

PROTO-BANTU REFLEXES IN THE SYNCHRONIC
ANALYSIS OF MODERN SWAHILI

by

MARTHA MAYES HUGHES, B.A.

A THESIS

IN

ENGLISH

Submitted to the Graduate Faculty
of Texas Technological College
in Partial Fulfillment of
the Requirements for
the Degree of

MASTER OF ARTS

Approved

August, 1968

805

T3

1968

No. 129

Copy 2

REC-77A-2

ACKNOWLEDGMENTS

I am deeply indebted to
Professor James M. Foster for
his direction of this thesis.

CONTENTS

ACKNOWLEDGMENTS	ii
I. INTRODUCTION	1
Purpose	1
References	3
II. ZELLIG HARRIS' ANALYSIS AND THE PROBLEM IT CREATES	9
The Problem	9
Examination of the Data	12
Summary	16
III. THE PHONEMES UNDERLYING <u>W</u> IN MODERN SWAHILI	17
The Problem	17
Examination of the Data	18
Summary	21
IV. THE CHARACTERISTICS OF THE TENTATIVE PHONEME /W/	22
The Problem	22
Examination of the Data	23
Summary	28
V. THE RELATIONSHIP BETWEEN THE SYNCHRONIC ANALYSIS AND HISTORICAL PROCESSES	29
The Theory of the Relationship	29
Synchronic Factors	31
Proto-Bantu Forms	33
Summary	37

VI. THE RULES WHICH GOVERN THE DERIVATION OF <u>W</u>	39
The Derivational Processes	39
Tentative Rules	40
The Final Solution	44
Sample Derivations	49
Residual Problems	53
Summary	54
VII. CONCLUSION	56
BIBLIOGRAPHY	59

CHAPTER I

INTRODUCTION

Purpose

It is my purpose in this paper to try to approach an old problem in a new way in the hope of arriving at a more complete solution.

Linguists have been trying to analyze and describe languages for at least two thousand years. By the nineteenth century, their knowledge and their methods resulted in considerable success. The principal contribution of nineteenth century linguistics was the light it shed on the historical development of languages.¹

Twentieth century American descriptivists have been more concerned with the development of synchronic analyses of natural languages. They have developed methods for describing contemporary languages, using as their data only the language itself as it is actually spoken at this time.²

¹An excellent source on historical linguistics and especially on nineteenth century linguistics is Holgar Pedersen's The Discovery of Language, trans. John Webster Spargo (Bloomington: Indiana University Press, 1959).

²There is one book in particular whose importance to this development has been highly significant: Leonard Bloomfield, Language (New York: Holt, Rinehart and Winston, 1933).

In the last few years, a new way of approaching the description of natural languages has been developed by a group of American linguists led by Noam Chomsky and his colleagues.³ The implications of this transformational generative grammar far transcend the scope of this paper, but the basic propositions involved underlie the work presented here. Of particular relevance to the problem here is the work which has been done in generative phonology.⁴

Looking at natural languages in the light of this new theory and with the aid of the tools it offers, we find that we are able to arrive at better descriptions. It is this sort of approach I propose to take in an attempt to solve a certain problem in the synchronic analysis of Modern Swahili. With an improved synchronic grammar of the language, we can turn to the parent language, Proto-Bantu, in the hope of finding the historical source for certain modern phenomena. It is possible that we will be able to identify certain segments in Modern Swahili as reflexes of Proto-Bantu forms.

³The new movement was signaled publicly by the appearance of one book, Noam Chomsky's Syntactic Structures (The Hague: Mouton & Co., 1957). Since that time, a copious literature in generative transformational grammar has appeared.

⁴These implications will be explored in the chapters which follow.

References

A word about the sources which I have used in the preparation of this paper is in order here.

The sources fall into three categories. First, there are general references on Swahili. Second, there are works more particularly concerned with Swahili phonology. Third, there are general references on generative phonology.

The basic source for a general understanding of the language is E. O. Ashton's Swahili Grammar (Including Intonation).⁵ This is recognized as "the best practical grammar available in English."⁶ I have used this book extensively as a source for the examples cited throughout the paper.

Another general source on the language has been a recent publication, Edgar C. Polomé's Swahili Language Handbook.⁷ This book is valuable for its structural account of the language. It holds added interest because it includes chapters about the people who speak the language, the places where it is spoken, the other languages that are related to it, and so forth. It also includes

⁵E. O. Ashton, Swahili Grammar (Including Intonation) (2d ed.; London: Longmans, 1947).

⁶Edgar C. Polomé, Swahili Language Handbook ("Language Handbook Series"; Washington: Center for Applied Linguistics, 1967), p. xi.

⁷Above, n. 6.

a section on Swahili native literature. Finally, it is an excellent bibliographical source for the student doing research on Swahili.

The sources more particularly concerned with Swahili phonology have particular relevance for the problem considered in this paper.

The first such source is Carl Meinhof's Introduction to the Phonology of the Bantu Languages. I have used N. J. van Warmelo's English translation of the original German.⁸ Meinhof is recognized as an outstanding source in the comparative study of the Bantu languages.⁹ His book gives first a description of the Proto-Bantu sound system. Then he discusses the phonology of each of the modern Bantu languages, showing how they relate to Proto-Bantu and how they relate to each other. I have used the chapters on Proto-Bantu and Swahili principally.

Another valuable source has been "Swahili Phonetics," a lengthy article by A. N. Tucker and E. O. Ashton (whose Swahili Grammar we mentioned earlier).¹⁰

⁸Carl Meinhof, Introduction to the Phonology of the Bantu Languages, trans. N. J. van Warmelo (Berlin: Dietrich Reimer/Ernst Vohsen, 1932).

⁹Pedersen, p. 138.

¹⁰A. N. Tucker and E. O. Ashton, "Swahili Phonetics," African Studies, I (1942), 77-103, 161-82.

The article is in two parts: one is concerned with the sounds of Swahili; the other deals with sound changes. These articles have been particularly enlightening for several reasons. The authors provide a careful description of the sounds of the language, they divide the Swahili words into syllables, and, like Meinhof, they hint at the relationships between sounds in the language today and the older sounds from which they have been derived.

The final source of this type is Zellig S. Harris' Structural Linguistics.¹¹ This is a very broad and general work on the methods of structural linguistics. Of particular interest in the preparation of this paper has been Harris' phonemic analysis of Swahili, which he prepared as a sample analysis to illustrate certain of his methods. Harris first isolates all the phonetic segments heard in Swahili. Then, according to such principles as complementary distribution, he attempts to group segments into phonemes. His interest centers on classification of the data; that is, he classifies each phonetic sound as a member of some phoneme. He also tries to arrive at the smallest total number of phonemes possible. He is not concerned with generative

¹¹Zellig S. Harris, Structural Linguistics (Chicago: The University of Chicago Press, 1951).

principles, and he does not make recourse to earlier forms of the language. It was a certain problem in his analysis of the phonemes that prompted the research that has resulted in the writing of this paper.

The third group of references includes those which discuss the principles of generative phonology on which the solution sought in this paper is based.

The first of these is Preliminaries to Speech Analysis by Roman Jakobson, C. Gunnar M. Fant, and Morris Halle.¹² In this book, the feature theory generally referred to as "Jakobson's distinctive feature theory" is developed. The authors discuss the segmentation of the flow of speech and the phonemic analysis of the speech sounds. Their emphasis is on the acoustical evidence for the set of features they propose.

The second source in this group is Morris Halle's article, "On the Bases of Phonology."¹³ It is similar in content to the book he wrote with Jakobson and Fant, except that the emphasis here is on the articulatory, rather than the acoustic, properties of the features. A second

¹²Roman Jakobson, C. Gunnar M. Fant, and Morris Halle, Preliminaries to Speech Analysis (Cambridge, Massachusetts: The M.I.T. Press, 1963).

¹³Morris Halle, "On the Bases of Phonology," The Structure of Language, ed. Jerry A. Fodor and Jerrold J. Katz (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), p. 324.

article by Halle, "Phonology in Generative Grammar," has important additional discussions.¹⁴ In this article, Halle shows how a grammar which makes use of distinctive feature analysis is an improvement over grammars which do not. He discusses the simplicity criterion which is the basis for his choosing one theory of grammar over the other.

These are the materials that I have used directly in the preparation of the paper. I have consulted other available works on Swahili (such as books designed for teaching or learning the language), but they did not seem to offer additional insights into the problem under consideration. There are other linguistically-oriented books on Swahili structure and history that might have proved valuable; however, I was unable to obtain them. One such work is Taylor's African Aphorisms.¹⁵ Although I could not consult it directly, I have had the benefit of Taylor's observations since the book is cited frequently in the sources I did have. Numerous other works have been similarly cited.

¹⁴Morris Halle, "Phonology in Generative Grammar," Word, 18 (1962), 54-72, reprinted in The Structure of Language, ed. Jerry A. Fodor and Jerrold J. Katz (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), p. 334.

¹⁵W. E. Taylor, African Aphorisms (London, 1891). I was unable to examine this book directly, and I am unable to give more detailed bibliographical information.

Two restrictions on the data used need to be mentioned. First, the dialect of Swahili under consideration is that of the Zanzibar region. Some of the sources compare several dialects, but I have only used statements and examples pertaining to the Zanzibar dialect. Harris' informant was actually a native of another region, but he was educated in Zanzibar; however, we will keep this difference in mind. Second, I have dealt only with words of native Bantu origin. Swahili has adopted numerous Arabic words, but these contain Arabic phonemes and do not usually conform to the Bantu sound change laws. The distinction between Bantu and foreign words is a general one in the literature.

With these selectional restrictions in mind, we can begin our effort to achieve a synchronic analysis of a particular phonological problem in Modern Swahili.

CHAPTER II

ZELIG HARRIS'S ANALYSIS AND THE PROBLEM IT CREATES

The Problem

In his analysis of the phonemes of Swahili, Zellig Harris chooses to regard both u and w as members of the phoneme /u/.¹ He contends that /u/ is realized as u or as w in certain specified environments.²

There are three environments in which w (and not u) is found: #V, C_, and V_. Harris fails to note that there are words in which u appears as the initial segment before a vowel.

ua 'fence'
uangalifu 'attention'
uapo 'oath'
uombi 'begging'
uuaji 'massacre'
uo 'cover'
uonyo 'warning'³

¹Harris, pp. 97-124.

²Throughout the paper, slash marks (/ /) will indicate the level of systematic phonemics. For a discussion of this term, see Noam Chomsky, "Current Issues in Linguistic Theory," The Structure of Language, ed. Jerry A. Fodor and Jerrold J. Katz (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), pp. 91-112. In this paper, underlining of the Swahili forms will indicate broad phonetic transcription.

³Examples come from all the sources; however, most are from Ashton's Swahili Grammar. Where the source is relevant, I will indicate what it is. Items in single quotation marks are glosses of the Swahili forms.

According to Harris' analysis, each of these initial u's should be a w. Since he offers no explanation for such forms as these, we cannot agree with the assertion that all initial /u/'s are realized as w's. In light of this failure, we might at this point open our minds to the possibility that not all initial w's are members of /u/.⁴

Harris does concern himself with apparent counter-examples in the environments C_ and V_. He cites as examples two Swahili words--kwa 'for' and kúa 'to be.' Ashton transcribes the 'to be' form kuwa (infinitive prefix ku + wa 'to be'). However, since there are minimal pairs in which both u and w occur in the position C_V, we will retain Harris' example.

Harris notes that if we consider each word to be phonemically /kua/, each form will be realized phonetically as kwa. In Swahili, stress falls on the penultimate vowel in a word. Therefore, we assume an underlying form /kúa/; actually, we do not have to mark stress since it is predictable. This stressed vowel /u/ is, of course, syllabic. Harris contends that the phoneme /u/ has a

⁴At this point, such a suggestion is purely speculative. However, if a given analysis is suspect (as Harris' seems to be), we must try to identify every point at which it fails and suggest alternate solutions. It is not likely that each proposal we make will prove valid when we carry it to its fullest implications; nevertheless, this is the way we must work if we hope to arrive finally at an accurate description of a portion of a language.

non-syllabic member. He chooses to mark this non-syllabic member with a phoneme /ʌ/ which he calls a consonantizing phoneme. Any member of /u/ which is to be realized phonetically as w is marked /ù/.

There are two ways of interpreting this solution. First, it seems that Harris is actually making a distinction at the phonemic level, since the consonantizing element must be added to /u/ prior to testing the environment for a possible change to w. He seems to be recognizing a vocalic segment /u/ and a consonantal segment /ù/. If this is the case, we could logically write /ù/ as /w/ at the phonemic level, since /ù/ underlies w and nothing else.

On the other hand, Harris is probably saying that /u/ is realized as w when the /u/ occurs in the phonemic environment C₁, in which /ʌ/ is regarded as an independent phoneme. However, Harris makes no suggestion of an environment in which /ʌ/ occurs, except to say that it marks a non-syllabic, non-stressed member of /u/. In other words, he gets w only when he has /ʌ/, and he has /ʌ/ only when he wants w. This seems to be an ad hoc device, not an adequate solution to the problem. It seems better at this point to assume that /u/ and /ù/ are independent phonemes. Again, we can write the two phonemes as /u/ and /w/.

Examination of the Data

An examination of various forms in which w occurs phonetically will support the contention that w cannot be regarded at the phonemic level as /u/. First, there are nouns of the u-class whose stems are written with the initial segment w. We will first see if this w can be regarded as a member of /u/. As an example, we will use uwanda 'open space,' spelled phonemically as /uuanda/. If this is the correct form, Harris' rule, $u \rightarrow w/\#_V$, will apply, giving *wuanda.⁵ Since stress is on the penultimate vowel of the word, and since the vowel before the stressed vowel carries a lesser degree of stress, we can assume that *wuanda can be written *wùánda. This form undergoes Harris' rule, $u \rightarrow w/C_$, giving *wwanda.

Obviously, we cannot regard the underlying phoneme as /u/. As an alternative, we add Harris' consonantizing phoneme to the phonemic representation, giving /uùanda/. Since a consonantizing element (/ù/) has been added to the second segment, the rule, $u \rightarrow w/\#_V$, does not apply. The rule, $u \rightarrow w/C_$, does apply, giving the correct form, uwanda.

To achieve a correct result, it is necessary to add the consonantizing element to the phoneme /u/ before

⁵An asterisk will be used throughout the paper to indicate a non-occurring form.

subjecting the form to any rules. To avoid the ad hoc solution of a consonantizing phoneme, let us spell the segments in accordance with Jakobson's distinctive feature framework.⁶

Harris' /u/ is spelled $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$. This seg-

ment is abbreviated in the orthography as u. Harris /û/ is spelled $\left[\begin{array}{l} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$.⁷ This segment is abbreviated

in the orthography as w. We will tentatively assume that in the following nouns, the u is a member of /u/ and the w is a member of /w/.

<u>uwanda</u>	'open space'
<u>uwezo</u>	'might, power'
<u>uwongo</u>	'falsehood'
<u>uwele</u>	'illness'

We noted earlier that, contrary to Harris' rule, u does occur initially before a vowel. Without considering

⁶There is no universal acceptance among linguists of Jakobson's distinctive feature framework. Of current interest is a new system proposed by Noam Chomsky and Morris Halle in The Sound Pattern Of English (New York: Harper & Row, 1968). This new system does not seem to offer an improvement for our analysis here, however.

⁷The difference between /u/ and /w/ is generally taken to be one of vocalicness. The /u/ is vocalic; the /w/ is not. We also specify /w/ as non-consonantal; this is the usual specification. This contradicts Harris' idea of the "consonantizing phoneme." Harris does indeed seem to have an insight into the true nature of w; the consonantal feature in regard to w is discussed in a later chapter.

for the moment why these u's do not become w's, we will look at those w's which do occur initially before a vowel to see if they can be members of /u/.

In a verb such as waka, we know that the penultimate a is stressed and that the initial segment is not. The initial segment, being unstressed, could not be a member of /u/; it would have to be a member of /ù/; therefore, we will consider it a member of /w/. In the following verbs, the initial segments are all members of /w/.

<u>waka</u>	'burn'
<u>washa</u>	'light (a fire)'
<u>weka</u>	'place'
<u>weza</u>	'be able'
<u>winda</u>	'hunt'
<u>waza</u>	'consider'

Harris assumes that /u/ is always realized as w in certain environments. There are important counter-examples. There is, for example, the minimal pair, fungua 'unfasten' and fungwa 'be fastened.' These conversive and passive forms are derived from the verb funga 'bind.' According to Harris, both the conversive and the passive forms should be written fungwa phonetically. However, on closer examination, we find a regularity which justifies the different spellings, showing them to be more than an exception to Harris' rule.

In Swahili, derivative verbs are formed by the addition of various suffixes to a stem. The a itself in

funga is a simple verbal suffix. There is a conversive suffix ua and a passive suffix wa.⁸

A verbal form might consist of a stem plus the conversive suffix: fung + ua. In fungua, the accent is on the penultimate vowel u, and the phonemic /u/ is realized phonetically as u according to Harris' rule. There might also be a verbal form consisting of a stem plus the passive. If we regard the underlying form of the passive as ua, its phonetic realization should be analogous to that of the conversive. That is, there would be no reason, such as lack of stress, for the /u/ to be realized as w. Since all passives are written phonetically with a w, we must conclude that the two suffixes are spelled differently at the phonemic level. In choosing to spell the conversive /ua/ and the passive /^hua/, Harris would be admitting this phonemic difference. In this case, Harris could not even use lack of stress to support the use of /^h/. We will conclude that the conversive is spelled /ua/ and that the passive is spelled /wa/.⁹

⁸There are modifications in form for these suffixes (such as liwa for the passive), but these can be explained on phonetic grounds and do not alter this case.

⁹In the materials available to me, I am unable to find other conversives and passives formed on the same root to give additional minimal pairs. However, since the conversive and passive endings are consistent (above, n. 8), and since I find no counter-examples, it would seem that more data would reveal more supportive examples.

Summary

Harris concluded that all u's and all w's are members of the phoneme /u/. The data examined in this chapter is evidence of the fact that not all w's can be regarded as realizations of /u/ according to Harris' rules. While not all occurrences of w in Swahili have been examined, the examples cited are varied enough and numerous enough to justify positing, for the time being, two distinct phonemes. At this point, we will regard all phonetic u's as members of /u/ and all phonetic w's as members of /w/.

CHAPTER III

THE PHONEMES UNDERLYING

W IN MODERN SWAHILI

The Problem

In the preceding chapter, we concluded that w and u must be members of different phonemes because it is evident that not all w's can be regarded as members of /u/. However, we did not prove that no w's can be regarded as members of /u/. We need to approach the problem in two different ways. First, there may be examples not discussed in the last chapter in which w is a member of /u/. Also, in some of the examples cited, w might be a member of /u/ after all; it may be that Harris' rules are at fault.

Before we go on, it would be helpful to recognize some alternate terminology. We have talked about phonetic realizations of phonemes. We can also regard these as derived forms of underlying phonemes. That is, we may find that in certain environments, w is derived from /u/; in other words, /u/ becomes w in certain environments. Our rules will be of this form..

u → w / X

/u/ becomes w in the environment X

Actually, these rules are the abbreviated forms of the

complete rules in which each phoneme and each phonetic representation is a set of features.¹

Examination of the Data

In the preceding chapter, we noted that there are words in which u occurs initially before a vowel, but we did not explain why they did not become w's. A closer examination of this question is in order now.

In Swahili, there is a class-prefix u. We have already shown that in words such as uwanda (class-prefix u + stem wanda), the w is not derived from /u/. However, there are other words of the u-class which have w as the initial segment; an example is wema 'goodness.' Since this w occurs where we would expect a u, perhaps the w is indeed derived from /u/. The word wema is, in fact, formed by adding the class-prefix u to an adjective stem -ema 'good,' giving /uema/. This /u/ does undergo a sound change to be pronounced wema. A similar word is wingi from /u + ingi/.

The environment for this change is not obvious. Generally, this class-prefix /u/ becomes w when the stem to which it is affixed begins with a vowel. However, it sometimes remains u (uombi), and it sometimes becomes uw

¹The nature of these feature complexes will be made more explicit when we actually use the rules. For the present, the reader is reminded of the way we spelled /u/ and /w/ with distinctive features, that is, as feature complexes.

(uwongo). To be sure which elements are correctly included in the prefix, we compare the noun with the form from which it was derived.

<u>wema</u> < - <u>ema</u>	<u>w-ema</u> < - <u>ema</u>
<u>uwezo</u> < <u>kuweza</u>	<u>u-wezo</u> < <u>ku-weza</u>
<u>uombi</u> < <u>kuombi</u>	<u>u-ombi</u> < <u>ku-ombi</u>
<u>uwongo</u> < <u>kuongopa</u>	<u>uw-ongo</u> < <u>ku-ongopa</u>

An attempt to explain these changes will be made in a later chapter. Here, the important point is that there are clearly some w's which are derived from /u/. At this point, we must abandon the assertion that all w's are members of /w/.

There is also a class prefix ku in Swahili.² It remains ku before both consonants and vowels.³ In the corresponding adjectival concord, we again find ku before consonants; however, before vowels, the prefix is written kw. In phrases like the following, we may assume that the w in the adjectival concord is a /u/ which has undergone a sound change.

<u>kuimba</u> <u>kuzuri</u>	'fine singing'
<u>kuimba</u> <u>kwena</u>	'good singing'

There is also a prefix ku which is used in reference to place and time. In the following examples, the phonetic kw's and ku's are recognized syntactically as

²This ku is the infinitive sign of the verb; when these verbals are used as nouns, they are regarded as nouns of the ku-class.

³It is kw only in a few verbs like kwenda and kwisha; these are irregular in other instances also.

members of the prefix /ku/. The fact that some are written phonetically as kw indicates another example of a w derived from /u/.

Twende kwingine. 'Let us go in another direction.'
Kwenye miti hakuna wajenzi. 'Where there are trees (i.e.,
a place having trees) there
are no builders.'
Wamerudi kwao? 'Have they returned home?'
Kwao ku wapi? 'Where is their home?'

From these examples, it is evident that some w's not discussed in the preceding chapter are derived from /u/. Perhaps some of the examples used in that chapter to suggest the independence of /w/ seemed to do so only because we failed to understand certain rules by which w can be derived from /u/.

First we concluded that in all nouns of the u-class which are written uwX (where X stands for the rest of the word), the initial segment is /u/, and the second is /w/. The rules allowed no other conclusion. However, in this chapter, we have shown that u-class prefix /u/ can be realized phonetically as u, w, or uw. By looking at related forms, we concluded that the w in uwezo is a member of /w/. However, the w in uwongo is a member of /u/. The rules failed to yield the correct result.

In the verbs cited beginning with w, there is no reason to suspect that the w is anything other than the initial segment of the stem. Therefore, there seems to be no way to interpret it as a member of /u/. Also, we

showed that such words as fungua and fungwa contain different morphemes (conversive and passive, respectively). There seems to be no reason to change our theory that the two morphemes are spelled differently at the phonemic level (/ua/ and /wa/).

Only in one instance does our analysis from the preceding chapter fail. However, the failure is genuine and is enough to make our rules highly suspect. We will come to the matter of revising the rules later.

Summary

At this time, we will accept the following suggestion. There are in Swahili two distinct phonemes, /u/ and /w/. The /w/ is always realized as w; /u/ is usually realized as u. However, there are instances in which an underlying /u/ is written phonetically as w. To put it another way, there are apparently two types of w's in Swahili: one is derived from /w/ and the other is derived from /u/.

CHAPTER IV

THE CHARACTERISTICS OF THE TENTATIVE PHONEME /w/

The Problem

At this point, we recognize two types of w's in Swahili phonetic transcription. There is w derived from /u/, and there is w derived from /w/.

The assertion that w can be derived from /u/ is reasonable enough. Earlier we spelled /u/ as the following set of features:

ing set of features: $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$. We spelled /w/

as $\left[\begin{array}{l} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$. Now we will assume that these two

sets of features actually represent /u/ realized phonetically as u and /u/ realized phonetically as w, respectively. We then see that for /u/ to become w, only a simple process of devocalization is required; that is, [+vocalic] is changed to [-vocalic], and the vowel becomes the semivowel (or glide). There are probably environments in which the rule which produces this change is obligatory; in others, it may be optional.

As a result of our earlier investigations, we are left with several types of w which are not members of

/u/. These are w's which occur initially in noun stems, those which occur initially in verbs, and those which occur as the initial segment in the passive suffix wa. We have decided that these are members of the phoneme

-vocalic	(/w/). However, such an analysis is
-consonantal	
+grave	
+diffuse	

suspect for a number of reasons.

First, Roman Jakobson has noted that it is not unusual for syllabic vocalic phonemes to lose their syllabicity in some positions. He notes that in English, unstressed /u/ loses its syllabicity when adjacent to another vowel; for example, /u/ in such a position becomes w. Furthermore, he says that only rarely are these non-syllabic vowels independent phonemes occurring in the same positions as their syllabic counterparts. We can interpret this as a challenge to the phoneme /w/ that we have suggested as the form which underlied certain Swahili w's.¹

Examination of the Data

Keeping this in mind, we examine w's which are not derived from /u/. (In this section, w will refer to this group unless specified as being derived from /u/.) If

¹Jakobson, Fant, and Halle, Preliminaries to Speech Analysis, p. 20.

we reject the suggestion that w is spelled phonemically as $\left[\begin{array}{l} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$, that is, if we reject the suggestion

that w is a true glide at the phonemic level, then we need to find out what it is and how it is spelled phonemically. Without limiting ourselves to the restrictions of his rules, we might keep in mind the fact that Harris suggested a consonantizing phoneme to explain some occurrences of w. Perhaps Harris had an insight into the nature of w that was lost in his determination to prove that w is a member of /u/. We will be alert to the possibility that the phoneme underlying w may be [+consonantal].

We note again the environments in which w occurs:

- (1) initial segment in noun stems
- (2) initial segment in verbs
- (3) initial segment in the passive suffix wa

We need to examine the general nature of the syllable in Swahili. The most common syllable types in the language are V (vowel) and CV (consonant, vowel).² Since w is not derived from /u/, there is no reason to regard it as a V. We will suggest that it is a C and that the following forms represent the syllabic divisions of certain of our examples.

²Polomé, p. 50.

u-wa-zo
wa-ka 3
fung-wa

Since no alternative scheme for dividing these words presents itself and since w occurs in those positions where we expect to find a consonant, we have added support for the suggestion that w is in some sense like a consonant.

As a possible answer, we can take our earlier phonemic spelling (set of features) for /w/ and alter it to conform with the suggestion that w is consonantal.

Instead of spelling the phoneme $\left[\begin{array}{l} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$, we will

spell it $\left[\begin{array}{l} -\text{vocalic} \\ +\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$. This brings us to the conclu-

sion that w is a labial consonant. Since w is not nasal, we will tentatively add the feature [-nasal]. Since it appears to be voiced, we will add [+voice]. Perhaps we should clarify one point here. The w at the phonetic

level will still be represented $\left[\begin{array}{l} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right]$; this is

the way it is pronounced, and it cannot be changed. What

³Polomé, p. 83. Polomé notes that a root may have a final consonant. The nasal-consonant cluster involves another problem in the language and is not relevant to our problem here.

we are looking for now is an underlying phoneme from which these w's will be derived just as the other w's are derived from /u/. Including our intuitive feature additions, we suggest that this underlying phoneme may

be spelled $\left[\begin{array}{l} -\text{vocalic} \\ +\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \\ -\text{nasal} \\ +\text{voice} \end{array} \right]$. This could correspond, ap-

parently, to either /b/ or /v/ in this language. The phonemes /b/ and /v/ are distinguished by the feature [continuant]; /b/ is [-continuant] and /v/ is specified [+continuant]. A w seems to be [+continuant] also; this fact would make /v/ seem the better choice. Furthermore, /b/ in the environments we have been considering is pronounced implosively in Swahili; this feature would make /b/ an unlikely candidate for our underlying phoneme.⁴ We will tentatively suggest that the underlying phoneme is /v/.

Now we must look for data which will test this hypothesis. We find a number of nouns of the following type.

<u>uwanda</u>	'open space'
<u>uwezo</u>	'might, power'
<u>uwele</u>	'illness'
<u>uvuli</u>	'shade'
<u>uvumbi</u>	'dust'

⁴Explosive /b/ occurs only after the nasal m; this occurrence will be discussed in a later chapter.

In these forms, v and w seem to occupy the same position. On closer examination, we see that v occurs when the initial stem vowel (not the initial segment) is u. The w occurs when it is another vowel. Perhaps the underlying phoneme for the initial segment of the stem in all the forms is v. The /v/ is changed to w in certain environments. Additional evidence of the same sort is found in certain verbs.

<u>waka</u>	'burn'
<u>weka</u>	'place'
<u>weza</u>	'be able'
<u>winda</u>	'hunt'
<u>vuja</u>	'leak'
<u>vuma</u>	'roar'

Similar examples cannot be found for the /b/ which was an alternate suggestion to /v/. That is, b occurs before all vowels.

There is other evidence for positing /v/ as the phoneme underlying w. When the causative suffix ya is added to a word with w, the resulting form contains a v in place of the w.

<u>lewa</u>	+	<u>ya</u>	→	<u>levya</u>
<u>nawa</u>	+	<u>ya</u>	→	<u>navya</u>

Perhaps the change is not actually from w to v. More likely, the underlying form in both is /v/. The change to w which occurs in lewa does not occur in such forms as levya. Similar processes are in effect with other suffixes.

lewa + uka (stative suffix) → levuka
lewa + usha (causative suffix) → levusha

In these examples, we note that v occurs before y and before u; we have not seen w in these same environments.

Summary

Some w's are not derived from /u/. Since it is unlikely that /w/ is itself a phoneme, and since it seems to be much like a consonant, we suggest that it may be the phonetic realization of some consonant. The evidence indicates that this consonant is /v/. At this point, we conclude that there are two types of w's in the language. One w is a derived form of the phoneme /u/; the other is a derived form of /v/.

CHAPTER V

THE RELATIONSHIP BETWEEN THE SYNCHRONIC ANALYSIS AND HISTORICAL PROCESSES

The Theory of the Relationship

We noted in the introductory chapter of this paper that linguistic investigation has traditionally fallen into two main categories. One is the study of the historic development of languages; the other is the synchronic description of natural languages. Now we find that these studies are often closely related; each area of investigation can gain insights from the other. This is the case precisely because synchronic rules often mirror historical sound changes, and the underlying forms in the synchronic analysis often resemble the forms suggested for earlier stages of the language.

Halle deals with these facts in a section of "Phonology in Generative Grammar."¹ He quotes an important passage from "Menomini Morphophonemics," a paper in which Leonard Bloomfield discusses the matter:

The process of description leads us to set up each morphological element in a theoretical basic form and then to state the deviations from this basic

¹Halle, "Phonology in Generative Grammar," in The Structure of Language, p. 346-352.

form which appear when the element is combined with other elements. If one starts with the basic forms and applies our statements . . . in the order in which we give them, one will arrive finally at the forms of words as they are actually spoken. Our basic forms are not ancient forms, say of the Proto-Algonquian parent language, and our statements of internal sandhi are not historical but descriptive and appear in a purely descriptive order. However, our basic forms do bear some resemblance to those which would be set up for a description of Proto-Algonquian, some of our statements of alternation . . . resemble those which would appear in a description of Proto-Algonquian, and the rest . . ., as to content and order, approximate the historical development from Proto-Algonquian to present-day Menomini.²

Halle expands on Bloomfield's ideas; he notes especially the significance of ordering the synchronic rules. One of the advantages of generative phonology over other methods of phonological investigation is its practice of discovering the forms which underlie the utterances. An analysis of sound changes in the synchronic description of a language which relied solely on phonetic strings would be hopelessly complex; in all probability, there would be only an exhaustive list. By discovering underlying forms and the processes (rules) by which these underlying forms become phonetic strings, generative phonology accounts for generalities in the language not apparent in the surface forms. Halle offers evidence from several languages to show that these forms

²Leonard Bloomfield, "Menomini Morphophonemics," Travaux du Cercle Linguistique de Prague, VIII (1939), 105-15, quoted in Halle, "Phonology in Generative Grammar," in The Structure of Language, p. 346.

and rules which we posit to account for utterances in our synchronic data correspond to historical forms and processes.

In The Sound Pattern of English, Chomsky and Halle include a brief section on linguistic change. They develop a theory about changes in the grammar of a language which account for observed changes in the utterances of the language. They state that their view of sound change explains those processes which Bloomfield noted.³

In keeping with these views, we will compare our synchronic analysis of a fragment of Swahili with the reconstructed Proto-Bantu forms.

Synchronic Factors

This attempt at a synchronic analysis of a certain segment of Modern Swahili has led us to this conclusion. The w's which occur in Swahili are derived from two sources, the phoneme /u/ and the phoneme /v/. As is implicit in the term "synchronic analysis," all of our data, all of our evidence, and all of our hypotheses have come from the language as it exists today, without any recourse to historical evidence.

When we look at the historical information, however, we find new information relevant to our conclusions about

³Chomsky and Halle, The Sound Pattern of English, p. 251.

the phonemes underlying w. We may find that the rules which govern the appearances of w in the synchronic analysis mirror historical changes in the language. Furthermore, we may find that the two types of w in Modern Swahili are reflexes of the phonemes /u/ and /v/ in Proto-Bantu.

We have seen phonological reasons for believing that some w's are derived from /u/ and some are derived from /v/. If these underlying phonemes are reflexes of earlier forms, there might be some residual phonetic differentiation still in evidence. A close examination of the pronunciation of Modern Swahili w's shows that this is exactly the case.

Tucker and Ashton, in their discussion of fricative consonants, relate that "a voiced bilabial fricative v has been heard instead of w in certain words in the pronunciation of many speakers."⁴ They cite two examples.

va or wa 'to be'
gava or gawa 'divide'⁵

These are exactly the kinds of w's that we have considered members of /v/ for phonological reasons.

In a later section, Tucker and Ashton are more detailed. They say that some speakers differentiate between

⁴Tucker and Ashton, African Studies, I, 92.

⁵Ibid.

the w which is derived from Proto-Bantu y and the one derived from Proto-Bantu short u. The speakers differentiate by simply substituting y for the former.⁶ For further evidence, the authors quote from an article by Meinhof in which he says, "Speakers of good Swahili make a clear distinction between the two w-sounds."⁷

Proto-Bantu Forms

With this much evidence from Modern Swahili data, it is time to turn to an examination of the Proto-Bantu forms.

Meinhof tells us that in Proto-Bantu, there was a primary fricative y.⁸ In his list of Swahili consonants, he says that this Proto-Bantu y is written w. That is, he classifies w as a fricative, and he gives as examples of its occurrence the class-prefix wa and wa 'to be.' These forms are reflexes of the Proto-Bantu va.⁹

There are other examples of reflexes of y which are not quite so obvious. In reference to certain noun classes, Meinhof gives the following evidence. A form

⁶Ibid., p. 98.

⁷Meinhof, Carl, Linguistische Studien in Ostafrika--Suaheli (M.S.O.S., Vol. VII, Part 3), pp. 201-216, quoted in Tucker and Ashton, African Studies, I, 98.

⁸Meinhof uses the term Ur-Bantu; Proto-Bantu and Ur-Bantu are synonymous.

⁹Meinhof, Introduction to the Phonology of the Bantu Languages, p. 112.

derived from the combination of Proto-Bantu ni and v contains a nasal compound mb.

mboni 'eye-ball' < -ona < Proto-Bantu vona 'see'¹⁰

Certain nouns written with this mb form the plurals of other noun classes. Thus, mbingu is the plural form of uwingu. From Meinhof's example, "ni + v uwingu 'sky' pl. mbingu,"¹¹ we can infer that the w in uwingu is a reflex of the Proto-Bantu v. Ashton gives "n + w → mb" as a general sound change rule for the class-prefix n before consonants.¹² From the evidence in Meinhof, we can deduce that the w's in Swahili which undergo this sound change rule are reflexes of Proto-Bantu v.

It is unfortunate for our case that Meinhof does not give examples from Proto-Bantu to account for all of our examples in which we have considered w a derivation of /v/ and, therefore, a reflex of Proto-Bantu v. However, he has given us conclusive evidence covering enough of our data for us to conclude that the synchronic analysis of w as a derivation of /v/ is a reflection of the historical change of v to w.

¹⁰Ibid., p. 114.

¹¹Ibid., p. 115.

¹²Ashton, p. 322.

We have shown that all Modern Swahili w's that are not derived from /u/ are reflexes of Proto-Bantu y. But it is important to note that w is not the only Modern form of the Proto-Bantu y.

In the first place, some Proto-Bantu y's have retained their original status and still appear as y. Also, there are cases where the y is reflected as \emptyset ; that is, it has dropped out phonetically. This is the case in words like mboni 'pupil of the eye' which is derived from ona 'see.' Meinhof has traced this to Proto-Bantu vona.¹³ (The expected Modern form *wona does not occur.) Forms like mboni are often explained by reference to a "submerged w" in the stem.¹⁴

In other cases, the Proto-Bantu y is reflected as b.¹⁵ We have noted that a nasal plus a Proto-Bantu fricative results in a cluster of a nasal plus a plosive (ni + y → mb). Other Swahili nouns are formed by dropping the nasal from words which have undergone the change to mb. When this occurs, the underlying fricative y is not restored; the plosive b remains. Such is the case in forming a diminutive.

¹³Meinhof, Introduction to the Phonology of the Bantu Languages, p. 114.

¹⁴Ashton, p. 322.

¹⁵We recall that the similarities between y and b have already been noted.

mbuzi 'goat' ki-buzi 'kid'¹⁶

In kibuzi, the b must be regarded as a reflex of v.

If we are considering the problem of reflexes by starting with the Proto-Bantu form and working forward in time, it is essential to study all the Bantu languages. We learn much about submerged forms in one language by an examination of corresponding forms in another language. However, since we are primarily interested in the derivation of the Modern Swahili w, we will leave these other problems open.

We have shown that some Modern Swahili w's are reflexes of Proto-Bantu v. We also suggested that some w's are reflexes of Proto-Bantu u. Part of the evidence supporting our case for w as a derived form of v was the fact that the fricative w did not exist as such in Proto-Bantu. If our case for w as a derived form of u is also true, there should be no w at all in Proto-Bantu. This, however, is not the case. The semivowel w is recognized as a segment in Proto-Bantu.

Unfortunately, Meinhof's discussions of semivowels do not cover many of the examples we have been using. However, there is one of value. We discussed the noun wema 'goodness' and showed that the w was derived from

¹⁶Meinhof, Introduction to the Phonology of the Bantu Languages, p. 115.

the class-prefix u. Meinhof cites a related noun mwema 'good.' He traces the mw to the Proto-Bantu form.¹⁷ This does not prove that the w is not derived from /u/. It simply shows that, in this case, the synchronic analysis does not mirror an historic change from Proto-Bantu to Modern Swahili.

We can suggest two alternate solutions. Perhaps an earlier historic process is involved. This is certainly not a suggestion that can be tested. A better suggestion would be that the devocalization process by which the vowel /u/ becomes the semivowel w is governed by a basic phonological rule which holds for the language at all stages about which we have reliable knowledge. The question of whether this is due to an earlier historical change or whether it is a universal phonological rule (as Jakobson has implied in the passage cited earlier¹⁸) is left open.

Summary

It does seem that the underlying (phonemic) forms we have posited for our sample words do reflect earlier forms, at least where we have used the phoneme /v/. The synchronic description of the process by which /v/ may

¹⁷Ibid., p. 122.

¹⁸Jakobson, Fant, and Halle, Preliminaries to Speech Analysis, p. 20.

become w may indeed reflect the historical change of v to w. A study of the broader implications, the ordering of the rules and the development of a chronology of sound changes, would require the examination of a much larger portion of the language.

In the case of the derivation of w from u, we seem to be dealing with a reflex of a much older (perhaps original) phonological process.

CHAPTER VI

THE RULES WHICH GOVERN

THE DERIVATION OF W

The Derivational Processes

In the preceding chapters, our principal concern was to determine the phonemes which underlie w in the synchronic analysis of Modern Swahili. The evidence has led us to conclude that these phonemes are /u/ and /v/. We have stated informally that w is derived either from /u/ or from /v/ in certain examples. In this chapter, we will attempt to restate these informal descriptions. We will attempt to formalize the derivative principles as phonological rules.

It seems that two distinct processes are involved in the derivation of w. One is a process of devocalization. The phoneme /u/, which is [+vocalic], becomes [-vocalic] under certain conditions; the devocalized /u/ is w. The second process is one of deconsonantization. The phoneme /v/, which is [+consonantal], becomes [-consonantal] under certain conditions; the deconsonantized /v/ is w. In writing our rules, we will use u, v, and w as abbreviations, keeping in mind the sets of features which they represent. The full forms are given here for reference.

$$\begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{bmatrix} / \text{X}$$

$$u \rightarrow w / \text{X}$$

$$\begin{bmatrix} -\text{vocalic} \\ +\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \\ -\text{nasal} \\ +\text{voice} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \\ -\text{nasal} \\ +\text{voice} \end{bmatrix} / \text{X}$$

$$v \rightarrow w / \text{X}^1$$

In writing our rules, we will confine ourselves to the examples already cited in this paper, and, by so doing, we will be dealing with words for which we can be sure of the phonemes underlying w.

Our rules will explicate the environmental conditions under which the changes to w take place. We will spell out only those parts of the environment which actually are determining factors.

Tentative Rules

Our data can be divided into six groups, each of which shows a type of sound change. The first group is made up of the following words in which the initial segment is a member of /v/.

¹The w derived from /u/ is also characterized as $\begin{bmatrix} -\text{nasal} \\ +\text{voice} \end{bmatrix}$, but it is not necessary to include these features in its set. What we are concerned with here are the distinctive features; we do not need a full phonetic characterization.

<u>waka</u>	/vaka/ ²
<u>washa</u>	/vasha/
<u>weka</u>	/veka/
<u>weza</u>	/veza/
<u>winda</u>	/vinda/
<u>waza</u>	/vaza/
<u>vuja</u>	/vuja/
<u>vuma</u>	/vuma/

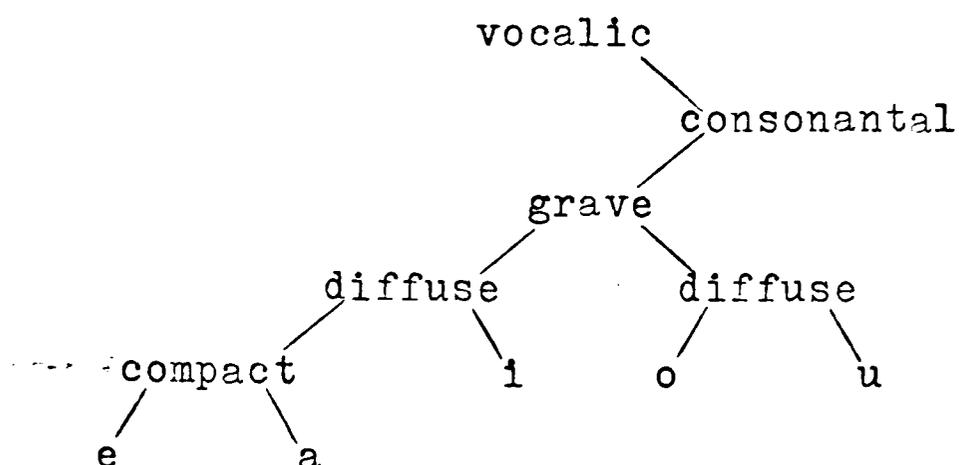
Our task is to predict which underlying /v/'s become w's and which do not. One method of analysis would make the following statement.

$$v \rightarrow w / \#_ - \begin{cases} a \\ e \\ i \end{cases}$$

$$v \rightarrow w / \#_ u$$

We, however, choose to use the distinctive feature system developed in generative phonology. We do not need a rule saying when /v/ becomes v, since all /v/'s will be phonetically v unless they undergo a rule which changes them. For our analysis, we need to specify the features which spell the Swahili vowels. The following coding tree gives us these sets of features. A right branch from any feature indicates that all segments traced through that branch are specified [+] in respect to that feature. A left branch indicates that segments traced through it are specified [-] in respect to the feature from which the branch extends.

²Although for convenience I enclose the whole word in phonemic markers, I am at this point prepared to defend the phonemic status of only those segments underlying w's.



Our rule covering the first group of the data is as follows.

$$v \rightarrow w / \# \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

The vowels included in the archiphoneme $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$

are a, e, and i. When any other vowel occurs in this position, /v/ remains v. We have no word written #voX to prove this, but we do not have any word written #woX to disprove it either. The rule stands.

The second group of examples from our data includes the following words.

<u>uwanda</u>	/uvanda/
<u>uwezo</u>	/uvezo/
<u>uwele</u>	/uvele/
<u>uvuli</u>	/uvuli/
<u>uvumbi</u>	/uvumbi/

Again, we need a rule to predict when /v/ becomes w. The following rule produces the correct result.

$$v \rightarrow w / \# \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{array} \right] - \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

The third kind of sound change is illustrated by the word fungwa, which is phonemically /fungva/. The following rule covers this case.

$$v \rightarrow w / \left[\begin{array}{l} +\text{consonantal} \end{array} \right] _ \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \end{array} \right] \#$$

Another group contains the following two words.

lewa /leva/
nawa /nava/

The following rule predicts this change.

$$v \rightarrow w / \left[\begin{array}{l} +\text{vocalic} \end{array} \right] _ \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \end{array} \right] \#$$

We now turn to the examples in which /u/ becomes w. The first group includes nouns of the u-class.

uwezo /uvezo/
wema /uema/
uombi /uombi/
uwongo /uvongo/

We choose to spell this last word phonemically as /uvongo/ contrary to our earlier decision that /u/ becomes uw.

Taylor and Ashton comment that uw is usually found with stems having a "submerged w."³ We will regard this as /v/ in the phonemic representation. In some forms, it drops out, but with the class-prefix u, it becomes w, as in this case.

The following rule accounts for these examples.

$$u \rightarrow w / \# _ \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

³Taylor and Ashton, African Studies, I, 166.

The final group deals with the prefix ku. We have examples of two types which are, however, governed by the same rule.

kuimba kuzuri /kuzuri/⁴
kuimba kwema /kuema/
Twende kwingine. /kuingine/
Kwenye miti hakuna wajenzi. /kwenye, hakuna/
Wamerudi kwao? /kuao/
Kwao ku wapi? /kuao, ku/

The rule which applies is this.

$$u \rightarrow w / \# \left[\begin{array}{l} -\text{vocalic} \\ +\text{consonantal} \end{array} \right] - \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \end{array} \right]$$

We now have six rules which account for the data. Our rules are observationally adequate. However, we do not wish to be satisfied with this level of adequacy.⁵ We want to achieve descriptive adequacy; that is, we want to take into account any underlying generalities which govern these sound changes. What we have now is several solutions for several problems. We want one solution to the problem of the derivation of w in Swahili, and we want this solution to be in the simplest form possible.

The Final Solution

There are several checks we need to make on our rules. First, have we listed environmental features

⁴Only words containing ku are given in phonemic transcription.

⁵Chomsky, "Current Issues in Linguistic Theory," in The Structure of Language, pp. 62-79.

which really are not constraints on the rule? That is, can we eliminate parts of the environment without changing the effect of the rule on our data? Second, can we coalesce any of our rules? Do we have two rules doing essentially the same thing? Finally, is any ordering necessary for the rules which apply to our data? When we have worked through these questions, we should have a descriptively adequate set of rules for this data.

In our first rule, the main conditioning factor is apparently the segment $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$ following the /v/.

We also included a word boundary before the /v/ as an environmental factor. We need to see if it is a necessary one. In our second rule, the $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$ segment

after the /v/ is also present. The environmental factors before the /v/ are different in the two cases. Perhaps

the common factor, the $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$ segment, is the

only necessary one. When we examine the first two sets of data, we find that one rule suffices for both.

$$v \rightarrow w / - \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

Our third and fourth rules are alike except that in one, $\left[+\text{consonantal} \right]$ precedes the /v/, and in the other,

[+vocalic] precedes the /v/. Since we have no example in which a $\begin{bmatrix} -\text{vocalic} \\ -\text{consonantal} \end{bmatrix}$ segment precedes the /v/, we can conclude that the constraints before the /v/ are unnecessary. We are left with two identical rules which we can regard as one.

$$v \rightarrow w / - \begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \end{bmatrix} \#$$

When we look at our data, we find that the only vowel occurring in the environment, $v_{\#}$, is a. Since a is a member of the archiphoneme $\begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{bmatrix}$, these examples are also predictable by the general rule we developed from our original first two rules. The final word boundary is unessential just as the initial word boundary was.

We check our new rule to see if it correctly predicts every /v/ to w change in our data. For uwongo, it does not work. However, our positing of the underlying /v/ was only a suggestion for this word, and apparently it is one we must abandon now. The presence of this one word hardly justifies throwing away our general rule, especially since we suspect the presence of some sort of "submerged" element in this word. It seems that the rules governing the behavior of /u/ before a submerged element are different in some way that our data is too

limited to determine. Having noted this exception, we conclude that one rule predicts the change of /v/ to w.

$$v \rightarrow w / - \begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{bmatrix}$$

Next we look at the rules which predict the change of /u/ to w. For our fifth rule also, we find that the conditioning factor seems to be $\begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{bmatrix}$. We again

question the necessity of the initial word boundary. In our sixth rule, we did not specify fully the vowel which follows /u/. An examination of the data reveals that in every case, it is either a, e, or i, all members of the archiphoneme $\begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{bmatrix}$. We can conclude that in

both our rules, the elements preceding the /u/ are irrelevant. One rule covers the data.

$$u \rightarrow w / - \begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{bmatrix}$$

Once again uwongo creates a problem. If we do not specify a submerged segment as $\begin{bmatrix} +\text{consonantal} \end{bmatrix}$, the rules give us simply *uongo. Instead of casting suspicion on our rules, however, this observation strengthens the decision to regard uwongo as an exception.

Although we did not consider it at the phonemic level, we should note that the nominal prefix ku does

not undergo this rule. This is a distinction that would have to be made in an earlier stage of the analysis.

At this point we have two rules.

$$v \rightarrow w / - \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

$$u \rightarrow w / - \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

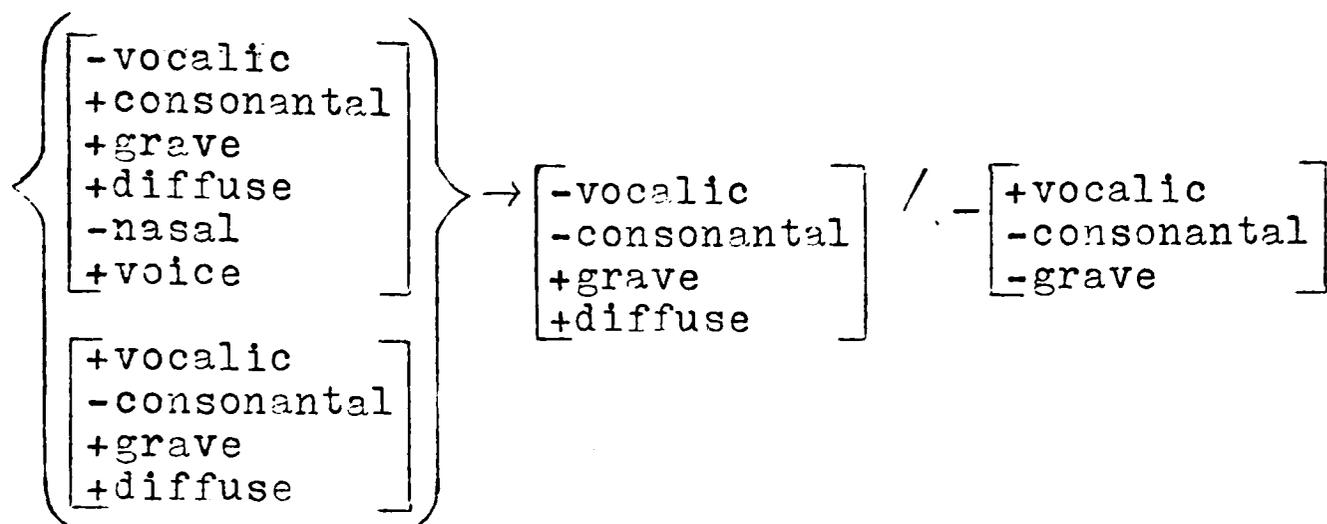
We are tempted to coalesce these rules into one.

$$\left\{ \begin{array}{l} v \\ u \end{array} \right\} \rightarrow w / - \left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{array} \right]$$

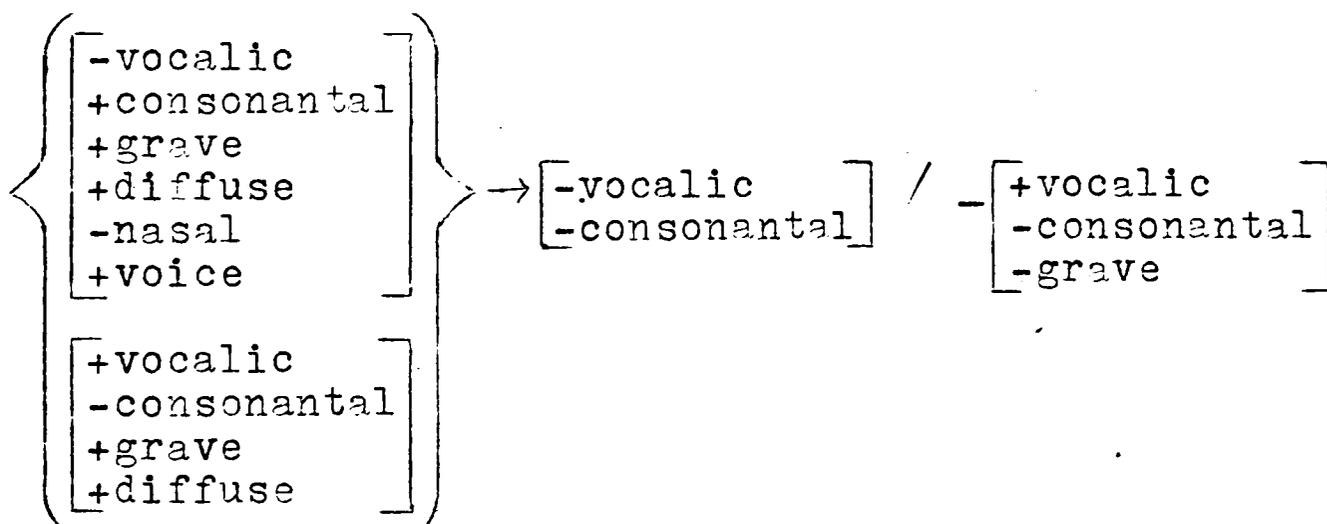
Before we do this, we must see if any ordering is necessary for the two rules. The phoneme /v/ always occurs before vowels (which are $\left[\begin{array}{l} +\text{vocalic} \\ -\text{consonantal} \end{array} \right]$); if the vowel is also $\left[-\text{grave} \right]$, the /v/ will become w. Since the vowels do not undergo any change by our rule, the rule can apply to /v/ at any time and give the correct result.

The /u/, however, sometimes occurs before /v/, a segment which is changed by the rule from $\left[+\text{consonantal} \right]$ to $\left[-\text{consonantal} \right]$. If the /u/ is changed in one case (before $\left[-\text{consonantal} \right]$) and not in the other, then the two rules must be ordered in respect to each other. However, we note that both /v/ and w are $\left[-\text{vocalic} \right]$. Since the /u/ undergoes a change only before a segment which is $\left[+\text{vocalic} \right]$, it will not change before either /v/ or w. There is no danger that the /u/ to w rule will apply

incorrectly because of an application of the /v/ to w rule. Therefore, no ordering is necessary, and we can coalesce our two rules into one that will handle all our data correctly.



Since in /v/, /u/, and w, we have [+grave] and [+diffuse], these need not be specified for w in the rule. Thus, the rule in its final, simplest form is this.



Sample Derivations

To illustrate how the rule applies, we will give several of our examples. On the left of the arrow is the phonemic spelling. (Feature complexes are given only for segments involved in the change.) On the right of the arrow is the derived form.

/vaka/ → waka

-vocalic +consonantal +grave +diffuse -nasal +voice	+vocalic -consonantal -grave -diffuse +compact	[k] [a] →
--	--	-----------

-vocalic -consonantal +grave +diffuse -nasal +voice	+vocalic -consonantal -grave -diffuse +compact	[k] [a]
--	--	---------

/veka/ → weka

-vocalic +consonantal +grave +diffuse -nasal +voice	+vocalic -consonantal -grave -diffuse -compact	[k] [a] →
--	--	-----------

-vocalic -consonantal +grave +diffuse -nasal +voice	+vocalic -consonantal -grave -diffuse -compact	[k] [a]
--	--	---------

/vinda/ → winda

-vocalic +consonantal +grave +diffuse -nasal +voice	+vocalic -consonantal -grave +diffuse	[n] [d] [a] →
--	--	---------------

-vocalic -consonantal +grave +diffuse -nasal +voice	+vocalic -consonantal -grave +diffuse	[n] [d] [a]
--	--	-------------

/leva/ → lewa

[l]	[e]	<table border="1"> <tr><td>-vocalic</td></tr> <tr><td>+consonantal</td></tr> <tr><td>+grave</td></tr> <tr><td>+diffuse</td></tr> <tr><td>-nasal</td></tr> <tr><td>+voice</td></tr> </table>	-vocalic	+consonantal	+grave	+diffuse	-nasal	+voice	<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>-grave</td></tr> <tr><td>-diffuse</td></tr> <tr><td>+compact</td></tr> </table>	+vocalic	-consonantal	-grave	-diffuse	+compact	→
-vocalic															
+consonantal															
+grave															
+diffuse															
-nasal															
+voice															
+vocalic															
-consonantal															
-grave															
-diffuse															
+compact															

[l]	[e]	<table border="1"> <tr><td>-vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>+grave</td></tr> <tr><td>+diffuse</td></tr> <tr><td>-nasal</td></tr> <tr><td>+voice</td></tr> </table>	-vocalic	-consonantal	+grave	+diffuse	-nasal	+voice	<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>-grave</td></tr> <tr><td>-diffuse</td></tr> <tr><td>+compact</td></tr> </table>	+vocalic	-consonantal	-grave	-diffuse	+compact
-vocalic														
-consonantal														
+grave														
+diffuse														
-nasal														
+voice														
+vocalic														
-consonantal														
-grave														
-diffuse														
+compact														

/nava/ → nawa

[n]	[a]	<table border="1"> <tr><td>-vocalic</td></tr> <tr><td>+consonantal</td></tr> <tr><td>+grave</td></tr> <tr><td>+diffuse</td></tr> <tr><td>-nasal</td></tr> <tr><td>+voice</td></tr> </table>	-vocalic	+consonantal	+grave	+diffuse	-nasal	+voice	<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>-grave</td></tr> <tr><td>-diffuse</td></tr> <tr><td>+compact</td></tr> </table>	+vocalic	-consonantal	-grave	-diffuse	+compact	→
-vocalic															
+consonantal															
+grave															
+diffuse															
-nasal															
+voice															
+vocalic															
-consonantal															
-grave															
-diffuse															
+compact															

[n]	[a]	<table border="1"> <tr><td>-vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>+grave</td></tr> <tr><td>+diffuse</td></tr> <tr><td>-nasal</td></tr> <tr><td>+voice</td></tr> </table>	-vocalic	-consonantal	+grave	+diffuse	-nasal	+voice	<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>-grave</td></tr> <tr><td>-diffuse</td></tr> <tr><td>+compact</td></tr> </table>	+vocalic	-consonantal	-grave	-diffuse	+compact
-vocalic														
-consonantal														
+grave														
+diffuse														
-nasal														
+voice														
+vocalic														
-consonantal														
-grave														
-diffuse														
+compact														

/uema/ → wema

<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>+grave</td></tr> <tr><td>+diffuse</td></tr> </table>	+vocalic	-consonantal	+grave	+diffuse	<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>-grave</td></tr> <tr><td>-diffuse</td></tr> <tr><td>-compact</td></tr> </table>	+vocalic	-consonantal	-grave	-diffuse	-compact	[m]	[a]	→
+vocalic													
-consonantal													
+grave													
+diffuse													
+vocalic													
-consonantal													
-grave													
-diffuse													
-compact													

<table border="1"> <tr><td>-vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>+grave</td></tr> <tr><td>+diffuse</td></tr> </table>	-vocalic	-consonantal	+grave	+diffuse	<table border="1"> <tr><td>+vocalic</td></tr> <tr><td>-consonantal</td></tr> <tr><td>-grave</td></tr> <tr><td>-diffuse</td></tr> <tr><td>-compact</td></tr> </table>	+vocalic	-consonantal	-grave	-diffuse	-compact	[m]	[a]
-vocalic												
-consonantal												
+grave												
+diffuse												
+vocalic												
-consonantal												
-grave												
-diffuse												
-compact												

/kuao/ → kwao

$$[k] \begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{bmatrix} \begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \\ -\text{diffuse} \\ +\text{compact} \end{bmatrix} [o] \rightarrow$$

$$- [k] \begin{bmatrix} -\text{vocalic} \\ -\text{consonantal} \\ +\text{grave} \\ +\text{diffuse} \end{bmatrix} \begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \\ -\text{diffuse} \\ +\text{compact} \end{bmatrix} [o]$$

In those examples in which y and u appear in the phonetic transcription, the rule has not applied because of some failure of the word to meet the environmental requirement. In each of these cases, /v/ and /u/ are immediately followed by a segment which is not specified

$$\begin{bmatrix} +\text{vocalic} \\ -\text{consonantal} \\ -\text{grave} \end{bmatrix}.$$

On the basis of the examples we have here, we could actually eliminate the /v/ segment in our rule. We seem to have come back to Harris' analysis that all w's are members of /u/. It is true that if we write all of the w's in these examples as /u/ phonemically, we would get the correct results. If we adopted Harris' analysis, we would still be dealing with three segments. We would have u, w, and y at the phonetic level. We would also still have /u/ and /v/ at the phonemic level, since we have to have /v/ to account for the segments transcribed phonetically as y. Thus Harris' method does not produce

a simpler analysis of the language (that is, it does not allow us to eliminate a phoneme). In view of the evidence we have uncovered about the similarities of some w's with v's, especially in view of the apparent consonantal nature of these w's, we will regard our solution as the description which better characterizes the underlying regularities of the language.

We will retain the rule as finally stated as a simple account of the derivations of w in these examples. There are a number of residual problems that we must consider briefly.

Residual Problems

We have already mentioned the problem created by uwongo. There are examples in the data where /u/ is written u in places where our rule predicts w; fungua is such a word. There are also examples where /v/ is written v in places where our rule predicts w; mlevi 'drunkard' is such a word. It may be that there are regularities among these apparent exceptions that can be handled by other rules. However, any such regularities are not clear at this point. Chomsky comments on this problem at some length.

Comprehensiveness of coverage does not seem to me to be a serious or significant goal at the present stage of linguistic science. Gross coverage of data can be achieved in many ways, by grammars of very different forms. Consequently, we learn

little about the nature of linguistic structure from study of grammars that merely accomplish this. . . .

It is important to bear this in mind in considering the masses of linguistic data that lie beyond the scope of an explicit generative grammar, proposed for some fragment of a language. It is no criticism of such a grammar to point to data that is not encompassed by its rules, where this data has no demonstrated bearing on the correctness of alternative formulations of the grammar of this language or on alternative theories of language. Until incorporated in an explicit generative grammar, such examples simply stand as exceptions, no more relevant to the correctness of the already formulated rules than strong verbs and irregular plurals.⁶

One further problem arises for the student of Swahili. There is disagreement among the authorities about the pronunciation of many forms. The phonologists are especially uncertain about where they hear u and where they hear w. When we attempt to write a grammar, we can only select one source (or, better, one informant for some source) and write our rules according to his pronunciation.

Summary

We have chosen a number of sample words from the Swahili language that illustrate the distribution of w in the phonetic transcription. We have found that one rule describes the derivation of these w's from the underlying phonemes /v/ and /u/. We did not suggest that this rule will account for all the w's in the language. There

⁶Ibid., pp. 78-79.

are, no doubt, other sound changes which also predict w's, but these are not within the scope of this study. When additional studies are made, additional rules will be devised. It may be that our rule will be changed in the light of further discoveries. The fact that there are numerous exceptions to our rule indicates that changes will probably be necessary.

Nevertheless, our rule has merit for two reasons. First, it is adequate for our data, and unexplained exceptions do not discredit it.⁷ Furthermore, it represents an improvement over earlier formulations. In our sources, the underlying /v/ is seldom recognized at all in synchronic analyses, and the only rule governing the /u/ to w sound change is generally the statement that u becomes w before vowels. Not only does our rule recognize the significance of the underlying /v/, but also it describes an environmental constraint not expressed before. By predicting that /u/ becomes w before vowels that are specified [-grave], we account for many of the exceptions to the earlier rule. Our criticism of earlier formulations is justified by the fact that we offer a more general rule. The formulation of the more general rule was made possible by the application of the techniques of generative phonology.

⁷Above, p. 46.

CHAPTER VII

CONCLUSION

In the introductory chapter, we stated that we hoped to approach an old problem in a new way in the hope of arriving at a better solution. The problem was the analysis of the phonemic membership of the phonetic w's in Swahili. We approached the problem with a set of tools that had not been applied to the problem before. We had first the general concept of a generative grammar; we had, particularly, the distinctive feature framework developed in generative phonology. We also had the suggestion that synchronic rules often reflect historical changes.

We began with a rejection of Zellig Harris' solution to the problem. It must be admitted that we did not attack him on his own ground. It was not our purpose to attack the accuracy of his structural account; rather, it was our intent to show the greater value of an alternate solution.

The work done here suggests numerous areas for further study. The exceptions to our rule offer an obvious challenge. A rule which could incorporate some of these exceptions into a more general description would be valuable. Even more interesting is the suggestion

that our rule may have an even more general effect than we have shown here.

In his analysis of the phonemes of Swahili, Harris regards the vowel i and the semivowel y as members of the same phoneme, just as he regards u and w as members of the same phoneme. We have seen that /u/ does often become w by a sound change rule; it seems likely that /i/ may often become y by a similar sound change rule. It would be interesting to see if our devocalization rule could be expanded (made more general) to account for this process.

It would be even more interesting to see if there is a deconsonantization process involved in the derivation of y corresponding to the derivation of w from /v/. There are indications that this might be the case. We recall that Meinhof suggested that there was a Proto-Bantu y which is realized as w in Modern Swahili. He also suggests that y is sometimes a realization of a Proto-Bantu fricative.¹ Interesting research could be done on the implications of his observation.

The work presented in this paper represents an attempt to give a description of a fragment of Modern Swahili. The writer hopes, first, that the analysis itself may have some value for students of the language.

¹Meinhof, Introduction to the Phonology of the Bantu Languages, p. 112.

But the writer hopes also that this paper may acquaint these students with a fascinating area of study. To date, it seems that very little application of the techniques of generative phonology has been made to the description of Swahili. There is ample material available on Swahili from which the student can get his basic understanding of the language. The writer hopes that this paper may illustrate the general value of applying the new tools of linguistics to the old problems.

BIBLIOGRAPHY

- Ashton, E. O. Swahili Grammar (Including Intonation).
2d ed. London: Longmans, 1947.
- Bloomfield, Leonard. Language. New York: Holt, Rinehart and Winston, 1933.
- Chomsky, Noam. "Current Issues in Linguistic Theory,"
in The Structure of Language. Edited by Jerry A.
Fodor and Jerrold J. Katz. Englewood Cliffs, New
Jersey: Prentice-Hall, Inc., 1964, pp. 50-118.
- Chomsky, Noam. Syntactic Structures. The Hague: Mouton
& Co., 1957.
- Chomsky, Noam, and Halle, Morris. The Sound Pattern of
English. New York: Harper & Row, 1968.
- Halle, Morris. "On the Bases of Phonology," in The
Structure of Language. Edited by Jerry A. Fodor
and Jerrold J. Katz. Englewood Cliffs, New Jer-
sey: Prentice-Hall, Inc., 1964, pp. 324-333.
- Halle, Morris. "Phonology in Generative Grammar," Word,
18 (1962), 54-72.
- Harris, Zellig S. Structural Linguistics. Chicago:
The University of Chicago Press, 1951.
- Jakobson, Roman, Fant, C. Gunnar M., and Halle, Morris.
Preliminaries to Speech Analysis. Cambridge,
Massachusetts: The M.I.T. Press, 1963.
- Meinhof, Carl. Introduction to the Phonology of the
Bantu Languages. Translated by N. J. van Warmelo.
Berlin: Dietrich Reimer/Ernst Vohsen, 1932.
- Pedersen, Holgar. The Discovery of Language. Translated
by John Webster Spargo. Bloomington: Indiana
University Press, 1959.
- Polomé, Edgar C. Swahili Language Handbook "Language
Handbook Series." Washington: Center for Applied
Linguistics, 1967.
- Tucker, A. N., and Ashton, E. O. "Swahili Phonetics,"
African Studies, I (1942), 77-103, 161-82.

