analysis, i.e. b + i → (d)ʒwa , f + i → ʃw , etc. The explanation for this labiality lies simply in a contamination of the pattern of alternations, induced by front vowel palatalization, with the alternations which occur in the passive and elsewhere. That is, palatalization by w is an older process, and since speakers already needed to learn a complex series of alternations involving labial consonants which results in labialized palatals, the labiality of that

[15]In fact, b often has a non-labialized palatal alternant: kolodʒwana ~ kolodʒana.

series is extended to all palatals derived from labials, whether historically justified or not.[16]

Another fact which points to the non-phonological status of palatalization is the number of exceptions to the process which occur. For example, in Zulu diminutives, some bilabials do not alternate:

(23)	impi	impana	'army'
	isimbɔ	isimbana ~ isimbɔana	'digging stick'

There are far more exceptions in the locative (cf. Section 4.3) where palatalization does not occur when expected:

(24)	iziŋkɔmɔ	eziŋkɔmeni	'cattle'
	impɛpʰɔ	empʰɛpʰɔeni	'medicinal plant'
	ipʰupʰɔ	epʰuʃeni ~ epʰupʰɔeni	'dream'

and cases where palatalization occurs but should not:

(25)	igama	ɛgameni ~ ɛgañeni	'name'
	iqɔma	ɛqɔmeni ~ ɛqɔñeni	'basket'

The criterion of rule opacity is also used to distinguish morphophonological and phonological rules. It is generally asserted that phonological rules tend to be transparent whereas morphophonological rules are opaque, i.e. they are superficially ambiguous. Morphological rules proper may be transparent or opaque. Thus, the substitution of labio-palatal affricates fʃ , pʃʰ : bɔfa , boʃwa or bɔfʃwa ; tʰopʃwʰa or tʰotʃwa represents a morphologization of a morphophonological process which increases transparency.

The morphophonological alternations are opaque in two ways. First, in some languages distinct labial input segments have identical output alternations, e.g. Tswana pʰ and f are tʃʰ . Second, the palatal consonants may represent underlying palatals or derived palatals, e.g.

---

[16]This does not represent a rule merger since the rules are still formally distinct. Exactly how these rules are to be formally represented is not an issue in this paper. The question of formal representation is a larger theoretical issue involving the general treatment of complex segments.

Zulu iñdʒana (iñdʒa) 'small dog', intañdʒana (intambɔ) 'small string'; isitʃana (isitʃa) 'small plate', intatʃana (intaβa) 'small hill'. Similarly, the derived palatals may have distinct sources in categories where the alternations have been extended: iŋkɔñana (iŋkɔmɔ) 'small beast', inɔñana (iñoni) 'small bird' as well as cases of underlying ñ. However, the criterion of opacity is not a particularly strong one for determining morphophonological status.

Thus, we claim that the process of diminutive formation in some Southern Bantu languages, especially within the Nguni group, is not a phonological process, but a morphophonological process. A good case could be made for fully morphological conditioning in Zulu where the alternations have been extended to include all noun forms regardless of the stem-final vowel. Our analysis of nouns with back rounded vowels in Tswana, Sutho, etc. parallels exactly our analysis of passives in these languages. There is a similar tendency in both cases to avoid the palatalization by the use of an alternate suffix. However, the palatalization of all final consonants in front vowel noun stems is a formally unrelated phenomenon in these same languages. This front vowel palatalization occurs in other environments in these languages where no change is exhibited in the languages of other groups.

4.3. Other contexts for palatalization. Although the passive form of verbs and the diminutive of nouns represent the categories in which palatalization/velarization is most pervasive in Southern Bantu, similar alternations are less regularly exhibited in other contexts. Doke [1967:94] notes that palatalization also occurs in some noun formations in Zulu, particularly in Class 14, which shows the class prefix uβu- , e.g.:

(26)

uβu	+	ala	→ utʃwala (Xh. utywala)	'beer'
uβu	+	ani	→ utʃani (Xh. utyani)	'grass'
umu	+	ana	→ uñana	'child'

in which forms a stem-initial vowel causes the prefix-final u- to lose its syllabicity and thereby to elicit palatalization of the prefix labial consonant.

Palatalization also occurs in locative formations in certain languages which form locatives by suffixation. In these cases, labial consonants are palatalized before back rounded vowels when the locative suffix follows, e.g. Zulu:

(27)	isiβɔpʰɔ	esiβɔʃeni	'grass rope'
	isigubu	esigudʒini	'calabash'
	iŋguβɔ	eŋgutʃeni	'blanket'
	umlɔmɔ	emlɔñeni	'mouth'
	emlambo	emlañdʒeni	'river'

Similarly, in Ronga:

(28)	nomo	noŋwen	'mouth'
	ŋkʰubu	ŋkʰubyin	'feast'
	mombo	mombyen	'fact'

No alternation occurs before any other vowels or with non-labial consonants. The pattern is thus exactly that of the passives and the diminutive. In many languages, the locative is no longer formed by suffixation; in other languages, it is formed by a suffix which does not condition any alternations, e.g. in Venda, -ni is suffixed directly to the noun stem:

(29)	mulamboni	'from the river'
	mbudzini	'on the goat'

4.4. The patterning of nasals. It is necessary to address briefly the general question of how nasal consonants, particularly the bilabial nasal m , are integrated into the series of consonant alternations. The situation is least complex in Nguni where m participates as expected in palatalization, e.g. Zulu:

(30)	luma	luñwa	'bite/be bitten'
	tʰuma	tʰuñwa	'send/be sent'
	umlɔmɔ	emlɔñeni	'mouth'/(loc.)
	iŋkɔmɔ	iŋkɔñana	'beast'/(dim.)

As was mentioned in Section 4.2, palatalization has been extended to include alveolar consonants within the diminutive paradigm in Zulu. The palatal equivalent of n is again the expected ñ :

(31)	iñoni	iñɔñana	'bird'
	imfɛnɛ	imfɛñana	'baboon'

No special rules are required to integrate palatalization of nasals into the general schema of consonant alternations.

In most of the Southern languages, however, we find that the equivalent of m is not ñ , but rather ŋ .[17] Of course, in languages which exhibit velarization, as opposed to palatalization, this is the expected form, e.g. Shona pka , bga , mŋa which are derived historically from forms such as those found synchronically in some Korekore areas, pwa , bwa , mwa , via a single rule. A similar situation obtains in Venda where there is fricative velarization, except that the velarized equivalent of m is either ŋw or the expected mŋ :

(32)	luma	luŋwa or lumŋa	'bite/be bitten'

In the Tsonga group, ŋw is the normal development from mw , although the passive suffix -wa occurs only in Ronga:

(33)	kuma	kuŋwa/kumiwa	'find'/(pass.)
	homu	hoŋwana	'ox'/(dim.)
	nomo	noŋwen	'mouth'/(loc.)

A similar situation obtains in the Sutho group:

(34)	roma	roŋwa	'send'/(pass.)
	k^homo	k^hoŋwana	'ox'/(dim.)

The range of variation occurring with m plus w sequences is also exhibited in comparative Class 1 and 3 noun forms, e.g.:

(35)	*mu-ana	'child'
	Xhosa uñana	
	S.Sutho ŋwana	
	Shona mŋana	

---

[17] In some languages, ñ is also velarized to ŋ , e.g. Tswana:

fɛña	fɛŋŋwa	'be conquered'
seña	seŋŋwa	'be spoiled'

(35) cont.

Venda	ŋwana
Tsonga	ŋwana
Lenge	mwanana

The problematic forms here are the Sotho, Venda, and Tsonga ŋw , where we expect ñw , mŋ , and mj respectively, based on the patterning of oral consonants. It is necessary in these languages to postulate an independent, possibly older, rule whereby mw → ŋw . There is no problem with the reconstructed phonetics of such a situation; similar rules occur independently in many languages outside the area. The fact that w patterns as a velar rather than a labial in such an assimilation is mirrored in its development into velar fricatives and plosives in those languages with velarization processes, e.g. Shona, where we also find mŋ as the alternate of m . The assimilation rule in conjunction with rules of palatalization and velarization thus accounts for all of the alternations which we find within the Southern group. The exact chronology of development, including the question of whether mw → ŋw preceded the development of palatalization/velarization, is a topic for future research.

5. Conclusion

By way of summary, there are a number of points which have been established during the course of this brief paper. First, within the framework of the Southern Bantu languages, an attempt was made to demonstrate that the complex series of consonant alternations traditionally termed palatalizations and prepalatalizations is no longer fully phonological in character. The analysis proposed in this paper is that the processes of alternation are morphophonological in most languages; through the course of time these alternations have come to be associated with particular morphemes and grammatical categories. It is juxtaposition with a particular morpheme and membership in a certain category which determines the alternation synchronically, though the alternations could be described in purely phonological terms. In some languages, a stronger case can be made for fully morphological conditioning, i.e.

the alternations occur context-free within a particular category.[18] Numerous types of evidence were cited in defense of such an analysis which included the many idiosyncracies and exceptions to palatalization, the phonetic non-naturalness and opacity of the alternations, the non-contiguous conditioning in some languages, the tendency for the alternation-determining suffixes to be lost in the course of time thereby eliminating the alternations, and the over-generalization of the process in certain categories, e.g. the diminutive in Zulu, so that the alternation receives a fully morphological status. Additionally, there are other facts, relating to the non-transfer of these alternations to sequences of labial consonant plus w in foreign language learning [A. Nkabinde, personal communication], the patterning of these alternations in language games, and the possibility that sound symbolism may account for their spread in certain categories, which point to the non-phonological status of palatalization.

It was demonstrated that the alternate passive suffixes -wa/-iwa in many languages are not synchronically derived from a single underlying form via a rule of i-deletion. The fact that both forms may occur in certain languages points to the spread of the -iwa form, which was originally limited to monosyllabic stems; this spread is possibly motivated by the desire to avoid completely the complex series of alternations. The development of an alternative diminutive suffix -ñana is explained in similar fashion. The situation with respect to the decline of palatalization in the locative and other categories is more complex, but the result is the same, viz. the alternations tend to be lost through change.

The history of palatalization in Southern Bantu parallels the general direction of change proposed by Dressler [to appear]. That is,

---

[18]The difference between morpho(phono)logization and lexicalization of a phonological rule is that the latter does not occur with particular categories only. Thus, non-alternating palatals are relexicalized in such forms as Tswana ñtʃa (*imbwa) 'dog', though these might be synchronically derived in an abstract generative analysis.

phonological rules become morphophonological rules which may ultimately become morphological rules. Of course, in many developments a phonological rule does not pass through a morphophonological stage in becoming morphological. Morphological rules are phonologically context-free; there is a tendency for the opacity of morphophonological rules to be lessened in morphologization as was seen in the example of labio-palatal affricates f$\int$, b$\jmath$, etc.

The particularly problematic cases in Tswana examined by Stahlke were shown to involve two distinct series of palatalizations. The second of these, which is of a different nature than "palatalization by w", occurs in the causative, with front vowel stems in the diminutive, etc. The fact that labial consonants give rise to palatals with labiality led Stahlke to a fusion analysis since there is no underlying w to explain the labialization in these cases. However, we proposed that the labialization in these cases is to be explained by reference to the older series of consonant alternations, which do involve an underlying w or back rounded vowel. That such a contamination could occur points again to the non-phonological status of the older series of alternations.

The reconstructed phonetics of palatalization needs to be worked out in much greater detail than the sketch presented within this paper. We also need to establish the relative chronology of palatalization and the rules with which it interacts and to determine, for example, whether the nasal assimilation rules m → ŋ / ___w in Sutho, Venda, Tsonga represent shared or parallel innovations. While it may be possible to find satisfactory answers to the above questions, there will remain the most important question of why incompatibility between labial consonants and w developed originally. The issue of actuation is, of course, one of the most vexing issues in any historical study.

Although we feel that a fusion analysis cannot be accepted for the palatalization of labials in Tswana or most of the Southern Bantu languages, this paper does not claim to cast any doubt on the general validity of the process of phonological fusion. As was stated in Section 1, there are numerous cases of vocalic and suprasegmental fusion which seem particularly well established. Cases of consonantal fusion involving two consonants also exist, but they are less frequent than the above types

and are often less convincingly argued. The issue of consonantal fusion is examined in some detail in Herbert [1977]. What does seem questionable at the present time is that fusion of segments which do not share any major class features might occur. For example, Stahlke's analysis of Tswana data involves a fusion of underlying consonants and vowels. There are, of course, numerous cases where glides fuse with both consonants and vowels in various languages. This is fully expected since glides exhibit properties of both consonants and vowels. For example, Sasse [1976] notes that certain palatalized consonants arise from sequences of consonant plus palatal glide and that some labialized consonants derive from sequences of consonant plus w . In this respect, the palatal consonants which we have examined in this paper do represent a fusion since, as was mentioned in Section 3.1, the labiality runs throughout the consonant articulation. However, this is a very different type of fusion than that proposed by Stahlke who accounts for the palatality of these consonants by the fusion of a labial consonant with a palatal vowel or glide. None of the coalescence processes surveyed by Clements [1976], apart from a citation of Stahlke's Tswana analysis, involve fusion of opposing major classes. The fusion of segmental and suprasegmental units, e.g. tones, nasality in some languages, etc., is a fusion of a very different sort; it may be best to regard this phenomenon as a "formal association". Many more cases need to be examined before this limitation on segmental fusion can be considered established. It is presented here as a profitable direction for further research.

REFERENCES

Bell, Alan. 1971. "Some patterns of occurrence and formation of syllable structures." *Working Papers in Language Universals*, no. 6, pp. 23-137. Stanford University, Stanford California.

Clements, George N. 1976. "Phonological coalescence. Paper presented, annual meeting of the Linguistic Society of America, Philadelphia.

Cole, Desmond. 1955. *An Introduction to Tswana Grammar*. London: Longmans, Green and Co.

Doke, Clement M. 1926. *The Phonetics of the Zulu Language. Bantu Studies* II, Special Number. [Reprinted 1969. Nendeln: Kraus Reprint.]

Doke, Clement M. 1967. *The Southern Bantu Languages.* London: Dawsons of Pall Mall.

Dressler, Wolfgang. To appear. "Morphologization of phonological processes (Are there distinct morphonological processes?)." In A. Juilland (ed.), *Linguistic Studies Presented to Joseph Greenberg.*

Herbert, Robert K. 1977. "Language universals, markedness theory, and natural phonetic processes." Doctoral dissertation, Ohio State University. [In preparation]

Hooper, Joan. 1976. *An Introduction to Natural Generative Phonology.* New York: Academic Press.

Linell, Per. 1976. "Morphophonology as part of phonology." In W. Dressler and O. Pfeiffer (eds.), *Phonologica 1976.* Innsbruck: Institut für Sprachwissenschaft. [To appear]

Meinhof, Carl. 1932. *Introduction to the Phonology of the Bantu Languages.* Berlin: Dietrich Reimer/Ernst Vohsen.

Sasse, Hans-Jürgen. 1976. "Multikolumnale Segmente in der Phonologie." Forschungsberichte/Working Papers, no. 6, pp. 115-162. Institut für Phonetik und sprachliche Kommunikation der Universität München.

Stahlke, Herbert F.W. 1976. "Segment sequences and segmental fusion." *Studies in African Linguistics* 7:41-63.

Tucker, A.N. 1929. *The Comparative Phonetics of the Suto-Chuana Group of Bantu Languages.* London: Longmans, Green and Co. [Reprinted 1969. Farnborough: Gregg International Publishers Ltd.]

Ziervogel, D. 1960. *Handboek van Noord-Sotho.* Pretoria: J.L. Van Schaik Beperk.

Zwicky, Arnold M. 1975. "The strategy of generative phonology." In W. Dressler and F. Mareš (eds.), *Phonologica 1972*, pp. 152-68. München: Wilhelm Fink Verlag.

Studies in African Linguistics
Volume 8, Number 2, July 1977

CONSONANT TYPES, VOWEL HEIGHT AND TONE IN YORUBA*

Jean-Marie Hombert
University of California, Los Angeles

Consonant types perturbate pitch in Yoruba, as they have been shown to do in non-tone languages. Such perturbations may serve as one source of "tone-splitting" in languages which already have tone. Average fundamental frequency of a given tone in Yoruba varies according to vowel height. The fact that average pitch differences for vowels bearing low tone is smaller than for those bearing high tone is evidence against a simple-minded version of the "tongue pull" theory as an explanation for the correlation of tongue and pitch height. Tonogenesis and tone-splitting would not be expected to arise from the vowel height/fundamental frequency correlation since this "steady state" correlation lacks the perceptual saliency of the perturbations caused by consonant types.

1. Introduction

In this paper I shall address myself to three different issues: consonant types, vowel height, and distribution of tones. In the first part, it will be shown how a voiced vs. voiceless consonant can affect the fundamental frequency of the following vowel depending on the tone of this vowel. In the second part, the intrinsic pitch of vowels as a function of tone will be investigated; the relevance of these data for rejecting or accepting current theories of intrinsic pitch of vowels and theories of tonal developments will be examined. Finally, it will be suggested that it is often the case that other cues than steady state fundamental frequencies are used to identify tones. The so-called Yoruba low level tone which is realized as a low falling tone, at least in some environments, is a good example of this.

*I would like to thank L. Hyman, J. Ohala, W. Leben and the members of the UCLA tone seminar for their helpful comments and suggestions on this paper. I also want to thank A. Bamgbose, B. Elugbe, M. Lindau and P. Williamson for their help when I was collecting my data at University of Ibadan, Nigeria. An earlier version of this paper was read at the 6th Conference on African Linguistics, Columbus, Ohio, April 1975.

2. Consonant Types

In an earlier study [Hombert 1976a], five American speakers were asked to read a word list consisting of ten tokens of each test word arranged in random order. These test words were 6 CV nonsense words using the consonants /p, t, k, b, d, g/. Only the vowel [i] was used since I was not interested in variations caused by vowel height in this experiment. With a reference point at the onset of the vowel, F_0 values were measured at the onset and 20, 40, 60, 80 and 100 msec after this onset. Under these conditions, data presented in Figure 1 were obtained. As to be expected, the largest differences between the two curves, obtained respectively after voiceless and voiced consonants, were found at the vowel onset, with these differences decreasing as time increases. A statistical analysis[1] of these data showed that these two curves were still significantly different[2] at 100 msec after vowel onset.

In the second part of this study using synthesized stimuli I showed that these intrinsic perturbations can be perceived even when they are only 60 msec long. In relating these perceptual data and the production data to each other, we can see that there is an overlap of at least 40 msec between the time we start hearing significant differences and the time these differences cease to be significant.

These experimental data validate and explain the well-attested development of tone due to the loss of some voicing distinction in prevocalic position [Brown 1965; Chang 1973, 1975; Haudricourt 1954, 1961; Hombert 1975, to appear; Hombert, Ohala and Ewan 1976; Matisoff 1973; Mazaudon forthcoming].

Tone systems are not static. A language can acquire tones and then increase the complexity of this tone system but it can also decrease the number of its tones and ultimately become non-tonal. These two processes, acquisition and recession of tones, have been termed *tonogenesis* [Matisoff 1970, 1973] and *tonoexodus* [Lea 1973]. Cases of tonoexodus are rare[3] and it is not clear what the intermediate historical stages between the tonal and non-tonal stages are.

---

[1]Analysis of variance followed by Duncan's test.

[2]With a 1% confidence level.

[3]Some cases can be found among Eastern Bantu languages.

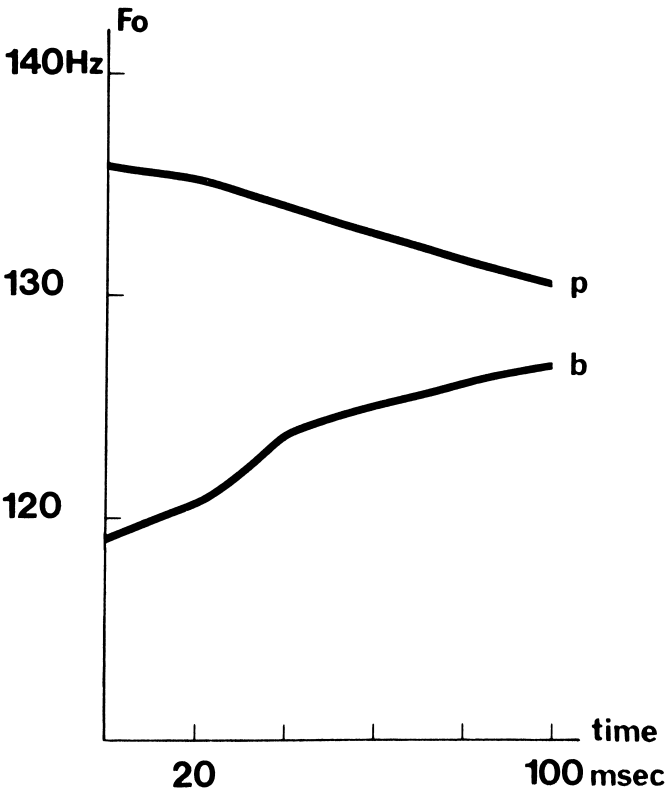


Figure 1: Averaged Fo of vowels after voiced and voiceless stops (from Hombert, 1976a) ([p] represents the voiceless stops and [b] represents the voiced stops)

In the case of tonogenesis, the complete "scenario" is well attested. The development of contrastive tones on vowels due to the loss of a voicing distinction on obstruents in prevocalic position is probably the most well-documented type of tonogenesis. When such a development occurs, a relatively lower pitch register develops on vowels following the previously voiced series and a relatively higher pitch is found after the previously voiceless or voiceless aspirated series. Phonetic studies by House and Fairbanks [1953], Lehiste and Peterson [1961], Mohr [1971], Lea [1972, 1973], Löfqvist [1975] and Hombert [1976a] show how a voicing distinction in prevocalic position can affect the fundamental frequency of the following vowel.

Unfortunately, all these phonetic studies are based on non-tonal languages. Thus, they can explain how a non-tonal language can acquire two tones from the loss of some voicing distinction in prevocalic position but we do not have any strong basis for believing that these data can be extended to languages which are already tonal. Namely we do not know what the behavior of voiced or voiceless consonants is going to be at different frequency registers. Is a voiced consonant still going to affect the onset frequency of a vowel with low tone? Is a voiceless consonant going to perturbate the frequency of a high tone?

In order to answer these questions, two Yoruba subjects were asked to read[4] a word list of 42 CV tokens (2 consonants[5] x 7 vowels x 3 tones) put in the frame: sõ CV sókè[6] ('say CV louder'). Each token was read five times. The results are presented in Figure 2. On this graph each point represents the average of 70 measurements (7 vowels x 5 repetitions x 2

---

[4]The recording was done at University of Ibadan, Nigeria, and the data analysis was done partly in the Phonology Laboratory, University of California, Berkeley and partly in the UCLA Phonetics Laboratory.

[5]Only two consonants [k] and [g] were used in this experiment to represent voiced and voiceless stops. Recent data seem to indicate that velar stops have a more important perturbatory effect on the F_0 of the following vowel than other stops [Hombert and Ladefoged 1976; Meyers 1976].

[6]The three Yoruba tones are represented as follows: High Tone ´
Mid Tone ¯
Low Tone `

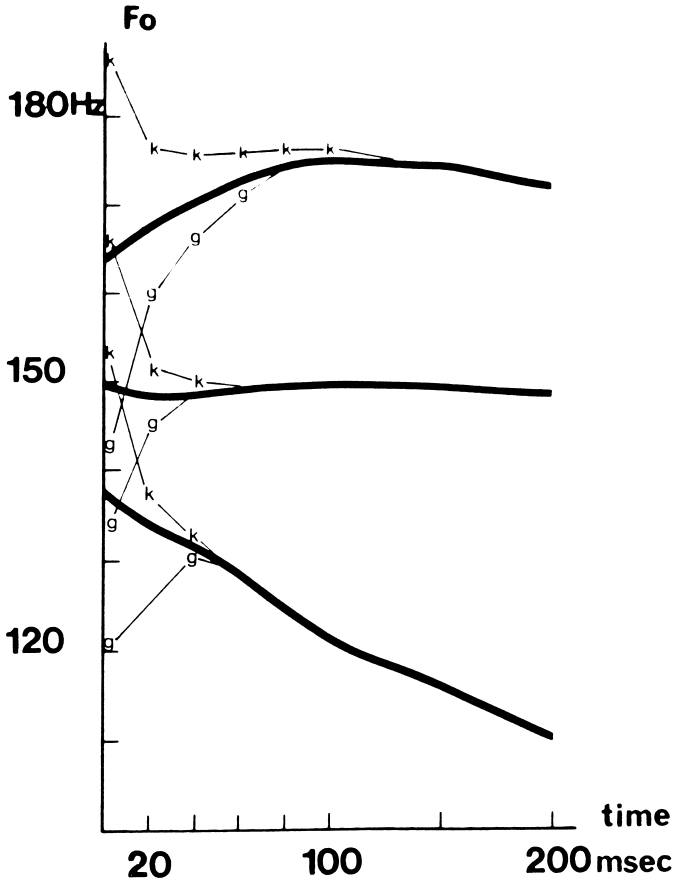


Figure 2: Influence of prevocalic voiced and voiceless stops on the fundamental frequency of the three Yoruba tones (2 subjects)

subjects). The thin lines represent the fundamental frequency of vowels after [k] or [g]. The wide lines represent the average F_0 after voiced and voiceless velar stops for the three Yoruba tones.[7]

My purpose was to compare the effect of voicing contrast at different frequency registers. From the data presented in Figure 2, three points should be emphasized:

1. The perturbation caused by a voiced consonant on a following high tone or by a voiceless consonant on a following low tone is greater than the effect of these two series of consonants on a mid tone.

2. The effect of a voiced consonant on a high tone is greater than the effect of a voiceless consonant on a following low tone.

3. The duration of the perturbations caused by prevocalic consonants on the fundamental frequency of vowels is shorter in a tone language (Yoruba) than in a non-tonal language (see Figure 1).

It is interesting to point out that these results are in agreement with Gandour's (1974) findings in his investigation of "Consonant types and tone in Siamese." Gandour found that a shorter part of the vowel was affected by the preceding vowel (about 30 msec for voiceless consonants and about 50 msec for voiced consonants). It seems that there is a tendency in tone languages (which does not exist in non-tonal languages) to actively minimize the intrinsic effect of prevocalic consonants probably in order to keep the different tones maximally different perceptually.

3. Intrinsic Fundamental Frequency of Vowels

In the second part of this paper, I shall address myself to the issue of intrinsic fundamental frequency of vowels. Essentially, four theories have been proposed to explain why high[8] vowels have a higher intrinsic fundamental frequency than lower vowels.[9]

---

[7]When the F_0 values after voiced or voiceless stops were too close to the average value (wide line), they were not represented on Figure 2.

[8]High refers to the tongue-height parameter (or more accurately low first formant value).

[9]See Atkinson [1973] and Ohala [1973a] for a more detailed review of these different theories.

The first theory, proposed by Taylor [1933] and adopted by House and Fairbanks [1953] is called the "dynamo-genetic" theory. Taylor claims that the muscular tension of the tongue, required for the realization of high vowels, is transferred to the muscles of the larynx "via a kind of sympathetic resonance or radiation." This is not a viable theory anymore, since we know that electrical insulation in muscles and nerves is good enough to prevent serial contraction of adjacent muscles triggered by osmotic spread of excitability [Atkinson 1973].

The second theory presented by Mohr [1971] relates width of the pharynx and pressure build-up behind the point of constriction to explain the fundamental frequency differences between low and high vowels. Since the width of the pharynx is about one-fourth as big for low back vowels as for corresponding high vowels, Mohr tries to relate smaller cavity and constriction further back with higher supraglottal pressure, leading to smaller pressure drop across the glottis and consequently lower fundamental frequency. Unfortunately Mohr's data do not support his theory. In any case, as Ohala [1973a] mentions

> "... the air flow during vowels is rapid enough and the magnitude of the pressure small enough that whatever back pressure is caused by the vowel constriction will be manifested equally rapidly for all vowels."

The next theory, known as the source/tract coupling theory, was first proposed by Flanagan and Landgraf [1968]. This theory assumes a possible coupling between the vocal cords and the vocal tract so that a low first formant (characteristic of high vowels) would attract and consequently raise the fundamental frequency. This sucking effect does not occur when the first formant is further away from the fundamental frequency (as it is in the case of low vowels). The intrinsic pitch difference between low and high vowels would then be explained. Unfortunately, predictions made by this theory do not receive empirical support. It would predict, for instance, that the difference in pitch between high and low vowels would be reduced when speaking with a helium-air mixture (since a property of helium or other light gases is to raise formants and consequently to increase the distance between F_0 and F_1). Beil [1962] showed that this was

The tongue pull theory [Ladefoged 1964; Lehiste 1970] is based on the assumption that when the tongue is in high position for the realization of high vowels, it exerts an extra tension transmitted to the larynx via the hyoid bone. This vertical pull increases the tension of the vocal cords [Ohala 1972] and gives rise to a higher pitch for these high vowels. This theory ran into great difficulty when Ladefoged et al. [1972] provided data showing that tongue height and hyoid bone height were inversely proportional. Ohala [1973a] admits that such findings show that the pulling is not done through the hyoid bone but he maintains that the tongue pull theory is still a viable theory provided that the pulling is done through other tissues.

I would like to show in this paragraph that tone languages such as Yoruba can bring some very useful data in this controversy. If we assume a correlation between larynx height and F_0 [Ohala and Ewan 1973; Ewan and Krones 1974], it seems that the tongue pull theory would predict that the F_0 difference would be smaller with vowels realized with high tones as opposed to vowels realized with low tones. Since the larynx is in higher position for high tones than for low tones, we expect that the tension exerted by the tongue will be less. This assumes a linear relationship between tension and larynx elevation (which would have to be tested). Figure 3 displays the averaged fundamental frequency values of the 7 Yoruba vowels depending on the tone under which they were realized. The measurements were made 100 msec after vowel onset. Each point is an average of 20 tokens (2 consonants x 5 repetitions x 2 subjects). From these data it is clear that the prediction made by the tongue pull theory is not verified; in fact the opposite is found, namely that the fundamental frequency difference between high and low vowels is more pronounced with high tone than with low tone. The same type of data were obtained from American English speakers [Hombert 1976d] who were asked to produce vowels at three different F_0 levels.

Although it is obvious that more data are needed before refuting either the tongue pull theory or accepting the source/tract coupling theory, the data I just presented seems to be difficult to account for by the tongue pull theory.

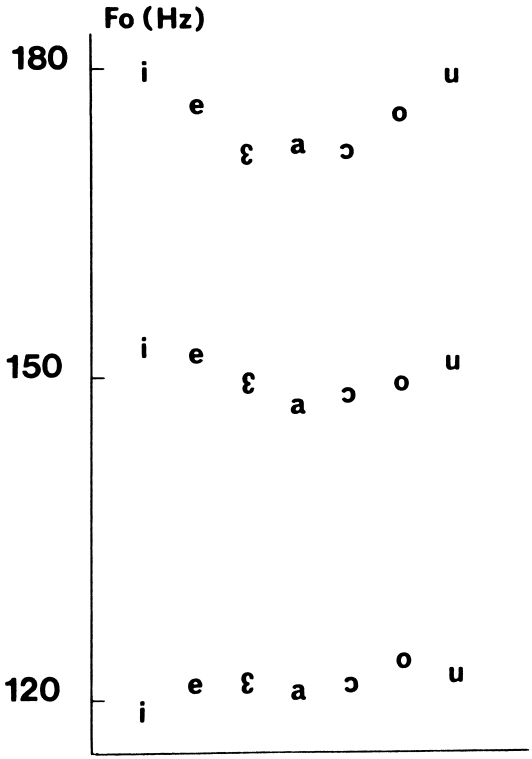


Figure 3: Intrinsic Fo of vowels for the three Yoruba tones (High, Mid and Low) (2 subjects)

The second point I would like to discuss with respect to intrinsic pitch of vowels has to do with tonogenesis. Phonetic studies indicate that the intrinsic perturbations caused by prevocalic consonants on the pitch of the following vowel are of about the same order of magnitude as the intrinsic differences depending on vowel height. Lehiste [1970] mentions

> "the influence of an initial consonant could counterbalance the influence of intrinsic pitch: the average for /kæ/ sequences was 171 Hz while that of /gi/ sequences amounted to 170 Hz."

Pilszczikowa-Chodak [1972] suggests that tone assignment of verbs and noun plurals in Hausa is largely predictable from the height of the final vowel: a high (vs. low) final vowel predicting a high (vs. low) tone. This analysis, however, has been criticized by Hausa scholars [Newman 1975; Leben and Schuh, personal communications]. It seems that Middle Chinese words with checked tones, i.e. p, t, k endings, and voiceless initial consonants developed a relatively lower tone when the vowel nucleus was [a] than when it was [ə] [Baron, in preparation; Pulleyblank 1970-1]. In some Cantonese dialects, this tone development has sometimes been analyzed as originating from a length contrast. In the Omei dialect of Mandarin, two tones rearranged themselves depending on vowel height, the "new" high tone regrouping high vowels [Baron, in preparation; Cheung 1973]. In Ngizim [Schuh 1971] and in Bade, the tone patterns of verbs are partially predictable from the vowel of the first syllable; if the vowel is [a], the verb will have a high tone. These historical data do not suggest that the development of contrastive tones from vowel height is a widely attested process; furthermore, the reverse direction of interaction (i.e. low vowels giving rise to high tones) as observed in Ngizim and Bade seems inexplicable phonetically. It would seem reasonable then to find an explanation for the infrequency of this type of effect.

First I want to show that different loudness levels cannot explain this asymmetry between the two potential possibilities of tonal developments:

We know that low vowels are perceived as louder than higher vowels [Fant 1960] and we also know that loudness can affect our perception of pitch. If we can show that the *produced* intrinsic differences between high and low vowels are not *perceived* because of factors (such as loudness) affecting our perception of pitch, then we would have an explanation to the question of why languages do not develop tone from these intrinsic fundamental frequency differences.

Although the magnitude of the effect of loudness on pitch differs from one study to the other [Zurmühl 1930; Stevens 1935; Snow 1936; Cohen 1961], it is generally accepted that the effect of increased loudness (if any) (see Cohen [1961]) will be to lower the pitch (at least within this frequency region). Thus, this effect will lead to an *increase* in the pitch difference between high and low vowels and would make it more difficult to explain why tone developments based on these differences did not occur historically. In fact, instead of comparing the overall amplitude values of vowels just by stating that low vowels are louder than high vowels, it would be more appropriate to compare the amplitude values of different vowels within the frequency region relevant for pitch discrimination. It has been shown [Plomp 1967] that the frequency region around the fourth harmonic is more important for pitch perception than the fundamental frequency region. Under the best conditions (around 300 Hz), high vowels are 10 dB louder than low vowels [Fant 1960]. This amplitude difference is not enough to cancel out the intrinsic differences obtained in production. Thus, this explanation based on loudness is not satisfactory.

The second suggestion I want to propose is based on the well-known fact that whatever the sensory modality, our auditory mechanism is more sensitive to a signal varying from state 1 to state 2 (with a variation $\Delta S = S_2 - S_1$) than to a static difference between the same two steady states S_1 and S_2 [Whitfield and Evans 1965; Møller 1973]. If we apply this principle to pitch perception we can understand why tones develop from prevocalic consonants (where the intrinsic effects are realized as either rising or falling contours) but not from vowel height differences (where the intrinsic differences are in terms of steady state differences).

A third possibility is that our perception of pitch of vowels is affected by vowel quality. Since intrinsic pitch and vowel quality are always associated for a given vowel (as opposed to the case of consonantal perturbation where the consonant can be removed) it is possible that the pitch of a high (vs. low) vowel is lower (vs. higher) than its intrinsic fundamental frequency as a result of a process of normalization done by our auditory system. If this is the case, the pitch differences between low and high vowels would be smaller than their fundamental frequency differences and this would account partially at least for the lack of development from vowel height. This last hypothesis was proven to be correct in a recent study [Hombert 1977] in which it was shown using synthesized stimuli that listeners consistently judged the high vowels [i] and [u] to be lower in pitch than the low vowel [a] although their actual fundamental frequencies were identical.

4. Distribution of Tones

It has been shown that if we consider intensity and frequency as two independent parameters, about 350,000 different pure tones can be discriminated by the human ear over the whole auditory area [Stevens and Davis 1938; Wever 1949; Licklider 1956; Winckel 1968]. About 1500 of these tones are discriminated from pitch differences only. The fact that it is very rare to find tone languages with ten or more distinctive tones can be explained by the following reasons:

-- the amplitude parameter is not completely independent of the frequency parameter in speech [Hombert 1975];

-- the fundamental frequency range is a much smaller range than the auditory range;

--the most important point is the difference between discrimination and identification. In contrast with our amazing ability to decide if two tones presented successively are similar or not, our identification ability, i.e. our ability to identify and name sounds, is rather poor. For speech and music it has been estimated that a trained listener can

identify about 50 sounds presented individually. Winckel [1938] indicates that fluctuations of less than 20 Hz are imperceptible, in noise, i.e. in everyday situations.[10] Figure 2 indicates that the three tones in Yoruba are from 20 to 30 Hz apart.

Pollack [1952] shows that a maximum of five level tones can be distinguished under laboratory conditions[11] (when loudness cues have been removed).

Few languages have been reported as having as many as five level tones [Longacre 1952]. In fact it seems that the more tones a language has the more likely this language will make use of other cues than steady state fundamental frequency to identify some of the tones.

It has been shown by Pollack and Ficks [1954] that our auditory system is more efficient, i.e. transmits more information, at processing a stimulus with multiple encoding, i.e. more than one cue is used, as opposed to the processing of the same amount of information using a more sophisticated coding of only one parameter. This finding can be applied to pitch perception indicating that secondary cues such as loudness, duration and direction and speed of change, and phonation types are likely to be used in order to facilitate our tone identification [Hombert 1976d]. From Figure 2, we can see that the so-called "low" tone in Yoruba is in fact a falling tone. The fact that the falling contour is a more important cue than the F_0 level has been shown by LaVelle [1974] and Hombert [1976c]. LaVelle argues that Yoruba has a rule which lowers a low tone in phrase final position. I propose that the "unmarked" realization of the Yoruba low tone is in fact a low falling tone and that the falling tone is realized as a low level tone when followed by a non-low tone, i.e. when followed by either a mid or a high tone. When a low tone occurs in isolation or in final position, it is realized with

---

[10] 20Hz is probably an overestimation considering on the one hand the richness of certain tone languages (in terms of number of tones) and on the other hand the maximum frequency range of vocal cord vibrations.

[11] Pollack's experiment was done using a 100-5000 Hz frequency range, but his data show that the number of identifiable tones is negligibly affected by a lowering of the upper limit of the frequency range.

its more distinctive perceptual characteristics; when it is followed by a higher tone, articulatory constraints (the complexity of going down for a falling tone and then up for the next tone) take over and the low falling tone is realized as a low level tone. But in this environment perception is made easier by the following tone which can be used as a reference for comparison. It has been shown by Han and Kim [1974] that "the pitch information in the neighbouring syllables serves as a basis on which the retrieval of the phonemic status of a tone is made."

5. Conclusion

In this paper, I have shown:

1. How the three Yoruba tones were affected by voiced/voiceless consonants in prevocalic positon. Voiced consonants have a greater effect on high tones and voiceless consonants on low tones. The duration of these perturbations is smaller in Yoruba than in a non-tonal language such as English.

These data show that an already existing tone system can multiply the number of its tones if the voicing contrast in prevocalic position is to disappear.

2. The fact that the intrinsic F_0 differences between high and low vowels are smaller when these vowels are realized with a low tone as opposed to a high tone seems to be a counter-argument to the tongue-pull theory generally proposed to account for these intrinsic F_0 differences between high and low vowels.

In the discussion it was also suggested that the fact that tones do not develop from intrinsic pitch of vowels as they do from intrinsic F_0 perturbations caused by prevocalic consonants cannot be explained by loudness but may be by the dynamic effect of prevocalic consonants as opposed to the static effect of vowel height.

3. It is often the case that other cues than steady state F_0 are used to identify tones. It seems that Yoruba "low" tone is in fact a low falling tone, but that this low falling tone is changed into a low level tone when followed by a non-low tone.

REFERENCES

Atkinson, J.E. 1973. "Aspects of intonation in speech: implications from an experimental study of fundamental frequency." Doctoral dissertation, University of Connecticut.

Beach, D.M. 1938. *The Phonetics of the Hottentot Language*. Cambridge: Cambridge University Press.

Beil, R.G. 1962. "Frequency analysis of vowels produced in Helium-rich atmosphere." *Journal of the Acoustical Society of America* 34:347-49.

Brown, J.M. 1965. *From Ancient Thai to Modern Dialects*. Bangkok: Social Science Assoc. Press of Thailand.

Chang, K. 1973. "The reconstruction of Proto-Miao-Yao tones." *Bulletin of the Institute of History and Philology. Academia Sinica* 44 (4): 641-628.

Chang, K. 1975. "Tonal developments among Chinese dialects." *Bulletin of the Institute of History and Philology. Academia Sinica* 46 (4): 636-710.

Chistovich, L.A. 1969. "Variation of the fundamental voice pitch as a discriminatory cue for consonants." *Soviet Physics - Acoustics* V. 14, no. 3., pp. 372-8.

Cohen, A. 1961. "Further investigation of the effects of intensity upon the pitch of pure tones." *Journal of the Acoustical Society of America* 33:1363-76.

Ewan, W.G., and R. Krones. 1974. "Measuring larynx movement using the thyroumbrometer." *Journal of Phonetics* 2:327-35.

Fant, G. 1960. *Acoustic Theory of Speech Production*. The Hague: Mouton.

Flanagan, J.L., and L. Landgraf. 1968. "Self-oscillating source for vocal tract synthesizers." *IEEE Trans. Audio* 16:57-64.

Fujimura, O. 1971. "Remarks on stop consonants." In *Form and Substnace* Akademisk Forlag. Pp. 221-50.

Gandour, J. 1974. "Consonant types and tone in Siamese." *Journal of Phonetics* 2:337-50.

Haggard, M., S. Ambler and M. Callow. 1970. "Pitch as a voicing cue." *Journal of the Acoustical Society of America* 47:613-17.

Han, M.S., and K.O. Kim. 1974. "Phonetic variation of Vietnamese tones in disyllabic utterances." *Journal of Phonetics* 2:223-32.

Haudricourt, A.G. 1954. "De l'origine des tons en vietnamien." *Journal Asiatique* 242:69-82.

Haudricourt, A.G. 1961. "Bipartition et tripartition des systèmes de tons dans quelques langages d'extrême-orient." *Bulletin de la Société Linguistique de Paris* 56:163-80.

Hombert, J.-M. 1975. "Towards a theory of tonogenesis (an empirical, physiologically and perceptually-based account of the development of tonal contrasts in language)." Doctoral dissertation, University of California, Berkeley.

Hombert, J.-M. 1976a. "Phonetic explanation of the development of tones from prevocalic consonants." In Working Papers in Phonetics no. 33, pp. 23-39. University of California, Los Angeles.

Hombert, J.-M. 1976b. "Noun classes and tone in Ngie." In Larry M. Hyman (ed.), *Studies in Bantu Tonology*, pp. 3-21. Southern California Occasional Papers in Linguistics, no. 3 Los Angeles:University of S.California.

Hombert, J.-M. 1976c. "Perception of bisyllabic nouns in Yoruba." In Larry M. Hyman, et al. (eds.), *Papers in African Linguistics in Honor of W. E. Welmers*, pp. 109-22. *Studies in African Linguistics*, Supplement 6.

Hombert, J.-M. 1976d. "Tone spaee and universals of tone systems." Paper delivered at the Fifty-first Annual Meeting of the Linguistic Society of America, Philadelphia.

Hombert, J.-M. 1977. "Development of tones from vowel height." *Journal of Phonetics* 5:9-16.

Hombert, J.-M. To appear. "Consonant types, vowel quality and tone." In Victoria Fromkin (ed.), *Tone: a Linguistic Survey*. New York: Academic Press.

Hombert, J.-M., J.J. Ohala and W.G. Ewan. 1976. *Tonogenesis, Theories and Queries*. Report of the Phonology Laboratory no. 1, Berkeley, 48-77.

Hombert, J.-M., and P. Ladefoged. 1976. "Effect of aspiration on the fundamental frequency of the following vowel." *Journal of the Acoustical Society of America* 59(A) S72.

House, A.S., and G. Fairbanks. 1953. "The influence of consonant environment upon the secondary acoustical characteristics of vowels." *Journal of the Acoustical Society of America* 25 (3):105-13.

Hyman, L.M. 1973. "The role of consonant types in natural tonal assimilations." In Larry M. Hyman (ed.), *Consonant Types and Tone*, pp. 153-79. Southern California Occasional Papers in Linguistics, no. 1. Los Angeles: University of Southern California.

Ladefoged, P. 1964. *A Phonetic Study of West African Languages*. Cambridge: Cambridge University Press.

Ladefoged, P., J. DeClerk, M. Lindau, G. Papçun. 1972. "An auditory-motor theory of speech production." In Working Papers in Phonetics, no. 22, pp. 48-75. University of California, Los Angeles.

LaVelle, C.R. 1974. "An experimental study of Yoruba tone." In Wm R. Leben (ed.), *Papers from the Fifth Conference on African Linguistics*, pp. 185-94. *Studies in African Linguistics*, Supplement 5.

Lea, W. 1972. "Intonational cues to the constituent structure and phonemics of spoken English." Doctoral dissertation, Purdue University.

Lea, W. 1973. "Segmental and suprasegmental influences on fundamental frequency contours." In Larry M. Hyman (ed.), *Consonant Types and Tone*, pp. 15-70. Southern California Occasional Papers in Linguistics, no. 1. Los Angeles: University of Southern California.

Lehiste, I. 1970. *Suprasegmentals.* Cambridge: M.I.T. Press.

Lehiste, I., and G. Peterson. 1961. "Some basic considerations in the analysis of intonation." *Journal of the Acoustical Society of America* 33:419-25.

Licklider, J.C. 1956. "Auditory frequency analysis." *Proceedings of the Third London Symposium on Information Theory,* pp. 253-68. London.

Longacre, R. 1952. "Five phonemic pitch levels in Trique." *Acta Linguistica* 7:62-82.

Löfqvist, A. 1975. "Intrinsic and extrinsic F_0 variations in Swedish tonal accents." *Phonetica* 31:228-47.

Matisoff, J. 1970. "Glottal dissimilation and the Lahu high-rising tone: a tonogenetic case-study." *Journal of the American Oriental Society* 90 (1):13-44.

Matisoff, J. 1973. "Tonogenesis in Southeast Asia." In Larry M. Hyman (ed.), *Consonant Types and Tone,* pp. 71-96. Southern California Occasional Papers in Linguistics, no. 1. Los Angeles: University of Southern California.

Mazaudon, M. Forthcoming. "Tibeto-Burman tonogenetics." In *Linguistics in the Tibeto-Burman Area.* Berkeley: University of California.

Meyers, L. 1976. "Aspects of Hausa Tone." UCLA Working Papers in Phonetics, no. 32. Doctoral dissertation, University of California, Los Angeles.

Mohr, B. 1971. "Intrinsic variations in the speech signal." *Phonetica* 23:65-93.

Møller, A.R. 19-3. "Coding of amplitude and frequency modulated sounds in the cochlear nucleus." Paper presented at the Symposium on Auditory Analysis and Perception of Speech, Leningrad, Aug. 21-24, 1973.

Newman, P. 1975. "The non-correlation of tone and vowel height in Hausa." *Studies in African Linguistics* 6:207-13.

Ohala, J. 1972. "How is pitch lowered?" (Abstract) *Journal of the Acoustical Society of America* 52:124.

Ohala, J. 1973a. "Explanations for the intrinsic pitch of vowels." Monthly Internal Memorandum, Phonology Laboratory, University of California, Berkeley, Jan. 1973:9-26.

Ohala, J. 1973b. "The physiology of tone." In Larry M. Hyman (ed.), *Consonant Types and Tone,* pp. 1-14. Southern California Occasional Papers in Linguistics, no.1. Los Angeles: University of Southern California.

Ohala, J., and W. Ewan. 1973. "Speed of pitch change." *Journal of the Acoustical Society of America* 53:345.

Pilszczikowa-Chodak, N. 1972. "Tone-vowel height correlation and tone assignment in the patterns of verb and noun plurals in Hausa." *Studies in African Linguistics* 3:399-422.

Plomp, R. 1967. "Pitch of complex tones." *Journal of the Acoustical Society of America* 41:1526-33.

Pollack, I. 1952. "The information of elementary auditory displays." *Journal of the Acoustical Society of America* 24:745-49.

Pollack, I., and L. Ficks. 1954. "Information of elementary and multidimensional auditory displays." *Journal of the Acoustical Society of America* 26:155-58.

Snow, W.B. 1936. "Change of pitch with loudness at low frequencies." *Journal of the Acoustical Society of America* 8:14-19

Stevens, S.S. 1935. "The relation of pitch to intensity." *Journal of the Acoustical Society of America* 6:150-54.

Stevens, S.S., and H.D. Davis. 1938. *Hearing: Its Psychology and Physiology*. New York: J. Wiley and Sons.

Taylor, H. 1933. "The fundamental pitch of English vowels." *Journal of Experimental Psychology* 16:565-82.

Wever, E.G. 1949. *Theory of Hearing*. New York: J. Wiley and Sons.

Whitfield, E.G., and E.F. Evans. 1965. "Responses of auditory cortical neurons to stimuli of changing frequency." *Journal of Neurophysiology* 28:655-72.

Zurmühl, G. 1930. "Abhängigkeit der tonhöhenempfindung von der Lautstärke und ihre Beziehung zur Helmholtzschen Resonanztheorie des Hörens." *Zeitschrift für Sinnesphysiologie* 61:40-86.

The following tentative program for the Colloquium on Bantu Expansion was received from Dr. Jacqueline M.C. Thomas, Directeur de Recherche au C.N.R.S.:

COLLOQUE INTERNATIONAL DU CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

EXPANSION BANTOUE

Lundi 4 avril

Thème 1 *"Méthodes comparatives en matière de classification linguistique (glottochronologie, lexicostatistique, problèmes des emprunts, correspondances régulières)."*

matin — Exposé introductif par B. HEINE

après-midi — "Développements récents en matière de classification bantoue" par T. SCHADEBERG

"La géographie linguistique des Grassfields" par K. STALLCUP

"Bantou et bane" par J. VOORHOEVE

Mardi 4 avril

Thème 1 *suite*

matin — Exposé par B. HEINE

après-midi — "Quelques parlers bamileke de l'Est" par G. NISSIM

"The Ngemba group" par J. LEROY

"Le groupe noun" par J.-M. HOMBERT

Mercredi 6 avril

Thème 2 *"Comparaison des unités lexicales (innovations lexicales, archaïsmes et formes résiduelles, phonologies comparées)."*

matin — Exposé introductif par A. COUPEZ

après-midi — Exposé introductif suite par A. COUPEZ

"Comparaisons lexicostatistiques dans des langues bantoues de la Tanzanie du Nord, du Kenya et d'Ouganda" par G. PHILIPPSON et D. NURSE

Jeudi 7 avril

Thème 2 *suite*

matin — Exposé par A. COUPEZ

après-midi — "Statut des voyelles des racines nominales en asimbi" par K. STALLCUP

Vendredi 8 avril

Thème 2 *suite*

matin — Exposé par A. COUPEZ

après-midi — Exposé par A. COUPEZ

Samedi 9 avril

Thème 3 *"Problèmes spécifiques de grammaire comparée du bantou (innovations dans le système grammatical : système des classes nominales, formes verbales, dérivation)."*

matin — Exposé introductif par A.E. MEEUSSEN

après-midi — "Accents et tons bantous" par L. HYMAN

"Les extensions bantoues et leurs rapports en Bénoué-Congo" par E. VOELTZ

"Les voyelles centrales en bafia et dans les autres langues du groupe A. 50" par G. GUARISMA

"Problèmes de dérivation en bamileke" par G. NISSIM

Lundi 11 avril — Thème 3 *suite*

matin — Exposé par A.E. MEEUSSEN

après-midi — "Problèmes de dérivation en basaa" par J. VOORHOEVE

"Babanki and the Ring group" par L. HYMAN

"Noni (Misaje group)" par L. HYMAN

Mardi 12 avril

Thème 3 *suite*

matin — Exposé par A.E. MEEUSSEN

après-midi — "La forme sous-jacente des racines pronominales en mankon" par J. LEROY

"Limbum" par J. VOORHOEVE

"Kenyang" par J. VOORHOEVE

"The Momo languages" par K. STALLCUP

Mercredi 13 avril

Thème 4 *"Données anthropologiques et archéologiques (principales hypothèses sur les facteurs de l'expansion bantoue, moyens de vérification)."*

matin — Exposé introductif par N. DAVID

après-midi — Exposé introductif (suite) par N. DAVID

"Bantu expansion in Eastern and Southern Africa: archeological and linguistic evidence" par D.W. PHILLIPSON

Jeudi 14 avril

Thème 4 *suite*

matin — Exposé par N. DAVID

après-midi — Exposé (suite) par N. DAVID

"L'organisation du système des classes nominales en aka (zone C)" par J.M.C. THOMAS

Vendredi 15 avril

Thème 5 *"Les migrations bantoues à partir des données linguistiques, des données de la tradition orale, des documents historiques, des institutions comparées."*
"L'habitat d'après les données linguistiques (milieu géographique et milieu naturel - flore et faune - technologie: agriculture- technique du fer)."

matin — Exposé introductif par P. ALEXANDRE

après-midi — "L'habitat d'après les données linguistiques" par E.C. POLOME

"Clés sociolinguistiques de l'écologie fumu et wumu" par J.-P. MAKOUTA-MBOUKOU

"Le phénomène migratoire chez les riverains de la région du confluent du Congo et de l'Oubangui" par P. van LEYNSEELE

"Social anthropology and the Bantu migration" par P. van LEYNSEELE et A. KUPER

Samedi 16 avril

Thème 5 *suite*

matin : Exposé par P. ALEXANDRE

après-midi : Bilan des activités

Announcing the following publications from Southern California Occasional Papers in Linguistics:

SCOPIL 5: ***DISCOURSE ACROSS TIME AND SPACE***

Edited by Elinor Ochs Keenan and Tina L. Bennett

TABLE OF CONTENTS

1. "Why look at unplanned and planned discourse" (Elinor Ochs Keenan)
2. "An extended view of verb voice in written and spoken personal narratives" (Tina L. Bennett)
3. "The typology of narrative boundedness" (Judith Walcutt)
4. "Combining ideas in written and spoken English: a look at subordination and coordination" (Barbara Kroll)
5. "Stress and sentence position: ways of indicating discourse prominence" (Christina Lehman)
6. "Repairs in planned and unplanned discourse" (Susan Shimanoff and Joanna Brunak)
7. "Pre-sequences and indirect speech acts" (James Heringer)
8. "Communicative distress" (Sharon Sabsay and Tina Bennett)
9. "Investigating politeness" (Susan Shimanoff)
10. "NP and Particle Deletion in Japanese discourse" (Ikuhiro Tamori)
11. "Understanding spoken discourse in a second or foreign language: pedagogical considerations" (Paola Giunchi)
12. "On reference in Haya" (Sarah Tenenbaum)

PLUS: A bibliography of selected topics in discourse!

Price: $5.00

SCOPIL 6: ***HAYA GRAMMATICAL STRUCTURE: PHONOLOGY, GRAMMAR, DISCOURSE***

Edited by Ernest Rugwa Byarushengo, Alessandro Duranti and Larry M. Hyman

TABLE OF CONTENTS

1. "Introduction" (Ernest Rugwa Byarushengo)
2. "On the phonological status of p/h and d/l" (Ernest Rugwa Byarushengo)
3. "The preprefix" (Jeremy Chagas)
4. "On the notion of direct object" (Alessandro Duranti and Ernest Rugwa Byarushengo)

5. "Instrumentals and causatives" (Lee Trithart)
6. "Locatives" (Lee Trithart)
7. "The syntax of body parts" (Larry M. Hyman)
8. "Relative clauses" (Alessandro Duranti)
9. "Conjunction" (Taro Kageyama)
10. "Imperatives" (Christina Lehmann)
11. "Conditionals" (Sukari Salone)
12. "Left- and right-dislocations" (Sarah Tenenbaum)
13. "Interrogatives" (Tina L. Bennett)
14. "Greetings" (Sheila Dauer)

Price: $4.00

Address all correspondence to:

S.C.O.P.I.L.
Department of Linguistics
University of Southern California
Los Angeles, CA 90007

CORRIGENDA

In the report of the Eighth Annual Conference on African Linguistics which appeared in SAL Volume 8, Number 1, two papers were omitted:

Gerard Dalgish and G. Sheintuch, "On the justification for language specific sub-grammatical relations"

Judith Olmstead Gary, "Implications for universal grammar of object-creating rules in Luyia and Mashi"

Although the authors of these papers were not able to attend the conference, their papers were read and discussed. We apologize for the omission of their papers from the conference report.