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A Reconstructed Chronology of Loss: Swahili Class 9/10

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1. Introduction

Most sound changes that occur in a particular language can usually be accounted for, or described, by a morphophonemic rule and/or diachronic correspondence. Such a formalization achieves a certain level of descriptive adequacy in at least delimiting the distribution and environments of the change, as well as the structural change and structural description. However, many such statements are unsatisfactory and fail to provide a more explanatory statement which reveals the underlying phonetic processes involved, unlike "natural assimilatory" rules whose statements provide direct insight into the assimilatory mechanisms at work, e.g. a rule of nasal-homorganicity. Not all rules are of this sort and not all show the assimilatory basis of the change. Rules which describe loss of segments are often of this sort. Internal reconstruction, furthremore, may not allow a reconstruction of the phonetic process--often assimilatory--involved in cases of segmental loss. The loss of the nasal prefix (hereafter N) in Swahili Class 9/10 nominals is such a case. I wish to discuss this in some detail and show how an examination of closely related languages will often provide more information to the linguist than internal reconstruction to allow a better understanding of the conditions which obtained in a particular instance of segmental loss. The input of dialect studies in these cases is of course not new, but in Bantu studies this is a relatively unexplored field.

2. Synchronic analysis

In a synchronic phonological treatment of the morphophonemics of the noun class system in Swahili a rule would be needed to describe the distribution of the nasal prefix in Class 9/10 nominals. A further rule would also be necessary to handle the distribution of aspiration on initial voiceless stops in the same nominals. Presumably the aspiration associated with these consonants is a reflex of the lost nasal. Thus one possible treatment would order the rule of initial voiceless stop aspiration first, and the rule of nasal deletion second. The rules are listed as (1) and (2) in their order of application:

(1) $C \rightarrow [+\text{aspiration}] / N \_\_$
(2) $N \rightarrow \emptyset / \_\_ [+\text{aspiration}]$

Their application can be demonstrated in the following derivation where a Class 10 nominal undergoes both (1) and (2) in contrast to its Class 11 singular form:

(3) /u-pepo; N-pepo/ 'wind/cold; high wind/spirits'
- p^h Rule (1)
- Ø Rule (2)
[upepo p^hepo]

If, however, the voiceless consonant is the initial of a monosyllabic stem, Rule (2) does not apply; whereas Rule (1) creates the aspirated C, as illustrated in (4):

(4) /Ń-ta/ 'wax'
t^h Rule (1)
- Rule (2) inapplicable
[ńt^{h}a]

Rule (2) does not apply in (4) because the nasal is both stressed and syllabic.[1]

Because the nasal prefix is also not realized before voiceless fricatives, as in (5)

(5) fimbo < /N-fimbo/ 'stick'
siku < /N-siku/ 'day'

Rule (2) must be slightly revised to allow deletion of the nasal before voiceless continuants as well as voiceless aspirated stops. This can be achieved simply by use of the feature specification [-voice] as in (6); the rule also must be constrained to prevent deletion of stressed nasal prefixes:

(6) $N \rightarrow \emptyset \; / \; \underset{[-stress]}{\_\_\_\_\_} \; [-voice]$

Derivationally then, the following schema obtains:

(7)

/N-pepo	N-siku	Ń-ta	N-bogo/	
p^h	-	t^h	-	Rule (1) - Aspiration
Ø	Ø	-	-	Rule (6) - Deletion
[p^hepo	siku	ńt^{h}a	mbogo]	
'spirits	day	wax	buffalo'	

By using a transformational format, as in (8), Rule (1) and (6) can be combined:

(8) /NC/ $\rightarrow$ $\underset{\circ}{C}^h$

Such a format is actually suggestive of what I will propose underlies the loss of the prefix and aspiration of the voiceless consonant. Rule (8), however, is not fully adequate in handling the loss of

the prefix before voiceless fricatives and I will show makes the wrong claims relative to fricatives. Furthermore, formulations such as (1), (6) and (8) are basically statements of the distribution of both nasal-loss and of aspiration. Rule (8) does not have the apparent advantage of indicating some connection between nasal-loss and aspiration that is not shown by the pair of rules (1) and (2) or (1) and (6).

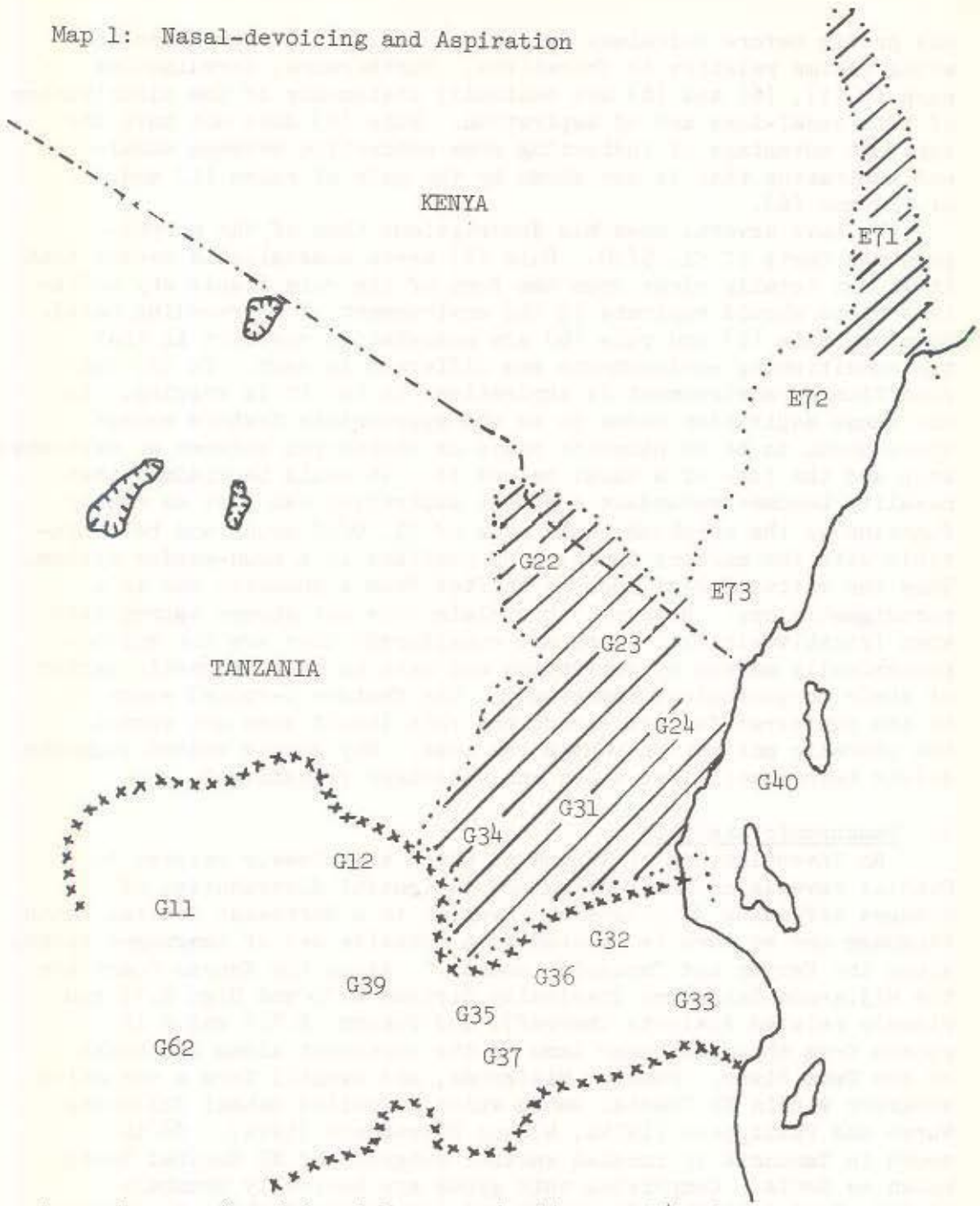
We have several possible descriptions then of the morpho-phonemic facts of Cl. 9/10. Rule (1) seems unassailable except that it is not totally clear from the form of the rule itself why voiceless stops should aspirate in the environment of a preceding nasal. However, rule (2) and rule (6) are somewhat in conflict in that the conditioning environments are different in each. In (2) the conditioning environment is aspiration; in (6) it is voicing. In one sense aspiration seems to be the appropriate feature except there seems to be no phonetic basis or connection between an aspirated stop and the loss of a nasal before it. It could be claimed that nasality becomes redundant and that aspiration can just as easily function as the morphophonemic mark of Cl. 9/10 nouns and be compatible with the marking function of prefixes in a noun-gender system. Thus the motivation of loss is shifted from a phonetic one to a paradigmatic one. However, this claim does not appear appropriate when fricative-initial stems are considered: they are not morpho-phonemically marked by aspiration and have no overt phonetic marker of their morphological membership. The feature [-voice] seems to be the preferred feature except the rule itself does not reveal the phonetic motivation behind the loss. Why should voiced segments delete before voiceless stops and voiceless fricatives?

3. Panchronic analysis

An investigation of languages which are closely related to Swahili reveals an interesting and insightful distribution of changes affecting NÇ clusters. Swahili is a Northeast Coastal Bantu language and as such is related to a cohesive set of languages spoken along the Kenyan and Tanzanian coasts.[2] Along the Kenyan coast are the Mijikenda languages (basically Giriama E.72 and Digo E.73 and closely related dialects thereof), and Pokomo (E.71) which is spoken from the coast near Lamu to the northwest along the banks of the Tana River. Pokomo, Mijikenda, and Swahili form a tentative subgroup within NE Coastal Bantu which is called Sabaki following Nurse and Philippson (1974a, b) and Hinnebusch (1974). To the south in Tanzania is located another subgroup of NE Coastal Bantu known as Seuta. Comprising this group are basically Shambala (G.23), Bondei (G.24), Zigula (G.31) and Ngulu (G.34). One other language is also considered in the study: Pare (G.22), a language spoken in the Pare mountains west of Tanga on the Tanzanian coast.

Each of these languages is represented on Map 1. Also included on the map are isoglosses demarcating languages which undergo changes affecting *NÇ clusters. Notice that in the center of this area Swahili (G.40), and the Mijikenda languages and dialects attest the change of *NÇ > Ç^{h}. This center group, moreover, is interestingly bounded on the north and south by languages which attest the change */NÇ > N̤Ç^{h}/, that is, the devoicing of the nasal

Map 1: Nasal-devoicing and Aspiration



Legend: .... Nasal-devoicing, aspiration, and/or loss
////Nasal-devoicing and aspiration only
××××*NÇ > N(h)
(isogloss crossing coastline indicates Swahili inclusion)

E71	Pokomo	G31	Zigula	G33	Zaramo
E72	Giryama	G34	Nguru	G35	Luguru
E73	Digo	G40	Swahili	G36	Kami
G22	Pare	G11	Gogo	G37	Kutu
G23	Shambala	G12	Kagulu	G39	Sagara
G24	Bondei	G32	Nhwele	G62	Hehe

prefix through assimilation to the following voiceless stop, and the aspiration of that stop. Examples from Pokomo and Pare are listed in (10) and (11):

(10) Pokomo (Masalani and Lower) (Hinnebusch 1973)

m̥pʰeɸo	'wind'	<	*/N-pepo/
n̥tʰahu	'three'	<	*/N-tatu/
ŋ̥kʰuyu	'big'	<	*/N-ku̱du/

(11) Pare (Nurse and Philippson 1974b)

m̥pʰeho	'wind'	<	*/N-pepo/
n̥tʰondo	'star'	<	*/N-tondo/
ŋ̥kʰombe	'fingernails'	<	*/N-kombe/

Other languages on the periphery of this central area which exhibit the same change are Shambala (G.23), Bondei (G.24), Nguru (G.34), Zigula (G.31), and Doe. These languages are demarcated on the map with diagonal lines, with the whole area bounded by an isogloss which demarcates those languages which attest the change */NC̥/ > (N)C̥ʰ.

There is further data from Pokomo which also assists in reconstructing the sequence of nasal-loss. In Masalani Pokomo the following Class 9/10 nouns with initial voiceless fricatives occur:

(12) Masalani Pokomo (Hinnebusch 1973)

fulafu	'army ants'	<	/*N-fulafu/
fwisi	'hyena'	<	/*N-fwisi/

Whereas in another Pokomo dialect voiceless nasals are still attested in identical environments:

(13) Lower Pokomo (Hinnebusch 1973)

m̥funda	'cheek'	<	*/N-funda/
m̥fwisi	'hyena'	<	*/N-fwisi/

A similar distribution was reported for Shambala and Zigula (Tucker and Bryan 1957): voiceless nasals are attested before stops but not before Class 9/10 nouns with voiceless initial fricatives as illustrated in (14):

(14) Shambala and Zigula (Tucker and Bryan 1957)

n̥tʰembo	'elephant'	but	swili	'hair' (Shambala)
n̥tʰembo	'elephant'	but	sigi	'string'
			fili	'hair' (Zigula)

Leaving aside the question of aspiration for the moment, let's first discuss nasal-loss. Given the spatial distribution of nasal-loss languages and nasal-devoicing languages, plus the nature of the changes themselves, it seems eminently straightforward that nasal-loss was first preceded by the sort of devoicing assimilation shown in (10) and (11) and formalized as (15):

(15) $$[+\text{nasal}] \rightarrow [-\text{voice}] \; / \; \underline{\qquad} \; \begin{bmatrix} [-\text{stress}] \\ +\text{cons} \\ -\text{son} \\ -\text{voice} \end{bmatrix}$$

It is only by positing (15) as an intermediate stage does ultimate nasal-loss make any sense thus doing away with part of the oddity of (6) that was noted earlier, namely that it did not reveal the motivation of the loss. Once of course nasal-devoicing occurs the next step is loss, a *fait accompli* for Swahili and Mijikenda, and a prediction for those which still attest a voiceless nasal. Voiceless nasals are somewhat marked segments and furthermore, their most obvious physical manifestation is a noisy egressive air stream through the nasal passage. Since they are already homorganic with the following obstruent, there is little for the hearer, language learner, or language-learning generation to pin down either acoustically or articulatorily. Furthermore, since voiceless nasals are always associated, in the case of stops, with a following aspirated obstruent, their importance either phonetically or morphophonemically (as a Cl. 9/10 nominal marker) is considerably weakened. Loss easily follows.

Given both the Pokomo evidence (10, 12, 13) and data from Shambala and Zigula (14) it is clear that the voiceless nasal disappeared first before voiceless fricatives and then before stops. Acoustically, of course, the stridency of voiceless fricatives easily masks the egressive nasal air stream which is the chief component of voiceless nasals: people do not hear them and thus do not learn them whereas before stops their acoustic effect is stronger and more enduring.

Comparative reconstruction would allow the following schema for Swahili and closely related languages:

(16)

/N-pepo	N-siku/	
m	n	Nasal-assimilation
m̥	n	Nasal-devoicing
-	n̊	Nasal-loss (Stage 1)
ø	-	Nasal-loss (Stage 2)
[p^{h}epo	siku]	

(Swahili has undergone Stage 1 and 2 of Nasal-loss, whereas some dialects of Pokomo, Shambala, and Zigula have only undergone Stage 1. Lower Pokomo has, however, not yet undergone either stage.)

Schema (16), as well as the discussion to this point, ignores the source of aspiration. The set of rules discussed earlier (Rules 1 and 2 or 1 and 6) claim that aspiration is independent of nasal-loss. Rule (8) essentially claims that there is some connection between nasal-loss and aspiration and as such comes closest in defining the source of aspiration. I will argue, however, that, in the cases under discussion, aspiration is actually dependent on nasal-devoicing, the stage immediately prior to nasal-loss.

To see this it will help to briefly review the nature of aspiration.

Aspiration has to do with phonation states and is essentially connected with certain configurations of the glottis. We normally think of aspiration as a puff of air and normally associate it with post-consonantal position. It is somewhat more complicated than that. Ladefoged (1971) defines aspiration as "a brief period of voicelessness during and immediately after the release of an articulatory stricture" (p. 8). The puff of air normally associated with aspirated sounds "could either be the result of an extra push from the respiratory muscles, or it could be due to the valvelike action of the glottis, allowing more air to be released" (p. 10). Both plosion and the state of the glottis are intertwined in the production of aspirated sounds.

The following then appears to be what has occurred in Swahili relative to aspiration. Both nasals and voiceless stops involve the formation of strictures of complete closure, and, as well, a pulmonic egressive air-stream. The difference between them is that in the production of the nasal there is no velic closure while stops involve velic closure. Nasals also involve the vibration of the vocal cords whereas in voiceless stops the vocal cords are apart. The stricture of a stop in tandem with the air-stream mechanism creates a certain amount of pressure which upon the release of the stricture results in a degree of plosion. In the case of nasal-consonant clusters (mp, nt, ŋk) the air stream is not dammed up in the production of the nasal but is allowed to pass through the nose. After devoicing of the nasal this air stream is all that remains to attest the presence of a nasal, and is essentially controlled by the closing and opening of the velum. Acoustically the voiceless nasal itself is now only characterized by a noisy expulsion of this air stream through the nasal passages (attested for Pokomo). Now what I propose happens next is somewhat speculative. Either or both of two possibilities may have occurred which can explain the aspiration. Perceptually, native speakers have reinterpreted the period of initial noisiness as post-aspiration rather than pre-aspiration, or a change in timing has occurred in that velic closure occurs before the air pressure has been totally expended in the production of the voiceless nasal and carries over in the release of the stop. Neither has to have occurred independently one of the other. In the case of Pokomo N̥C̥ clusters [N̥C̥^{h}] both pre-aspiration and post-aspiration are part of their pronunciation and this would essentially seem to be due to what I have suggested here: air pressure release is spread out over the articulation of both the nasal and stop with the eventual elimination of the period of devoicing in pre-stop position in favor of post-stop position which results in a less marked and more natural distribution. Furthermore, the noisy characteristic of voiceless nasals would seem to involve greater pulmonic pressure than would be called for in the articulation of a plain voiced nasal and this too would result in greater plosion when the following stop stricture is released. Essentially then what has occurred is a metathesis of aspiration, articulatorily and

acoustically, with a transfer of a particular phonation state from pre-position to post-position. Thus it seems that nasal-devoicing in these languages is intimately related to aspiration if not actually at the root of it. Consequently the transformation rule given as (8) more accurately reflects what happened phonetically than rules (1) and (2) or (1) and (6).

Rather than rule (8), however, I would propose the following rule (17) which, unlike (8), does not claim that aspiration results immediately in loss, but which does claim that aspiration is concomitant upon nasal-devoicing:

(17) $/\underset{\circ}{NC}/ \rightarrow \underset{\circ\circ}{NC^h}$

This rule adequately states the situation for Pokomo, Shambala, and others which still attest voiceless nasal-voiceless consonant clusters. A further rule would still be necessary to delete the voiceless nasal in Swahili and Mijikenda; this rule can take either the form of rule (2) or rule (6). In (1) deletion occurs sensitive to the feature [aspiration] and in (6) to the feature [voice]. Deletion or nasal-loss both before stops and fricatives would appear to be due to the acoustic nature of aspirated stops and to the stridency (or sibilancy) of fricatives wherein the voiceless nasal is simply absorbed or masked by a more obvious acoustic parameter. Therefore, a modified form of rule (2) is preferred:

(18) $\underset{\circ}{N} \rightarrow \emptyset \; / \; \underline{\qquad}\; \begin{bmatrix} \left\{ \begin{matrix} +\text{aspirated} \\ +\text{sibilance} \end{matrix} \right\} \end{bmatrix}$
$[-\text{stress}]$

This discussion has so far ignored monosyllabic stems in Swahili which are somewhat exceptional as illustrated in (19):

(19)

Swahili	
$\acute{\underset{\circ}{n}}t^ha$	'wax'
$\acute{\underset{\circ}{m}}p^hya$	'new'

where a fully voiced nasal is maintained preceding an aspirated stop. These forms appear to be counterexamples to the claim that aspiration in Swahili is essentially due to an assimilatory change of devoicing, I would argue that they are not. First of all, it is clear that the nasal prefix in the examples in (19) does not undergo change because it is both stressed and syllabic. The aspiration, moreover, could then be due to paradigmatic pressures in that all class 9/10 stops are aspirated. Alternatively, by positing a period of partial devoicing the aspiration can be explained as above. This is formalized as (20):

(20) $/\underset{\circ}{NC}/ \rightarrow \begin{matrix} N\underset{\circ}{N}C^h & \text{Stage 1} \\ \underset{\circ\circ}{NC^h} & \text{Stage 2} \end{matrix}$

Stage 1 can be posited for all Class 9/10 nominals, but Stage 2, full devoicing, only occurs if the nominal is polysyllabic. The

process is illustrated in the schema given in (21):

(21)	/N-pepo	Ń-ta/	
	m	n	Nasal-assimilation
	mm̥p^h	nn̥t^h	Nasal-devoicing Stage 1
	mm̥p^h	-	Nasal-devoicing Stage 2
	ØØ	Ø	Nasal-deletion
	[p^{h}epo	ńt^{h}a]	

Stage 1 is completely plausible phonetically and could occur simply as a transition between a fully voiced nasal and a following voiceless segment; its metathesis then to post-consonantal position explains the aspiration. Something similar to this process has been reported for an Indo-Aryan language (John Ohala, personal communication via Leon Jacobson, UCLA).

In conclusion I refer to the schema given as (22) which lists in a discrete fashion the various processes by which nasal-loss has occurred in Swahili.

(22)	/N-pepo	N-siku	Ń-ta/	
	m	n	n	Nasal-assimilation
	mm̥p^h	nn̥s^h	nn̥t^h	Nasal-devoicing/aspiration
	m̥	n̥	-	Full devoicing
	-	ØØ	-	Nasal-loss Stage 1
	ØØ	-	Ø	Nasal-loss Stage 2
	-	Ø	-	Aspiration-masking
	[p^{h}epo	siku	ńt^{h}a]	

(N̥N̥ = "partial devoicing"; N̥N̥ = "full devoicing")

While this schema and the discussion upon which it is based probably does over-simplify what actually happened in the course of nasal loss in Swahili it does have the advantage of specifying some of the conditions under which Swahili lost its Class 9/10 morphological marker.

Footnotes

[1]Where the nasal prefix is preserved, as in (4) or before stem initial voiced segments, it is always realized as homorganic: ḿp^{h}ya 'new', mbwa 'dog', ŋguruwe 'pig', etc.

[2]For a fuller discussion of the NE Coastal Group see Hinnebusch (1973, 1974).

[3]For a somewhat different schema see Givón (1974).

References

Bryan, M. A. 1959. *The Bantu Languages of Africa.* London: Oxford University Press.

Givón, T. 1974. Rule un-ordering: generalization and de-generalization in phonology. Paper presented at Chicago Linguistic Circle Meeting, Chicago, Illinois.

Hinnebusch, T. J. 1973. *Prefixes, Sound Changes, and Subgrouping in the Coastal Kenyan Bantu Languages.* Unpublished Ph.D. dissertation, UCLA.

_____. 1974. The Shungwaya hypothesis: a linguistic reappraisal. Paper presented at the Meeting of the African Studies Association, October 1974, Chicago, Illinois

Ladefoged, P. 1971. *Preliminaries to Linguistic Phonetics.* Chicago: University of Chicago Press.

Nurse, D. and G. Philippson. 1974a. A linguistic sketch of the Northeast Bantu languages, with particular reference to Chaga history. Paper presented at the Historical Research Seminar jointly with the Linguistic Symposium, University of Dar es Salaam.

_____. 1974b. The Northeast Bantu languages: a tentative classification. University of Dar es Salaam. Ms.

Tucker, A. N. and M. A. Bryan. 1957. *Linguistic Survey of the Northern Bantu Borderland*, Vol. IV. London: Oxford University Press.