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ASPECTS OF SUMBWA DIACHRONIC PHONOLOGY

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ABSTRACT

ASPECTS OF SUMBWA DIACHRONIC PHONOLOGY

By

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This study has two closely-connected aims: (1) to present a description of the (segmental) diachronic phonology of Sumbwa, a West Tanzania Bantu language, and (2) to address some issues in Bantu reconstruction pertinent to such a description.

The study is organized as follows. Chapter 1 presents some details on the linguistic and geographic position of Sumbwa and the available literature, the sources of the types of data used in the study, matters of transcription and the organization of the study. Chapter 2 addresses the issue of the theoretical and methodological assumptions which form the background to the study. Chapter 3 is a presentation of Sumbwa segmental phonology, focussing on the inventory of phonemes, distinctive features, phonological rules (rules for segment structure, alternations, and syllable structure), and morphophonemic rules. Chapter 4 addresses the issue of stops versus continuants in Sumbwa and its sisters in the context of Bantu reconstruction. Chapter 5 deals with the reconstruction of continuants, affricates, voiceless stops, nasals, and vowels; it also deals with the issue of distinctive feature specification of Proto-Bantu and

Proto-West Tanzania, phoneme structure, and syllable structure. Chapter 6 investigates some developments in Sumbwa prehistory including palatalization, labialization, changes affecting palatal consonants, and changes involving vowels. Chapter 7 describes a case of rule inversion involving l/d, ƀ/b, and h/p. Chapter 8 is a discussion of the changes that have occurred in the perfective stem. Internal and comparative evidence is used to support the position that while phonetic change has been responsible for the changes in the l-final verb roots, change in other verb-stems has been due to analogy. Chapter 9 is the conclusion. Here, a summary of the study is provided, the limitations of the study stated, its contributions noted, and areas for further research pointed out.

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Chapter 1

Preliminaries

1.0 Introduction

This study investigates the diachronic phonology of Si-Sumbwa, a West Tanzanian Bantu language. The study only treats segmental aspects of the diachronic phonology. Tonological evolution is not considered due to the unavailability of tonal descriptions of Sumbwa dialects. (The only tonal description of a Sumbwa dialect is Kahigi and Haubert, 1983. This is a partial description of some aspects of Sumbwa verbal morphotonology).

This chapter deals with the following preliminaries. Section 1.1 states the aims of the study. Section 1.2 presents some details on the linguistic and geographic position of Sumbwa and the available literature, while section 1.3 gives some details on the sources of the types of data used in the study. Sections 1.4 and 1.5 deal with matters of transcription and the organization of the study, respectively.

1.1 Aims of the study

This study has the following aims.

The first and primary aim is to present the salient aspects of the evolution of the segmental phonology of Sumbwa. Since Sumbwa is a largely undescribed language, it has been deemed desirable to present the segmental phonology (Chapter 3).

The second aim of the study, closely connected with the first, is to discuss some issues relevant to the description of Sumbwa and Bantu diachronic phonology. This aspect of the study draws on current theoretical and methodological assumptions in diachronic phonology. From the very beginning of the research, it was felt that one of the pressing matters in Bantu diachronic phonology was to confront some controversial issues (e.g. the stop versus continuant issue) which have not been dealt with or dealt with only briefly (cf. Chapter 4). It should be stressed here that discussion of any issue (whether controversial or not) in the context of this study is supposed to clarify the evolutionary scenario presented.

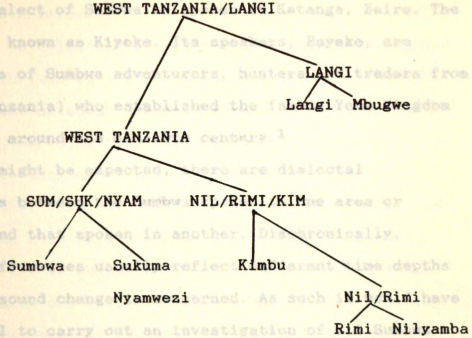
1.2 Si-Sumbwa: Linguistic and Geographic Position and the Literature

1.2.1 Linguistic Position: Sumbwa and its sisters

Sumbwa (or [sisumbwa] as it is known by its speakers), as already noted, is a western Tanzania Bantu language (cf. Capus 1898:1, Gulliver 1959:66, Nurse 1979a:28, Nurse and Philippson 1980:47ff.). But it should be noted that Sumbwa has not always been regarded as a distinct language. Thus, although Capus 1898 regards it as a distinct language, other scholars, notably Dahl 1915: xii and Bryan 1959:119, regard Sumbwa as a dialect of Nyamwezi, also dubbed Mweli. In this study we follow the the view that regards Sumbwa as a distinct language.

Such a view agrees with Guthrie's classification (1948) in which Sumbwa is put in Zone F, group 20, along with Sukuma, Nyamwezi, Kimbu and Bungu. In this classification, Sumbwa is classed as F.23, and Sukuma, Nyamwezi, Kimbu and Bungu as F.21, F.22, F.24, and F.25, respectively (1948:78). Guthrie's Zone F also includes Tongwe (F.11), Bende (F.12), Nilyamba (F.31), Rimi or Nyaturu (F.32), Langi (F.33), and Mbugwe (F.34). Since not all of these languages have been investigated, only Nyamwezi, Sukuma, Rimi, Nilamba, and Kimbu will be used as close sisters of Sumbwa. As we were unable to get enough data on Kimbu (cf. Busse 1953), our references to this language will be based on conclusions reached by Nurse and Philippson 1980 (henceforth N & P 1980).

N and P's 1980 lexicostatistical survey is the first systematic investigation of the relationships among Sukuma, Nyamwezi, Sumbwa, Kimbu, Nilyamba, Rimi, Langi and Mbugwe (Buwe). Of these, Langi and Mbugwe are found to be closer to the rest of West Tanzania group in terms of the lexicon while they are closer to West Ruvu in their verbal systems (N and P, 47-8). N & P posit a non-immediate relationship between Langi (Langi and Mbugwe) and West Tanzania (Sukuma, Nyamwezi, Sumbwa, Kimbu, etc.); the latter form two subgroups: Nyamwezi-Sumbwa-Sukuma and Kimbu-Nilyamba-Rimi. These relationships are represented schematically as follows (cf. N & P, p. 50):



It is clear that Sumbwa is closer to Nyamwezi and Sukuma than to other languages of the West Tanzania group. N and P also find Nyamwezi and Sukuma to be dialects of the same language (1980:48). This, of course, bears out classifications of earlier scholars, such as Johnston 1919, which regarded Sukuma as North and North-eastern Nyamwezi. Nilyamba and Rimi are more closely related; Kimbu is closer to this group than it is to the Suk/Sum/Nyam group.

1.2.2 <u>Geographic Position</u>

Sumbwa is spoken in several regions in Tanzania: West Lake (Biharamulo district: Nyantakara, Chato, Buzilayombo, Bwanga, etc.), Shinyanga (Kahama district: Lunzewe (Uyovu), Ushilombo, Mbogwe, etc.), Mwanza (Geita district: Bugando, Bukoli, etc.), and Tabora (Ulambo area, Nzega district: Usongo and Puge) (cf. Abrahams, 15-19). Another dialect of Sumbwa is spoken in Katanga, Zaire. The dialect is known as Kiyeke. Its speakers, Bayeke, are descendants of Sumbwa adventurers, hunters and traders from Kahama (Tanzania) who established the famous Yeke Kingdom in Katanga around the mid-19th century.[1]

As might be expected, there are dialectal differences between the Sumbwa spoken in one area or district and that spoken in another. Diachronically, dialect differences usually reflect different time depths as far as sound change is concerned. As such it would have been useful to carry out an investigation of all Sumbwa dialects with a view to shedding some light on chronology. However, an investigation of this sort was beyond the resources of the investigator. This study is based on the Lunzewe dialect, although the researcher had occasion to refer to A. Capus' Grammaire de ShiSumbwa, representing the Ushilombo dialect (whose segmental phonology does not differ much from that of the Lunzewe dialect).

It should be pointed out that in all the above areas, the Sumbwa have traditionally lived or interacted with other linguistic groups. In Biharamulo, they have interacted, and still interact, mainly with the Ha, Rongo, Zinza, and Subi; in Kahama they have interacted (and still interact) mainly with Sukuma, Nyamwezi, Ha and Rongo; in Nzega, they have interacted with Sukuma, Nyamwezi, Ilamba, etc.; in Tabora, they have interacted mainly with the Nyamwezi (own information; also cf. Abrahams 1967: 15-19). The extent to which the groups the Sumbwa have interacted with have influenced the Sumbwa language has yet to be investigated, although Nurse 1979a:28 and Nurse and Philippson 1980:47ff note the lexical influence of Ha and Zinza. (What they don't say is which dialect they are dealing with). However, what they say is not new; it had already been said by an earlier student of the Sumbwa language: "... le Shisumbwa s'est il enrichi d'un grand nombre de mots des diverses langues parlées par les peuples environnants, et avec lesquels les Basumbwa entretiennent des relations journalières..." (Capus 1898:1).

1.2.3 The Literature

Like all Bantu languages (with the possible exception of Swahili), Sumbwa does not have a long written tradition which can be used in the investigations of its evolution. The earliest record of the language, Polyglotta Africana Orientalis, by J.T. Last, which included a list of some 250 words, was published in 1885. The first Sumbwa grammar (already referred to above) was written by A. Capus (Grammaire de ShiSumbwa, 1898), who also wrote the first Sumbwa dictionary (Dictionaire ShiSumbwa-Francais, 1901)[2]. Capus also collected and translated into French (with notes) ten Sumbwa tales, seven songs, and ten proverbs (1897). In his Nyamwezi dictionary, Dahl 1915 includes Sumbwa variants of some of the Nyamwezi entries. (Dahl regards the dialect he uses, dubbed Mweli, as a dialect of Nyamwezi). Another writer, Harry Johnston, who refers to Sumbwa as 'North-West Nyamwezi' in his comparative study of Bantu and semi-Bantu languages (1919, Vol. 1), includes a basic vocabulary of some 250 Sumbwa words (pp. 86-96). The most recent descriptions of parts of Sumbwa grammar are the unpublished Kahigi 1977, and Kahigi and Haubert 1983. Apart from these, the only other literature of interest to the researcher are several religious books, written by Catholic missionaries, which were used in missionary work before Swahili became the language of religious instruction in the whole nation.

1.3 <u>The Data</u>

The data utilized in this study is of several kinds. First, there is the Sumbwa data, which comes from three sources:

(i) the writer, who is a native speaker of the language;

(ii) research notes, based on research done by the writer in Lunzewe, Kahama district in 1977-1978;

(iii) the <u>Grammaire</u> and the Christian literature mentioned above.

Second, there is the data on sisters of Sumbwa, which is used in the reconstruction of Proto-West Tanzania and Proto-Sumbwa-Sukuma-Nyamwezi, and also as supportive evidence for some stages in the development of the Sumbwa sound system. The writer was able to get enough Nyamwezi, Sukuma, Rimi and Nilyamba. Data on Nyamwezi comes from Velten 1901, Dahl 1904, 1915; Stern 1906; Johnston 1919; Nurse 1979a: 57-66; and also from one informant, Evelyne Chota, a native speaker of the Nyamwezi dialect spoken in Kitunda Division, Tabora district. (While this research was going on, Ms. Chota was an M.A. student in Agricultural Economics at Michigan State University, East Lansing, Michigan, U.S.A.). Data on Sukuma comes from Richardson 1959, 1966; Koenen, n.d., Guthrie 1970 (Vols. III and IV) and Nurse 1979a: 45-56; 63-66. Data on Rimi comes from Schregel 1913, Dempwolff 1914-15:270-298; Olson 1964 and Nurse 1979a: 37-44, 63-66. Nilyamba data comes from Dempwolff 1914-15:227-53; Ittameier 1922-3:1-37; and Nurse 1979a:30-36, 63-66. Data on Langi and Mbugwe are from Dempwolff 1915-6:1-27; 102-23.

Third, there is data from Bantu languages which are not as closely related to Sumbwa as are the above-mentioned. This is used in the discussion of, for example, issues having a bearing on the Bantu situation as a whole (e.g. Chapter 4), processes which have affected many Bantu languages (e.g. spirantization or weakening, cf. Meinhof and van Warmelo 1932 (henceforth Meinhof 1932); Guthrie 1971, Vol. II:30-64; Hinnebusch et al. 1981), or as further evidence for some reconstructed developments in Sumbwa (e.g. Chapters 6, 7, 8). Data on Haya (Guthrie's E. 22) is from Herrmann 1904, Rehse 1912-13, and also from Francis Ngarambe (Michigan State University student), a native speaker of the Nyambo dialect (E. 21). The sources of data from other Bantu languages are indicated as they are cited.

Fourth, there are Proto-Bantu reconstructions. Data of this type has been taken from the relevant works of Bantuists, for example Meinhof 1932, Guthrie 1967-71, Meeussen 1967, etc. The reconstructed roots/radicals included in the data list used had to be restricted to two kinds:(i) 'general roots' (Guthrie's term) found in Sumbwa and its sisters, and (ii) roots not general but attested in sister languages closer to Sumbwa (i.e. Nyamwezi, Sukuma, Rimi, Nilyamba). (By 'general root' is meant (1) a root which has a spread covering all the fifteen zones posited by Guthrie (1967-71), or (2) a root occurring in most of the zones.) These roots are assumed to be retentions from the proto-Bantu period, but might have undergone similar or different sound changes in different languages or language groups.

The above restrictions with respect to roots are not meant to eliminate the problem of (intra- or inter-group) borrowing in the determination of whether a sound change took place or not in a particular language (in this case Sumbwa). As is well-known, this problem is a difficult one, especially so in a situation such as the Bantu one where bilingualism is the rule rather than the exception, and also where reconstruction is based solely on current comparative and internal data. What one can hope to do is reduce the problem of inter-group borrowing as much as possible by using roots (whether general or not) which are common to a group or subgroup of languages (in this case the West Tanzania group or the Sumbwa-Sukuma-Nyamwezi subgroup). Accordingly, any putative correspondence, diachronic rule or process has to be based on these roots. If a correspondence or diachronic rule does not apply to them at all, then it is more than likely that it is a borrowing.

1.4 Transcription

The transcription used for much of the data reflects the value of the IPA symbols, with certain exceptions found typographically convenient. Thus o and e have been used with the IPA values of ɔ and ɛ; ƀ has been used with the IPA value of β, and a has been used with the IPA value of ɑ. With respect to proto-forms and Sukuma data, the transcriptions in Guthrie (1967-71), Meeussen (1967) and Richardson and Mann (1966) have been retained, with clarifications inserted as necessary. Data from other Bantu languages from grammars and dictionaries are also presented with the original transcription unchanged, again with clarifications where necessary.

1.5 Organisation of study

The study is organised into nine chapters, including the present one. Chapter 2 addresses the issue of the theoretical and methodological assumptions which form the background to the study. Chapter 3 is a presentation of Sumbwa segmental phonology, focussing on the inventory of phonemes, distinctive features, phonological rules (rules for segment structure, alternations, and syllable structure), and morphophonemic rules. Chapter 4 addresses the issue of stops versus continuants in Sumbwa and its sisters in the context of Bantu reconstruction. Chapter 5 deals with the reconstruction of continuants, affricates, nasals, and vowels; it also deals with the issue of distinctive feature specification of Proto-Bantu and Proto-West Tanzania, phoneme structure, and syllable structure. Chapter 6 investigates the evolution of Sumbwa consonants and vowels, noting, describing and explaining (if possible) the different processes and rules involved. Chapter 7 describes a case of rule inversion involving l/d, ƀ/b, and h/p. Chapter 8 is a discussion of the changes that have occurred in the perfective stem. Previous approaches are discussed and found wanting; it is then argued that two mechanisms have been responsible for these changes: 1) phonetic change in l-final verb-roots, and 2) analogy, which generalized the pattern established by phonetic change in one type of roots. Chapter 9 is the conclusion.

Here, the important findings are summarized, limitations and contributions of the study noted, and areas for further research pointed out.

Notes

1 Unfortunately, Munongo and Grevisse, n.d., became available to the researcher too late to be thoroughly investigated. The book contains an interesting historical text (pp. 79-129) and songs (pp. 139-243) in Sumbwa (Yeke dialect), with translations and annotations in French.

2 The writer has not been able to get access to the Dictionaire. It is listed in Whiteley and Gutkind 1954.

Chapter 2

Theoretical and Methodological Assumptions

2.0 Introduction

This chapter deals with the theoretical and methodological assumptions on which this study is based. The former include synchronic and diachronic assumptions. The synchronic assumptions are stated in section 2.1. The diachronic assumptions are stated in section 2.2. Section 2.3 is concerned with the notions 'description' and 'explanation' as they are applied in the study. Section 2.4 is a short note on the methodology used in this study.

2.1 Synchronic Assumptions

Synchronic analysis is a prerequisite to diachronic description. Now, given the differing theoretic trends in the current linguistic scene (cf. e.g. Fischer-Jorgensen 1975; Dinnsen 1979), synchronic assumptions cannot be taken as given: we have to state them, just as we have to state the diachronic assumptions.

Our focus in this study is on phonology. The assumptions that we shall use here come from generative phonology, originated by Chomsky and Halle (cf. Sound Pattern of English (SPE), 1968), and revised by others such as Kiparsky, Vennemann, Hooper, Hudson, etc.

One fundamental problem with the SPE approach, addressed in SPE's famous Chapter Nine, was that it was too formal and too abstract. The abstractness of the model made it too powerful. Some generative phonologists started suggesting ways of constraining the theory with the express aim of making it reflect what they thought human languages were really like. The issues dealt with touched all important matters having to do with the phonological system, such as:

1. The abstractness problem: How far should phonological representations be allowed to differ from their phonetic counterparts? Should absolute neutralizations be allowed in phonological descriptions? (cf. Kiparsky 1968; Kisseberth 1969; Hyman 1970; Vennemann 1971, 1972, 1974a, 1974b; Hooper 1976:3-22; Clayton 1976; Hudson 1974a, 1980).

2. The duplication problem: Given the fact that certain morpheme structure rules/conditions or lexical redundancy rules (which state inter-morphemic regularities) overlap with some phonological rules (which state intra-morphemic regularities), how is this redundancy of statements to be resolved? (cf. Vennemann, Hooper, Hudson, Clayton, Kisseberth 1970, Kisseberth and Kenstowicz 1979);

3. The rule typology problem: What are the different types of phonological rule, and how should each type be formalized? (cf. Vennemann 1972c:236; Anderson 1974b, Hooper 1976:13-18; Hudson 1974b, 1975, 1980; Clayton 1981);

4. The rule application problem: Should rules be ordered or not; if yes, is the ordering governed by extrinsic, i.e. language-specific, or intrinsic, i.e. universal, principles? (cf. Vennemann, Hudson, (above), Hooper, op. cit.:53-83; Koutsoudas et al., 1974);

5. The problem of synchronic 'mutations': While the 'mutational' format is acceptable when expressing diachronic changes, is it the appropriate manner for expressing synchronic relationships between phonological and phonetic representations as well as non-productive alternations between phonemes (i.e. morphophonological alternations)? In other words, is the transformational rule (i.e. feature-changing rule) an appropriate concept/notation, or just a 'metaphor' that could best be substituted with some other concept or notation? (cf., e.g. Hudson, above, and 1978).

The different answers that were given to the above problems resulted in the rise of different approaches to the description/explanation of phonological phenomena within generative phonology (cf. Bruck, Fox, La Gally, eds., 1974; Dinnsen, ed., 1979; etc.). At present there is the natural phonology of David Stampe, the natural generative phonology (NGP) of Vennemann (which differs somewhat from the NGP of Hooper or Hudson), the 'revised' SPE approach of Kisseberth and Kenstowicz 1979, etc., the semiotic approach of Dressler 1981, 1982, etc., the autosegmental approach of Goldsmith, and other approaches (cf. Bruck et al. 1974; Dinnsen 1979). It is not within the scope of this study to discuss the similarities and differences of these approaches; it is sufficient to note that the most 'concrete' approach, NGP, differs from the others by assuming that rules of grammar are not extrinsically ordered, and that all rules are generalizations about surface structure, while the other approaches allow rule ordering and rules which apply to an 'abstract' lexicon or underlying (phonological) representations.

The picture just sketched of the proliferation of approaches in generative phonology suggests that many issues or assumptions are controversial. Given this fact, it would be difficult in a study of this kind to take account of all positions on any issue. We shall therefore proceed by stating the assumptions we are going to use without being very much concerned about arguing against alternative approaches. The approach adopted here utilizes some ideas from SPE and subsequent revisions - especially NGP revisions. For instance, we have retained the classical distinctions among lexical, phonological, and phonetic representations, while at the same time using the concepts of lexical representation (cf. Hudson 1974b) and phonetic realization rules which have NGP origin or justification. The following order will be followed in the statement of the synchronic assumptions followed here: (1) the model in brief; (2) the rule typology problem; (3) the rule duplication problem; (4) the rule application problem, and (5) the problem of synchronic mutations.

1. The model in brief: The distinctive feature, the phoneme, the syllable, and the word are taken to be the primary units of phonological organization and description. (There is also another unit, the phonological phrase, but it is not relevant here since we are only concerned with segmental phonology which can be dealt with in terms of the above units).

The task of phonology as understood by almost all linguists is one of characterizing contrast, the distinctive feature composition of phonemes, the allowable (and non-allowable) segments, the sequences of segments, the notion 'possible word', and the relationship between phonemes (and archiphonemes) and their realizations (i.e. the realizations of alternating and non-alternating segments). Contrast is basically accounted for by use of the phonemic method; allowable segments are accounted for in terms of segment structure rules (which also state lexical redundancies); sequence structure is accounted for in terms of the syllable. The allowable syllable sequences also characterize the notion 'possible word' in the language. The relationship between segments (whether alternating or not) and their phonetic realizations are accounted for by realization rules. There are phonetic realization rules (which express automatic alternations and the relationship between phonemes and their phonetic realizations) and morphophonological realization rules (which express productive morphophonological rules). Non-productive alternations between phonemes are expressed by non-productive morphonological rules discussed below.

The model adopted here assumes that the lexicon consists of non-redundantly specified matrices of morphemes. This specification of morphemes remains the same up to the derivation of the syntactic surface structure. At this point, the following operations occur: 1) non-productive morphophonemic rules apply; 2) the segment or phoneme structure rules fill in redundant feature values in the matrices; 3) syllable structure conditions apply to specify syllable boundaries and also fill in redundant feature values; 4) other rules apply which insert phonological word boundaries (which coincide with syllable boundaries) and phrase boundaries, and delete morpheme boundaries. Following Hudson 1974b, 1975, 1980, non-productive morphophonemic alternations will be represented in the lexicon as allomorphic variants. Morphophonemic rules which distribute these variants to their environments are intrinsically ordered to apply before the application of syllable structure conditions since these cannot apply to disjunctions of segments (cf. Hudson 1974b:217). It is after all these operations that phonetic realization rules (PRRs) apply. In the approach followed here, absolute neutralization and language-specific extrinsic ordering as understood in the SPE sense are prohibited as in NGP.

2. <u>The rule typology problem</u>: In this study the notion 'phonological rule' subsumes any rule or condition which exclusively expresses phonological structure. In segmental terms, such structure includes: segmental redundancy (which also subsumes the notion 'possible segment'), sequence structure -- expressed in terms of the syllable, and the relationship between phonological and phonetic representations.

Three types of rule are relevant here: segment structure/redundancy rules, syllable structure rules or conditions, and PRRs. Segment redundancy rules express the segments of the language by stating the redundant feature values. As noted above, these apply to the syntactic surface structure to fill in all the redundant features (cf. section 3.2.1). Syllable structure conditions specify the syllable patterns of the language, and in some cases act as redundancy rules by filling in redundant values (cf. section 3.2.2).

The next set of rules are PRRs. (The concept 'realization rule' is not new at all; it has been used by many linguists, e.g. Hudson 1975:52-54; Hooper 1976a:86, 114-15; Andersen 1979:378ff). These indicate how fully-specified matrices (or archisegmental matrices) are realized at the phonetic level of representation. These rules may be viewed as commands or instructions on how to time articulatory gestures in the pronunciations of phonological segments.

Two types of realization rules can be recognized. The first type is the so-called 'low-level' rule (cf. Hooper 1976a:86, 114-5), having the form:

/X/---> [X]

This rule says that a particular phoneme is realized as its phonetic counterpart, without any modification. The usual practice is not to write these rules. We shall also follow this usual practice; however, we shall recognize them as rules, since when there is change, it is such rules of pronunciation which change or get modified.

The second type subsumes rules which realize archi-segments and those that have been called phonological alternation rules (cf. Wurzel 1981:417) or the 'phonological rules proper'. These have the form:

/X/ --->[Z]/Y

This rule says that a phoneme /X/ gets realized as the phonetic segment [Z] in the environment Y (which may be expanded as: Y__ or __Y). The environment, being the syntagmatic trigger of the phonetic segment, provides the basis for the 'explanation' of the realization.

Another type of rule, the morphophonological (MPR), does not exclusively express phonological structure. MPRs express alternations conditioned by lexical or morphological environments, or both. There are productive and non-productive MPRs. As noted above, Hudson's lexical representational approach will be used in expressing the non-productive type. In this approach, non-automatic alternations are represented as suppletions or disjunctions, their distribution in the different environments implemented by morphophonemic selection rules (cf. section 3.2.0).

3. <u>The rule duplication problem</u>: In the view followed here, duplication between rules of the phonology has been minimized by recognizing (i) the lexical, phonological, and phonetic levels of representation, and (ii) four types of rule: MPRs, segment structure rules, syllable structure conditions, and PRRS, each of which has a different function in the phonology. Non-productive MPRs are intrinsically ordered before other rules (cf. Hudson 1974:219; also Chapter 3 in this study). Segment and syllable structure rules (or conditions) apply to lexical representations; while the remaining rules (i.e. productive MPRs and PRRs) may apply to fully-specified (including archi-segmental) matrices, producing phonetic realizations which represent pronunciations.

4. <u>The rule application problem</u>: The ordering that is assumed for the rule types is intrinsic. As noted above, segment structure rules, syllable structure conditions, and non-productive MPRs are intrinsically ordered before PRRs (for the simple reason that the features the PRRs refer to

have to be filled in, and also the different variants of non-productive MPRs have to be distributed in the different environments). As far as PRRs are concerned they are also assumed to apply whenever their structural description is met. It is generally assumed that any 'ordering paradoxes' that may arise may be resolved within the purview of the 'no rule order' principle.

5. The problem of synchronic mutations: One problem in the SPE model was representing non-productive MPRs, productive MPRs, and PRRs using the same transformational notation. On this view, non-productive MPRs as well as PRRs were feature-changing rules. This view, based as it was on an unsatisfactory typology of rules, was untenable. The difference between 'non-productivity' and 'productivity' was not expressed at all by the 'feature-changing' metaphor (cf. Hudson 1978). In the approach followed here, we have replaced the metaphor of "feature-changing" with the concept of "realization". A rule is either a realization rule or not. Non-realizational rules include non-productive MPRs, segment structure rules, syllable structure rules, and realizational rules include PRRs and productive MPRs. Realizational rules will be expressed using the rewrite format, e.g. /X/--->[Z]/Y i.e. the segment /X/ is realized phonetically as [Z] in the environment Y. Non-realizational rules will be expressed differently according to whether they are segment or syllable structure, or non-productive MPRs.

2.2 Diachronic Assumptions

So much has been written on the 'what', the 'how', and the 'why' of language change that it would be impossible to deal with all the assumptions relevant to our purposes here. We shall therefore restrict ourselves to some 'basic' assumptions; other assumptions not dealt with in this section will be noted in the respective chapters or sections where they will be used. This section deals only with the following: the different views of sound change (Neogrammarian, Structuralist, Generative (TG and NGP), and other views) and what phonological change means in the context of this study, and the factors assumed to be involved in the causation and implementation of phonological change.

2.2.1 Phonological Change: Neogrammarian Views and Modern Perspectives

It is, we think, uncontroversial to say that the foundations of diachronic phonology were laid down in the 19th century by Neogrammarians and their contemporaries. Two among the 19th century contributions stand out: the identification of the mechanisms of change and the regularity hypothesis. Three mechanisms of change were identified: phonetic change, analogy, and borrowing. (On borrowing see section 2.2.2.2.4). The neogrammarian view was that phonetic change effects changes on the sound level of language, and analogy changes on the morphological and syntactical levels (Paul 1891:36-64, 92-110; Saussure 1959:143-161, 161-73; Sturtevant 1917:38-44, 68-84, 131-37). These two mechanisms were investigated and their traits isolated very early in the history of diachronic linguistics, long before the phonological (phonemic) principle, which revolutionized the theory of language and linguistic methodology, was 'discovered'. Another important contribution by 19th century diachronic linguists was the regularity hypothesis. This states that sound laws (changes) are regular and apply exceptionlessly in purely phonetic environments (cf. Bloomfield 1933:364). According to this view, sounds change imperceptibly; also, once a phonetic law has applied, it affects all sounds in its domain simultaneously (see for instance Meinhof 1932:12). That is, sound change was regarded as being phonetically gradual but lexically abrupt (cf. Wang 1969). As a methodological principle, the regularity hypothesis proved useful (even necessary) in the task of uncovering sound laws (e.g. Grimm's Law, Verner's Law, etc.) and it has proved indispensable in the investigations of the prehistory of languages without long written traditions (e.g. Meinhof 1932; Guthrie 1967-71).

Diachronic linguists in our century, using modern theories of language and improved methodologies, have built on the 19th century foundations by highlighting certain aspects of change in the context of the different descriptive models, stating more clearly the problems of diachronic linguistics (cf., e.g., Hoenigswald 1960, Greenberg 1966; Labov 1972, 1981, 1982; Anttila 1972; etc.), and paying closer attention to problems of actuation and implementation (cf. Labov, above; Wang 1969; Chen and Wang 1975; Andersen 1973).

It is an undeniable fact that important aspects of language change have been highlighted by the different descriptive models that have been developed in this century. The discovery of the concepts of 'phoneme', 'structure', and 'system', and their applications to diachronic linguistics (cf. Jakobson 1931; Bloomfield 1933; Martinet 1952; Hoenigswald 1960) ushered in a new way of looking at language change. Phonological change was now being investigated in terms of the notions 'structure' and 'system'. American and Prague structuralism adopted this approach in reaction to neogrammarian atomism (i.e. non-system approach to sound change).

The dictum "phonemes change" (Bloomfield 1933:351) summarizes the American structuralist attitude. A typology of phonemic change was worked out which used two key concepts, split and merger (cf. Hoenigswald 1960:72-98; Anttila 1972:69-70). While split is replacement of one segment with two or more segments, merger is the opposite: replacement of two or more segments with one. Two major categories of split are: primary and secondary. Primary split affects some allophones of a phoneme only which merge with a different phoneme. An example of this is Latin rhotacism, whereby all intervocalic occurrences of **s* changed to *r*, thereby merging with **r*>*r*, i.e. a partial merger. In secondary split, conditioned allophones of a phoneme become phonemicized as a consequence of a change in the conditioning environment. An example: Sanskrit had a palatalization rule, *k*--->*c*/_ *e*. But as a result of a later change, **a*, **o*, **e* > *a*, both *k* and *c* occurred before the new *a*, attesting a contrast between them. Mergers are partial or complete. An example of a partial merger has already been given above, i.e. Latin rhotacism. A complete merger can be illustrated by vowel changes that occurred in Bantu prehistory. According to an accepted view, Proto-Bantu had the vowel system */i į e a o u ų/. In some languages, e.g. Sumbwa, the close and tense variety of the high vowels, i.e. į and ų, caused massive spirantizations in the obstruent system, giving rise to a lot of phonetic splits; at a later period, /į/ merged with /i/, and /ų/ with /u/. Not only was the vowel system reduced to /i e a o u/, but the merger was also a contributing factor in the split of stop phonemes that occurred giving rise to an expanded obstruent system of stops and fricatives/ affricates (cf. Meinhof 1932; Guthrie 1967-71).

A similar typology was developed by Jakobson 1931 within the framework of Praguian structuralism. This typology included the following types of change: phonologization, dephonologization, and rephonologization. Phonologization corresponds to secondary split.

Dephonologization corresponds to complete merger, with a difference: in addition to loss of a phonological opposition, dephonologization also subsumes loss of a phonological correlation, i.e. the system of relationships obtaining between distinctive features. To take the merger of the high vowels in Bantu prehistory as an example, when */į/ and */ų/ merged with */i/ and */u/, respectively, the oppositions were lost, in addition to the phonological correlation (i.e. distinctive feature) that distinguished the close and tense variety from the other type. Another type of change, rephonologization, occurs when a particular change leads to a reorganization in the system of correlations with no change at all in the number of distinctive oppositions. An example from Slavic history illustrates this (Jakobson 1931). Slavic had a voicing opposition, e.g., /p-b/, /t-d/, /k-g/. There was also a fricative /x/ which was disjunct (i.e. isolated) as far as voicing was concerned. In some Slavic dialects, *g>ǵ, thus giving rise to a new voicing opposition <u>x</u>/ǵ, leaving /k/ disjunct in relation to voicing.

Another view of linguistic change was developed within TG. This view was based on the notion of grammar (i.e. idealized homogeneous competence) as a system of rules. In this view, phonological change subsumed: (1) primary change, i.e. change in the system of rules, and (2) restructuring, i.e. change in phonological representations. (The emphasis was, of course, on primary change). A typology of phonological change was developed that conflated traditional sound change and analogy into rule change. Early TG postulated the following types of rule change: rule addition, rule reordering, rule simplification, rule complication, and rule loss (cf. Kiparsky 1968a, 1970, 1971; King 1969; Robinson and van Coetsem 1973; Lipski 1973).

Rule addition corresponds to traditional sound change or phonetic split. For instance, the labialization of velar stops before the back high close vowel which occurred in Bantu prehistory (cf. chapter 6) was the addition of the rule:

$$\begin{bmatrix}\text{-son}\\ \text{+bk}\end{bmatrix} \text{--->} [\text{+lab}]/\_\_ \begin{bmatrix}\text{+syl}\\ \text{+lab}\end{bmatrix}$$

This rule represents a split since the change is restricted to the environment before the labial vowel, with no change in other environments. Within early TG, once a rule was added to the phonological component, it could undergo any of the following processes: reordering, simplification (=generalization), complication, or loss.

Rule reordering was originated by Kiparsky 1968a in his attempt to determine the direction of change in the order of rules. Proceeding from the implicit idealization that all dialects of a language develop as one language, he attempted to explain some phonological dialect differences as rule reorderings. He distinguished two types of this change: reordering into feeding order, and reordering out of bleeding order. An example of the former situation is from Finnish, involving two rules, diphthongization and loss of ǥ, which apparently differ in their order of application in the standard and other dialects:

	I. Standard			II. Other Dialects	
	/vee/,	/teǥe/		/vee/,	/teǥe/
Dipth.:	vie	---	Loss of ǥ:	---	tee
Loss of ǥ:	--	tee	Dipth. :	vie	tie
	[vie]	[tee]		[vie]	[tie]
	'take'	'make'			

Kiparsky's claim is that the order of the two rules has changed from that in I to that in II, i.e. from counter-feeding to feeding order.

Reordering out of bleeding order is exemplified by the differences in the order of application of umlaut (applying in certain morphological contexts) and vowel lowering (applying to mid back vowels before some consonants) in two Swiss German dialects:

	I. Schaffhausen			II. Kesswil	
	bodə (sin)	bodə (pl)		bodə (sin)	bodə (pl)
umlaut	—	ö	lowering	ɔ	ɔ
lowering	ɔ	—	umlaut	—	ɔ̈
	[bɔdə]	[bödə]		[bɔdə]	[bɔ̈də]
	'floor'				

Kiparsky assumes that I is the old order of rules; II is the innovating order. That is, the rules have been reordered from a bleeding to a non-bleeding order. On the basis of examples like these, Kiparsky suggests that reorderings tend to prefer feeding or nonbleeding to bleeding orders.

A phonological rule may also undergo simplification or generalization. The mechanism responsible for this is phonetic analogy (cf. Vennemann 1972b), which generalizes the input or the environment of the rule. (It should be noted that 'rule simplification' is not equivalent to 'rule generalization'; the former necessarily entails formal generalization (in feature terms) of the input or environment of a rule, while the latter does not, cf. Vennemann 1972b:186-87; Ralph 1977:175ff). An example of generalization of the input which is also a simplification can be drawn from Bantu. Some Bantu languages have the following alternations: d/l, t/r (or t/ṛ) in their synchronic systems. Diachronically, *d>l, *t>r (or *t>ṛ). (The sonorant reflexes may vary from language to language, e.g. *d>r, or *t>l, cf. Guthrie 1971:30-64)). The question here is how these changes proceeded chronologically. Using distributional evidence (i.e. the presence of t/r implies the presence of d/l, but not vice versa) and the assumption that voiced stops are weaker than voiceless ones, a chronological profile may be reconstructed as follows:

1. *d>l, r
2. *t>r, l

In rule terms, these changes may be expressed as follows:

$$1.\ {*}\begin{bmatrix}-son\\+cor\\+vcd\end{bmatrix} > [+son]$$

$$2.\ {*}\begin{bmatrix}-son\\+cor\end{bmatrix} > [+son]$$

Rule 2 is a more general rule: it is also simpler than Rule 1. What these rules say is that sonorantization affected voiced alveolar stops first, and then spread to voiceless ones.

A good example of a generalization of the environment of a rule may be taken from the history of Germanic languages. The following rules are found in Norwegian (Oslo), N. German, and Standard German, respectively (Vennemann 1972b:186):

a. s--->š/__l

b. s--->š/__{l r m n w}

c. s--->š/__{l r m n w p t}

The environments of these rules show different levels of generality: (c) contains the most general environment (all consonants, i.e. those occurring in this environment), (b) contains a less general environment (all sonorants), and (a) the least general (the liquid l). Apparently, the direction of the generalization was from (a) to (c).

The converse of rule simplification/generalization, i.e. complication, has also been claimed to occur (Lipski 1973). In this view, complication is the curtailing of a previously general or formally simple rule in terms of its input or environment, usually by the addition of a feature or features or conditions. An example of this, given by Lipski, is from the history of a southwest Galician dialect. At a certain stage all Galician dialects had the following natural PR:

I. /l, n/--->Ø/V__V

At a later stage, this rule started having exceptions, thus splitting into two:

II(a) /l/--->Ø/V__V

(b) /n/--->Ø/V__V, except V__Vs#]pl.

It is claimed (cf. Lipski, p. 55) that the evolution of I into II represents a formal complication. It should be noted that such putative rule complications (e.g. above example) can be given a different interpretation.[1]

Rule loss occurs if a rule no longer functions to relate phonological and phonetic representations, i.e. if it is no longer part of the statement of the phonetic structure of the language. It may occur as a result of levelling e.g. the levelling of the voiced/voiceless stop alternation in Yiddish in favour of the voiced stop (cf. Anttila 1972:81-2). It has also been observed that some morphologized rules representing redundant alternations (i.e. alternations which have no unique function or meaning) tend to get lost. This is due to the striving in the conceptual component of language toward optimal symbolization. The mechanism responsible for rule loss is conceptual analogy (cf. Vennemann 1972b; also section

2.2.2.1).

One more thing needs to be said in regard to the early TG view of phonological change. As noted above it was based on the abstract conception of underlying representations proposed in SPE. It was assumed that underlying representations remained the same for a long time (SPE, 49); rules were either added, lost, reordered, or simplified. The types of change posited were at the same time considered to be "mechanisms of change". Thus if a rule was simplified, it was said to be due to the mechanism of rule simplification; if it was lost it was supposed to be due to rule loss, etc. The idea was that changes first took place in competence or the system of rules; any change in performance was supposed to be effected by the corresponding change in competence. This view of change has been shown to be incorrect; the causes of phonological changes have to be sought in the phonological system as well as in performance and the social situation (Anttila 1972:128; see also section 2.2.2.0).

The more realistic version of generative phonology, NGP, has a slightly different view of phonological change. Since it is based on the no-ordering principle, rule reordering is ruled out as a possible phonological change (Hooper 1976:84-110). Another difference between NGP and early TG in regard to phonological change has to do with the actuation and evolution of a phonological rule. NGP makes the strong claim that a P-rule enters a language on the basis of purely phonetic motivation. It is only in the course of the implementation of the sound change reflecting the rule that other factors, such as grammatical conditioning, social factors, etc. play a role. Proceeding from an explicit typology of phonological rules, NGP proposes the following model of the evolution of phonological rules:

phonetic variation--->P-rule--->MP-rule--->M-rule

(Hooper, op. cit., 86). According to this model, P-rules result from the 'phonologization' of phonetic variations which occur in speech. (Note that a P-rule may be a segment or a syllable structure rule/condition, or a PRR). This phonetic innovation has been called rule addition in the rule-oriented model of TG. Although the term "rule addition" can be used to refer to phonetic innovation, it should be pointed out that (cf. Hooper op. cit.) what happens in most cases is not "addition" but "modification" of existing rules. In a "realizational" approach in which phonological representations are connected to phonetic representations by realizational rules, what is called rule addition is modification of existing realizational rules. For instance, if a rule /p/--->[p] changes to /p/--->[pφ̄] before a vowel, what has happened is not "addition" but modification of the former rule in the specific environment. The change has to do with the retiming of the articulatory gestures for sequences [-cnt][+cnt], i.e. instead of timing the first segment before the vocalic (i.e. [+cnt]) element, it is timed so that part of the segment coincides with the vocalic element.

After a rule is "added" to the grammar, it becomes subject to the vicissitudes of the implementation of the sound change expressed by the rule. Thus it may be generalized or morphologized. After developing a lot of exceptions, it may be lost, or inverted. (Rule inversion is a situation whereby a rule which was previously stated as: A--->B/__C, comes to be stated as: B--->A/ __C, i.e. the inverse of the former rule. Cf. Vennemann 1972c; also Chapter 6). The complex evolution of a P-rule and its interaction with other rules sometimes causes the restructuring of the distinctive feature system or phonological representations. (Restructuring may, of course, be due to borrowings - cf. section 2.2.2.2.4).

In this study, phonological change will be interpreted along the lines suggested by Natural Generative Phonology. That is, it will include:

A. rule addition (which may result through borrowing or modification of an existing rule), generalization, morphologization, loss, inversion;

B. restructuring, i.e. changes in the system of distinctive features or phonological representations.

Any view of phonological change partly rests on the concept of competence adopted, and the assumed role of both competence and performance in the actuation and implementation of change. As noted already, early TG assumed that competence was homogeneous. Such an assumption, however, eliminates synchronic variation, which is the prerequisite for change. Only the assumption of competence characterized by 'orderly heterogeneity' (Weinreich et al. 1968, etc.) is an adequate starting point for diachronic linguistics. This assumption brings in the relevance of sociolinguistic investigations in diachronic linguistics (see section 2.2.2.2.6 for sociolinguistic factors).

2.2.2 Assumptions about the 'why' and the 'how' of phonological change

This section is concerned with some factors used in the explanation of phonological change. The notion 'explanation', however, is problematic; and a few words are in order here to clarify its use in this study.

2.2.2.0 A note on 'explanation'

To begin with, it is possible to distinguish between explanations based on a deterministic notion of 'law' and those based on a relativistic one. Explanations of the first kind are usually referred to in the literature as deductive-nomological or covering law (cf. Newman 1968; Lass 1980, 1981; Itkonen 1981; Romaine 1983); those of the second kind include the first kind plus others based on probabilistic or statistical laws (Greenberg 1979).

A deductive-nomological approach, formulated by positivist philosophers of science and based on Newtonian (classical) physical laws, proceeds on deductive inference, and has two parts: the deductive base or explanans (consisting of necessary and sufficient conditions and at least one law) and the thing to be explained or the explanandum. In this model, if X is the explanans and Y the explanandum, then Y necessarily follows from X. Here laws are of unrestricted generality, which is another way of saying that they are predictive. There are only a few areas in the sciences which have such laws, viz. the physical sciences. Even here most of the laws are probabilistic (Kovacs 1971:362ff). Naturally, there are no covering laws in diachronic linguistics. Thus if prehistory or the history of languages is approached from this view, then it would follow that there are no explanations in diachronic linguistics (Lass 1980, 1981 passim). This view, however, is untenable (cf. Itkonen 1981; Romaine 1983), since 'laws' governing the evolution of language (a social, psychological, and partly physical phenomenon) can not be based on a notion developed within classical physics.

A relativistic approach has been advocated by Greenberg (1979:279ff). In this view, the notions of 'law' and empirical generalization are relative, and the term 'explanation' can be applied to both restricted and unrestricted generalizations (op cit., 280). (Restricted generalizations, such as sound laws, are, naturally, not predictive). On this approach, the Greenbergian type of universals, genetic explanations, phonetic explanations (cf. Ohala 1974a, b), and Labovian type of correlations between language and society are viewed as explanatory.

Another mode of explanation is the teleological one. Teleology refers either to the intentionality and goal-directedness evident in the attainment of a target (cf. Vincent 1978:409-10; Andersen 780-1; 789-90), e.g . the adaptation of one's speech habits to new norms (cf. Labov's investigations, e.g. 1972), or to the function of an element or set of elements in a system (cf. Andersen op. cit., 789; Jakobson 1931:122), e.g. the addition of a rule which may functionally affect the phonologic system in realigning the relationships between phonologic and phonetic representations.

Both relativistic and teleological explanations have been used in historical linguistics. Phonetic explanations proposed by Ohala (1974a, b), Jeffers (1974), and others, may be taken to belong to the first type; some 'explanations' such as rule reordering (proposed by Kiparsky 1968a) —i.e. rules reorder 'in order to' maximize feeding orders— or ease of articulation/perception are teleological.

One further point needs to be emphasized. In view of the fact that language is a social, psychological, and physiological phenomenon, there has recently been an emphasis on a 'multiple cause' approach in contradistinction to former 'explanations' which were based on a 'single cause' approach, e.g. simplification, ease of articulation or perception (cf. Malkiel 1968; Anttila 1972:179-80, 391; King 1975; Aitchison 1981:169). This approach takes into account the interplay of various factors— internal and external —in the causation and progression of a change. This strategy involves investigating questions such as: (1) what caused the change, and (2) how was it implemented? The important factors involved here will be dealt with below under two categories: internal and external.

2.2.2.1 Internal Factors

These have to do with the internal characteristics of language which have been noted to be active in phonological change.

Although phonological change may be due to phonological causes (e.g. morphologization of a rule due to addition of another rule), it has been observed to also be due to morphological pressures to attain or maintain "one meaning, one form" symbolization (Anttila 1972:98-108). This principle states that one-to-many relations between form and meaning are undesirable, and should be eliminated or prevented. Elimination of 'one-to-many' relations (the 'one-meaning, two forms' situation) refers to the leveling of alternations. Alternations are good as far as the phonetic end of language is concerned if and only if they form part of the overall statement of the phonetic structure of the language in question. After alternations get morphologized, i.e. lose their phonetic function, either due to phonological reasons or otherwise, they become redundant. Now, these redundant alternations make linguistic relations opaque as far as perception and learnability are concerned. Unless some function gets assigned to them, these alternations are likely targets of analogy which may eliminate them to restore the "one meaning, one form" situation. The language acquisition process is usually regarded as the main source of such 'analogical levelings'. (The principle itself has been referred to by various names in the literature, including 'Humbolt's Universal' (Vennemann 1972b, 1972c), and 'minimization of allomorphy' (Kiparsky 1971:588, 1972:195, 207), etc.). The conflicting roles of sound change and analogy noted here manifested by the occurrence and elimination of allomorphy have been referred to as 'Sturtevant's paradox', which states that sound change is regular but produces irregularity; analogy is irregular but produces regularity (Sturtevant 1947:109; Saussure 1959:161-2; Anttila 1972:94).

Another internal factor that has been discussed in the literature is the tendency of languages to strive toward symmetry. On this view, 'holes in patterns' tend to be filled. An illustration of this are the changes that occurred in the vowel system of the French dialect of Hauteville, Savoy (Martinet 1952). At one stage, this dialect had /ɛ,a/ but no /ɔ/. Then the following chain shifts occurred: a>ɔ; ɛ >a; ɛ̃ >ɛ ; ẽ>ɛ̃, i.e. the chainshift started with a shifting to fill a hole in the pattern, thereby creating a new hole; ɛ shifted to fill the space vacated by a; ɛ̃ shifted to fill the space vacated by ɛ ; etc. This type of chain has been called 'drag chain'.

There are other shifts known as 'push chains'. These are assumed to be motivated by the principle of maximal differentiation (Anttila 1972:186). This principle has to do with the tendency for optimal phonological space, i.e. phonological space tends to be shared evenly among all units in a phonological system. In accordance with this principle, mergers of phonological units may be prevented. A push chain proceeds as follows: a phoneme whose phonological space is being encroached upon or invaded by another phoneme shifts to the next available space, pushing the phoneme in the space, which also moves away, pushing the next phoneme, and so on, till the chain shift is completed. Convincing examples of push chains are hard to get, partly due to the lack of written records which make it difficult, if not impossible, to verify the lengthy relative chronology of the shifts involved. Among the few whose relative chronology can be verified are the displacements called the Great Vowel Shift of the Late

Middle Chinese (Chen 1976:221-5). These push chains followed the scenario: ɑ>a; a>ia; ia>ie; ie>i; i>ï.

Of the above factors, the 'one meaning, one form' principle is certainly teleological. Analogical change (levelling) occurs in order to restore the 'one meaning, one form' symbolization. Push chains are also teleological: the chainshifts occur in order to maintain maximal differentiation. As regards drag chains, it has been argued that their "explanation is not irreducibly teleological" (Vincent, p. 411); they can be explained in terms of frequency shifts of segments within articulatory space. On this view, a drag chain begins when a segment, through articulatory shifts, gradually moves into a neighbouring empty slot, leaving behind an empty space; this may be filled by the next segment shifting into it, and so on.

2.2.2.2 External factors of change

2.2.2.2.1 Phonetic factors

The relevant phonetic factors are articulatory and acoustic-auditory, discussed in this order.

Linguists have long recognized that the constraints of the human articulatory mechanism give rise to innovations "...that have a purely phonetic function, i.e. the class of natural rules" (Hooper 1976a:84). This class of natural rules includes a set of universally determined phonetic processes such as palatalization, spirantization, aspiration, labialization, velarization, nasalization, affrication, etc. In all these natural processes, the phonetic change involves the "retiming of a muscular gesture or the increase or decrease in muscular activity" (Hooper, op. cit., 85). Here the 'increase' in muscular activity should result in a strengthening process, and 'decrease' in muscular activity in a weakening process.

Among these processes are those involving two sounds becoming similar to each other (assimilation), e.g. Sundanese nasalization, [mãro] 'to halve', [mãnẽh] 'you', etc. (Anderson 1974:148), where the vowel following the nasal consonant shares the feature [nasal] with the consonant. What happens here is that when the nasal segment is being articulated velic closure is delayed, thus the following vowel is pronounced as a nasal segment. There are also processes involving the omission of final segments. These are based on the general tendency in languages for word-final sounds to be weakly pronounced. For instance, word-final stops are either weakly exploded or unreleased (Aitchison 1981:131), which is the first step in their being omitted. Furthermore, there are processes which are due to the difficulty of co-ordinating articulatory gestures perfectly (Ohala 1974b; Aitchison op. cit.). These include cases of consonant epenthesis (Anttila 1972:67-8; Ohala 1974b:357-360) such as <u>ml</u>><u>mbl</u>, <u>mr</u>><u>mbr</u>, <u>ms</u>><u>mps</u>, <u>sr</u>><u>str</u>, <u>nr</u>><u>ndr</u>, <u>ns</u>><u>nts</u>, all of which are due to the articulatory difficulty of moving from one segment to the second segment. For instance, in the pronunciation of [ml] or [mr], the lips are closed when [m] is being pronounced, the nasal cavity open. If the velum is closed before the lips are open, then a [b] will occur before [l] or [r] are pronounced.

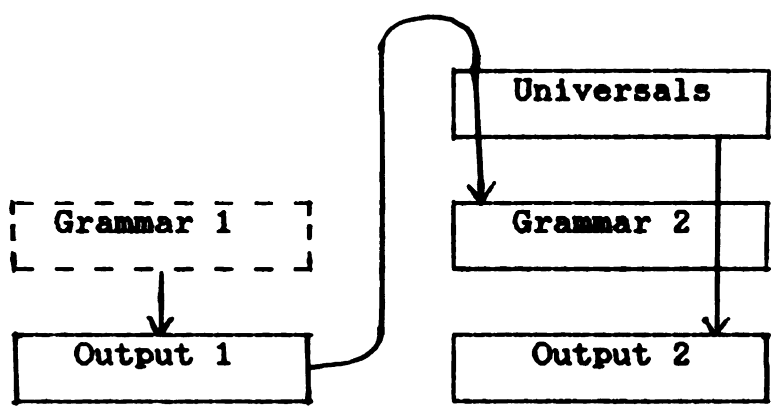
Acoustic-auditory factors also play a role in phonological change. Change resulting from these factors is based on the acoustic similarity between sounds. As has been noted: "...a speech sound X as produced by a speaker is acoustically similar to sound Y; a listener hears the sound as Y and reproduces it that way when he turns speaker. This is an excellent mechanism for producing phonetically abrupt sound changes..." (Ohala 1974a:254ff.). Sound changes such as Norwegian *s*--->*š*/__ *l* and Scots *al*>*au* (Ohala, op cit.) are due to acoustic/perceptual factors. In the Norwegian case, the change probably had the path: *sl*>*sl̥l*>*sšl*>*šl*. The voiceless lateral *l̥* is acoustically a fricative, similar to *š*. It is thus easy for hearers to misperceive the former as the latter. As Ohala notes, the stage *sl̥l* is attested in some Norwegian dialects. In the Scots case, the acoustic similarity is between *l* and the high back round vowel. This similarity is no doubt the reason for the reinterpretation of English dark *l* [ɫ] as *u* in some dialects, e.g. *milk* > [miuk], *bottle* > [baɾu], etc. Changes such as **x*>*f*, **f*>*x*, **x*, **s*, **ç* > *h*, **θ*>*f*, (Ohala, op cit., 267) are also assumed to be due to acoustic/perceptual factors.

Although these phonetic tendencies are more or less common, languages differ as to which they implement at different times. But once a phonetic tendency is activated in language, it is up to the other factors (social, linguistic, etc.) to either block or accelerate it.

2.2.2.2.2 A model of change

The perceptual factor of sound change has to do with the decoding or reinterpretation of the acoustical signal. Diachronic phonologists are indebted to Andersen (1973) for having discussed this problem in relation to language acquisition and change. Proceeding from Peircian ideas on cognition and modes of inference, he discusses change as a function of abduction and deduction. These two are modes of inference; the third mode is induction. Deduction proceeds by inferring the result from the rule (major premise) and the case (minor premise), induction by inferring the rule from the case and the result, and abduction by inferring the case from the rule and the result. These modes are related as follows: "...abduction suggests that something is the case, that something _may be_; deduction proves that something _must be_; induction tests to show that something _actually is_ (Anttila 1972:197). Of these modes, only abduction supplies us with new insights and new ideas. It is the fundamental analogizing mechanism of the human mind. Though fallible, abduction is very useful in scientific inquiry. Hypotheses are abductions; they are inferences about reality. However, they have to be proved by deduction, and tested by induction.

The abductive-deductive model has proved to be useful in the explanation of the process of language acquisition and the rise of synchronic variation due to (1) the abductive reinterpretation of the acoustical signal, and (2) the deductive implementation by the learner, whereby (s)he produces 'acceptable' deviations vis-a-vis the speech of others (Andersen 1973). The model by Andersen is based on the simple truism that language acquisition/learning proceeds by the learner inferring his/her grammar from the output of other grammars, with the aid of "universals', as shown in the following diagram (from Andersen 19773:778; Anttila 1972:197):



Grammar 1 and Output 1 belong to the models of the learner; Universals, Grammar 2, Output 2 belong to the learner. The diagram shows that when the learner is acquiring/learning her/his language, the only source (s)he has is Output 1. On hearing Output 1 (result), Universals (rule) are invoked, and the learner infers Grammar 2 (case). This is abduction.

Now, abductive change occurs if Grammar 2 differs from Grammar 1. The learner has to prove whether her/his output is the same as that of other speakers by implementing the abduced grammar, i.e. using the Universals (rule), and Grammar 2 (case), (s)he produces Output 2 (result). This is deduction. If Output 2 differs from Output 1, but is acceptable to other speakers, then deductive change has occurred.

This is how, it is argued, grammars are learned; this is how phonology is acquired. Abductive change occurs because the "...child can not learn all the articulatory facts - many are simply not visible - but he has to abduce the sounds from his perception" (Anttila 1972:198). This perceptual factor seems to be active in phonological change. Andersen (1973) gives a good example of a change based on such a mechanism. In some Czech dialects some changes occurred whereby sharping was lost (giving rise to mergers of formerly distinct sharped/non-sharped pairs of labials and dentals), and formerly sharped labials changed to plain dentals in a few dialects (so-called Tetak dialects). Andersen argues that this latter change occurred as a result of the abductive reinterpretation of the ambiguous acoustic manifestations of [+sharp, +grave] and [-grave, -sharp], i.e. the former (sharped labials) were abduced as the latter (non-sharped dentals) (Of course the implementation of the change took several generations to take root in the speech community). As already noted above, perceptual reinterpretations of this type are not uncommon, e.g. the Norwegian example, s--->š/__ l, Scots and English l>u, etc.

2.2.2.2.3 Language acquisition

In the preceding, we discussed a perceptual/ cognitive mechanism involved in language learning. But we need to be more clear as to the nature of the contribution of language acquisition to language change. This is important, especially in view of some rather extreme claims about its contribution, such as: "We are led to conclude that the ultimate source of dialect divergence — and of linguistic change in general — is the process of language acquisition" (Andersen 1978:21). Other linguists also share this view (cf. King 1969:65; Akmajian et al. 1979:210). But what exactly is the contribution of language acquisition to change?

There are several ways in which learners can introduce variation in language: (1) by failing to learn a rule (because it is opaque and hard to learn, etc.), (2) by failing to learn a restriction to a rule, hence extending the rule to other environments, and (3) by introducing new rules into the language through abduction and deduction. However, the fact that (1)-(3) may occur does not mean that language change will occur. Variation based on age (adults vs. children) will be introduced only if (1)-(3) are not corrected. Even if (1)-(3) were to occur (and they do occur often) they become subject to social (and linguistic) forces which determine the spread or elimination of variable rules.

The idea that all major linguistic changes have their source in the language acquisition process has recently been challenged by some linguists. Drachman 1978 and Aitchison 1981 point out that although there are similarities between processes found in language acquisition and those found in language change, the differences between them are greater than the similarities. Some of the important differences are as follows: (1) in the language acquisition process, children tend to harmonize consonants in CVC sequences, e.g. [tæt] (cat), <u>gʌk</u> (duck), etc. while in language change this is rare; in fact, the opposite tendency occurs, i.e. dissimilation, e.g. Dahl's Law in Bantu, Grassmann's Law in Greek and Sanskrit, etc. (2) In language acquisition, there is a strong tendency to substitute stops for fricatives, but in language change the reverse is more common (weakening is more common than strengthening); (3) the technique of shortening words in language acquisition is different from that found in language change: while children tend to omit beginnings, ends are left out more often in language change (Aitchison 1981:181-2). Two other linguists, Bybee and Slobin (1982), have investigated the problem of the relationship between children's analogical innovations and similar changes found in language history. They found that

"... current changes in a language will be better reflected in adult innovations, and that adults are actually responsible for carrying out morphophonemic change" (37) and also that "...there is nothing particularly special about the relation between small children's innovative forms and morphophonemic change. In fact ... the adults and older children, who are in better command of the entire system, innovate in ways that manifest more precisely the on-going changes in the system... both socially and linguistically the older children and adults are in control of the morphophonemic changes"(36-7).

In view of the foregoing, it is probably more correct to say that language acquisition may produce some of the variation that may participate in language change. The question of whether language acquisition is a major contributor to change is still an open one.

2.2.2.2.4 Borrowing

Borrowing has since neogrammarian times been recognized as one of the main causes of language change. Borrowing can have a tremendous impact, especially if the borrowing language needs new lexical items for new concepts, and if the source language is in a culturally dominant position. This happened to English in respect to Latin and French; it also happened (and is still happening) to Swahili in respect to Arabic, English, etc.

Phonological change through borrowing comes about through the adoption of new lexical items for new concepts or even substitution of old native words by borrowed ones.

The two languages mentioned above, English and Swahili, are good illustrations of languages whose phonological systems have been restructured through borrowing. Borrowings into English from French helped effect the /v/:/f/, /θ:d/, and /s/:/z/ oppositions —the other factor being sound change (cf. Anttila 1972:58-9); they also introduced the morphophonemic alternation k/s into the language. Examples from Standard Swahili are even more impressive. Borrowings from Arabic introduced new phonemes into the language: /đ/, /θ/, /ɣ/, /x/. Also, new syllable structure rules have been introduced into the language from both Arabic and English through the introduction of sequences such as: lh (alhamisi 'Thursday', <Arabic), kr (shukrani 'thanks' <Arabic), kt (sekta 'sector' <English), tr (treni 'train' <English), etc.

2.2.2.2.5 The 'regularity' hypothesis and lexical diffusion

Explanation of sound change includes its implementation. It was noted previously that Neogrammarians assumed that sound changes were phonetically gradual and lexically abrupt. In the case of early TG, assumptions of homogeneity and rule change implied that change was 'instantaneous'. In recent times, a new hypothesis regarding the implementation of sound change has been proposed. This hypothesis is called 'lexical diffusion'(Wang 1969; Chen 1972; Chen and Wang 1975). In this view, a sound change is phonetically abrupt and lexically gradual. 'Phonetical abruptness' means that the resulting sound is discrete enough to be phonetically distinct; 'lexical gradualness' means that the implementation of the change follows an item-by-item progression. Lexical diffusion can be conveniently compared to an S-curve (Chen 1972:47). At first the diffusion is slow; only a few relevant lexical items are affected. After some time, the climb is fast; a lot of lexical items are affected. Then there is a tapering off during which the remaining items may be affected - all things being equal. In many cases, however, things are never equal; thus sound changes do not reach completion. It is possible for a sound change to be arrested at any point in the S-curve. In some cases, a sound change may be arrested after affecting a few lexical items only, i.e. in the lower part of the S-curve. In other cases, a sound change will affect most lexical items (normally most frequent ones) before being arrested, leaving some exceptions. The lexical diffusion hypothesis has undoubtedly increased our understanding of how some sound changes have been implemented. Recently, however, investigations have shown that the neogrammarian regularity hypothesis and the lexical diffusion hypothesis might both be right. Labov 1981 is devoted to the discussion of this problem. Using data of sound changes in progress from

Philadelphia, Labov shows that: 1) changes such as raising, lowering, fronting, and backing support the neogrammarian hypothesis (pp. 274-284), and 2) the lengthening (tensing) (or lexical split) of short _a_ supports the lexical diffusion hypothesis (pp. 284-301). Changes in 1) are low-level output rules within subsystems, while the change in 2) occurs across subsystems, i.e. it is a redistribution of an abstract class of short and long/tense _a_'s. Labov (p. 303) notes that vowel shifts involving lexical diffusion are mostly lengthenings and shortenings; apparently, dipthongizations and monopthongizations are intermediate: some cases have been observed to indicate lexical diffusion as the mechanism of implementation, while in others regularity was observed. With respect to consonants, it is noted that metathesis, haplology and discontinuous shifts (e.g. place of articulation shifts, e.g. _x_>_f_ or _f_>_x_) are most commonly subject to lexical diffusion, while manner of articulation changes are most often implemented in accordance with neogrammarian regularity (pp. 301-303).

2.2.2.2.6 Sociolinguistic factors

It is clear from the preceding that physiological and acoustic-auditory factors are the source of phonetic innovations. However, research on sound changes in progress (Weinreich et al. 1968; Labov 1972, 1982) has shown the relevance and importance of social factors (sex, social status, age, etc.)[2] in accounting for the adoption of phonetic innovations. According to this sociolinguistic perspective, change is set in motion when a specific phonetic variable starts being associated within a social group as a marker of group identification. The phonetic variable thus gains social significance, and becomes part of competence, being accounted for by a variable rule of the type: /x/---> <a,b> which means: /x/---> [a] in social context A; /x/--->[b] in social context B. Subsequently, the innovation may spread to other contexts, and if the group has some prestige in society, it will spread to other groups as well. Alternatively, if the group does not have any prestige at all, the variable rule may be stigmatized, and probably eliminated. However, if the innovation spreads to other groups, it may eventually (if other social forces do not arise to block its spread) be generalized within the speech community. At this point it ceases to be a variable rule and becomes a categorial rule, i.e. conditioned by phonological, or other grammatical factors, not social ones.

Labov believes that since this pattern of the implementation of change has been observed in all studies of sound change in progress, other completed changes in the past were implemented in the same way. This is what is known as the uniformitarian principle (Labov 1972:161, 1982:20-1).

The sociolinguistic investigations of sound change in progress and their implications for the theory of language change have underscored one crucial point: that sociolinguistic data are important in the study of language change. This data, however, is not available at all when we are dealing with prehistory; the most that can be done is infer, on the basis of available methods, as to how certain changes might have occurred.

2.3 Description and explanation in the context of this study

All the above factors have been used to 'explain' the why and the how of phonological change. Articulatory and acoustic-auditory factors and borrowing give rise to synchronic variation, which is the prerequisite to change. Social and systemic factors may trigger a particular development in which one of the variants may be favored to win over the others. Ideally, diachronic linguistics should be able to identify all the factors involved in every change and show the interconnections among them. This is not possible because the necessary data are not available. In the investigation of linguistic prehistory, the data becomes even more restricted since there are no records. Descriptions and explanations depend on inferences based on current data. In view of this, it is imperative to know what it means to 'describe' and to 'explain' a phonological change in the context of this study.

In this study, to 'describe' a change will mean to present the facts having to do with the change. For instance, if we want to describe the change *p>f/__ ų (which occurred in many Bantu languages), it is not enough to list it; we would like to include in our statement the (possible) stages of the change, with internal or comparative evidence supporting these stages. Additional facts will also be included: is it a weakening, etc.; did a split occur through this change, etc.?

To explain a change in this study will be to say why the change occurred. Now, as Jeffers 1974:231 has noted, there are two types of why: the immediate why, and the ultimate why. The former deals with the contextual causes of change; the latter the reasons why language changes in general. If a change is a conditioned one, its immediate causes are in the phonetic context: here, the explanations given will be phonetic explanations (cf. Ohala 1974a, b). If the change is an unconditioned one, the context will be the whole phonological system; if the change is due to phonological/morphophonemic analogy (Jeffers, op cit., 239ff), then the context is the relevant paradigm. In this study, we specifically address ourselves to the immediate why of changes, although we may refer to general causes of language change when discussing specific issues.

2.4 Methodology

The usual methods, the internal and comparative, have been used. The internal method uses cases of allomorphy and other irregularities in the language(s) in question as primary data, while the comparative method uses sets of correspondences from a group of related languages. Using these data the investigator of a diachronic grammar of a language or group of languages faces a task involving two closely-connected processes. These are the processes of projection and mapping. The former refers to the setting up of the appropriate proto-entities using correspondences in the language(s) in question; the latter refers to the reconstruction of the appropriate paths or rules between the proto-entities and the reflexes (Anttila 1972, chapters 10 -13, passim; Lass 1978:246).

These methods, however, do not provide an 'algorithm' for reconstruction; they are just guidelines which have limited predictive power. Given this fact, one problem that comes up again and again in diachronic methodology is how to ensure the reconstruction of well-formed reconstructions (cf. Lass 1978). Diachronists have used, in conjunction with the reconstruction methods, assumptions such as the regularity of sound change, frequency of occurrence, phonetic plausibility and the principle of economy to get 'appropriate' projections and mappings. The only rule of thumb has been to be true to the facts and to exercise a balanced application of these assumptions. In view of this, it is not uncommon for two workers to posit different proto-forms, especially in a situation where one assumption conflicts with another.

A case in point is the one discussed in Chapter 4, where the methodological principle of frequency of occurrence seems to conflict with phonetic plausibility in some cases, i.e. some most frequent segments do not provide the most phonetically-plausible starting point for shifts which occurred in the Bantu group.

A solution to situations such as these was suggested long ago by Jakobson 1958:23-24 who advocated the use of typological generalizations as evidence for reconstructions. In the case just mentioned, the generalizations in question have to do with the so-called theory of strength or lenition hierarchies. These are used to give substance to the notion 'phonetic plausibility', in support of a solution which is seemingly in conflict with the principle of frequency of occurrence.

Notes

1 In the 'lexical representational' approach (cf. Hudson 1974b), such a change would not be regarded as a complication of the rule, although it would be a complication of the grammar. In this view, what happened in the Galician dialect would be regarded as lexicalization, i.e. the rule is no longer phonological; it is morphophonemic. That is, lexical entries involving intervocalic /n/ would be represented as:

$$/\ldots\begin{Bmatrix} n \\ \emptyset \end{Bmatrix}\ldots/$$

The distribution rules would be:

$$\begin{Bmatrix} n \\ \emptyset \end{Bmatrix} \text{--->} \begin{Bmatrix} \emptyset & / \ V\_Vs\#]_{Pl.} \\ n & \text{Otherwise} \end{Bmatrix}$$

2 In a recent study, Milroy and Milroy 1985 add a new dimension to the discussion of the social mechanisms of linguistic change by showing that it is the factor of weak social ties (versus strong ties), rather than sex, status, etc., that is crucial in the transmission of innovations from one group to another. Thus "...innovations are normally transmitted from one group to another by persons who have weak ties with both groups" (p. 380).

Chapter 3

The Segmental Phonology

3.0 Introduction

This chapter deals with the segmental phonology of (Si)Sumbwa. Although it is not our aim to present a complete description, it is desirable that enough phonological facts be provided as background information for the purposes of this study and to acquaint the reader with some aspects of the Sumbwa sound pattern. In view of our restricted aim, we do not intend to take up controversial issues that the data might raise within the generative framework.

The description will deal with the phonological inventory (section 3.1), including phonemes, distinctive features, a note on tone; phonological rules (section 3.2) [including: segment/phoneme structure rules (section 3.2.1), syllable structure conditions (section 3.2.2), phonetic realizational rules (section 3.2.3)]; and morphophonemic rules (section 3.2.4).

3.1 The Phonological Inventory

3.1.1 Segmental Phonemes

A classical phonemic analysis (à la Gleason 1961) of Sumbwa would result in the setting up of the following inventory of phonemes:

Consonants:

	Bilab.	Lab.-dent.	Alv.	Alv.-pal.	Pal.	Velar	Glot.
Stops	p, b		t, d			k, g	
Affr.				(c, j)			
Fric.	ƀ	f, v	s, z	(š)			h
Nas.	m		n		(ň)	(ŋ)	
Lat			l				
Glide					y		

Vowels: These occur both short and long, as follows:

i, ii		u, uu
e, ee		o, oo
	a, aa	

Examples: _Consonants_

/p/	/b/	/t/
ipapa 'wing'	-_boola_ 'abduct'	-_teeka_ 'cook'
-_peha_ 'smoke'	-_bela_ 'break, e.g. cup'	-_hita_ 'pass'
/d/	**/k/**	**/g/**
-_dula_ 'bore a hole'	-_kola_ 'do'	-_gula_ 'buy'
idaale 'herd'	-_kema_ 'refuse'	-_oga_ 'take a bath'

/c/	/j/	/b/
mcungwa 'orange tree'	ijesi 'army'	-ƀaƀa 'smart, itch'
mcenza 'tangerine tree'	januali 'january'	iƀuƀa 'jealousy'
/f/	**/v/**	**/s/**
-fua 'die'	-vua 'ooze'	-sangaana 'meet'
-fisi 'hyena'	muviila 'soot'	-susa 'resemble'
/z/	**/š/**	**/h/**
-zia 'go'	iješi 'army'	-hola 'become cool'
-iza 'come'	bulaši 'brush'	-huula 'beat'
/m/	**/n/**	**/ň/**
-mela 'germinate'	-niga 'throttle'	-ňaaňa 'tomato'
-lima 'cultivate'	-vuna 'break, e.g. stick'	-ňooňa 'exploit'
/ŋ/	**/l/**	**/y/**
ŋombe 'cow'	-lila 'cry'	-yomba 'say, talk'
ŋondi 'ram'	-laala 'sleep'	-yoga 'make noise'

It should be noted that the palatal consonants /š, c, j, ň/ and the velar nasal /ŋ/, in parentheses in the chart above, are peripheral phonemes. They occur in a few words or morphemes only, mainly borrowings from Swahili or Sukuma/Nyamwezi. Some of the words in which these phonemes occur (see examples above) represent items that were introduced into the Sumbwa area in the last century or so, e.g. <u>mcungua</u> 'orange tree', or concepts referring to some aspect of the new political culture, e.g. <u>ƀujamaa</u> 'socialism', -<u>ňooňa</u> 'exploit', etc.

<u>Examples</u>: Vowels

<u>i</u>, <u>ii</u>: -<u>ƀika</u> 'announce death'; -<u>ƀiika</u> 'keep, put away'

<u>e</u>, <u>ee</u>: -<u>leha</u> 'elope'; -<u>leeha</u> 'become long or tall'

<u>a</u>, <u>aa</u>: -<u>lala</u> 'fly (of winged termites)'; -<u>laala</u> 'sleep'

<u>o</u>, <u>oo</u>: <u>likoko</u> 'big chicken'; <u>likooko</u> 'wild animal'

<u>u</u>, <u>uu</u>: -<u>tuma</u> 'send'; -<u>tuuma</u> 'dance'

3.1.2 <u>Distinctive Features and the Sumbwa Phonological System</u>

3.1.2.1 <u>Introductory note</u>

A distinctive feature, being a minimal unit of phonological analysis, serves to represent contrast at the phonological level. We will assume, as many linguists do, that at this level, distinctive features are binary, with - or + specifications. (At the phonetic end, the binary features get spelt out as 'scalar' phonetic features which represent pronunciations). Features also function to capture similarities among segments which make them motivate or undergo the same or similar processes. Segments sharing a feature or a set of features form a 'natural class'. (A 'natural class' has been formally defined as a set of segments which can be characterised by fewer features than can any one member of the set). Phonological rules or rather phonetic realization rules, which relate phonological to phonetic representations, typically refer to the natural class which has undergone or motivated the process.

A problem that distinctive feature theorists have had to deal with is whether acoustic or articulatory or both kinds of features should be used in phonological description and explanation. Although Jakobson et al. 1951 proposed exclusively acoustic features (revised in Jakobson and Halle 1956), and Chomsky and Halle 1968 mainly articulatory ones, it soon became apparent that neither could capture every regularity in all languages, and it has been argued that both modes are needed not only in synchronic descriptions but also in diachronic description and explanation (cf. Vennemann et al. 1973:73; Ohala 1974b:369). Both modes are necessary since speech involves 'speaking' and 'hearing', the former needing articulatory instructions, the latter auditory ones. But since there is as yet no agreed-upon set of universal articulatory-acoustic features, what most linguists do is select the features that they think may capture the necessary distinctions and phonological rules in the language they are describing. For the purposes of this description, we will, following Chomsky and Halle (1968) and others, use mainly articulatory features. These are: Syllabic, Sonorant, Coronal, Anterior, High, Low, and Back, Voice, Continuant, Nasal, Strident (a perceptual feature) and Long (see Table 1 below). There is no need to comment on these features; for definitions and discussion, see Chomsky and Halle 1968: 293-329; Hyman 1975:42-58; Lass and Anderson 1975:2-5, and Lass 1984: 75-101, among others.

3.1.2.2 The Distinctive Feature Matrix for Sumbwa Phonemes

Table 1 displays the distinctive feature matrix for Sumbwa phonemes.

In working out the classificatory matrix, two notions have been taken into account: relevance and redundancy. A feature is relevant to the characterization of, say consonants, if there is at least one member that can be specified for the feature positively and negatively in any meaningful way. For example, the features [lateral], [labial], [palatal], etc. are relevant to Sumbwa phonology, while the feature [long] is irrelevant to the characterization of Sumbwa consonants, and [str] to that of vowels. On the other hand, a redundant feature is one that is unnecessary in the contrastive characterization of a segment, this being due to its predictability from other features(e.g. [lateral], [labial], [palatal]). In the table, redundant values of the relevant features are parenthesized. Redundant features (e.g. [lateral], etc.) are not included. The redundancies have been formulated into phoneme/segment structure rules (PSRs) which are presented in section 3.2.1. Long vowels are represented as sequences of two identical vowels.

Table 1: <u>A CLASSIFICATORY MATRIX FOR SUMBWA PHONEMES</u>

	p	b	ƀ	m	f	v	t	d	s	z	n	l	š	c	j	ȟ	y	k	g	ŋ	h
syl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
son	(-)	-	(-)	(+)	(-)	-	(-)	-	(-)	-	(+)	+	(-)	(-)	(-)	(+)	+	(-)	-	(+)	(-)
cor	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-	-	-	-	(-)	-
ant	+	+	+	+	+	+	+	+	+	+	(+)	(+)	-	-	-	-	(-)	-	-	(-)	-
bk	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	-	(-)	(+)	(+)	+	(-)
vcd	-	+	(+)	(+)	-	+	-	+	-	+	(+)	(+)	(-)	-	+	(+)	(+)	-	+	(+)	-
cnt	-	-	+	(-)	+	+	-	-	+	+	(-)	(+)	+	-	-	(-)	(+)	-	-	(-)	+
nas	(-)	(-)	(-)	+	(-)	(-)	(-)	(-)	(-)	(-)	+	-	(-)	(-)	(-)	+	-	(-)	(-)	+	(-)
str	(-)	(-)	-	(-)	(+)	+	(-)	(-)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)

	i	ii	u	uu	a	aa	e	ee	o	oo
syl	+	+	+	+	+	+	+	+	+	+
hi	+	+	+	+	(-)	(-)	-	-	-	-
lo	(-)	(-)	(-)	(-)	+	+	-	-	-	-
bk	-	-	+	+	(+)	(+)	-	-	+	+
long	-	+	-	+	-	+	-	+	-	+

The above features, being 'classificatory', will be used in the simultaneous and sequential matrices in lexical representations. At this level, redundant features or values don't have a role to play at all. This, however, does not mean that redundant features are non-functional. Those that are relevant to the synchronic phonology are utilized in the statement of segment structure rules and the formulation of phonetic realization and other rules (cf. section 3.2 for typology of rules).

3.1.3 <u>A Note on Tone</u>

Although we are not concerned with tone in this study, a few words are in order here. A preliminary analysis (Kahigi & Haubert 1983) has shown that Sumbwa has two contrastive tones, high and low. The phonetic realizations are: H, L, and on long vowels: HH, LL, LH, and HL, as exemplified below (H is accented; L is unmarked):

(H) ƀá̲ƀa 'they become'	(LH)ƀaá̲ƀa 'father'
(L) o̲ya 'this one'	(HL)oyá̲ane 'this very one'
(HH) i̲i̲za 'he comes'	
(LL) le̲e̲ha 'become tall/long'	

Tone also distinguishes certain grammatical constructions in Sumbwa; for example:

<u>Habitual</u>	<u>Near past</u>
gwáákа 'it burns'(fire)	gwaaka 'it has burned'
ííza 'he comes'	iiza 'he has come'
íílúka 'he runs'	iilúka 'he has run'

Preliminary analysis (Kahigi & Haubert 1983) has also shown that Sumbwa does not have 'general' tone rules e.g. tonal displacement found in its sister Sukuma (Richardson 1959; 1966). It only has rules of limited application and grammatical tone patterns. Sumbwa appears to be among Bantu languages which have undergone reduction in tonal distinctiveness and tonal morphologization. Further research is needed not only for the dialect under description, but for the other Sumbwa dialects as well. Undoubtedly, such a multi-dialectal research program can shed light not only on the synchronic patterning, but also on the evolution of Sumbwa tonology.

3.2. The Rules

3.2.0 Introduction

As noted in Chapter 2, we shall in this study refer to all those rules which exclusively express phonological structure as phonological rules. These will include rules which map phonololgical on to phonetic representations, i.e. phonetic realization rules, rules expressing phoneme structure and those stating the syllable structures allowed in the language.

PRRs expressing productive (or automatic) alternations are a subset of phonetic realization rules, i.e. they state how a segment is realized at the phonetic level in a particular environment. The format used to express these rules is the usual one of rewrite rules, i.e. /X/--->[Z]/Y (The phoneme /X/ is realized as the phonetic segment [Z] in the environment Y).

Phoneme structure is expressed by the usual redundancy rules of implication, i.e. [+F]--->[+G] (The feature [+F] implies the feature [+G]; therefore [+G] is redundant in the phonological characterization of the segment in question). These could easily be translated into IF-THEN conditons, à la Stanley 1967.

Syllable structure will be expressed in terms of positive and negative conditions stating the sequences allowed in the language. The arguments for the use of the syllable to represent sequence structure instead of the morpheme used in early TG (e.g. Chomsky and Halle 1968) presented by proponents of NGP (e.g. Hooper 1976a:1980ff) include: (i) morphemes are not pronounceable units (e.g. Sumbwa root morphemes -tuk- 'insult', -tum- 'send' etc. cannot be recognized as 'Sumbwa' by native speakers when pronounced); (ii) the syllable correctly expresses the allowable and un-allowable sequences not correctly expressed by morpheme structure; (iii) the word, the next unit above the syllable is correctly expressed in terms of the syllable, (iv) speakers can break words of their language (e.g. in language games) into syllables but not into morphemes (unless morpheme and syllable structure coincide in a language), and (v) speakers usually modify foreign words in accordance with the syllable structures of their language.

Hooper 1976a:195ff also incorporates the notion of consonant strength within the theory of the syllable. In this view of the syllable, segments are assumed to be ranked according to a scale of sonority or strength. A typical structure of the syllable based on this view would be:

Obst-Nas-Liquid-Glide-Vowel-Glide-Liquid-Nas-Obst

That is, the most sonorous element - the vowel, fills the slot of the syllable nucleus, while the less sonorous segments fill the slots in the margins in a hierarchical manner. There are variations, of course, with some languages favoring certain segments or segment sequences syllable-initially and syllable-finally, and other languages favoring other sequences. (There is also the problem of NC sequences in Bantu and other languages which are apparently in violation of the hierarchy; however, it is beyond the scope of this study, and we won't deal with it.). In our view, we don't think the statement of constraints on sequences in Sumbwa needs the use of the concept of consonant strength or sonority. As will become evident below, the syllable structure of the language is a simple one and does not need complicated statements like the language Hooper was dealing with. (We would like to note, however, that the notion of consonant strength, also known as the theory of lenition or strength hierarchies, is still useful as a typological statement of diachronic developments of consonants and will be used in the investigations of these developments, cf. Chapter 4).

Besides the set of phonological rules there are morphonological rules. These express morphonological alternations, of which two types can be recognized: productive and non-productive. The former can apply to new words (whether nonsense or borrowed) more or less exceptionlessly, while the latter can generally not. As noted already, non-productive alternations will be expressed using the suppletive format proposed by Hudson (1974b:219ff.; also Hooper 1976a:128-31). In this format, the alternates are entered in the lexicon as a disjunction, and a set of rules is posited to distribute them in the relevant environments. As an example, take the Sumbwa morphophonemic alternation <u>k/s</u>, and the forms -<u>teek</u>- 'cook'(v.), -<u>teesi</u> 'cook'(n.). In the suppletive approach, the lexical form here will be:

$$/\text{tee}\begin{Bmatrix}\text{k}\\ \text{s}\end{Bmatrix}/$$

and the distribution rules will be:

$$\begin{Bmatrix}\text{k}\\ \text{s}\end{Bmatrix} \dashrightarrow \begin{Bmatrix}\text{s} & /\_\_\ \text{i}\\ \text{k} & \text{otherwise}\end{Bmatrix}$$

One important argument for this approach in so far as our purposes in this study are concerned has to do with how analogical levelings affect alternations (cf. Hudson, Hooper, op. cit.). The claim here is that leveling affects the alternate that is secondary in function, in favor of the 'otherwise' alternate. The result is the simplification of lexical entries (as the distribution or morphophonemic rule is simultaneously lost).

The rules of the phonology are presented as follows. Phoneme/segment structure rules will be presented in section 3.2.1; syllable structure in section 3.2.2.; phonetic realization rules in section 3.2.3; and morphophonemic rules in section 3.2.4.

3.2.1 Phoneme Structure Rules

PSRs express the phonemes of language by stating their redundant feature specifications. In presenting PSRs for Sumbwa, we have reproduced the distinctive feature matrix (Table 1) as Table 1a below, filling the redundant slots (i.e. parentheses) with rule numbers for ease of reference. Letters (a-u) have been used for convenience of presentation, but the rules can also be referred to as (1-21), as we do elsewhere when we continue the count with Rule 22, 23, 24, and so on.

Table 1a: <u>A CLASSIFICATORY MATRIX FOR SUMBWA PHONEMES</u>

	p	b	ƀ	m	f	v	t	d	s	z	n	l	š	c	j	ň	y	k	g	ŋ	h
syl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
son	f	-	g	h	f	-	f	-	f	-	h	+	f	f	o	h	+	f	-	h	f
cor	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-	-	-	-	m	-
ant	+	+	+	+	+	+	+	+	+	+	n	d	-	-	-	-	l	-	-	m	-
bk	b	b	b	b	b	b	b	b	b	b	b	b	c	c	c	-	l	s	s	+	i
vcd	-	+	g	a	-	+	-	+	-	+	a	a	p	-	+	a	a	-	+	a	-
cnt	-	-	+	h	+	+	-	-	+	+	h	d	+	-	-	h	l	-	-	h	+
nas	e	e	e	+	e	e	e	e	e	e	+	-	e	e	e	+	-	e	e	+	e
str	q	q	-	q	r	+	j	j	j	j	-	-	j	+	+	k	k	k	k	k	k

	i	ii	u	uu	a	aa	e	ee	o	oo
syl	+	+	+	+	+	+	+	+	+	+
hi	+	+	+	+	t	t	-	-	-	-
lo	u	u	u	u	+	+	-	-	-	-
bk	-	-	+	+	t	t	-	-	+	+
long	-	+	-	+	-	+	-	+	-	+

a. [+son] ---> [+vcd]

b. [+ant]---> [-bk]

c. $\begin{bmatrix}\text{+cor}\\ \text{-ant}\end{bmatrix}$ --->[-bk]

d. $\begin{bmatrix}\text{+son}\\ \text{+cor}\\ \text{-nas}\end{bmatrix}$ ---> $\begin{bmatrix}\text{+ant}\\ \text{+cnt}\end{bmatrix}$

e. [-son]--->[-nas]

f. [-vcd]--->[-son]

g. $\begin{bmatrix}\text{-cor}\\ \text{+ant}\\ \text{+cnt}\\ \text{-str}\end{bmatrix}$ ---> $\begin{bmatrix}\text{-son}\\ \text{+vcd}\end{bmatrix}$

h. [+nas] ---> $\begin{bmatrix}\text{-cnt}\\ \text{+son}\end{bmatrix}$

i. $\begin{bmatrix}\text{-cor}\\ \text{-ant}\\ \text{-vcd}\\ \text{+cnt}\end{bmatrix}$ ---> [-bk]

j. $\begin{bmatrix}\text{-son}\\ \text{+cor}\\ \text{+cnt}\end{bmatrix}$ ---> [+str]

k. $\begin{bmatrix}\text{-cor}\\ \text{-ant}\end{bmatrix}$ ---> [-str]

l. $\begin{bmatrix} +son \\ -cor \\ -nas \end{bmatrix} \text{--->} \begin{bmatrix} -ant \\ -bk \\ +cnt \end{bmatrix}$ m. $\begin{bmatrix} +nas \\ +bk \end{bmatrix} \text{--->} \begin{bmatrix} -cor \\ -ant \end{bmatrix}$

n. $\begin{bmatrix} +cor \\ +nas \end{bmatrix} \text{--->} [+ant]$ o. $\begin{bmatrix} +cor \\ -ant \\ +vcd \end{bmatrix} \text{--->} [-son]$

p. $\begin{bmatrix} +cor \\ -ant \\ +cnt \end{bmatrix} \text{--->} [-vcd]$ q. $\begin{bmatrix} -cor \\ +ant \\ -cnt \end{bmatrix} \text{--->} [-str]$

r. $\begin{bmatrix} -cor \\ +ant \\ -vcd \\ +cnt \end{bmatrix} \text{--->} [+str]$ s. $\begin{bmatrix} -son \\ -cor \\ -ant \\ -cnt \end{bmatrix} \text{--->} [+bk]$

t. $\begin{bmatrix} +syl \\ +lo \end{bmatrix} \text{--->} \begin{bmatrix} -hi \\ +bk \end{bmatrix}$ u. $\begin{bmatrix} +syl \\ +hi \end{bmatrix} \text{--->} [-lo]$

It should be noted that Rule <u>t</u> or 20 (i.e. [+lo]--->[-hi] and the first part of Rule <u>u</u> or 21 (i.e. [+hi]--->[-lo] are universal redundancies, i.e. they apply to all human languages.

In addition to these rules stating the redundant values parenthesized in Table 1, other redundancies should be noted that involve features not mentioned in the classificatory matrix, but which may be utilized in expressing facts about the structure of segments which occur in the language. Some of these rules are:

22. $\begin{bmatrix} -cor \\ +ant \end{bmatrix} \text{--->} [+lab]$ 23. $\begin{bmatrix} +syl \\ -lo \\ \alpha bk \end{bmatrix} \text{--->} [\alpha lab]$

24. $\begin{bmatrix} +hi \\ -bk \end{bmatrix} \text{--->} [+pal]$ 25. $\begin{bmatrix} +syl \\ +lab \end{bmatrix} \text{--->} [+r(ou)nd]$

$$26.\begin{bmatrix}+son\\+cor\\+cnt\end{bmatrix} \dashrightarrow [+lateral]$$

Note that two of the redundant features, [lab] and [rnd] are in addition used in the formulation of rules (cf. sections 3.2.3.2.2.4, 3.2.3.2.3, and 3.2.4). It should also be noted here that the above analysis is not an exhaustive presentation of the structure of Sumbwa segments. It is, however, enough for the purposes of this study.

3.2.2 Syllable Structure

We shall in this study distinguish between a phonological and a phonetic syllable (cf. Pike 1947:145; Fudge 1969:254ff). The phonological syllable will be the product of the application of syllable structure conditions; the phonetic one the result of the additional application of phonetic realization rules such as nasal assimilation, prenasalization, devocalization and vowel assimilation (cf. sections 3.2.3.1 and 3.2.3.2).

At the phonological level, syllable structure in Sumbwa can be expressed in terms of positive and negative conditions (Stanley 1967:432) and if-then conditions. Positive conditions state generalizations concerning allowable sequences in the phonology. Negative conditions are prohibitions against sequences which do not occur.

3.2.2.1 Positive Condition

A general syllable structure condition for Sumbwa can be formulated as:

27. P(C): $/\$C_0^2V\$/$ (where P(C) = positive condition, and \$ = syllable boundary)

This positive condition states that the language has three phonological syllable patterns: V, CV, and CCV. An if-then condition specifies the phonetic content in the CC sequence.

28. $$\begin{array}{llccc} \text{If:} & /\$ & C & C & V\ \$/ \\ & & \downarrow & \downarrow & \downarrow \\ \text{Then:} & / & [+\text{nas}] & [-\text{syl}] & [+\text{syl}]/ \end{array}$$

i.e. in a CC sequence the first C is a nasal, the second any C. This condition also functions as a redundancy rule in that the feature [+nas] can be left unspecified in the lexicon, to be filled in later when syllable structure conditions apply.

Rules 27 and 28 will characterize the syllable structure of Sumbwa phonological words. They will function as syllabification rules which will apply after morphological spell-out rules and non-productive morphophonemic rules have applied. (That is, they will insert syllable boundaries). They will also function as conditions on borrowed words, i.e. any borrowing will have to satisfy these conditions. This can be illustrated with some examples of borrowings from Swahili.

Consider Swahili *štaki* > Sumbwa *sitaka* 'accuse, sue', Swahili treni (from English train)> Sumbwa teleni. In these examples, the CC sequences št and tr are not allowed in Sumbwa; they are naturally rejected by the SSCs. On the basis of the pattern CV, vowels are inserted between the CCs. The palatal vowel is inserted after s. The vowel inserted between the sequence tr is a copy of the next vowel. It should be noted that these vowel insertions follow universal principles of vowel insertion as suggested by Hooper 1976a:235-36: "The epenthetic V must always be the minimal V or a V whose features are copied from a nearby segment; usually this V is identical to a nearby V, although in some cases surrounding C's have an effect..." In the case of sitaka < štaki, the features of the vowel in the first syllable were copied from the alveo-palatal consonant š; in the case of teleni < treni, the inserted vowel is a copy of of the next vowel. š changes to s since the alveo-palatal fricative in other Bantu languages correspond to Lunzewe Sumbwa s. r changes to l to conform to the phoneme structure rule stating that Sumbwa only has one liquid: the lateral. The final vowel -a in sitaka conforms to the morphological condition that verb stems end in -a in the language.

3.2.2.2 Negative conditions

As stated earlier, negative conditions state sequences which do not occur. On the basis of the data we have, there are two such conditions.

One such condition has to do with the fact that Sumbwa lacks the sequences Nƀ and Nl, that is the bilabial voiced fricative and the lateral do not occur postnasally. This may be formulated as the following negative condition:

$$29.\ \sim [+\text{nas}] \begin{bmatrix} -\text{syl} \\ +\text{ant} \\ +\text{cnt} \\ -\text{str} \end{bmatrix}$$

That is, a sequence of nasal followed by an anterior, non-strident continuant is disallowed in the language.

Another negative condition has to do with the non-occurrence of Nj and Nš in the data we have. (Nc occurs in -coNcomel- 'eat quickly with appetite'). This may be represented as Rule 30:

$$30.\ \sim [+\text{nas}] \begin{bmatrix} +\text{pal} \\ \alpha\text{cnt} \\ -\alpha\text{vcd} \end{bmatrix}$$

Rules 29 and 30, in addition to stating the non-occurrence of particular sequences, will also function as conditions on borrowings.

3.2.3 Phonetic Realization Rules

As noted before, a phonetic realization rule is a command on how to time an articulatory gesture (from the speaker-point of view) in the pronunciation of the relevant phonological segment. The phonetic motivation of such a rule is usually transparent. Most PRRs are automatic; they may be optional. PRRs expressing automatic alternations have no exceptions. Usually, such rules are 'anywhere' rules, i.e. they apply wherever their structural description is met. New PRRs may have some exceptions (if they are spreading through the lexicon by diffusion), and may be stylistically, grammatically, or socially conditioned, apart from being phonetically conditioned. In this section we are concerned with PRRs which are, to my knowledge, still productive.

3.2.3.1 PRRs involving Consonants

3.2.3.1.1 Nasal Assimilation (NA)

Sumbwa, as many other languages around the world, has a nasal assimilation rule by which the nasal segment assimilates to the place of articulation of the following non-syllabic segment.

Two types of NC sequences can be distinguished: those that are traceable to lexical representations, and those that are formed through the morphological process of prefixation.

As noted earlier, NC sequences traceable to the lexicon are represented as: [-syl][-syl]; the feature [+nas] is filled in by a sequential redundancy rule, i.e. syllable structure condition no. 28. Examples of such sequences are:

/i-ƀuNba/ 'clay'	/li-iNso/ 'eye'
/-igoNt-a/ 'bask'	/i-loNko/ 'clod'

(Note that "-" indicates a morpheme boundary. To make the data in this study comparable to other Bantu data, we have followed the tradition of some Bantuists (e.g. Guthrie) of presenting data showing root and other morphemes. Syllable boundaries are not shown; they are taken to be evident in light of the conditions formulated above).

These examples have presumably passed through all the rules except for phonetic realization rules. The N is an archisegment, unspecified as to place of articulation. The rule for the phonetic realization of this archisegment may be formulated as:

31. $/+\text{nas}/ \longrightarrow [\alpha\text{place}] / \_\_\_ \begin{bmatrix} -\text{syl} \\ \alpha\text{place} \end{bmatrix}$

The cover feature [place] has been used here since the features [cor] and [ant] cannot distinguish bilabials from labiodentals. In the language, [place] subsumes: bilabial, labiodental, alveolar, alveopalatal, palatal, velar, and glottal.

In addition to lexical CC sequences, prefixation creates NC sequences which are subject to the nasal assimilation rule. The n- involved represents classes 9 (singular) and 10 (plural) noun marker, and the first person subject and object marker in verbal constructions. Examples are:

Nouns	Verbs
/n-pasa/-->[mpasa] 'axe'	/n-bod-a/-->[mboda] 'I hit'
/n-fui/-->[ɱfui] 'fish'	/n-fil-a/-->[ɱfila] 'I take'
/n-zala/-->[nzala] 'hunger'	/n-tuk-a/-->[ntuka] 'I insult
/n-koni/-->[nkoni] 'stick'	/n-cool-a/-->[ňcoola] 'I draw
	/n-gul-a/-->[ŋgula] 'I buy'

(Glosses: -bod- 'hit', -fil- 'take', -tuk- 'insult', -cool- 'draw (a picture)', -gul- 'buy'). As can be seen, n- is realized as [m], [ɱ], [n], [ň], and [ŋ]. Alveopalatal realizations (with š) are non-existent in the dialect under description (cf. Rule 30). As pointed out earlier, the corresponding consonant is a borrowing; in addition, as will be noted in chapters 5 and 6, wherever it occurs in Sukuma and Nyamwezi, it corresponds to Lunzewe Sumbwa s .

3.2.3.1.2 Prenasalization

The NC sequences to which Rule 31 applies do not get realized only as homorganic. In addition, they are realized with the phonetic duration of single segments, i.e. the two segments get unified into a complex segment composed of features of both segments, with [+nas] preceding [-syl]. This phenomenon is known as prenasalization (cf. Herbert 1975, 1977). This realization process is characteristic of many Bantu and other languages. A problem with this process is how to formalize it in feature terms. Although it can be represented as:

32. CC--->C

the rewrite rule format does not quite capture this type of unification process very well since one way the process could be represented would be:

$$33.\ [+nas][-syl]\text{--->}\begin{bmatrix}-syl\\+nas\end{bmatrix}$$

which does not say whether the [-syl] segment is prenasalized, nasalized, or postnasalized. One way of representing this process that is available in the literature is to allow complex symbols (Campbell 1974a) to be used to represent the output of unification processes like prenasalization. Thus the above process may be formulated as:

$$34.\begin{bmatrix}+nas\\\alpha place\end{bmatrix}\begin{bmatrix}-syl\\\alpha place\end{bmatrix}\ \text{--->}\ [+nas\ -syl]$$

i.e. the NC sequence would be realized as a single segment as specified. The complex symbol [+nas -syl] would function as a command to time the gesture for [+nas] before that for [-syl]. For other views, see Herbert 1975.

Prenasalization is important in Sumbwa (and Bantu) phonology at least in one way. All phonetic realizations of vowels occurring in the environment /__NC/ are long, and prenasalization can be said to trigger this lengthening (cf. section 3.2.4).

3.2.3.1.4 Nasalization

The unification referred to above as regards prenasalization becomes nasalization in the case of /n-y/ and /n-h/. Examples are:

/n-y/	/n-h/
/n-yog-a/-->[ňoga] 'I shout	/n-heem-a/-->[ṅeema] 'I breathe
/n-yoNb-a/-->[ňomba] I say'	/n-ham-a/-->[ṅama] 'I shout'
/n-yung-a/-->[ňunga] I visit'	/n-hik-a/-->[ṅika] 'I arrive'

The rule that nasalizes /y/ and /h/ can be formulated as:

$$35. \quad [+nas] \begin{bmatrix} -cor \\ -ant \\ +cnt \end{bmatrix} \; \text{--->} \begin{bmatrix} -cor \\ -ant \\ +cnt \\ +nas \end{bmatrix}$$

The rule says that if a non-coronal, non-anterior continuant follows a nasal the two will be unified into a single nasalized segment.

3.2.3.1.5 Reduction in [+nas][+nas] sequences

Reduction in these sequences can be observed in these examples:

/ku - n - moog - a/ ---> [kuumooga] 'to shave me'
 to -me - shave-suf

/ku - n - nug - a / ---> [kuunuga] 'to hate me'
 hate

/ku - n - ňooň - a/ ---> [kuuňooňa] 'to exploit me'

This reduction, which is probably due to the complete assimilation of the first nasal to the second, may be formalized as the following rule:

$$36.\quad [+nas]_1[+nas]_2 \text{--->} [+nas]_2$$

(cf. section 3.2.3.2.4.2. for a consideration of vowel lengthening due to nasal reduction).

3.2.3.1.6 Post-nasal strengthening

This realization process affects post-nasal stem-initial ƀ's and l's, producing the phonological alternations b/ƀ and l/d. Following are examples of the b/ƀ alternation:

/Ø-ƀiika/-->[ƀiika!] 'keep!'	/Ø-ƀa/-->[ƀa!] 'be!'
/a-ƀiika/-->[aƀiika] 'he keeps'	/a-ƀa/-->[aƀa] 'he becomes
/n-ƀiika/-->[mbiika] 'I keep'	/n-ƀa/-->[mba] 'I become'

Following are examples of the l/d alternation:

/Ø-lila/-->[lila!] 'cry!'	/Ø-luka/-->[luka!] 'vomit!'
/a-lila/-->[alila] 'he cries'	/a-luka/-->[aluka] he vomits
/n-lila/-->[ndila] 'I cry '	/n-luka/-->[nduka] 'I vomit'

These examples show that ƀ and l occur initially and intervocalically, while b and d occur post-nasally. A question arises as to whether the process at work here should be understood as a weakening initially and intervocalically or a strengthening post-nasally. In the consideration of this question, some of the factors to be taken into account are: (a) ƀ, l, b, and d are all phonemes in Sumbwa; (b) the continuants are by far more frequent than the stops in the alternations. Now, if the process were treated as a weakening it would be impossible to predict which b's and d's become continuants, i.e. weakening is non-productive, and no longer constitutes a generalization. However, if the process were regarded as a strengthening, only those continuants occurring post-nasally would be affected, and the rule would be a general one. In addition, the strengthening solution captures one generalization about the language: ƀ's and l's do not occur post-nasally. (More on this in Chapter 7, where it is argued that this rule is an inverted version of the diachronic rule *b>ƀ/*V(##)__V)).

The strengthening rule, formulated as:

$$37.\ \begin{bmatrix}-\text{syl}\\+\text{ant}\\-\text{str}\end{bmatrix} \text{--->} [-\text{cnt}]/[+\text{nas}]\_\_\_$$

is actually the same rule that was stated as a negative condition on sequences in syllables, i.e. Rule 29 (cf. section 3.2.2.2).

3.2.3.2 PRRs involving vowels

Realization processes involved here are: devocalization (or gliding), assimilation, lengthening, and complete assimilation of a vowel to a consonant.

3.2.3.2.1 <u>Devocalization</u>

Sumbwa does not allow VV sequences at the phonetic level, except only as lengthened vowels. Whenever VV sequences occur in phonological representations, there are some processes that remove them. These processes are: devocalization and assimilation. Devocalization occurs when the non-low vowels /i, u, o/ are followed by another vowel. Their phonetic realizations are: [y, w, w], respectively.

3.2.3.2.1.1. <u>The /i/-->[y] realization</u>

/i/ is realized as [y] before vowel segments /e, a, o, u/, whether across the syllable/morpheme or word boundary, as shown below:

(1) /si-oma/--->[syooma] 'piece of metal'
/si-ambalua/--->[syaambalua] 'sth. to wear'
/ƀi-ombo/--->[ƀyoombo] 'utensils'
/ƀi-umba/--->[ƀyuumba] 'rooms'

(2) /mulimi##alalia/-->[mulimyaalalya] 'the farmer ate'
/mulimi##eekulia/-->[mulimyeekulya] the " is eating
/mulimi##oƀaha/-->[mulimyooƀaha] 'the " is afraid'
/mulimi##umuhe/-->[mulimyuumuhe] 'give the farmer'

Examples in (1) illustrate devocalization across the syllable boundary within words; those in (2) illustrate devocalization across word boundaries. Note also that there is vowel lengthening after the derived glides. This will be dealt with below. The devocalization of /i/ in the specified environments can be formalized as the following rule:

$$38.\quad \begin{bmatrix} +syl \\ +hi \\ -bk \end{bmatrix}_{\alpha} \text{--->} [-syl] / \_\_\ V_{\beta}$$

3.2.3.2.1.2 <u>The /u/--->[w] realization</u>

When /u/ is followed by a vowel (other than itself) across a syllable/morpheme or word boundary it is realized as a glide [w]:

(1)/mu-ana/--->[mwaana] 'child'

/mu-enekili/-->[mweenekili] 'himself, herself'

/mu-ihazi/-->[mwiihazi] 'killer'

/mu-ombesi/-->[mwoombesi] 'builder'

(2)/ndimu##isatu/-->[ndimwiisatu] 'three animals'

/isumu##elio/-->[isumweelyo] 'that spear'

/muntu##azia/-->[muuntwaazya] the person has gone

/muntu##oyo/-->[muuntwooyo] 'that person'

Examples in (1) illustrate realization across the syllable boundary, those in (2) realization across the word boundary. As in the case of /i/--->[y], there is lengthening after the derived glide. Note also the pre-NC lengthening of vowels, as evidenced in [muuntu]. This will be dealt with below.

The devocalization of /u/ can be formalized as:

39. $\begin{bmatrix} +syl \\ +hi \\ +bk \end{bmatrix}_{\alpha}$ --->[-syl]/__ V_{β}

3.2.3.2.1.3 The /o/-->[w] realization

There are no morpheme-internal /o-V/ sequences in the language. However, derived /o-V/ sequences occur in "perfective in -e" constructions, cf. section 3.2.4.2.3. They also occur across the word boundary, and these are the ones we shall consider in this section. Examples are:

/olo##akazia/-->[olwaakazya]

/ngoko##ekukola/-->[ngokweekukola] 'since he's doing

/nolo##iyiite/-->[nolwiiyiite] 'even if s/he kills her/himself'

As in the other cases, lengthening here is associated with gliding. The gliding rule here can be stated as:

40. $\begin{bmatrix} +syl \\ -hi \\ +rnd \end{bmatrix}$---> [-syl]/__(##)V

where V is a vowel other than $\begin{bmatrix} +bk \\ +rnd \end{bmatrix}$.

It should be noted that rules 38, 39, and 40 would make a complicated rule if collapsed. Such a formalization would represent no generalization especially as /e/, the front congener of /o/, does not trigger devocalization in the language. Only 38 and 39 seem to represent a generalization that can be collapsed into one rule, as formulated below:

41. $\begin{bmatrix}+\text{syl}\\+\text{hi}\end{bmatrix}_{\alpha}$ ---> [-syl]/__ V_{β}

3.2.3.2.2 <u>Vowel Assimilation</u>

Complete vowel assimilation occurs across the syllable and word boundary when two vowels occur in juxtaposition, except for the sequences affected by devocalization. This type of assimilation is always regressive. The vowels affected are: /a/, /e/, and /o/, i.e. [-hi] vowels. After the rule of assimilation has applied, the assimilated vowel is identical with the following vowel, and both are realized as a long vowel.

3.2.3.2.2.1 <u>Assimilation of /a/</u>

The vowel /a/ is assimilated across the syllable/morpheme boundary when followed by /e/, /i/, and /o/ (there are no /a-u/ sequences word-internally), and across the word boundary when followed by /e/, /i/, /o/ and

/u/. Assimilation of /a/ across the phonological syllable boundary is illustrated as follows:

/ƀa-enekili/--->[ƀeenekili] 'themselves'
plur-self

/ƀa-ivi/--->[ƀiivi] 'thieves'

/ƀa-ombesi/--->[ƀoombesi] 'builders'

Assimilation of /a/ across the word boundary is illustrated by the following examples:

/ipanga##ikulu/--->[ipangiikulu] 'big bush knife'

/akaƀa##eekuiza/-->[akaƀeekwiiza] 'if he is coming'

/akasuƀa##ulimpe/--->[ukasuƀuuliimpe] 'if you return give it to me'

/mugoosya##oyo/--->[mugoosyooyo] 'that man, the man'

The assimilation rule at work in these examples can be formalized as:

$$42.\ \underset{1}{\begin{bmatrix}+\text{syl}\\+\text{lo}\end{bmatrix}}\ (\#\#)\ \underset{2}{\begin{bmatrix}+\text{syl}\\-\text{lo}\end{bmatrix}} \ \text{--->}\ \underset{2}{\begin{bmatrix}-\text{lo}\\+\text{long}\end{bmatrix}}$$

i.e. a sequence of low and non-low vowels is realized as a long non-low vowel.

3.2.3.2.2.2 <u>Assimilation of /e/</u>

There are no morpheme-internal /e-V/ sequences in the language. But /e-i/ occurs across the morpheme boundary in prepositional, perfective and causative forms of some 'monosyllabic' verbs; this sequence is subject to progressive assimilation (cf. section 3.2.4.2.2). /e-V/ sequences also occur across the word boundary, before vowels /o/, /a/, /i/, and /u/; these are subject to regressive assimilation, and will be considered in this section. Examples are:

/nge##oɓeene/--->[ngooɓeene] 'it is you' (emphatic)

/ɓuile##akuzia/--->[ɓwiilaakuzya] 'Bwiile will go'

/a-li-e##i-gi/--->[alyiigi] 'let him eat an egg'

/nge##uli/--->[nguuli] 'that is how you are'

This process can be formalized as the following rule:

$$43.\quad \underset{1}{\begin{bmatrix}+\text{syl}\\-\text{bk}\\-\text{hi}\\-\text{lo}\end{bmatrix}}\ \underset{2}{[+\text{syl}]} \text{--->} \underset{2}{\begin{bmatrix}+\text{syl}\\+\text{long}\end{bmatrix}}$$

i.e. a sequence in which the front mid vowel is followed by a vowel other than itself is realized as a lengthened second vowel.

3.2.3.2.2.3 Assimilation of /o/

We have already seen above that if /o/ occurs in juxtaposition with /a/, /e/, and /i/ across the word boundary, it is devocalized. When, however, it occurs before /u/, it is assimilated. Examples are:

/ƀugolo##uƀulie/--->[ƀugoluuƀulye] 'eat the tobacco'

/oko##ulamuha/--->[okuulamuha] 'since you gave him'

We can formalize this process as:

$$44.\quad \underset{1}{\begin{bmatrix}+\text{syl}\\+\text{bk}\\-\text{hi}\end{bmatrix}}\underset{2}{\begin{bmatrix}+\text{syl}\\+\text{bk}\\+\text{hi}\end{bmatrix}} \text{--->} \underset{2}{\begin{bmatrix}+\text{hi}\\+\text{long}\end{bmatrix}}$$

i.e. a sequence in which a non-high back vowel is followed by a high back vowel is realized as a lengthened high back vowel.

3.2.3.2.2.4 Devocalization and Assimilation: The Rules

Both devocalization and assimilation involve sequences of vowels, and both trigger lengthening. These processes have the effect of removing sequences of non-identical vowels in phonetic representations. It is possible to formulate two realization rules which summarize the facts of devocalization and assimilation as follows:

Devocalization:

$$45.\quad \underset{1}{\overset{V_i}{\begin{Bmatrix}[+\text{hi}]\\ [+\text{rnd}]\end{Bmatrix}}}\ \underset{2}{V_j} \text{--->} \underset{1}{G}\ \ \underset{2}{\overset{V}{[+\text{long}]}} \qquad \text{(where G = glide)}$$

Exception: [+rnd][+rnd] sequence is never affected by the rule.

This rule states that a sequence of non-identical vowels in which the first one is either high or round (except for the [+rnd][+rnd] sequence) is realized as a glide and a lengthened vowel.

Assimilation:

$$46.\ \underset{\substack{[-hi] \\ 1}}{V_i}\ \underset{2}{V_j} \text{--->} \underset{\substack{[+long] \\ 2}}{V}$$

The rule states that a sequence of non-identical vowels in which the first one is non-high is realized as a lengthened second vowel.

These two rules can apply anywhere their structural description is met.

3.2.3.2.2.5 Realization of sequences of identical vowels

The realization of sequences of identical vowels is simply a lengthened vowel, as exemplified:

/ka-ana/--->[kaana] 'a small child'

/a-agalala/--->[aagalala] 'he is facing problems'

/mu-ana##alia/--->[mwaanaalya] 'the child has eaten'

/igi##i-kulu/--->[igiikulu] 'a big egg'

The realization rule for such sequences is:

$$47.\ V_iV_i \text{--->} \underset{[+long]}{V}$$

3.2.3.2.3 Complete assimilation of /u/ in mu-

This refers to the assimilation of /u/ in mu. The mu may be a marker for classes 1 and 3 nouns, 2nd person subject (plural) and 3rd person object pronoun or a stem-internal mu. The assimilation occurs when mu appears before a consonant. It is optional in slow (or careful) speech, but applies almost obligatorily in fast speech. Examples are:

/mu-goosya/--->[m̩goosya] 'a man'

/mu-lomo/--->[m̩lomo] 'mouth'

/mu-ti/--->[m̩ti] 'tree'

/halamuk-a/--->[halam̩ka] 'wake up'
wake up

/mu-ka-kema/--->[m̩kakema] 'if you (pl.) refuse'
you-if-refuse

/a-ku-mu-leeta/--->[akum̩leeta] 's/he will bring him'
s/he-to-him-bring

The essence of this assimilation process is that the syllabicity of /u/ is reassigned to m-. That is the process represents the fusion of the shared features of m- and u into one segment. The realization rule for this process can be formulated as:

$$48.\ \begin{bmatrix}\text{+nas}\\ \text{+lab}\end{bmatrix} \begin{bmatrix}\text{+syl}\\ \text{+lab}\\ \text{+hi}\end{bmatrix} \text{--->} \begin{bmatrix}\text{+nas}\\ \text{+lab}\\ \text{+syl}\end{bmatrix}$$

Condition: Optional

i.e. a labial nasal followed by a labial high vowel is optionally realized as a syllabic labial nasal. (The feature value [+hi] is needed to block the rule from applying to /mo/).

3.2.3.2.4 <u>Vowel Lengthening</u>

Although phonetic vowel length in Sumbwa is a direct realization of phonological length, phonetic length may also be due to devocalization, complete regressive assimilation, the phonetic realization of a sequence of identical vowels, and lengthening before [+nas][-syl] sequences. Apart from the last-mentioned instance of lengthening, all these sources of phonetic length have been considered above. Here we shall consider further lengthening due to devocalization, and also deal with length before [+nas][-syl] sequences. These two types of lengthening differ from the other types since they may be said to be instances of 'compensatory lengthening'. (There is also lengthening after the first person subject/ object marker <u>n</u>- before vowel-initial verb stems. This is dealt with in section 3.2.4 under MPR's since it seems to be conditioned by the first person morpheme.)

3.2.3.2.4.1 <u>Lengthening due to devocalization</u>

As noted in section 3.2.3.2.1, devocalization is accompanied by the lengthening of the conditioning vowel. Examples have already been given; some more below:

/u - a - zi - a/ ---> [waazya] 'you have gone'
you-perf-go-suffix

/i - a - zi - a/ ---> [yaazya] 'it has gone'
it

/olo ## a - a - zi - a/---> [olwaazya] 'if he goes'
if he -perf-

One thing that is evident here is that lengthening occurs only if there is no pause following the conditioning vowel: for instance in /uazia/-->[waazya] 'you have gone' the first /a/ lengthens because there is no pause following, while the second /a/ does not as it occurs immediately before a pause. Secondly, it should be noted that if the derived glide follows a consonant as in [waazya], it gets unified with the consonant in such a way that the two result in a segment that has the phonetic duration approximating that of a simple segment (cf. prenasalization, section 3.2.3.1.2).

One way to understand lengthening due to devocalization is to regard it as a sort of 'compensatory lengthening', i.e. the conditioning vowel, if not before a pause, lengthens to fill in the slot left by the devocalized segment which can not stand as a syllabic peak. Thus another condition has to be added to Rule 46 (restated as Rule 49 below) to make it more accurate:

49.
$$\begin{array}{cccc} V_i & V_j \text{--->} & G & V \\ \left\{\begin{matrix}[+hi]\\ [+rnd]\end{matrix}\right\} & 2 & 1 & \begin{matrix}[+long]\\ 2\end{matrix} \\ 1 & & & \end{array}$$

Conditions: 1) [+rnd][+rnd] sequence is never affected by the rule.
2) lengthening does not occur if V_2 occurs before a pause.

3.2.3.2.4.2 <u>Vowel Lengthening before NC sequences</u>

In considering this, we shall start with lengthening before /n-N/ sequences. Examples are:

/ku - n - mani - a/--->[kuumanya] 'to know me'

/ku - n - nig - a/--->[kuuniga] 'to throttle me'

/ku - n - ňooň - a/--->[kuuňooňa] 'to exploit me'

In these examples, the vowel in ku- (the infinitive 'to') lengthens before underlying /n-N/ sequences, the first nasal being the first person object marker, the second the stem-initial segment. In these examples the realization of the first nasal is zero. (It gets lost probably through assimilation to the second nasal). The lengthening of the vowel before /n-N/ may clearly be regarded as 'compensatory lengthening', i.e. the vowel is lengthened to fill in the slot vacated by the lost nasal (cf. section 3.2.3.1.5).

As mentioned in section 3.2.3.1.2, lengthening is also due to prenasalization of obstruents. Examples are:

/ku - n - bod - a/--->[kuumboda] 'to hit me'
hit

/ku - n - tuk - a/--->[kuuntuka] 'to insult me'
insult

/ku - n - kat - a/--->[kuunkata] 'to cut me'

/ku - ƀuNb - a/--->[kuƀuumba] 'to mould'

/ku - soNt - a/--->[kusoonta] 'to point at'

/ku - toNg - a/--->[kutooŋga] 'to go ahead'

These examples show that there is lengthening of the vowel preceding any /NC/ sequence, whether traceable to the lexicon or derived. But the N does not delete as in the /n-N/ examples. Recall, however, that NC clusters in Sumbwa get realized phonetically as prenasalized consonants (cf. section 3.2.3.1.2.). As noted there, the duration of these consonants is approximately equivalent to that of simple consonants. This means that this unification of Nasal-Obstruent sequences leaves an empty slot which, apparently, triggers the lengthening of the preceding vowel.

Other instances of lengthening before NC sequences have to do with /n-y/ and /n-h/ sequences. Here the second consonant gets nasalized. Examples for /n-y/ are:

```
/ku-yoNb-a/-->[kuyoomba]  /ku-n-yoNb-a/-->[kuuňoomba]
 to-say                                   'to tell on me'

/ku-yool-a/-->[kuyoola]  /ku-n-yool-el-a/-->[kuuňoolela]
   pick up                         for  'to pick up for me

/ku-yuNg-a/-->[kuyuunga]  /ku-n-yuNg-il-a/-->[kuuňuungila]
    visit                                   'to visit me'
```

Examples for the /n-h/ sequence are:

```
/ku-huul-a/-->[kuhuula]    /ku-n-huul-a/-->[kuuħuula]
to-hit                                    'to hit me'

/ku-hit-a/-->[kuhita]     /ku-n-hit-a/-->[kuuħita]
    pass                                  'to pass me'

/ku-heek-a/-->[kuheeka]  /ku-n-heek-a/-->[kuuħeeka]
   carry on back                   'to carry me on back'
```

The process of pre-NC lengthening can be expressed by the following rule:

50. [+syl] --->[+long]/___[+nas][-syl]

It should be noted that the application of this rule is related to the applications of the following rules:

34. $\begin{bmatrix} +\text{nas} \\ \alpha\text{place} \end{bmatrix} \begin{bmatrix} -\text{syl} \\ \alpha\text{place} \end{bmatrix}$ ---> [+nas -syl]

35. [+nas] $\begin{bmatrix} -\text{cor} \\ -\text{ant} \\ +\text{cnt} \end{bmatrix}$ ---> $\begin{bmatrix} -\text{cor} \\ -\text{ant} \\ +\text{cnt} \\ +\text{nas} \end{bmatrix}$

36. $[+\text{nas}]_1[+\text{nas}]_2 \text{--->} [+\text{nas}]_2$

These rules present a problem in relation to the application of Rule 50, and vice versa. In the classical TG view, Rules 34-36 bleed Rule 50. In a model which allows language-specific extrinsic ordering, Rule 50 would have to be ordered before 34, 35, and 36. But, as has been argued by Koutsoudas et al. 1974, Hudson 1975:37ff and Hooper 1976a:53-83, extrinsic ordering is by no means the only way to resolve problems of this kind, nor is it a necessary part of the form of grammar.

Although this is not the place to go into the arguments for and against language-specific extrinsic ordering, it is appropriate to point out that all cases of such ordering can be replaced with the principple of un-restricted application of rules which subsumes 1) application of rules wherever their structural descriptions are met, and 2) simultaneous rule application. The rule application problem mentioned above can be resolved by applying rules 34, 35, and 36 simultaneously with Rule 50, which will result in correct outputs.

3.2.4 Morphophonological Rules (MPRs)

Morpho(pho)nological rules belong to "morphonology", which is understood as not representing a subcomponent of language but an area of the interaction between phonology and morphology and/or the lexicon (cf. Dressler 1981; Wurzel 1981). A morphologically conditioned rule is one that applies in a certain morphological category or categories; a lexically conditioned rule is one that applies to some lexical items, but not to all that meet the structural description of the rule. Some MPRs are only of the first type, some only of the second, but others are both morphologically and lexically conditioned.

It seems reasonable to make a distinction between productive and non-productive MPRs (cf. Dressler 1981). 'Productivity' here should be understood in the sense of the applicability of a rule to new forms. A productive MPR is always exceptionless in relation to the forms to which it is supposed to apply. An example of such a rule in Sumbwa and other Bantu languages is the vowel harmony (VH) rule (cf. section 3.2.4.2.1); this rule is exceptionless in relation to the morphological categories to which it is supposed to apply. A non-productive MPR is one that has exceptions even in the categories it is supposed to apply. (As we will see in Chapters 6, and 7, some of the synchronically non-productive MPRs are relics of historically productive PRRs). Examples of non-productive MPRs are the 'velar softening' rules /k,g/--->/s,z/ and the labial weakening rules /p,b/--->/f,v/ (cf. section 3.2.4.1), which are interchanges between phonemes in the specified environments.

As already mentioned previously, we shall use Hudson's format to express non-productive MPRs (cf. Hudson 1974b). This consists of positing the alternates in lexical representations, and writing the relevant MPRs to distribute the variants in the appropriate environments. Listing the variants in the lexicon means, of course, that they are unpredictable and unproductive (since the lexicon consists of unpredictable and unproductive phenomena). The productive MPRs will be expressed using the traditional rewrite format. We have used this format to express phoneme structure rules (which are essentially rules of implication) and PRRs. In using the rewrite format we are expressing the fact that these are a type of morphonological 'realization rules', that is they start with phonological representations as inputs and end up with phonetic representations as outputs.

Most of the rules to be dealt with here govern alternations in the root-final position. We shall deal with MPRs involving consonants first (section 3.2.4.1), and then those involving vowels (section 3.2.4.2).

3.2.4.1 MPRs involving consonants

3.2.4.1.1 b/v:

Post-nasal b alternates with v in verbs when the nominal suffix -i and the perfective suffix -ile are affixed. Examples are:

Stem	Nominal	Perfective
/ɓaNb-a/ 'peg out'	/ɓaNv-i/	/ɓaNv-ile/
/ɓuNb-a/ 'mould'	/ɓuNv-i/	/ɓuNv-ile/
/yoNb-a/ 'say'	/yoNv-i/	/yoNv-ile/
/heNb-a/ 'light a fire'	/heNv-i/	/heNv-ile/

This alternation is morphologically and lexically conditioned. It is morphologically conditioned because it is restricted to certain morphological categories (in the above case, Nominal and Perfective); it is lexically conditioned because not all of the relevant lexical items show the alternation. Now, in accordance with the lexical representational approach, the variants b and v will both be entered in the lexicon. Taking /buNb-a/ as an example, its lexical representation will be: /ɓuN$\left\{\begin{matrix}b\\v\end{matrix}\right\}$/.

The morphonological rules:

$$51.\quad \begin{bmatrix}-son\\+lab\\-/+str\end{bmatrix} \text{--->} [+str] \;/\_\_ \quad \underset{\text{Nominal}}{-\underline{i}} \;,\; \underset{\text{Prefective}}{-\underline{ile}}$$

will distribute the variants to their respective environments. (Note that the "-/+" notation in relation to a feature will be used throughout to indicate lexicalization. The notation replaces +X, i.e. minor rule formulation used in other versions of generative phonology).

3.2.4.1.2 b/v:

This alternation occurs when the nominal morpheme -i is suffixed to b- final verb stems, as the following examples show:

Stem	Nominal
/kuaƀ-a/ 'engage in some activities to get wealthy'	/kuav-i/
/iƀ-a/ 'steal'	/iv-i/
/gab-a/ 'distribute'	/gav-i/
/ƀiƀ-a/ 'sow'	/ƀiv-i/

(This alternation also occurs in perfective forms but in 1978 the researcher noticed that some native speakers of the Lunzewe dialect did not have the alternation in -iƀ-, and -gaƀ-. Further research is needed to determine whether some native speakers have lost the alternation in the perfective forms or not.)

The MPR for these forms is:

$$52.\quad \begin{bmatrix} \text{-syl} \\ \text{+lab} \\ \text{+cnt} \\ \text{-/+str} \end{bmatrix} \text{--->}\ [\text{+str}]/\_\_\quad \underset{\text{Nominal}}{\underline{\text{i}}}$$

3.2.4.1.3 *p*/*f*:

This alternation affects the few verbs with final *p*. Examples are:

Stem	Causative	Perfective
/ihiNp-a/ 'become short'	/ihiNf-i-a/	/ihiNf-ile/
/puup-a/ 'become light' (not heavy)	/puuf-i-a/	/puuf-ile/

The rule for this alternation is:

$$53.\quad \begin{bmatrix} \text{-son} \\ \text{+lab} \\ \text{-vcd} \\ \text{-/+str} \end{bmatrix} \text{--->}\ [\text{+str}]/\_\_\quad \text{Causative, Perfective}$$

Rules 51, 52, and 53 represent 'general' non-productive MPRs which can be conflated as follows:

$$54.\quad \begin{bmatrix} \text{-son} \\ \text{+lab} \\ \text{-/+str} \end{bmatrix} \text{--->}\ [\text{+str}]/\_\_\ \begin{array}{l} \text{Nominal, Causative,} \\ \qquad\qquad \text{Perfective} \end{array}$$

where Nominal is -*i*, Causative -*i*-, and Perfective -*ile*. The suffixes have to be specified in the rule to block the selection of other suffixes, e.g. Nominal -*o*, Causative -*is*i-, Perfective -*e*. From now on whenever we write

Nominal, Causative, and Perfective, we shall be referring to -*i*, -*i*-, and -*ile*, respectively.

3.2.4.1.4 *l*/*z*:

This occurs in verbs with root-final *l*'s; the *z* alternate occurs in causative, nominal (for some stems) and perfective stems. In the perfective, however, the *z* occurs only in verb-roots of the -*CVl*- type (cf. next section for more examples). Following are examples of the -*CVl*- verb-root type:

Stem	Nominal	Causative	Perfective
/kal-a/ 'become dry'	---	/kaz-i-a/	/kaz-ile/
/kel-a/ 'be clever'	/kez-i/	/kez-i-a/	/kez-ile/
/kol-a/ 'do'	/koz-i/	/koz-i-a/	/koz-ile/
/kil-a/ 'surpass'	---	/kiz-i-a/	/kiz-ile/
/kul-a/ 'grow'	---	/kuz-i-a/	/kuz-ile/

The MPR for distributing the variants to their relevant environments is:

$$55.\ \begin{bmatrix}\text{+cor}\\ \text{+cnt}\\ \text{+vcd}\\ \text{-/+str}\end{bmatrix} \text{--->} [\text{+str}]/ \langle \text{CV}\rangle\_\_ \ \text{Nominal, Causative,} \ \langle\text{Perfective}\rangle$$

As an example of the lexical form of verbs of this type, let us take the verb-root for 'grow', whose lexical representation can be expressed as:

$$/ku \begin{Bmatrix} z \\ l \end{Bmatrix} /$$

and the above MPRs will distribute the variants accordingly.

3.2.4.1.5 d/z and t/s:

The d/z alternation applies to nominal, causative, and perfective forms, as these examples show:

Stem	Nominal	Causative	Perfective
/kand-a/ 'plaster'	/kanz-i/	/kanz-i-a/	/kanz-ile/
/lond-a/ 'follow'	/lonz-i/	/lonz-i-a/	/lonz-ile/
/fund-a/ 'become narrow'	---	/funz-i-a/	/funz-ile/
/lend-a/ 'while away the time'	/lenz-i/	/lenz-i-a/	/lenz-ile/
/lind-a/ 'wait for'	/linz-i/	---	/linz-ile/

The blanks in respect to /fund-a/ 'become narrow' and /lind-a/ 'wait for' merely mean that these verbs no longer use the nominalizing suffix -i in the formation of nouns. The nominal for /fund-/ is /fund-e/, and the causative form for /lind-/ is /lind-iisi-a/.

A similar situation obtains in regard to the t/s alternation. It is exceptionless in perfective forms; it applies to most nominal forms, and only to a few causative forms. Examples are:

Stem	Nominal	Causative	Perfective
/leet-a/ 'bring'	/lees-i/	---	/lees-ile/
/but-a/ 'give birth to'	/bus-i/	---	/bus-ile/
/kat-a/ 'cut'	/kas-i/	---	/kas-ile/
/it-a/ 'kill'	/is-i/	---	/is-ile/
/hit-a/ 'pass'	/his-i/	/his-i-a/	/his-ile/
/tet-a/ 'speak'	/tes-i/	/tes-i-a/	/tes-ile/

The MPR governing the distribution of the variants is:

$$56.\ \begin{bmatrix} \text{-son} \\ \text{+cor} \\ \text{-/+cnt} \end{bmatrix} \text{---> [+cnt]/\_\_ Nominal, Causative, Perfective}$$

3.2.4.1.6 g/z and k/s:

The g/z alternation occurs in nominal forms in some verbs, in causative forms in other verbs, and in both forms in at least one verb. Examples are:

Stem	Nominal
/swaag-a/ 'chase away'	/swaaz-i/
/log-a/ 'bewitch'	/loz-i/
/hiig-a/ 'hunt'	/hiiz-i/
/ihag-a/ 'kill'	/ihaz-i/

Examples of causative forms in which the alternation occurs are:

Stem	Causative
/zig-a/ 'burn, e.g. of food being cooked'	/ziz-i-a/
/haag-a/ 'be satisfied with food'	/haaz-i-a/
/saNg-a/ 'find'	/sanz-i-a/
/og-a/ 'wash'	/oz-i-a/

In at least one verb, the alternation occurs in both the nominal and the causative forms:

Stem	Nominal	Causative
/yuNg-a/ 'visit'	/yuNz-i/	/yuNz-i-a/

The k/s alternation behaves in similar ways to g/z. It occurs in nominal, or causative, or both forms. As in the g/z case, the perfective forms are not affected. Examples of nominal forms are:

Stem	Nominal
/taNk-a/ 'court (a lady)'	/taNs-i/
/suk-a/ 'plait'	/sus-i/
/ziik-a/ 'bury'	/ziis-i/
/oNbek-a/ 'build'	/oNbes-i/

Examples of causative forms are:

<u>Stem</u>	<u>Causative</u>
/puluguk-a/ 'escape suddenly'	/pulugus-i-a/
/lok-a/ 'set (of sun)	/los-i-a/
/oNk-a/ 'suck'	/oNs-i-a/
/hulik-a/ 'be silent'	/hulis-i-a/

Examples of verbs showing the alternation in both their nominal and causative forms are:

<u>Stem</u>	<u>Nominal</u>	<u>Causative</u>
/fuluk-a/ 'move one's residence'	/fulus-i/	/fulus-i-a/
/guluk-a/ 'jump'	/gulus-i/	/gulus-i-a/
/piluk-a/ 'turn, change'	/pilus-i/	/pilus-i-a/

The rule governing the g/z and k/s alternations is:

$$57.\ \begin{bmatrix} \text{-son} \\ \left\{ \begin{matrix} \begin{bmatrix} \text{-cor} \\ \text{-ant} \\ \text{-cnt} \end{bmatrix} \\ \begin{bmatrix} \text{+cor} \\ \text{+ant} \\ \text{+cnt} \end{bmatrix} \end{matrix} \right\} \end{bmatrix} \text{--->} \left\{ \begin{matrix} \begin{bmatrix} \text{+cnt} \\ \text{+cor} \end{bmatrix} & /\_\_\_ \text{ Nominal, Causative} \\ \begin{bmatrix} \text{-cnt} \\ \text{-cor} \end{bmatrix} & \text{Otherwise} \end{matrix} \right\}$$

It is evident from the above that Rule 57 is lexically, in addition to being morphologically, conditioned. Lexical items affected in their nominal forms only will have to be marked [-Rule 57, Causative], and those affected in their causative forms only will be marked [-Rule 57, Nominal]. Otherwise the rule may produce wrong outputs in these cases.

3.2.4.1.7 p/h:

This seems to be a relic alternation which occurs in forms of a few lexical items. As far as verbs are concerned, it occurs in one verb only, /ha/ 'give'. Examples below show that the p alternate occurs only in constructions in which (-)N-, the first person object marker, is used:

/a - mu - ha/ s/he-her/him-give 's/he gives her/him'	/a - N - pa/ s/he-me-give 's/he gives me'
/a - la - mu - ha/ past 's/he gave him/her'	/a - la - N - pa/ 's/he gave me'
/a - la - mu - ha - e/ 's/he will give her/him'	/a - la - N - pa - e/ 's/he will give me'

(In the third example, the future is marked by the discontinuous morpheme -la-... -e). There are also at least two noun forms in which the p/h alternation occurs:

/lu - he/ 'wooden tray'	/n - pe/ pl.
/lu - hu/ 'hide, skin'	/n -pu/ pl.

lu- and n- are here are Class 11 and 10 noun prefixes, respectively. The rules which distribute the variants involved are:

58. $$\left[\begin{array}{c} -\mathrm{son} \\ \left\{\begin{array}{c}[-\mathrm{ant}] \\ \begin{bmatrix}+\mathrm{ant}\\+\mathrm{lab}\end{bmatrix}\end{array}\right\}\end{array}\right] \dashrightarrow \begin{array}{l}\begin{bmatrix}+\mathrm{ant}\\+\mathrm{lab}\end{bmatrix} / \ [+\mathrm{nas}]\_\_ \\ [-\mathrm{ant}] \text{ Otherwise}\end{array}$$

3.2.4.1.8 Realization of first person marker in monosyllabic verb forms

There is a morphologically and lexically conditioned rule by which the first person subject marker n- is realized as a syllabic nasal in all monosyllabic verb constructions of the type: "I - habitual - Verb-root - Suffix". The monosyllabic verbs affected include: -li- 'eat', -ni- 'defecate', -nu- 'drink', -ku- 'pay dowry', -fu- 'die', -si- 'grind', -gu- 'fall'. Examples are:

/n - Ø - fu - a/ -->[m̩mfwa] 'I die'
/n - Ø - si - a/ -->[n̩nsya] 'I grind'
/n - Ø - gu - a/ -->[ŋ̩ŋgwa] 'I fall'

The realizations consist of two phonetic syllables: a syllabic nasal followed by a prenasalized syllable. The rule, though affecting verbs only, is 'productive' in the sense that it can apply to any monosyllabic verb (including nonsense forms) in the respective construction. And since there are no lexical syllabic nasals, the rule can be expressed as a morphonological 'realization' rule, thus:

59. $$/+\mathrm{nas}/ \dashrightarrow [+\mathrm{syl}] / \ \underset{\text{First Person Sing. Subject}}{\_\_\_\_ \ - \text{Monosyl. Verb}}$$

This morphophonological rule can be assumed to apply simultaneously with the prenasalization rule (cf. Rule 34).

3.2.4.2 MPRs involving vowels

3.2.4.2.1 Vowel harmony

Vowel harmony in many Bantu languages refers to the phenomenon whereby the high front vowel in verbal extensions (e.g. prepositional /il/, stative /ik/, causative /iisi/) assimilates to the height of the root mid-vowel, and also to the process whereby the u in the reversive extension /ul/ and the reversive stative /uk/ assimilates to the back, round mid vowel in roots. The first case is illustrated in the following:

Stem	Prepositional	Stative
/ƀon-a/ 'see'	/ƀon-il-a/-->[ƀonela]	/ƀon-ek-a/-->[ƀoneka]
/bel-a/ 'break'	/bel-il-a/-->[belela]	/bel-ik-a/-->[beleka]

Causative

/ƀon-iisi-a/-->[ƀoneesya]

/bel-iisi-a/-->[beleesya]

In these examples, the vowel of the extensions, i, harmonizes with the height of the root vowels o and e. The lowering rule which expresses this harmony is a completely productive rule. The same lowering rule applies to constructions taking the reversive /ul/ and the reversive stative /uk/, although here it is restricted to roots with the back mid vowel /o/:

Stem	Reversive	Reversive Stative
/som-a/ 'pierce'	/som-ul-a/--->[somola] 'pull out'	/som-uk-a/--->[somoka] 'poke out'
/gom-a/ 'disobey'	/gom-ul-a/--->[gomola] 'discipline'	/gom-uk-a/--->[gomoka] 'be obedient'

The rule for this lowering process is a morphonological realization rule which can be stated as:

$$60.\quad /{+}\text{syl}/\text{--->} \begin{bmatrix} -\text{hi} \\ -\text{lo} \\ \langle +\text{bk} \rangle \end{bmatrix} /\text{C-}\ \underset{\substack{\text{Prep., Stat., Caus.,} \\ \langle\text{Revers.}\rangle}}{\underline{\quad\quad}}\ \text{X\#\#}$$

3.2.4.2.2 <u>Lexical representation of monosyllabic verbs</u>

In Sumbwa, as in many Bantu languages, there are eleven or so 'monosyllabic' verbs whose phonetic surface forms may be exemplified as follows:

	Stem	Prepositional	Causative	Perfective
A.	-ƀa 'be'	-ƀeela	---	-ƀeele
	-ha 'give'	-heela	---	-heele
	-sya 'grind, dawn'	-syeela	-syeesya	-syeele
	-nya 'defecate'	-nyeela	-nyeesya	-nyeele
	-nwa 'drink'	-nweela	-nweesya	-nweele
	-kwa 'pay dowry'	-kweela	-kweesya	-kweele
B.	-fwa 'die'	-fwiila	-fwiisya	-fwiile
	-gwa 'fall'	-gwiila	-gwiisya	-gwiile

-lya 'eat'	-liila	-liisya	-liile
-zya 'go'	-ziila	---	-ziile
-vwa 'come from; leak'	-vwiila	-vwiisya	-vwiile

(Note that ny in -nya 'defecate' is pronounced as a palatalized alveolar nasal, not as a palatal nasal.)

Two points need to be made in regard to the surface phonetic realization of these forms:

(1) verbs in A take e in their prepositional, causative and perfective forms, a vowel that is not manifested in the stem forms; those in B take i - which is normal with root-final u and i (which, by the way, have undergone Gliding).

(2) The perfective forms in A take e instead of the usual i (e.g. -teek-ile [teekile] 'have cooked', -log-ile [logile] 'have bewitched', -lim-ile [limile] 'have cultivated', etc.). In this case at least the monosyllabic verbs in question seem to exhibit a different pattern.

One analysis that has been proposed to account for forms in A is to posit root-final e in all the verbs showing e in their extensions (cf. Kahigi 1977:70ff; also Givón 1970). Thus:

	Stems		Prepositional		Perfective	
A.	-ƀe-a	[ƀa]	-ƀe-ila	[ƀeela]	-ƀe-ile	[ƀeele]
	-he-a	[ha]	-he-ila	[heela]	-he-ile	[heele]
	-nie-a	[nya]	-nie-ila	[nyeela]	-nie-ile	[nyeele]

	-sie-a	[sya]	-sie-ila	[syeela]	-sie-ile	[syeele]
	-nue-a	[nwa]	-nue-ila	[nweela]	-nue-ile	[nweele]
	-kue-a	[kwa]	-kue-ila	[kweela]	-kue-ile	[kweele]
B.	-fu-a	[fwa]	-fu-ila	[fwiila]	-fu-ile	[fwiile]
	-gu-a	[gwa]	-gu-ila	[gwiila]	-gu-ile	[gwiile]
	-li-a	[lya]	-li-ila	[liila]	-li-ile	[liile]
	-zi-a	[zya]	-zi-ila	[ziila]	-zi-ile	[ziile]
	-vu-a	[vwa]	-vu-ila	[vwiila]	-vu-ile	[vwiile]

(The causative forms are not shown; however, given the causative morpheme -isia, the respective forms can be derived as follows: -nie-isia [nyeesya] 'cause to defecate', nue-isia [nweesya] 'cause to drink', etc.)

It should be observed that the positing of root-final e in extensions in A is justified since 1) it is present on the surface, and 2) it explains the lowering of the high vowel in the prepositional, etc. extensions. On the other hand, the positing of e in the stem forms presents a problem. Apart from the fact that the vowel is not present on the surface in stem forms, there is the additional problem of positing a segment which is later eliminated by one or two rules. In this case the rules may either be vowel deletion or assimilation and then vowel shortening (e.g. -be-a 'be'--> [ba-a] --> [ba])). In the approach followed here, such unproductive or restricted allomorphy is handled by representing the surface allomorphy between stem and extensional forms in lexical representations. Thus the lexical forms in A above would be: -ƀ(e)-, -h(e)-, -ni(e)-, -si(e)-, -nu(e)-, -ku(e)-, accompanied with rules distributing the forms with e in prepositional, causative and perfective extensions, those without e elsewhere. The only rules that would then apply in extensional forms would be the usual ones of Vowel Lowering and Gliding, which are normal rules in the language.

The vowel lowering rule that will take care of monosyllabic forms will be a modification of Rule 60:

```
61.   /+syl/--->┌ -hi  ┐ /(C)- ____ X##
                │ -lo  │    Prep., Stat.,Caus.,
                └<+bk> ┘      <Revers.>, Perfect
```

Condition: Perfect forms only affected in monosyllabic verbs.

3.2.4.2.3. The Perfective in -e

In this section we consider a case of allomorphy which occurs in perfective and non-perfective stems of a certain class of polysyllabic verbs. Consider the following examples:

	Stem	Perfective
A.	bomol-a 'pull down, e.g. a wall, building, etc.'	bomweele
	kolol-a 'cough'	kolweele
B.	tegel-a 'trap for'	tegeele
	tetel-a 'cackle'	teteele

C. lagal-a lageele
'drop'

tatal-a taleele
'become wet'

D. fumul-a fumwiile
'pierce'

kuzul-a kuzwiile
'pound e.g. corn'

E. ingil-a ingiile
'enter'

gulil-a guliile
'buy for'

Given these examples, one might be tempted to posit a rule of l-drop which would apply in the perfective forms. This rule would trigger other processes, as exemplified below:

kolol-ile	'have coughed'
kolo -ile	l-drop
kolo -ele	Vowel Lowering
kolw -ele	Gliding
kolw-eele	Vowel Lengthening

The problem with the rule of l-drop, however, is that the above pattern of forming perfectives is not restricted to l-final roots. It is a very productive process which also includes polysyllabic roots ending in n, m, k, and g, as illustrated here:

F. -lagan-a lageene
'promise each other'

-gaban-a gabeene
'share, divide'

-sigin-a sigiine
'pulverize'

G. -tumam-a 'work' — tumeeme

-fikim- 'sob' — fikiime

-hangam- 'live a long life' — hangeeme

H. -guluk-a 'jump, fly' — gulwiike

-bonek-a 'be seen' — boneeke

-halik-a 'be bigamous' — haliike

I. -ihag-a 'kill' — iheege

-tulag-a 'castrate' — tuleege

-sandag- 'incise' — sandeege

It is readily apparent that an analysis which allows a rule of l-drop above would leave these examples out, to be accounted for in some other way. In fact, it is difficult to see how one would account for the phonetic realizations of perfective forms in F - I without resorting to some 'crazy' synchronic derivations such as: */halik-ile/ --> [haliike], */ihag-ile/ --> [iheege], */tumam-ile/ --> [tumeeme], */lagan-ile/ --> [lageene], etc. (An asterisk before a form means that the form does not occur).

A different analysis, one followed here, starts with the systematic alternations in all the above examples (A-I). These alternations are: u/wii, o/wee, a/ee, e/ee, _i_/_ii_. On this analysis, the perfective suffix is -_e_. It should be noted that this manner of forming the perfective is not used in roots which end in NC, e.g.:

-sumink-a 'tie'	sumink-ile --> [sumiinkile]
-kalamunk-a 'dry up, e.g. clothes'	kalamunk-ile --> [kalamuunkile]
-kulung-a 'make smooth and round'	kulung-ile --> [kuluungile]
-kalang-a 'fry, roast'	kalang-ile --> [kalaangile]

(Note that vowel lengthening takes place in pre-NC position.)

Let us consider the vowel alternations further. In _u_/_wii_, _o_/_wee_, it is clear that Gliding and Vowel Lengthening have applied in _wii_ and _wee_. The sequences before the application of these rules are: _ui_ and _oe_. _ee_ in _a_/_ee_ can be analyzed as _ae_ with regressive assimilation applying to give _ee_. Given this analysis, the phonological representations of the vowel alternations are: _u_/_ui_, _o_/_oe_, _a_/_ae_, _e_/_ee_, _i_/_ii_. In rule form, the alternation may be stated as:

62. $[\ldots V_i C-]_{Verbroot} \rightarrow [\ldots \underset{\langle -hi \rangle}{V_i} \quad \underset{\langle e \rangle}{i} \quad C\ -]_{Perf.}$

Since this is a morphophonemic rule it will apply before the phonological rules of gliding, lengthening, and vowel assimilation. (A similar rule was used by Givón 1970:47ff to account for perfective forms in Bemba, and also by Mould 1972:109ff as a 'historical' rule that applied in Rundi, Ankore, and Ganda.)

3.2.4.2.4 Vowel lengthening after the first person marker

This is a morphologically and lexically conditioned process which applies after the first person marker n in constructions involving vowel-initial verb stems. Some examples are:

/ku - n - ihag - a/---> [kuniihaga]
to-me-kill 'to kill me'

/ku - n - agalaz -i -a/-->[kunaagalazya]
-bother sb. 'to bother me'

/ku - n - egelel - a/--->[kuneegelela]
'come near' 'to come near me'

/ku - n - oɓah - a/---> [kunooɓaha]
-fear 'to fear me'

This lengthening rule applies to all vowel-initial verbs; it is productive. Since the rule involved here is simply a realization rule, we can formalize it as follows:

63. [+syl]--->[+long]/N ___
1st Pers
Sg.

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Chapter 4

Reconstructing voiced stops in Sumbwa and Bantu: the problem of stops vs. continuants

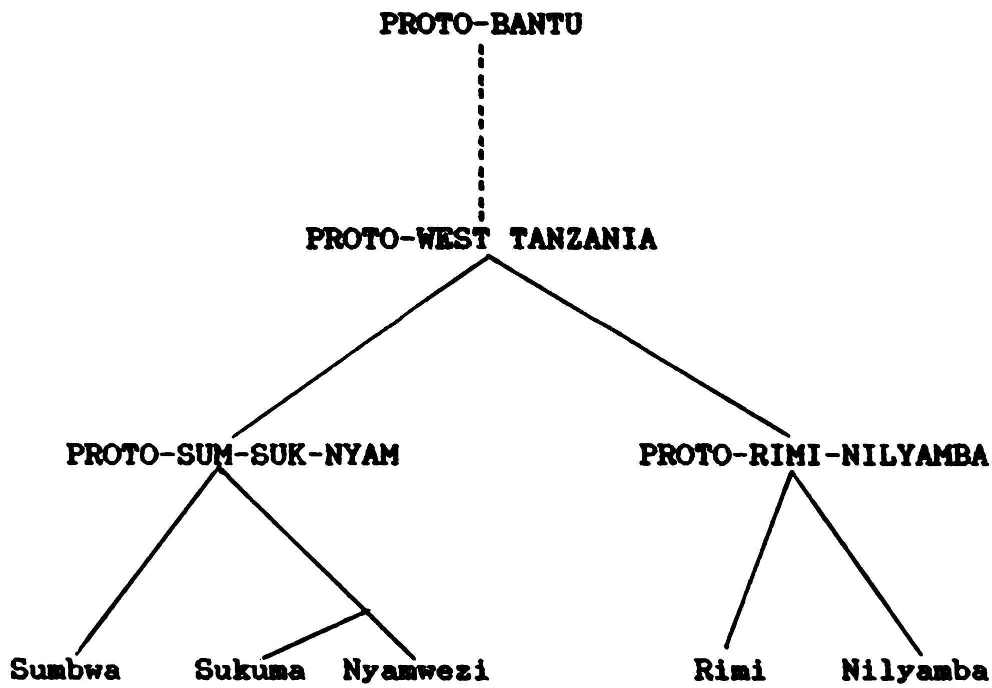
4.0 Introduction

This chapter deals with the issue of whether stops or continuants should be inferred as representing an earlier stage in the diachronic evolution of Sumbwa and Bantu in general. In Bantu diachronic studies, continuants (*b̲, *l̲, and *g) were proposed by Meinhof 1910[1899] and stops (*b̲, *d̲, and *g) by Homburger 1914 and Guthrie 1967-71, among others[1]. We will call this the stops vs. continuant issue in Bantu reconstruction. Meinhof based his proposal on two principles: frequency of occurrence and analogical symmetry (1929:46-7; 1932:28-31). Guthrie also uses the principle of frequency of occurrence, but adds another important principle: probable direction of sound shifting (Vol.1:61-62). Although these principles will be dealt with in section 4.2, it is necessary to define them here as we shall refer to at least two of them in the next section.

Let us start with the principle of frequency of occurrence. Sometimes known as the "majority vote principle" (Zwicky 1973:408) it states that, other things being equal, "...if the majority of the daughter languages agree in having a certain feature, then that feature is to be attributed to the proto-language" (Zwicky, op. cit.). In internal reconstruction, it is the more frequent alternant that is attributed to the pre-language. The problem here, as we will see later, is that "other things" may not be equal in some cases. The principle of analogical symmetry, as used by Meinhof, may be defined as follows. If the majority of segments (or features) in a series (e.g. stops) are reconstructed on solid evidence, the remaining segment (or feature) may be posited on analogy with the others even if there is no sufficient evidence. (It should be noted that the synchronic counterpart of this principle, known as "pattern congruity" in structuralist literature, has been criticized [cf. Hyman 1975:94]). The third principle, that of the "probable direction of sound shifting", refers mainly to conditioned sound changes. It may be defined thus: given a particular environment (e.g. intervocalic), segments are more likely to change in a particular direction than otherwise. For instance, intervocalically, stops tend to spirantize, before the palatal vowel they tend to palatalize, etc. This principle is usually subsumed under the label 'phonetic plausibility'.

Most researchers writing diachronic phonologies (or slices thereof) of Bantu languages have generally used Meinhof's or Guthrie's reconstructions without saying why, and the principles that underlie them have remained for the most part un-investigated (but see 4.2 below). However, if we are to approach the diachronic phonology of a Bantu language (and of Bantu in general) in a principled way, the issue must be discussed, and grounds for preferring one set of reconstructions over another clarified. Furthermore, in the application of internal reconstruction (cf. section 4.1) in Sumbwa and Rimi (Nyaturu), it seems difficult to decide in an un-arbitrary way, which alternants (stops or continuants) should be posited as pre-segments. This is the 'stops vs. continuants' issue in the internal reconstruction of these languages. Here we find conflicting principles, a situation reflecting the stop vs. continuant controversy. The only way out is a consideration of all the principles underlying the stop and continuant reconstructions. In this consideration, some well-known methodological and theoretical principles, including simplicity, phonetic and typological plausibility, etc. are brought to bear on the issue.

The following prehistoric linguistic systems or stages will be referred to in this study: Proto-Bantu, Proto-West Tanzania, Proto-Suk(uma)-Ny(amwezi)-Sum(bwa) and Pre-Sumbwa. Proto-Bantu refers to an inferred stage from which all Bantu languages presumably derive. Proto-West Tanzania refers to the ancestor of Sukuma, Sumbwa, Nyamwezi, Rimi, Nilyamba and other languages which belong to the West Tanzania group (cf. Nurse and Phillipson 1980) or Guthrie's Zone F. Proto-Suk-Sum-Ny refers to the ancestor of Sukuma, Sumbwa and Nyamwezi. Pre-Sumbwa refers to the system arrived at solely on the basis of internal evidence. The 'diachronic' relationships among Sumbwa, Sukuma, Nyamwezi, Rimi, and Nilyamba in relation to the proto-languages can be presented schematically as follows:



As expected, this schema is similar to the subgrouping schema in Chapter 1, page 4. The broken line between Proto-Bantu and Proto-West Tanzania indicates that there are intermediate stages. The 'shallow' notch of separation between Sukuma and Nyamwezi indicates that they are close enough to still be regarded as 'dialects of the same language' (Nurse and Phillipson 1980:48).

The chapter has the following sections. Section 4.1 deals with the reconstruction of voiced consonants in Sumbwa and West Tanzania in relation to the stops vs. continuant issue; it is shown that the two solutions (Meinhof's and Guthrie's) stem from a conflict between principles of reconstruction. Section 4.2 addresses the stops vs. continuant controversy in Bantu reconstruction; the various arguments (considerations) involved in the issue are dealt with in the different sub-sections.

4.1 Reconstructing the voiced series in Sumbwa and West Tanzania

Our aim in this section is to show that there is a conflict between methodological principles of reconstruction - specifically between the principle of frequency of occurrence and probable direction of sound shifting, or phonetic plausibility. We do this by attempting to reconstruct the voiced consonant series in Sumbwa (section 4.1.1) and Rimi (where the voiceless series is also dealt with) (section 4.1.2). Data from other West Tanzania languages (Sukuma, Nyamwezi, and Nilyamba) is not discussed but is given alongside Sumbwa data for comparative purposes. However, conclusions reached in respect to Sumbwa generally apply to the other languages as well since, as the data shows, the situations are similar and even identical in some cases. The conflict of principles, it is noted, can lead to arbitrary and inconsistent reconstructions. It is suggested that the problem be approached from the broader perspective of Bantu languages in general with a consideration of all the principles involved.

4.1.1 The case of Sumbwa voiced segments

The alternations considered in this section are: b/ƀ, b/v, d/l, d/z, and g/z.

4.1.1.1 The g/z alternation:

We shall deal with this alternation first since the internal data in the language under description is completely unambiguous as to the segment to be posited. g/z only occurs with verbs. Examples for g/z were presented in section 3.2.3.1, some of which are: -zig- 'burn (of food')/ -zizi- 'cause to burn, -taag- 'throw away'/-taazi- 'take away by force',-log- 'bewitch /-lozi 'witch'.

One notable fact is that g is the more frequent alternant in the g/z alternation, i.e. z occurs before i only, and g elsewhere. This is certainly an obvious case of where, in respect to frequency of occurrence, other things are completely equal. It is thus easy to infer that the original segment was *g, and z is a result of weakening in the relevant environment. The reconstruction of *g is supported by the fact that g occurs in very common roots in Sumbwa and other West Tanzania languages. Examples:

Sumbwa	Sukuma	Nyamwezi	Nilyamba	Gloss
-ganza	-ganza	-ganza	-gandza	'palm of hand'
-gendo	-gendo	-gendo	-gend- (v.)	'journey'
-gi	-gi	-gi	-gi	'egg'
-golo	-golo	-golo	-golo	'yesterday'
-gu-	-gu-	-gu-	-gu-	'fall'

-gulu	-gulu	-gulu	-gulu	'leg'
-gili	-gili	-gili	-gili	'warthog'
-gongo	-gongo	-gongo	-gongo	'back(bone)'
-gana	-gana	-gana	-gana	'hundred'

Thus *g is not only valid for Pre-Sumbwa, it is also valid for Proto-Sumbwa- Sukuma-Nyamwezi.

*g, however, is presumably not the only reconstruction that could be proposed. Hinnebusch 1973:8-9, following Meinhof 1932, proposes the corresponding fricative *g as the proper reconstruction for Swahili and other Kenyan Bantu coastal languages. It should be noted that the Swahili and Sumbwa situations are very much alike: Swahili also has the g/z alternation - in relic form (e.g. -log-/-lozi 'bewitch/witch'; -tung-/-tunzi 'compose/ composer'; -finyang-/-finyanzi 'mould pots with clay/ n.';etc.) and g occurs in roots which correspond to the Sumbwa/Sukuma/Nyamwezi/Nilyamba forms above: e.g. -ganja 'palm of hand'; -endo 'distance'; -gu- 'fall' (obsolescent, poetic); -gongo 'back'; -guu 'leg'; -gili 'warthog'; etc. Thus, if the fricative *g was proposed in the case of Swahili, it could presumably be proposed for Pre-Sumbwa or Proto-West Tanzania. As we shall argue below in section 4.2 (cf. also Kahigi 1984), such an approach is subject to several fundamental objections, which have to do mainly with the principles of simplicity, and phonetic and typological plausibility.

4.1.1.2 b/ƀ, b/v; d/l, d/z

In these alternations, the first members occur postnasally, and the second elsewhere (in the case of ƀ and l) or in a morphological environment (in the case of v and z). Examples for these alternations were given in sections 3.2.3.1.6 and 3.2.4.1, but we will repeat a few examples below for convenience of reference.

Examples for b/ƀ are: n-bon-a/a-ƀon-a 'I see/he sees', n-bumb-a/a-ƀumb-a 'I mould/he moulds', n-bogo/ka-ƀogo 'buffalo/small buffalo', lu-ƀoola/n-boola 'bee sting/pl.' This alternation is also present in Nyamwezi and Sukuma; e.g. n-bogo/ka-ƀogo 'buffalo/small...'; -ƀin-/n-bina 'dance(v.)/dance(n.)'; n-buli/ka-ƀuli 'goat/small...'n-bula/ka-ƀula 'rain/ little...'; -ƀisi/n-bisi 'raw, unripe/ with class 9/10 nouns'. In Nilyamba, postnasal b alternates with Ø; examples are: lu-alu/mbalu 'rib/s', lu-elele/mbelele 'woman's breast/s', -isi/mbisi 'fresh, unripe', -al-/umbalilye 'count/count for me'.

b/v can be illustrated as follows: ƀumb-a/mu-ƀumv-i 'mould/one who ..s',-yomb-a/mu-yomv-i 'say/ one who says or speaks'; -sumb-a/mu-sumv-i 'create/ creator'. This alternation does not occur in Nyamwezi, Sukuma and Nilyamba (from the data available to me).

Examples for d/l are: -li/n-di 'be/I am'; n-daal-a/a-laal-a 'I sleep/he sleeps', n-dil-a/a-lil-a 'I cry/he cries'; n-dim-a/a-lim-a 'I cultivate/he cultivates'. This alternation is also productive in Nyamwezi, e.g. -li/n-di 'be/I am'; -lual-/ n-dual-ile 'become sick/I am sick'; -laal-/n-daal-ile 'sleep/I am sleeping'; lu-lela/n-dela 'umbilical cord/pl.'; lu-limi/n-dimi 'tongue/pl.'; -lim-/ n-dim-ile 'cultivate/I am cultivating'. As with b/~~b~~, this alternation is limited in Sukuma for the same reason: the competing assimilation to the nasal; a few examples, however, are: -li/n-di 'be/I am'; lu-lila/n-dila 'bud/buds'; -laal-/n-daal-o 'sleep/sleeping place'. In Nilyamba, the l/d alternation occurs in some forms, although in specific contexts l is assimilated to the alveolar nasal. Examples of l/d are: lu-lelu/ndelu 'beard/s', mala/nda 'intestines', -la/ndia 'eat/food', lu-loti/ndoti 'dream/s', liipu/ndiipu 'long', -let-/ undetele 'bring/bring me'. (Root-initial l is nasalized if the following syllable is a nasal or a nasal compound. Examples: lu-limi/nimi 'tongue/s', -lindil-/unindile 'wait for/wait for me', -longol-/nongole 'go ahead/ I am going ahead').

d/z can be exemplified as follows: -lind-a/ a-linz-ile 'wait for/he is waiting for', -lund-/a-lunzile 'store up/ he has already ...', -lend-a/a-lenz-ile 'while away the time/he is...' This alternation is absent in Nyamwezi, Sukuma and Nilyamba.

Turning now to the reconstruction of the pre-/

proto-segments relating to the above examples, we shall first eliminate alternants which are not possible pre-/proto-segments. v and z are restricted to the palatal environment (in the respective morphological category). We may assume that whatever gave rise to z and v might have been some type of palatalization followed by assibilation (i.e., e.g. d>dy>dz>z) and spirantization followed by stridentization (i.e. *b>b̸>v). Thus v and z can be left out of consideration as possible pre-/proto- segments. This leaves us with b and ƀ, and d and l.

Now, the question which confronts a diachronist is whether to posit the stops *b and *d and diachronic rules of the type: *b>ƀ, *b>v, *d>l, *d>z. (i.e. weakening rules), or the continuants *ƀ and *l and strengthening rules of the type: *ƀ>b, *l>d, and *l>z. (For the notions weakening and strengthening see section 4.2.4 below). We noted in the reconstruction of *g above that the reasons why it was easy to posit it are: it occurs more frequently in paradigms than z; it occurs in non- alternating form in common words (not only in Sumbwa, but also in Nyamwezi and Sukuma and also Swahili), and the other alternate, z, is restricted to __i/ile. In the case of b/ƀ, d/l, the continuants are more frequent in paradigms (and textually) than the stops. Thus if 'other things are equal' we would be justified in positing *ƀ and *l as pre-segments (and also as proto-segments for Proto-Sum- Suk-Nyam). But let us see whether 'other things are equal'. Let us apply the principle of 'probable direction of sound shifting', and see whether it is in agreement with the principle of frequency of occurrence. If the continuants *ƀ̲ and *l̲ are posited we will have strengthening rules, i.e. *ƀ̲>b̲/N__, *l̲>d̲/N__, which are plausible phonetically. Of course we can stop here and claim that the two principles are in agreement. (This is where proponents of the Meinhof solution stop). Yet there is another possibility that cannot be discounted: that of positing the less frequent, i.e. the stops *b̲ and *d̲, and weakening rules, *b̲>ƀ̲/V(#)_V, *b̲>y̲/_i/ile, *d̲>l̲/V(#)_V, *d̲>z̲/_i/ile, which are also phonetically plausible. Once this possibility is considered, then the conflict between the two principles becomes real, and perhaps cannot be resolved using internal data.

It thus seems that the internal evidence and the principles in question do not point unequivocally to either solution. In either case, the directionality of the sound shifts can be justified: intervocalic weakening and postnasal retention are phonetically plausible; but so is postnasal strengthening. Here is a dilemma: should we allow frequency of occurrency to take precedence or not? However we decide, it seems there is no way to prevent some arbitrariness in the decision.

4.1.2 The case of Rimi alternations

To illustrate the conflict of principles further, we shall consider some consonant alternations in Rimi (Nyaturu), a sister of Sumbwa. A synchronic phonology of Rimi has to include the following alternations in its description: b/ƀ, d/r, g/ǥ, exemplified as follows:

b/ƀ: uƀaru/mbaru 'rib/s', ubee/mbee 'woman's breast', kaƀua/mbua 'rain', kaƀogo/mbogo 'buffalo'.

d/r: -rorya/ndoryo 'watch/ evidence', rurimi/ndimi 'tongue/s', -rigirya/ndigirya 'speak/language', la/nda 'eat/stomach', -riδ-/-ndiδi 'pay/fine'.

g/ǥ: -ǥurube/ngurube 'pig/s', ruǥohe/ngohe 'string', -ǥur-/ngura 'buy/I buy', -ǥoor-/-ngoora 'straighten/ I straighten'.

In these examples, the stops occur postnasally, and the continuants elsewhere. And from the data in Olson 1964 and Nurse 1979a:37-44 there is no doubt that the continuants are more frequent. This situation is similar to the Sumbwa situation: if one gives precedence to the principle of frequency of occurrence, one can posit the continuants *ƀ, *l, and *ǥ, and the diachronic rules: *ƀ>b/N_, *l>d/N_, and *ǥ>g/N_. These rules are phonetically plausible. But if one considers the other possibility, that of positing the less frequent, the result will be: *b, *d, *g, and *b>ƀ/V(#)_V, *d>l/V(#)_V, and *g>ǥ/V(#)_V. The rules are undoubtedly plausible. Discounting the second possibility without good reasons does not make the reconstructions based on frequency more valid.

Rimi is even more interesting in that there are corresponding alternations in the voiceless series. These are: *p/Φ*, *t/ɾ*, *kx/x*. The first members occur postnasally; the second, elsewhere. Some examples:

p/Φ: -*Φia*/*nimpya* 'new', -*ΦeΦo*/*mpeΦo* 'cold, wind', -*Φembe*/*mpembe* 'horn', -*Φik*-/*mpiko* 'arrive/arrival'.

t/ɾ: -*ɾend*-/*ntendo* 'do/deed', -*ɾig*-/*ntiga* 'be straight/giraffe', -*ɾem*-/*unteme* 'cut/cut me', -*ɾum*-/*ntuma* 'send/I send'.

kx/x: -*xoor*-/*nkxoora* 'cough/I cough', -*xam*-/*nkxama* 'milk/I milk', -*xand*-/*nkxanda* 'plaster/I plaster'.

Other distributional facts are: 1) there are no intervocalic *p*'s and *t*'s; 2) for the most part, *x* occurs before *a*, *e*, *o*, and *ų*; *k* occurs before *i*, *į*, and *u* (cf. Olson 1964); 3) there are also instances of postnasal *x*, e.g. *nxama* 'heifer'.

As in the voiced series, the continuants here are more frequent than the stops. Given this fact, the continuants could be posited as pre-segments, i.e. **Φ*, **ɾ*, **x*, with the rules: **Φ*>*p*/N_, **ɾ*>*t*/N_, and **x*>*kx*/N_. Since *k* occurs before *i*, *į*, and *u*, an additional rule will be needed: **x*>*k*/.... Note that **x*>*k*/... is not a common change before vowels, although one could find some way to justify it. There is the other possibility: that of positing stops instead of continuants, which will result in: **p*, **t*, **k*, and **p*>*Φ*, **t*>*ɾ*, **k*>*x* and **k*>*kx*. This solution has the

advantage of eliminating the uncommon rule *x>k/...
Incidentally, both Meinhof and Guthrie agree on reconstructing voiceless stops. However, this does not eliminate the more general concern of the need to state explicitly what should take precedence when there is some apparent conflict of principles, in both internal and comparative reconstruction.

4.1.3 The problem of consistency

Apart from the problem of conflict of principles noted in the foregoing, there is an additional problem of consistency in reconstruction. Whatever one may think reconstructions are, at least they have to be consistent. Consistency is required by the diachronic evolution itself; it is commonly uni-directional. Diachronic evolution moves from stage to stage: for instance from Proto-Bantu to Proto-West Tanzania to Proto-Sukuma-Sumbwa-Nyamwezi/ Pre-Sumbwa to Modern Sumbwa). That is, sound changes have a certain directionality (e.g. *b>ƀ>w>Ø, *d>dž>z>Ø, *g>ǥ>y>Ø) usually reflected in the dialect situation. On this view, a solution at one stage (e.g. Proto-West Tanzania) should be consistent with a solution at the previous stage (e.g. Proto-Eastern Bantu or Proto-Bantu). That is, if one were to posit *b and *d (plus the rules *b>ƀ, *d>l) for Proto-Bantu and *ƀ and *l (plus the rules *ƀ>b, *l>d) for Proto-West Tanzania, the two solutions would be mutually inconsistent since what would be a retention (postnasally) in the one case would be a strengthening in the other. Also, if one were to posit *ƀ and *l (and respective rules) for Proto-Bantu and *b and *d (and respective rules) for Proto-West Tanzania the two solutions would also be mutually inconsistent since what is diachronically basic in the former is taken as derived in the latter. This suggests that if a diachronic description of a language (e.g. Sumbwa) is to be consistent with descriptions of earlier stages it cannot use internal reconstruction alone; the larger comparative picture has to be brought in.

4.2 Stops vs. Continuants in Bantu Reconstruction

4.2.0 Background

However, the Sumbwa and Rimi cases are not only interesting for the problems they raise in respect to internal reconstruction. As already noted at the beginning of the chapter, the problem of "stops versus continuants" constitutes an important issue in Bantu diachronic reconstruction. As already noted, the continuant solution (i.e. the positing of *ƀ, *l, *ǥ) according to Meinhof 1910[1899], 1929, 1932, was generally based on two methodological principles: frequency of occurrence and analogical symmetry (1929:46-7; 1932:28-31). The stop solution (i.e. the positing of *b, *d, *g) is based on the principle of frequency of occurrence and the probable directionality of sound changes (Guthrie, Vol. 1: 61-2).

Although the 'stop versus continuant' controversy may be said to have been present in the field of Bantu historical phonology since 1914 when Homburger reconstructed Proto-Bantu stops instead of using Meinhof's 1910[1899] continuants, there hasn't been any principled discussion of the differences between the two solutions. For the most part, workers in this field have been satisfied with using either the continuant or stop reconstructions without commenting at all on the validity of their choice. (See for instance Tucker 1969; Tucker and Ashton 1942; Baucom 1974, 1975, who use Meinhof's continuant reconstructions; and Meeussen 1955, Coupez 1954, de Rop 1958, Jacobs 1965-66, and others who use stop reconstructions without even mentioning the problem. Meinhof himself, in the 1932 English edition of his 1910[1899] important work on Bantu historical phonology, does not even mention the problem.)

More recently, the stop versus continuant problem has been discussed or commented on by Nurse 1979b, Hinnebusch 1973, Mould 1977, and Hinnebusch et. al, 1981, who think that continuant reconstructions are the proper ones. The arguments given are: continuants occur more frequently in Eastern Bantu languages, and the Meinhof solution is more economical than the Guthrie one. Also, Mould 1977, discussing Dahl's Law and other sound shifts in the phonological history of Luyia, constructs a complicated argument to the effect that these changes can be explained if, and only if, continuants are posited and a diachronic conspiracy to preserve the redundancy of [voice] assumed.

However, in the brief and superficial discussions and commentaries which are given this problem by these workers, the methodological principles and their implications are barely touched upon. Thus Hinnebusch's observation that the "... question of continuants versus stops has not been fully argued in the literature" (1973:8) still holds.

In view of the difficulty confronted by the method of internal reconstruction in Sumbwa and Rimi, it is important that the problem be discussed. If a choice has to be made between continuants and stops it has to be based on well-known principles, and all the relevant available data taken into account. In the remaining part of this section the arguments that have been used in support of each side will be considered against the background of some assumptions concerning the well-formedness of reconstructions, how sounds change, the strength hierarchies of segments, etc. A number of solid considerations lead to the conclusion that stop reconstructions result in more plausible and economical derivations than continuant ones. It needs no stressing that the discussion of the larger issue has a bearing on the consideration of Sumbwa prehistory. To begin with, the Sumbwa problem noted above will get a resolution that is consistent with the broader Bantu picture. Moreover, the principles and assumptions that will be referred to in the course of the discussion will form a sort of background to the following sections and chapters which deal with various aspects of reconstruction in Sumbwa.

The problem is discussed as follows. Section 4.2.1 addresses the methodological principle of frequency of occurrence; section 4.2.2 deals with Meinhof's principle of analogical symmetry; the principle of simplicity is discussed in 4.2.3 considerations from the theory of strength and lenition hierarchies are brought to bear upon the issue in section 4.2.4 section 4.2.5 addresses Mould 1977; section 4.2.6 is the conclusion; and section 4.2.7 is a supplementary note, briefly touching on the issue of the 'possibility/ probability' of continuants in Proto-Bantu and the issue of the reality of reconstructions.

4.2.1 Frequency of Occurrence

This is undoubtedly the most important principle used by proponents of continuant proto-segments.

The argument based on this principle goes back to Meinhof 1929, 1932 who reconstructs *p, *t, *k, *b, *l due to the apparent fact that they occurred more frequently than other sounds which correspond to them in the languages he investigated. This position has been supported by Mould 1977:389 and Hinnebusch et. al, 1981:16.

4.2.1.1 Problems with the argument

As far as Bantu is concerned, the argument based on frequency of occurrence has two problems. In the first place, the claim that the continuants β, l, ɣ are more frequent than stops b, d, g is apparently not wholly supported by the facts. According to Guthrie 1967, Vol. 1:62, the distributions of the bilabial voiced stop (plain voiced and implosive/glottalic) and the continuant are very similar (See also Guthrie's Topogram 6:71). Also, the velar voiced stop (plain voiced and implosive/ glottalic) is distributed over a larger area than the corresponding continuant (op. cit., p. 62; see also Topogram 10, p. 75). The only continuant that can be said to be more frequently attested than the corresponding stop in Bantu is l (op. cit., p. 62; see also Topogram 8, p. 73). Here, d has a clearly restricted distribution. The general situation has been stated thus:"... the reflex of *nd usually contains d, while that of id does so in languages as far apart as Ganda E.15, Ngazidya G.44a, Nyanja N.31 and Venda S.21. In addition many languages have di as the reflex of *di"(op. cit., p. 62). If these distribution statements are correct, then the "majority vote" principle would not automatically rule out b or g as proto-segments. Only *d would need some justification on other than this principle.

The second problem with the argument based on the "majority vote principle" as it has been applied to Bantu by proponents of the continuant solution is that it has been used without regard to other constraints on the well-formedness of reconstructions. (In other words, they have applied the principle of frequency of occurrence without considering whether "other things are equal or not".) These constraints or principles include simplicity, and phonetic and typological plausibility. The simplicity criterion requires that a description be as concise and utilize as few constructs as possible; the criterion of phonetic plausibility, already noted before, requires that the sound changes or rules posited should reflect what is physiologically probable; and typological plausibility requires that well-formed reconstructions reflect the structural types, rule types and sound shifts that are in the daughters, and also agree in important ways with the types that are usually found in languages around the world (cf. Lass 1978:272).

4.2.1.2 Consequences of phonetic change in relation to frequency of occurrence

Let us now consider why the principle of frequency of occurrence should not be given precedence without exploring the other possibilities. The reason is very simple and is a commonplace to every linguist who has worked with phonological evolution: the consequences of long-term phonetic change. Given the necessary consequences of long-term phonetic change, the original or input segment might come to represent the 'minority vote'. We shall exemplify this first from languages with written traditions: Spanish and Greek. Ferguson 1978 reports two interesting cases of the historical spirantization of *d in Spanish and Greek. In both languages *d changed to the labio-dental continuant đ except mainly postnasally. In Spanish, the continuant is "... a little more than twice as frequent as the phone [d] in text occurrence..."(p. 410), while in Greek, the "frequency of /đ/ is close to three times that of /d/"(p. 414).

Another example may be taken from a Bantu language, Rimi, already discussed in the foregoing. All Bantuists are agreed that the proto-voiceless stops are: *p, *t, *k. Rimi, as we saw in 4.1.2, has the alternations: p/ɸ, t/ɾ, and kx/x (Note that the facts are more complex in the case of the reflexes of *k, cf. section 4.1.2). Diachronically, *p>ɸ, *t>ɾ, *k>kx>x. Synchronically, the distribution of stops is very restricted: in the case of p and t, they only occur postnasally; k occurs mainly before i, ɨ, and u. (kx occurs postnasally). The continuants are overwhelmingly more frequent. Here again we see that what is taken to be uncontroversially "original" has been overtaken by the historically derived segment in terms of frequency of occurrence.

It is clear that the Spanish, Greek and Rimi examples speak for themselves. Frequency of occurrence cannot always stand as proof of the direction of a change, i.e. the most frequent is not necessarily the 'original' segment. In some cases the less frequent alternant or segment in a correspondence set may represent the original segment, if all other things are equal.

4.2.2 'Analogical' Symmetry

This is the principle used by Meinhof to reconstruct *g. He reconstructed this segment 'hypothetically', i.e. it was not present in the data he was using; he did so on 'analogy' with the continuants *b̲, *l̲, which he had reconstructed on the basis of the "majority vote" principle. One methodological objection to be noted here is that Meinhof does not say why he uses 'analogical symmetry' rather than 'frequency of occurrence' in the reconstruction of the voiced velar. When one adopts a new method the least one should do is say why. This was in fact necessary in the case of Meinhof since if he had used the 'frequency of occurrence' principle he would have ended up with the voiced velar stop instead of the continuant. This is because the former is more frequent than the latter in the languages listed on his map (facing p. 248). (Meinhof's map includes many of Guthrie's zone D, E, F, G, N, and P languages which have the voiced velar stop — cf. Guthrie, Vol. 1967:75, Topogram 10).

In objecting to Meinhof's use of 'analogical symmetry' we are not claiming that symmetry should never be used in reconstruction. After all, symmetry is a common characteristic of linguistic systems (cf. King 1969:62, 191-9), although it is also not uncommon to find asymmetries in languages. It should be noted however that methodological decisions in reconstruction (as elsewhere in the social sciences) should be based on data, and should always be justified in a principled way. Undoubtedly, Meinhof's approach leaves a lot to be desired.

4.2.3 Simplicity

The importance of simplicity or economy in description was stated by Halle thus:

> Given two alternative descriptions of a particular body of data, the description containing fewer... symbols will be regarded as simpler and will, therefore, be preferred over the others" (1962:55).

In diachronic description, it is a measure of alternative solutions in terms of the number and complexity of the proto-segments, diachronic rules and mechanisms of change posited. It should however be noted that simplicity is meaningful only when applied with due regard to considerations such as phonetic and typological plausibility. That is, the segments, rules, and the mechanisms posited should be based on a reconstruction (projection and mapping) methodology guided by the simplicity criterion and the plausibility considerations noted above. In this view, the simpler solution should also be the more plausible, phonetically and typologically.

The issue of simplicity in Bantu diachronic description has been broached by Hinnebusch 1973:8-9, who claims that the continuants reconstructed by Meinhof have an advantage over Guthrie's stop reconstructions as far as the Kenyan Coastal languages are concerned since

> .. the types of changes that have occurred historically in the Kenyan Coastal languages are more easily predicted in terms of Meinhof's reconstructions than Guthrie's, in that an extra step would be required, using Guthrie's forms, in getting from the deep forms to the surface forms (p. 8).

Hinnebusch gives as an example the following mappings to support his claim:

Meinhof's reconstruction: *ƀ̲>w̲>Ø̲

Guthrie's reconstruction: *b>ƀ>w>Ø

Here Meinhof's reconstruction appears simpler since it has fewer steps. However, it is easy to see that these mappings, in isolation from related mappings and other parts of the 'historical grammars' of the languages in question can not prove the claim of relative simplicity. In order to demonstrate that a solution is simpler than another, the competing solutions have to be assessed in terms of the 'whole grammar' vis-a-vis the constraints of phonetic and typological plausibility. For as King 1969:193 states: "...simplicity...is a systematic measure applied in principle to grammars and not to individual rules".

In discussing the relative simplicity of Meinhof's (continuant) and Guthrie's (stop) solutions it is necessary to know what mechanisms and rules each one would need to account for the relevant data. But before dealing with this, we should identify, in a general way, the type of relevant data which each solution is supposed to account for. Both solutions are faced, inter alia, with the problem of explaining how and why the following occurred:

Meinhof	Guthrie
1)voiced occlusives and affricates	1)voiced continuants and affricates
2)further weakening of continuants	2)loss of segments
3)strengthening of the Kongo type, *g>k	3)devoicing, e.g. Kongo *g>k (a type of strengthening)
4)implosion, e.g. *g>ɠ	4)implosion, e.g. *g>ɠ

With the exception of cases of weakening and loss (which appear to be 'natural'), it can be said that the Meinhof solution relies heavily on the mechanism of strengthening. As formulated by Meinhof 1932:31, this solution proceeds on the assumption of the 'half-plosivity' of the posited continuants and their 'inherent tendency to become plosive'. There is context-sensitive and context-free strengthening: the former takes place before the close vowels į and ų, after į, and postnasally; the latter occurs in cases of e.g. implosion (as in the Swahili case) and the Kongo case mentioned above. Examples of strengthening before/after the high close vowels are:
Before į: *gį>Sotho di(dental d); *lį>dzi(Nyamwezi, Shona);
before ų:*lų> Sotho du (retroflex d); *gų, *lų>Venda

bvu (Meinhof,26-7). After ɨ:*-ǥɨb->Swahili -ib-'steal'(with loss of *ǥ) (Meinhof, p.121). Postnasally, *Nƀ>Nb, *Nl>Nd, *Nǥ>Ng. In addition, Meinhof posits another mechanism, analogy. This mechanism is supposed to account for certain occurrences of voiced stops, e.g. *-ǥongo>-gongo 'back of body' (Sumbwa, Sukuma, Nyamwezi). The *ǥ>g change here was supposed to have occurred in analogy with the postnasal stop. In sum, Meinhof's continuant reconstructions give rise to the following mapping rules:

1. *ƀ>b, ƀ, bv, ɓ, w, v, ... Ø
2. *l>d, ɗ, dž, dz, bv, l, r, ...y, z, Ø
3. *ǥ>g, ǥ, ɠ, bv, dz, k, ...y, z, Ø

As noted above, in this solution, the stop and affricate reflexes result from strengthening, while the rest of the reflexes are either retentions or results of different types of sound changes.

In contrast to Meinhof, Guthrie's solution heavily relies on the mechanism of weakening. To account for the occurrence of continuants and affricates or loss Guthrie 1967:55-80; 1971:30-64 posits weakening rules of the type: *b>w, *b>v, *d>Ø, *d>l, *d>dz, *g>y, *g>Ø, etc. Some of the rules posited by Guthrie can be summarized as the following lenition chainshifts:

1 (a) *b>ƀ>w>Ø (b) *b>bv>v

2 (a) *d>dž>z (b) *d>l>y>Ø

3 (a) *g>ǥ>Ø (b) *g>g^y>dž>z

The output of each shift can be found in some Bantu language(s), and can be regarded as a stage in the phonological development of Bantu. In this view, different languages in Bantu can be seen as reflecting varying time depths. As an example, let's consider some of the reflexes of *-bad- 'count' (Guthrie 1970, Vol. 3:19):

E.22	Ziba	-bal-
F.21	Sukuma	-ƀal-
G.11	Gogo	-wal-
C.71	Tetela	-al-

In Guthrie's view, these examples show that *b has changed in Tetela, Sukuma, and Gogo, but has been retained in Ziba (Haya). They also reflect the lenition chainshift 1(a) above, i.e. *b>ƀ>w>ø. (Note that since Guthrie, like Meinhof, reconstructs voiceless stops, he also posits weakening rules for this stop series: see Guthrie 1967, Vol. 1, 55-80; 1971, Vol. 2, 30-64.)

In addition to lenition rules, Guthrie posits devoicing (which is a 'strengthening') to take care of cases such as those affecting his *g in some languages, i.e. *g>k. Some examples are: *-gamb->-kamb- 'speak'; *-gab-> -kab- 'divide'; *-dog->-lok- 'bewitch' (Kongo) (For more examples see Guthrie 1970, Vol. 3.)

Guthrie also posits rules of implosion, i.e. *b>ɓ, *d>ɗ, *g>ɠ, which take care of developments in Swahili and other Bantu languages.

Now, given these considerations, which solution or analysis is simpler? For our purposes, the following should be noted.

First, Meinhof's notion of the 'half-plosivity' of continuants and their 'inherent tendency to become plosive' (p. 31) is highly questionable. It is evidently posited so as to trigger some strengthenings. Thus, *g changes into ?g in Kinga due to its "...tendency to become plosive"(p. 31). However, all that is known about sounds and their dynamic tendencies does not support the idea of a continuant or non-continuant having an "inherent tendency" to become some other sound. Sounds have been noted to change due to structural, physiological, psychological, language-acquisition, and contact factors. A sound does not, in and of itself, have any tendency to become some other sound; the activating factor of a sound change has to come from somewhere else.

In addition to this problematic aspect of Meinhof's solution, there is the issue of the status of strengthening as a mechanism of sound change. Strengthening, according to Meinhof, occurs before į and ų, after į, postnasally, and in other environments. The concepts of strengthening and weakening will be taken up in the next section; it should, however be noted that strengthening before and after high close vowels is difficult to defend, in view of known history and other Bantu-internal facts. Known history tells us that the environment of high vowels (especially i) is, generally, a weakening environment. Taking _i as an example, this is, universally, a palatalizing environment (Foley 1977:90-106). Palatalization is commonly followed by assibilation. These two processes are the usual historical sources of d^y, dž, dz, ž, z; t^y, tš, ts, š, s, etc. Bantu-internal evidence also supports this position. According to Meinhof 1932:26ff, Guthrie 1971, Vol. 2:30-64, and others, there occurred, in Bantu prehistory, widespread weakenings before i and u in the voiceless stop series. These weakenings gave rise to a lot of palatal sounds and spirants. In some cases, however, this environment has not caused any palatalization or assibilation, e.g. in Makua, *pį>p^hi, *kų>k^hu (Meinhof, p. 27). These few facts about the diachronic evolution of the voiceless stop series point to the fact that weakening (or no change), not strengthening, is the solution that makes more phonetic and typological sense in the environment in question. This, in turn, points to the validity of Guthrie's stop reconstructions. In Guthrie's view, weakening may or may not occur in the environment before i and u or after i. This, however, does not mean that strengthening does not occur in this environment. What it means is that, if it occurs at all, it should somehow be the exception, not the general rule.

A related consideration concerns Meinhof's 'analogy' part of his solution. In this case, the posited continuants become stops on 'analogy' with postnasal stops. Thus, in Swahili *ǥ>g "by analogy with its change after a nasal, viz. <u>n+g</u>><u>ng</u>"(p. 31). What Meinhof means by 'analogy' here is vague, but his move to resort to this 'mechanism' in this case is quite understandable: after all, he has to account for such cases of non-postnasal 'strengthening'. The move is necessitated by the very analysis he adopts. But analogy (whether phonetic or morphological) operates on the basis of the sameness/similarity of the relevant elements and environments. The cases supposed by Meinhof to be affected by analogy lack the necessary condition on which this mechanism is based: the sameness/similarity of environments. Guthrie's approach is of course simpler and more plausible: to him this is simply a case of retention. Retentions of this sort are widespread all over the Bantu area (cf. Guthrie's Vol. 3).

To conclude: although our discussion does not exhaust the problem of simplicity in Bantu projection and mapping, we have shown that Meinhof's solution is very problematic since it gives rise to mappings which are not in line with phonetic and typological plausibility. Guthrie's solution, however, makes sense phonetically and typologically, and is, on the evidence, simpler.

4.2.4 Further Considerations: Weakening and Strengthening of Segments

It was noted in the foregoing that Guthrie used the principles of the probable direction of sound shifts and frequency of occurrence to posit PB stops (both voiceless and voiced) from which the current reflexes are derived. His solution has been referred to as the 'weakening' solution, represented by the following chainshifts:

1 (a) *b>ƀ>(y)>w>Ø (b) *b>bv>v

2 (a) *d>dz>z (b) *d>l(y)>Ø

3 (a) *g>ǥ>y>Ø (b) *g>g^y>dž>z

As is evident in these chainshifts, the shifting is in the direction of the wedges. On the other hand, Meinhof's continuant reconstructions result in rules which have a reverse direction to some of Guthrie's rules, e.g., *b>b, *l>d, *g>g, etc. This type of solution has been referred to as the 'strengthening' solution. The purpose of this section is to define the notions of weakening and strengthening and to relate them to the issue at hand.

4.2.4.1 Strength hierarchies

Strengthening and weakening have been defined within the theory of strength hierarchies (cf. Zwicky 1972; Lass and Anderson 1975:148-187; Hooper 1976:195-242; Foley 1977, and Lass 1984:177-183.) Briefly, this is a theory according to which segments, environments of the word (initial, medial, final), and positional classes (labial, alveolar, palatal, velar) are characterized in terms of relative strength in relation to synchronic and diachronic processes in language. For our purposes here we shall concern ourselves with segmental and environmental hierarchies; we shall not deal with positional hierarchies (but see Lass and Anderson 1975:183ff; Foley 1977:31-32).

Some relations holding among segments are schematized as follows:

1. zero>vowel>glide>liquid>nasal>fricative>$\left\{\begin{array}{l}\text{aspirate}\\ \text{affricate}\end{array}\right\}$>stops

2. voiced obstruent>voiceless obstruent

3. S>SS or S_iS_j (where S = Segment)

In these schemata, the direction of the wedges shows increasing strength. In (1), stops are the strongest segments, and vowels the weakest. Here it should be noted that the notion 'strength' is associated with the phonetic parameters of openness and sonority. The most open and sonorant segments (i.e. vowels) are the weakest, while the least open and sonorant (i.e. voiceless stops) are the strongest (cf. Lass and Anderson 1975:151; Hooper 1976:198). In (2) voiceless obstruents (e.g. <u>t</u>, <u>ts</u>, <u>s</u>) are stronger than voiced ones (e.g. <u>d</u>, <u>dz</u>, <u>z</u>). In (3), a geminate (SS) or a cluster (S_iS_j) is stronger than a single segment. Thus, in terms of strength, a geminate is stronger than a voiceless stop, which in turn is stronger than its voiced counterpart, and so on. Now, if a segment's rank changes in the direction of the wedges, the process is called strengthening; if its rank changes in the reverse direction, it is a weakening. These are key notions in the theory of strength hierarchies. An important task of the theory is to specify the contexts in which these processes take place.

Segments commonly weaken or strengthen in specific environments. Such environments have been referred to as weak or strong environments, respectively, and have been considered from two angles: the environments of the word (i.e. initial, intervocalic, and final), and other specific phonological environments, e.g. the pre-C or post-C environment.

4.2.4.2 Initial, intervocalic and final environments

Word-initial environments are assumed to be strong. This assumption is supported by the universal fact that all contrasts of consonants in a language may occur initially, while contrasts in the final position are fewer and tend to be neutralized (cf. Hooper 1976:200). Furthermore, apparent strengthenings have been observed to occur in this environment, e.g. Sp(anish) huevo 'egg' has two pronunciations: [webo]~[g^webo]; huerto 'garden' is pronounced as [werto] or [g^werto]; L(atin) vita [wita] 'life'> Sp. vida [bida]; Sp. vivo [bibo] 'alive'.

The intervocalic position is the preferred one for weakening. It is a weak environment; here, consonants take on some of the qualities of the surrounding vowels -- voicing and continuancy, for example. For instance, in their development from Latin, Spanish and French segments have undergone weakening in specific intervocalic environments:

Latin	Spanish	French	
agua	agua [aǥua]	eau [o]	'water'
amica [amika]	amiga [amiǥa]	ami	'friend'
legere	leer	lire [li:r]	'read'
credere	creer	croire [krwa:r]	'believe'

In these examples, the 'input' intervocalic stops are: *g, **k*, and **d*. The diachronic (weakening) rules are: *g>ǥ (Spanish), **k*>g>ǥ (Spanish), *g>ǥ>Ø (Spanish and French), and **d*>*đ*>Ø (Spanish and French).

The word-final environment is regarded as the weakest since loss (the logical conclusion of weakening) has been observed to occur here (in closed syllables) before occurring in the other environments. The reason for the weakness of the word-final environment is that final segments are more often pronounced weakly. The weakening of consonants in this environment typically proceeds by devoicing, then glottalization, which gives way to total loss eventually. Examples: weakening and loss of final **p*, **t*, **k* in French, Maori, Chinese; also, in many dialects of English, final voiceless occlusives, especially *t* and *k*, are being replaced by a glottal stop, which is just one step from total loss (cf. Aitchison 1981: 32-33).

Therefore, hierarchically, word-initial positions are strong, intervocalic ones weak, and final ones the weakest.

4.2.4.3 The concept of 'protection'

We shall now turn to the consideration of strong and weak environments as they relate to the concept of 'protection'. One key assumption in the theory of strength hierarchies is that when strengthening occurs, strong segments are affected first "and most extensively and preferentially in strong environments", while weakening occurs to weak segments first "and most extensively and preferentially in weak environments" (Foley 1977:107). We have already noted that the intervocalic and the final positions in a word are weak. The initial environment is strong. Additional environments which have been observed to behave as strong ones are pre-C, post-C, and after a stressed vowel (cf. Anttila 1972:66; Meinhof 1932:29, 59; Foley 1977:91). One characteristic of strong environments is that they tend to resist weakenings which commonly occur in weak environments. In other words, they tend to 'protect' the relevant segments from phonetic attrition for as long as possible. As an example, consider the evolution of Proto-Indo-European voiceless stops which spirantized in all environments except when they occurred in a post-C environment, e.g. Latin captivus 'captive'; Old High German spiwan 'spit'; Gothic fisks 'fish'(Anttila 1972:66). The only probable reason why there was no change in this environment is that the segments were protected from weakening by the first consonant in the cluster. An additional example of a protective environment is the Bantu postnasal environment. This can be said to have protected segments from weakening or further weakening. Examples have already been given of diachronic shifts which have occurred in Rimi, a sister of Sumbwa. In Rimi, *p and *t have weakened intervocalically (including the initial position) but not postnasally. Examples are: -φeφo/mpeφo 'cold, wind' (< PB *-pepo), -φik-/mpiko 'arrive/arrival' (< PB *-pik-). Additional examples are from Haya (E. 22; from research notes) and Kongo (cf. Meinhof 1932:158-9); in this case, Proto-Bantu *p lenited to h in Haya and β in Kongo, except in the postnasal environment. Haya examples: -h- 'give', [mpa] 'give me' (<PB *-pa-); -hulil- 'hear', [mpulile] 'that I may hear' (<PB *-pudid-); Kongo examples: -βan- 'give', [mpeni] 'I have given' (<PB *-pa-); -βol- 'be cold', [mpolo] 'cooling' (<PB *-pod-).

It is important to note that weak and strong environments only constitute "preferred" environments for the respective processes (Lass and Anderson 1975:159ff; Foley 1977:107ff). However, segments need not weaken or change at all in a weak environment, nor need they strengthen in a strong environment. In other words, weak and strong environments do not constitute the necessary and sufficient conditions for the respective processes.

4.2.4.4 <u>The theory of strength hierarchies and Bantu reconstruction</u>

4.2.4.4.0 <u>Introduction</u>

Having clarified some aspects of the theory of strength hierarchies, we will now relate the theory to Bantu reconstruction.

One way to find out which environments are relatively strong or weak in a language or group of languages is to consider reconstructed history with a view to pinpointing the weakenings, retentions or strengthenings. In Bantu, this can be done by considering the diachronic shifts of some proto-segments on which all Bantuists are agreed upon, i.e. *<u>p</u>, *<u>t</u>, *<u>k</u>, which, according to the theory of strength hierarchies, are strong segments. In Proto-Bantu they were the strongest, regardless of whether one adopts Meinhof's or Guthrie's reconstructions. Given their relative strength, massive weakenings affecting them in many languages would be highly diagnostic of the weakness of the environments involved. Thus a weak environment would be one which, on the basis of internal and comparative evidence, could be shown to have induced extensive weakenings of *<u>p</u>, *<u>t</u>, and *<u>k</u> in many Bantu languages. A strong environment would be one which could be shown to have either induced strengthenings or protected segments from phonetic attrition. After identifying the weak and strong environments for the voiceless stops, we shall apply this consideration to the issue of Meinhof's and Guthrie's reconstructions.

First, however, a few facts about Bantu need to be known. In general, Bantu languages tend to favor open syllables, and consequently Proto-Bantu has been reconstructed thus. This means that, for the data we are dealing with, there are only two consonant environments in the word: the initial and the intervocalic. The former is represented by Guthrie as C_1, and the latter as C_2. Although the distinction between these two environments may be regarded as unimportant in very many languages (due to the openness of their syllables), we shall, for our purposes, maintain it. Another relevant fact to note here is that, apart from NC clusters, there were no other structural CC sequences in Proto-Bantu.

4.2.4.4.1 <u>The reflexes of *p, *t, *k in relation to weak and strong environments</u>

Let us now turn to the sound shifts affecting *p, *t, *k, (as in Homburger 1914, Meinhof 1932, Guthrie 1967-71, Jacobs 1965-6, Slavikova 1975, Nurse 1979, Hinnebusch et al. 1981, etc.). The reconstructed histories of these segments indicate that they have weakened in various environments. For example, two of the five languages used in Meinhof 1932 (Pedi and Kongo) show weakening of voiceless stops in C_1 and C_2 positions, while all of them show weakening before high close vowels. Some examples are given below:

Pedi (pp. 58-81): weakening in C_1 and C_2, and also before high close vowels. *p>ɸ: -ɸa (< PB *-pa) 'give', -ɸiɬ- (< PB *-pįc-) 'hide'(ɬ = voiceless lateral fricative); *t>r: -raro (<PB *-tatu) 'three', -phiri (< PB *-pįtį) 'hyena'; *k>x: -xam- (< PB *-kam-) 'milk', -xura (<PB *-kųta); *k>š: moši (<PB *-okį) 'smoke', mo-šiɸa (<PB -kįpa) 'sinew'.

Zulu (pp. 82-110): weakening before high close vowels. Before *į: *p>f: u-bu-fifi (<PB *-pįpį) 'darkness', -fig- (<PB *-pįk-) 'arrive'; *t>s: -p'isi (<PB *-pįtį) 'hyena', ubu-siga (<PB *-tįka) 'winter'; *k>s: umu-si (PB *-okį) 'smoke'; before *ų: *p, *t, *k>f: -fu (PB *-pų 'stomach') 'stomach of cattle', -fund- (<PB *-tųnd- 'teach') 'learn', -fuy- (<PB *-tųg-) 'own cattle'; fuba (<PB *-kųba) 'chest', -ɬafun (<PB *-takųn-) 'chew'.

Swahili (pp. 111-33): weakening before high close vowels. Before *į: *p>f: -fik- (<PB *-pįk-) 'arrive', -fic- (<PB *-pįc-) 'hide'; *t>s: -fisi (PB *-pįtį) 'hyena', -sima (<PB *-tįma); *k>s: mosi (<PB *-okį) 'smoke', -sipa (<PB *-kįpa) 'vein'. Before *ų: *p, *t, *k>f: -fanan- (<PB *-pųan-) 'resemble', -fug- (<PB *-tųg-) 'keep domestic animals', -fum- (<PB *-tųm-) 'sew'; -futa (PB *-kųta) 'fat, oil', -tafun- (<PB *-takųn-) 'chew'.

Konde (pp. 134-54): weakening before *į: *p>f: -fis- (<PB *-pįc-) 'hide', -fik- (<PB *-pįk-) 'arrive'; *t>s: -siku (<PB *-tįku) 'night'; *k>s: ily-osi (PB *-okį); before *ų: *p, *t, *k>f: -fum- (PB *-pųm-) 'come from',

-fund- (PB *-tųnd-) 'instruct'; -futha (<PB *-kųta) 'oil'.

Kongo (pp. 155-75). Weakening of C_1 and C_2: *p>β: -βan- (<PB *-pa) 'give'. Before *į: *p>f: -fik- (PB *-pįc-) 'hide'; *t>s: -sima (PB *-tįma) 'pool'; *k>s: mw-isi (PB *-okį) 'smoke'. Before *ų: *p, *t, *k>f: -fukul- (PB *-pųkul-) 'dig out', -fuku (PB *-tųkų) 'night', -futa (<PB *-kųta) 'fat'.

In addition, Guthrie's Vol. 2 (1971:30-64) displays sound shifts including numerous weakenings of *p, *t, *k in C_1 and C_2 environments, and before high close vowels *į and *ų. Other Bantuists have posited these same weakenings (cf. Meeussen 1955; Jacobs 1965-6; etc.). What all these data seem to indicate is the weakness of the three environments: C_1 (initial), C_2 (intervocalic), and before the high close vowels *į and *ų, although the relative strength of each seem to differ from language to language, e.g. while all three seem to have induced weakenings in Pedi, only the high close vowels appear to have caused extensive weakenings in Zulu or Swahili). Moreover, the C_1 (initial) environment seems to be stronger than the C_2 (intervocalic) environment in some languages, as the folowing examples show. In Ngazidya (G. 44a), *-piko > piho/ma-biho 'wing/s', *-paka > paha/ma-baha 'cat/s', *-koko > koho/ma-hoho 'crust/s', and in Nzwani (G. 44b), *-pi > pi/ma-vi 'palm/s of hand/s', *-tope > t^r^ove/ma-rove 'earth', *-kojo > kozo/ma-hozo 'urine'. In these examples, *p weakens intervocalically to β in Ngazidya, and to v in Nzwani; *k weakens to h. In Nzwani, *t weakens to r intervocalically, but only to t^r initially. The distribution of the initial and medial variants indicates that the medial position has historically induced weakening more readily; the occurrence of stronger variants initially indicates that the initial position is more resistant to weakening. (For a more reliable statement, a deeper investigation of the internal and comparative evidence needs to be carried out — a task beyond the scope of this study.)

Another important environment to be considered here for our purposes is the postnasal environment. As noted earlier, this position seems to be very strong in that it is an environment of retention in very many languages. Rimi, Haya and Kongo examples were given above in which Proto-Bantu *p is assumed to have changed to ɸ, h and β, respectively, except in the postnasal environment. Additional examples of languages which show weakening of *p and retention after N are: E.13 Nyankore and Chiga, E.15 Ganda, E.21 Nyambo, D.62 Rundi, D. 66 Ha, F.32 Rimi, G.23 Shambala, and many other Bantu languages. *p is of course not the only stop that weakens in non-postnasal environments while being retained postnasally in very many languages; *t, *k, and other stop reconstructions behave in a similar manner (cf. Guthrie 1971, 30-64; Nurse 1975; Meeussen 1955, and others).

To say that the postnasal environment is relatively strong does not, of course, mean that change does not occur in this environment. For instance, in Dawida (E.74a) and Shaghala (E. 74b), *p>ɸ, f, s, in various environments and *Np>Nb (Shaghala), Nb (Dawida) (cf. Slavikova 1975:36, 53). We see here that the postnasal *p gets voiced (i.e. weakens one step), but the environment itself is still stronger in relation to other environments. Other changes in the postnasal environment include the so-called Meinhof rule by which *Nb, *Nd, *Ng > NN, i.e. the stop acquires the nasalization of the adjacent nasal, if the following syllable consists of nasal+voiced stop. This has applied in Sukuma, Ganda, and other Bantu languages (Meinhof 1932:183-4). Other weakenings affecting stops in the postnasal environment are: *Np, *Nt, *Nk > Nh in Nyamwezi and Sukuma; affrication in Pedi, e.g. *Nk>Nkx^h; aspiration, deocclusivization, and voicing in some Southern Bantu languages, e.g. Tswa *mp>mp^h>mɦ.

From the above evidence and considerations, the following inferences are in order:

1. The preferred process intervocalically and before high close vowels is weakening. The initial environment behaves like the intervocalic in very many languages (probably due to the open-syllable character of Bantu languages), although in some languages, e.g. Ngazidya, it appears to be stronger than the intervocalic.

2. The postnasal environment is relatively strong.

Here, segments get retained which weaken in other environments (cf. Haya and Kongo example above). However, as noted above, postnasal segments are not immune to sound change.

4.2.4.4.2 Some implications for reconstruction of the voiced series

We will now consider the implications of the above inferences for reconstruction. Recall that the reconstructions in dispute are voiced stops and continuants. Note further that these segments are weaker than the uncontroversial voiceless stops considered above from the point of view of weakening and strengthening. Now, if "... weaker elements weaken first and most extensively and preferentially in weak environments" as is assumed in the theory of strength hierarchies (cf. Foley 1977:107), then the following further inferences are in order:

1. If stronger segments (in this case the Proto-Bantu voiceless stops) weaken in an environment, weaker segments should also weaken in this environment. That is, in principle, such an environment cannot be a weakening one for strong elements, and a strengthening one for weaker elements. This is in accord with what is known about the weakening of segments in general.
2. Since the postnasal environment is a strong one for stronger segments, it should also be a strong one for weaker segments.

These typological statements may be used in the attempt to make a decision as to which solution is the proper one, Meinhof's or Guthrie's. Apart from stating weak and strong environments, they also state the direction of change in these environments. A proper solution would be one which would be in line with these typological statements (if all other things are equal, of course). In what follows Meinhof's and Guthrie's solution will be considered in the light of these inferences of weakenings and retentions in Bantu prehistory.

First, Meinhof's solution. In this solution, voiced continuants are posited and then mapped on to the various reflexes in modern Bantu languages, including voiced stops and affricates. Strengthenings occur postnasally, before *<u>į</u>, *<u>ų</u>, after *<u>į</u>, stem-initially and intervocalically (Although some initial strengthenings e.g. *-<u>ɡ̸ongo</u> > -<u>gongo</u> 'back of body' (in Sumbwa, Nyamwezi, Swahili, etc.) are supposed to be explained by what Meinhof calls 'analogy'). The following rules summarize these changes:

$$1.\ [+\text{cnt}]>[-\text{cnt}]/\left\{\begin{array}{l} \text{N}\_\_ \\ \text{į}\_\_ \\ \_\_\text{ų} \end{array}\right\}$$

$$2.\ [+\text{cnt}]>\begin{bmatrix} -\text{cnt} \\ +\text{implosion} \end{bmatrix}\ldots$$

$$3.\ [+\text{cnt}]>[-\text{cnt}]/\_\_\text{VNCV}$$

Now, postnasal strengthening is phonetically, a plausible process, since the conditioning environment is strong. But strengthening in the intervocalic environment and before *<u>į</u>

and *u, and after *i (and also stem-initially in many languages) seems to be unmotivated, typologically and phonetically, given inference (1) above, and preceding considerations. Continuants, being weak consonants, are not expected to strengthen in weakening environments. If anything, they are expected to weaken further in such environments (cf. Foley 1977:107). In effect, Meinhof's solution has some unnatural consequences as far as the theory of weakening is concerned.

Guthrie, on the other hand, posits voiced stops *b, *d, and *g. As noted earlier, Guthrie takes into account two considerations: (1) frequency of occurrence, and (2) the probable direction of sound shifts. It is the second consideration, that of the principle of the direction of change, that makes Guthrie's solution agree with the conclusions based on the theory of strength hierarchies. The 'weakening' chainshifts discussed earlier, which we repeat below for convenience, summarize most of the changes suggested by this solution:

1 (a) *b>ƀ>w>Ø (b) *b>bv>v

2 (a) *d>dz>z (b) *d>l>y>Ø

3 (a) *g>ǥ>Ø (b) *g>g^y>dž>z

To appreciate Guthrie's conclusions, a look at some examples of some of the data that led to these conclusions is in order.

4.2.4.4.3 Guthrie's solution: a look at some examples

We shall begin with *b and *g, some of whose modern correspondences are found in the following comparative series (C.S.):

C.S. 5a *-babud- 'singe', v.t.> Bobangi -babol-, Lega -babul-, Nyankore -ƀaƀul-, Ganda -babul-, Sumbwa -ƀaƀul-, Luchazi -ƀaul-, Luba-Kasai -babul-, Luba-Katanga -babul-, Bemba -ƀaƀul-, Maŋanja -waul-, Herero -ƀaur-, Zulu -ɓaɓul- (Guthrie Vol. 3, p.18, except Sumbwa).

C.S. 771 *-gambo 'affair'> Tetela di-kambo, Rundi i-džambo, Nyoro eki-gambo, Haya eki-gambo, Tongwe e-ǥambo, Sumbwa i-gambo, Swahili (Unguja) ki-ɠambo, Luchazi ts-ambo, Luba-Kasai di-ambu, Kahonde c-ambo, Ila k-ambo, Matengo li-gambo (Guthrie Vol. 3, p. 205, except Haya and Sumbwa).

C.S. 5a illustrates *b, and C.S. 771 *g. C.S. 5a has the following correspondences: b/ƀ/w/ɓ root-initially, and b/ɓ/ø/ƀ root-medially. Guthrie posits *b as the most probable proto-segment not only because it occurred in many Bantu languages, but also because shifts like b>ƀ(>v)>w>ø and b>ɓ (implosion) are more probable than ƀ>b or ƀ>ɓ. Frequency of occurrence and the direction of shifting also motivate the positing of *g in C.S. 771. Here the correspondences are: k/dz/ɠ/g/ǥ/ø. g occurs more frequently than ǥ (in this and other comparative series) and also the direction of shifting *g>ǥ>ø (weakening), and *g>k (devoicing), *g>dž>z (palatalization — a weakening process) are more probable than the Meinhof alternative.

With the exception of *g>k and implosion a consideration of changes affecting *b and *g (cf. Guthrie, Vol. 2:30-64; Vol. 3:1-73, 200-241) shows that they are, in general, the same weakenings which affect *p and *k (Guthrie Vol. 4: 61-7; Vol. 3:319-26). Such weakenings, as noted earlier, typically occur in weak environments: intervocalically, before *i̧, *u̧, and in many cases initially. In the examples just given (C.S. 5a and C.S. 771), weakenings may be noted both intervocalically and initially. However, as regards *-babud- 'singe'(v.t.), some languages appear to have treated the root-initial position as the stronger one. For instance, root-medial *b weakens one step (or two steps) further than root-initial *b, e.g. Luchazi -ƀaul-, Mang'anja -waul-, Herero -ƀaur-. As can be seen here, in Luchazi, Mang'anja, and Herero, *b has weakened root-initially to ƀ, w, ƀ, respectively, and root-medially to ∅.

Further examples showing that the initial position is treated as stronger are from Ngazidya G.44a, which was referred to above in respect to the relative strength of *p, *t, *k initially. Consider the following: *-bada>baala/ma-ala 'spot/s'; *-bingu>bingu/ma-ingu 'cloud/s'; *-bundi>bundi/ma-undi 'owl/s'; *-bue>bwe/ma-we 'stone/s'. These examples show that the intervocalic position has induced weakening while the initial has not. The path of the weakening in both the *-babud- case and the Ngazidya examples can be assumed to be the usual *b>ƀ>w>∅.

The postnasal environment is the next one to consider. It was noted in the case of *p, *t, and *k that this environment is relatively stronger than either the initial or intervocalic. In the case of *b and *g, too, postnasal retention is a widespread phenomenon, e.g. Zulu, Kongo, Konde, Swahili (cf. Meinhof 1932: 82-175), Dawida, Shaghala, Giryama, Kikuyu (Slavíková 1975: 36, 53, 70, 95), Sumbwa (in this study), and many other Bantu languages (cf. Guthrie Vols. 3 and 4).

Turning now to *d, we find (as all Bantuists have found) that d is less frequently attested in modern Bantu languages. In general, before *a, *e, *o, *i, and *u (non-postnasally) we find mostly l or r, although there are, in some languages, occurrences of d (or d-related affricates) before i (cf. Guthrie, Vol. 3:150-161). Before į and ų are found d, affricates (triggered by the palatal and labial qualities of the vowels), spirants, and l or r. l and r are not dominant here. Following are examples:

Before *į: C.S. 591 *-dį 'root' > Ombo bo-lį, Rundi umu-dzi, Ganda omu-zi, Kikuyu mo-ri, Kamba mo-į, Sukuma (n)dži, Hungu mu-ži, Mbunda mu-đi, Kwanyama omu-ḑi.

Before *ų: C.S. 730a *-dųųd- 'take off (clothes) > Bali -dzwul-, Nyoro -juur-, Nyankore -žuur-, Sukuma -zuul-, Swahili -yu-, Kongo -yuul-, Maŋanja -bvul-, Makua -rul-, Kwanyama -ḑuul-.

The sets of correspondences in these examples are: l/dz/r/z/Ø/dž/ž/ḑ/đ (C.S. 591) and dz/j/z/ž/y/bv/r/ḑ (C.S.

730a). Now, what is the most economical and phonetically plausible reconstruction that can account for all these correspondences? Here the consideration of the probable direction of sound shifts (a principle which captures the basic assumptions of the theory of strength hierarchies) suggests *d, not *l. *d (and the relevant environments) can account for the affricates (dž, dz, bv), the spirants (đ, ž, z, v), the palatal stop (j), and the liquids (l, r) in the most economical and phonetically plausible way. Given that

d>dž>dz>z
↘ž

is the usual path of diachronic derivation, it is easy to see that the affricates (dž, dz) point back to their source, i.e. d, and the spirants also point back to their ultimate source, i.e. d, through the intermediary, the affricates. Likewise, since d>đ and d>l(r) are natural weakening shifts in such environments, the continuants can plausibly be assumed to point back to *d. j does not necessarily point back to d, but *d can explain j as a simple place of articulation shift, i.e. d>j, that can take place as a single abductive reinterpretation of d, or through the path: d>d^y>j. Also, bv, v do not necessarily point back to d since they could well be from *b. However, even here *d scores over *l since d>bv>v before *u̯ is decidedly more plausible and simpler than *l>bv>v. All these changes are analogous to those affecting *t (cf.

Guthrie, Vol. 2:30-64; Vol. 4).

Additional evidence that can be brought to bear on the choice between *d and *l has to do with the widespread occurrence of d, not l, in the postnasal environment. It has been noted above that the postnasal environment is generally a position of retention in Bantu. The postnasal occurrence of d correspond with the occurrence of b and g in this environment; and these occurrences parallel the widespread postnasal retention of *p, *t, and *k. Two types of postnasal d need to be distinguished: those that do not alternate (i.e. those occurring intramorphemically), and those that do alternate with l/r, or r. Examples of this latter type of d were given in chapter 3 (section 3.2.3.1.6) and at the beginning of this chapter (sections 4.1.1 and 4.1.2); Meinhof 1932, Hinnebusch 1973, Nurse 1979a, and others also give some examples of this alternation. Guthrie posits *d>l/r to account for this alternation. Only initial and intervocalic *d (with exceptions, noted above) weakens to l or r; postnasal *d was retained in very many languages. It should be noted that this type of intervocalic weakening (i.e. sonorantization) of d is not an uncommon occurrence; it has been reported to have occurred in other languages, e.g. Tagalog (Schachter and Otanes 1972:25 and other Austronesian languages, cf. Dahl 1976:55-69); in some dialects in England, t and d have become r intervocalically (Wright 1905:230, 232); in Dravidian languages, t and d have changed to either _l_ or one of '_r_'-type sounds (Caldwell 1961:153, 154ff); also, in Mande *_d_ has changed to _l_ intervocalically while being retained postnasally (personal communication from David Dwyer).

A further consideration in favour of *_d_ is the parallelism between *_d_>_l_/_r_ and *_t_>_l_/_r_ in Bantu. All Bantuists who have dealt with phonological reconstruction have at least reconstructed *_t_>_l_/_r_, etc. Meinhof 1932 notes the change *_t_>_r_ for Sotho (p. 26) and Pedi (p. 59ff). He also states that"... we find that a number of sounds, e.g. _t_, _th_, ṭ, ṛ, _r_, _l_, _h_ regularly correspond to one another in various languages, and conclude that their original form most probably was *_t_"(p. 28). The sonorantization of *_t_, though not as widespread and far-reaching as that of *_d_, occurs in 10 of the 15 Bantu zones set up by Guthrie (cf. Vol. 2:30-64), i.e. Zone A, B, C, E, (Masaba-Luhya group, Chaga group), F (F.32 Rimi, a sister of Sumbwa, cf. section 4.1.2), G (G.44a Ngazidya, G.44b Nzwani), H (H.13 Kunyi, Zaire), K (K.21 Lozi), P (P.30 Makua group), S (S.20 Venda group, S.30 Sotho-Tswana group, S.50 Tswa-Ronga group, S.60 Chopi group). It is no doubt an important shift in Bantu. What is interesting about the parallelism of *_t_>_l_/_r_ and *_d_>_l_/_r_ is that the former implies the latter. That is, if a language has shifted *_t_ to _l_ or _r_, it will also have shifted *_d_ to _l_/_r_/ṛ/_y_/_Ø_, but not vice versa. (The shift to _y_ and _Ø_ is assumed to go through the stages: _d_>_l_>_y_>_Ø_.) This implicational relationship suggests that the shift involving *d antedated that of *t, and that *t>l/r was most likely a result of rule simplification. That is, the rule

$$\begin{bmatrix} \text{C} \\ \text{+cor} \\ \text{+vcd} \end{bmatrix} \text{--->} \text{[+son]}$$

accounting for the sonorantization of *d was simplified to

$$\overset{\text{C}}{\text{[+cor]}} \text{--->} \text{[+son]}$$

The direction of this simplification (i.e. from voiced to voiceless stop) is in accord with some general assumptions in the theory of strength hierarchies: that is, d, being the weaker occlusive in the alveolar region, is expected to "... weaken first and most extensively and preferentially in weak environments"(Foley 1977:107).

The typological perspective of strength hierarchies, then, favors Guthrie's analysis of reconstructing voiced stops rather than Meinhof's analysis based on continuant reconstructions. This may be used as an additional argument in favor of the voiced stop reconstructions.

4.2.4.4.4 Devoicing and Implosion

This section is no more than a brief note on devoicing and implosion, two shifts mentioned several times in the foregoing but not yet considered. Devoicing (e.g. PB *g> Kongo *k) is not problematic at all; such single feature changes are very common. In the framework of the theory of strength hierarchies, such a change is a strengthening, a categorization which agrees with traditional classification of voiceless obstruents as 'fortis' and their voiced counterparts as 'lenis'.

Implosion (e.g. *b>ɓ, *d>ɗ in some dialects of Shona) may be considered from two angles: (1) its probable source, and (2) its rank in the segmental strength hierarchy. There are two theories as regards the probable source of Bantu implosion: external influence or borrowing and internal evolution. The theory of the external origin of Bantu implosives was (probably) first proposed by Doke 1931, who ascribes them to the influence of Indian languages (e.g. Sindhi). He states:"The implosive, as a phonetic phenomenon in Bantu languages...in all probability owes its origin to Indian influence" (p. 48). While not ruling out contact influence in all cases (e.g. between Bantu and other Niger-Kongo languages), it should be noted that for a language to borrow a feature such as [+implosion], the contact between the source and the borrowing language must be intense (e.g. as intense as the Swahili-Arabic contact situation). Since we do not know of any such intense contact between Bantu and Indian languages, the theory of the Indian origin of Bantu implosion must be rejected. The other theory, that of internal evolution, was suggested by Greenberg 1970:134ff. According to Greenberg, implosives may originate in the following ways: (1) implosivization of a plain voiced stop, e.g. in some Bantu languages, (2) gb changing to ɓ (e.g. in some Southwestern Mande languages), and (3) preglottalization of plain voiced stops (e.g. Papago, an Amerindian language of Arizona). Greenberg's theory of the rise of Bantu implosives by the acquisition of the feature [+implosion] by the plain voiced stops of the feature [+implosion] is plausible, and agrees with the typological inference about postnasal retention noted above: that is, this environment has tended to retain the 'input' proto-segment. Implosives in Bantu do not usually occur postnasally; it is the explosive counterpart which occurs in this environment, and the implosive initially or intervocalically. Examples:

Konde		Zulu	
-ɓiɓi/imbibi	'bad'	-ɓi/embi	'bad'
-ulu-ɓafu/imbafu	'rib/s'	u-ɓambo/izimbambo	'rib/s'
-ɓomb-/umbombi	'work/-er'	-ɓaz-/imbazo	'carve/axe'

Thus, the ɓ/b alternation is analogous to the stop/continuant alternations dealt with in the foregoing. Diachronically, the non-postnasal segment is derived, while the postnasal segment is a retention. Therefore, although we may never know all the factors involved in the development of the Bantu implosive, it is plausible to assume its source to be the plain voiced stop.

We shall now take up the second issue, that of the rank of the implosive on the segmental strength hierarchy. On this issue, we take the position accepted by Hooper 1976a:205 that voiced explosives, implosives, and velar-labials (e.g. gb) have the same rank on the strength scale. On this view, the shift *b>ɓ in some Bantu languages is not a shift in rank as the other changes which can be categorized as weakenings or strengthenings.

4.2.5 Mould's 'conspiracy' argument

Before concluding this discussion, we need to address Mould's (1977) argument for reconstructing continuants for the voiced series, especially since Hinnebusch, Nurse and Mould 1981:16 refer to it as an additional argument why Meinhof's reconstructions are the proper ones.

Mould's aim in his paper is to adduce evidence to the effect that (i) the feature [voice] was redundant in PB, and (ii) there has been a 'diachronic conspiracy' which has functioned to preserve the redundancy of this feature in some Bantu languages. A conspiracy is a situation whereby two or more seemingly independent rules/changes appear to work toward a particular structural effect or target (Kisseberth 1970). An example is two Sumbwa rules, devocalization and vowel assimilation (cf. chapter 2), which may roughly be written as:

1. $\underset{[+\text{hi}]}{V} \text{ ---> } [-\text{syl}] / \text{---}\underset{[-\text{hi}]}{V}$ 2. $V_i + V_j \text{ ---> } \underset{[+\text{long}]}{V_j}$

These rules may be said to 'conspire' against VV-sequences in phonetic representations in the language. This is, of course, a 'synchronic conspiracy'. In a diachronic conspiracy, an additional variable, that of time, is involved, and here the rules/changes are presumed to work toward maintaining a specific situation (in Mould's case, the supposed redundancy of [voice]). Mould's evidence for the [voice] redundancy and the conspiracy "consists of motivating and explaining subsequent phonological changes in various Bantu languages"(p. 389).

Mould proceeds on the presupposition that three categories of phonological phenomena need to be explained as far as Bantu prehistory is concerned: assimilations, dissimilations, and chainshifts (similar to Grimm's Law). To him, assimilations pose no problem:"ease of articulation is motivation enough"(p. 389). However, dissimilations (such as Dahl's Law) and chainshifts (such as ones that presumably occurred in Luyia) are more difficult to explain. In order to explain these changes, Mould (assuming Meinhof's reconstructions) proposes a redundancy of [voice] in PB and to consider the changes in question as constituting a "conspiracy to preserve the predictability of [voice]"(p. 389). According to Mould, the conspiracy was "most thoroughly carried out" in Luyia (p. 390).

Mould's evidence for the redundancy of [voice] in PB concerns Dahl's Law. This is a law (or rule) whose original formulation by Edmund Dahl was that the first of two voiceless aspirates in two neighboring syllables dissimilated by losing the aspiration and getting voiced (cf. Meinhof 1932:181). Mould thinks ease of perception is "weak and insufficient" as an explanation of such a dissimilation; to him there is a much more important factor:

> "...what is more important is what made Dahl's law possible, and that is that there were no voiced stops already present, and therefore there was a lot of phonological space encouraging free variation, which, together with the motivation for perceptual ease led to phonologization"(p. 390).

Now, since Dahl's law is supposed (in Mould's view) to presuppose the absence of voiced stops in the system (that is, its basic motivation) it is easy to see why it would supposedly support the redundancy of [voice], thus endorsing Meinhof's reconstructions.

But Mould's 'explanation' of Dahl's law poses a problem which stems from, inter alia, the fact that his explanation depends on the supposition that the variation that gave rise to dissimilation depended on the absence of one of the members (the voiced member) from the phonemic inventory. Linguists and other students of language have known for a long time that variation is an immanent quality of language on all levels. As far as the sound level is concerned, it is known that articulatory, perceptual, and other factors (cf. chapter 2) are responsible for the variation that occurs. In view of this, I think it is too strong a claim to say (as Mould does) that free variation in respect to a feature (in this case, [voice]) presupposes the absence of contrast involving the feature. To be sure, the absence of distinctiveness of a feature (i.e. its redundancy) makes it available for variation, but so does the presence of distinctiveness of a feature. Unless there is independent evidence pointing to the absence of distinctiveness of a feature being the motivating factor of variation it is safer to avoid such a supposition, especially in prehistoric reconstruction.

Moreover, Mould's supposition that Dahl's Law was possible due to the absence of voiced stops is contradicted by what is known about dissimilations in general. Considerations of known cases of dissimilation from Neogrammarian times to the present have consistently shown that dissimilations are "changes by phonemes", i.e. the dissimilated segment becomes an instance of a different phoneme(Bloomfield 1933:390), and do not produce sounds that are not already in the phonemic inventory (Hoenigswald 1978:172-81). In other words, dissimilations constitute phonetic mergers (cf. Bennett 1967:137). On this point, one student of language categorically states:"... la dissimilation ne crée pas phonemes nouveaux..."(Grammont 1933:270;cf. also Vendryes 1925:62). All known dissimilations seem to have obeyed this principle. As Hoenigswald 1978:177 notes, such a generalization "must [...] be taken as typological in nature and hence as subject to empirical confirmation..." The opposite claim, that dissimilations give rise to new phonemes, must also be supported by evidence, which, in the case of Bantu prehistory, may not be forthcoming.

The rest of Mould's evidence consists of shifts which he thinks support the conspiracy to preserve the redundancy of [voice]. These include: (1) the shift of *<u>c</u> to the alveolar area (afterwhich it spirantized) in response to the supposed phonemicization of *<u>j</u> (<*<u>ǥ</u>); (2) the devoicing of *<u>j</u> in Gusii and most of Luyia dialects; (3) the spirantization of voiceless stops and the devoicing of voiced ones (Luyia Law), supposedly motivated by the need to level out a contrast that had begun to occur in the velar area (where, presumably, the reconstructed *<u>ǥ</u> had already shifted to <u>j</u>, <u>y</u>, <u>Ø</u>, and <u>g</u>, thereby causing a contrast between <u>k</u> (<*<u>k</u>) and <u>g</u> (<*<u>ǥ</u>)); (4) postnasal neutralization of [voice], and (5) devoicing of strident fricatives, i.e. *<u>v</u>, *<u>z</u> > <u>f</u>, <u>s</u>.

Since Dahl's Law does not appear to support Mould's theory of redundancy of [voice] in PB, the hypothesis of a diachronic conspiracy going all the way back to PB seems to be baseless. Besides, the above shifts will have to be accounted for in terms of either the processes affecting Eastern Bantu, e.g. *<u>c</u>><u>s</u>, spirantization of voiceless stops, etc., or those having to do with the diachronic phonology of Luyia (and neighboring languages such as Kikuyu), e.g. postnasal neutralization of [voice] (cf. Guthrie 1971, Vol. 2:30-64). It should be noted that Bennett 1967 provides an account of Dahl's Law which takes into account the above shifts (for the Kikuyu group, Luyia and Gusii); the account is consistent with Guthrie's reconstructions. This account, very plausible and consistent with the simplicity criterion, cannot be passed over in silence in favor of an unmotivated and unprovable conspiracy.

Mould's conspiracy hypothesis could be considered from a different angle. As an "explanation", it is teleological. A teleological explanation differs from a causal one in that instead of the causal structure: "y because of x" it has the structure: "y in order that x" (Vincent 1978:409). For instance, in Mould's conspiracy, some changes supposedly occur <u>in order to</u> preserve the redundancy of [voice]. There are two types of teleology: functional and purposeful. A functional teleology refers to the function of an element in a system (Andersen 1973:789). As far as the phonologic system is concerned, the element may be a distinctive feature, a phoneme, or rule. As an example, consider the Sumbwa rule of devocalization referred to earlier, roughly stated as:

$$\underset{[+hi]}{V} \longrightarrow [-syl] / \text{---} \underset{[-hi]}{V}$$

A functional teleological explanation of the addition of this rule to Pre-Sumbwa phonology would take into account at least two things: first, the new relationship that will be introduced between the phonologic representations /u̱-V, i̱-V, o̱-V/ and their phonetic representations [w̱V, y̱V, w̱V]; second, the relationship of this rule to other rules in the system - for instance, the vowel assimilation rule, which, together with the rule in question, function to eliminate VV-sequences in the phonetic representations in the language.

A purposeful teleology refers to the intentionality and goal-directedness evident in the attainment of a target, or in our case, in the implementation of a change (Vincent 1978:409-10; Andersen 1973:780-1, 789-90). An example of this is the adaptation of one's speech habits to new norms (cf. Labov's investigations, e.g. 1972). As noted by Andersen (op. cit.), this is both a goal-directed and goal-intended process; when it happens the norms are regarded as the 'final cause' of the change(s) in one's speech habits(p. 790), and one is said to have changed his speech habit(s) intentionally (whether consciously or unconsciously).

Now, returning to Mould's conspiracy, we note that it is purposefully teleological. Mould attributes the 'conspiracy' to the proto-system he reconstructs. Thus the system supposedly activates some sound shifts in order to maintain the predictability or redundancy of [voice]. It has been observed that such a teleology is objectionable in reference to language since it "... ascribes to language a will of its own, a sort of conscious control over its own future..." (Vincent 1978:414). It has also been noted that to accept the existence of conspiracies (such as Mould's) would "so enormously extend our conception of what sort of things qualify as human languages..." (Vincent, p. 427). This is a serious problem, especially in view of continuing attempts in linguistic theory to 'constrain' the power of grammars. Investing language with a 'will' which cannot be demonstrated or proved would be a step backward in our attempts to define 'language'.

Finally, Mould's hypothesis could be considered in relation to projection and mapping in the context of Bantu as a whole. It is to be noted that as a projection, a diachronic conspiracy, even as 'metaphor', would be difficult to verify in prehistory. Mould notes that the conspiracy was (apparently) "most thoroughly carried out" only in Luyia (p. 390), and the 'evidence' used is from Luyia, with a few comparisons with Gusii and Luganda (where, apparently, the conspiracy failed). However, he remains silent on the crucial issue of how the supposed conspiracy is to be mapped on to the synchronic states of the remaining Bantu languages. Given the shifts posited by Guthrie 1971 (30-64) and other Bantuists, the mapping of the conspiracy on to the synchronic states of Bantu languages would, of course, result in uneconomical, phonetically and typologically implausible mappings such as we have argued against in the above sections. This consideration, I think, is an important one against such an unmotivated conspiracy.

4.2.6 Conclusion: Stops vs. continuants in West Tanzania

We now go back to the problem of 'stops vs. continuants' in relation to internal reconstruction in

Sumbwa and Rimi. It was noted that it would be difficult to argue for either stops or continuants as the proper reconstructions using internal evidence only. In addition, it was noted that an internal reconstruction approach was bound to come face to face with the problem of consistency. An example: consider a case in which continuants were posited for Pre-Sumbwa (with the rules *ƀ>b, *l>d, i.e. strengthening in the postnasal environment), and stops for some earlier stage, e.g. Proto-Bantu (with the rules *b>ƀ, *d>l, i.e. weakening rules in the pre-vocalic/intervocalic environment, and retention postnasally). Here, the Pre-Sumbwa solution would be claiming that postnasal stops were a result of strengthening and the Proto-Bantu solution that they have never changed at all, an utterly inconsistent consequence. The 'stop vs. continuant' problem is, of course, not restricted to Sumbwa (or West Tanzania); as a matter of fact it is an unsettled issue in Bantu diachronic phonology. Here the issue boils down to a confrontation between Guthrie's voiced stop solution and Meinhof's continuant reconstructions. It was seen that it would be necessary to settle the issue in so far as the comparative picture is concerned first as a prerequisite to settling it in relation to Sumbwa.

The discussion of this issue in relation to Bantu as a whole has taken into account criteria used by Meinhof 1932 (frequency of occurrence and analogical symmetry), Guthrie 1967-71 (frequency of occurrence and probable direction of sound shifts), Hinnebusch 1973 (simplicity or economy criterion), and Mould 1977 (redundancy of [voice] in PB, and the conspiracy to preserve it.) We have also made use of an additional consideration, the theory of strength and lenition hierarchies, to identify the probable environments for weakenings and strengthenings/ retentions /protection, i.e. weak and strong environments, and their general behavior synchronically and diachronically. All these considerations have led to the conclusion that the assumptions underlying the continuant solution lead to very complicated and unnatural mapping rules, while those underlying the stop solution lead to well-motivated mapping rules which are phonetically as well as typologically plausible.

Let us now turn to the Sumbwa, Sukuma, Nyamwezi, and Rimi alternations b/ƀ, and d/l, Rimi g/ǥ and Nilyamba Ø/b and d/l (cf. sections 4.1.1 and 4.1.2). As noted before, the stop alternants occur postnasally, and continuants elsewhere. In dealing with the problem of which one to posit for Pre-Sumbwa/Proto-West Tanzania the following typological facts need to be taken into account:

(1)the postnasal environment is a protective one, and in Bantu it has generally acted as one of retention; and

(2) the pre-vocalic/intervocalic environment is a weakening one.

On the basis of these facts we posit *b, *d and *g as Proto-West Tanzania phonemes, and the rules: *b>ƀ/V(#)_V, *d>l/V(#)_V, *g>ǥ/V(#)_V (Rimi), and the chainshift *b>ƀ>Ø/V(#)_V (for Nilyamba).

It should be noted that this solution is consistent with the broader Bantu picture. The rules posited for some stage earlier than Proto-Sumbwa, e.g. Proto-Bantu, i.e. *b>ƀ or *d>l (as posited by Guthrie and others) are consistent with the ones that may be used to derive modern Sumbwa, Sukuma, Nyamwezi, Rimi and Nilyamba from Proto-West Tanzania or Proto-Bantu.

3.2.7 On the 'possibility' of continuants in Proto-Bantu and 'reality' of reconstructions: A Supplementary Note

This section contains some remarks on (1) the 'possibility' or probability of continuants in Proto-Bantu, and (2) the issue of the reality of reconstructions.

Although we have argued against continuant reconstructions in the case of b/ƀ, d/l, and g/ǥ for Proto-Bantu, the issue of the 'possibility/probability' of 'structural' continuants does not end there. For one thing, the assumptions used above result in a symmetrical system without continuants: */b, d, j, g, p, t, c, k/ (cf. Meeussen 1967, 83). Notably, phonological systems lacking continuants are very rare (cf. Ruhlen 1976: 153-299); thus the proposed Proto-Bantu system could presumably be argued against on this score. For another, there have been suggestions in the literature of continuants other than the ones dealt with above. For instance, Jacobs 1965-66 posits *s instead of the usual *c, and Mann 1973, arguing from the perspective of distinctive features, thinks *c is better specified as */s/ than otherwise. Interestingly, Guthrie recontructs *y, which is later argued against by Meeussen 1973 on distributional grounds. In addition, Nurse 1979:86, proceeding on the principle of frequency, questions the validity of stop reconstructions */b, d, j, g/ for Proto-Eastern Bantu and suggests that their corresponding continuants */ƀ, l, s, ɣ/ would probably be more appropriate.

Nonetheless, there are valid grounds for supporting the stop reconstructions. First, the above system (without continuants) is supported by the principles of comparative and internal reconstruction, the principle of economy, and the principle of the probable direction of sound shifts. It should be noted that the reductionism of the reconstruction methods plus the limitations of the data (synchronic correspondences and internal alternations only) do not allow for the reconstruction of unconditional mergers that might have taken place in prehistory. For instance, if an *l were present in Proto-Bantu and later merged with *l<*d/*t, it is quite likely that there would be no evidence to show that such an *l existed at all. Or if Bantu had *s at some stage in prehistory, and this segment later merged with some *s from *c, *t, *k and other sources e.g. borrowing), then there would be no evidence at all to show that *s had existed independently as a phoneme at some earlier stage. Thus the question of whether the above system is 'complete' can not be answered. What can be said, though, is that it is as complete as our data and reconstruction assumptions can allow.

Our second observation concerns the issue of the phonetic reality of reconstructions. Views on this which have been subscribed to at one time or another are: (1) formulaic, i.e. reconstructions are not phonetically real, (2) realist, i.e. reconstructions are phonetically real. While it is not our intention to go into the formulaic-realist controversy here, it is important to note that the formulaic view has been criticized for its essentially ahistorical approach to reconstruction (Lass 1978). The point has been made that if one intends to engage in diachronic phonologic derivation at all one has to start with some type of input having phonetic content (Lass, op. cit.). This assumption of phoneticity is even entailed in the time-honored criterion of phonetic plausibility. The question is therefore not whether reconstructions are phonetically real, but what degree of phoneticity they have. The degree of phoneticity a reconstruction has is mostly a function of the nature of the input data available to the diachronist. Some reconstructions have a high degree of phoneticity and others a weak one. If the data are transparent, i.e. point to a specific reconstruction then you have a high degree of phoneticity. Examples of reconstructions with such phoneticity are the Proto-Bantu voiced stop reconstructions. Their high degree of phoneticity is based on massive data of synchronic correspondences (such as in Guthrie, Vols. 3 and 4, and others) and alternations. In some other cases the reconstructions may be characterized by weak phoneticity. Such reconstructions are based on input data which are either ambiguous or insufficient. For example, any intermediate steps posited without being attested in the languages being described have weak phoneticity. They should, of course, be phonetically plausible — which includes being attested in some languages around the world.

Note

1 Although Bantuists today refer to 'stop reconstructions' as Guthrie's, it is more accurate to call them Homburger's since he was the first, to my knowledge, to reconstruct voiced stops. In this study I will follow the usage of Bantuists.

Chapter 5

Other Reconstructions: the remaining Segments, Distinctive Features, Phoneme Structure Rules, and Syllable Structure

5.0 Introduction

The last chapter dealt with the reconstruction of *b, *d, and *g for Proto-Bantu and other stages in the prehistory of Sumbwa (or any other Bantu language). The present chapter deals with the reconstruction of continuants, affricates, voiceless stops, nasals, vowels; distinctive features; phoneme structure rules (PSRs) and syllable structure. The chapter also addresses the issue of the proto systemic constraints on sound change.

Segments will be posited for Pre-Sumbwa, Proto-Sum(bwa)/Suk(uma)/Ny(amwezi), and Proto-West Tanzania. The two proto-systems (Proto-Sum/Suk/Ny and Proto-W. Tanzania) are posited in order to set up different levels of derivation in the prehistory of Sumbwa (and its sisters). As in the previous chapter, we are interested in the yield of both the internal and the comparative method; applying the former reveals that reconstruction of the pre-segments using morphophonemic alternations (e.g. t/s, k/s, etc.) permits the recovery of the source phoneme (or segment), while in cases where change has left no alternations (e.g. f and v before u) it is the latter method that is helpful in pointing to the probable source segment. Distinctive features and PSRs will be posited for

Proto-W. Tanzania; Proto-Bantu distinctive features will also be posited since they represent the 'initial' input to the phonological history of any Bantu language. (Features for pre-Sumbwa will not be posited since a pre-language is assumed not to represent one stage but several; those for Proto-Sum/Suk/Ny are not posited since they are not necessary in the derivation of the Sumbwa sound system.

The chapter is organized as follows. Sections 5.1, 5.2, 5.3, 5.4, and 5.5 reconstruct continuants, affricates, voiceless stops, nasals, and vowels, respectively. Section 5.6 deals with the input classificatory and redundant features, phoneme structure rules, syllable structure and the question of proto constraints on sound change.

5.1 Continuants in Pre-Sumbwa, Proto-Sum/Suk/Ny, and Proto-West Tanzania

Although the issue of whether or not Proto-Bantu had continuant phonemes may never be settled, there is no doubt that the system of non-continuants posited underwent massive weakenings which most probably started in the proto period and characterized the split of the proto community into the different linguistic groups that later expanded into the south, east, etc. These weakenings are reflected by (i) morphophonemic alternations (whether relic or productive) in individual Bantu languages and (ii) inter-dialectal correspondences and (iii) the sets of correspondences among Bantu languages (cf.Guthrie, Vol.3,4; Nurse 1979a, 1979b passim; Hinnebusch et al. 1981 passim). In this section we shall be concerned with continuants that can be posited on the basis of the synchronic evidence available in Sumbwa and its sisters.

5.1.1 <u>*ƀ and *l</u>

The segments *<u>b</u> and *<u>d</u> and the rules *<u>b</u>><u>ƀ</u> and *<u>d</u>><u>l</u> were posited for Pre-Sumbwa and the two proto-languages. The question remains whether /ƀ/ and /l/ can be justified for Pre-Sumbwa and the proto-languages. Since Sumbwa maintains a synchronic contrast between these continuants and their corresponding stops (cf. Chapter 3), it is reasonable to assume that the continuants have been in existence as contrastive phonemes for a long time. Thus *<u>ƀ</u> and *<u>l</u> can be inferred for Pre-Sumbwa. These segments can also be posited for Proto-Sum/Suk/Ny on the evidence presented in Nurse 1979a: 63-66, Olson 1964, Richardson 1966, Velten 1901, etc. Nyamwezi, Sukuma, and Rimi have phonemic inventories which include both the stops /<u>b</u>, <u>d</u>/ and the continuants /<u>ƀ</u>, <u>l</u>/. (Of the West Tanzania languages, only Nilyamba does not have a synchronic voiced bilabial fricative, although it has the lateral continuant. But since certain occurrences of Proto-Bantu *<u>b</u> have been lost in Nilyamba, e.g. *<u>ba</u>->-<u>a</u> (Class 2 Noun Marker), *<u>bu</u>-><u>u</u>- (Class 14 Noun marker), it may be assumed this loss went through the stages *b>ƀ>w>Ø, the *ƀ stage representing Proto-W. Tanzania). The evidence for the phonemic status of both the stops and their corresponding continuants is presented below. The Sumbwa/Sukuma/Nyamwezi examples are as follows:

*b and *ƀ: -bad-/-ƀal- 'catch, e.g. insect with hand'/spot, pattern of piece of fabric; -bel-/ -ƀeel- 'break, smash/have an improved appearance'; -bool-/-ƀol- 'abduct/rote'; all these examples apply to all three languages, with the exception that, for -bel- and -bool-, Sukuma has -ƀel- and -ƀool-. More examples can be found in Velten 1901, Dahl 1915, and Richardson 1966.

*d and *l: -daale/-laale 'herd/uncultivated field'; -diil-/-liil- 'remain, stay (Suk. delay)/eat for'; -dod-/-lol- 'sew/look at'; -dedeƀal-/-leet- 'look puzzled/bring'; -dugu/-lugu 'relative/war'.

In Nilyamba b occurs in -bi 'bad', -bili 'two'; as noted above, the corresponding continuant does not occur (having been lost in many environments). d and l alternate, as in: -lek-/ndekile 'let, allow, leave/I have let...', -liipu/ndiipu 'long/Cl. 9/10', etc. but they also contrast since there are occurrences of d's in non-postnasal environment, e.g. idoa /madoa 'spot(s)', idale/madale 'herd'.

In Rimi, examples for the b/ƀ contrast are: -bi 'bad' (also pronounced as ƀi, cf. Oslon 1964), ibi 'feces', -belu- 'break'; the continuant counterpart occurs in e.g., -bega 'shoulder', -bii 'body', -bab- 'pain', etc. The contrast for d and l is illustrated by -du- 'come out' (cf. Sukuma -zu-, 'ooze'; Sumbwa -vu- 'ooze, come out/from'), -lulu 'bitter', -l- 'eat', -di- 'refrain from', etc. It thus appears that Proto-West Tanzania had the continuants ƀ and l, in addition to the stops b, d.

5.1.2 *s and *z

The evidence for the inferences *s and *z for Pre-Sumbwa is overwhelming, e.g. -sang- 'find', -sek- 'laugh', -siki 'tree stump', -sol- 'take', -suɣ- 'return'; -zi- 'go', -zala 'hunger', -zoɣ- 'be tired'; -zumi- 'agree, believe'. *s and *z can also be posited for the ancestor of Sumbwa, Sukuma and Nyamwezi; the following examples from Sumbwa, Nyamwezi, and Sukuma show correspondences involving these alveolar fricatives:

*s: Suk/Ny/Sum: -sal-/-sal-/-sal- 'go mad'; -sang-/-sang-/-sang- 'find, meet'; -sek-/-sek-/-sek- 'laugh'; -si/-si/-si 'country, land'; -simb-/-simb-/-simb- 'dig'; -sol-/-sol-/-sol- 'take (Sum & Ny), choose (Suk)'; -songol-/-songol-/-songol- 'sharpen to point'; -sua/ -sua/ -sua 'termite (flying kind)'.

It should be noted that in some lexical items Lunzewe Sumbwa s corresponds to ɣ in the Ushilombo dialect and in some dialects of Nyamwezi (e.g. Dahl 1915). Some such Nyamwezi/Sumbwa examples include: iɣiki/isiki 'stump',

-šiim-/-siim- 'like', išimi/isimi 'worm', -išini-/-isini- 'play', -šangul-/-siangul- 'wipe', etc. The segment š occurring here may be regarded as a dialectal variant of s and can be derived from Proto-Sum-Suk-Nyam *s

*z: -zagamba/-zagamba/-zagamba 'bull'; -zala/-zala/ -zala 'hunger, famine'; -zeng-/-zeng-/-zeng- 'build'; -zila/-zila/-zila 'path'; -zoka/-zoka/-zoka 'snake'; -zuna/ -zuna/-zuna 'younger brother'; -zuni-/zumi-/-zumi- 'agree, believe'.

Most occurrences of Pre-Sumbwa *s derive from Proto-Bantu *c, e.g. the above examples used as evidence for Proto-Sumbwa *s are reflexes of the Proto-Bantu *-cad-, *-cang-, *-cek-, *-cang-, *-ci, *-cimb-, *-cod-, *-congod-, *-cua , while its *z derives from Proto-Bantu *j and *d, e.g. *-jada >*-zala, *-jeng->*-zeng-, *-dumi->*-zumi- (cf. Guthrie, Vol. 3).

Proto-West Tanzania *s can be posited on the basis of the following Rimi/Suk/Sum/Ny correspondences: -hor-/-sol-/-sol-/sol- 'take'; -iho/-iso/ -iso/-iso 'eye', -rah-/-las-/-las-/-las- 'hit with arrow', -hek-/-sek-/-sek-/-sek- 'laugh', -himb-/-simb-/-simb- /-simb- 'dig', -ho/-so/-so/-so 'your father'. Pre-Sumbwa and Proto-Sum/Suk/Ny *z, however, seems to derive from Proto-West Tanzania *j, as the following Rimi/Sukuma/ Sumbwa/ Nyamwezi correspondences show: maji/ minzi/minzi/ minzi 'water', njia/njila nzila/nzila/nzila 'path', njaa/nzala/nzala/nzala 'famine, hunger', -jum-/-zum-/-zum-/

-zum- 'curse', -j-/-iz-/-iz-/-iz- 'come'. It is significant that Rimi does not even have a phonetic [z]; as the above examples show, its j corresponds to the z in the other daughter languages.

5.1.3 What are Sumbwa f and v reflexes of?

According to the data in Nurse 1979a:63-66, these sounds do not occur in Nilyamba and Rimi; Sukuma has /f/, with [v] occurring as an alternant of bw e.g. /n-bua/> /n-bwa/>[mva]; Nyamwezi has /f/ and a peripheral /v/. In Sumbwa (cf. Chapter 3) both /f/ and /v/ are phonemes. With the exception of borrowings, e.g. -falansa 'french', -falanga 'franc', their occurrence is restricted to the environment before the high vowels, e.g. f: -fil- 'take'; -finul- 'turn inside out', -figo 'kidney', -fum- 'come out', -fumu 'medicine man'; v: -vimb- 'swell', -amvi 'feces', -viol- 'open eyes wide in wonder, fear, etc.', -vui 'white hair/knee', -vu- 'come from, ooze', -vugut- 'blow bellows'. This limitation suggests that f and v are more likely than not historically-derived segments.

This is partly supported by internal evidence in the form of alternations p/f and b/v presented in chapter 3 (with the fricative occurring before the causative or nominalized morpheme or both and the stop elsewhere). Examples: p/f: -ihimp-/-ihimfi- 'become short/shorten (v.t.)', -puup-/-puufi- 'become light/ make light'; b/v: -yomb-/-yomvi 'talk/talker'; -simb-/-simvi 'dig/digger'.

These examples point to *p and *b as the sources of f and v before i. Since occurrences of f and v before i can be assigned to *p and *b, respectively, we are left with occurrences of f and v before u. The environment itself suggests that the source-segments were either labialized (if non-labial) or just spirantized (if labial). But one can go no farther: there is no internal evidence in the language which points to what these source consonants were. Hence in order to take care of f's and v's before u we posit *f and *v as Pre-Sumbwa segments.

This internal situation is somewhat clarified by the comparative evidence. Suk(Ny)-Sum correspondences such as -pigo/-figo 'kidney', -bimb- /-vimb-, 'swell', etc. point to *p and *b as the source of the relevant occurences of f and v, i.e. those occurring before i. Other correspondences also show that some occurrences of f and v before u are traceable to Proto-Sum/Suk/Ny and Proto-W. Tanzania *p and *b, e.g., -pulu/-fulue 'turtle/ tortoise', -pumuk-/-fumuk- 'burst'(intr.), -bula/-vula 'rain', -bu/-vu 'ash', -bvui/-vui 'grey hair'.(cf. Rimi: -buvi 'grey hair', -imb- 'swell', mbura 'rain', ibi 'feces'/Sumbwa -amvi).

However, all occurrences of f and v do not go back to *p and *b. Dialectal variants such as -tung-/-fung- 'tie, bind', -tungul-/-fungul- 'open, untie', etc. noted by Dahl 1915 suggest that some occurrences of f go back to *t. This inference is strengthened by examples such as: Sum/Suk -tul-/-ful- 'wash clothes', Nilyamba/Rimi/Sum u-tiku/u-ṛiku/bu-fuku 'night', Rimi t/ṛ alternation (postnasally/elsewhere) exemplified by -tung-/-ṛung- (postnasal/elsewhere) 'tie' juxtaposed with Suk/Nilyamba -fung-/-tung- 'tie', all of which point to *t. All this shows that the rule *t>f is a valid one for Proto-Sum/Suk/Ny and Proto-W. Tanzania.

Other sources of f and v in Sumbwa are *k and *g, as the following Suk-Sum correspondences indicate: -kuba/-fuba 'chest' (c.f. Rimi -kuba), -kumbat-/-fumbat- 'hold in arms, embrace', -boku/ -hofu 'blind', -kundikil-/-fundikil- 'cover'(cf. Rimi -kunik-), -kundukul-/ -fundukul- 'uncover'(cf. Rimi -kunuku-), -dakun-/-tafun- 'chew', -igu-/-invu- 'hear', -gubu/-vubu 'hippo', -guba/-vuba 'bellows', -gulaal-/ -vulaal- 'suffer a severe physical injury'. Note should also be taken of a set of Nyamwezi variants kikuba/sifuba 'chest'.

The remaining source of Sumbwa v appears to be *d. This is suggested by the Suk/Sum z/v correspondence exemplified by the following: -zu- 'ooze'/-vu- 'ooze, come out/from', -zuul- 'undress'/ bu-vuule 'naked', -zumbi/ -vumbi 'continuous rain', -zubuk-/-vubuk- 'get cool', -zui/ -vui 'knee'. Observe that this correspondence occurs only before u; in other environments we have either z/z, e.g. -zala/-zala 'hunger/famine', -zila/-zila 'path', etc. or dz/z, e.g. -buudži-/-buuzi- 'ask', -dzi/-zi 'root', -dziik-/-ziik- 'bury', etc. Since the z/v correspondence occurs only before u, it seems reasonable to suppose that the labio-dental fricative was either a secondary development or an independent innovation in Sumbwa prehistory. The other correspondences point to *d as the source segment; thus in Sumbwa *d>v/_u, analogous to *t>f/_u. Positing *d as the source of the relevant Sumbwa v's is supported by at least one Rimi/Suk/Sum correspondence, d/z/v: Rimi -du- 'come out', Suk -zu- 'ooze', Sum -vu- 'ooze, come out/from'. Further support comes from Suk/Swahili correspondences. Suk/Swahili examples are: -dut-/-vut- 'pull'; -zual-/-va- 'wear'; -zuul-/-vu- 'undress', -zub-/-vu- 'fish', -zumbik-/-vumbik- 'bake in ashes'.

Although *d can be used as a Proto-Sum/Suk/Ny 'symbol' for the segment that was the source of Sumbwa v, the phonetic content of this symbol can not be completely specified. This is because the mechanisms responsible for the labializations, i.e. Cu>vu, seem to have been at work already in Pre-Proto-Sum/Suk/Ny times. (This should at least account for the lack of direct correspondences, i.e. those involving d in the Sum/Suk/Ny group).

To conclude: since (1) f and v do not occur in Nilyamba and Rimi, (2) all relevant occurrences of these segments are restricted to the environment before high vowels in Sumbwa, and (3) internal alternations, and correspondences among West Tanzania Bantu indicate that these occurrences derive from stops, we can exclude f and v from the phonological inventories of Proto-Sum/Suk/Ny and

Proto-W. Tanzania.

5.1.4 *h:

There is a relic alternation p/h in the language (cf.chapter 3), which points to *p as the earlier segment. In view of such pairs as -pam-/-ham- 'hit, push/ shout at someone (to attract attention)', -pelo/-helo 'outside edge/doom, annihilation', -pon-/-hol- 'get a good crop/cool down', -pul-/-huul- 'snatch (with hand)/hit, beat', we may infer that the contrast between Sumbwa /p/ and /h/ has existed for a long time. *h is therefore valid for Pre-Sumbwa. Since the above examples also apply to Sukuma and Nyamwezi, *h can be posited for Proto-Sum/Suk/Ny too.

Now, the question is whether /h/ should be inferred for Proto-W. Tanzania also. Consider the following Nilyamba/ Rimi/Sukuma/Nyamwezi/Sumbwa correspondences: -kupi/ -kuɸi/-guhi/-guhi/-ihi 'short', -pia/-ɸia/-pia -hia/-pia -hia/-hiahia 'new', -kupa/-kuɸa/-guha/-guha/ -gufua 'bone'. Here, Nilyamba p corresponds to Sukuma/ Nyamwezi p or h, Sumbwa h or f and Rimi ɸ. Considerations of phonetic plausibility point to *p as the appropriate Proto-W. Tanzania segment; the others can be derived from it, i.e. *p>h, *p>f, *p>ɸ, *p>p. On the basis of this, *h is excluded from the Proto-W. Tanzania phonemic inventory.

5.1.5 *y*

y is the only glide that can be posited for Pre-Sumbwa, Proto-Sum/Suk/Ny, and Proto-W. Tanzania. The Pre-Sumbwa and Proto-Sum/Suk/Ny is straightforward, e.gs.: -uyil-/-oyil-/-oyil- 'sweat', -yomb-/-yomb-/-yomb- 'speak', -yung-/-yung-/-yung- 'sieve, take a stroll', -yanda/-yanda/-yanda 'young boy', -yaga/-yaga/-yaga 'wind', -koy-/-koy-/-koy- 'struggle, make an effort'. The Nilyamba and Rimi data accessible to us at this moment does not have many examples of /y/; however, the following should be noted: Rimi ujoya, Suk looya, Ny luyoya 'feather'; Rimi yiu, Suk and Ny maayu, Sum yaayo/maayo 'mother'; Nilyamba -yimb-, Suk -imb-, Rimi -imb-, Ny -imb-, Sum -imb- 'sing'; Rimi mu-oyo 'vitality', Suk mu-oyo, Ny moyo 'soul'; Nily -yonk-, Ny/Suk/Sum -onk- 'suck (of child)'. We therefore assume that *y was part of the Proto-W.Tanzania phonemic inventory.

5.2 The Affricates *c and *j

These two segments cannot be posited on the basis of the internal evidence in the dialect under consideration, i.e. we can not posit *c and *j for Pre-Sumbwa. As noted in chapter 2, these segments are peripheral; basically, they are a result of borrowing from Swahili. However, Suk/Ny/Sum correspondences point to the probable existence of these affricates at the Proto-Sum/Suk/Ny stage. Examples illustrating these correspondences are given below. (The examples are from Guthrie, Vol. 3, Velten 1901, Dahl 1915, Richardson 1966, Olson 1964, Nurse 1979a, and research notes.)

*c: Suk-Sum: -caagul-/-saagul- 'choose, select'; -icaabo/-isiabo 'their companion'; -iciinwe/-isiinu 'your(pl.) companion'; -oc-/-osi- 'roast, bake'; -oci/-onsi'smoke'; -cuuma/-sioma 'iron, metal'.

Ny-Sum: calo/sialo 'land, country'; cali/siali 'nest'; celu/sielu 'luck'; ciliwa/silibwa 'food'; -cimu/-sumu 'spear'.

The c/s correspondence here points to *c. The Sumbwa reflex can be accounted for by a rule of spirantization, i.e. *c>s.

*j: Suk-Sum: -j-/-zi- 'go'; -ji/-zi 'root'; -jiik-/-ziik- 'bury in'; -jim-/-zim- 'go out (of fire)'; -jinga/-zinga 'beehive'; -jnukuul-/-ziikuul- 'dig up (from ground)'. As in the case of c/s, the j/z correspondence here can be accounted for by positing *j, and a rule of spirantization, i.e. *j>z.

Insufficient data from the Nilyamba/Rimi group makes it difficult to decide whether a c can be posited for Proto-W. Tanzania. Some c's at the Proto-Sum /Suk/Ny stage seem to be traceable to Proto-W. Tanzania *k, cf. Nilyamba -ki-, Sukuma -c- 'die'; Nilyamba lyuki, Rimi yuki, Suk lyoci, Ny lyoci, Sum lyonsi 'smoke', etc. which seem to suggest the chainshift *k>c>s. However, correspondences such as Rimi/Suk/Sum -oc-/-oc-/-osi- 'bake', Rimi/Sum -c-/

-si- 'dawn' suggest that *c was probably functioning as a phoneme at the Proto-W. Tanzania stage.

As for *j, it was noted in section 4.1.2 that j can be assumed for Proto-W. Tanzania in view of the correspondence j/z between Rimi and its sisters.

5.3 *p, *t, *k

These segments have already been noted as being the sources of Sumbwa /f/ (section 4.1.3); *p has also been noted as being the source of /h/ (section 4.1.4), and *k as the source of some c's (section 4.2). The positing of these segments is therefore straightforward, whether as Pre-Sumbwa, Proto-Sum/Suk/Ny, or Proto-W. Tanzania segments. For Pre-Sumbwa, the alternations p/f, p/h, t/s, and k/s, illustrated in chapter 2, should be noted; so, also, should numerous internal non-alternating occurrences of these segments. For Proto-Sum/Suk/Ny, the following Suk/Ny/Sum examples should be noted:

*p: -lip-/-lip-/-lih- 'pay'; -pini/-pini/-hini 'handle', -piagul-/-piagul-/-hiagil- 'sweep', -panga/-panga/-hanga 'healthy, sound', -pemb-/ -pemb-/-hemb- 'burn (v.t.), set alight'.

*t: -ta/-ta/-ta 'bow'; -leet-/-leet-/-leet- 'bring'; -tem-/-tem-/-tem- 'cut'; -ti/-ti/-ti 'tree'; -biti/-biti/-fisi 'hyena'; -tu/-tu/-tui 'ear'; -tum-/-tum-/-tum- 'send'.

*k: -kala/-kala/-kala 'charcoal', -kand-/-kand-/

-kand- 'plaster', -kul-/-kul-/-kul- 'grow', -kil-/-kil-/-kil- 'surpass', -kuba/-kuba/-fuba 'chest', -lek-/-lek-/-lek- 'leave'.

For Proto-W. Tanzania *p, *t, *k, we may note the following Rimi examples which correspond to the above:

*p: -liΦ-, -Φ̄ini, -Φiagu-, -Φanga, -Φemb-.

*t: -r̥a, -er̥-, -r̥em-, -r̥i, -Φ̄ir̥i, -r̥ui, -r̥um-. (Note that r̥ is a voiceless alveolar flap).

*k: -xaa, -xand-, -kur-, -kir-, -kuba, -rek-.

Data from Nilyamba also shows that *p, *t, *k are straightforward reconstructions, e.g. -kupi 'short' (cf. Rimi/Suk/Ny -kuΦi/-guhi/-guhi), itima 'liver' (cf. Rimi/Suk/Ny/Sum irima/litima/itima/itima), mkila 'tail' (cf. Suk/Ny/Sum nkila/mkila/msila).

5.4 Nasals *m, *n, *ny

Pre-Sumbwa *m, *n are straightforward reconstructions, as these examples show:

*m: mu-lomo 'lip', -mil- 'swallow', i-tima 'liver', -lim- 'cultivate', -tem- 'cut'.

*n: -bon- 'see', -lagan- 'agree (mutually)', -hini 'handle', gin- 'be fat', -ana 'child'.

The labial and alveolar nasals are also easy to reconstruct for Proto-Sum/Suk/Ny and Proto-W. Tanzania, as the following Rimi/Suk/Ny examples (which correspond to the above Sumbwa examples) show:

*m: muomo/mlomo/mulomo, -mir-/-mil-/-mil-, i-ɽima/li-tima/i-tima, -rim-/-lim-/ -lim-, -ɽem-/-tem-/-tem- 'cut'.

*n: -on-/-bon-/-bon-, -ragan-/-lagan-/-lagan-, -ɗini/-pini/-pini, -gin-/-gin-/-gin-, -ana/-ana/-ana.

Let us now turn to ny, the palatal nasal. Although Sumbwa has a phonetic ny from n+y sequences, there is no evidence for a Pre-Sumbwa *ny. All occurrences of ny in the modern language (e.g. nyanya 'tomato', nyaa(m)u 'cat', etc.) can be attributed to borrowing, e.g. from its sisters, Swahili, etc.

*ny can however be posited for Proto-Sum/Suk/Ny since there are correspondences such as Suk/Sum: nyakamo/nakamwi 'only child', -ny-/-ni- 'defecate', nyama/nama 'meat',-nyo/-nio 'female genitals'. Besides, Nyamwezi has dialectal variants such as nyama/nama 'meat', nyoko/noko 'your mother', -ny-/-ni- 'defecate', -nyungu/-nungu 'pot', munyu/muunu 'salt', nyoota/noota 'thirst', which point to *ny.

Positing *ny for Proto-W. Tanzania is based on the following Rimi/Suk/Ny/Sum examples: nyama/nyama/nyama~nama/nama 'meat', -nyu-/-nu-/-nu-/-nu- 'drink', nyokwe/noko/nyoko~noko/noko 'your mother', -nyunk-/-nunk-/-nunk-/-nunk- 'smell bad', -ny-/-ni-/-ny-~-ni-/-ni- 'rain (Rimi), defecate (Suk/Ny/Sum)', nyinya/nina/nyina~nina/nina 'his/her mother', nyweera/noota/nyoota~noota/noota 'thirst', nyonyi/noni/noni/noni 'bird', -manyi-/-man- /-many-/-mani-

'know', etc.

A question which arises in the case of *ny is why the palatal nasal should be posited instead of assigning all its occurrences in the modern languages to *n. This may be answered in the following way. Positing *ny fits in with other aspects of the evolution of West Tanzania languages. ny is a [+palatal] nasal. The shift *ny>n which certainly occurred in Sumbwa prehistory and is still occurring sporadically in Sukuma and Nyamwezi can be associated with the shift of other [+palatal] segments to the alveolar area, viz., *c>s, *j>z. Sumbwa, which does not appear to have retained any Proto-W. Tanzania *c or *j, has also lost *ny which has merged with *n (cf. Chapter 6 for more discussion).

Another question to be briefly considered is why the velar nasal can not be posited for any of the prehistoric systems. In chapter 3 it is assigned the status of phoneme in Sumbwa. Its yield is very low, however; besides, it is restricted to the initial position. In Sukuma, the velar nasal seems also to be restricted to the initial position, although its yield is slightly higher than in Sumbwa. It should be noted however that Sukuma has a velarization rule which affects the mu- prefix across vowel-initial roots giving rise to many phonetic occurrences of the velar nasal. The other cases of [ŋ] can be attributed to the effects of Meinhof's rule, e.g. -ŋoma 'drum', -ŋombe, 'cow, ox', -ŋondi 'ram', whereby a consonant is assimilated to a preceding nasal if a nasal or a nasal cluster occurs in the following syllable. (Other occurrences of ŋ , e.g. -ŋool- 'howl, scream, groan' appear to be due to onomatopeic creation). Turning to other West Tanzania languages, we see that Rimi has a phonemic /ŋ/, e.g. /ŋombe/ 'cow', etc. which can be explained by Meinhof's rule; it also has a phonetic [ŋ] which derives from sequences of n+h, e.g. n+himba-->[ŋimba] 'lion' or n+g if the following syllable contains a nasal cluster (i.e. domain of Meinhof's rule) e.g. u-gembe 'razor', n-gembe -->[ŋembe] 'razors'. In view of this we can conclude that ŋ can not be reconstructed for any of the prehistoric systems.

A summary of the different levels of prehistoric derivation of Sumbwa consonants is given in Table 2 below.

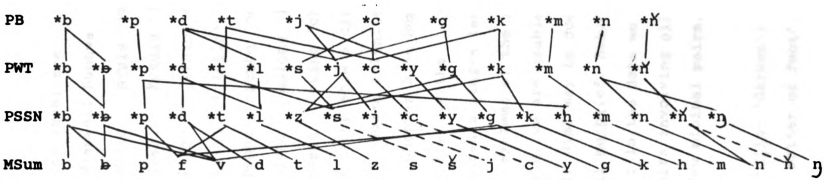
5.5 Vowels

Five Pre-Sumbwa vowels, all occurring short and long, can be posited on the basis of examples such as the following:

*i, *ii: -ɓik- 'announce death', -ɓiik- 'keep, store'; *e, *ee: -ɓele 'millet', -ɓeele 'breast, milk'; *a, *aa: -ɓaɓ- 'smart', -ɓaaɓa 'father'; *o, *oo: -sol- 'take', -sool- 'quarrel, fight'; *u, *uu: -kul- 'grow' -kuul- 'extract, e.g. thorns'.

The remaining West Tanzania languages all have seven vowels (cf. Nurse 1979a:28, 30, 37, 45, 58). On the basis

<u>Table 2</u>: <u>Relationships among the Proto-Bantu, Proto-West Tanzania, Proto-Sukuma-Sumbwa-Nyamwezi, and Modern Sumbwa Consonant Segments</u>.



<u>Note:</u> A broken line indicates that the Sumbwa segment in question occurs in borrowings in the available data, and might not have a (direct) derivational relationship with the relevant proto-segment.

It should also be noted that the table only shows relationships that are relevant to the derivation of the modern Sumbwa dialect from the proto-segments.

of this, a seven vowel system can be posited for both Proto-Sum/Suk/Ny and Proto-W. Tanzania. Examples (from Nurse 1979a:63-66; also Richardson 1966) are:

	Nilyamba	Rimi	Sukuma	Nyamwezi	Sumbwa	
*ʉ:	mbʉra	mbʉa	mbʉla	mbula	mvula	'rain'
*u:	mugulu	muguu	kigulu	kugulu	kugulu	'leg'
*ɨ:	lɨɨso	rɨso	lɨɨso	liiso	liinso	'eye'
*i:	-liipu	-riɸu	liihu	liihu	(-leele)	'long/tall'
*e:	-pembe	-ɸembe	-pembe	-pembe	-hembe	'horn'
*o:	mulomo	muomo	nnomo	mlomo	mulomo	'lip/mouth'
*a:	muana	muana	nuana	nuana	muana	'child'

All the languages in this group show a distinction between long and short vowels (cf. Nurse 1979a:18-44, passim; researcher's notes; also Chapter 3 on Sumbwa vowel length). We can therefore assume that at the Proto-Sum/Suk/Ny and Proto-W. Tanzania stages length was a distinctive trait of the vocalic systems of the relevant dialects. Due to insufficient data, we are unable to give examples from Nilyamba. Length in Rimi may be due to loss of medial consonants, e.g. mu-bii/mu-bi(cf. Suk/Ny mu-ƀili/mu-ƀi) 'body/bad person'; in the data we have, however, there aren't minimal pairs involving all seven vowels. But Sukuma has quite a few minimal pairs, such as the following:

ɨ, ɨɨ: -gɨt- 'blockade', -gɨɨt- 'darken'; i, ii: gisi 'bad manners', giisi 'as a matter of fact'; e, ee: -leƀ- 'be deadly sick', -leeƀ- 'intoxicate'; a, aa: -pal-

'peel', -paal- 'blow'; o, oo: -bol- 'rot', -bool- 'abduct'; u, uu: ndulu 'bitter', nduulu 'rude'; ụ, ụụ: -lụb- 'mix up', -lụụb- 'frown'(cf. Nurse 1979a:47).

5.6 Distinctive Features, PSRs and Syllable Structure for Proto-Bantu and Proto-West Tanzania

5.6.1 Distinctive Features and PSRs

It was noted in chapter 3 that features, apart from characterizing the sound system of a language in phonetic terms, also capture (1) the phonological contrasts in the language, and (2) similarities among segments which either make them undergo, or motivate, the same processes. Segments characterized by such similarities constitute a natural class. As noted in chapter 3, the usefulness of the distinctive feature approach in description is in capturing generalizations, i.e. general statements of processes affecting natural classes. These statements may be synchronic or diachronic.

It should be observed that in both synchronic and diachronic description there is the notorious problem of which distinctive features to use, already referred to in Chapter 3 in relation to synchrony. In diachrony, however, there is the additional problem of the 'phoneticity' of the reconstructed features. This is the traditional problem of the reality of reconstructions in general, discussed in Chapter 4 in relation to the issue of voiced stops versus continuants in Bantu reconstruction. What was said there applies here as well. First, the assumption of the phoneticity of reconstructions is relative to the type of input data a historical linguist is dealing with: in some cases one can assume a high degree of phoneticity, in other cases weak phoneticity. Examples of the former are Proto-Bantu *t̲ and *p which were reconstructed on the basis of Bantu correspondences such as t/r/th/l/... and p/h/Φ/...(cf. Guthrie,Vol. 4: 1404-1628, 1629-1882). In these cases we can assume that the proto-segments were, phonetically, [+cor, +ant, -cnt, -vcd, -son] and [-cor, +ant, -cnt, -vcd, -son]. (The issue of whether *t̲ was dental or alveolar would be a minor one since there is no evidence of an opposition between dentality and alveolarity in Proto-Bantu). Weak phoneticity has to do with unclear cases or insufficient 'input' data; an example was given in chapter 4 of intermediate steps unattested in the languages being described but attested cross-linguistically.

Second, there is the related issue of the validity of reconstructions. In our case the validity of a set of distinctive features posited for a proto-system depends on the validity of the input data, the theoretical and methodological assumptions used in the description, and the consistency of the description itself. Like any description, the validity of an aspect of reconstruction is reduced somewhat, or even reduced to zero, if there is something wrong with the input data, or the assumptions, or the analysis itself.

The application of the distinctive feature approach in diachrony is, however, more advantageous than a solely phonemic approach. On this approach, we can make the stronger claim, not explicitly made in a phonemic notation, that all regular sound changes and other phonetically-based or system-based developments can be explained as functions of the possibilities for change present in the features, distinctive and otherwise, in their paradigmatic and syntagmatic interactions. Thus, in this view, assimilatory developments from Proto-Bantu to Proto-West Tanzania to Sumbwa can be explained in terms of the combinatory possibilities present in the feature systems at each stage of development. This will be briefly considered below after distinctive feature matrices and PSRs for Proto-Bantu and Proto-West Tanzania are presented.

Tables 3 and 4 present the classificatory matrices. PSRs (i.e. phoneme structure rules) for each proto-system follow the respective table.

Table 3: A CLASSIFICATORY MATRIX FOR PROTO-BANTU(PB)

	p	b	m	t	d	n	c	j	ɲ̌	k	g
syl	-	-	-	-	-	-	-	-	-	-	-
cor	-	-	-	+	+	+	+	+	(-)	-	-
ant	+	+	+	+	+	(+)	-	-	-	-	-
vcd	-	+	(+)	-	+	(+)	-	+	(+)	-	+
nas	-	-	+	-	-	+	(-)	(-)	+	-	-

	i	ii	i	ii	u	uu	u	uu	a	aa	e	ee	o	oo
syl	+	+	+	+	+	+	+	+	+	+	+	+	+	+
hi	+	+	+	+	+	+	+	+	(-)	(-)	-	-	-	-
lo	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	+	+	(-)	(-)	(-)	(-)
bk	-	-	-	-	+	+	+	+	(+)	(+)	-	-	+	+
tns	+	+	-	-	+	+	-	-	(-)	(-)	(-)	(-)	(-)	(-)
lng	-	+	-	+	-	+	-	+	-	+	-	+	-	+

Some comments to clarify some things about the matrix are in order. First, all the features used in the matrices except [tense] have already been introduced in chapter 3. [tense] is used here to distinguish a very close from an not so close variety of high vowel reconstructed for PB.

Second, features in the matrix which are irrelevant to the characterization of certain segments have been left unspecified, e.g. [cor], [ant], [vcd], and [nas] for vowels, and [lo], [hi], [lng], and [tns] for consonants. Redundant feature values are parenthesized.

PSRs (phoneme structure rules) stating the redundant values Table 3 are:

1. $[\text{+nas}] \text{---}> [\text{+vcd}]$

2. $\begin{bmatrix}\text{+cor}\\ \text{+nas}\end{bmatrix} \text{---}> [\text{+ant}]$

3. $\begin{bmatrix}\text{+cor}\\ \text{-ant}\end{bmatrix} \text{---}> [\text{-nas}]$

4. $\begin{bmatrix}\text{-ant}\\ \text{+nas}\end{bmatrix} \text{---}> [\text{-cor}]$

5. $\begin{bmatrix}\text{+syl}\\ \text{+hi}\end{bmatrix} \text{---}> [\text{-lo}]$

6. $\begin{bmatrix}\text{+syl}\\ \text{-hi}\end{bmatrix} \text{---}> [\text{-tns}]$

7. $\begin{bmatrix}\text{+syl}\\ \text{+lo}\end{bmatrix} \text{---}> [\text{-hi}]$

8. $\begin{bmatrix}\text{+syl}\\ \text{-bk}\\ \text{-hi}\end{bmatrix} \text{---}> [\text{-lo}]$

9. $\begin{bmatrix}\text{+syl}\\ \text{-hi}\\ \text{+bk}\end{bmatrix} \text{---}> [\text{-lo}]$

Notice that rules 5 and 7 are universal redundancies.

As noted in Chapter 3 in reference to Table 1, classificatory features only function to capture the basic or non-redundant phonological distinctions. This means that certain generalizations may not be stated using these features only, e.g. about which segments occur and which do not, and some processes. Recall that in chapter 3 redundant features were invoked to carry out some of these tasks. We also need to use some redundant features to give an adequate statement of the structure of proto-phonemes and phonological processes/phonetic innovations in Bantu prehistory. These involve: (1) features not mentioned in the matrix, and (2) those that are mentioned but are irrelevant to the phonological specification of either consonants or vowels. Redundancies involving these features can easily be abstracted from the proto realization processes that can be reconstructed using internal or comparative data. Using the data in Meinhof 1932 and Guthrie 1967-1971, some of the processes that can be posited are:

1) sonorantization, i.e. d--->l, r.../V__V
2) palatalization, e.g. k--->k^y/__i
3) labialization, e.g. k--->k^w/__u
4) continuantization, e.g. g--->g/V__V

(It should be noted that d--->l, r,... was in all probability an early and widespread phenomenon, given the reflexes *d in most Bantu languages in non-postnasal environments. Also labialization and palatalization seems to have been widespread. However, the continuantization of *g does not seem to have been as widespread in the proto dialects since many languages have retained the proto segments intervocalically.)

The phonetic features corresponding to these processes are, respectively: [sonorant], [palatal], [labial], and [continuant]. In addition, there is another feature that is not mentioned in Table 3: [round], which redundantly specifies back nonlow vowels. Also, the feature [high] is classificatory in relation to vowels only; but it can be used in statements which refer to consonants.

Now, using these features, the following redundancies may be stated in reference to Table 3:

10. $\begin{bmatrix}\text{+cor}\\ \text{-ant}\end{bmatrix} \text{--->} \begin{bmatrix}\text{+hi}\\ \text{-bk}\end{bmatrix}$

11. $[\text{+ant}] \text{--->} \begin{bmatrix}\text{-hi}\\ \text{-bk}\end{bmatrix}$

12. $[\text{-ant}]\text{--->}[\text{+hi}]$

13. $\begin{bmatrix}\text{-cor}\\ \text{+ant}\end{bmatrix} \text{--->} [\text{+lab}]$

14. $\begin{bmatrix}\text{+hi}\\ \text{-bk}\end{bmatrix} \text{--->}[\text{+pal}]$

15. $[\text{-syl}] \text{--->} [\text{-cont}]$

16. $\begin{bmatrix}\text{+syl}\\ \text{+bk}\\ \text{-lo}\end{bmatrix} \text{--->}[\text{+r(ou)nd}]$

17. $[\text{+rnd}] \text{--->} [\text{+lab}]$

18. $\begin{bmatrix}\text{-syl}\\ \text{-nas}\end{bmatrix} \text{--->}[\text{-son}]$

(Note that 18 applies only if a system of stop phonemes, which has been argued for in Chapter 4, is posited and the continuant system derived from it.)

Let us now turn to table 4 which presents the classificatory matrix for Proto-West Tanzania.

Table 4: <u>A CLASSIFICATORY MATRIX FOR PROTO-W. TANZANIA(PWT)</u>

	p	b	b	m	t	d	s	n	l	c	j	n	y	k	g
syl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
son	(-)	(-)	(-)	(+)	(-)	(-)	-	(+)	+	(-)	(-)	(+)	+	(-)	(-)
cor	-	-	-	-	+	+	+	+	+	+	+	(-)	-	-	-
ant	+	+	+	+	+	+	(+)	(+)	(+)	-	-	-	(-)	-	-
vod	-	+	(+)	(+)	-	+	(-)	(+)	(+)	-	+	(+)	(+)	-	+
cnt	-	-	+	(-)	-	-	+	(-)	(+)	(-)	(-)	(-)	(+)	-	-
nas	-	-	(-)	+	-	-	(-)	+	-	(-)	(-)	+	-	-	-

	į	įį	i	ii	ų	ųų	u	uu	a	aa	e	ee	o	oo
syl	+	+	+	+	+	+	+	+	+	+	+	+	+	+
hi	+	+	+	+	+	+	+	+	(-)	(-)	-	-	-	-
lo	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	+	+	(-)	(-)	(-)	(-)
bk	-	-	-	-	+	+	+	+	(+)	(+)	-	-	+	+
tns	+	+	-	-	+	+	-	-	(-)	(-)	(-)	(-)	(-)	(-)
lng	-	+	-	+	-	+	-	+	-	+	-	+	-	+

The segment structure rules expressing the redundancies here are:

19. $[+\text{nas}] \dashrightarrow \begin{bmatrix}+\text{son}\\-\text{cnt}\end{bmatrix}$

20. $[+\text{son}] \dashrightarrow [+\text{vcd}]$

21. $\begin{bmatrix}+\text{son}\\-\text{nas}\end{bmatrix} \dashrightarrow [+\text{cnt}]$

22. $\begin{bmatrix}-\text{cnt}\\-\text{nas}\end{bmatrix} \dashrightarrow [-\text{son}]$

23. $\begin{bmatrix}+\text{son}\\-\text{cor}\\-\text{nas}\end{bmatrix} \dashrightarrow [-\text{ant}]$

24. $\begin{bmatrix}+\text{cor}\\-\text{ant}\end{bmatrix} \dashrightarrow \begin{bmatrix}-\text{cnt}\\-\text{nas}\end{bmatrix}$

25. $\begin{bmatrix}+\text{son}\\+\text{cor}\\-\text{nas}\end{bmatrix} \dashrightarrow [+\text{ant}]$

26. $\begin{bmatrix}+\text{nas}\\+\text{cor}\end{bmatrix} \dashrightarrow [+\text{ant}]$

27. $\begin{bmatrix}-\text{son}\\+\text{cor}\\+\text{cnt}\end{bmatrix} \dashrightarrow \begin{bmatrix}+\text{ant}\\-\text{vcd}\\-\text{nas}\end{bmatrix}$

28. $\begin{bmatrix}-\text{cor}\\+\text{ant}\\+\text{cnt}\end{bmatrix} \dashrightarrow \begin{bmatrix}-\text{nas}\\-\text{vcd}\end{bmatrix}$

PB redundancies for vowels (i.e. Rules 5-9 which refer to Table 3) apply also to the PWT vowel system. As to the redundancies having to do with (i) features not mentioned in the matrix and (ii) those mentioned but irrelevant to the specification of some set of segments, the following need to be noted.

To begin with, changes between PB and PWT introduced two features: [sonorant] and [continuant]. The change *d--->l/V__V introduced some l's which contrasted with some d's. Also, some y's developed from j's (cf. Guthrie 1971:30-64). Thus the feature [sonorant] was no longer an irrelevant and redundant feature; it had become distinctive. PSR 18 above which applied at the phonological level in PB did not apply any more. In addition, introduction of /ƀ/ and /s/ in PWT ensured the distinctiveness of the feature [cnt], which is also used to specify the liquid. That is, PSR 15 above no longer applied since [-syl] now included both [-cnt] and [+cnt] phonemes. All the other redundancies, i.e. 10, 11, 12, 13, 14, 16, and 17 still applied at the PWT stage.

5.6.2 Syllable Structures for PB, PWT and PSSN

The following syllable structures for the proto stages may, on the synchronic evidence, be posited: V, CV, and NCV. At any of the proto stages the evidence suggests that the only element forming the syllable nucleus was a vowel which carried a high or low tone. Segmentally, something like the conditions formulated for Sumbwa (Rules

27 and 28, Chapter 3) may be assumed to have been operating at the phonological level in the proto systems in question. That is, the following rules may be posited:

29. P(C): $*/\$C_0^2V\$/$ (where P(C) = positive condition and \$ = syllable boundary)

30. If: $*/\$ \quad C \quad C \quad V \; \$/$
Then $/ \; [+nas][-syl][+syl]/$

Rule 29 states the syllable structures allowed in the proto-systems, and Rule 30 says that the only CC sequence allowed then was a nasal followed by a consonant.

It is important to note a distributional limitation of the NCV sequence. This sequence is very rare initially in the modern languages; in fact the only occurrence initially in a lexical morpheme is in the lexeme -ntu which may mean 'person', 'thing', or 'place' depending on whether the prefixes are mu-/ba- (Class 1/2 - the human class), si-/bi- (Class 7/8 - the class of things), ha- (class 16 - locative class) (Sumbwa situation). This limitation or something close to it may also be assumed to have been in existence in prehistory.

5.6.3 Systemic Constraints on Sound Changes

It is important to observe that the posited features and the PSRs are not only input elements at the respective proto stage but they also function as constraints on the types of changes that may be internally induced (as opposed that become distinctive or are lost, the phonetic realization rules that are possible in a given system, etc. —all these are constrained by the initial input. Thus, from the very beginning, a proto-phonology has a set of possible changes in terms of distinctive features and realization rules already 'mapped out' by the initial input.

Another parameter that constrains the types of processes and phonological representations that develop is the syllable structure. Processes or changes in a phonology can only operate within the bounds of the syllable shapes, or syllable sequences, allowed in the language. Languages with certain syllable structures may favour certain changes, while other languages with different structures may favour some slightly different changes. The predominant changes that affected Proto-Bantu (whose syllable structures have been reconstructed as: V, CV and NCV) were processes affecting abutting segments, and since the abutting segments were in the majority of cases CV, most of the changes came to be assimilations (mostly regressive, but sometimes progressive), with the vowels inducing all the palatalizations, labializations, sonorantizations, and most of the continuantizations that occurred in Bantu prehistory (cf. Chapter 6). (Note that there were also processes involving the nasal compound, and also dissimilations, cf. Chapters 4 and 6).

The 'map' of possible changes which the feature combinations in syllables allowed in Proto-Bantu and Proto-West Tanzania can be illustrated with several examples. Consider the following feature combinations in syllables and some of the associated possible changes:

Feature Combinations in syllables	Possible changes
1. $\begin{bmatrix}\text{+nas}\\ \text{+place}\end{bmatrix}\begin{bmatrix}\text{-syl}\\ \text{-cnt}\\ \text{-/+vcd}\\ \text{+place}\end{bmatrix}[\text{+syl}]$	1. nasalization of C/N__ 2. devoicing and eventual loss of N /__[-syl, -vcd] 3. prenasalization 4. voicing of -vcd consonant before nasal. 5. NC>NN>N 6. NC>CC
2. $\begin{bmatrix}\text{-syl}\\ \text{-pal}\end{bmatrix}\begin{bmatrix}\text{+syl}\\ \text{+pal}\end{bmatrix}$	palatalization
3. $\begin{bmatrix}\text{-syl}\\ \text{-lab}\end{bmatrix}\begin{bmatrix}\text{+syl}\\ \text{+lab}\end{bmatrix}$	labialization
4 $\begin{bmatrix}\text{-syl}\\ \text{-cnt}\\ \text{-/+vcd}\end{bmatrix}[\text{+syl}]$	1. voicing of C before a vowel (and after a vowel) i.e. intervocalic voicing 2. spirantization before a vowel 3. aspiration of voiceless stop

The above feature combinations in syllables and the accompanying possible changes just show how the parameters of features in syllables can 'map out' the processes which may be internally induced in a language. All of the changes listed have occurred either in all Bantu languages or in some, e.g. palatalization is more general than voicing of C intervocalically (cf. Guthrie 1971:30-64; 1970, Vols. 3 & 4). Now, the issue of what among possible changes may occur in the different descendant languages, or why some occur and others don't, is not relevant here; what is important is that phonological systems, barring borrowing, can only evolve within the parameters set by the inherited distinctive and redundant features, PSRs, and syllable structures. What linguistic historians do in reconstruction of processes and their changes is a retracing of the 'footprints' of what happened from among a set of initial possibilities.

In the next chapter we investigate some of the most salient changes that occurred in Sumbwa prehistory.

Chapter 6

Towards Sumbwa Prehistory

6.0 Introduction

This chapter deals with some aspects of the evolution of the Sumbwa phonological system. The investigation will necessarily move back and forth from the internal to the comparative evidence, and also between Pre-Sumbwa or the posited proto-systems and the modern language. In addition, because of the emphasis on Sumbwa, the comparative data will in most cases be restricted to the West Tanzanian languages, except in situations where the West Tanzanian data or a diachronic phenomenon needs independent confirmation. The the reconstructed evolutionary scenario reconstructed consists of rule additions, rule changes, morphologizations, etc. representing different levels of derivation between the proto systems and modern Sumbwa.

The chapter begins with the consideration of palatalization (section 6.1), followed by a discussion of labialization (section 6.2) - two processes or mechanisms of change which must be posited in order to explain certain internal alternations and correspondences between Sumbwa and its sisters. This is followed by a discussion of the changes involving *c, *j and *ny (section 6.3). Section 6.4 deals with other reflexes of *j (i.e. y and Ø). Section 6.5 considers the changes involving vowels. Section 6.6 is a summary of the developments considered in 1-5.

6.1 Palatalization

The term 'palatalization' is used in two senses. First, it refers to the 'palatal coloring' that a palatal vowel or glide imparts to a consonant. This type of assimilation results in a minor modification, referred to as 'secondary articulation' in the literature. In articulatory terms, the modification involves a gesture in which the tongue moves towards the hard palate.

Second, 'palatalization' refers to the process by which a consonant changes into a palatal or alveo-palatal as in *k>c, *g>j, or *k>s, *g>z. The progression of this process has been noted to subsume the first sense of palatalization (above) and assibilation (the change of a consonant into a palatal (or alveo-palatal) strident - affricate or fricative). It is generally assumed that the process goes through a series of steps, e.g. *k^y>t^y>ts>s. We are concerned with this second sense of 'palatalization' in our discussion.

Palatalization in Sumbwa prehistory can be reconstructed on the basis of internal alternations such as k/s, g/z, t/s, and d/z (cf. Chapter 3; also below). Since the reflexes of Pre-Sumbwa palatalization are alveolar spirants, we will sometimes use the term 'historical palatalization' to refer to this process. Comparative evidence from sister languages can be used to either confirm such reconstructions based on the internal evidence, or to ensure the appropriateness of the mapping rules.

The relevent data are presented first (section 6.1.1). Then the phonetic mechanism of palatalization and the evolution of the process in prehistory are dealt with (section 6.1.2). Next, palatalization in other environments is dealt with (6.1.2.2.3). Finally, the reflexes of palatalization are discussed in relation to the issue of the interaction between phonology and morphology.

6.1.1 The Data

Direct internal evidence for historical palatalization, as noted already, consists of morphophonemic alternations k/s, g/z, t/s, and d/z. (We say 'direct' because there is also indirect evidence in the form of the l/z alternation, which will be discussed in section 6.1.2). Data pertaining to each of these alternations are given below, along with examples for cognate alternations in Sukuma/Nyamwezi and Rimi wherever possible. Following each alternation are examples showing the relevant correspondences in West Tanzania languages.

6.1.1.1 The k/s alternation:

Examples illustrating this alternation are:

Verb-root		Causative	
-buuk-	'get up'	-buusi-	'lift, carry'
-hik-	'arrive'	-hisi-	'bring to intended destination'
-luk-	'vomit'	-lusi-	'cause to ...'
-guluk-	'fly; jump'	-gulusi-	'cause to ...'
-onk-	'suck (breast)'	-onsi-	'suckle'
-bak-	'flame'	-basi-	'light (fire)'

Some verbs show alternation not in the causative but the nominal stem, as in:

-ombek-	'build'	-ombesi	Cl. 1, 2, 14
-teek-	'cook'	-teesi	Cl. 1, 2, 14
-hanik-	'hang (e.g. beehive'	-hanisi	Cl. 1, 2, 14

This alternation is easily comparable to the Sukuma and Rimi k/c alternation, illustrated below:

Sukuma:

-bak-	'flame'	-bac-	'light (fire)
-buuk-	'get up'	-buuc-	'carry'
-lok-	'set (of sun)'	-loc-	'spend the whole day on'

Rimi:

-wuk-	'get up'	-wuc-	'cause to ...'

-ruk-	'vomit'	-ruc-	'cause to ...'
-rek-	'leave'	-rec-	'cause to ...'

Evidence in terms of correspondences from the West Tanzania reinforces the positing of palatalization in Sumbwa prehistory:

Sum	Suk	Nyam	Rimi	Nilyam	
-sila	-kila	-kila	-kila	-kila	'tail'
si	ki	ki	--	ki	'what'
sienda	kenda	kenda	kenda	kenda	'nine'
si	ki/si	ki	ki	i	'Cl.7 Noun pref
-osi	buuki	wuki	uki	uki	'honey'

6.1.1.2 The g/z alternation:

This morphophonemic alternation can be illustrated by the following examples:

Verb-root		Causative	
-og-	'take a bath'	-ozi-	'bathe'
-sang-	'find'	-sanzi-	'meet'
-saag-	'remain over'	-saazi-	'leave a remainder'
-yog-	'make noise'	-yozi-	'cause to ...'
-boloog-	'shout, yell'	-boloozi-	'cause to ...'

Some verbs show alternation in the nominal form:

-tong-	'go ahead'	-tonzi Cl. 14,	'front'
-hiig-	'hunt'	-hiizi Cl. 1, 2, 14	

-log-	'bewitch'	-lozi	Cl. 1, 2, 14

As in the k/s alternation, a comparable situation exists in Sukuma and Rimi; these languages have the g/j alternation. Examples from Sukuma are the same ones as the verb/causative examples given above, except that instead of the z alternate there is j. Rimi shows the g/j alternation postnasally only, as in:

-hang-	'get'	-hanj-	'assemble in groups'
-rung-	'fasten'	-runj-	'cause to ...'
-hong-	'follow'	-honj-	'cause to ...'

In non-postnasal environment there is the g/y alternation, as in: -og-/-oy- 'take a bath'/bathe', -rug-/-ruy- 'cook/cause to ...', etc.

Examples of correspondences related to the g/z alternation are not many in the available data; only the following have been noted:

Sum	Suk	Nyam	Rimi	Nilyam	
-lozi	-logi	-logi	-rogi	-logi	'witch'
-zil-	-gil-	-zil-	--	--	'refuse'
-hiizi	-hiigi	-hiigi	--	--	'hunter'

6.1.1.3 The t/s alternation can be illustrated as follows:

Verb-root		Causative	
-tet-	'speak'	-tesi-	'cause to ...'
-hit-	'pass'	-hisi-	'step aside to let pass'
-hilingit-	'roll along'	-hilingisi-	'cause to ...'

The s alternant also occurs in the nominal form of some verbs:

-leet-	'bring'	-leesi	Cl. 1, 2, 14
-but-	'bear (child)'	-busi	Cl. 1, 2, 14
-vugut-	'blow bellows'	-vugusi	Cl. 1, 2, 14
-tet-	'speak'	-tesi	Cl. 1, 2, 14
-hit-	'pass'	-hisi	Cl. 1, 2, 14

In addition all t-final -CVC- verb-roots show alternation in the perfective, e.g. -tet-/-tes-ile, -hit-/-his-ile, -leet-/-lees-ile, -but-/-bus-ile, already glossed above.

Importantly, comparable data in the Sukuma dialect recorded in Richardson 1966 do not show this alternation: -saat-/-saati- 'fall ill/cause pain', -bit-/-biti- 'pass/usher sb. in/past', -hilingit-/ -hilingiti- 'roll along/cause to ...', etc.

The West Tanzania correspondence set related to the t/s alternation is illustrated by:

Sum	Suk	Nyam	Rimi	Nilyam	
-satu	-datu	-datu	-raru	-tatu	'three'
-fisi	-biti	-biti	-piti	-piti	'hyena'

suggesting that the palatalization of *t before i was not a widespread change in West Tanzania.

6.1.1.4 The d/z alternation:

This alternation is restricted to the postnasal environment; the z alternate occurs in causative and/or nominal, and perfective forms. Examples:

Verb-root	Causative	Nominal	Perfective
-lend-	-lenzi-	-lenzi	-lenzile
-fund-	-funzi-	---	-funzile
-kond-	-konzi-	-konzi	-konzile
-land-	---	-lanzi	-lanzile
-lind-	---	-linzi	-linzile
-lund-	---	-lunzi	-lunzile
-lond-	---	-lonzi	-lonzile
-ond-	-onzi-	---	-onzile

The glosses for the verb-roots are: 'while away time', 'be narrow', 'be/become soft', 'creep (as sweet potato stems)', 'gurad', 'heap up', 'follow', 'become thin'. (The d/z alternation is discussed in section 6.1.2.2.2 in relation to the l/z alternation).

As in the case of the t/s alternation, Sukuma shows no cognate alternation here (cf.: -pond-/-pondi- 'smash/cause to ...', -band-/-bandi- 'go into hiding/cause to ...', -bind-/-bindi- 'hem/cause to...', etc.

There were hardly any examples relevant to the d/z alternation in Rimi or Nilyamba (in the data we have). This may be due to our limited data or the restricted nature of the alternation.

6.1.2 The Mechanism of Palatalization and the Evolution of the Process in prehistory

In this section we shall consider the mechanism of palatalization and the evolution of palatalization and subsequent changes (reflected by the k/s, etc. alternations) in Sumbwa prehistory.

6.1.2.1 The Mechanism of Palatalization

A question facing any historical study of palatalization (or other process) is: what are the factors involved in palatalization as a 'natural' process? There are three possible approaches to such a question: (1) the articulatory approach, (2) the auditory/perceptual approach, and (3) a combination of both approaches.

The articulatory approach is by far the most widespread approach to palatalization, where palatalization is regarded as a typical articulatorily-based assimilation based on the syntagmatic relationship between the consonant that undergoes it and the high, front vowel/glide that induces it. The assimilation can be regressive or progressive (though, typically, it is regressive). Within this view, the changes involved can be understood as a matter of the timing of the consonant and front vowel/glide gestures. In a regressive palatalization, there is regressive retiming of the front glide/vowel; in a progressive palatalization, there is progressive retiming (cf. Hooper 1976:114ff).

An articulatory (timing) view suggests the following steps as natural diachronic developments in regard to the palatalization of k, g, t, and d:

$$g > g^y > (d^y) > d\check{z} > dz > z$$
$$\searrow \check{z}$$
$$k > k^y > (t^y) > t\check{s} > ts > s$$
$$\searrow \check{s}$$
$$d \;\; {-}{-}> \;\; d^y \;\; > d\check{z} > dz > z$$
$$\searrow \check{z}$$
$$t \;\; {-}{-}> \;\; t^y \;\; > t\check{s} > ts > s$$
$$\searrow \check{s}$$

However, it has been pointed out that an exclusively articulatory approach fails to explain the change of palatalized velars to alveolars, e.g. $\underline{k}^y$ to $\underline{t}^y$ (cf. Anttila 1972: 72-3). The issue here is whether the actuation of such a change can be accomplished without the full participation of auditory/perceptual factors.

The auditory/perceptual approach is based on the abductive view of historical change proposed by Andersen 1973 (cf. Chapter 2). Abduction is reinterpretation based on acoustic similarity: if segment $\underline{x}$ is acoustically similar to $\underline{y}$, $\underline{x}$ may be reinterpreted as $\underline{y}$ by some language learner/speaker who perceives it as $\underline{y}$. Supporting the abductive approach, Anttila 1972:198 notes:

> Historical change actually must go through abduction... Sounds cannot be shifted directly on the articulatory scale in spite of the convenience of such terminology. The child cannot learn all the articulatory facts - many are simply not visible - but he has to abduce the sounds from his perception... Articulatory space and ease do produce random variation on which social forces feed, but this happens through abduction.

On this view, all the steps of palatalization (and other changes) are based on a series of reinterpretations of the acoustic signals they represent.

The third approach seeks to explain natural phonetic changes by investigating both articulatory and auditory factors. This has been called 'experimental historical phonology' (cf. Ohala 1974a, b) and here changes may have either articulatory or acoustic/perceptual causes. (The possibility that some changes may have both causes is not ruled out). For instance, the step $\underline{k} > \underline{k}^y$ may have articulatory causes, while the step $\underline{k}^y > \underline{t}^y$ may better be explained as an abduction. But the step $\underline{k}^y > \underline{t}^y$ may not be universal; in languages where $\underline{k}^y > \underline{c}$ is the assumed historical step (e.g. Sumbwa and other West Tanzania languages), it may be difficult to decide which one is the basic mechanism: the articulatory or the auditory factor? It may turn out that both may be equally valid.

On the basis of the above considerations, we may conclude that although palatalization is possible through articulatory retiming of the gesture for the palatal vowel or glide, the progression of the changes can reasonably be conceived as being implemented through the co-operation of both articulatory and auditory factors. And this is as it should be; in this view, change is a function of both speech production and perception.

6.1.2.2 Evolution of the process

It is a well-known fact that historical palatalization is reflected in a wide area in Bantu (cf. Guthrie 1971:30-64; Meinhof 1932; Hinnebusch et al., 1981), and that it was responsible for the development of palatal(ized) fricatives and affricates in many Bantu languages. Well-known is also the fact that palatalization was induced by the high, close front vowel i. What is not well-known, or what has yet to be investigated, are the diachronic changes and rules reflecting this process in the individual languages or groups of languages. What follows is a consideration of these changes and rules in relation to Sumbwa prehistory.

6.1.2.2.1 The Changes and Rules

Our considerations will proceed on two general assumptions: (1) palatalization in Bantu was part of Bantu weakening (cf. the lenition hierarchy, Ch. 4), and (2) the process was implemented gradually. That is, it will basically be analysed as a phonetic process. The problem with this position is that, although palatalization may have occurred as a phonetic process in Bantu prehistory, it may have been 'borrowed' into some languages. That is, by reconstructing 'palatalization' for the ancestors of Sumbwa, Sukuma, Nyamwezi, etc., we are assuming that palatalization occurred in these ancestors as a phonetic process, and did not spread to it. Of course this is a problem with most reconstructions based on synchronic evidence; and, in terms of the present study, we may not have an answer.

Two specific assumptions about palatalization also need to be stated at this point: (1) In terms of point of articulation, velars are more readily palatalized than apicals, which are more readily palatalized than labials. That is, palatalization usually begins with velars, then spreads to dentals/alveolars, but need not; later the process may affect labials, but need not (cf. Foley 1977:93ff., on assibilation). (2) In terms of conditioning segments, palatalization occurs first in the environment of the high, front glide or vowel, and may spread to other environments (e.g. in the environments of e, a or u) by phonetic analogy (cf. Foley, op. cit.).

6.1.2.2.1.1 <u>The Palatalizing environment</u>

Proto-Bantu, Proto-West Tanzania, and Proto-Sum-Suk-Nyam had a seven vowel system: */i, i, e, a, o, u, u/. In this system, both *i and *i can be categorized as [+hi] and [-bk]. However, *i is 'higher' than *i, and has been categorized as [+tense] (cf. Chapter 5). It is this higher, tense *i that induced palatalization in the prehistory of many Bantu languages. The differences between these two vowels can be readily seen in their diachronic effects on the preceding consonants, as exemplified below:

Proto-form	Suk	Sum	Nyam	Rimi	Nilyam	Gloss
* ki	ki/ci	si	ki/ci	ki	ki	Cl. 7 prefix
*-kid-	-kil-	-kil-	-kil-	-ki-	-kil-	'pass over, 'surpass'
*-gid-	-gil-	-zil-	-zil-	--	-gil-	'refuse, be taboo'

*-gili	-gili	-gili	-gili	-gili	-gili	.'warthog'
*-pįtį	-biti	-fisi	-biti	-piti	-piti	'hyena'
*-ti	-ti	-ti	-ti	-ri	-ti	'tree'
*-jedį	-edzi	-ezi	-ezi	-eri	-eli	'moon'
*-di	li/i	li/i	li/i	ri/i	li	'Cl. 5 prefix

The differences between *i and i are transparent in the reflexes of the preceding consonants in Sumbwa; proto-stops followed by the former are reflected as spirants, while those followed by the latter are reflected as stops, i.e. with no change, or in the case of *-di 'Class 5 prefix', reflected as li or i (reflecting the shifts *d>l>Ø). (The examples above present a somewhat over-simple picture; for instance, *g before the high, tense front vowel is sometimes reflected as -dz- in Sukuma, e.g. Proto-Bantu *-gį 'go' >Sukuma -dz-. Also, there are cases where palatalization spread to thė nontense front vowel - which are not shown. Nonetheless, the examples are enough for the purpose of distinguishing between the differing effects of the two high vowels).

We shall now turn to the consideration of the changes and rules reflecting the progression of palatalization in Pre-Sumbwa.

6.1.2.2.1.2 Steps in historical palatalization

In an earlier section, the following steps were posited to describe the general progression of palatalization:

$g > g^y > (d^y) > d\check{z} > dz > z$
$\searrow \check{z}$

$k > k^y > (t^y) > t\check{s} > ts > s$
$\searrow \check{s}$

$d \;\; -- > \;\; d^y \;\; > d\check{z} > dz > z$
$\searrow \check{z}$

$t \;\; -- > \;\; t^y \;\; > t\check{s} > ts > s$
$\searrow \check{s}$

In order to determine whether the dialect(s) from which Sumbwa derives went through all, or some, of these steps we have to look at some comparative evidence, some of which has been given above. Consider:

Proto-Bantu	Sumbwa	Sukuma	Gloss
*-buuk-/-buuki-	-buuk-/-buusi-	-buuk-/-buuc-	'get up/Caus.
*-joki	-onsi	-oci	'smoke'
*-sang-/sangi-	-sang-/-sanzi-	-sang-/-sanj-	'find/mix, meet'
*-gi-	-zi-	-dž-	'go'
*-tiki	-siki	-siki	'stump of tree
*-timu	-sumu	-cimu	'spear'
*-di	-zi	-dži	'root'
*-diik-	-ziik-	-džiik-	'bury'

On the basis of data like these, we can posit, as a first approximation, the following steps:

$k > c > s \qquad t > c > s > s$

$g > j > z \qquad d > j > z$

The first stage (velar or alveolar stop) represents the 'original' source; the palatal affricate or sibilant represents the situation still found in Sukuma; the alveolar spirant stage is the Sumbwa stage (i.e. the dialect under description).

The historical steps suggested here are:

$$\begin{array}{lllllllll}
 & & \mathrm{I} & & \mathrm{II} & & \mathrm{III} & & \\
g & > & g^{y} & > & d\check{z} & > & dz & > & z \\
 & & & & & \searrow & \check{z} & & \\
k & > & k^{y} & > & t\check{s} & > & ts & > & s \\
 & & & & & \searrow & \check{s} & & \\
d & > & d^{y} & > & d\check{z} & > & dz & > & z \\
 & & & & & \searrow & \check{z} & & \\
t & > & t^{y} & > & t\check{s} & > & ts & > & s \\
 & & & & & \searrow & \check{s} & &
\end{array}$$

Stage I above represents the first step in palatalization. As noted earlier on, in Bantu prehistory this step was induced by the front high tense vowel. At this stage palatalization is still a phonetic realization rule. Now, if velars were the first to palatalize (in accordance with the assumption that palatalization begins with velars, noted earlier), then the initial formulation of the palatalization rule would be as in (1) below:

1. $$\begin{bmatrix} -\text{son} \\ -\text{cor} \\ -\text{lab} \end{bmatrix} > [+\text{pal}] / \_\_ \begin{bmatrix} +\text{syl} \\ +\text{pal} \\ +\text{tense} \end{bmatrix}$$

We may also assume that the next step was the spread of the palatalization rule to the alveolar stops. If this was what happened, the modified rule would be stated as in (2):

2. $$\begin{bmatrix} -\text{son} \\ -\text{lab} \end{bmatrix} > [+\text{pal}] / \_\_ \begin{bmatrix} +\text{syl} \\ +\text{pal} \\ +\text{tense} \end{bmatrix}$$

This rule states that non-labial nonsonorants were palatalized before the palatal, tense vowel.

Stage II may be said to be the crucial step in historical palatalization. The movement from */k^y, t^y/ and */g^y, d^y/ to *<u>tš</u> and <u>dž</u>, respectively, is no simple phonetic modification; it is a radical one. As suggested above (cf. section 6.1.2.1), the mechanism responsible for this step may have involved both articulatory and auditory dimensions of speech. From the articulatory point of view, it is, as has been noted (cf. Hooper 1976:114ff), a regressive retiming of the front, high vowel vowel so that the consonant-vowel sequence is articulated in one complex gesture. At the same time, from the auditory point of view, k^y/t^y and g^y/d^y are close to ts and dz, and the reinterpretation of the former as the latter is not an impossibility. Thus both factors might have reinforced each other, not only at the beginning of this development, but also in the implementation of the change in the lexicon.

The data provide no clue as to whether stage II began with velars and then spread to the apicals, or applied to both simultaneously. Whatever might have happened it is apparent that at some point both velars and apicals showed some alternating products of palatalization. This is the point at which *k/tš, *t/tš, *g/dž, *d/dž were productive alternations in the dialects that gave rise to modern Sumbwa. (Sukuma and Rimi, as noted in section 6.1.1, are still at this stage in respect to k/c and g/j. Sukuma (cf. Richardson 1966) went through the *t>c, *d>dž changes (e.g. *-timu> Suk -cimu 'spear', *-di> Suk -dži 'root') but, apparently, the changes are not reflected by alternations).

The diachronic rule reflecting stage II can be formalized as:

$$3.\ \begin{bmatrix}-\text{son}\\-\text{lab}\\+\text{pal}\end{bmatrix} > [+\text{del rel}]\ /\_\_\begin{bmatrix}+\text{syl}\\+\text{pal}\\+\text{tense}\end{bmatrix}$$

This rule says that a palatalized velar or apical mutates into an affricate in the environment before a high, palatal tense vowel.

Stage III, i.e. dz>z, ts>s, is a step that has been implemented in a thoroughgoing manner in Sumbwa. It is evident that this step is not part of the palatalization process. The step in fact reflects a telescoping consisting of two processes: depalatalization and deaffrication. The problem here is whether the former was followed by the latter, or vice versa. The two possibilities may be represented as follows:

(A) Depalatalization, Deaffrication:

dž>dz>z, tš>ts>s

(B) Deaffrication, Depalatalization:

dž>ž>z, tš>š>s

Both of these changes are plausible phonetic changes. The question is which of them applied to the ancestor of Sumbwa. It turns out that the chronology in (A) (i.e. depalatalization, deaffrication) finds support mainly from dialectal gradation in Sukuma. Here we find the dž/dz/z and tš/ts variants, e.g. mwedži/mwedzi/mwezi 'moon' (in kimunasukuma/kimunakiiya/kimunadakama dialects); and -buutš-/-buuts- 'carry' (in kimunasukuma/kimunakiiya dialects). The problem with the chronology in (B) (i.e.

deaffrication, depalatalization) is that we do not have any instance of the palatal voiced spirant z in the whole of West Tanzania. Pending further investigation, we can assume the chronology in (A). Depalatalization can be represented as in (4):

$$4.\quad \begin{bmatrix}-\text{son}\\ +\text{del rel}\end{bmatrix} \text{--->}\ [-\text{pal}]/\_\_\begin{bmatrix}+\text{syl}\\ +\text{pal}\\ +\text{tense}\end{bmatrix}$$

Depalatalization is further considered in section 6.4 in connection with palatal consonants which were alveolarized in Sumbwa. This process is also ordered in respect to the merger of the two front high vowels which occurred in Sumbwa, discussed in section 6.5.

Deaffrication, which may be regarded as a simplification, can be formulated as in (5):

$$5.\quad [-\text{cnt}\ +\text{cnt}]\text{--->}\ [+\text{cnt}]/\_\_\begin{bmatrix}+\text{syl}\\ +\text{pal}\end{bmatrix}$$

This process is also considered in respect to the alveolarization of palatal consonants in Sumbwa prehistory in section 6.3. Sumbwa has undergone this change in such a complete manner that there is not even an instance (borrowed or otherwise) of a depalatalized affricate in the language.

It should be noted that the steps reconstructed here are by no means the only ones that have been proposed to describe the progression of palatalization and subsequent developments. For instance, Foley 1977:90-106, in his description of universal assibilation, posits the following steps, some of which are different from those posited for Sumbwa prehistory:

I II III IV V VI VII

$*k > k^y > kd^y > kt^y > kts^y > ts^y > ts > s$

$*g > g^y > gd^y > \text{--} > gdz^y > dz^y > dz > z$

Stages I-VII represent the following rules, in order: palatalization, Holtzmann's Law, assimilation, assibilation, cluster simplification, loss of palatal glide, lenition (deaffrication). Foley claims that these are universal rules from which each language chooses a subset.

Now, compare Foley's scheme with the one given at the beginning of this section, with relevant parts repeated below:

$k > k^y > (t^y) > ts > s$

$g > g^y > (d^y) > dz > z$

As noted before, this scheme differs from the one suggested for Sumbwa prehistory in that the latter does not have the step $\underline{k}^y>\underline{t}^y$, etc. —the reason being lack of supporting evidence (at least in the data available to us at this writing).

It is evident that the major difference between the two schemes above is that Foley's has an extra step, Holtzmann's Law, which complicates the subsequent shifts. In the context of the development of diachronic linguistics, Foley's proposal is quite understandable: it is based on the time-honored notion of 'gradualness of sound change', and for him, this simply translates into 'articulatory gradualness'. Let us consider Foley's reasons for the step of Holtzmann's Law to find out whether it is necessary at all.

But, first, what is Holtzmann's Law? This law originally referred to the apparent strengthenings of glides which occurred in certain Germanic dialects. Thus, y>dy, y>gy and w>gw (Foley 1977:91). The part of Holtzmann's Law that Foley uses is y>dy (i.e. the insertion of a d into k^y and g^y), his justification being: "(1) The assibilated reflex is always dental or modified dental (palatal), whether the etymon is dental, velar or labial; (2) (the step) is not an ad hoc rule, but rather a universal law; (3) certain languages proceed only to this stage, revealing the dental reflex, without further progression to assibilation" (Foley op cit.,93). Notice that Foley assumes that he needs a rule which adds a dental to a velar (or labial) in order for the reflex to turn out as a dental. But the fact that the reflex of a velar or (labial) is a dental cannot, in itself, be taken as an argument for the step of Holtzmann's Law in diachronic palatalization. A diachronic step, if it is to be raised to the level of a 'universal law' has to be found to have taken place in many languages which show the process of which the step is part. Holtzmann's Law is certainly not such a law, since Foley does not give even a single example illustrating *kt^y<*k^y or *gdz^y<*gd^y. In view of these considerations, we may conclude that there is no justification for Holtzmann's Law in the progression of palatalization/assibilation. The steps which Foley wanted to account for, i.e. $\underline{k}^y$>$\underline{t}^y$ or $\underline{g}^y$>$\underline{d}^y$, can be plausibly explained within the acoustically-motivated abductive framework, as noted in section 6.1.2.1.

6.1.2.2.2 The d/z and l/z alternations and prehistory

Examples illustrating the d/z alternation were given in section 6.1.1.4; there it was mentioned that d/z occurs in the postnasal environment in causative and/or nominal and perfective stems. Internal analysis and comparative evidence shows that, diachronically, d/z is part of a set of alternations that reflect the development of Proto-Bantu *d in various environments. These alternations are:

1. d/z
2. d/l
3. l/Ø
4. l/z

The d/z alternation is a reflex of diachronic palatalization and subsequent developments, i.e. *d>$\underline{d}^y$>dz>dz>z, as discussed in the previous section. d/l was discussed in Chapter 3 as a synchronic alternation and in Chapter 4 as a diachronic correspondence; it will be considered again in Chapter 7; for now it is sufficient to say that *d>l/V__V. The l/Ø alternation occurs in Class 5 Noun prefix, i.e. li before vowel initial stem, i before consonant initial stem; the alternation also shows up between l-final base forms and their perfective forms (cf. Chapter 8). The l/Ø alternation reflects the changes: *d>l(>Ø/V(#)_V). In this section, we shall deal mainly with alternation (4), i.e. l/z.

We shall begin with a few examples. Consider the following causative, nominal and perfective forms of the respective base forms:

Base form	Gloss	Causative	Nominal	Perfective
-mal-a	'finish'	-maz-i-a	-mazi	-maz-ile
-mel-a	'germinate'	-mez-i-a	-mezi	-mez-ile
-mil-a	'swallow'	-miz-i-a	-mizi	-mez-ile
-kol-a	'do'	-koz-i-a	-kozi	-koz-ile
-kul-a	'grow'	-kuz-i-a	-kuzi	-kuz-ile

Sukuma has a cognate alternation, l/dz; it can be illustrated with the following examples:

Base form	Gloss	Causative	Nominal
-laal-	'lie down & sleep'	-laadž-i-a	-laadzi
-bol-	'rot'	-bodž-i-a	--
-kul-	'grow'	-kudž-i-a	-kudzi

Given the diachronic interpretations of the other alternations, the l/z and l/dž alternations can be given the following interpretation. To begin with, as noted elsewhere (e.g. Chapter 4), *d sonorantized to l or some type of r non-postnasally, starting with the environment before a (the most open vowel), proceeding to the environment before o, then e, u, and i (cf. Guthrie 1970:

Vols. III & IV). It can be assumed that while this was going on, *d before the high, front tense vowel i started being palatalized. (Note also that *d before the high back tense vowel u was labialized, cf. section 6.2). The palatalization of *d before i included the postnasal *d, of course. Thus we have:

1. *d>l/ V__V
2. *d>dž>dz>z before i

In this way, we find that a Sumbwa word may have l in its base form, while it has z in causative, nominal and perfective forms; while a cognate Sukuma word has l and dz, respectively. Two conclusions may be drawn from these considerations:

1. The l/z alternation provides evidence for diachronic palatalization, but it is disguised by earlier mutations which can be posited on the basis of internal analysis, comparative evidence, and some universals of sound change;
2. The fact that two segments (in this case l and z or dž show alternation synchronically does not necessarily mean that one 'derives' from the other diachronically. The segments may in fact be results of two different processes which have affected a proto-segment in mutually exclusive environments.

6.1.2.2.3 Palatalization in other environments

In the dialect(s) which gave rise to modern Sumbwa dialects, palatalization seems, in general, to have been restricted to the high front tense vowel *i. There are, however, a few items which indicate the operation of sporadic palatalization in other environments. Consider:

-si-	'dawn'	< PB *-ki-
si	'what'	< PB *ki 'which'
-sila	'tail'	< PB *-kila
-sienda	'nine'	< PB *-kenda
-satu	'three'	< PB *-tatu
-zumi-	'assent'	< PB *-dumi-
-zum-	'curse'	< PB *-dum-
-sum-	'sew'	< PB *-tum-

(The items for 'dawn', 'what', and 'tail' have been reconstructed with the non-tense high front vowel, and comparative evidence from sisters of Sumbwa indicates that the vowel in these items is not tense [cf. below for cognate items]).

These items certainly need explanation. Some are easy to explain as the related correspondence set is transparent; others are not.

Let us start with -si- 'dawn'. This is easy to explain since we find the following cognate items in Sukuma, Nyamwezi, and Rimi: -s-/-s-/-c-, which indicates that the non-tense high, front vowel must have been interpreted as a palatalizing vowel at an early stage in prehistory. Given Proto-Bantu *-ki-, we can posit the following changes: *k>k^y>c>s>s. The s reflex in Sumbwa is part of the changes related to depalatalization and deaffrication. The same explanation can be given to si 'what' and -sila 'tail'. The relevant correspondences are:

Sum	Suk	Nyam	Rimi	Nilyam
si	ki	ki	--	ki
-sila	-kila	-kila	-kila	-kila

As in the 'dawn' case, it appears that palatalization spread to these items early in prehistory; this applied only to the dialect(s) from which modern Sumbwa derives.

Turning to siendа 'nine' and -satu 'three', we find that the former is restricted to Sumbwa in West Tanzania, while the latter occurs in Sumbwa and 'West Nyamwezi' (cf. Johnson 1919, Vol. 1: 93). Relevant correspondences are:

Sum	Suk	Nyam	Rimi	Nilyam
sienda	kenda	kenda	kienda	kenda
-satu	-datu	-datu	-raru	-tatu

-satu also occurs in Mbugwe (Buwe) and Langi (Irangi), which are closely related to West Tanzania. In Langi -satu occurs in the word mu-satu, "March" (i.e. the third month); in Mbugwe the form is morphologically conditioned: it occurs with Class 10 nouns while -tatu occurs elsewhere. Further examination of the Mbugwe lexicon shows that this morphologically conditioned alternation applies to a few other items, a fact which might shed light on Sumbwa sienda and -satu. The other items affected are:

Class 10 Form	Other Classes
i-nye 'four'	-ne
i-sano 'five'	-tano
i-sansatu 'six'	-tantatu
i-nyanye 'eight'	-nane

(Dempwolff 1915-16:22)

This alternation also occurs in Irangi in the following items:

Class 10 form	Other Classes
i-sano 'five'	-tano
i-sasatu 'six'	-tatatu

(Dempwolff 1915-16:120)

Given these examples, we can assume that far back in prehistory, when Irangi and Mbugwe were probably still part of the 'dialect continuum' from which Sumbwa, Sukuma, etc. derive, the process of progressive assimilation affected some words in Class 10. Later, the forms in Class 10 for 'three' and 'nine' got generalized in the dialect which developed into modern Sumbwa.

There are alternative explanations, of course. -<u>satu</u> can simply be assumed to be a borrowing - a borrowing in prehistoric times from some West Tanzania dialect (including an earlier form of Mbugwe). This, however, does not apply to -<u>sienda</u>, since it occurs in Sumbwa only. An alternative explanation for this is 'sporadic' palatalization before the front vowel <u>e</u> which might have proceeded thus: *<u>kenda</u> > *<u>kyenda</u> > *<u>tsyenda</u> > <u>sienda</u>. At the moment we don't know which one of these explanations is the more plausible.

We now turn to the examples -zumi-<*-dum- 'assent', -sum- <*-tum- 'sew', -zum- <*-dum- 'curse', which indicate some apparent palatalization before the high back tense vowel. In our data the items for 'assent' and 'curse' are restricted to Sumbwa, Sukuma, and Nyamwezi; the forms for Sukuma and Nyamwezi are: -zuni-/-zumi- and -zum-. The item for 'sew' has the following West Tanzania correspondences (including Mbugwe and Irangi):

Sum	Suk	Nyam	Rimi	Nilyam	Mbugwe	Irangi
-sum-	-sum-	-sum-	-rum-	-tum-	-tum-	-cum-

It is reasonable to assume *t>t^y>c>s as the diachronic path for *-tum->-sum-, and *d>d^y>dz>z for -zumi- and -zum-. If this is correct, then we have to posit palatalization before the high back tense vowel *u. The only way to justify such a process is to assume that it sporadically spread to this environment from the environment before the high front tense vowel through phonetic analogy. The question is whether this happened in a direct ancestor of Sumbwa. It might have or it might have not. It is important to note that Sukuma seems to indicate more systematic results of palatalization before the high back tense vowel, while Sumbwa appears to indicate more systematic results of labialization in the environment (cf. section 6.2). A few examples here will do:

Sum	Suk	Proto-Bantu
-vui 'knee'	-zui	*-dui
-vuule 'naked'	-zule	*-duud- 'undress'
-vu- 'ooze'	-zu-	*-du-
-vugut- 'work bellows'	-zugut-	*-dugut-

In view of this evidence, it is probably more correct to assume borrowing from Sukuma in relation to the Sumbwa words for 'assent', 'curse', and 'sew' (especially as they are so few and the development seems to have been more far-reaching in Sukuma).

6.1.2.2.4 Reflexes of Palatalization and Morphologization

In this section we deal with alternation reflexes of palatalization in terms of the interaction between phonology and morphology/lexicon. This interaction will be considered from the angle of the status of the synchronic rules representing the alternations.

The relevant synchronic alternations, presented in Chapter 3 and sections 6.1.1 and 6.1.2.2.2, are: d/z, t/s, k/s, g/z, and l/z. Alternations involving stops represent the following telescoped diachronic correspondences: *d>z, *t>s, *g>z, *k>s, while l/z was noted to be a result of two distinct developments: *d>l/V__V and *d>z/_i.

Rules representing these alternations were formulated in Chapter 3, section 3.2.4.1, but will be repeated here for convenience.

Rule (6) below represents the l/z alternation; it distributes the coronal nonstrident and strident voiced continuants in the respective environments:

$$6.\quad \begin{bmatrix} \text{+cor} \\ \text{+cnt} \\ \text{+vcd} \\ \text{-/+str} \end{bmatrix} \text{ ---> [+str]/ <CV>\_\_ Nominal, Causative, <Perfective>}$$

As noted in chapter 3, the notation "-/+" in respect to a feature indicates lexicalization; the notation replaces minor rule feature formulation, e.g. [+ Rule 6], used in other versions of phonology.

Rule (7) distributes the members of the d/z and t/s alternations in the respective environments:

$$7.\quad \begin{bmatrix} \text{-son} \\ \text{+cor} \\ \text{-/+cnt} \end{bmatrix} \text{ ---> [+cnt]/\_\_ Nominal, Causative, Perfective}$$

And rule (8) distributes the members of the k/s and g/z alternations as required:

$$8.\quad \begin{bmatrix} \text{-son} \\ \left\{ \begin{matrix} \begin{bmatrix} \text{-cor} \\ \text{-ant} \\ \text{-cnt} \end{bmatrix} \\ \begin{bmatrix} \text{+cor} \\ \text{+ant} \\ \text{+cnt} \end{bmatrix} \end{matrix} \right\} \end{bmatrix} \text{ --> } \begin{bmatrix} \text{+cnt} \\ \text{+cor} \end{bmatrix} \text{/\_\_\_ Nominal, Causative}$$

These rules have at least the following characteristics. First, as is evident from the environments, the rules are morphologically conditioned. The strident alternants occur in causative, nominal and perfective forms for l/z, d/z, t/s, and in causative and nominal forms for *k*/*s* and *g*/*z*.

As noted in Chapter 3, the rules are lexically conditioned since not all roots meeting the conditions of application get affected in all environments.

Second, the rules exhibit no phonological 'naturalness'. A natural phonological rule has at least the following attributes: (1) the phonetic distance between the input and output segments is minimal, e.g. *k* and k^y; (2) the rule is more or less maximally transparent, i.e. it has few or no exceptions, and (3) the process reflected by the rule refers for its explanation to some explicit articulatory or perceptual factors.

These two characteristics, morphological and lexical conditioning and lack of phonological naturalness, reflect some complex diachronic developments which can only be partially recovered. One of these, which has led to loss of phonological naturalness, has already been reconstructed. This development can be summarized as follows:

1. Initial palatalization, e.g. **k*>k^y/__i
2. Affrication, e.g. *k^y>*c*/__i
3. Depalatalization, e.g. **c*>*ts*/__i
4. Deaffrication, e.g. *ts*>*s*/__i

These four stages can be posited for **k*>*s*, **g*>*z*, **t*>*s*, and **d*>*z*. (As for *l*/*z*, the changes involved are: **d*>*z*/__i, **d*>*l*/V__V, as noted before). Of the above stages, only the first one can be said to be a phonologically natural stage. The alternations are allophonic, the phonetic distance between the allophones is minimal, and the rule can be stated in phonological terms. The next stage, affrication, represents a radical change with radically reduced phonological naturalness. Here the phonetic distance between the alternants (k/c) is great (the alternants are phonological), and although the rule expressing the alternation can be stated in phonological terms it has reduced 'naturalness'. (Cf. Sukuma k/c and g/dz alternations which are morphophonological). Stages three (depalatalization) and four (deaffrication) further increase the phonetic distance between the alternants (k/ts, k/s). Thus loss of phonetic naturalness here was largely due to telescoping. (There was also change in the conditioning environment: the high tense vowels merged with their nontense counterparts, thus opacifying the rules further).

Changes constituting the phenomenon of telescoping are phonological, and can tell us little, if anything, about the interaction between phonology and morphology. But the 'morphological' conditioning of rules (such as in 6-8 above), can tell us much about such interaction, a question to which we now turn.

The morphological conditioning of rules, or morphologization, is a phenomenon which represents a deep-seated morphological tendency. This tendency has to do with (i) analogical pressure to remove redundant alternations (through levelling), and (ii) assigning grammatical function to such alternations. The underlying principle for such a tendency is the 'one form, one meaning' principle. According to this principle, alternations may either be levelled, or grammatical meaning assigned to them (since redundant alternations are bad conceptually, cf. Vennemann 1972b:182ff). Once function (e.g. causative function) becomes associated with an alternant, the risk of being levelled is considerably reduced; from now on, the rule can cease to refer to phonological factors only, and morphology becomes increasingly a dominant factor.

Now, at what stage did morphologization begin in Sumbwa prehistory? It seems that Stage 1 (Initial palatalization), as noted above, was 'the phonological stage', i.e. the phonetic alternation was phonologized and functioned as such in the proto-system. As noted already, at Stage 2 (affrication), 'phonological naturalness' was radically reduced through a purely phonological process. In many respects, some Sukuma dialects are still at this stage; that is, *<u>k</u>><u>c</u>, *<u>g</u>><u>j</u> in alternating and non-alternating forms, *<u>t</u>><u>c</u> in non-alternating forms, and *<u>d</u>><u>j</u> in the alternation <u>l</u>/<u>j</u>. Examples have already been given in the foregoing sections (e.g. section 6.1.1); here we give only a few for Verb-root/Causative forms:

Verb root	Causative
-bak- 'flame'	-bac- 'light (fire)'
-buuk- 'get up'	-buuc-'carry'
-og- 'take a bath'	-oj- 'bathe'

-sang- 'find'   -sanj- 'meet'

In view of this comparative evidence, we may assume that it was probably at this stage that morphologization began in prehistory. Once it took root, new words were no longer subject to the palatalizing rule; the rules started having exceptions in respect to lexical items (i.e. lexical conditioning).

It should be noted that morphologization was an important mechanism of phonological change in Bantu. It is not restricted to diachronic palatalization; it applies to labialization as well (section 6.2). Some of the alternations found in some Bantu grammar books (e.g Ashton 1947, Ashton et. al. 1954; Velten 1901) and comparative and historical studies (e.g. Meinhof 1932 on such languages as Pedi, Zulu, Swahili, Konde, and Kongo) have been morphologized. An investigation of this phenomenon in as many Bantu languages as possible is desirable, but is not possible in the context of this study.

6.2 Labialization

'Labialization', like 'palatalization', has more than one sense. The first sense is one in which the term refers to the labial colouring which a labial vowel imparts to a preceding consonant. In most cases the labial quality is just a phonetic modification based on universal phonetic rules (i.e. the tendency for consonants to become 'rounded' if followed by a labial vowel). Sometimes, however, this phonetic 'rounding' may get 'phonologized' in a certain environment, i.e. a more perceptible 'rounding' may begin to occur in this environment which may need a language-specific rule. This 'phonologized' rounding is usually represented as an off-glide as in $\underline{k}^w$ and g^w.

The second sense of 'labialization' refers to the process whereby a consonant mutates into a labial consonant. Examples are: *$\underline{k}$>$\underline{f}$, *$\underline{g}$>$\underline{v}$, *$\underline{t}$>$\underline{f}$, *$\underline{d}$>$\underline{v}$ (Swahili, Sumbwa). This second sense subsumes the first sense since 'rounding' is assumed to be the first step in the mutating process of labialization (just as palatal-gliding is assumed to be the first step in the process of palatalization). We shall basically be concerned with the second sense of labialization.

In Sumbwa prehistory, labialization can be reconstructed mainly on the basis of comparative evidence. This evidence will be presented in 6.2.1. Section 6.2.2 considers the mechanism of labialization and the evolution of the process in prehistory. In section 6.2.2.3 we deal with labialization in other environments. And finally, section 6.2.2.4 discusses the reflexes of labialization and morphologization.

6.2.1 <u>The Data</u>

The evidence for historical labialization is presented below. The data consists of (i) correspondence sets from West Tanzania languages (including Mbugwe and

Langi in some cases) and (ii) Proto-Bantu reconstructions. The proto forms comes from Guhtrie 1967-71 and Meeussen (1955, 1967).

6.2.1.1 Correspondence set involving *k

Examples illustrating this correspondence set are:

Sum	Suk	Nilyam	Rimi	Mbu	Langi	Gloss
-tafun-	-dakųn-	-takųn-	----	-takun-	-dakun-	'chew'
-fuba	-kųba	-kųa	-kųba	-kuba	-kuya	'chest'
-fu	---	---	-kuiy-	-kuiy-	-ku-	'die'
-hofu	-bokų	-pokų	-pokų	-poku	-poku	'blind'

These examples show that Sumbwa f corresponds to k in the other languages. (Note that Rimi word for 'chew' is -ranun-, Sukuma word for 'die' is -c- while the Nilyamba word is -ki-. Nyamwezi forms are the same ones as the Sukuma ones. The proto-Bantu forms for the above examples are: *-takųn-, *-kųba, *-kų-, *-pokų.)

6.2.1.2 Correspondence set involving *g

This correspondence is illustrated by the following examples:

Sum	Suk	Nyam	Nilyam	Rimi	Gloss
-vubu	-gubu	---	-guu	---	'hippo'
-invu-	-igu-	-igu-	-igu-	-igi-	'hear'
-zovu	---	-zovu	-zogu	-jou	'elephant'

These examples show that v corresponds to g in the other languages. The proto forms are: *-gubu, *-jigu-/-jingu-,

*-jogu.

6.2.1.3 Correspondence set involving *t

Examples for this correspondence set are:

Sum	Suk	Nyam	Nilyam	Rimi	Mbu	Langi	Gloss
bufuku	bujiku	buziku	utiku	uriku	utiku	uciku	'night'
-fung-	-tung-	-tung-	-tung-	-rung-	-tung-	-cung-	'tie'

The proto-forms for these examples are: *-tiku, *-tung-. A correspondence set f:t can be established on the basis of these examples. Other examples are: *-tui > Sum -fui 'fish', *-tue> i-fue 'we, us'.

6.2.1.4 Correspondence set involving *d

Examples illustrating this correspondence set are:

Sum	Suk	Nyam	Nilyam	Rimi	Gloss
-vu-	-zu-	-zu-	---	-du-	'ooze'
-vui	-zui	-zui	-lu	-ilu	'knee'
-bavu	-bazu	-bazu	-alu/mbalu	mbalu	'side; rib

The proto-forms for these examples are: *-du-, *-dui-, *-badu. Other examples involve reflexes of a few proto-forms, e.g.:

Proto-forms	Sum	Suk	Gloss
*-dugut-	-vugut-	-zugut-	'work bellows'
*-duud-	-vuule 'naked'	-zule	'naked'
		-zuul-	'undress'

In the light of such examples we can posit the *d>v diachronic correspondence.

6.2.1.5 Correspondence set involving *p

The *p>f diachronic correspondence can be established by the following examples:

Sum	Suk	Nyam	Nilyam	Proto-forms	Gloss
-fum-	-fum-	-fum-	-pum-	*-pųm-	'go/come out'
-fulo	-fulo	-fulo	---	*-pųdo	'foam'
-fulum-	-fulum-	-fulum-	---	*-pųdum-	'sprout'
-fulue	-pulu	---	---	*-pųdue	'turtle'

(Note that *-pudum- (C.S. 1614a) has the gloss 'froth over' not 'sprout' as indicated above. Whether 'sprout' developed from 'froth over' or not is not an issue here.)

6.2.1.6 Correspondence set involving *b

The diachronic correspondence *b>v can be posited on the basis of the following examples:

Sum	Suk	Nyam	Nilyam	Rimi	Proto-form	Gloss
-vu	-bu	-bu	-u	-u	*-bu	'ash'
-vui	-vi	-vui	--	-buyi	*-bųi	'grey hair'
-vula	-bula	-bula	-bula	-bua	*-bųda	'rain'

6.2.2 The Mechanism of Labialization and the Evolution of the process in prehistory

In this section, we consider the mechanism involved in the development of the correspondences f/k, t, p and v/g, d, b and the steps involved in the development of the labiodental reflexes from the stops.

6.2.2.1 <u>The Mechanism of Labialization</u>

As in the case of palatalization, there are three possible approaches to the labialization of stops into labiodental fricatives. These are: (i) the articulatory approach, (ii) the acoustic/auditory approach, and (ii) a combination of both.

As in the case of palatalization, the articulatory view approaches labialization as an assimilation; in this case, the assimilation of the stops to the high back tense round vowel. A thoroughgoing application of this view to the process was done by Ponelis 1974. Step-by-step rules are formulated; these rules are supposed to be universal, although it is not necessary for them to be instantiated in all developments of labialization. For instance, Ponelis posits the following step-wise rules to diachronically derive <u>f</u> from *<u>k</u>:

*ku	
k^wu	Labialization (i.e. Gliding)
kwu	Segmentation
kwu	Glide Narrowing
kfu	Fricativization
pfu	Stop Assimilation
Pfu	Stop Subordination
fu	Stop Elision

(cf. Ponelis 1974: 50)

(It should be noted that 'Fricativization', as used by Ponelis, is equivalent to Affrication. 'Stop Subordination' has to do with the release of doubly-articulated segments, such as kf, gb, pf, bv, etc. Release of such segments can not be simultaneous; the stricture for the first part of the segment gets released first, thus becoming subordinate or secondary to the following stricture (cf. Ponelis, 46). In this way, change in doubly-articulated segments favours the second part of the segment).

This step-wise progression is plausible, and probably most of the steps may be attested in language history. The problem with the articulatory approach is its inability to account for the lack of many steps in some diachronic labializations, e.g. Greek *k^w>p (cf. Foley 1977:39ff) and English *x>f. Such phonetic leaps cannot be explained in terms of a step-wise articulatory approach such as the above.

The acoustic/auditory approach, as noted before, is based on abduction (cf. Andersen 1973). Abduction is reinterpretation of the acoustic signal through a 'misperception' of the distinctive feature composition of the 'original' segment or segment sequence. Such changes occur due to the fact that the acoustic signal is ambiguous, and the frequency continuum can be bisected in more than one way (i.e. can be 'perceived' in more than one way). Acoustic explanations are not uncommon; in the case of labialization, a few have in fact been proposed, e.g. to explain the labialization of *x in the history of English, as in enough, tough, etc. (Anttila 1972:198). An acoustic explanation has also been proposed to explain the labialization of k before u in Luganda (a Bantu language), e.g. in -atik-/-atifu 'be cracked/cracked' (cf. Herbert 1975/76: 177). This mutation is explained as follows: labial segments (including u) are characterized by falling second formant transitions; these may induce F_2 transitions of velars to fall. In other words, this is an 'acoustic assimilation', which is another way of referring to abduction.

The third approach combines both articulatory and acoustic/auditory approaches. The idea is that both articulatory and acoustic factors participate in processes such as labialization which may, in some languages, be gradual (e.g. k>k^w>kf>pf>f), and in other languages non-gradual (e.g. *x>f). As noted before, this approach is in line with the idea that languages change because people both 'speak' and 'hear' languages.

6.2.2.2 Evolution of the Process

Labialization is reflected in many Bantu languages (cf. Guthrie 1971:30-64; Meinhof 1932; Ponelis 1974:48ff). Comparative evidence indicates that it was induced by the high back tense vowel *ų. Like palatalization, it caused the development of fricatives and affricates in many Bantu languages. Below we consider the steps that this process might have gone through in Sumbwa prehistory.

6.2.2.2.1 Steps in historical labialization

Ponelis (1974:39, 50) proposes the following processes or steps of labialization:

*pu	*tu	*ku	*du	
$p^{w}u$	$t^{w}u$	$k^{w}u$	$d^{w}u$	Labialization
pwu	twu	kwu	dwu	Segmentation
pwu	twu	kwu	dwu	Glide Narrowing
pfu	tfu	kfu	dvu	Fricativization
	pfu	pfu	bvu	Stop Assimilation
^{p}fu	^{p}fu	^{p}fu	^{b}vu	Stop Subodrdination
fu	fu	fu	vu	Stop Elision

Steps for *gu>vu are not given but those for *gwa>va are, and they are the same as the above, i.e. *g>g^{w}>gv>bv>v. Steps for *bu>vu are also not given, but there is no reason to suppose that they would be any different from those of its labial congener p.

The above steps do not represent the only possible path for labialization. There are other possible paths which may accomplish the same result. For instance, the labialization of k may be accomplished through the above steps, or any of the following variant paths: (1) k>k^{h}>k^{f}>p^{f}>f (cf. Herbert 1975/76:118); (2) k>k^{w}>p^{w}>pf>f; (3) k>k^{w}>pw>pɸ>ɸ>f.

Now, the problem facing anybody attempting a reconstruction of the steps of labialization for Sumbwa prehistory is that there is no confirming evidence from the sister languages for some of the crucial steps proposed by

Ponelis. Certainly, the first step, 'Labialization', based on universal phonetic constraints, does not require confirmation from the synchronic evidence. Another step that requires no confirmation is Stop Elision, since it is implied in the diachronic correspondences, e.g. *b>v, *p>f. The two steps, Segmentation and Glide Narrowing, are not needed at all since they appear to be variations of Labialization. Another step that is redundant is Stop Subordination; Ponelis does not show how this differs from Fricativization (i.e. Affrication); it is questionable whether diachronic labialization has to go through this step instead of going directly from Affrication to Stop Elision. The rest of the steps (Fricativization, Stop Assimilation) appear to be plausible intermediate steps but need some type of confirmation.

The steps bv and pf are easily confirmable since they are attested in some words in Sukuma. Examples are: -bvui 'grey hair', -bva 'dog' (Guthrie 1970, Vol.III), and -ipfa 'nephew, niece' (Richardson 1966). (Note that Richardson 1966 has -vi for 'grey hair' and -va for 'dog', and Guthrie 1970 has -ihwa for 'nephew, niece'. These differences seem to be dialectal. Compare also Nyamwezi -ipua 'nephew, niece' (Dahl 1915)). In the comparative data in Guthrie 1970, Vols. 3 & 4, the steps bv and pf are widely attested as reflexes of *gu, *du, *bu and *ku, *tu, *pu, respectively (cf. Vol. 3: 68-73; 193-200; 237-241; 319-326; Vol. 4: 78-82; 133-38). We can therefore conclude that bv and pf are valid steps in the diachronic labialization under discussion.

In the West Tanzania data we have there is no evidence for tf, kf, dv, gv. Outside of the West Tanzania subgroup, these affricates are found to occur only rarely. tf as a reflex of *t before *u is attested in Tende (Zaire, B.81), e.g. -tful- < *-tud- 'forge' (Guthrie, Vol. 4), and in Swazi, e.g. -tsatfu < *-tatu (cf. Ponelis 1974:51-2), although in the latter case the environment is not the tense high back vowel. (Note also that Tende tf corresponds to Ngom (Gabon, B.22b) tsf e.g. -tful-/-tsful- < *-tud- 'forge', which suggests that Ngom might have passed through the step tf.) kf as a reflex of *k before *u is attested in two languages: Ngulu (Mozambique, Malawi, P.33), e.g. ma-kfura <* ma-kuta 'oil', and Ngom, e.g. -kfuba <*-kuba 'chicken'(Guthrie, Vol. 3). Guthrie 1967, Vol. 1:64 and 1971, Vol. 2:34 notes that *d>dv/__*u in Ngom but he does not give examples. Swazi (S.43) examples of *d>dv are given by Ponelis (51-2), e.g. indvuna < *induna 'headman'. The occurrence of gv seems to be even rarer, although Guthrie 1967:64 gives it as a reflex of *g before *u, with no examples.

It is thus evident that the occurrence of tf, kf, and dv is very limited. This limitation is probably due to the articulatory difficulty of co-ordinating the gestures involved which differ in both point and manner of articulation, in addition to the perceptual factor that these affricates of limited occurrence can be easily perceived as pf and bv. Thus, instead of $*k^w > kf/\_\_u$, we might have $*k^w > pf^w$.

Now, since tf, kf, and dv are rare, and gv is not attested at all (in the data we have), it is likely that many Bantu languages (including Sumbwa) never went through these stages. In view of this, and assuming that labialization took place in the ancestors of Sumbwa (i.e. the modern reflexes were not borrowed), we may posit the following steps:

	I	II	III	IV
k >	k^w >	(p^w)>	pf^w >	f
g >	g^w >	(b^w)>	bv^w >	v
t >	t^w >	(p^w)>	pf^w >	f
d >	d^w >	(b^w)>	bv^w >	v
p >	p^w >		pf^w >	f
b >	b^w >		bv^w >	v

Stage I is the usual labial off-gliding, assumed to be the starting point of diachronic labialization in Bantu. Thus:

$$9.\quad [-\text{son}] > [+\text{rnd}]/\_\_\overset{V}{\begin{bmatrix} +\text{bk} \\ +\text{tns} \\ +\text{rnd} \end{bmatrix}}$$

Stage II, regarded as optional, represents a qualitative change of a velar into a labial:

$$10.\quad \begin{bmatrix} -\text{son} \\ -\text{cor} \end{bmatrix} > +\text{lab}\ /\_\_\overset{V}{\begin{bmatrix} +\text{bk} \\ +\text{tns} \end{bmatrix}}$$

Stage III is the affrication stage. A rounded non-sonorant is changed into an affricate:

$$11.\quad \begin{bmatrix}-\text{son}\\+\text{rnd}\end{bmatrix} > [+\text{del rel}]\ /\_\_\overset{V}{\begin{bmatrix}+\text{bk}\\+\text{tns}\end{bmatrix}}$$

In stage IV the labial affricate is simplified. The stop closure is elided (cf. Rule 5). This change can be represented as:

$$12.\quad [-\text{cnt}\ +\text{cnt}] > [+\text{cnt}]/\_\_\overset{V}{\begin{bmatrix}+\text{bk}\\+\text{tns}\end{bmatrix}}$$

Notice that Rules 9-10 have been formulated as diachronic rules. Since there is no evidence to suggest where the process began among the stop series, it would not do to speculate where it began and how it spread in successive synchronic grammars.

6.2.2.2.2 Spirantization through spread

In Sumbwa prehistory, there occurred the following mutations: */k, t, p/>f/__ų, */g, d, b/>v/__ų. Examples for these mutations have already been given in the foregoing. Mutations which resulted into the same outputs affected labial obstruents before the high front tense vowel i. Eaxamples are for *b>v are:

Sum	Suk	Nyam	Nilyam	Rimi	Langi	Buwe	Gloss
-vi	--	-vi	-i/ma-bi	ma-bi	ma-bi	-vi	'dung'
-vimb-	-bimb-	-bimb-	-imb-	-imb-	--	--	'swell

The proto-Bantu forms for these examples are: *-bį and *-bįmb-. Other examples in Sumbwa include: mu-viala 'cousin' < *-bįada (cf. Sukuma -bial- 'bear (child)'), mu-viila 'soot' < *-bįdo.)

Examples for *p>f are:

Sum	Suk	Nyam	Nilyam	Rimi	Langi	Buwe	Gloss
-figo	-pigo	-pigo	-pigo	--	piho		'kidney'
-fisi	-biti	-biti	-piti	piti	pici	piti	'hyena'
-fila	-hila	-hila	--	pia/-fila	-fira	-fila	'pus'

The diachronic changes affecting labial obstruents before i are synchronically reflected by the b/v and p/f alternations dealt with in 3.2.4.1.1 - 3.2.4.1.3 and some comparative data. Examples for b/v are:

Stem	Causative	Nominal	Perfective
/baNb-a/ 'peg out'	/baNv-i-a/	/baNv-i/	/baNv-ile/
/boNb-a/ 'become soft'	/boNv-i-a/	/boNv-i/	/boNv-ile/
/suNb-a/ 'create'	---	/suNv-i/	/suNv-ile/
/iNb-a/ 'sing'	---	/iNv-i/	/iNv-ile/
/heNb-a/ 'light a fire'	/heNv-i-a/	/heNv-i/	/heNv-ile/

Examples for p/f are:

Stem	Causative	Perfective
/ihiNp-a/ 'become short'	/ihiNf-i-a/	/ihiNf-ile/
/puup-a/ 'become light' (not heavy)	/puuf-i-a/	/puuf-ile/

These data show that the change spread from i to the perfective -ile (which has been reconstructed as *-ide.

A problem posed by *b/p>v/f/__i is that it cannot be explained on the basis of the syntagmatic environment, i.e. __i. If it were thought of as being no more than a spirantization, the problem would turn into one of explaining why such a change never occurred before other vowels. Another possibility is to explain the changes on the basis of analogical spread from the environment of the high back tense vowel. On this view, the problem of why it never occurred before other vowels never arises. We shall follow this view here. (This view that was also assumed by Ponelis 1974:51 when he was dealing with the same phenomenon in Bantu).

It should be noted that the inference of spread of labialization from the environment before the high back vowel to that of its front congener can only be reached by first reconstructing such a process before the back vowel using comparative reconstruction. We cannot start by assuming that the b/v and p/f alternations provide internal evidence for diachronic labialization; the environment does not suggest such a process directly, it does so only indirectly by mediation of phonetic analogy. (For Bantu data illustrating this phenomenon refer to Guthrie 1970, Vol.3:48-52 and Vol. 4:61-67).

6.2.2.2.3 The b/v and p/f alternations and Morphologization

As noted in the foregoing, *b*/*v* and *p*/*f* developed by spread from the environment of the high tense back vowel. Below we repeat, for convenience, the rules formulated in Chapter 3 to represent the alternations:

$$13.\quad \begin{bmatrix} -\text{son} \\ +\text{lab} \\ -/+\text{str} \end{bmatrix} \;\text{--->}\; [+\text{str}] \;/\_\_ \quad \underset{\text{Nominal}}{-\underline{\text{i}}}\;,\quad \underset{\text{Prefective}}{-\underline{\text{ile}}}$$

$$14.\quad \begin{bmatrix} -\text{son} \\ +\text{lab} \\ -\text{vcd} \\ -/+\text{str} \end{bmatrix} \;\text{--->}\; [+\text{str}]/\_\_ \quad \text{Causative, Perfective}$$

These rules, like the rules representing reflexes of palatalization are morphologically conditioned, i.e. they are restricted to specific morphological categories. And as mentioned in section 3.2.4.1, they are also lexically conditioned because not all roots to which the rules would otherwise apply are affected.

The above rules are, of course, not phonologically natural (cf. section 6.1.2.2.4 on the notion 'natural rule'). Apart from the above characteristics (morphological and lexical conditioning), the environment of the high vowel does not induce such spirantizations (if they are restricted to this environment). Telescoping also characterizes the alternations (just as it did the reflexes of palatalization), but this is not the reason for 'unnaturalness'. Even if the alternations were not telescoped, e.g. *b*/*bv* and *p*/*pf*, they would still be unnatural because of the environment.

6.3 Some developments affecting palatal consonants

In this section we shall look at some developments which affected palatal consonants in the prehistory of Sumbwa and other West Tanzanian languages. These involve the palatal affricates *c and *j and the nasal *ɲ. All proto-palatal affricates have been subject to deaffrication and alveolarization in Sumbwa, while these developments have not been implemented to the same extent in the other West Tanzania languages. The alveolarization of the palatal nasal has been more implemented in Sumbwa than in any other West Tanzania language. Section 6.3.1 deals with the reflexes of *c and *j, and section 6.3.2 with the reflexes of the palatal nasal.

6.3.1 The depalatalization and deaffrication of *c and *j

Consider the following Sumbwa, Sukuma, and Standard Swahili examples which show the respective correspondence set s, s, and c (with Proto-Bantu reconstructions given):

Sumbwa	Sukuma	Swahili	PB	Gloss
-sal-	-sal-	ki-caa (n.)	*-cad-	'be mad'
-sozi	-sodži	-cozi	*-codi	'tear (of eye)'
-senga	-senga	-canga	*-cenga	'sand'
-sek-	-sek-	-cek-	*-cek-	'laugh'
-si	-si	-ci	*-ci	'ground; land
-simb-	-simb-	-cimb-	*-cimb-	'dig'

-som-	-cim-	-com-	*-com-	'pierce'
-songol-	-songol-	-congo-	*-congud-	'sharpen to a point'
-sua	-sua	-cua	*-cua	'termite'
-suiz-	-suidž-	-cuuj-	*-cuuj-	'strain; filter'

(Note that Sukuma, apart from other words with c, also has -caagul- 'choose' (Sumbwa -saagul-, Swahili -cagu-, and PB *-caagud-).

Clearly, Sumbwa and Sukuma s in the above examples can be derived from *c, which is directly reflected in Swahili. These processes of depalatalization and deaffrication, a widespread phenomenon in Bantu (cf. Guthrie 1971:30-64), have already been discussed in connection with the process of palatalization and subsequent developments (cf. section 6.1.2.2.1.2). The widespread nature of this change suggests that the change must have operated at an early stage, probably before, or simultaneously with, the early manifestations of the palatalization of Bantu obstruents.

Now consider the following examples illustrating the correspondence set z/dz/j in West Tanzania:

Sumbwa	Sukuma	Nilyamba	Rimi	Gloss
-ganza	-ganza	-gandza	-ganja	'palm of hand'
-iz-	-iz-	-z-/-dz-	-j-	'come'
-zala	-zala/-dzala	-zala/-dzala	-jaa	'hunger'
-zengul-	-zeng-	-zeng-	-jeng-	'build'
-zila	-džila	-zila/-dzila	-jia	'path'

-izukulu	-izukulu	-dzukulu	-jukulu	'grandchild'
-zuuli	-zuuli	-dzuli	-juli	'before yesterday
-inzi	-inzi	-dzi	-ji	'water'

These examples are easily comparable to the Swahili cognates -ganja, -j-, -jaa, -jeng-, -jia, -jukulu, -juzi, -ji. The Proto-Bantu forms are: *-ganja, *-jij-, *-jada, *-jeng-, *-jida, *-jijukudu, *-juudi, *-ji.

The above examples suggest that Sumbwa z < *j, with the stages: dž>dz>z, i.e. depalatalization and deaffrication (simplification). Rimi is consistent in its retention of *j; the Sukuma situation (further examples below) shows the stages: dž>dz>z, with dialectal variation.

Depalatalization and deaffrication is not restricted to etymological *c and *j. As noted previously, the results of the palatalization of */k, t, g, d/ were also deaffricated and depalatalized. This inevitably caused some mergers, e.g. *di>zi, *ji>zi. The following examples from Sumbwa and Sukuma, with their proto forms show that occurrences of zi in Sumbwa do not necessarily derive from *ji:

Sumbwa	Sukuma	Proto-forms	Gloss
-ziik-	-jiik-	*-dįįk-	'bury'
-zi	-ji	*-dį	'root'(of tree)
-zig-	-jig-	*-dįg-	'become burnt'
-zige	-jige	*-gįge	'locust'
-zim-	-jim-	*-dįm-	'go out (of fire/light)

-zimu	-jimu	*-dįmu	'ancestral spirit
-zinga	-jinga	*-dįnga	'beehive'
-zi-	-j-	*-gį	'go'

The fact that all of these examples of z:j correspondence between Sumbwa and Sukuma occur before the front vowel clearly points to the likelihood of their being results of palatalization. The examples show that */g, d/ palatalized to *j and then depalatalized and deaffricated to z in Sumbwa.

There are no parallel examples for *t. As regards *k, there are at least two examples:

Sumbwa	Nyamwezi	Sukuma	PB	Gloss
si	ki/c	ki/si	*ki	Cl. 7 Noun Prefix
-onsi	-oki	-oci	*-jokį	'smoke'

The class 7 noun prefix can be illustrated with the following examples:

Sumbwa	Nyamwezi	Proto-forms	
si-alo	calo	*ki-alo	'land; country'
si-ali	cali	*ki-ali	'nest'
si-ntu	ki-nhu	*ki-ntu	'thing'

All the above examples show that depalatalization (or alveolarization) operated in a thoroughgoing manner on (i) 'original' (i.e. PB) *c's and *j's in Sumbwa and Sukuma, and (ii) 'derived' *c's and *j's (derived via palatalization of velar and alveolar stops) mostly in Sumbwa.

6.3.2 The alveolarization of *ny

Consider these examples:

Sum	Suk	Nyam	Nilyam	Rimi	
nama	nyama	nyama/nama	nama	nyama	'meat'
nina	nina	nyina/nina	nina	nyinya	'his mother'
noko	noko	nyoko/noko	noko	nyokwe	'your " '
-mani-	-man-	-many-	-many-	-many-	'know'
-ni-	-ny-	-ny-/-ni-	-ni-	-ny-(rain)	'defecate'

Notice that Sumbwa is the only language with no palatal nasal in these examples. Sukuma has two occurrences of ny, Nyamwezi shows dialectal variation between n and ny, Nilyamba has one occurrence of ny, while Rimi is the only language which has ny in all the examples. Other examples which illustrate the ny/n correspondence set are the following Nyamwezi/Sumbwa pairs: munyamwezi/munamwezi 'a Nyamwezi person', munyampala/munampala 'old man', noota~nyoota/noota 'thirst', and personal names: Nyamizi/Namizi, Nyanzala/Nanzala, Nyanzila/Nanzila. Since we reconstructed *ny for West Tanzania (cf. chapter 5, section 5.4), we can infer that depalatalization (and concomitant alveolarization) has been active in some West Tanzania languages for a long time. The process appears to be at a more advanced stage in Sumbwa. The rule representing this process may be formulated as:

15. $\begin{bmatrix}+\text{nas}\\-\text{ant}\end{bmatrix} > \begin{bmatrix}+\text{cor}\\-\text{pal}\end{bmatrix}$

6.4 The reflexes of *j in Sumbwa: Further Considerations

In the preceding section comparative evidence was used to show the depalatalization and deaffrication of *j, which is reflected as z in Sumbwa. In this section we look at the further reflexes of *j, y and Ø.

Comparative evidence provides the clue that Pre-Sumbwa *z and *y, posited in chapter 5, derive from the same source segment, and that the source segment appears to be *j. Examples of this comparative evidence are:

Sum	Nyam	Suk	Nilyam	Rimi	Gloss
-zala	-zala/-yala	-zala/dzala	-zala/dzala	-dža	'hunger
-zila	-zila/-yila	-dzila/yila	-zila/dzila	-džia	'path'
-zoki	-zuki/-yuki	-dzuki/-yuki	---	---	'bees'
-zoka	-zoka/-yoka	-zoka/yoka	-zoka/dzoka	-džoxa'	snake'
-zi-	-y-	-dž-	---	---	'go'

The following should be noted about the above data. First, the variants for 'hunger' in Sukuma and Nilyamba are dialectal. Second, the z/y alternation in Nyamwezi and the z/y and dz/y alternations in Sukuma are distributed as follows: the y alternate occurs intervocalically, the other one postnasally. It should also be noted that in Nyamwezi instead of the variant with y, the variant with z is sometimes used both postnasally and intervocalically. Now, given the correspondences z/dž/y/dz above, it can be inferred that the most economical and plausible reconstruction would be *j (*dž). In the Sumbwa case, *j only 'explains' z directly; but the z/y and dz/y alternations in Nyamwezi and Sukuma suggest that Sumbwa y may also be traced to Proto-West Tanzania *j. What follows is a discussion and illustration of y and Ø as reflexes of Proto-West Tanzania/Proto-Bantu *j.

Let us start with examples illustrating y:

Sum	Suk	Nyamwezi	Proto-form
-oyil- 'sweat'	-uyil-	-uyil-	*-jujid-
-ayul- 'yawn'	-ayul-	-ayul-	*-jajud-
-oy- 'cease'	-oy-	-oy-	*-joj-
-yaga 'wind'	-yaga	-yaga	*-jaga
-yanda 'boy'	-yanda	-yanda	*-janda
-yenze 'mane'	-yenze	-yenze	*-jenze
-yog- 'shout'	-yog-	-yog-	*-jog-
-yomb- 'say'	-yomb-	-yomb-	*-jomb-
-yung- 'stroll'	-yung-	-yung-	*-jung-
-yung- 'sieve'	-yung-	-yung-	*-jung-

Given these examples, the following rule is valid for Pre-Sukuma/Sumbwa/Nyamwezi:

16. $\begin{bmatrix}-\text{son}\\+\text{pal}\end{bmatrix}$ > [+son]/V(#)_V

This is a sonorantization. It is analogous to the sonorantization of *d, i.e. *d>l/V(#)_V).

If we assume *j>y, then we have to clarify the relationship between y and z, since as pointed out above, *j>z, too. This is essentially a question of the environments in which the changes took place. An answer is suggested by the Nyamwezi and Sukuma examples given earlier in this section. In these examples there is alternation involving two environments: postnasal and intervocalic. z or dz occurs postnasally, y intervocalically. Thus the answer to the above question is this: the change *j>z occurred postnasally, and *j>y intervocalically. In nouns the alternation that occurred is still present (in relic form at least) in Sukuma and Nyamwezi. In Sumbwa, where there is z in both environments, two possibilities present themselves: (1) the changes occurred as reconstructed, in nouns and verbs, but later there was levelling in favour of z, or (2) there was only *j>z in Sumbwa nouns, and *j>y in verbs and other parts of speech. The second possibility is plausible, but the first is more in accord with other changes that occurred in prehistory. In particular, *j>y/V_V (sonorantization) is related to *d>l/V_V, which, as noted earlier, also occurred in prehistory.

Let us now turn to Ø as a reflex of *j. Consider the following examples:

Sum		Suk	Nyam	Proto-forms (cf. Meeussen)
-inam-	'bend'	-inam-	-inam-	*-jinam-
-imb-	'sing'	-imb-	-imb-	*-jimb-
-inso	'eye'	-iso	-iso	*-jico
-ezi	'moon'	-edzi	-ezi	*-jedi
-enda	'cloth'	-enda	-enda	*-jenda
-ana	'child'	-ana	-ana	*-jana
-anike	'girl'	-anike	-anike	*-janike

-og-	'take a bath'	-og-	-og-	*-jog-
-oya	'fur'	-oya	-oya	*-joja
-om-	'be dry'	-um-	-um-	*-jum-

These examples suggest the following changes which must have occurred in Pre-Suk-Sum-Nyam times: *j>y>Ø.

Now, there is an interesting relationship between the examples illustrating *j>y above and the ones illustrating *j>y>Ø. This relationship consists in the fact that there are no root-initial y's in Sumbwa. The only occurrence of y before i is a root-medial one in -oyil- 'sweat'. This absence of root-initial y's in the language suggests that at an earlier stage all root-initial y's were elided before i:

17. $\begin{bmatrix} -\text{syl} \\ +\text{hi} \end{bmatrix} \begin{bmatrix} +\text{syl} \\ +\text{hi} \end{bmatrix} \text{--->} \begin{bmatrix} +\text{syl} \\ +\text{hi} \end{bmatrix}$

This y-effacement rule spread to other environments, e.g. *-yedzi/*-yezi > -ezi, *-yana>-ana, *-yaka> -aka (cf. above examples).

6.5 Changes involving vowels

This section addresses some of the changes that have affected the Sumbwa vowel system. It deals with vowel merger (section 6.5.1), devocalization (section 6.5.2), and assimilation (section 6.5.3). Vowel merger can only be reconstructed on the basis of the comparative evidence, while the other changes can be reconstructed on the basis of internal evidence since they are still synchronically productive.

6.5.1 Vowel merger

Proto-Bantu, Proto-West Tanzania, and Proto-Sum-Suk-Nyam has been reconstructed with the following seven-vowel system:

į						ų
	i				u	
		e		o		
			a			

Length has also been posited for each of these vowels (cf. Chapter 5). Now, as noted in chapter 3, Sumbwa has the following five-vowel system:

i				u
	e		o	
		a		

The difference between these two systems can be illustrated with some comparative examples from Sukuma (which still has the seven vowel system) and Sumbwa:

	Sukuma			Sumbwa
ų:	m-bųla	'rain'	u:	m-vula
	n-gųƀu	'hippo'		n-vuƀu
u:	lu-ƀuga 'threshing floor'			lu-ƀuga
	ku-gulu	'leg'		ku-gulu

į:	n-gįlo 'taboo'	i:	mu-zilo
	-dzįįk- 'bury'		-ziik-
i:	n-gili 'warthog'		n-gili
	-diim- 'graze'		-diim-

i and u are tense vowels; i and u are nontense. As the examples here show, Sukuma has a contrast between the high tense vowel and its nontense counterpart. In Sumbwa, this contrast has been levelled in all environments. That is:

18. $\begin{bmatrix} +\text{syl} \\ +\text{hi} \end{bmatrix} > [+\text{tns}]$

Notice that the Sumbwa consonants before the vowels to which this rule applies are all continuants, while the cognate Sukuma consonants are stops or affricates (in the case of -dzįįk- 'bury'). This, of course, is the very environment where palatalization and labialization (and the accompanying subsequent processes) took place (cf. sections 6.1 and 6.2). What this means is that Rule 17 applies after all rules having to do with these processes have applied. The order of application is thus:

1. Palatalization or Labialization
2. Affrication
3. Deaffrication
4. Vowel Merger

Now, what were the conditions which made vowel merger possible? We assume the conditions include all the changes that precede vowel merger chronologically. Consider a language stage which has a high vowel tense-nontense contrast, such as the Proto-Bantu situation:

A. *ų, *u: *-bųda 'rain'; *-buga 'threshing floor'

*į, *i: *-gįdo 'taboo'; *-gidi 'warthog'

Now, consider another stage (a pre-Sumbwa stage) which has been brought about as a result of phonetic mutations (palatalizations, labializations, and other mutations):

B. *ų, *u: *-vųla 'rain'; *-buga 'threshing floor'

*į, *i: *-zįlo 'taboo'; *-gili 'warthog'

The difference between these two stages is that the vowel contrast in A is non-redundant (cf. bų/bu, gį/gi), while in B there is an additional consonant feature or features (cf. vų/bu, zį/gi). That is, while contrast in the former is encoded by the feature [+tense], in the latter that feature is not necessary at all since the distinctions can be encoded by the spirants. Now, once the possibility of encoding the distinction by means of a spirant presents itself, we have an ambiguous situation: should the distinction be carried by the feature [+tense] or the spirant, or both? The route followed by Sumbwa (and other Bantu languages indicated in Topogram 1 (Guthrie 1967:66) was elimination of the feature [+tense] since it was no longer needed in the system. This is a good example of a change (vowel merger) which has the consequence of eliminating a phonological correlation from the system.

6.5.2 Devocalization

Devocalization was described in chapter 3, section 3.2.3.2.1. It affects the vowels i, u, and o. Each of these vowels is devocalized if followed by a different vowel, which is lengthened if not followed by a pause. The devocalization part of the rule affecting i and u is:

$$19.\quad \begin{bmatrix}\mathrm{V}\\ \mathrm{+hi}\end{bmatrix}_i \;\mathrm{--->}\; [\mathrm{-syl}]/\_\_\mathrm{V}_j$$

The rule affecting o is:

$$20.\quad \begin{bmatrix}\mathrm{V}\\ \mathrm{+rnd}\end{bmatrix}_i \;\mathrm{--->}\; [\mathrm{-syl}]/\_\_\mathrm{V}_j$$

Devocalization is easily reconstructible since it is still a productive rule in the language. It can reasonably be assumed that it started with the high vowels i and u and later spread to the mid round vowel o. Note that Rules 19 and 20 are not collapsible into a simpler rule. This indicates that the spread of devocalization was not symmetrical; in a symmetrical development the spread would have affected both e and o.

It appears that the devocalization of o is a Sumbwa phenomenon. All West Tanzania languages investigated (Sumbwa, Nyamwezi, Sukuma, Nilyamba, Rimi) have Rule 19 (which affects i and u), but so far as I can tell (on the basis of the available evidence) none except Sumbwa has Rule 20. Examples illustrating Rule 19 among West Tanzania languages are:

	Sum	Suk	Nyam	Nilyam	Rim	Gloss
*mu-ana	[mwaana]	[nwana]	[mwana]	[mwana]	[mwana]	'child
*mu-edi	[mweezi]	[mweji]	[mwezi]	[mweli]	[mweri]	'moon'
*mi-edi	[myeezi]	[myeji]	[myezi]	[myeli]	[myeri]	'moons'

(Note that 'lengthening' is not shown in the examples from other West Tanzania languages; this is because it was not indicated in the sources).

6.5.3 Vowel Assimilation

Vowel assimilation phenomena in the language are regressive progressive. Regressive assimilation applies to all non-identical vowel sequences (other than the ones affected by devocalization) in affixal, morpheme-internal, and word-boundary positions. Progressive assimilation applies to suffixal positions (vowel harmony or vowel lowering, cf. sections 3.2.4.2.1 and 3.2.4.2.2) and to u in prefixal and morpheme-internal mu (cf. section 3.2.3.2.3).

6.5.3.1 Regressive assimilation

The following sequences are affected:

a - i -->ii	e - a -->aa	o - u --> uu
a - e -->ee	e - o -->oo	
a - o -->oo	e - i -->ii	
a - u -->uu	e - u -->uu	

A formal rule for this phenomenon was proposed in chapter

3, section 3.2.3.2.2:

$$\begin{array}{llll} 21. & \underset{[-hi]}{V_i} & V_j & \longrightarrow \underset{[+long]}{V} \\ & 1 & 2 & \quad 2 \end{array}$$

i.e. if non-identical vowels occur in a sequence in which the first one is non-high, then the sequence will be realized as a lengthened second vowel. Thus a phonological representation like /ma-ino/ will be realized as [miino].

6.5.3.2 Progressive assimilation

An instance of such assimilation is vowel harmony, of which more are given below:

		Sum	Suk	Nyam
/-loƀ-ik-a/	'soak'	[loƀeka]	[loƀeka]	[loƀeka]
/-ƀon-il-a/	'see for'	[ƀonela]	[ƀonela]	[ƀonela]
/-lel-il-a/	'nurse for'	[lelela]	[lelela]	[lelela]
/-seen-il-a/	'get fire-wood for'	[seenela]	[seenela]	[seenela]

(cf. Dahl 1915; Richardson 1966; Koenen; Nurse 1979a). These are prepositional forms. In these examples, the high vowel in -<u>il</u>- assimilates to the height of the mid vowels in verb roots. As indicated in 3.2.4.2.1 and 3.2.4.2.2 this phenomenon is not restricted to the prepositional form; it occurs in certain other forms too: in the stative, causative, the perfective of monosyllabic verbs, etc. The rule for vowel harmony was given in section 3.2.4.2.2 as:

$$22.\ [+syl] \longrightarrow \begin{bmatrix} -hi \\ -lo \\ \langle -bk \rangle \end{bmatrix} / [-hi]\ (C)\ -\ \underline{\quad}\ \underset{\text{Prep, Stat, Caus, } \langle\text{Revers}\rangle\text{, Perf}}{X\#\#}$$

Another example of progressive assimilation is that of u in mu (cf. 3.2.3.2.3). Examples are:

/mu-kiima/ --> [m̩kiima] 'woman'

/mu-goosia/ --> [m̩goosya] 'man'

/mu-zuna/ --> [m̩zuna] 'younger sibling'

/mu-sumvi/ --> [m̩suumvi] 'creator'

/mu-limo/ --> [m̩limo] 'work'

/mu-ti/ --> [m̩ti] 'tree'

/mu-fu/ --> [m̩fu] 'dead person'

/halamuka/ --> [halam̩ka] 'wake up'

/a-la-mu-lia/--> [alam̩lya] 'he ate him'

The realization rule for this type of assimilation (given in chapter 3) is:

$$23.\ \begin{bmatrix}+\text{nas}\\+\text{lab}\end{bmatrix}\begin{bmatrix}+\text{syl}\\+\text{lab}\\+\text{hi}\end{bmatrix} \text{--->} \begin{bmatrix}+\text{nas}\\+\text{lab}\\+\text{syl}\end{bmatrix}$$

Condition: Optional

Recall that this rule was interpreted as an assimilation instead of a deletion due to the similarity between u and m (i.e. both are [+labial]), and that instead of having a sequence in which [+labial] occurs twice, there may be an 'assimilative' shortening in which the major feature of u (i.e. [+syl]) is reassigned to m.

6.5.3.5 Reconstructing vowel assimilations

All these rules are reconstructible using internal evidence; they are still very productive. Comparative evidence however shows that affixal V_i-V_j assimilation must have been added during Pre-West Tanzania times. Examples of prefixal V_i-V_j assimilation in West Tanzania are:

		Sum	Suk	Nyam	Nilyam	Rimi	Gloss
*ma-ino	>	[miino]	[miino]	[miino]	[miino]	[miino]	'teeth'
*ma-ico	>	[miinso]	[miiso]	[miiso]	[miiso]	[miiso]	'eyes'

Vowel harmony (Rule 22) also appears to have been added in pre-West Tanzania times: it is a widespread rule in Bantu (e.g. Swahili: Ashton 1947; Luganda: Ashton et al. 1954; Rundi: Meeussen 1959, etc.).

As far as the assimilation of *u* in *mu* is concerned, it seems to be a common change. For example, in some dialects of Swahili (e.g. Standard Swahili) the assimilation is no longer optional but obligatory. At the moment we don't know whether the change applies (or applied) in all West Tanzania languages; this is a matter for further investigation. The data we have (e.g. Koenen) indicates that assimilation of *u* in *mu* occurred in Sukuma; this set the stage for the subsequent assimilation of the nasal to the following segment. Consider these examples (which, for practical purposes, are the same ones as those given for Sumbwa above):

Base forms	u-assimilation	nasal-assimilation	
/mu-kiima/ -->	[m̩kiima] -->	[nkiima]	'woman'
/mu-goosa/ -->	[m̩goosa] -->	[ngoosa]	'man'

/mu-zuna/ -->[m̩zuna] -->[nzuna] 'younger sibling'.

/mu-sumbi/ -->[m̩suumbi]-->[nsumbi] 'creator'

/mu-limo/ -->[m̩limo] -->[nimo] 'work'

/mu-ti/ -->[m̩ti] -->[nti] 'tree'

/mu-fu/ -->[m̩fu] -->[nfu] 'dead person'

(In /mu-limo/-->[m̩limo]-->[nimo] 'work', the root -initial l assimilates to the nasal after the application of nasal assimilation). Note that while Sumbwa is still at the u-assimilation stage, Sukuma has already gone a step further: assimilation of the syllabic nasal. It should also be noted that these examples are only sufficient for our purposes here: they do not represent all the nasal assimilations in Sukuma.

6.6. Summary

In this chapter, we have considered diachronic palatalization, labialization, the changes affecting proto-palatal consonants, and vowel changes. Starting with the 'initial' input as: */b, p, t, d, c, j, k, g, i, i, e, a, o, u, u/, we trace the relevant changes to the modern Sumbwa reflexes /b, p, v, f, t, s, z, d, k, g, i, e, a, o, u/. The intermediate stages posited are attested either in West Tanzania languages or other Bantu languages. Table 5 below summarizes the changes dealt with in the chapter.

Table 5a: Consonantal Changes

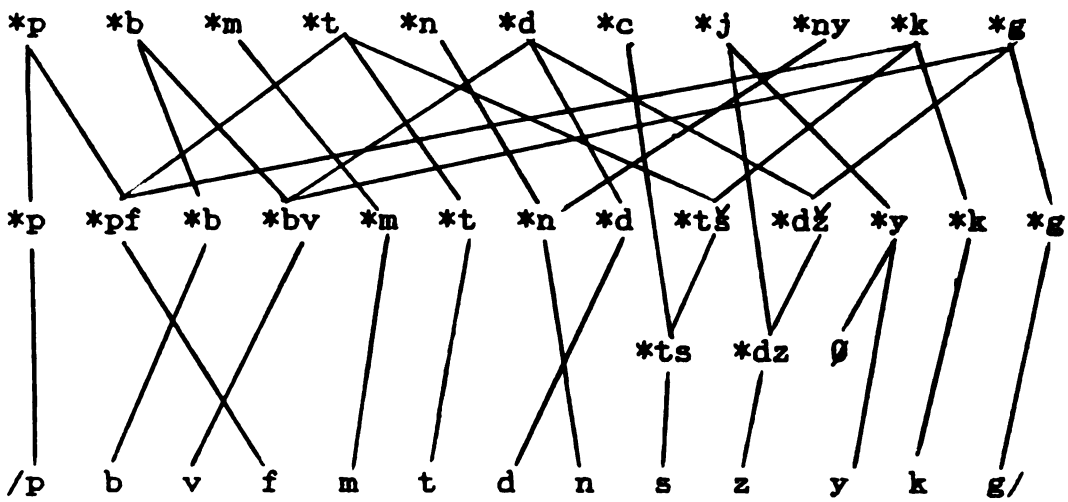
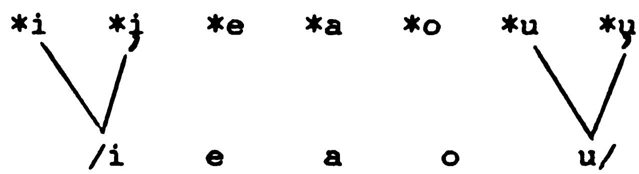


Table 5b: Vowel Changes



Diachronic Rules:

A. Palatalization:

1. $\begin{bmatrix}-\text{son}\\ -\text{cor}\\ -\text{lab}\end{bmatrix} > [+\text{pal}]/\_\_\begin{bmatrix}+\text{syl}\\ +\text{pal}\\ +\text{tense}\end{bmatrix}$ (Velar palatalization)

2. $\begin{bmatrix}-\text{son}\\ -\text{lab}\end{bmatrix} > [+\text{pal}]/\_\_\begin{bmatrix}+\text{syl}\\ +\text{pal}\\ +\text{tense}\end{bmatrix}$ (Velar and alveolar palatalization)

3. $\begin{bmatrix}-\text{son}\\ -\text{lab}\\ +\text{pal}\end{bmatrix} > [+\text{del rel}] /\_\_\begin{bmatrix}+\text{syl}\\ +\text{pal}\\ +\text{tense}\end{bmatrix}$ (Affrication)

4. $\begin{bmatrix}\text{-son}\\ \text{+del rel}\end{bmatrix} > [\text{-pal}]/\_\_ \begin{bmatrix}\text{+syl}\\ \text{+pal}\\ \text{+tense}\end{bmatrix}$ (Depalatalization)

5. $[\text{-cnt +cnt}] > [\text{+cnt}]/\_\_ \begin{bmatrix}\text{+syl}\\ \text{+pal}\end{bmatrix}$ (Deaffrication)

B. <u>Labialization</u> (section 6.2):

9. $[\text{-son}] > [\text{+rnd}]/\_\_ \overset{\text{V}}{\begin{bmatrix}\text{+bk}\\ \text{+tns}\\ \text{+rnd}\end{bmatrix}}$ (Labialization)

10. $\begin{bmatrix}\text{-son}\\ \text{-cor}\\ \text{-lab}\end{bmatrix} > [\text{+lab}] /\_\_ \overset{\text{V}}{\begin{bmatrix}\text{+bk}\\ \text{+tns}\end{bmatrix}}$ (Velar Labialization)

11. $\begin{bmatrix}\text{-son}\\ \text{+rnd}\end{bmatrix} > [\text{+del rel}] /\_\_ \overset{\text{V}}{\begin{bmatrix}\text{+bk}\\ \text{+tns}\end{bmatrix}}$ (Affrication)

12. $[\text{-cnt +cnt}] > [\text{+cnt}]/\_\_ \overset{\text{V}}{\begin{bmatrix}\text{+bk}\\ \text{+tns}\end{bmatrix}}$ (Deaffrication)

C. <u>Developments affecting palatal consonants</u> (section 6.3):

i. Depalatalization (Rule 4 above)

ii. Deaffrication (Rule 5 above)

iii. Alveolarization:

15. $\begin{bmatrix}\text{+nas}\\ \text{-ant}\end{bmatrix} > \begin{bmatrix}\text{+cor}\\ \text{-pal}\end{bmatrix}$

D. Reflexes of *j in Sumbwa (section 6.4)

i. Sonorantization of *j:

16. $\begin{bmatrix}-son\\+pal\end{bmatrix}$ > [+son]/V(#)_V

ii. y-effacement:

16. $\begin{bmatrix}-syl\\+hi\end{bmatrix}\begin{bmatrix}+syl\\+hi\end{bmatrix}$ > $\begin{bmatrix}+syl\\+hi\end{bmatrix}$

E. Vowel Merger (reflected in Table 5b):

17. $\begin{bmatrix}+syl\\+hi\end{bmatrix}$ > [+tns]

F. Vowel Devocalization:

19. $\underset{[+hi]}{V}{}_i$ ---> [-syl]/__V_j (Devocalization of i and u

20. $\underset{[+rnd]}{V}$ i ---> [-syl]/__V_j (Devocalization of o)

G. Vowel Assimilations:

(i) Regressive assimilation:

21. $V_i\ V_j\ >\ \underset{[+lng]}{V_j}$

(ii) Progressive assimilation:

22. $V_i\ V_j\ >\ \underset{[+lng]}{V_i}$

(iii) u-assimilation in mu:

$$23.\ \begin{bmatrix}+\text{nas}\\+\text{lab}\end{bmatrix}\begin{bmatrix}+\text{syl}\\+\text{lab}\\+\text{hi}\end{bmatrix} > \begin{bmatrix}+\text{nas}\\+\text{lab}\\+\text{syl}\end{bmatrix}$$

<u>Condition</u>: Optional

Devocalization and assimilation were accompanied by lengthening; the only exception being when the conditioning vowel is followed by a pause.

Chapter 7

Rule Inversion

7.0 Introduction

The phenomenon of rule inversion was explicated, formalized and put on the research program of generative phonology by Theo Vennemann in his 1972c paper. Briefly, rule inversion is a type of change whereby an earlier rule of type (1) is reflected by a later rule of type (2) below:

1. $*A > B/X\_\_Y$
2. $B \text{--->} A/\sim(X\_\_Y)$

As is evident here, rule type (2) is the approximate inverse of (1). One of the assumptions in the rule inversion hypothesis is that it comes about if the elements in the conditioning environment in (1) belong to basic categories (Vennemann 1972c:211, 237-241). In the inverted rule, (2), the conditioning environment is other than that in (1), that is, it belongs to secondary categories. Another important claim contained in the hypothesis is that levelling is the subsequent change that typically takes place with (2). It is further claimed that this levelling, which normally favours B in (2) above, is motivated by the universal tendency in language toward paradigm uniformity (cf. Vennemann, op. cit. and 1972b).

The importance of rule inversion is that it counters the classical TG claim that underlying representations are resistant to historical change (e.g.

SPE 1968:49). According to this claim, historical change involved rules which were added at the end of the grammar, leaving the underlying representations intact. (In such a view, abstract lexical representations, extrinsic rule order, absolute neutralization, etc. a la SPE are necessary - of course - in order for synchronic derivations to continue to mirror diachronic derivations). In the rule inversion hypothesis, it is claimed that synchronic rules are sometimes the inverse of diachronic rules; that is, at least in this case, synchrony does not correspond to, or mirror, diachrony.

Since the publication of Vennemann's paper, the subject of rule inversion has been taken up by a number of linguists (e.g. Schuh 1972, Hinnebusch 1973:181-3, 1974; Klausenburger 1974; Frajzyngier 1976; Leben 1974; Churma 1982; Hudson 1984). Although a discussion of all these contributions is out of place in this chapter, a few observations are in order on one or two of the ideas in the literature as a statement of our position on this phenomenon.

First, the notion of rule inversion as both a mechanism of change and a type of change. This notion was propounded by some writers (Vennemann, Schuh, Leben). The first part of the notion (rule inversion as a mechanism of change) was of course part of a conception of all rule changes as also mechanisms of change that was current at the time - an incorrect idea that has since been abandoned. Rule changes are just that: rule changes; other factors (cf. chapter 2) are responsible for such events.

Second, the idea, propounded by Leben 1974, that rule inversion should be ruled out as a possible change. Leben's intention was not only to discredit rule inversion as a descriptive device in Kanakuru and Hausa (cf. Schuh 1972), but also wanted to rule out rule inversion in linguistic theory: he claims that "...the positing of a synchronic stage with "conceptually anomalous" inverse rules constitutes a middleman which it would be advantageous to eliminate in principle from the realm of possible phonological systems" (265-6). This statement reflects a misunderstanding as to what rule inversions are. While one may quarrel with un-substantiated claims of "conceptual anomalies" in a synchronic system, one should distinguish these from claims of a rule inversion arrived at through valid methods of analysis. Rule inversions, like all types of change (e.g. simplification, morphologization, etc.) are diachronic phenomena which can only be established through comparative and internal reconstruction and other criteria such as frequency of occurrence, treatment of borrowings, etc. Any claim for such a change has to be supported empirically - in much the same way as a claim for a simplification. Thus any claim of a rule inversion is an empirical issue (as Churma 1982 shows).

Having said this, we now turn to the topic of this chapter - rule inversion in Sumbwa.

The rule inversions to be discussed in this chapter involve the alternations b/ƀ, l/d, and h/p. The first two are still productive, while the last one is reflected in a few relic forms and in a limited number of paradigms of one verb only. The productive alternations (b/ƀ, l/d) can be formulated into phonetically plausible rules, ƀ -->b/N__ and l-->d/N__, which are the approximate inverse of the historical rules b-->ƀ/V__V and d-->l/V__V (cf. Chapter 3). These rules are based on reliable synchronic criteria such as contrast, frequency of occurrence of the alternants, and whether the rule applies to borrowings or not. Unlike the other two alternations, h/p has been subject to levelling. This raises the question of why certain alternations may be levelled at all, which is also discussed.

It should be observed that the Sumbwa cases (and other cases of rule inversions in Bantu mentioned in the conclusion) are clear cases of rule inversion for two reasons: (1) the environments are mutually exclusive, i.e. complementary (intervocalic and postnasal); (2) the inverted rule is not ad hoc - it is required by an independent constraint on the phonetic structure of the language, i.e. the fact that bilabial continuant and the lateral don't occur postnasally in Sumbwa.

The chapter has the following sections. Section 7.1 presents the relevant data. Section 7.2 presents arguments for rule inversion. Then the development of rule inversion is traced from the Pre-Sumbwa stage to the present; the levelling of h/p is also treated (Section 7.3). Section 7.4 summarizes the major stages reconstructed. Section 7.5 is the conclusion.

7.1 The Data

The alternations to be discussed have been illustrated in chapter 3 (cf. sections 3.2.3.1.6 and 3.2.4.1.8). But for convenience of reference, we shall present some examples before presenting the arguments for rule inversion.

7.1.1 Examples involving b/ƀ:

As noted in section 3.2.3.1.6, the b alternate occurs whenever N (whether as a first person prefix or as a noun class or adjectival prefix) directly precedes the root, the ƀ alternate occurring elsewhere. In verbal constructions, the former occurs in habitual, subjunctive, past and future tense constructions, the latter elsewhere, as shown below; in nominal constructions b occurs only when the root is used in classes 9 and 10 (cf. Appendix 1 for a chart of Noun Classes); in adjectives it occurs when the relevant adjectives are used with class 9 or 10 nouns.

Verbs: To illustrate the b alternate, the verbs used are:

-ƀon-a 'see' and -ƀis-a 'hide'. The N immediately preceding b is the first person singular pronominal prefix; -la-...-a is the past tense marker, -laa-...-e the future tense marker. What follows are phonetic representations having the glosses: -ƀona: 'I usually see', 'that I should see', 'he saw me', 'he will see me', and -ƀisa: 'I usually hide', 'that I should hide', 'he hid me', 'he will hide me'.

Habitual	Subjunctive	Past	Future
N-ƀon-a	N-ƀon-e	a-la-N-ƀon-a	a-laa-N-ƀon-e
[mbona]	[mbone]	[alambona]	[alaambone]
N-ƀis-a	N-ƀis-e	a-la-N-ƀisa	a-laa-N-ƀise
[mbisa]	[mbise]	[alambisa]	[alaambone]

To illustrate ƀ we use only -ƀis-a 'hide'(transitive). Examples are:

	Present Progressive	prefective	Past	Future
A.	n-e-ku-ƀis-a	n-a-ƀis-ile	n-la-ƀi-s-a	n-laa-bis-e
	[neekuƀisa]	[naaƀisile]	[ndaƀisa]	[ndaaƀise]
	'I am hiding'	'I have hidden'	'I hid'	'I will hide'
	tu-e-ku-ƀis-a	tu-a-ƀis-ile	tu-la-ƀisa	tu-laa-ƀis-e
	[tweekuƀisa]	[twaaƀisile]	[tulaƀisa]	[tulaaƀise]
	'we are hiding'	'we have ...'	'we ...'	'we will...'
B.	u-e-ku-ƀis-a	u-a-ƀis-ile	u-la-ƀis-a	u-laa-ƀis-e

	[weekuƀisa]	[waaƀisile]	[ulaƀisa]	[ulaaƀise]
	'you...'	'you...'	'you...'	'you...'
	mu-e-ku-ƀis-a	mu-a-ƀis-ile	mu-la-ƀis-a	u-laa-ƀis-e
	[mweekuƀisa]	[mwaaƀisile]	[mulaƀisa]	[mulaaƀise]
	'you(pl.)...'			
C.	a-e-ku-ƀis-a	a-a-ƀis-ile	a-la-ƀis-a	a-laa-ƀis-e
	[eekuƀisa]	[aaƀisile]	[alaƀisa]	[alaaƀise]
	'he/she...'			
	ƀa-e-ku-ƀis-a	ƀa-a-ƀis-ile	ƀa-la-ƀis-a	ƀa-laa-ƀis-e
	[ƀeekuƀisa]	[ƀaaƀisile]	[ƀalaƀisa]	[ƀalaaƀise]
	'they ...'			

Note that tu, u, mu, a, ƀa are dependent personal pronoun markers, glossed as: we/us, you (sg.), you (pl.), s(he)-her/him, and they/them, respectively. e-...-a and -a-...-ile are present progressive and perfective markers.

Nouns: In many Bantu languages, N is the prefix or part of the prefix for classes 9 and 10. In Sumbwa (and many other Bantu languages), the b alternate occurs whenever the class prefix N- directly precedes the relevant noun stem; ƀ occurs elsewhere. In the examples below, the glosses are: -buzi 'goat', -bwa 'dog' and -bogo' buffalo'; the prefixes li-/ma- and ka-/tu- represent singular/plural augmentative and dimunitive class markers, which are glossed as 'big' and 'small', respectively.

Cl(ass) 5	Cl. 6	Cl.9	Cl.10	Cl. 12	Cl. 13
li-ƀuzi	ma-ƀuzi	N-buzi	N-buzi	ka-ƀuzi	tu-ƀuzi
li-ƀwa	ma-ƀwa	N-bwa	N-bwa	ka-ƀwa	tu-ƀwa
li-ƀogo	ma-ƀogo	N-bogo	N-bogo	ka-ƀogo	tu-ƀogo

Adjectives: The b alternate occurs when the relevant adjectives are used to modify class 9/10 nouns; ƀ occurs elsewhere. Examples are:

Cl. 5	Cl. 6	Cl. 7	Cl. 8	Cl. 9	Cl. 10	Cl. 11
i-/li-ƀisi	ma-ƀisi	si-ƀisi	ƀi-ƀisi	N-bisi	N-bisi	lu-ƀisi
'raw'						
i-/li-ƀole	ma-ƀole	si-ƀole	ƀi-ƀole	N-bole	N-bole	lu-ƀole
'rotten'						
i-/li-ƀi	ma-ƀi	si-ƀi	ƀi-ƀi	N-bi	N-bi	lu-ƀi
'bad'						

All the examples given in this section show that b is by far the more frequent alternate.

7.1.2 Examples involving d/l

Verbs: As with b in b/ƀ, d in d/l occurs when the first person singular is subject or object in habitual, subjunctive, past, future, etc. constructions; l occurs elsewhere. The following examples illustrate d:

Habitual	Subjunctive	Past	Future
N-duma	N-dum-e	a-la-N-duma	a-laa-N-dum-e
[nduma]	[ndume]	[alaanduma]	[alaandume]
'I usually bite'	'that I should...'	'he bit me'	'he'll...me'
N-dia	N-die	a-la-N-dia	a-laa-N-die
[ndya]	[ndye]	[alaandya]	[alaandye]
'I usually eat'	'that I should...'	'he ate me'	'he'll...me'

The alternate l occurs in the same type of constructions in which the b alternate occurs. For example:

	Present Progressive	Perfective	Past	Future
A.	n-e-ku-li-a	n-a-li-ile	n-la-li-a	n-laa-li-e
	[neekulya]	[naaliile]	[ndalya]	[ndaalye]
	'I am eating'	'I have eaten'	'I ate'	'I'll eat'
	tu-e-ku-li-a	tu-a-li-ile	tu-la-li-a	tu-laa-li-e
	[tweekulya]	[twaaliile]	[tulalya]	[tulaalye]
	'we are...'			
B.	u-e-ku-li-a	u-a-li-ile	u-la-li-a	u-laa-li-e
	[weekulya]	[waaliile]	[ulalya]	[ulaalye]
	'you are...'			
	mu-e-ku-li-a	mu-a-li-ile	mu-la-li-a	mu-laa-li-e
	[mweekulya]	[mwaaliile]	[mulalya]	[mulaalye]
	'you (pl.)...'			

C.	a-e-ku-li-a	a-a-li-ile	a-la-li-a	a-laa-li-e
	[eekulya]	[aaliile]	[alalya]	[alaalye]
	's(he)...'			

ƀa-e-ku-li-a	ƀa-a-li-ile	ƀa-la-li-a	ƀa-laa-li-e
[ƀeekulya]	[ƀaaliile]	[ƀalalya]	[ƀalaalye]
'they are...'			

<u>Nouns:</u> The alternate <u>d</u> occurs after the <u>N</u>- prefix, and <u>l</u> elsewhere, as exemplified below:

Cl. 5	Cl. 6	Cl. 10	Cl. 11	Cl. 12	Cl. 13
li-limi	ma-limi	N-dimi	lu-limi	ka-limi	tu-limi
li-lela	ma-lela	N-dela	lu-lela	ka-lela	tu-lela
--	--	N-duulu	--	ka-luulu	ka-luulu

The glosses here are: <u>-limi</u> 'tongue', <u>-lela</u> 'umbilical cord', and <u>-luulu</u> 'shout of pain, etc.'

<u>Adjectives:</u> The <u>d</u> alternate occurs when adjectives with initial <u>l</u> elsewhere modify nouns in classes 9 and 10. Examples:

Cl. 2	Cl. 3	Cl. 4	Cl. 7	Cl. 9	Cl. 10
ƀa-leele	mu-leele	mi-leele	si-leele	N-deele	N-deele
ƀa-laala	mu-laala	mi-laala	si-laala	N-daala	N-daala

The glosses are: -<u>leele</u> 'long', and -<u>laala</u> 'old'.

Note that the examples given in this section indicate that <u>l</u> is overwhelmingly the more frequent alternate in paradigms.

7.1.3 <u>Examples involving p/h</u>

As noted in chapter 3 (section 3.2.4.1.8), this is a relic alternation in the language.

<u>Verbs:</u> The only verb that still has the <u>p/h</u> alternation in its paradigms is -<u>ha</u> 'give'. The <u>p</u> alternate occurs in the following constructions:

Present Progressive	Perfective	Subjunctive
a-e-ku-N-pa	a-a-N-pe-ile	a-a-N-pe
[eekuumpa]	[aampeele]	[aampe]
'he is giving me'	'he has given me'	'that he should give..

Past	Future	Imperative
a-la-N-pa	a-laa-N-pe-e	N-pe
[alaampa]	[alaampe]	[mpe]
'he gave me'	'he will give me'	'give me'

The <u>h</u> alternate occurs elsewhere. Examples are:

	Present Progressive	Perfective	Past	Future
A.	n-e-ku-ha	n-a-he-ile	n-la-ha	n-laa-he
	[neekuha]	[naaheele]	[ndaha]	[ndaahe]
	'I am giving'	'I have given'	'I gave'	'I will give'

	tu-e-ku-ha	tu-a-he-ile	tu-la-ha	tu-laa-he
	[tweekuha]	[twaaheele]	[tulaha]	[tulaahe]
	'we are...'			
B.	u-e-ku-ha	u-a-he-ile	u-la-ha	u-laa-he
	[weekuha]	[waaheele]	[ulaha]	[ulaahe]
	'you ...'			
	mu-e-ku-ha	mu-a-he-ile	mu-la-ha	mu-laa-he
	[mweekuha]	[mwaaheele]	[mulaha]	[mulaahe]
	'you (pl.)...			
C.	a-e-ku-ha	a-a-he-ile	a-la-ha	a-laa-he
	[eekuha]	[aaheele]	[alaha]	[alaahe]
	's(he)...			
	ƀa-e-ku-ha	ƀa-a-he-ile	ƀa-la-ha	ƀa-laa-he
	[ƀeekuha]	[ƀaaheele]	[ƀalaha]	[ƀalaahe]
	'they...			

Nouns: There are, to my knowledge, two nouns which still show this alternation:

Class 11		Class 10	
lu-hu	'hide, skin'	N-pu	(pl.)
lu-he	'wooden tray'	N-pe	(pl.)

Other Items: There are three other items which further indicate the relic nature of the alternation. These are:

(1) the allomorphs -Npa/-ha, which are concerned with changing adjectives into verbs. The former

occurs in one word only: -ihi 'short' > ihimpa 'become short', and the latter in the rest, e.g. -ingi 'many'> ingiha 'become many', -do 'small'> -dooha 'become small', etc.

(2) the pairs -hol-a 'cool down'/ N-pola 'peace' (<*-pod-), and

(3) -hek- 'carry child on back'/N-pesio 'cloth for carrying child on back' (<*-pek-).

In all of them p is found postnasally, and h elsewhere.

7.2 Evidence for Rule Inversion

Having presented the relevant data in the foregoing, evidence will now be presented to support the position that the alternations in question have to be formulated as synchronic rules which are the inverse of the historical rules. The historical rules are easy to reconstruct from the data and also by reference to the reconstructed consonant system for Proto-Bantu. Given the historical segments *b, *d, and *p (cf. chapters 4 and 5), the historical rules represent weakenings which occurred in pre-Sumbwa times, producing continuants, as schematized below:

$$3.\quad \begin{bmatrix} *b \\ *d \\ *p \end{bmatrix} > \begin{bmatrix} \text{ƀ} \\ l \\ h \end{bmatrix} \ /V(\#\#)\_\_V$$

The environment V(##)__V will be considered intervocalic. The optional word boundary is included since stem-initial stops weakened also.

The synchronic rules representing the alternations were formulated in chapter 3. The rule for b/b and d/l was formulated as a phonetic realization rule which captures the generalization that the continuant alternates do not occur postnasally:

$$4.\quad \begin{bmatrix}\text{-syl}\\ \text{+ant}\\ \text{-str}\end{bmatrix} \text{--->}[\text{-cnt}]/[\text{+nas}]\_\_\_$$

i.e. the continuants are realized as the respective non-continuants postnasally (cf. section 3.2.3.1.6).

The relic alternation p/h was represented by the following morphophonemic rule (cf. 3.2.4.1.8):

$$5.\quad \begin{bmatrix}\text{-son}\\ \text{+/-ant}\\ \text{(+lab)}\end{bmatrix} \quad \text{--->}\begin{Bmatrix}\begin{bmatrix}\text{+ant}\\ \text{+lab}\end{bmatrix} & /\ [\text{+nas}]\_\_\\ [\text{-ant}] & \text{Otherwise}\end{Bmatrix}$$

i.e. the labial stop occurs postnasally, and the glottal continuant elsewhere.

More will be said later on the diachronic development of the p/h alternation. For now, we shall concentrate on b/b and d/l since these are still productive, and represent a phonetic generalization. We shall proceed to present the pieces of evidence which support Rule 4 above, which is the inverse of part of the historical rule (3). The evidence relate to contrast and neutralization, frequency of occurrence, semantic primeness, and borrowing.

7.2.1 Contrast and contextual neutralization

We shall begin by considering the issue from the point of view of contrast and contextual neutralization.

In a description of Sumbwa phonology, the following facts having to do with b, ƀ, d, and l have to be stated:

i) the contrast between the stops and the continuants (cf. chapter 3, section 3.1.1 and below);

ii) the alternation between b and ƀ, and d and l;

iii) the contextual neutralization between the continuants and the stops postnasally, i.e. the continuants do not occur postnasally.

Now, which description would account for them in a 'natural' way, the historical rules or the inverted rule?

It seems that the historical rules (as formulated in 3 above) cannot adequately describe the above facts. In the first place, this solution would give us the wrong outputs for all stems with root-initial/intervocalic b's and d's. Note that in this solution, the phonological representations in the above examples would be stops, and the phonetic representations would be continuants, giving the wrong outputs in the case of root-initial/intervocalic stops. Some examples of root-initial contrast between b and ƀ, and l and d are:

A. Contrast between b and ƀ:

i) -ƀeela 'have an improved appearance'

-bela 'break, e.g. pot, plate'

ii) -ƀola 'rote'

-boola 'abduct'

iii) -ƀaNba 'fix skin over drum'

-bama 'hit'

B. Contrast between l and d:

i) -lila 'cry'

-diila 'stay'

ii) -leeha 'become tall/long'

-dooha 'become small, diminish'

iii) -lima 'cultivate'

-diima 'graze'

Note that these stop-continuant contrasts in initial position get neutralized postnasally, as exemplified:

A. i) N-ƀeela--->[mbeela] tu-ƀeela--->[tuƀeela]

'I usually...' 'We usually...'

N-bela---> [mbela] tu-bela--->[tubela]

'I usually...' 'We usually...'

B. i) N-lila---> [ndila] tu-lila--->[tulila]

'I usually...' 'We usually...'

N-diila--->[ndiila] tu-diila--->[tudiila]

'I usually...' 'We usually...'

As noted already, this neutralization represents a constraint on Sumbwa pronunciation which states that the continuants ƀ and l do not occur phonetically postnasally.

Contrast between the stops and continuants and their neutralization postnasally is not restricted to verbs; it also occurs with nouns and adjectives:

	Cl. 5	Cl. 6	Cl. 9/10	Cl. 11	Cl. 12	Cl. 13
i)-baƀo	li-baƀo	ma-baƀo	N-baƀo	lu-baƀo	ka-baƀo	tu-baƀo
'board/piece of wood'						
-ƀuzi	li-ƀuzi	ma-ƀuzi	N-buzi	--	ka-ƀuzi	tu-ƀuzi
ii)-do	i/li-do	ma-do	N-do	lu-do	ka-do	tu-do
'small'						
-lele	li-lele	ma-lele	N-dele	lu-lele	ka-lele	tu-lele
'long/tall'						

Thus the historical rules will have a lot of exceptions and will say nothing about postnasal neutralization.

It should be noted that the 'historical' solution appears to be at odds with at least one time-honored goal of phonological description, that of capturing 'generalizations'. Phonological description intends to account for distinctiveness, phonotactics (sequences), segmental composition, alternations, etc. Phonological/lexical representations are posited and rules are formulated to capture either sequential/segmental constraints or alternations. It is usually assumed that if alternations are automatic, i.e. represent significant generalizations, they should be formulated in such a way as to reflect such generalizations. Apparently, the historical rules are not based on alternation, nor are they based on any obvious synchronic constraint.

On the other hand, the inverted rule in 4 above is based directly on the alternations b/ƀ and d/l. These alternations are apparently treated as automatic since they represent the generalization that the continuants do not occur postnasally. In this solution, both stops and continuants are posited at the phonological level, and the inverted rule affects only *ƀ*'s and *l*'s which occur root-initially after the nasal. It does not affect the stops (*b*'s and *d*'s) which occur root-initially/ intervocalically. A sample derivation of habitual constructions where the first person singular is subject looks like this:

UR	/ N-ƀeela	N-bela	N-lila	N-diila /	
	m-ƀeela	m-bela	--	--	Nasal Assimilation
	m-beela	--	n-dila	--	Inverted Rule (4)
PR	[mbeela	mbela	ndila	ndiila]	

The glosses are: 'I become good', 'I break, e.g. pot', 'I cry', 'I stay'.

If the above analysis is correct, then the inverted rule is the only solution that can account for the alternations directly in a natural way, thus capturing a significant generalization.

7.2.2 Frequency of occurrence

Having argued for the inverted rule solution in the preceding section, we will now consider whether another principle, frequency of ocuurrence, supports this solution.

This is an important criterion used by phonologists (cf. Kisseberth and Kenstowicz 1979: 199-201) to identify the underlying segment in an alternation. In order for an alternating segment to be considered underlying or 'phonological' it has to be more frequent in surface phonetic paradigms than the other alternate, which is considered 'derived'.

The paradigms given in 7.1 do not represent an exhaustive list of contexts in which the alternating segments occur. Even so, it is easy to notice that the stop alternates are restricted to the environment after N_, which is either the first person singular prefix (in the case of verbs) or the class 9/10 prefix (in the case of nouns and adjectives). In the remaining environments the continuants occur. It is evident that the continuant alternates are overwhelmingly more frequent in paradigms. This, of course, strengthens the conclusion reached in the section above that continuant alternates have to be considered basic and the stop alternates derived.

7.2.3 Semantic Primariness

Frequency of occurrence is associated with another factor, the principle of semantic primariness. This principle has been called the "fundamental principle for rule inversion (as well as for other forms of analogic change)" (Vennemann 1972c:237). As Vennemann (op. cit.) notes, this principle has to do with the way grammars are internalized in language acquisition. In language acquisition children are more exposed to primary categories (e.g. singular, nominative, active, indicative, present, etc.) than to secondary categories (e.g. plural, genitive, passive, subjunctive, past, etc.). Since primary categories are more frequent, children construct grammars in which the phonetic manifestations of these categories are basic and the phonetic manifestations of the secondary categories are derived.

The question is whether the continuant alternates posited above as underlying predominate in primary categories. The answer is yes, although the situation is not reducible to a rigid primary-secondary distinction. The segments ƀ and l, which are basic according to our inverted rule solution, are not always in primary categories, nor do b and d occur in secondary categories only. The examples in 7.1 show that the alternates b and d occur in the first person singular constructions (which could be argued to be primary); these constructions, however, are in the habitual, subjunctive, past and future mood/tense (which could be argued to be secondary - vis-a-vis present tense constructions). The stop alternates also occur in classes 9 and 10 (which are semantically unmarked -- and therefore primary -- vis-a-vis augmentative and dimunitive classes). The alternates ƀ and l dominate in the primary categories, of course -- but they also occur in marked classes, e.g. dimunitive (classes 12 and 13) and augmentative (classes 5 and 6). It can however be said that ƀ and l are more frequent in primary categories. Yet it does not appear obvious at all that the basic-secondary category distinction plays any significant role in the rule inversions in question. Frequency of occurrence seems to be a more salient factor.

7.2.4 Borrowing

Borrowing can be used in testing the validity of linguistic generalizations. In general, if it is claimed that a rule is productive or active in a language, then if that language borrows from another one under normal conditions, the synchronic rule is expected to apply to the borrowed items.

In the case at hand it has proved difficult to find borrowed items which are relevant to the inverted rule. The only example that I could think of is from Swahili:

Swahili	Sumbwa	
-lazimisha 'force'	-lazimisya	[ndazimisya] 'I force'

This example illustrates the operation of the realization rule l--->d/N__. This suggests that the inverted rule has some psychological reality among Sumbwa speakers. Although we do not have any example illustrating ƀ--->b/N__ (probably because it is difficult to distinguish between borrowed and native words), we can say that the above example reinforces the position already supported in previous sections.

7.3 The Development of Rule Inversion

7.3.1 The early changes

In this section we are concerned with the changes that gave rise to the alternations b/b, d/l, and p/h. One of these changes has already been stated in (3), repeated as (6) below:

6. $\begin{bmatrix} *b \\ *d \\ *p \end{bmatrix} > \begin{bmatrix} \text{ƀ} \\ l \\ h \end{bmatrix} /V(\#\#)\_\_V$

That is, weakening did not occur after nasals, which, as we have already seen are prefixes in Sumbwa (and in other Bantu languages). It is important here, for the purposes of internal or comparative reconstruction, to recognize two environments: the intervocalic and the postnasal. In addition, we have to distinguish two postnasal environments in Bantu: etymological or 'original' and derived. Examples of the original postnasal environments, all of which are root-internal, are:

Proto-forms		Sumbwa
*-buNb-	'mould'	-ƀuNb-
*-diNd-	'wait'	-liNd-
*-joNk-	'suck'	-oNk-
*-caNg-	'find, meet'	-saNg-

Many Bantu languages, however, developed another set of postnasal environments through the syncopation of the postnasal vowel i, as illustrated below from Sumbwa:

First Personal Prefix	Classes 9 and 10	
*ni-pa-e 'Give me'	ni-budi 'goat'	
n -pa-e	n -budi	i-syncopation
/N-pa-e/	/N-budi/	

In chapter 4, in our discussion of the weakening hierarchy, we noted that the postnasal environment is generally an environment of retention in Bantu. In many Bantu languages, weakening, which occurred intervocalically, tended to occur less frequently to postnasal stops. On this view, it follows that i-syncopation is crucially ordered in relation to weakening. We can derive the relevant forms using the following order of rules:

A. */ni-pa-e/ */mu-pa-e/

n- pa-e	---	i-syncopation
m-pa-e	---	N-assimilation
---	mu-ha-e	weakening
[mpe]	[muhe]	Other rules
'give me'	'give him'	

B. */ni-budi/ */ka-budi/

n- budi	---	i-syncopation
m- budi	---	N-assimilation
m-buzi	ka-ƀuzi	weakening
[mbuzi]	[kaƀuzi]	
'a goat'	'a small goat'	

C.	*/ni-dimi/	*/lu-dimi/	
	n- dimi	---	i-syncopation
	n- dimi	---	N-assimilation
	---	lu-limi	weakening
	[ndimi]	[lulimi]	
	'tongues'	'tongue'	

In these derivations, only *i*-syncopation and weakening are crucially ordered with respect to each other. Nasal assimilation is not diachronically ordered with respect to any of the other rules. Nasal assimilation is a straightforward process; it is an articulatory simplification since the assimilated nasal shares the place-feature with the following consonant. Thus it does not need any further comment. However, *i*-syncopation and the weakenings in A, B, and C need to be commented upon.

First, *i*-syncopation. The first thing to notice here is that this change is analogous to *u*-assimilation in *mu* (or *u*-effacement, if you like) that has occurred in a thoroughgoing manner in Sukuma and Swahili and is still optional in Sumbwa (cf. Chapter 6, section 6.5). The analogous relationship between the two changes may be observed in the following rules:

NV Stage		Syllabic Stage		Loss of Syllabicity
*mu	>	m̩	>	N
*ni	>	N̩	>	N

(Notice that *N* is unspecified for the place feature).

The developments involving **mu* can be exemplified from West

Tanzania; Sumbwa is still between the NV stage and the syllabic stage, that is the rule is optional, while Sukuma is at the 'loss of syllabicity' stage. Developments involving **ni* are a Bantu phenomenon; they involve the Classes 9/10 prefixes in many languages, and the first person singular marker. In Sumbwa, as shown in the derivations above, both changes occurred. As in the case of **mu*>*m*, in **ni*>*n* the syllabic feature for *i* is reassigned to *N*. The change **ni*>*n*, including reassigment of syllabicity from the assimilated vowel, may be stated as:

$$7.\quad \begin{bmatrix} +\text{cor} \\ +\text{nas} \end{bmatrix} \begin{bmatrix} +\text{syl} \\ +\text{cor} \end{bmatrix} \quad > \quad \begin{bmatrix} +\text{syl} \\ +\text{cor} \\ +\text{nas} \end{bmatrix} \;/\_\_\; \text{C}$$

This reconstruction is not an imaginary one; in fact, this can be exemplified from varieties of Swahili, where all the stages are attested:

nitakula --> [n̩takula] --> [ntakula] 'I will eat'

The reduced forms are used in colloquial styles.

In arguing for *u*-assimilation, we said that the basis of the process are the shared features [+lab, +son]. The same argument may be used in the **ni* case, since *n* and *i* share two features, too: [+cor, +son]. On the basis of this, one could argue that what we have called *i*-syncopation is actually *i*-assimilation.

It is worth noting that the **ni* case is also similar to **li*, the Class 5 prefix, which, as was noted in the last chapter, has simplified to *i* or Ø in many Bantu languages. Notice, however, that *li never changed to syllabic l, as *ni did; the only changes observed are: *li>i>Ø. This is not because *li cannot change to syllabic l; it is probably because there are no [+lateral][-syl] sequences in Bantu languages.

Let us now turn to the weakenings. The weakening in (A) above is *p>h. The difference between the initial input and the final output is one of presence and absence of oral stricture. This type of change may follow either of these paths: (1) p>p^h>h, (2) p>Φ(>f)>h. Both paths are basically motivated by articulatory factors. In (1), the initial stage p>p^h is induced by the failure of glottal vibrations to follow immediately after the release of p. Such a failure causes a voiceless breath, i.e. an h, to intrude between the closure for p and the following vowel. In (2), the initial stage, p>Φ, is an assimilation to the continuancy of the surrounding vowels. The later stages (p^h>h, Φ(>f)>h) represent 'cluster' simplification (in the first case) or shifts based on preceptual factors or acoustic similarity (in the second case). It seems that the Sumbwa change *p>h did not follow path (2); it followed path (1). This was also the path that was followed in Sukuma and Nyamwezi, as the following examples show:

Sumbwa	Sukuma	Nyamwezi	Proto-forms
ha- 'Cl.16 prefix'	ha-	ha-	*pa-
ha-ihi[hiihi] 'nearby'	hiihi	hiihi	*pa-ipi
-hangam- 'live long a life'	-hangam-	-hangam-	*-pangam-

-hamb-	'plant'	-hamb-	-hamb-	*-pamb-
-higa	'cooking stone'	-higa	-higa	*-piga
-hiig-	'hunt'	-hiig-	-hiig-	*-piig-

But as the following examples show, the *p>h change was evidently implemented in a more thoroughgoing way in Sumbwa than in Sukuma or Nyamwezi:

Sumbwa		Sukuma	Nyamwezi	Proto-forms
-halik-	'marry second wife'	-palik-	-palik-	*-padik-
-hemb-	'light a fire'	-pemb-	-pemb-	*-pemb-
-hembe	'horn'	-pembe	-pembe	*-pembe
-hini	'handle'	-pini	-pini	*-pini
-hanga	'healthy, alive'	-panga	-panga	*-panga
-hol-	'cool down'	-pol-	-pol-	*-pod-
-hond-	'smash'	-pond-	-pond-	*-pond-
-huul-	'beat, pound'	-puul-	-puul-	*-puud-
-hi-	'get burnt'	-pi-	-pi-	*-pi-
-hiahia	'new'	-pia	-pia	*-pia

There are some items, however, that show that even in Sumbwa the *p>h change did not reach completion, e.g. -pilul- 'turn over (tr.)', -piluk- 'turn over (intr.)', -pe 'white', -pi 'black', -pandik- 'get', etc., although these might have been borrowed from a dialect that only partial underwent the change. At any rate, once the contrast between p and h was established after the *p>h change, it was probably not altogether eliminated, or if eliminated, was introduced later through borrowing, analogical or onomatopeic creations.

The weakenings in (B) above are: *b>ƀ and d>z. The first one is a common intervocalic process, analogous to p>Φ; it needs no further comment. The second one is a reflection of the processes of palatalization, depalatalization and deaffrication, which were discussed in chapter 6.

The weakening in (C) above represents the sonorantization of d, referred to in chapter 4. As noted there, it is an intervocalic process which is very common. In some languages (e.g. Rimi, a sister of Sumbwa), sonorantization also affected *t, which weakened to its corresponding trill, r (i.e. a voiceless trill).

7.3.2 Contrast, Frequency, and Restructuring

It is perhaps not possible to ascertain whether the contrast between /b, d/ and /ƀ, l/ was at a certain point completely eliminated and later restored through analogical changes, borrowing, or onomatopeic creations. What seems evident is that at a certain stage of development all the historically derived continuants contrasted with their corresponding stops and the intervocalic/postnasal alternation no longer represented a generalization. That is, the first part of the 'historical' rules was no longer valid:

$$8.\ (i)\begin{bmatrix} b \\ d \\ p \end{bmatrix} \dashrightarrow \begin{bmatrix} \text{ƀ} \\ l \\ h \end{bmatrix} /\ V(\#\#)\_\_V$$

$$(ii)\begin{bmatrix} b \\ d \\ p \end{bmatrix} \qquad \text{Elsewhere}$$

The first part of the rule was valid before there were exceptions to it. But once exceptions to the rule developed (through morphological levellings, borrowings, onomatopeic formations, etc.) the 'intervocalic/postnasal' alternation became opaque, and thus could no longer be reflected by a general rule. Even so, there was still a generalization to be captured: the non-occurrence of the relevant continuants in the postnasal position. This generalization was captured by a rule which (1) restricted the domain of the historical rule and (2) was the inverse of the historical rule. Instead of the 'intervocalic/postnasal' alternation, there was now the 'root-initial/postnasal' alternation, which was expressed by the new inverse rule. It is assumed that it was mainly the predominant frequency of the continuant alternates in the speech of adults to children learning the language that made it possible for continuants to be posited as underlying, deriving the stops from them. (At the same time there were underlying b's, d's, and p's to which the new rule did not apply.)

This process of rule restructuring may have taken more than one generation to get implemented, but when it did reach its logical conclusion, it was a partial rule inversion:

$$9.\ (i)\ \begin{bmatrix} b \\ l \\ h \end{bmatrix} \text{--->} \begin{bmatrix} b \\ d \\ p \end{bmatrix} /\ N\_\_$$

$$(ii)\ \begin{bmatrix} b \\ l \\ h \end{bmatrix} \quad \text{Elsewhere}$$

It is interesting to note that what started as a historical retention of stops after N__ was reanalyzed as a synchronic strengthening, as the above rule shows. This, of course, points to the ahistorical characteristic of synchronic grammars: that is, in the acquisition of language, children develop grammars on the basis of the synchronic data presented to them by their adult models, regardless of the history of the adult grammars.

What is interesting though is that of the three rules in (10), only b--->b/N__ and l--->d/N__ are still productive; h--->p/N__, as noted before, has all but been eliminated from the Sumbwa grammar -- except in the items specified (cf. 7.1.3). The loss of this alternation is discussed in the following section.

7.3.3 The loss of the h/p alternation[1]

With the exception of the few relic items noted in section 7.1 in connection with the h/p alternation, /p/ and

/h/ show the following distribution:

A. (i) V(##)pV (ii) N-p --->[mp]

B. (i) V(##)hV (ii) N-h --->[h̃]

The evidence, as presented in 7.3.1, shows that *p>h, and in 7.3.2 an inverted rule, *h--->p/N__, is reconstructed. This rule may be assumed to have been productive at one one. If these reconstructions are correct, then the current situation as noted in A and B above suggests that the h/p alternation underwent levelling, in favour of h (i.e. B above). The relic items (cf. 7.1) are indicative of the fact that such levellings leave residues behind which are useful in reconstruction.

An interesting question here is why levelling occurred in the case of h/p, but not in the case of l/d and b/b. We shall now address this issue.

Levelling is part of a larger issue of rule loss. After a rule is added to a grammar, it goes through some changes, just like anything else. If it is still a 'natural rule' (i.e. a phonetically transparent rule) it may continue to exist as a productive rule which may apply to all the relevant forms in the language, to new creations and to borrowings. But after losing its phonetic transparency (through telescoping and/or morphologization), the rule is subject to analogical pressures to restore paradigm uniformity (cf. Vennemann 1972b:200). It may get eliminated from the grammar as it passes from generation to generation of language learners if the analogical pressures are not counteracted by some other factors (e.g. complete morphologization of the alternations, cf. the case of the Sumbwa l/z alternation or Sukuma l/j alternation discussed in chapter 6).

Now, how does the above relate to the h/p alternation as opposed to l/d and b/b? Notice that h/p is not a phonetically transparent alternation. The phonetic difference between them is great: one is glottal and continuant, the other bilabial and a stop. Thus although the historical rule p--->h/V(#)_V is somewhat plausible (i.e. the intervocalic environment can 'explain' the continuancy in h), the inverted rule h--->p/N__ is not plausible at all. Its output, p, cannot be 'predicted' from the input, h, in the stated environment. There is, of course, a reason for this: *p--->h/... is a telescoped rule, with the following steps: *p>p^h>h. Conversely, l/d and b/b are phonetically transparent alternations: the outputs of both the historical and the inverted rule can be predicted from the inputs and the environment. It is probably due to the high level of opacity (reflected by the lack of 'predictability' of the output from the input and the environment) that caused the h/p alternation to be levelled while the other alternations are still productive.

7.4 Summary of the reconstructed stages:

Stage 1: Uniform symbolization: *b/b, *d/d, *p/p. At this stage the first person singular marker is *ni, and the Class 9/10 prefix is *ni.

Stage 2: Simplification of first person marker, and Classes 9 and 10 prefixes by syncopation: *n-, *n-, *n-.

Stage 3: Intervocalic Weakening: *b/ƀ, *d/l, and *p/h. Stops retained after *n-.

Stage 4: Rule inversion: Since continuants are more frequent in running text and paradigms, and are therefore more salient than stops, children acquiring language start positing them as basic. Once this happens, the only generalization of consequence becomes the root-initial/postnasal one, that is: b/ƀ, l/d, h/p. Thus intervocalic weakening and restructuring (continuants becoming basic) result in a situation whereby postnasal stops (retained historically) are interpreted as 'strengthened' segments.

Stage 5: Levelling in h/p.

7.5 Conclusion

In this chapter a case for rule inversion has been presented. Synchronically, an 'inverted' rule is just like any rule (whether phonological or morphophonological), and may thus be productive or un-productive. The base and the derived forms are established by using the usual principles of analysis used in a rule-based grammar: contrast, frequency of occurrence, and probably simplicity. In the rule inversions discussed here, the main factor does not seems to be semantic basicness; frequency of occurrence seems to be more salient.

It should be noted here that rule inversion is by no means restricted to Sumbwa among Bantu languages. There are other cases that have been reported in the literature: for instance, Vennemann 1972c reported some rule inversions in Fe?fe?-Bamileke, and Hinnebusch reported some rule inversions in Pokomo, Giryama, Mijikenda (1973:175-83) and Kamba (1974). Besides, inspection of the morphophonemic alternations in the literature indicate that this phenomenon is apparently widespread in Bantu. A few examples here will do: (1) Nyamwezi and Sukuma have the inverted rules ƀ--->b/N__ (e.g. -ƀazu/N-bazu 'rib(s)'), l--->d/N__ (e.g. -lulu/N-dulu 'bitter'). (2) Rimi has the inverted rules: Φ--->p/N __(e.g. -ΦeΦo/N-p^{h}eΦo 'cold'), r--->t/N__ (e.g. -rem-/N-tema 'cut/I cut'), ƀ--->b/N__ (e.g. -ƀaru/N-baru 'rib(s)'), r/l--->d/N__ (e.g. -rimi/N-dimi 'tongue(s)'), ǥ--->g/N__ (e.g. -ǥohe/N-gohe 'string(s)') -- cf. Nurse 1979a:38-9). (3) Ha has the rules: ƀ--->b/N__ (-ƀwa/iN-bwa 'dog'), h--->p/N__ (e.g. -hene/iN-pene 'small goat/goat'), l--->d/N__(e.g. -limi/iN-dimi 'tongue(s)'). (4) Haya has the following inverted rules: l--->d/N__ (e.g. -luma/N-duma 'bite/I bite) and h--->p/N__ (e.g. -ha/N-pa 'give/I give'), although there is an on-going h--->Ø/V(##)__V change in some dialects. (5) Kongo has the inverted rules: ƀ--->p/N_ (e.g. -ƀa/N-pa 'new') and l--->d/N__ (e.g. -la/N-da 'long'). The list could go on: we could give examples from Shambaa (Nurse 1979a:93), Pedi (Meinhof 1932:58-81), etc. The main point here is that, given a rule-based model of language, and thus a 'rule change' view of phonological evolution, rule inversion appears to have been part of the prehistory of quite a few Bantu languages. Obviously, each of the above-mentioned languages has to be investigated to see if the internal and comparative evidence support the claim of rule inversion.

Notes

1 I would like to report that, according to the data in Munongo and Grevisse, n.d., this alternation has completely been lost in Kiyeke, the Sumbwa dialect spoken in Katanga, Zaire. In this dialect, instead of /u-n-pe/[uumpe] 'give me', there is /u-n-he/ [uuh̃e].

Chapter 8

Some developments involving the perfective stem

8.0 Introduction

The allomorphs of the Sumbwa perfective morpheme are: -ile, -e, -izye, and -iCwe = {-iƀwe, -ilwe}, which may be exemplified as follows:

(a) -tem-/-tem-ile 'cut',
-fum-/-fum-ile 'come out/from'
-lim-/-lim-ile 'cultivate'

(b) -sakal-/sakeel-e 'get worn out by disease'
-sendam-/-sendeem-e 'lean against'
-kolol-/-koloel-e 'cough'

(c) -temeesi-/-temeesi-izye 'cause to cut'
-limiisi-/-limiisi-izye 'cause to cultivate'
-liisi-/-liisi-izye 'feed'

(d) -liisi-ƀw-/-liisi-iƀwe 'be fed'
-gumi-ƀw-/-gumi-iƀwe 'be made firm'
-lim-w-/-lim-ilwe 'be cultivated'
-tem-w-/-tem-ilwe 'be cut'
-las-w-/-las-ilwe 'be shot with arrow'

As illustrated, the -izye allomorph is used with the causative form, while -iƀwe and -ilwe are used with the passive. In this chapter, we shall be concerned with verbs which take -e in the perfective stem, such as -sakal-/-sakeel- in (b), which were described in chapter 3, section 3.2.4.2.3. Our aim is to reconstruct the evolution of the root-internal alternation.

The data to be accounted for are presented in section 8.1. Section 8.2 deals with previous treatments of the issue, and section 8.3 the evolution of root-internal alternation in the verbs in question. Section 8.4 looks at the evidence from other Bantu languages, and section 8.5 is a summary of the chapter.

8.1 The Data

Consider the following data showing two phonological forms of each verb, the common root and the perfective root (cf. also chapter 3, section 3.2.4.2.3):

(f) -sakal-/-sakael-e 'get worn out by disease'
-bomol-/-bomoel-e 'pull down'
-lamul-/-lamuil-e 'settle a dispute'
-egelel-/-egeleel-e 'approach'
-ingil-/-ingiil-e 'enter'

(g) -lagan-/-lagaen-e 'agree'
-sangan-/-sangaen-e 'meet'
-tumam-/-tumaem-e 'work'
-gaɓan-/-gaɓaen-e 'share'
-fukam-/-fukaem-e 'kneel; menstruate'

(h) -guluk-/-guluik-e 'fly, jump'
-piluk-/piluik-e 'alter (intr.)'

-salag-/-salaeg-e 'make an incision'

-hulik-/-huliik-e 'be silent'

-kalab-/-kalaeb-e 'wash one's hands'

The minimal stem structure showing such alternation is: -(C)V(N)CVC-. Examples in (f) end in l, those in (g) in a nasal, and those in (h) in other consonants. In the perfective forms the vowel sequences oe and ui are subject to the rules of gliding and lengthening described in chapter 3; thus: /bomoel-e/-->[bomweele] 'has pulled down', /lamuil-e/-->[lamwiile] 'has settled a dispute', while the vowel sequence ae is subject to the rule of vowel assimilation, i.e. /ae/-->[ee]. It should be noted that the root-internal alternation is a very productive phenomenon. The rule that was formulated in chapter 3 to take care of these alternations is:

$$[\ldots V_i C\text{-}]_{Verbroot} \text{-->} [\ldots \underset{\langle -hi \rangle}{V_i} \quad \underset{\langle e \rangle}{i} \quad C\ \text{-}]_{Perf.}$$

Exceptions to this rule are:

(i) -kulung-/-kulung-ile 'make smooth and round (e.g. pot)'

-kalang-/-kalang-ile 'fry'

-kuming-/-kuming-ile 'gather, assemble'

-kalamunk-/-kalamunk-ile 'dry, e.g. after rain'

-selemb-/-selemv-ile 'purge'

-ihimp-/-ihimf-ile 'become short'

The exceptions all end in NC. Root-final post-nasal b and p alternate with v and f, respectively, in the perfective form.

The task which faces a historical linguist here is to reconstruct the source and development of the alternation, and if possible account for the exceptions.

8.2 Previous Approaches

But before addressing the issue of the source and development of the above perfective forms, we need to look at how Bantuists have treated similar forms in other Bantu languages.

We shall here present views of three Bantuists: Meinhof 1932, Berger 1937-38, and Mould 1972.

8.2.1 Meinhof 1932

Meinhof was probably the first scholar to deal with the problem. He never systematically dealt with it but in his surveys of the historical phonologies of some Bantu languages the mutations in the perfective stem attracted his attention. He tried to explain the majority of these forms within what we shall here refer to as the 'transposition theory' (cf. p. 16; 150). Let us illustrate this theory by using Meinhof's own examples. Consider the following:

-eluph-/-eluiph-e 'be white' (Konde; p. 16)

-ap'ar-/-ap'er-e 'put on a garment' (Pedi; p. 78)

(cf. Sumbwa -ambal-/ambeel-e 'put on a garment'.)

According to Meinhof, the perfective form for 'be white' developed as follows:

Stage 1:	*-eluph-ile	
Stage 2:	*-eluph-ie	Loss of <u>l</u> in <u>-ile</u>
Stage 3:	*-eluiph-e	Transposition: *ph-ie> iph-e
	/eluiph-e/	

And the perfective form for 'put on a garment' followed the following scenario:

Stage 1:	*-ap'ar-ile	
Stage 2:	*-ap'ar-ie	Loss of <u>l</u> in <u>-ile</u>
Stage 3:	*-ap'air-e	Transposition
Stage 4:	/-ap'er-e/	Vowel fusion

Transposition is by no means the only mechanism Meinhof uses to explain reduced forms of the perfective. To explain some forms, for example, he assumes analogy to have been at work; he also assumes assimilation, loss of <u>i</u> in <u>-ile</u>, and contraction. For instance, he assumes Pedi <u>-eme</u> (the perfective of <u>-em-</u> 'stand') to have developed on analogy with forms like <u>-slak'ane</u> (the perfective of -<u>slak'an</u>- 'meet'; <u>sl</u> represents a voiceless lateral fricative) which in turn developed as follows:

Stage 1:	*-slak'an-ile	'have/has met'
Stage 2:	*-slak'an-ine	Assimilation: *l>n/N__
Stage 3:	*-slak'an-ne	Fall of <u>i</u> in <u>-ine</u>
Stage 4:	*-slak'ane	Contraction: *nn>n

(cf. Sumbwa -<u>sangan</u>- 'meet'; perfective: -<u>sangeen-e</u>).

8.2.2 Berger 1937-38

Another scholar, Paul Berger, made the perfective form the topic of his dissertation titled "Die mit B. -ile gebildeten Prefektstaemme in den Bantusprachen" (i.e. "How perfect stems with Proto-Bantu *-ile are formed in Bantu Languages"). Using data from Herero (85-91), Ndali (91-96), Gikuyu (96-103), and Yao (103-122), he describes the synchronic distribution of the perfective allomorphs, and also gives diachronic rules to account for the discrepancies from *-ile. He basically follows Meinhof's approach to the problem.

Of the four languages he deals with, only Herero does not show root-internal alternation. The perfective morpheme in the language is realized by two basic allomorphs, -ile and -ilue (passive perfect). Two rules, stated below, take care of additional variation:

1) Vowel Lowering $\text{i} \text{---}> \text{e} / \left\{ \begin{array}{c} \text{e} \\ \text{o} \\ \text{a} \end{array} \right\} \text{C}\_\_$

2) Assimilation: l--->n/N__

Thus the only changes that have occurred in Herero in regard to the perfective are those represented here in (1) and (2). An example of a derivation utilizing both rules (not all forms utilize both rules) is:

*-sembam-ile	(cf. -sembam- 'be straight')
*-sembam-ine	Assimilation l--->n/N__
-sembam-ene	Vowel Harmony

The two rules are not ordered at all.

The other languages Berger investigates show root-internal alternation in some polysyllabic verbs; some examples are:

Ndali: -sekel-/-sekiil-e 'laugh about'
-ongel-/-ongiil-e 'increase'
-ikal-/ -ikiil-e 'sit down'
-fikil-/-fikiil-e 'arrive at'

Gikuyu: -gurir-/-guriir-e 'buy for'
-ikar-/ -ikair-e 'stay'
-rakar-/-rakair-e 'be angry'
-ringan-/-ringain-e 'be equal with'

Yao: -jegam-/-jegem-e 'lean'
-kotop-/-kotuep-e 'become beautiful'
-taun-/-tauin-e 'chew'
-gumbal-/-gumbel-e 'become full'

(All the data are from Berger's study).

There are other allomorphs of the perfective in these languages, but since they are not relevant to the problem dealt with here, they will be excluded from consideration. Let us now see how Berger explains the alternations in the verbs.

As noted earlier, Berger basically follows Meinhof's approach whose main feature is the transposition theory. In dealing with the relevant Yao forms, Berger asserts that the development of above forms (e.g. -ongiile 'have increased' from *-ongel-ile) "... nicht unter Ausfall des l zwischen e und i, sondern durch Transposition des perf. i unter Aufgabe des l der Perfektendung *-ile entstanden seien" (p. 95) [...did not arise through the disappearance of l between e and i but through transposition of perf. i under the direction of l of the perfect suffix *-ile]. On this view, the diachronic derivation of -ongiile from *-ongel-ile would look something like:

*-ongel-ile	'have increased'
*-ongeil-le	Transposition
*-ongei-le	l-Absorption
-ongiile	Regressive Assimilation

l-Absorption is probably not a rule; the juxtaposition of l with l may automatically result in one l in a language which does not have long consonants. Transposition is chronologically ordered in respect to other rules. Notice that although Berger espouses Meinhof's transposition theory, there is a slight difference between them: Meinhof allows the l in -ile to drop out before transposition, while Berger assumes transposition to be "under the direction of l of the perfect suffix *-ile".

Of the languages he investigates, Gikuyu seems to provide direct evidence for the transposition theory:

> Das Gikuyu laesst uns die Transposition des perf. i einwandfrei erkennen, waehrend wir fuer das Ndali noch im Zweifel sein konnten, ob nicht doch in der Regel blosse Assimilation des Vokals des vorhergehenden Silbe an das perf. i vorlaege. (p. 102).

[That is, Gikuyu allows us to discover with certainty the Transposition of the perfective i, which was still in doubt in Ndali, and is certainly not merely a rule of vocalic assimilation of the preceding syllable on the perf. i next to it.]

Thus a Gikuyu perfect form such as -rakaire (cf. -rakar- 'be angry') is assumed to have evolved as follows:

*-rakar-ire

*-rakair-re Transposition

-rakair-e r-Absorption

Berger insists that it is not the root-final r (or l depending on the language) that drops out; transposition is the main mechanism here:

> Aehnlich wie fuer das Ndali wird man auch fuer das Gikuyu anzunehmen haben, dass in Perfekten ... nicht das l vor der Perfektendung -ile ausgefallen ist, sondern dass das perf. i ueber dieses l unter Aufgabe des perfektischen l in das Verb transponiert wurde (p. 102).
> [As in Ndali, so also in Gikuyu, in perfect forms... it is not the l before the perfect suffix that falls out but that perf. i becomes transposed over this l under the direction of perfective l.]

Berger says basically the same thing in the section on Yao. One quote will do:

> Werden Perfekta von mehr als zweisilbigen Verben gebildet, dann dringt in der Regel das pref. i - offenbar unter Aufgabe des perf. l - in das Verb ein, und das schliessende perf. e wird beibehalten; so wird z.B. das Perfekt *-taunile zu -tauine geworden sein (p. 108)
> [In verbs of more than two syllables, the rule is that the perf. i intrudes into the verb - obviously under the direction of perf. l - and the final perf. e becomes attached to the verb; thus, *-taunile becomes -tauine] (cf. -taun- 'chew').

We may conclude that Berger differs only in minor details from Meinhof in his use of the transposition theory.

8.2.3 Mould (1972)

Another scholar who has dealt with the perfective form is Mould. In his paper, he is interested in accounting for the changes that have taken place in the perfective suffix (or modified base, as it is sometimes called). He uses data from Bemba, Rundi, Ganda, and Ankore, and attempts to reconstruct ordered diachronic rules for each of the languages. Such rules include Vowel harmony, Gliding, and other assimilations and reductions, but we are not specifically interested in them here. What we are interested in is what Mould has to say about how the following examples originated and developed:

Bemba: -ikal-/-ikeel-e 'stay'
-onon-/-onween-e 'remove from trap'
-kutuluk-/-kutulwiik-e 'remember'
-ikat-/-ikeet-e 'seize'
-ipay-/-ipeey-e 'kill'
(cf. Mould 1972:109; Givon 1970:48)

Ankole: -ikar-/-ikair-e 'wait a while
-goror-/-goroir-e 'straighten'
-fumur-/-fumwiir-e 'pierce'
-hakan-/-hakain-e 'dispute'
-tyootyooz-/-tyootyooiz-e 'interrogate'
(cf. Taylor 1959; Mould 1972:110ff.)

Mould, incidentally, is not very clear on this issue since it is not the main focus of his paper. However, in the conclusion of his paper, he offers some suggestions as to the origin of the vocalic alternations we are talking about. He offers two suggestions.

The first suggestion is that the alternations began in Proto-Bantu in polysyllabic stems ending in /l/ (or /r/ in some languages) (p. 124). But since Mould does not state explicitly what happens to the /l/, let alone illustrate, it can be assumed that what he meant was the loss or modification of /l/. Mould continues: "Once this change took place it was possible for individual languages later to generalize it to include additional environments" (p. 124). In Ankole, for instance, the change was extended to /n/ and /z/; in Bemba it was extended to /t/ and /k/. However, it is not suggested whether the 'spreading' was based on phonetic analogy (i.e. a phonetic change extending its environment on the basis of phonetic reasons) or conceptual analogy (i.e. a change extending its environment due to pressures from the meaning end of language).

Mould's second suggestion represents what will be called here the 'copying theory'. Mould bases his theory on some data from Kihungan which show alternation in base-perfective forms, such as: -<u>buk</u>-/-<u>buikir</u> 'cure'. According to this theory, the forms above, e.g. Ankole -<u>ikaire</u> began "...as a copying of /i/ ... across the final stem consonant, followed in most languages by deletion of the original ...*i*..."(p. 125). Now, this idea (unlike Mould's first idea) is explicit, and is easy to illustrate. On this view, the form *-ikaire* (Ankole), might have evolved as follows:

Stage 1	*-ikal-ile	
Stage 2	*-ikail-ile	Vowel Copying
Stage 3	*-ikail-le	Loss of *i* in *-ile*
Stage 4	*-ikail-e	*l*-Assimilation
Stage 5	*-ikair-e	*l>r

8.2.4 An Assessment of the approaches

In this section we briefly comment on the 'transposition theory' and Mould's views on the origin of the perfective.

8.2.4.1 The Transposition Theory

The initial plausibility of this theory is based on 'appearances'. That is, the *i* of *-*ile* 'appears' to be transposed over the root-final consonant (into the verb-root) in the surface forms of the perfective forms in question, and it is this surface fact that has probably made some linguists conclude that 'transposition' must be the mechanism that caused this change. Beyond this surface plausibility, there seems to be no evidence to support the theory.

It is appropriate to ask what types of evidence, other than 'appearances', would strengthen the 'transposition' hypothesis. The hypothesis would at least be plausible if there were some independent evidence in the different Bantu languages to support it. True, among the languages of the world there are some that have historically undergone transpositions, of consonants or vowels. Meinhof 1932:16 mentions "Hamitic", with respect to consonantal transpositions. Anttila 1972 mentions Rotuman (an Oceanic language)--p.63-4, Slavic and Ilocano (in the Philippines)--p. 75. Kasem has also been analyzed as having undergone transpositions (SPE, 358ff). Bantu languages are apparently not among languages which have undergone extensive transpositions, and Meinhof says as much (op. cit.). The few transpositions that occur sporadically in Bantu seem to proceed on a CV syllable basis. That is, it is whole CV syllables that get transposed, not vowels. Some sporadic examples include: Haya *-gaban->-bagan- 'share, divide'; Ilamba variants -khakhuph-/-khaphukh- 'be/become hard', -khathaph-/-khaphath-/-phakhath- 'be/become bad, rotten', etc. (cf. also Meinhof 1932:16).

The notion of independent evidence is crucial in arguing for the plausibility of any change. If a change is assumed to be widespread enough (like transposition is supposed to be) it must be shown to occur or to have occurred elsewhere other than the putative context. In the case of transposition, it must be shown to have occurred in phonetically identical environments other than the perfective forms. For instance, why not transposition in initial or medial position? Inspection of the various Bantu handbooks and grammars does not seem to promise much as far as independent evidence for the transposition hypothesis is concerned.

8.2.4.2 Mould's views

As noted already, Mould has two suggestions about the origin of the allomorphy in the perfective: (1) modification or change of root-final l, which later spread to other root-final consonants; (2) the copying theory. Mould does not make his first suggestion explicit; he does not illustrate how this idea might be applied to the forms in question. As we shall see below, this idea might actually be developed into a plausible explanation of the allomorphy in question.

As for the copying theory, it raises serious questions about the concept itself as a possible mechanism of phonological change. Mould does not deal with this problem (since this is not his aim), and the issue of the nature of copying, its validity, and its place in the typology of mechanisms of change. Using the limited Kihungan data to introduce the concept of 'copying' does not help much. In our view, it is does not serve any useful purpose to formulate a diachronic hypothesis on the basis of a limited set of data as Mould does. The apparent 'copying' of i in the verb-root could have been a result of any number of causes, including analogy, borrowing, etc.

but any putative cause must be supported by internal analysis, comparative evidence, and some universal tendencies. Obviously, this was not Mould's intention.

8.3 A diachronic analysis of the root-internal alternation

In this section we propose a diachronic analysis of the alternation in question using two mechanisms: sound change and analogy. We shall first propose the analysis, then give reasons why we think such an analysis should be preferred to other alternative analyses.

8.3.1 The analysis

We have already said that our analysis utilizes an idea suggested but not developed by Mould. The idea is that the changes in the perfective evolved as follows: root-final l's and final l's in prepositional roots dropped out, and the changes spread to other consonants in some languages. The idea as stated by Mould is vague, but we shall develop it below with some examples from Sumbwa and other Bantu languages.

The 'modification' or 'change' of l suggested by Mould is part of what we refer to here as the 'sound change' part of the analysis; the 'spread' of the change is the 'analogy' part.

Let us now consider some examples of root-final and prepositional l's.

A. Root-final l's:

Sumbwa	Gikuyu	Ankore
-ikal-/-ikeel-e	-ikar-/-ikair-e	-ikar-/-ikair-e
-kolol-/-koloel-e	-rungar-/-rungair-e	-koror-/-koroir-e

B. Prepositional l's:

-gulil-/-guliil-e	-gurir-/-guriir-e	-gurir-/-guriir-e
-limil-/-limiil-e	-noger-/-nogeir-e	-rimir-/-rimiir-e

The glosses are: A. ikal-/-ikar-...'live, stay'; -kolol-/-koror- 'straighten'; -rungar- 'become straight'; B: -gulil- ...'buy for'; -limil-/-rimir- 'cultivate for'; -noger- 'become tired for'.

In the analysis we are proposing here, the first step in the evolution of the perfective forms was the dropping out of the final l's; other modifications followed after this step had been accomplished. Examples of derivations will help clarify this point. Consider:

A. Root-final l's:

	Sumbwa	Gikuyu	Ankore	
Stage 1	*-ikal-ile	*-ikar-ire	*-ikar-ire	
Stage 2	*-ika -ile	*-ika -ire	*-ika -ire	Loss of l/r
Stage 3	*-ikeele	---	---	Assimilation
Stage 4	-ikeel-e	-ikair-e	-ikair-e	Reanalysis

B. Prepositional l's:

Stage 1 *-gulil-ile *-gurir-ire *-gur-ir-re

Stage 2 *-guli-ile *-guri-ire *-gur-i-ire Loss of l/r

Stage 3 -guliil-e -guriir-e -guriir-e Reanalysis

Stage 1 in A and B represents the Pre-Sumbwa, Pre-Gikuyu, and Pre-Ankore forms. Stage 2 represents a period when root-final and prepositional l's were dropped. Stage 3 in A represents a period in which assimilations such as those seen in Sumbwa and Bemba (examples of which were cited earlier) were accomplished. (This shows that languages like Sumbwa and Bemba are ahead of languages like Gikuyu and Ankore in this respect). Reanalysis here represents a restructuring of the different forms such that we get a perfective/non-perfective distinction which will have to be represented as a productive morphophonemic rule. There is an additional allomorph of the perfective morpheme, -e, which is also the product of the changes.

Now, a question may be asked whether the rule of l-drop began in the base or the prepositional roots. In our view, it seems that the forms most likely to drop their l first are those with a sequence of l's, that is prepositional forms. Consider forms such as Pre-Sumbwa *-gulil-ile 'have bought for', -ikalil-ile 'have sat on/for, stayed for', etc. In these forms there is a sequence of three l's. In such a situation, the probability of one l dropping out is very high, especially if there is no danger of disrupting the grammatical distinctions involved.

We shall now consider the question of how the change spread to roots which end in other consonants. Such a spread can be assumed to be through analogy - specifically proportional analogy. Such analogy might have started to operate probably after the old perfective forms (e.g. Pre-Sumbwa *-<u>ikalile</u> 'have sat down') had been ousted by the new forms (e.g. *-<u>ikaile</u>). It is the new perfective forms that provided the basis for the proportional analogy. The following Sumbwa examples illustrate some of the 'analogizing' that might have gone on:

A. *-ikal- : -ikaile 'sit, stay'

   *-taagan-: X 'go separate ways'

   X = *-tagaine (cf. Modern form: -tageene)

B. *-hulul-: -huluile 'strip leaves'

   *-guluk-: X

   X = -guluike

   Phonetic form: [gulwiike]

C. *-kolol- : -koloile 'cough' (Modern form: [kolweele])

   *-gotok- : X 'return from work, e.g. farmwork'

   X = -gotoike

   Modern phonetic form: [gotweeke]

D. *-imilil- : -imiliile 'stand'

   *-hitilizi-: X 'go beyond (a limit)'

   X : -hitiliizye

E. *-egelel- : -egeleile 'come near'

*-gelek- : X 'add on top'

X = -geleike

These analogical reformations can be summarized as the following rule:

$$[\ldots V_i C-]_{Verbroot} \rightarrow [\ldots V_i\ \underline{i}\ C\ -]_{Perf.}$$

This rule, which produced forms like the ones found in Ankore (e.g. -ikaire 'has stayed') and Gikuyu (e.g. -rakaire 'has been angry'), was modified later by the rule of high vowel lowering, stated as follows:

$$V > [-hi] / \underset{[-hi]}{V}\ \_\_$$

This rule applied in the sequences *oi, *ai, *ei with the results: oe, ae, ee. o in oe is subject to gliding which is accompanied by lengthening of the second vowel, thus: oe-->wee; a in ae assimilates, thus: ae-->ee. This is the situation as it is now in Sumbwa. The morphophonemic rule for capturing the alternations in base/perfective forms has been given as (cf. chapter 3 and the beginning of this chapter) the following synchronic rule:

$$[\ldots V_i C-]_{Verbroot} \rightarrow [\ldots \underset{\langle -hi \rangle}{V_i}\ \underset{\langle e \rangle}{i}\ C\ -]_{Perf.}$$

This rule differs from the historical rule in that instead of producing *oi, *ai, *ei, it produces oe, ae, and ee. These sequences act as input to the phonological rules of gliding and vowel assimilation.

A similar rule, stated as:

$[\ldots C-]_{root} \text{--->} [\ldots VC - e]_{perfective}$

was used by Givon 1970:47 as a synchronic rule, and by Mould 1972:109ff in his 'rule-ordering' approach to some changes affecting the perfective stem.

Having described the way the changes that began in roots with final l's spread to other environments, we shall now turn our attention to the extent of implementation of the spread in some languages. It is readily seen that some languages differ as to the extent of implementation of the change. This difference is briefly noted by Mould 1972:124 but here we shall look at some Ankore and Sumbwa data and use the differences to infer the order in which the roots were affected, i.e. which final consonants were affected first, which followed, etc.

Consider these examples:

Sumbwa	Ankore
-sangan-/-sangeene	-bonan-/-bonaine
-galam-/-galeeme	-garam-/-garamire
-hitilizy-/-hitiliizye	-korez-/-koreize
--- ---	-kores-/-koreise
-kalab-/-kaleebe	-- --
-guluk-/-guluike	-guruk-/-gurukile
-salag-/-saleege	-- --
-kalang-/-kalangile	-irukang-/-irukangire

(Glosses are: -sangan- 'meet', -bonan- 'see each other', -galam-/-garam- 'lie on one's back', -hitilizy- 'go beyond (a limit)', -korez- 'feed baby with soft food', -kores- 'use', -kalab- 'wash one's hands', -guluk-/-guruk- 'jump', -kalang- 'fry', -salag- 'incise', -irukang- 'run fast'.)

In the above examples, roots with the following final consonants have been affected by analogical reformations in Sumbwa: n, m, z (actually written zi at the lexical level, and [zy] phonetically), b, g, and k. Roots with final Ng (and other NC sequences) are not affected. In Ankore only roots with final n, z and s (in a few cases) are affected. These data tell us the following about the spread of the reformation of the perfective stem:

1. Ankore is behind Sumbwa as far as this process is concerned;

2. In Sumbwa the change seems to have started with root-final l's and then spread to the two nasals which occur in root-final position (i.e. n and m). This is probably due to the phonetic closeness between l and the nasals. Next the change spread to zi; later it spread to the other points of articulation: labial b, and velar k and g. We think the spread to k is a later step by comparing Sumbwa with Ankore forms: here z is afftected but k is not.

3. In Ankore the change only spread in the alveolar region: n, z, and it now seems to be spreading to root-final s.

All in all, the spread of the changes shows two tendencies: one, it is partially controlled by the morphology in that only the perfective forms are involved; two, the spread proceeds on the basis of phonetic principles in that the sounds that are closer to l (either in point of articulation or sonorancy) seem to be affected first before others. In spite of the lack of direct evidence, the spread seems to have followed, in a subtle way, the sonority scale: l-->N-->z, b-->g, k, i.e. from l-final roots the pattern spread to nasals, fricatives, and then stops. The NC sequences, being stronger than single segments, have not yet been affected in Sumbwa, while the step from z to b to g, k has not yet been reached in Ankore. If this is true, then this subtle interaction between phonological and morphological factors needs to be further investigated in respect to the changes in question by bringing in more data from as many languages as possible.

8.3.2 Arguments for the analysis:

This section presents the arguments why we think the analysis presented has a high degree of plausibility, and is consistent with the facts. The arguments are: the phonetic argument and the typological argument.

8.3.2.1 The phonetic argument:

Phonetically, the loss of l before -ile should not cause any surprise; it is a natural change. The naturalness of the change has to do with the phonetic relationship between l and i, which has already been investigated both articulatorily and acoustically. As noted by Essen 1964, it was the phonetician Daniel Jones that investigated the articulatory relationship, which was found to be very close. Reporting Jones' findings, Essen says: "Clear l ... contains an [i]-component, which can easily be understood by the fact that 'in clear varieties of [l] there is a raising of the front of the tongue in the direction of the hard palate (in addition to the tongue-tip articulation)', the body of the tongue thus approaching the position which is used for pronouncing an [i]-sound." (p. 54) Thus from this point of view, if an l drops before i it may easily have been assimilated to the i.

In addition, acoustic investigations have been made to determine the acoustic relationship between l and i (cf. Essen 1964:55-8). These investigations have shown that the two sounds are acoustically very close, that is, they are acoustically similar. As such it is possible for clear l to change to i or to assimilate to it.

Given this articulatory and acoustic relationship between l and i, it may be added that, in Pre-Sumbwa forms such as *-gulil-/ -gulil-ile 'buy for/have bought for', -ingil-/-ingil-ile 'enter/have enterred', the i between the two l's and the l between the two i's must have been perceptually very weak. This, of course, is an additional point in favour of mutation rather than transposition.

In view of these facts, we may say that the analysis we have proposed has a very solid phonetic base.

8.3.2.2 The typological argument:

This argument has to do with the fact that the diachronic rule type of l-loss (or *d>l>Ø if one starts from the Proto-Bantu forms) was apparently widespread in Bantu prehistory. Some examples are:

1. l-loss in Class 5 Noun prefix li (especially before consonant-initial roots) is a common Bantu change (cf. Guthrie 1971:30-64; Hinnebusch 1973:65ff).

2. l-loss before i has been observed in other contexts too; consider these examples:

Sumbwa	Ganda	Ankore	Haya	Swahili	
u-line	u-lina	o-ina	o-ina	u-na	'you have'
a-line	a-lina	a-ina	a-ina	a-na	's/he has'
tu-line	tu-lina	tu-ina	tu-ina	tu-na	'we have'
mu-line	mu-lina	mu-ina	mu-ina	m-na	'you (pl.)...'

In these examples, u-, a-, tu-, m(u)- are pronominal markers glossed as: 'you, s/he, we, you (pl)'; -li is the verb 'be' and -ne or -na 'with'. The evidence here points to the inference that all the languages had -li in the 'pre-forms'. Thus Ankore, Haya and Swahili have lost the l in -li; Swahili has also lost the following i.

3. l-loss in root-final position (in verbs) or in the final syllable (in nominals) has occurred in some Bantu languages, e.g. Swahili and Rimi:

Rimi	Swahili	Sumbwa	
-ingi-	-ingi-	-ingil-	'enter'
-guu	-guu	-gulu	'leg'
-jaa	-jaa	-zala	'hunger'
-xa-	-ka-	-ikal-	'sit, live'

As we can see here, l has been lost in Rimi and Swahili forms, but not in Sumbwa forms.

The point of the typological argument is that since Bantu languages have been losing l's in more than one environment, losing l in the perfective does not seem out of the ordinary. Here, unlike in the transposition theory case, there is independent evidence to support the changes affecting perfective l.

8.4 The perfective in Bantu

A survey of the Bantu grammar books or handbooks shows that the perfective form in *-ile is one of the few forms that has undergone some interesting changes. (*-ile is used here for convenience; the Proto-Bantu reconstruction is *-ide). What follows are statements summarizing the situation with respect to some of the few languages surveyed. The statements are only intended to indicate the complexity of the situation and also to show that the topic is certainly an important one for further investigation. (Only languages which the researcher felt had been described fully enough have been cited.)

A. The *-ile in some languages like Herero (cf. Meinhof 1910:113-41; Berger, op. cit.), etc. has only been modified through assimilations (cf. section 8.2.2 of this chapter).

B. In languages such as Sumbwa, Bemba, Sango (cf. Meinhof 1910:209-11; Heese 1919-20), etc. there seem to have been root-final l-drop in respective roots (followed by vocalic assimilations, etc.) in addition to later analogical spread of the new pattern.

C. In some languages, e.g. Soli (cf. Eeden), *-ile has been reduced to -i, which almost always assimilates to the preceding vowel (e.g. -balabon-i > [balabono] 'they have seen' (Eeden, p. 261). In others, e.g. Duala (Meinhof 1910:165), such reduction is restricted to roots of two syllables or more; in monosyllables, the suffix is -edi.

D. In some languages, e.g. Gikuyu, *-ile has mutated to -ire, ii, -ite and -e (in forms such as -rakar-/-rakair-e 'be angry'); the first three may occur with some roots, apparently without any difference in meaning, e.g. -nog-: -nog-ire, -nogii, -nog-ite 'have been tired'.

E. In some southern Bantu languages, e.g. Xhosa (cf. Jordan, 73-4), Zulu (Doke, 132-4, 334ff), we find the use of long and short perfect (in -ile and -e) which have been assigned specific pragmatic or grammatical context. This is apart from having alternations of the Sumbwa type, e.g. Xhosa -hlangan-/-hlangeene 'come together'; Zulu -thandan-/ -thandeene 'love one another'.

F. The *-ile in some languages has been lost altogether except for few relic words used in poetry. Examples here are: Swahili (Meinhof 1932:131; Lambert 1958:47-8) and Shona.

These are some of the situations that obtain. The statements given are necessarily partial; however, they indicate that there is still a lot that has to be explained from the diachronic point of view.

8.5 Conclusion

In this chapter we have proposed an analysis of the changes that have occurred in the perfective stems. The analysis has two components: phonetic change, i.e. loss of root-final or prepositional l's, and analogy, i.e. the spread of the new perfective pattern to forms ending in other consonants. Two arguments for this analysis are given; one phonetic, the other, typological. In section 8.4 a brief look at the reflexes of *-ile indicates that there is still a lot to be explained diachronically as far as the topic is concerned.

Chapter 9

Conclusion

This chapter summarizes the preceding chapters, points out the limitations of the investigation, suggests areas for further research, and states what the writer considers to be the contributions of the study.

9.1 Summary

The aims of the study, as stated in chapter 1, are: 1) to present a description of the diachronic phonology of si-Sumbwa, a West Tanzania Bantu language, and 2) to discuss issues having a bearing on this in terms of current thinking on reconstruction and diachronic phonological theory. Chapter 1 also deals with preliminaries such as the linguistic and geographical position of Sumbwa, the sources of the data used, matters of transcription, and the organisation of the study.

The theoretical and methodological assumptions are dealt with in chapter 2. The synchronic assumptions include: the no-order principle and a typology of rules which includes segment structure rules, syllable structure rules, phonetic realization rules (all of which form a class of phonological rules) and morphophonemic rules (productive and non-productive). In the section on diachronic assumptions, neogrammarian, structuralist (praguian and american), and transformationalist views are dealt with. The view of change adopted here is close to the realist views of natural generative phonology (cf. Hooper 1976). Internal and external factors involved in phonological change (articulatory, acoustic/auditory, language acquisition, borrowing, sociolinguistic factors) are discussed. Andersen's model (1973), based on abduction and deduction, is dealt with in connection with the issue of the rise of variation due to acoustic and perceptual factors. The last sub-section of the chapter is concerned with the methodological assumptions used in the study.

Chapter 3 presents the segmental phonology of Sumbwa, including: the phonological inventory (phonemes and distinctive features), the phonological rules (segment and syllable structure rules and phonetic realization rules) and morphophonemic (productive and non-productive) rules.

Chapter 4 is devoted to the stops vs. continuant issue in Bantu reconstruction. Methodological and theoretical principles such as frequency of occurrence, simplicity, phonetic and typological plausibility, etc. are brought to bear on this issue. It is concluded that: 1) in general, the analysis involving stop reconstructions appears more appropriate than that involving continuants, and 2) until and unless other better arguments are advanced by proponents of the continuant solution, it is more appropriate for all Bantuists to use stop reconstructions.

The reconstruction of voiceless stops, continuants, affricates, nasals and vowels for Proto-West Tanzania, Proto-Sukuma-Nyamwezi-Sumbwa, and also Pre-Sumbwa is presented in chapter 5. The chapter also deals with the reconstruction of distinctive features, segments structure rules, syllable structure of the Proto-Bantu and Proto-West Tanzania systems.

Chapter 6 is a survey of some important aspects of the evolution of the Sumbwa phonological system. Two important processes of change, palatalization and labialization, and the changes effected, are dealt with. Other changes dealt with here include those involving *j, *c, and *ny, and vowels.

Rule inversion is discussed in Chapter 7. Rule inversion is found to be a result of some other changes; it is not a mechanism of change as assumed by Vennemann 1972, Schuh 1972 or Leben 1974. An inspection of the Bantu grammars shows that rule inversion appears to have been a widespread phenomenon in Bantu.

Chapter 8 is concerned with some changes in the perfective stem. Previous approaches to these changes are discussed; there is no independent evidence to support one of the approaches (the transposition theory); the second approach, that of Mould 1972, is either inexplicit (the idea of the modification of l-final roots and the spread of the change) or questionable (the notion of copying). An explanation is proposed in terms of two mechanisms of change: phonetic change, and analogy.

9.2 Limitations of the Study

The following limitations in connection with this study may be noted:

A. Data Limitations:

1) Sumbwa Data: As noted in chapter 1, the researcher had to restrict the research to one dialect only, the Lunzewe dialect. However, even with this restriction the data problem didn't end, for the researcher had to rely on his own intuition to decide matters such as productivity, non-productivity, etc. (He was even unable to get access to Capus' Dictionaire which would have probably made the job easier). The only other dialect that the researcher had the time to investigate was the Ushilombo dialect, which is quite close to the Lunzewe dialect.

2) Data from sisters of Sumbwa: Data from Sukuma, Nyamwezi, Nilyamba, and Rimi was from the sources indicated, but was not enough in some cases and was by no means representative of all the dialects. It would have helped a lot if dialectal data had been available.

B. Descriptive Limitations:

Diachronic, unlike synchronic description has its inherent descriptive problems which may remain unsolvable. One of these problems is whether to attribute a change to internal (evolutionary) forces or to borrowing. In the case of Sumbwa and other Bantu languages, the situation is complicated by the fact that little, if anything, is known of the history of the speakers and their languages. In the context of this study, we have tried to explain most changes from the evolutionary point of view; borrowing has only been resorted to in a few cases where it was felt the evolutionary view would be arbitrary. Further investigation of this issue might, perhaps, reveal a different picture.

9.3 Areas for Further Research

This study may be expanded in the following ways. First, it may be expanded and modified by incorporating results of dialectal studies (which are not available yet) in Sumbwa and its sisters. Such expansion of the data base would ensure a more detailed and probably more accurate description. Second, certain topics dealt with in the study could be expanded both by examination of data from more Bantu languages, using more cross-linguistic evidence, etc. Such topics include, for instance: the stop vs. continuant issue (chapter 4), rule inversion (chapter 7), and the changes in the perfective stem (chapter 8). Third, the description of the synchronic and diachronic tonology of the language, taking into account all dialects, is another important topic. Fourth, a more difficult area for further research would be that of borrowing. It has been claimed by Nurse 1979a:28 and Nurse and Philippson 1980:47ff that Ha and Zinza have exerted some influence on Sumbwa lexically.

This could of course be further investigated, taking into account all the dialects; the changes dealt with in this study could also be investigated from the same point of view.

9.4 Contributions of the Study

The contributions of the study may be summarized as follows. First the study provides a diachronic phonological description of Sumbwa, apart from contributing to our knowledge of the segmental phonology. Second, the study contributes to Bantu comparative and diachronic studies by expanding the data base (in terms of the diachronic phenomena described). It also contributes to Bantu diachronic phonology by discussing some issues in Bantu reconstruction (chapter 4), rule inversion (chapter 7), and the changes in the perfective stems (chapter 8).

Finally, since the study is based on some current theoretical assumptions, the data and the issues dealt with should be of interest to non-Bantuist diachronic phonologists.

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