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Kinyambo prosody

Bickmore, Lee Stephen, Ph.D.

University of California, Los Angeles, 1989

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UNIVERSITY OF CALIFORNIA

Los Angeles

KINYAMBO PROSODY

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Linguistics

by

Lee Stephen Bickmore

1989

The dissertation of Lee Stephen Bickmore is approved.

Robert Delange

Carlos Otero

Hilda Koopman

Russel Schuh

Bruce Hayes, Committee Chair

University of California, Los Angeles

1989

Dedicated to my wife

HELEN REBECCA BICKMORE

TABLE OF CONTENTS

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The next one whom I wish to thank is Bruce Hayes, the chairman of my doctoral committee. As I began to search for a thesis topic he wrote me a letter in which he encouraged me to write up a description of a little-known language. He knew my strengths and weaknesses as a linguist and could somehow foresee that this course of action would prove to be the most profitable one for me. I not only thank him for putting me on the right track, but for helping me through the more arduous parts of the journey that followed. His high standards and expectations with respect to both content and clarity have forced me to greatly refine my research and writing styles. As a gross understatement, I am a better phonologist for having been exposed to Bruce's approach and having worked under his guidance.

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phonology/syntax interface. I also wish to thank Carlos Otero and Robert Delange as well for their time and efforts and the respective roles they played on my committee.

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Next, I am indebted to those (and I refer to them throughout the thesis where appropriate) who have compiled and analyzed data from Kinyambo's neighboring languages, especially Haya, on which the most work has been done of any language in the area. These existing accounts acted as a springboard for my own research and greatly simplified my task. In this regard, I wish to thank Larry Hyman with whom I have discussed this work in the most unlikely places.

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Though I am extemely appreciative of all the suggestions which I have received from both faculty and friends, I , of course, am responsible for any errors.

Part of chapter five of this dissertation will be published in Inkelas & Zec (forthcoming), *The Phonology-Syntax Connection*, Center for the Study of Language and Information, Stanford.

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PUBLICATIONS AND PRESENTATIONS

Bickmore, Lee S. (forthcoming a) "Trigger-target Distance Effects in Kinyambo" to appear in *Current Approaches To African Linguistics Vol. 6* (18th Conference on African Linguistics).

Bickmore, Lee S. (forthcoming b) "Branching Nodes and Prosodic Categories: Evidence from Kinyambo" to appear in *The Phonology-Syntax Connection*, edited by Sharon Inkelas and Draga Zec, Center for the Study of Language and Information, Stanford.

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Bickmore, Lee S. (1986) "The Lexical Phonology of Swahili", paper presented at the 17th Conference on African Linguistics, Bloomington, Indiana.

Bickmore, Lee S. (1985) "Hausa-English Code Switching", paper presented at the 16th Conference on African Linguistics, New Haven, Connecticut.

ABSTRACT OF THE DISSERTATION

Kinyambo Prosody

by

Lee Stephen Bickmore

Doctor of Philosophy in Linguistics

University of California, Los Angeles, 1989

Professor Bruce Hayes, Chair

This thesis examines the prosodic system of Kinyambo, a Bantu language spoken in northwestern Tanzania. This thesis constitutes the first linguistic treatise on the language in this century. I address three main issues. First I examine the syllabic structure of the language. I suggest that the compensatory lengthening facts arising from processes of devocalization, vowel elision, and prenasalization are neatly accounted for in a moraic framework under the assumption that Kinyambo preserves mora count.

The second and perhaps central claim of this thesis is that although phonetically Kinyambo is a tone language with a simple High/Low surface contrast, phonologically it is a stress language exhibiting metrical properties commonly found in other stress languages. I show that a rule of Beat Deletion is employed to resolve 'clashes', while a rule of Beat Addition resolves phrasal 'lapses'. I show that Beat Deletion exhibits 'trigger-target distance effects', its likelihood of application increasing the shorter the interval between the clashing elements. Finally, and perhaps most crucially, I argue that there is an underlying hierarchy of stress levels in Kinyambo. I show that a four-

way underlying distinction in stress levels accounts for the differing behavior of lexical roots with regard to the rules of the phrasal phonology.

Third, I define the domain of the rules I motivate in terms of the theory of the prosodic hierarchy. I suggest on the basis of the Kinyambo data that any cross-linguistic phonological phrase construction rule will have to take syntactic branching into account. I argue that there is a sub-word prosodic domain in Kinyambo that I call the 'phonological stem' which serves as the domain for several phonological rules. Lastly, I show that rule ordering cannot be predicted from the levels at which the phonological rules apply, as a bottom-up rule ordering could not generate the correct array of surface facts in Kinyambo.

Chapter One

Introduction

1.1 Background on the Kinyambo language

Kinyambo is a Bantu language spoken in the Karagwe district of northwestern Tanzania near Lake Victoria. It is estimated (by my consultant) to be spoken by some 500,000 speakers, many of whom also speak Swahili. According to Nurse's (1979) classification, Kinyambo is part of the Rutara subgroup of the Lacustrine branch of Bantu, as shown in (1) below.

(1) Genetic Classification (Nurse 1979)

Lacustrine:	North:	Nyanza, Luganda, Soga, Gwere
	Rutara:	Nyoro, Tooro, Chiga, Runyankore, Haya, Zinza, Kikerewe, **Kinyambo**
	Western Highlands:	Kirundi, Kinyarwanda, Ha, Vinza, Shibi Hanganza

I have come to find that there are different dialects of Kinyambo which differ in systematic ways. The data in this thesis has been compiled during elicitation sessions over the last three years (1986-1989) with Ruth Adewole, a native speaker of Kinyambo, currently residing in Los Angeles. Ruth is from the village of Yakahanga in the ward of Bugene, and it is her dialect that will be described in this thesis.

I had the opportunity to hold several elicitation sessions with another Kinyambo speaker, Gilbert Bonkobeza, who is from the village of Kishojo in the ward of Kihanga. Additionally, David Odden sent me some data which he elicited from Josephat Rugemalira who is from Northwest Karagwe, near the Uganda border. Ruth, Gilbert, and Josephat all appear to have systematic differences in their speech, particularly in their phrasal prominence patterns. Finally, Ruth's father made a

recording for us of a meeting which involved Kinyambo speakers from differing areas within Karagwe. Ruth said that the speech of the different participants differed both in terms of intonation/rhythmic patterns as well as choice of lexical items. Anecdotally, she says one can commonly tell what part of Karagwe a Kinyambo speaker is from just by listening to his or her speech.

Not only does there seem to be a great deal of dialectal variation in this region, but within a single dialect, such as the one I describe here, there is considerable 'free variation' in the pronunciation of many isolation forms and phrases.[1] Most, but by no means all, of this variation occurs in the prominence system. The specific historical and synchronic factors which foster dialectalization and free variation in the languages in this area is a matter for further research. As far as this thesis is concerned, when more than one pronunciation of a single phrase or utterance was found to be grammatical by my consultant (not differing on semantic or pragmatic grounds), I worked under the assumption that both (or all) variants must be accounted for by the grammar, and formulated the phonological rules accordingly. I will, in fact, show that this variation is crucial in understanding the nature of the prominence system.

I often found it helpful, in this regard, to ask my consultant to 'grade' the grammaticality of the forms or phrases. She would invariably classify them as either 'A' (fully grammatical), 'C' (marginal) or 'F' (ungrammatical). The grammar of Kinyambo which I present in this thesis generates all and only the 'A' utterances. I do, however, on occasion, include a discussion which motivates the differences between marginal and ungrammatical judgements in certain phrases. Where there were multiple 'A' pronunciations of the same phrase, I was sometimes able to make a determination

[1]This was also true, although to a lesser extent, in the speech of Gilbert Bonkobeza.

about which variation was preferred or used more frequently, and when this is the case, I note the preferred pronunciation.

Finally, at several different points in the thesis, I refer to my database of lexical items.[2] There are approximately 660 items of which 380 are nouns, 225 are verbs, 15 are adjectives, and 8 are adverbs. The remaining items are prepositions, pronouns, numerals, and interrogatives. The items are cross-referenced by tone pattern, syllable shape and grammatical class.

1.2 Existing literature of languages of the Rutara subgroup

To the best of my knowledge this is the first treatise on the Kinyambo language in this century. The only reference at all on the language that I have located is a brief description of some of the basic aspects of the grammar and a word list, written by A. Seidel (1898) in German near the turn of the century.

Below I list the following works of which I am aware on the languages of the Rutara subgroup (see (1)), and Jita which Guthrie (1967) lists as belonging to the subgroup which contains Kinyambo (E-21) (i.e. the Haya-Jita Group, Zone E.10).[3] I do this for two reasons. First, I think this information may be valuable to those who have historical or comparative interests in the languages of this area. Second, I wish to give the reader some idea as to the state of research on the languages in this area. As will be noted, little is known about certain of these languages, and the phonologies of only three (Kinyambo, Haya and Jita) have been analyzed in a generative framework.

---

[2]The compilation of this data base was greatly facilitated by the existence of the Haya word list found in Byarushengo et al. (1977) which served as the model upon which my list is based.

[3]This list is certainly not comprehensive. Many of the works were found in Bastin's (1975) *Bibliographie Bantoue Sélective*. Others were found as a result of my ongoing search for existing literature on the languages spoken in this area of East Africa.

(2) Research on languages of the Rutara Subgroup and Jita

Chiga: none found

Haya: Rascher (n.d.); Hermann (1904); Rehse (1912); Byarushengo (1975); Byarushengo & Tanenbaum (1976); Byarushengo, Duranti & Hyman (eds.) (1977) [4]; Byarushengo, Hyman, Tanenbaum (1976); Hyman & Byarushengo (1984); Hyman (1989)

Jita: Werner (1927); Sillery (1932); Downing (1988, ms.)

Kikerewe: Hurel (1909); Botne (1987)

Kinyambo: Seidel (1898); Bickmore (forthcoming a, b)

Nyoro: Davis (1952)

Runyankore: Morris & Kirwan (1957); Morris (1958); Taylor (1959, 1966, 1967, 1972, 1977, 1985)

Tooro: none found

Zinza: Seidel (1898); Rehse (1914)

1.3 Overall goal and purpose of the thesis

The goal of this thesis is two-fold. First, I hope to provide the field of linguistics with new data. The data will be mostly of phonological interest, although relevant aspects of the morphology, syntax, and semantics will, by necessity, be discussed as well. I hope to provide enough 'raw data' throughout the thesis to enable others to see the phonological patterns of the language to both evaluate my analysis and, if they wish, reach their own conclusions and analyses.

The second goal of the thesis is to contribute to our understanding of phonology from a theoretical perspective. Throughout the thesis I note theoretical contributions from others which have enabled me to describe the Kinyambo facts in a descriptively and explanatorily adequate manner. In turn, I make suggestions, based on the data presented, on how some of these theoretical positions could be refined or modified to

[4] As opposed to the other references in (2) which are individual articles, this is a volume on Haya grammatical structure which contains 14 individual articles on virtually all aspects of the language.

account for the Kinyambo facts while still motivating existing accounts of other data. At other points in the thesis I simply note that one of several competing theories neatly accounts for the Kinyambo facts without modification, while the others do not.

As a final note here I should state the obvious, which is that I have only scratched the surface of this wonderful and fascinating language. As more pieces of the puzzle from all areas of the grammar are uncovered and analyzed, the account of the prosody which I present here can be put into a broader context and re-evaluated and refined in that new light.

1.4 Organization of thesis

The outline, by chapter, of the thesis is as follows. In Chapter Two I discuss the morphological and syllabic structure of Kinyambo words. I show that a moraic analysis, along the lines of Hayes (1989) neatly accounts for the facts. Toward this end I present a complete moraic and syllable building algorithm for Kinyambo. I show that the glides and high vowels are in complementary distribution in Kinyambo. I then show that the glides can all be derived from underlying moraic segments. Given that Kinyambo, in general, exhibits moraic conservation, this analysis predicts that compensatory lengthening can occur on a following vowel when present, and I show that it does. In fact, compensatory lengthening is quite a productive process in Kinyambo. It is triggered not only by devocalization, but also by vowel elision, and prenasalization. I show that a moraic analysis in which all [-cons] and certain (predictable) [+nasal] segments are moraic predicts compensatory lengthening in these cases as well. Finally, I account for the distribution of five different phonetic nasals, suggesting that there are only three underlying nasal phonemes.

In Chapter Three I present the underlying prominence patterns of Kinyambo words. This is based largely on the isolation forms, although in some cases it is

necessary to look at the words in larger phrasal contexts to determine their underlying representations. Specifically, I suggest that the underlying prominence patterns of Kinyambo lexical items essentially reflect their surface forms, except in the case where a prominence would be found phrase-finally. In these cases, the prominence simply shifts one syllable to the left. We will see that there is only one prominence per lexical root, and that the location of this prominence is largely predictable, occurring on the first syllable of the root. I will show that the domain of underlying prominence is the syllable, although the domain of surface tone is the mora.

In Chapter Four I present what could be considered the central thesis of this work, which is that although phonetically Kinyambo has a simple High/Low tonal contrast, phonologically it is a stress language, exhibiting metrical properties commonly found in other stress languages. I present evidence that there are different phonological degrees of stress. More specifically, I suggest that these different stress strengths are not derived by subordination, as is usually the case, but instead are actually found underlyingly. This suggestion is based on two observations, the first of which is discussed in Chapter Three, while the second is discussed in Chapter Four. The first piece of evidence for establishing a hierarchy of underlying stresses is that, in isolation, certain words are obligatorily pronounced with a High tone, others are optionally pronounced with a High tone, while others are obligatorily pronounced as all Low toned. Of the words which must be pronounced with a High in isolation, some lose their prominence phrase-finally, while others do not. This, I claim, motivates an underlying four-way distinction in stress strength. As supporting evidence I argue that the underlying stress hierarchy motivated by these two phenomena makes correct predictions about which stress deletes under Beat Deletion as constrained by the Continuous Column Constraint (Prince 1983).

In Chapter Four I also present the rules of the phrasal phonology. Three rules play the major role in deriving the complex surface prominence patterns. The first is the rule, mentioned above, which shifts a phrase-final prominence one syllable to the left. The second is a rule which inserts a phrasal prominence. The third is a rule which deletes a prominence when close to another prominence. I claim that this third process, which applies both stem-internally, and at the phrasal level, is one of 'clash' resolution, found in many other stress languages. I then show that the actual probability of application of this clash resolving rule depends on the phonological distance, measured in syllables, between the two clashing elements. These 'trigger-target distance effects' in clash resolution have also been found in other stress languages which conspire against prominences in close proximity, and I compare a documented case from English (Hayes 1984) with the Kinyambo facts.

In Chapter Five I suggest that the phrasal or 'external sandhi' rules presented in Chapters Two, Three, and Four do not simply apply anywhere their structural description is met, but instead apply within prosodic phrases which are constructed on the basis of the syntax, but which are not necessarily identical to it. I explain these facts within the theory of the 'prosodic hierarchy' first developed by Elizabeth Selkirk (1980a-b, 1984, 1986). I provide an algorithm for constructing 'phonological phrases' in Kinyambo which serves as the domain for many of the phrasal rules. I review the literature concerning rules in other languages which are claimed to be bounded by the phonological phrase and suggest a possible cross-linguistic parameterization of a phonological phrase construction rule which accounts for both previously discussed phrases and the Kinyambo ones.

I establish, within the theory of the prosodic hierarchy, the domain of application of all the rules which I motivate in the previous chapters and show that a

sub-word level which I call the 'phonological stem' is necessary to account for certain facts. Finally, I show that the ordering of the phonological rules cannot be predicted by the prosodic domains within which they apply.

Chapter Two

The Morphological and Syllabic Structure of Kinyambo Words

In this chapter I will examine the morphological and syllabic structure of Kinyambo words. The outline of this chapter is as follows. First, I shall briefly examine the morphological make-up of Kinyambo nouns, adjectives, and verbal infinitives. Next I shall describe the moraic and syllabic structure of Kinyambo words. I will present a mora and syllable building algorithm which will correctly accounts for the surface syllable structure, the distribution of glides, and vowel lengthening due to compensatory lengthening resulting from different phonological processes.

2.0 Preliminaries

I propose that the phonemic inventory of Kinyambo is as follows:

(1) Vowels

i		u	i:	u:
e		o	e:	o:
	a			a:

(2) Consonants

p	b	m		f	
t	d	n	r	s	z
č	ǰ	N			
k	g				
				h	

Vowel length is phonemic as will be illustrated in §2.3.1. Derived phonetic consonants include: [ñ], [ŋ], [ɱ], [w], [y]. The /N/, a nasal unmarked for place of articulation, will be discussed in §2.3.3.4. I will employ the standard orthographical symbols *ch* and *j* to represent [č] and [ǰ] respectively. The graph *n* will be employed to represent a homorganic nasal before a consonant, unless the consonant is bilabial,

in which case *m* is written. (E.g. *engái* 'paddle' = [eŋgái], *enjóka* 'snake' = [eñjóka], *enfúka* 'hoe' = [eɱfúka]).

In the discussion which follows I will need to refer to the prominence patterns found in Kinyambo words. One of the primary goals of this thesis is to determine whether the prominence patterns are best described in terms of tone, accent, or stress. In Chapters Three and Four I will present evidence that while phonetically Kinyambo is a tone language (having a surface High/Low contrast), underlyingly it is a stress language best described in metrical terms. The surface tones will be marked as follows: High (v́), Low (v), and Falling (v̌v). In this chapter an underlying prominence will be represented in one of two ways. The first way entails placing a metrical grid mark ('x') on the relevant syllable. Syllables not bearing any stress are designated with a period ('.'). (Grid theory will be explained in some detail in §4.2.1.) Thus, in the grid representation, the first of the two nominal roots in (3a) bears an underlying prominence while the second does not:

(3a)	x .	. .
	-tebe	-tabo
	chair	book

In the interest of clarity and brevity, all phonologically stressed syllables will be represented in this chapter with a single grid mark, although I will argue in §3.7.5 that there are actually different phonological levels of stress. This, however, will not affect the generalizations and analysis presented in this chapter.

In some instances the grid formalism outlined above will be abbreviated by simply using an acute accent mark in phonemic form, which indicates that the syllable is stressed.

(3b)	/-tébe/	/-tabo/
	chair	book

2.1 Morphology of Kinyambo nouns, verbal infinitives, and adjectives

The noun and verbal infinitive have the following morphological structure: Preprefix (PP) - Class Prefix (CP) - Root - Final Vowel (for verbs) (e.g. *o-mu-rimi* 'farmer'; *o-ku-chuumb-a* 'to cook'). The preprefix has three possible shapes which vary according to the vowel in the class prefix. The preprefix is /e-/ if the class prefix contains the [-back] vowel /i/ [1]; /o-/ if the class prefix contains the [+round] vowel /u/; and /a-/ if the class prefix contains the [+low] vowel /a/.

The class prefix varies according to lexical properties of the nominal root. Both preprefix and class prefix information are summarized in the table below:

Class	PP	CP	Example	Gloss
1	o	mu	o-mu-góre	'bride'
2	a	ba	a-ba-góre	'brides'
3	o	mu	o-mu-ji	'town'
4	e	mi	e-mi-ji	'towns'
5	e	ri/i	e-rí-ino/i-huri	'tooth/egg'
6	a	ma	a-ma-huri	'eggs'
7	e	ki	e-ki-tabo	'book'
8	e	bi	e-bi-tabo	'books'
9	e	N/ø	e-n-jobe/e-raangi	'antelope/color'
10	e	N/ø	e-n-jobe/e-raangi	'antelopes/colors'
11	o	ru	o-ru-higi	'door'
12	a	ka	a-ka-baanga	'hill'
13	o	tu	o-tu-baanga	'hills'
14	o	bu	o-bu-goro	'snuff'
15	o	ku	o-ku-guru	'leg'
15a	o	ku	o-ku-chuumb-a	'(to) cook'
16	o	mu	o-muu-nda	'inside'

Table I

Synchronically, the Class 9 and Class 10 prefixes and preprefixes are identical. These two classes are listed as distinct here because their morphological shapes do differ in verbal, adjectival, and associative agreement.

[1] Or if it did historically, as is the case with the Class 9/10 prefix.

Regarding class 5 nouns, a few take the preprefix /e-/ and the class prefix /ri-/. (The only three nouns in my database of this kind are: *e-rí-ino* 'tooth', *e-rí-iso* 'eye', and *e-ri-híga* 'cooking-stone'). Most, however, surface simply with the prefix /i-/ which I will assume derives from /e-i-/, the /r/ of the class prefix having elided. Evidence for this is that the pre-root material may optionally be pronounced [ey], although the preferred pronunciation is [i].

Certain Class 9/10 nouns are pronounced without any class prefix. The prefix drops before roots beginning with a nasal consonant, but it drops in other cases as well which show no overall pattern (cf. *e-n-sénene* 'grasshopper', *e-ságama* 'blood').

Class 15a is the class of verbal infinitivals. As one can see they are formally structured identically to nominal forms. When they become finite forms, however, the class prefix and preprefix are not present, and the final vowel (FV) may be different as shown below.

(4) a. o- ku- kóm-a
PP CP tie FV
'to tie'

b. ba- ra- kóm- a
3pl FUT tie FV
'they will tie'

c. ba- kóm-e
3pl tie FV (subjunctive)
'that they tie'

Adjectives are composed of a root and a class prefix which agrees with the class of the noun being modified. This is illustrated below.[2]

[2] My consultant never produced any adjectives with a preprefix. When asked to judge the grammaticality of an adjective with a preprefix (e.g. *o-mu-gor' ó-mu-ruungi* 'the good bride'), she remarked that she found such forms grammatical, but did not use them. All the Kinyambo adjectives found in this thesis were given without any preprefix.

(5) a. o- *mu* -goré *mu* -ruungi
PP CP bride CP good
'good bride'

b. e- *ki* -tabó *ki* - ruungi
PP CP book CP good
'good book'

c. o- *bu* -goró *bu* -ruungi
PP CP snuff CP good
'good snuff'

2.2 Building moraic and syllabic structure

Syllables in Kinyambo have the following surface structure: ((N)C) (G) V(V). Several possible types are illustrated below.

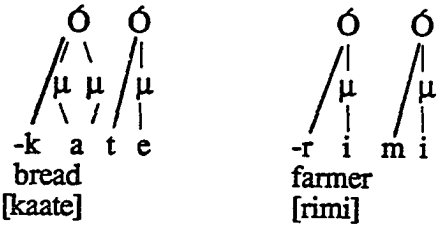
(6) o.mu.taa.mbi 'doctor'
ée.mbwa 'dog'
o.kú.ñwa 'drink'

In moraic terms, syllables may be either monomoraic or bimoraic. Monomoraic syllables represent a short vowel in the nucleus, while bimoraic syllables represent a long vowel in the nucleus.

I will now present the algorithm which I will assume builds moraic and syllabic structure in Kinyambo. The particular points presented will be justified throughout the chapter, and a review of the algorithm will be made in §2.6.

First, let me state that I will be assuming the moraic framework presented in Hayes (1989) in which onsets and morae are linked to the syllable node as illustrated below in (7).

(7)



The mora and syllable building algorithm is as follows.

(8) <u>Mora and Syllable Building Algorithm</u>: (x represents an element on the melodic tier)

a. Certain [-cons] segments will be underlyingly associated to two μ's.

```
μ   μ
 \ /
  x
```

b. Associate any sequence of two tautosegmental morae to a single Ó.

```
                        Ó
                       / \
μ   μ      -->      μ   μ
 \ /                 \ /
  x                   x
```

c. Associate every [-cons] segment to its own μ.

```
                        μ
                        |
[-cons]    -->      [-cons]
```

d. The morae associated to sequences of /ai/ which are *not* word final are associated to a single syllable node.

```
                        Ó
                       / \
μ   μ      -->      μ   μ
|   |               |   |
a   i               a   i
```

e. Associate a new Ó to each remaining μ.

```
                    Ó
                    |
μ          -->      μ
```

f. Associate a maximum of one melodic segment to the following syllable node. Where more than one segment could be associated, associate only the rightmost one.

```
    Ó                   Ó
    |                  /|
    μ      -->        / μ
    |                  |
x   x   x           x   x   x
```

g. If there is any melodic segment which still is not associated to a mora, assign it its own mora and syllable node.

```
                    ó
                    |
                    μ
                    |
x        -->        x
```

I will make only brief comments regarding these principles here. That they make correct predictions will be seen in the analysis and examples to be presented below. I will consider the derivations of the roots of three words: *e-sóoka* 'hair', *o-mu-sáija* 'man, and *o-bu-háango* 'bigness'. (Prominences will be ignored.)

```
(9)      μ μ                                                    U.R. of root (8a)
          \ /
-s  o  k a      -s a i j a      h a N g o
hair            man             big

         Ó                                                       (8b)
        / \
       μ μ
        \ /
-s  o  k a      ----------------  ------------------

         Ó                                                       (8c)
        / \
       μ μ  μ      μ μ   μ      μ     μ
        \ /  |      |  |   |      |     |
-s  o  k a      -s a i j a      h a N g o

                     Ó                                           (8d)
                    / \
                   μ μ   μ
                   |  |   |
----------------  -s a i j a    ------------------

         Ó   Ó       Ó   Ó       Ó     Ó                         (8e)
        / \  |      / \  |      |     |
       μ μ   μ     μ μ   μ      μ     μ
        \ /  |      |  |   |      |     |
-s  o  k a      -s a i j a      h a N g o

         Ó   Ó       Ó   Ó       Ó     Ó                         (8f)
        / \  |      / \  |      |     |
       μ μ   μ     μ μ   μ      μ     μ
        \ /  |      |  |   |      |     |
-s  o  k a      -s a i j a      h a N g o

                                Ó Ó   Ó                          (8g)
                                |  |   |
                                μ μ   μ
                                |  |   |
----------------  ----------------  h a N g o

[sooka]         [saija]         [haango]                         Surface Form
```

The first vowel in *-sooka* 'hair' is phonemically long. This is represented by setting that vowel up as underlyingly bimoraic in accordance with (8a). Principle (8b) will immediately assign the two mora to a single syllable node. (8c) then assigns a new mora to all remaining vowels. (8d) stipulates that the morae of a non-word-final /ai/

sequence will be tautosyllabic. (8e) then assigns a new syllable node to all morae which have not yet been assigned to one. (8f) syllabifies a maximum of one consonant to the following syllable node. Finally (8g) assigns a mora and syllable node to any remaining segment, which, in Kinyambo will always be a nasal.

These, then, are the moraic and syllabic structures which the algorithm in (8) generates. Rules to be presented below will affect these structures in systematic ways. I should note here that I am assuming that each principle of the algorithm above will apply whenever its structural description is met. The examples above show its initial application at the level of the root. When the class prefix and preprefix (or any other morpheme) is added, I assume that the syllabification algorithm applies again. There are reasons for which the algorithm cannot be said to apply only once, at the very end of the lexical phonology, when word formation is complete. In brief, there is a Lexical Stress Rule which applies at the level of the root which must be able to assign prominence to its initial *syllable*. Therefore I assume that syllable nodes must be present at that time. For a detailed justification of this see §4.3.

2.3 Distribution of vowel length

2.3.1 Phonemic vowel length

Vowel length is phonemic, as seen in the minimal and near minimal pairs below.

(10)

o-ku-bík-a	'put away'
o-ku-bíik-a	'announce death'
o-ku-sik-a	'inherit'
o-ku-ziik-a	'bury
i-sóke	'hair'
e-sóoka	'axe'

Underlyingly, long vowels have a very limited distribution. Specifically, they only occur in penultimate position. Thus, although there are many forms of the type /...CVVCV/, there are no forms of the type /...CVV/, /...CVVCVCV/, etc.

Justification for this is that all long surface vowels in non-penultimate position can be shown to be derived. This will be demonstrated below. In moraic terms, then, there is a morpheme structure constraint holding for underlying representations which states that a syllable node may only be lexically associated with two morae when it is in penultimate position. We will see below, however, that this constraint does not hold for surface forms, as derived long vowels may occur in positions other than the penultimate one.

Phonemic long vowels are not the only source of surface long vowels in Kinyambo. There are two ways in which long vowels may be derived: morphological concatenation, and compensatory lengthening. Compensatory lengthening arises due to processes of vowel elision, devocalization, and nasal demorification. I will address each of these cases in turn.

2.3.2 Morphological concatenation

Surface long vowels result when identical vowels are made contiguous through morphological concatenation. This can be seen in the following examples.

(11)	Underlying (PP+CP+Root)	Surface	Gloss
a.	/e-ki-iba/	ekiiba	'pigeon'
	/e-bi-ita/	ebiita	'war'
b.	/e-ri-íno/	eríino	'tooth'
	/e-ri-íso/	eríiso	'eye'
	/a-ma-áni/	amáani	'strength'

The realization of the surface tones in examples in (11b) will be explained later in §3.5. Let us briefly consider the syllabic structure of these words. The syllabification algorithm in (8) will initially generate the following syllable structure for *ekiiba* 'pigeon'.

(12)

```
Ó    Ó Ó   Ó
|   /| |  /|
μ  / μ μ / μ
|  | | | |
e- k i-i b a
PP CP   pigeon
```

After Syllabification (8)

Recall, that the reason that each of the /i/ segments receives its own syllable node is because of the cyclic application of syllabification. It first applied to the root /-iba/, then again after the prefixation of /ki-/, then again after the prefixation of /e-/. I will then assume that the Obligatory Contour Principle (OCP) (Leben 1973, Goldsmith 1976, Odden 1986) is an active 'repair' principle in the language, immediately applying whenever its structural description is met. It will not permit a sequence of two identical and contiguous segments. It will thus modify the syllable structure of that in (12) into that of (13).

(13)

```
Ó    Ó Ó   Ó
|   /| |  /|
μ  / μ μ / μ
|  | \/ | |
e k  i b a
```

Obligatory Contour Principle

In order to make the two middle morae tautosyllabic, I will assume that syllabification principle (8b) not only applies to create structure, but may also modify existing structure, applying whenever its structural description is met. It will thus apply, generating the structure in (14).

(14)

```
Ó    Ó   Ó
|   /| \  /|
μ  / μ μ / μ
|  | \/ | |
e k  i b a
```

Principle (8b)

Other syllabification principles appear to be structure modifying as well. Let us consider the application of principle (8d) in a word such as *a-má-iso* 'eyes'. The syllabification algorithm would initially produce (15).

(15)

```
ó   ó ó   ó
|   || |  ||
μ  /μ μ  /μ
|  /| |  /|
a - ma - i s o
```

I then assume that (8d) may act as a structure modifying rule as well to produce the structure in (16).

(16)

```
ó    ó    ó
|   /|\   ||
μ  /μ μ  /μ
|  /| |  /|
a - ma - i s o
```

Principle (8d)

The phonetic realization of the stress on the penultimate syllable of (16) confirms that the /a/ and /i/ are part of the same syllable. This will be illustrated in §3.2.

2.3.3 Compensatory lengthening

Underlyingly short vowels may become long by a process of compensatory lengthening which is triggered by three different rules. Compensatory lengthening may be triggered by devocalization, vowel elision, or prenasalization. I will discuss each separately.

2.3.3.1 Devocalization

Devocalization takes place when the first V in a VV sequence is [+high]. Compensatory lengthening then applies to lengthen the following vowel. In moraic terms compensatory lengthening is a direct result of devocalization and moraic conservation. Devocalization, in a moraic framework, is simply the deletion of the association line which links a mora and a [-cons] segment, as the only difference between vowels and their corresponding glides is the presence or absence (respectively) of linkage to a mora. After the association line is deleted, the stranded mora will reassociate by convention to an adjacent segment on the melodic tier. The rule of Devocalization is formalized below.

(17) *Devocalization*

```
  μ                μ     /          μ
  |        --->          /          |
[+ high ]        [+ high] /  _____ [    ]
```

Additionally, the two adjacent vowels must not be identical (ii --> ii *yi; uu --> uu *wu). As we saw in the case of *e-ki-iba* 'pigeon' ((12)-(14)), the Obligatory Contour Principle and syllabification principle (8b) apply whenever their structural description is met and will turn identical vowel segments into a single (bimoraic) segment, and, subsequently, the configuration will not meet the structural description of Devocalization. There are no surface sequences of [wu] or [yi].

Above I provided the syllable and mora building algorithm specific to Kinyambo. Before providing an example of devocalization I will need to make explicit the following well-formedness conventions concerning moraic and syllabic association.

(18) <u>Syllabic and Moraic Well-formedness Conventions</u>

a) Every segment on the melodic tier must be associated to either a mora or a syllable (but never both).

b) Every syllable must be associated to at least one mora.

c) Every mora must be associated to at least one segment on the melodic tier and one syllable on the syllabic tier.

d) No association lines may cross.

e) *Parasitic Delinking* (cf. Hayes 1989): when either i) a segment or ii) an association line from a segment to a mora deletes, the syllable node in that chain deletes.

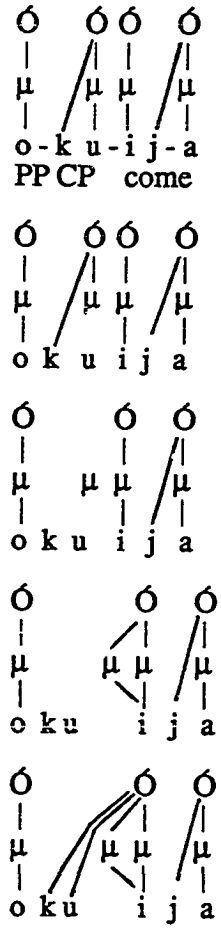
f) *Mora Reassociation*: a stranded mora will reassociate to the segment on the melodic tier which triggered its stranding, as long as this does not violate (8a-d). If this would violate (8a-d), then it will reassociate to another melodic segment which would not violate (8a-d).

g) *Stray Mora Erasure* (cf. Steriade 1982, Ito 1986): a mora which is still unassociated deletes.

h) *Onset Formation*: any unassociated melodic segment associates with the syllable node to the right.

(18a-d) might be considered the well-formedness conditions on syllabic and moraic representations which must be satisfied at the end of each cycle.[3] Principles (18e-h) direct the repairing of the representation if one of these conditions is violated. To illustrate the effects of Devocalization in a moraic framework, let us consider the derivation of *o-kw-iij-a* 'come', keeping in mind that [w] and [u] are identical feature matrices on the melodic tier, as [syllabic] is no longer a feature. Syllabicity is represented instead by association to a mora.

(19)



After Syllabification (8)

Devocalization (17)

Parasitic Delinking (18e)

Mora Reassociation (18f)

Onset Formation (18h)

Surface Form

[3]It may be the case that these derive from more general constraints pertaining to all autosegmental structures, as these conditions will hold for other languages as well. Cf. Williams (1971), Goldsmith (1976), Clements & Ford (1979), and Halle & Vergnaud (1982).

First, Devocalization removes the association line from the /u/ to its mora (19b). Parasitic Delinking will then erase the syllable node associated to that mora (19c). Since the triggering element which causes the stranding of the mora is the /i/ (see (17)) it is to this segment that the stranded mora relinks (19d). Onset Formation then comes into play, associating the /k/ and /u/ to the following syllable node (19e).

In this derivation, we note the integrity of the moraic tier, which is independent justification for its autosegmental existence. In general, Kinyambo is a language which preserves mora count. It is this moraic stability which allows for an elegant account of all occurrences of compensatory lengthening in Kinyambo. With regard to Mora Reassociation (18f), note that it is this principle which prevents the stranded mora from reassociating to either the /k/ (producing a geminate in *okkwija*) or the word-initial /o/ (producing *ookwija*). Both of these representations would be otherwise possible, as they would not violate any well-formedness condition (18a-e). Although I could stipulate that a moraic (= geminate) consonant in Kinyambo is ill-formed, this would not prohibit the mora from associating to the word-initial /o/. Principle (18f) predicts the reassociation straightforwardly.

Devocalization with subsequent compensatory lengthening seems to apply in both derived and non-derived environments. It will apply in cases of morphological concatenation where the class prefix ends in a [+high] vowel and the lexical root begins with a vowel as shown below:

(20)

Underlying Representation	Surface Form	Gloss
o-ku-ij-a	okwiija	'come'
e-bi-aro	ebyaaro	'villages'
e-bi-oya	ebyooya	'feathers'
o-bu-áto	obwáato	'boat'
o-ku-ét-a	okwéeta	'call'
e-bi-ára	ebyáara	'fingers'
e-mi-ézi	emyéezi	'months'

(The reason for which a Falling tone and not a Rising tone results in the last four forms will be explained in §3.5.)

Devocalization also applies to morpheme internal VV sequences. This is illustrated below:

(21)

Underlying Representation	Surface Form	Gloss
mbúenu	mbwéenu	'today'
o-ku-túar-a	okutwáara	'carry'
o-bu-súere	obuswéere	'marriage'
o-ku-bíar-a	okubyáara	'plant'
o-ku-ruan-a	okurwaana	'fight'
e-N-duano	endwaano	'quarrel'
e-N-tuiga	entwiiga	'girrafe'

The reason I set the above forms up as having underlying /u/ or /i/ and not /w/ or /y/ is because a long vowel always follows a morpheme internal consonant-glide sequence.

There is, however, a major restriction on the possible surface positions where the effects of compensatory lengthening are, in fact, manifested. I will first consider the data to be accounted for, then I will formalize the rules which account for the data in §2.4. Surface Falling tone is only found in penultimate position in Kinyambo. Therefore, the rule will not produce a compensatorily lengthened vowel on the surface, if that vowel is in a prominent prepenultimate syllable. Thus, consider the forms below:

(22)

Underlying Rep.	Surface Form	Gloss	Position of High Tone
o-ku-ét-a	okwéeta	'call'	penult Ó
o-mu-ána	omwáana	'child'	penult Ó
o-ku-étab-a	okwétaba	'answer'	antepenult Ó
o-bu-kúatani	obukwátani	'relationship'	antepenult Ó
o-mu-íjukuru	omwíjukuru	'grandchild'	pre-antepenult Ó
o-ku-éhahamur-a	okwéhahamura	'yawn'	pre-pre-antepenult Ó

If, however, the syllable to be lengthened is not prominent, and hence no Falling tone could be created, then compensatory lengthening may apply in any position (see (23)) except in final syllables (see (24)), as shown below:

(23)	Underlying Rep.	Surface Form	Gloss	Position of Long Low
	o-mu-oyo	omwooyo	'heart'	penult Ó
	o-ku-ruan-a	okurwaana	'fight'	penult Ó
	o-ku-inam-a	okwiinama	'bend'	antepenult Ó
	e-bi-akúrya	ebyaakúrya	'foods'	antepenult Ó
	o-ku-ikiriz-a	okwiikiriza	'agree'	pre-antepenult Ó
	e-bi-ererezo	ebyeererezo	'brooms'	pre-antepenult Ó

(24)	Underlying Rep.	Surface Form	Gloss
	o-mu-nua	omunwa	'mouth'
	o-bu-raingua	oburaingwa	'height'
	iñue	iñwe	'you (pl)'
	o-ku-remu-a	okuremwa	'fail'
	e-ki-akúria	echakúrya	'food'
	o-bu-sía	obúsya	'newness'

The restriction against compensatory lengthening in final syllables is based on morpheme internal VV sequences only, as there are no roots of the form /-V/ to test effects in a derived environment.

It seems that syllables in certain roots need to be lexically marked to not undergo Devocalization. Consider the data in (25).

(25)		U.R.	Surface Form	Gloss
	a.	e-úa	eúa (*é-wa)	'flower'
		e-barúa	ebarúa (*ebárwa)	'letter'
		o-ku-huu-a	okuhuua (*okuhwa)	'blow'
	b.	i-júi	íjwi (*i-júi)	'knee'
		o-ku-túi	okútwi (*okutúi)	'ear'
		o-mu-nua	omunwa (*omunua)	'mouth'
		o-ku-túar-a	okutwáara (*okutúara)	'carry'
		o-ku-bíar-a	okubyáara (*okubíara)	'plant'

The question here is how to prevent the forms in (25a) from undergoing devocalization while allowing the forms in (25b) to do so. To prevent devocalization in *o-ku-huu-a* 'blow', it can stipulated that the vowel undergoing this process be monomoraic. But, how can Devocalization be prevented in *e-úa* 'flower' and *e-barúa* 'letter'.

To begin with, I will show later (§3.6) that a prominence on a phrase final syllable shifts one syllable to the left. This rule of Phrase-final Left Shift will apply

after Devocalization. This explains the stress shift in *í-jwi* 'knee' and *o-kú-twi* 'ear' in (25b). To prevent devocalization in *e-úa* 'flower' it might be thought that the structural description of the rule could include a C before the two moraic segments. However, this would not account for *e-barúa* 'letter' and furthermore this hypothesis is falsified by forms such as *ezawáadi* < /e-zauádi/ 'gift'.

It seems, then, that the most straightforward way to account for *e-barúa* 'letter' and *e-úa* 'flower' is to assume that the [+high] vowel (or the root itself) in each case is lexically marked to not undergo devocalization. It should be noted that both of these words are borrowings (from Swahili). We will see below (in §3.1) that borrowed words are exempt from other productive processes as well, such as root-initial stress placement.

I will assume that Devocalization applies from right to left. This is motivated by forms such as *iwe* 'you (sg.)' (< /iue/). Whereas a right to left application of Devocalization generates the correct from, a left to right application would yield **yuue* which is incorrect. The only other possible analysis would be to complicate the structural description of Devocalization, stipulating that the second vowel must be [-high].

Let me briefly discuss where Devocalization might apply in Kinyambo nouns. Since none of the preprefix vowels is [+high], the structural description of the rule will never be met in the concatenation of the preprefix and class prefix. Therefore this process as it applies in derived environments is only seen at the juncture of certain class prefixes and vowel-initial roots. The class prefixes with a final [+high] vowel, which trigger gliding and compensatory lengthening are: *mu* (Class 1,3 & 16), *mi* (Class 4), *ri* (Class 5), *bi* (Class 8), *ru* (Class 11), *tu* (Class 13), *bu* (Class 14), *ku* (Class 15, 15a).

Several comments are in order here. The first is that although I assume that the Class 15a and Class 16 morphemes would behave identically to the other vowel-final class prefixes, I have not found any forms in which they attach (lexically) to a vowel-initial root. The second comment regards the Class 7 prefix /ki-/. This /ki/ becomes [č] (transcribed as *ch* in standard Kinyambo orthography), not [ky-] when attached to a vowel-initial root. In these cases I assume that Devocalization occurs followed by a rule in which every [ky] becomes [č]. In the nine examples in my database, a long vowel follows the [č] in every case but two (*e-ch-úpa* 'bottle', and *e-ch-ererezo* 'broom'). I will assume that these two forms are lexical exceptions to the compensatory lengthening which would be expected *a priori* to follow the rule which devocalizes the [i] in [ki] before a vowel.

2.3.3.2 Vowel Elision

The second rule which triggers compensatory lengthening is Vowel Elision which can be formulated as follows:

(26) *Vowel Elision*

$$[\text{-cons}] \rightarrow \emptyset \ / \ \underline{\quad\quad} \ \overset{\mu}{\overset{|}{[\text{-cons}]}}$$

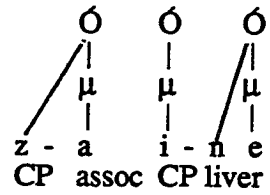
This rule will have the effect of deleting a vowel which precedes another vowel. (The domain of application of this rule will be specified later in Chapter Five in terms of constituents of the prosodic hierarchy.) In order for this rule to be formalized in maximally general terms, I will order it after Devocalization. Two sample derivations are shown below.

(27)	a.	o-mu-ójo son	a-ba-ójo sons	Underlying Representation
	b.	omwóojo	----------	Devocalization (& Compen. Lengthening)
	c.	----------	abóojo	Vowel Elision

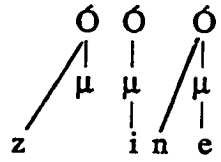
If Vowel Elision (as formalized above) were ordered first, it would bleed Devocalization. I will assume that Vowel Elision applies only in derived environments, as it never affects morpheme internal vowel sequences (e.g. *e-m-bao* 'plank', *e-úa* 'flower', *e-papái* 'papaya'). I should note here that it is not always the first vowel in V##V sequences which deletes. In many cases either the first or second vowel may delete (but not, of course, both).[4] We might assume, then, that in some cases Vowel Elision (26) is 'bidirectional' or a mirror image rule. Below is a derivation of the associative phrase *z' íine* 'of the liver' (< /z-á i-ne/) in which the first vowel deletes. (assoc = associative morpheme /-á/.)

[4]I will not attempt to give a comprehensive list of environments here in which the first, second, or either vowel deletes, as such would take us far afield from our present discussion of compensatory lengthening. I will, however, make explicit the direction of elision in the examples throughout the thesis where it applies. The rule will be discussed again in §5.6.2, where its prosodic domain of application is examined.

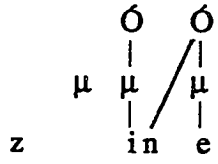
(28)



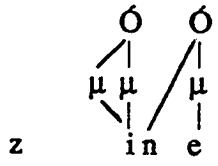
After Syllabification (8)



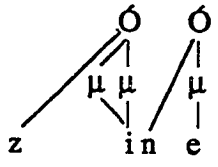
Vowel Elision (26)



Parasitic Delinking (18e)



Mora Reassociation (18f)



Onset Formation (18h)

z' íine

Surface Form

In the derivation above it is again Mora Reassociation (18f) which insures that the stranded mora will not associative to the preceding consonant, yielding **zz' íine*. It will associate to the /i/ as it is that segment which triggered the deletion. As was the case in the Devocalization examples, Vowel Elision only results in the compensatory lengthening of the following vowel in certain environments. The lengthening of a vowel in final position cannot be tested, as that would require the second word to be a single vowel, and such a word has not been found.

Here, then, are examples of the application of Vowel Elision. The examples here are of the form: *y-a* (Class 9 - associative marker) ## noun (with preprefix) in

which the /a/ of the associative marker elides. The apostrophe is standard in Kinyambo orthography and simply indicates the place of elision.

(29)

Underlying Rep.	Surface Form	Gloss	Position of High Tone
y-á i-fá	y'íifa	'of the famine'	penult Ó
y-á o-mu-ji	y'ómuji	'of the town'	antepenult Ó
y-á e-m-beba	y'émbeba	'of the rat'	antepenult Ó
y-á o-mu-rimi	y'ómurimi	'of the farmer'	pre-antepenult Ó
y-á e-n-dagano	y'éndagano	'of the agreement'	pre-antepenult Ó
y-á o-mu-sogoro	y'ómusogoro	'of the bean leaf'	pre-pre-antepenult Ó

It can be seen from the above examples that the effects of compensatory lengthening on a prominent vowel only surface on the penultimate syllable--the same pattern that was found for Devocalization (17) (§2.3.3.1). Again, I will formally account for the surface realization of long vowels in §2.4.

2.3.3.3 Nasal Demorification

It has been noted in many Bantu languages that prenasalization may trigger compensatory lengthening of the preceding vowel. This process, for example, is evident in Kimatuumbi (Odden ms.), Luganda (Clements 1986), and Runyankore (Morris 1957, Taylor 1959), the latter language being extremely closely related to Kinyambo (see (1) of Chapter One). In these languages there is a neutralization of vowel length before prenasalized clusters, the vowel being phonetically longer that a short vowel, though often not quite as long as an underlying long vowel.[5]

[5] With respect to the phonetic realization of derived long vowels, they are not all quantitatively identical. In Kinyambo, long vowels which have arisen from morphological concatenation or compensatory lengthening due to Devocalization or Vowel Elision appear to have roughly the same phonetic length as underlyingly long vowels. However, as is the case in Luganda (Herbert 1975) as quoted in Clements (1986), vowels preceding prenasalized consonants in Kinyambo tend to be longer than underlying short vowels, but not quite as long as underlyingly long vowels. Additionally, in Kinyambo, Low toned vowels preceding NC clusters seem to be slightly shorter than high vowels (which will surface as Falling). Finally, long vowels derived by demorification are phonetically longest in penultimate position. E.g. the vowel in the penultimate syllable of *oruhaango* 'valley' is phonetically longer than the vowel in the antepenultimate syllable of *orufuunguruzo* 'key'.

Let us now consider the data to be accounted for. Below are examples illustrating the environments where compensatory lengthening does and does not appear on the surface. (Recall that all surface nasals are homorganic to a following obstruent.)

(30)

Underlying Rep.	Surface Form	Gloss	Position	Tone
o-ku-nuNk-a	okunuunka	'smell'	penult Ó	Low
o-ru-haNgo	oruhaango	'valley'	penult Ó	Low
o-bu-háNgo	obuháango	'bigness'	penult Ó	Falling
o-ku-zíNg-a	okuzíinga	'fold'	penult Ó	Falling
o-ku-taNbuk-a	okutaambuka	'walk'	antepenult Ó	Low
o-ku-hoNder-a	okuhoondera	'follow'	antepenult Ó	Low
o-ku-káNjur-a	okukánjura	'chew'	antepenult Ó	High
o-ku-áNguh-a	okwánguha	'quick (be)'	antepenult Ó	High
o-ku-geNderer-a	okugeenderera	'go ahead'	preantepen Ó	Low
o-ru-fuNguruzo	orufuunguruzo	'key'	preantepen Ó	Low

As can be seen in the data above, the very pattern we found in the Devocalization (§2.3.3.1) and Vowel Elision (§2.3.3.2) cases emerges here. A surface long Falling vowel only occurs in penultimate position, while a surface long Low vowel can occur in any position except in the final syllable.

How can the lengthening process precipitated by a nasal consonant cluster be accounted for? In a moraic framework, this process can be thought of as a compensatory lengthening of the vowel due to the demorification of a nasal which immediately precedes a consonant. The nasal segment of all underlying NC sequences is underlyingly associated to a mora of its own due to principle (8g) of the syllabification algorithm (see derivation of *-haango* 'big' in (9)). Prevocalic nasals will not be associated to a mora as they will become onsets by principle (8f). Thus, after syllabification, a VNCV and VNV sequence will be structured as follows:

(31) a.

```
Ó    Ó              Ó
|    |              |
μ    μ              μ
|    |              |
[-cons] [+nas] [+cons] [-cons]
```

b.

```
Ó          Ó
|          |
μ          μ
|          |
[-cons] [+nas] [-cons]
```

On the basis of the examples above, I could postulate a phonological rule in the language which delinks the association line from a nasal to its mora when that nasal is immediately preceded by a consonant. The floating mora would then relink to the preceding vowel, rendering it bimoraic, and hence long.[6] The rule of Demorification could be formalized as follows:

(32) *Nasal Demorification (first attempt)*

```
 μ    μ
 |    ≠
[-cons] [+nas] [+cons]
```

This, however, makes incorrect predictions in the case of word initial nasals. It turns out that some word initial nasals are syllabic while others are not. For example consider the words *m̩káaga* 'six' (< /mkáaga/) in which the initial nasal is syllabic, and *ŋkáha* 'where' (< /Nkáha/) in which it is not. The syllabification algorithm (8) will build the following structures:

(33)

```
 ó   ó   ó          ó   ó   ó
 |  /|\  |          |   |   |
 μ / μ μ / μ        μ   μ   μ
 | /  \/  |        |   |   |
 mk  a g  a         Nk  a h a
 'six'              'where'
```

The rule of Nasal Demorification as formalized in (32) would make the initial nasal of both words non-moraic, which is incorrect. I suggest that one way of accounting for the difference in the syllabicity of the initial nasal involves the place of articulation specification of the nasal segment on the melodic tier. If a pre-consonantal

[6]This approach is consistent with the other cases of compensatory lengthening which we examined above in which the lengthening was due to the reassociation of an existing mora. An alternative approach would be to set up underlying prenasalized stops. As onsets, however, they would presumably not be moraic, and therefore the lengthening would have to be accomplished by inserting an additional mora before one of these stops. Although this latter approach does not seem unworkable, I will assume the approach outlined above in which nasals (which are not onsets) are made moraic by the syllabification algorithm given above in (8).

nasal is specified for place of articulation in the underlying representation (as in *ṃkáaga* 'six') then the nasal will surface as syllabic.

Therefore, I propose the following. I will first assume that there is a place of articulation assimilation rule which basically spreads a place node of a [+ cons] segment to the left onto a [+nasal] segment which is unspecified for place. This would be a feature supplying rule and not a feature changing rule. It is formalized as follows.

(34) *Place of Articulation Assimilation*

```
[+nas] [+cons]
  \ \ \ \ |
   \ \ \ \|
    PLACE
```

The reason for which the second segment must be specified as [+cons] is because in underlying sequences where /N/ is intervocalic (e.g. *o-ku-mañ-a* 'know' < /o-ku-maÑ-a/), I do not wish to spread the place features of the following vowel onto the nasal. (We will see in the next section that there is good justification for assuming that surface [ñ] always derives from underlying /N/).

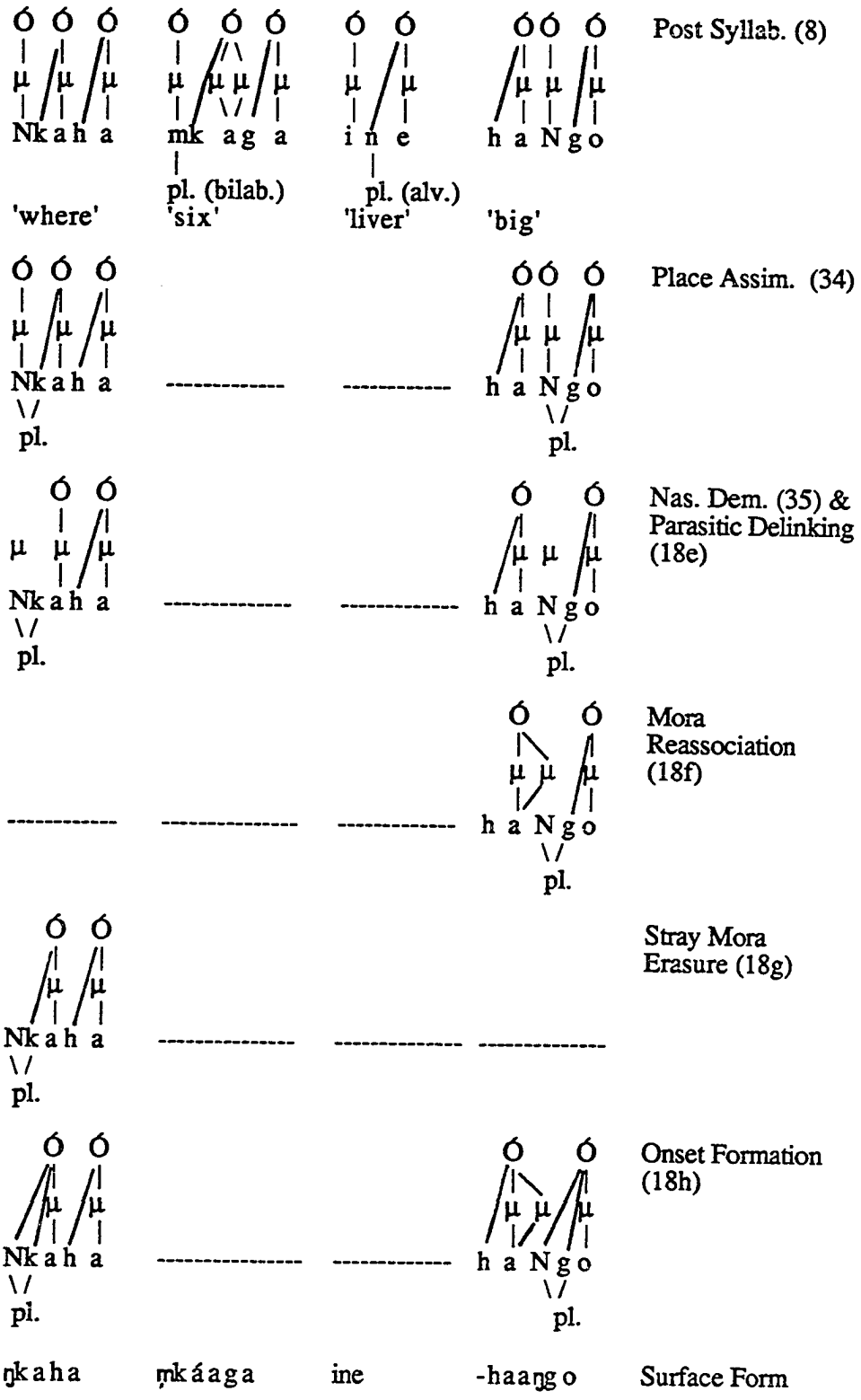
The rule of Nasal Demorification can now be formalized as follows:

(35) *Nasal Demorification*

```
 μ          μ    /
 |    -->        /
[  ]       [  ] / ____ [  ]
                  \    /
                   \  /
                  PLACE
```

In order to see the effects of this rule, let us consider four parallel derivations: those of *ŋkáha* 'where', *ṃkáaga* 'six', *i-ne* 'liver' and *-háango* 'big'. (Prominence will be ignored.)

(36)



Place of articulation assimilation only affects *ŋkaha* 'where' and *-haango* 'big' because only they contain nasals unspecified for place of articulation. Since Demorification requires the nasal to share a place node with the following consonant, it is again only these two forms which can undergo the rule. Now, in the case of *-haango* 'big', the only available melodic segment to which the mora can attach without violating any of the well-formedness conventions (18a-d) is the preceding vowel. In the case of *ŋkaha* 'where', there is no segment at all available for association, and therefore, by Stray Mora Erasure (18g), the stranded mora simply deletes.

The word-initial nasal will then associate to the initial syllable node. In this regard, note that although the syllabification algorithm in (8) would never associate two segments to the same syllable node (as onsets), none of the well-formedness conditions (18) are violated by such. This, then, is simply a case which shows that generalizations which hold true for underlying forms do not necessarily hold true for surface forms, and vice-versa. In the next chapter we shall see later that this is the case with regard to prominence patterns as well.

2.3.3.4 Compensatory lengthening and the distribution of nasals

I will now argue that the Class 9/10 prefix is /N-/. Before consonants it is always homorganic. (E.g. *ée-m-bwa* 'dog' < /e-N-búa/, *ee-n-te* 'cow' < /e-N-te/, *ee-ŋ-go* 'leopard' < /e-N-go/, *eeŋfúka* 'hoe' < /e-N-fúka/). This enables it to be unspecified for place of articulation (standardly written as [N] in phonemic representation). Before vowels it is phonetically realized as [ñ] (= *ny* in standard orthography). The two cases in which this prefix is attached to a vowel initial root are: *e-ñ-iimba* 'marimba', and *e-ñ-ama* 'meat'.[7]

[7]There are other words of the form e-ñ..., e.g. *eñuma* 'bird', *eñáaña* 'tomato', etc, however these forms must be analyzed as having roots beginning with ñ, as they retain the palatal nasal in augmentatives, which are derived from roots. E.g. *o-mu-rimi* 'farmer', *a-ka-rimi* 'big farmer'; *e-ñuma* 'bird', *a-ka-ñuma (*a-ka-uma)* 'big bird'; *eñáaña* 'tomato', *a-ka-ñáaña (*a-ka-aña)* 'big tomato'. The two words in which I

There is (at least) one other possible analyses of these words. This would be to set up this prefix as /Ni/. Devocalization would apply when a vowel-initial root followed. (A subsequent rule would then change [ny] --> [ñ]). I would need an additional rule, however, which deleted the i of /Ni/ before consonant initial roots. I propose to set up the Class 9/10 prefix as a /N/ and will assume there is a late default rule which changes a /N/ into [ñ]. Since intervocalic nasals are never moraic, this correctly predicts that no compensatory lengthening occurs in the root initial vowel, as seen in *e-ñ-ama* 'meat' (**e-ñ-aama*). Compensatory lengthening would be predicted if the prefix were /Ni-/. (The long vowel in *e-ñ-iimba* 'marimba' is due to Nasal Demorification (35).)

The following forms, in which the surface [ñ] is not the Class 9/10 prefix, also support the hypothesis that surface [ñ]'s derive from /N/ (as opposed to /Ni/) as no compensatory lengthening is triggered: *e-ki-ñíra* 'snail', *o-ku-ñurur-a* 'pull', *e-ñuma* 'back', and *e-ñoñi* 'bird'. Of course, a long vowel can follow as seen in the forms: *e-ñ-añíiñi* 'star' and *e-bi-ñóobwa* 'peanuts'. In these cases I can simply assume that the vowel is underlyingly long, as roots with an underlyingly long penultimate vowel are quite common (e.g. *o-mu-káate* 'bread').

Finally, the existence of a form such as *e-ñ-iimba* 'marimba' supports the /N/ analysis. If the class prefix were /Ni-/ we would expect the form *e-ñ-iimba* 'marimba' (< /-imba/) to be **e-ni-imba*, as other identical V+V sequences do not trigger gliding (cf. *ebiita* (< /e-bi-ita/)'war', *ekiiba* (< /e-ki-iba/) 'dove').

Note that the analysis of the Class 9/10 prefix as /N/ instead of /Ni/ predicts that it will trigger compensatory lengthening of the preceding vowel when a consonant-

---

claim the nasal is the class 9/10 prefix have two augmentative forms: *eñama* 'meat', *a-ka-ama* ~ *a-ka-ñama* 'big meat'; *eñiimba* 'marimba', *a-ka-imba* ~ *a-ka-ñiimba* 'big marimba.

initial root follows, just as we saw in the case of root internal, preconsonantal /N/'s in (25). Such is true as seen below.

(37)

Underlying Rep.	Surface Rep.	Gloss
/e-N-te/	eente	cow
/e-N-go/	eengo	leopard
/e-N-búa/	éembwa	dog
/e-N-sí/	éensi	ground

In conclusion, there are five phonetic nasals: [m], [ɱ], [n], [ñ], and [ŋ]. Intervocalically, there is only a three way contrast (between [m], [n] and [ñ]), as seen in *o-mu-sana* 'sun', *o-ku-mañ-a* 'know', *o-mu-kama* 'chief'. There are no attestations of [..VŋV..] or [..VɱV..]. In VNCV sequences, all five surface varieties are found, however since they are always homorganic in this environment to the following consonant, I will assume that they are derived from underlying /N/ by the rule of Nasal Assimilation formalized above in (34). Finally, word initially, there is a three way contrast before vowels, (e.g. *mazima* 'well', *ni* COPULA, *ñina* 'his mother'). There are no attestations of [ŋV..] or [ɱV..]. Before consonants, however, the nasal can either be homorganic to the following consonant (e.g. *mbwéenu* 'today', *ŋkaha* 'where') or, in the case of /m/, syllabic (e.g. *m̩káaga* 'six').[8]

To account for these facts I suggest that the inventory of underlying nasals is: /m/, /n/, and /N/. I will assume that all surface [ñ]'s preceded by a vowel are derived from underlying /N/ by a late feature filling rule which provides the correct palatal specifications. To formally account for the fact that only *m* can be syllabic I will assume that there is an underlying syllable structure constraint applying to the melodic tier which stipulates that: whereas any nasal phoneme can occur before a vowel, only /N/ can appear before a consonant, except in word-initial position, where /m/ may also occur.

[8]Syllabic *m* 's derive historically from /mu/. The vowel elided causing the *m* to become moraic and syllabic. This may be the reason that there are no other syllabic nasals in present day Kinyambo.

2.4 Analysis of vowel length

A summary of the surface patterns of possible combinations of vowel length, prominence, and syllable position in *phrase-final* forms is found in the chart below. 'x' represents a possible combination, ø represents a combination which is not possible.

Syl Length	Tone	Syllable Position				
		Ó	Ó	Ó	Ó	Ó]P
Short	L	x	x	x	x	x
Short	H	x	x	x	x	ø
Long	L	x	x	x	x	ø
Long	F	ø	ø	ø	x	ø

Table II

I will now account for the impossible combinations. The reason for which a High tone will never appear in final position is due to a phrasal rule mentioned briefly above. The rule in question, Phrase-final Left Shift (to be discussed in further detail in Chapters Three and Four), will shift an underlying prominence in phrase-final position one syllable to the left.

The major reason for which there are no long vowels in final position may ultimately be motivated by the proposed underlying morpheme structure condition which only allows long vowels in penultimate position (see §2.3.1). This underlying constraint, however, does not explain the lack of a surface long vowel in cases such as *o-mu-nwa* 'mouth' which is derived from underlying /o-mu-nua/. I assume that Devocalization (17) applies here as it does in all ..V[+high] V.. sequences (giving the intermediate form /omunwaa/). However no long vowel results on the surface. There appear to be two possible ways to account for this fact. One option would be to complicate the rule of Devocalization, such that if the syllable which would normally

undergo lengthening is word-final, both the association line (from the [+ high] vowel) *and* the corresponding mora node delete, eliminating any possibility of compensatory lengthening caused by moraic reassociation.

The second option would be to add a rule which shortens a syllable in word-final position. I prefer to leave Devocalization formalized in maximally general terms, and will adopt the second option and assume there is a rule of Final Shortening formalized in (38). (That the relevant domain of this rule is the word (=W) will be shown in Chapter Five)

(38) *Final Shortening*

```
μ ---> ø /   Ó ]W
            / \
           μ ___
            \ /
           [-cons]
```

For concreteness I have written the rule such that the second mora deletes. This is not crucial, however, as it will not matter which mora deletes.

The last impossible combinations in the chart above involve Falling tones in pre-penultimate position. Here again, I will assume that compensatory lengthening applies after every application of Devocalization, Vowel Elision, and Demorification. I will adopt a shortening rule which will shorten any long syllable in prepenultimate position which is linked to an underlying prominence. The addition of this one rule, I feel, is preferable to complicating the three rules which trigger compensatory lengthening. The formalization of this rule is then as follows:

(39) *Prepenultimate Shortening*

```
                x
                Ó   Ó   Ó ...]W
               / \
μ ---> ø /    μ ___
```

The above two rules in (38) and (39) will account for the observations in Table II regarding phrase-final words. There is, however, one more environment in which a vowel becomes shortened, which occurs when the word is *not* phrase-final. Simply put, any long vowel is shortened in a word which is not phrase final. This is illustrated below in (40) for prominent syllables, and in (41) for non-prominent syllables.

(40)

	Isolation		Non-phrase-final	
a.	o-ku-byáar-a	'plant'	okubyar' ébiintu	'plant things'
	o-ku-ráaz-a	'extinguish'	okuraza mpóra	'extinguish slowly'
	o-ku-túur-a	'disrobe'	okuturá bwaangu	'disrobe quickly'
b.	o-mu-káate	'bread'	omukáte gwaange	'my bread'
	o-bu-háango	'bigness'	obuhángo bwaange	'my bigness'
	o-mw-áana	'child'	omwána waange	'my child'

(41)

	Isolation		Non-phrase-final	
a.	o-ku-ragaan-a	'promise'	okuragan' ékiintu	'promise something'
	o-ku-ziik-a	'bury'	okuzik' ékiintu	'bury something'
	o-ku-tiin-a	'fear'	okutina Tibamánya	'fear Tibamanya'
	o-mu-keeka	'mat'	omukeka gúbi	'bad mat'
	o-ru-hooya	'song'	oruhoya rúbi	'bad song'
	e-bi-choori	'maize'	ebichorí byaange	'my maize'
b.	o-kw-iikar-a	'dwell'	okwikara Kénya	'dwell in Kenya'
	o-kw-iinuk-a	'go home'	okwinuka Kénya	'go home to Kenya'
	o-kw-iinam-a	'bend'	okwinam' ékiintu	'bend somthing'
	o-kw-iijuk-a	'remember'	okwijuká kuruungi	'remember well'
c.	o-kw-iikiriz-a	'agree'	okwikiriza kúbi	'agree poorly'

To account for the forms in (41) it is not possible to simply change the domain of Pre-penultimate Vowel Shortening (39) to the phrase and remove the stress from the structural description, because, although this correctly predicts shortening of the non-phrase-final forms in (40) and (41) (as well as the isolation forms in (40)), the rule would incorrectly shorten the long stressless vowels in isolation forms of (41b-c) (as they are phrase-final). It seems, then that one more rule of vowel shortening is needed, such as the one I present below. (CG = clitic group, which will be defined in Chapter Five)

(42) *Phrasal Vowel Shortening*

$$\mu \text{ ---> } \emptyset \;/\; \begin{array}{c} \acute{\sigma} \\ / \backslash \\ \mu \end{array} \_\_\_ \ldots \;]_{CG}\; CG \;]_{F}$$

This rule correctly predicts that any long vowel will shorten when in a clitic group which not phrase-final. In Chapter Five I will, in fact, show that the domain interior to the phonological phrase in (42) is the clitic group and not the word.

2.5 Phonemic status of surface glides

2.5.1 Phonemic status of *w*

Above, we have seen many surface [w]'s which derive from underlying /u/'s found at the right edge of the noun class prefixes. With respect to morpheme internal [w]'s we have seen that since long vowels always follow them (in the environments where they are not subsequently shortened), it is possible to set them up as underlying /u/'s. All the examples I have given containing a morpheme internal [w] are of the form [...CwV...]. One may wonder what happens to sequences of the type [wV...] and [...VwV...]. There is only one word in my data base of the form [wV...] which is the compound form *wénéne* 'him/her'. In this case compensatory lengthening could not occur as it would derive a surface Falling tone in antepenultimate position which is forbidden by (39). Thus I may assume this [w] derives from /u/.

Of the [...VwV...] type, I have found three forms: *ówa* 'who', *iwe* 'you (sg.)', and *e-zawáadi* 'gift'. In the first two cases, no compensatory lengthening could occur, as a long syllable is final position is prohibited by (38). In *ezawáadi* , however, a long vowel occurs after the surface [w] which is what is predicted if that [w] was underlyingly /u/. Thus, it seems both possible and desirable to set up every surface [w] as underlying /u/.

2.5.2 Phonemic status of *y*

We saw in (20) - (24) above that noun class prefixes ending in /i/ behave in the same way as those ending in /u/, gliding before vowel initial roots which subsequently triggers compensatory lengthening. Thus, a surface [y] in morpheme-final position certainly derives from /i/. E.g. [e-by-úupa] < /e-bi-úpa/ 'bottles'. (Cf. e-bi-tabo 'books'). But, what of morpheme initial and internal [y]'s? All morpheme internal [y]'s can be derived from /i/ as they trigger compensatory lengthening (E.g. *o-ku-byáar-a* 'to plant' < /o-ku-bíar-a/.) One morpheme initial [y] is followed by a short vowel (viz. *o-mu-yaga* 'wind'). I will simply assume that this form is marked as an exception to compensatory lengthening.

I conclude that there is no /y/ phoneme, but that all surface [y]'s are derived from underlying /i/. This accounts for the widespread compensatory lengthening effects when /i/ becomes devocalized.

2.6 Review of mora and syllable building algorithm

Now that I have reviewed the processes and rules which manipulate moraic and syllabic structure let me review the syllabification algorithm (8) presented above, repeated here as (43).

(43) Mora and Syllable Construction:

a. Certain [-cons] segments will be underlyingly associated to two μ's.

b. Associate any sequence of two tautosegmental morae to a single σ.

c. Associate every [-cons] segment to its own μ.

d. The morae associated to sequences of /ai/ which are *not* word final are associated to a single syllable node.

e. Associate a new σ to each remaining μ.

f. Associate a maximum of one melodic segment to the following syllable node. Where more than one segment could be associated, associate only the rightmost one.

g. If there is any melodic segment which still is not associated to a mora, assign it its own mora and syllable node.

(43a) explains the fact that certain vowels are underlyingly long (= bimoraic) while others are not. (43b) insures that the two morae associated to a single vowel are always tautosyllabic. (43c) predicts that all vowels (some of which will ultimately surface as glides) are underlyingly moraic, which accounts for the compensatory lengthening after Devocalization and Vowel Elision. (I will discuss (43d) below.) (43e) renders all remaining moraic segments syllabic. (43f) predicts that, at this stage, syllables may have a maximum of one onset consonant. Thus the only possible syllable shapes after initial syllabification are V and CV(V). (43g) specifies the underlying source of prenasalized stops as moraic nasal + stop sequences, which is necessary to predict the compensatory lengthening of pre-NC vowels. (See §2.3.3.3 for justification)

(43d) which allows /ai/ diphthongs in non-word-final position merits further discussion. Only a small subset of possible two-vowel sequences occur in Kinyambo, namely: [ia], [iu], [ei], [eu], [ua], [ai], [ao]. I motivated the rule of Devocalization (17) in §2.3.3.1 which stated that [+high] vowels glide before a following non-identical vowel. What then of [ia], [iu], and [ua]?

The status of [ua] was discussed in §2.3.3.1 above. We saw that the *u* in *o-ku-huu-a* does not glide because it is bimoraic, not meeting the structural description of devocalization. The forms *i-úa* 'flower' and *e-barúa* 'letter' were argued to be lexically marked as exceptions to gliding.

The only [iu] sequence is found in the form *i-úa* 'flower'. Here I will simply assume that the /i/ allomorph of the Class 5 prefix /ri/ is marked as a lexical exception to gliding, as it never undergoes devocalization.

The only noun with a [ia] sequence is *o-ku-ñíam-a* 'lie down'. I propose the following tentative account. Cross-linguistically a [ñy] sequence is highly marked if attested at all, and I will assume that it is excluded by a universal principle which will prohibit glides from following a segment which shares all of the features of that glide. This might fall out from the Obligatory Contour Principle. This blocks conversion of [ñiama] to *[ñyama].

I will claim that the remaining VV sequences [ei], [eu], and [ao] behave as two syllables. The sequences occur in the following words: *e-béi* 'prize', *e-úunga* 'flour', *e-úuzi* 'thread', *e-m-bao* 'plank'. First, Devocalization would not be expected to apply in /eV/ sequences as the first vowel is not [+ high]. As far as word-final /ei/ and /ao/ are concerned, we have seen that Kinyambo does not tolerate phrase-final bimoraic syllables either underlyingly or phonetically (cf. Table II). Syllabification principles (8c) and (8e), which assign all [-cons] segments a mora and syllable node account for the lack of underlying bimoraic syllables in phrase-final position. Additionally, all VV sequences in word-final position are treated as two syllables by the phrasal phonological rules which will be discussed in Chapter Four.

The sequence [ai] is exceptional in that it usually acts as a bimoraic ("long") syllable when not word-final. (E.g. *o-mu-sáija* 'man', *o-mu-máiso* 'front', *o-bu-*

raingwa 'height', *bwaigoro* 'evening'). If the sequence is found at the end of a word, it is analyzed as being disyllabic (as are all such VV sequences). (E.g. *e-n-gái* 'plank', *e-papái* 'papaya'). The non-word-final bimoraic /ai/ sequences pattern with the other bimoraic vowels in that they undergo Phrasal Vowel Shortening (42) when followed by another word as illustrated below:

```
(44)  ó ó   ó  ó          ó ó   ó  ó        ó  ó
      | |   /\ |          | |   |  |        |  |
      μ μ   μ μ μ          μ μ   μ  μ        μ  μ
      | |   | | |          | |  /\  |        |  |
      o-mu-s a i j a       o-mu-s a i j a    m u- k e
      'man' (isolation)    man               small
                           'small man'
```

2.7 Summary

In Kinyambo, glides and vowels do not contrast. Specifically, [i] and [y], and [u] and [w] are in complementary distribution, the latter member of each pair only occurring before vowels. This is predicted on my analysis which makes no distinction between vowels and glides in the underlying representation. All [-cons] segments are uniformly represented, being associated to a mora and syllable node.

This underlying representation makes further predictions which are borne out by the facts. Under Devocalization, the mora initially associated to the gliding vowel remains and reattaches to the adjacent vowel, making it long. Similarly, under Vowel Elision, the mora associated with the eliding vowel remains and reassociates to the adjacent vowel, making it long.

Finally, we have seen that some nasals are syllabic while others are not. Under my analysis the five phonetic nasals ([m], [ɱ], [n], [ñ], and [ŋ]) derive from three underlying ones (/m/, /n/, /N/). The syllabification algorithm will render all /N/'s which precede consonants moraic (and syllabic), as they will be the only nasals which will not become onsets. This makes the correct prediction that under Nasal Demorification these

nasals will a) surface as non-moraic, and b) trigger compensatory lengthening of the preceding vowel. The fact that Nasal Demorification only applies to nasals which are homorganic to the following consonant correctly predicts that word-initial nasals specified for place of articulation will surface as syllabic.

Chapter Three

The Underlying Prominence Patterns of Kinyambo Words

In this chapter I will establish the underlying representations of the various types of lexical items in Kinyambo, concentrating on those which are part of the nominal system. In many cases, this can be done by simply referring to the isolation forms. Although the bulk of the phrasal phonology will be discussed in Chapters Four and Five, I will refer to it below to the extent needed to establish the correct underlying forms of the lexical items under examination.

3.1 Data to be accounted for

In the following table are examples of surface nouns listed according to number of syllables (in both the word and root) and tone pattern.

SIR	TS	All Low	One High	One Falling
1	2	ee-n-**te** 'cow'	í-**fa** 'famine' (U.R. i-**fá**)	ée-m-**bwa** 'dog' (U.R. e-m-**bwá**)
1	3	e-kii-**ntu** 'thing'	o-mú-**ti** 'tree' (U.R. o-mu-**tí**)	ø[1]
2	3	ee-n-**goma** 'drum'	ee-n-**jóka** 'snake'	o-mw-**áana** 'child' a-má-**iso** 'eyes' (U.R. a-ma-**íso**)
2	4	e-ki-**tabo** 'book'	o-mu-**káma** 'chief'	o-mu-**káate** 'bread'
3	4	ee-n-**dagano** 'agreement'	ee-n-**kókora** 'cough'	
3	5	o-mu-**sogoro** 'bean leaf'	o-mu-**rúmuna** 'sibling'	

Table I

[1]This gap in the table is due to the fact the none of the class prefixes is underlyingly bimoraic to produce a word of the type V-CVV-CV.

(SIR = syllables in root; TS = total syllables. Hyphens indicate morphological boundaries. Roots are in boldface.)

Underived nominal roots may vary in length from one to three syllables. Since the preprefix + prefix can be either one or two syllables, Kinyambo underived nouns range from two to five syllables. I would like to make the following generalizations about the surface tone patterns of these words.

First, there is a maximum of one non-Low tone per noun in isolation. Second, a High (or Falling) tone surfaces on the initial syllable of the root, except in the case of monosyllabic roots, in which case it surfaces on the penultimate syllable of the word. Finally, Falling tone only occurs penultimately. I will discuss these generalizations further below.

3.2 Domain of prominence

I will now consider how underlying prominence may associate onto prominence bearing units. I will claim that prominence in Kinyambo is best represented as stress underlyingly. A late rule of Tone assignment will assign High and Low tone on the basis of the existing stresses.[2] In the discussion which follows I will make the standard autosegmental assumption that contour tones are merely a sequence of level tones. Hence, reference to a 'Falling' tone implies a High tone followed by a Low tone.

I propose that the domain of stress is the syllable, while the domain of tone is the mora. A mora will never bear more than one tone. In a bimoraic syllable, a Falling tone is simply a sequence of a High-toned mora followed by a Low-toned mora. In

[2]I am not the first to suggest that a language might employ grid marks in the phonology, but have only tones on the surface. Goldsmith (1987) suggests this is the case for Kintandu, a Bantu language in the Kikongo group. In his analysis, however, both grids and tones interact in the phonology, whereas I will suggest that there is no such interaction. Only grids are present in the phonology, until the final rule assigns tones on the basis of existing stresses.

Kinyambo a short (= monomoraic) vowel cannot bear a Falling tone. Since every syllable is either associated with one mora or two, there are six logical possibilities of tone/syllable types: [v], [v́], [vv], [v́v], [vv́], [v́v́]. Of these six possible combinations the first four are extremely common. The final type does not occur in any lexical item that I know of. The existence of [vv́] depends on the analysis of words such as: *e-papái* 'papaya', (cf. *epapaí yaange* 'my papaya'). If this noun were analyzed as having three syllables then the pattern [vv́] would exist in certain derived contexts. However, we saw in Chapter Two that Kinyambo does not tolerate word-final bimoraic syllables. (This fact will be discussed again in §5.5.1). This suggests we are dealing with two syllables. Moreover, the phrasal rules to be discussed in Chapter Four treat such words as if the syllable structure were [e.pa.pá.i]. Therefore I will claim that there are no [vv́] syllables, which is consistent with my analysis in which the syllable, and not the mora, is the domain of underlying prominence.

I will suggest that when a monomoraic syllable is stressed, a rule of Tone Assignment (to be formalized in §3.7.5.2 below) simply assigns a High tone to the mora in question. Likewise, when a monomoraic syllable is unstressed a Low tone will be assigned to the mora. When a bimoraic syllable is unstressed a Low tone will be assigned to both morae. Finally, when a bimoraic syllable is stressed a High tone will be assigned to the first mora while a Low tone will be assigned to the second.[3] This accounts for the fact that there are no [vv́] or [v́v́] syllables.

I now propose the following analysis of underlying representations, each point of which I will justify.

[3]If we consider morae associated to a syllable node to be left-headed structures, then the rule of Tone Assignment simply assigns a High tone to the head of any stressed syllable.

3.3 The position of underlying prominence

If a root bears a stress, that stress will be realized on the initial syllable of the root. With the exception of monosyllabic roots and the word *a-má-iso* 'eyes (which cases will be discussed below), all the forms in Table I conform to this statement. There are, however, some surface exceptions to this generalization. There are nine cases known to me (out of approximately 380 nouns in my data base) in which a High tone is born by a non-initial mora in a noun root [4]. I will briefly consider them here.

(1)	e-papái	'papaya'
	o-mu-tamíire	'drunkard'
	e-zawáadi	'gift'
	e-ñañíiñi	'star'
	e-ch-akúrya	'food'
	e-barúa	'letter'
	e-ki-goongóro	'millipede'
	o-ru-huguhúgu	'bat'
	e-ki-zuunguzúungu	'giddiness'

First, it is interesting to note that in each case, stress falls on the penult. The words *ebarúa* 'letter' and *ezawáadi* 'gift' are both borrowings from Swahili which has regular penultimate stress. (Swahili borrowed both of these words from Arabic.) The word *epapái* 'papaya' may or may not have been borrowed from the Swahili *papaya*, but is obviously a borrowing as well.

Some of these forms appear to be derived. If this is true, and it can be shown that the nouns they are derived from all bear a stress on their initial mora, then they can be dismissed as exceptions to this generalization that no syllable other than the first may bear stress underlyingly. The first process which may be at work here is reduplication. The words *oruhuguhúgu* 'bat' and *ekizuunguzúungu* 'giddiness' are certainly reduplicated forms of *-húgu* and *-zúungu* respectively, although these latter forms do

[4] With regard to verbal infinitives, which function simultaneously as Class 15a nouns, there are only three exceptions (in over 225 forms) to the generalization that any high tone is born by the first mora of the stem. Of approximately 15 adjectival stems this generalization holds true for all of them as well. Thus, there are actually twelve exceptions out of 620 stems.

not appear to exist independently in Kinyambo. It is also possible that *ekigoongóro* 'millipede' is a reduplicated form of *-gor-* (which also does not exist independently). The *r* may have become a homorganic nasal since [rg] sequences are impossible in Kinyambo. The final *o* could be a type of nominalizer as it is in the word *o-ru-gend-o* 'journey' which is derived from the verb *o-ku-gend-a* 'go'. If this analysis is adopted for these three words, then a lexical rule would be needed which states that after a root is reduplicated only one (in these cases, the second) of two prominences survive.

The word *echakúrya* 'food' is derived from *(ekintu) cha + okúrya* '(thing) of the eating'. The word *o-mu-tamíir-e* 'drunkard' is derived from the verb *o-ku-tamiir-a* 'be drunk', the insertion of the prominence presumably being part of the nominalization process as seen in other forms such as *e–n-góonz-i* 'love (n.)' (< *o-ku-gonz-a* 'love (v.)').

Of course, borrowings are not exempt from just any constraint. There are no borrowings, for example, with consonant clusters or word-final consonants. It appears, however, that the recently borrowed words which had penultimate stress in the donor language do not violate the prosodic system of the language to the extent that any restructuring is required. This, I believe, is due to two things. First, it seems that the language can itself produce isolation forms by the process of reduplication which do not bear their High tone on the first mora of the enlarged root. Second, as we will see in the next chapter, in non-phrase-final position a syllable other than the root-initial one may bear a prominence. (E.g. *o-mu-góre* 'bride', *omugoré waange* 'my bride').

Of the nine words which appeared to be exceptions to the generalization that prominence is borne only by the first syllable of the word, I have considered explanations for all but *eñañíiñi* 'star' which itself looks suspiciously derived by reduplication. To conclude, I will assume that the overwhelming majority of lexical

items in Kinyambo which a surface with a prominence, are assigned that prominence on the initial syllable of the root by a rule of Lexical Stress to be formalized below. A borrowed word such as *e-barúa* 'letter' is simply a lexical exception in that its penultimate syllable is underlyingly stressed. I suspect that there will be other borrowings (of which I am not yet aware) which will have to be treated similarly.

3.4 Noun roots have a maximum of one stress underlyingly

The assertion that noun roots may have no more than one stress is justified by the surface tone patterns of the isolation forms themselves (see Table I), as no noun bears more than one non-Low tone. The mora on which this tone is realized on the surface is a separate issue which will be addressed below. Domains which have a maximum of one prominence include not only nominal roots but adverbs, adjectives, prepositions, and verb roots (see §4.4 for examples). This cannot be a morpheme structure constraint holding for all *words* , however, as proper nouns (2) and inflected verbal complexes (3) may contain more than one High tone in their surface forms.

(2) Byéngózi
Kambuzémyáanya
Kókuháabwa
Tíbwóomo
Tínkalégaire

(3) a. bá- ka- kóm-a
3pl PAST tie FV (final vowel)
'they tied'

b. ba-rá- mu- kóm-ir- e
3pl FUT 3sg. tie INCEPT FV
'they have ever tied him'

The prominence patterns of the forms in (3) will be discussed in §4.5.10.

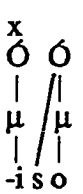
3.5 All class prefixes are underlyingly stressless

In all nouns wherein the root has at least two syllables, there is only one type of noun (see *a-má-iso* in Table I) in which the class prefix bears a High tone. (This form

was discussed in §2.3.2 and will be discussed again below.) All other cases in which a class prefix (or preprefix in the event the class prefix is not syllabic) bears a High tone involve monosyllabic roots. I will assume that monosyllabic roots are like other roots in that some may be stressed and some stressless. There is a language-specific prohibition in Kinyambo against a prominence in phrase-final position. Given the autosegmental nature of underlying prominence, one might expect the underlying stress associated with a monosyllabic root to be realized on some other syllable.[5] In Kinyambo, the stress shifts leftward onto the next syllable which, in the case of a monosyllabic root, will include the class prefix or preprefix. This rule will be discussed and formalized below in (8). Given this analysis it is correctly predicted that there will be no High tone on the class prefix of nouns whose roots contain more than one syllable, as an underlying stress could be realized on the penultimate syllable of the root.

The case of nouns such as *a-má-iso* 'eyes' is slightly different. In this case I will assume that the root is underlyingly bisyllabic and that the first syllable is stressed. At the level of the root, then, the structure after the Lexical Stress Rule applies is the following:

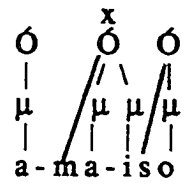
(4)



As shown in §2.3.2, when the class prefix and preprefix are added, principle ((8d) of Chapter Two) of the syllabification algorithm (see §2.2) will make any /ai/ sequence (which is not word-final) monosyllabic as shown below.

[5] The fact that stress remains even after the unit which bore it is becomes deleted is documented in Al-Mozainy et al. (1985) and later work. This phenomenon will be discussed in §4.4.7.2.

(5)



In the case of words such as *e-rí-iso* 'eye' (< /e-ri-íso/) and *a-má-ani* 'strength' (< /a-ma-áni/), the same process occurs, but this time as a result of the Obligatory Contour Principle affecting the melodic tier, and syllabification principle ((8b) of Chapter Two) affecting the syllabic tier as discussed above in §2.3.2.

3.6 All preprefixes are underlyingly stressless.

As seen in Table I, preprefixes always bear a surface Low tone unless they are part of a noun whose monosyllabic root is stressed and whose class prefix is not syllabic. In these cases, the rule mentioned above (to be formalized in (8) below) which shifts a phrase-final stress one syllable to the left will shift the stress on the root of a form such as *éembwa* 'dog' onto the preprefix (i.e. /e-m-bwá/ --> [éembwa]).

Preprefixes are often High when phrase-medial as seen below.

(6)

Isolation	Gloss	Non-post-pausal	Gloss
omugóre	'bride'	Mbonir' ómugóre	'I saw the bride'
enjóka	'snake'	Niñendá kubon' énjóka	'I want to see the snake'
omuntu	'person'	Nibakomá bwang' ómuntu	'They are tying, quickly, the person'
ekitabo	'book'	Nejákworech' ómurim' ékitabo	'I will show the farmer the book'

In Chapter Four I will argue that the prominence on the preprefixes in phrase-medial cases are derived by a phrasal rule, allowing them to be set up as underlyingly unstressed, reflecting their surface realization in isolation forms.

3.7 Underlying representations of lexical items

3.7.1 All low surface forms

I will now specify the underlying representations of the noun types in Table I. Given the above assumptions, nouns that are all Low in isolation would have no underlying stress underlyingly.

(7)

. . . . e-ki-tabo 'book'	Underlying Representation
ekitabo	Surface

3.7.2 Nouns whose class prefix or preprefix bear a High tone

Nouns in which a surface High tone appears on the Class Prefix or Preprefix bear a stress on the monosyllabic root underlyingly. To account for the fact that they surface with a prominence on the penultimate syllable of the word I propose the existence of a rule of Phrase-final Left Shift which is formalized below in (8)

(8) *Phrase-final Left Shift*

. x]$_P$ --> x .]$_P$

I will specify the exact domain of application of this rule in Chapter Five. Its application is illustrated in the derivations below.

(9)

a.	. x . . . [i-jwi ri-ruungi]$_I$ ashes good 'good ashes'	a'.	. x [i-jwi]$_I$ ashes	Underlying Representation
b.	----------	b'.	x . [ijwi]$_I$	Phrase-final Left Shift (8)
c.	ijwí riruungi	c'.	íjwi	Surface Form

As seen above, the rule only affects prominences in phrase-final position. If the prominence is not phrase-final, as in the derivation in the left column, then no shift occurs.

3.7.3 Nouns with a surface Falling tone

Noun roots with a surface penultimate Falling tone have an underlying stress on the penultimate syllable.

(10)

```
                x
  ó    ó    ó    ó
  |    |    /\    |
  μ    μ   μμ    μ
  |    |    \/    |
  o-   m   u-k a t  e
  'bread'
```

After Syllabification & Lexical Stressing

omukáate — Surface Form

Words of this kind show an alternation in the length of the penultimate syllable when found in phrase-final and non-phrase-final position as illustrated in Chapter Two. (Cf. *omukáte guruungi* 'bread--good')

3.7.4 Nouns which surface with a High on the penult or pre-penult

All remaining noun roots which surface with a prominence (besides the exceptional forms discussed in §3.3) will bear a stress on their initial syllable as in the examples below.

(11)

```
. . x .
o-mu-kono
'arm'
```

Underlying Representation

omukóno — Surface

(12)

```
. . x . .
o-mu-fagizo
'broom'
```

Underlying Representation

omufágizo — Surface

The rhythmic changes which operate on these nouns when they are not phrase-final will be discussed in detail in the next chapter.

3.7.5 Optional stress

3.7.5.1 Isolation forms with optional stress

An interesting aspect about Kinyambo words is that some have two possible surface prominence patterns in isolation. Consider the isolation forms below (in the column on the left) which have two possible pronunciations in contrast with those that do not (in the column on the right). (13a-c) list nouns with roots containing one, two and three syllables respectively.

(13)	Forms with optional stress	Gloss	No opt. stress	Gloss
a.	e-ño ~ é-ño	anus	o-muu-nda (*omúunda)	inside
	i-ne ~ í-ne	liver	o-muu-ntu (*omúuntu)	person
	ee-n-da ~ ée-nda	lice	ee-n-te (*éente)	cow
	o-bu-ra ~ o-bú-ra	length	a-ma-ra (*amára)	intestines
	o-ru-ho ~ o-rú-ho	fog	e-kii-ntu (*ekíintu)	thing
	o-mu-ji ~ o-mú-ji	town	o-mu-nwa (*omúnwa)	mouth
	o-mu-zi ~ o-mú-zi	root		
b.	o-mu-nofu ~ o-mu-nófu	flesh	e-ki-reju (*ekiréju)	chin
	o-mu-rimi ~ o-mu-rími	farmer	o-ru-higi (*oruhígi)	door
	o-bu-nuzi ~ o bu núzi	flavor	e-ki-bira (*ekibíra)	forest
	o-bu-tiini ~ o-bu-tíini	fear	e-n-saano (*ensáano)	flour
	o-bu-huunga ~ o-bu-húunga	flour	e-ki-paanga (*ekipáanga)	knife
	o-mu-taambi ~ o-mu-táambi	doctor	e-ki-reenge (*ekiréenge)	foot
c.	e-ki-chuchuzo ~ e-ki-chúchuzo	comb	e-ki-takuri (*ekitákuri)	yam
	o-ru-papuro ~ o-ru-pápuro	paper	i-chumbiro (*ichúmbiro)	fireplace
	o-mu-sogoro ~ o-mu-sógoro	bean leaf	e-m-pororo (*empóroro)	answer

When I first elicited the forms on the left, they were given to me in their all Low form. It was only later when I rechecked the possible tone patterns of isolation forms that I discovered that certain of these nouns could be pronounced as if they had a stress on the initial syllable of their root underlyingly. When asked which of the two pronunciations my consultant prefers, she claims that both are equally acceptable, however, it is usually the all-Low alternate which she produced first. Moreover, if she is asked to read a long list of different nouns, she will generally pronounce more of

these items as all-Low than with one High. Since both forms are readily accepted and produced, however, I will assume that the grammar must account for both of them.

These variably pronounced nouns cannot, however, simply be set up as underlyingly stressed because there are many nouns with a surface High (or Falling) which do not have an alternate pronunciation, as shown below in (14).

(14)	Form	Gloss
a.	o-bú-bi (*obubi)	badness
	ée-mbwa (*eembwa)	dog
	í-jwi (*ijwi)	knee
b.	e-ki-kére (*ekikere)	frog
	e-n-kóko (*enkoko)	chicken
	e-ki-húungu (*ekihuungu)	eagle
	o-mw-áana (*omwaana)	child
	o-mu-káate (*omukaate)	bread
c.	o-mu-fágizo (*omufagizo)	broom
	e-ságama (*esagama)	blood
	e-n-kóroro (*enkororo)	elbow

Upon inspection of the three types of forms in (13) and (14) above I think it will be impossible to distinguish the three types of nouns on any phonological criteria. Therefore, given the forms in (14) and those in the right-hand column of (13), it cannot be assumed that the variably pronounced nouns have roots which are underlyingly either stressless or stressed.

How, then, can the variably pronounced isolation forms be accounted for? In order to answer this question, I must first discuss how best to represent nouns with an underlying stress, such as those in (14). It seems that they could either a) bear a stress underlyingly or b) be lexically marked to undergo a Lexical Stress rule. The formal difference between these two proposals is illustrated below for the forms *e-ki-kére* 'frog' and *e-ki-tabo* 'book'. (R= root)

(15) Proposal A

U.R. $\overset{\cdot\ \cdot}{/tabo/}$ Morpheme Structure Constraint: $* \quad \overset{\cdot\ \ \overset{x}{\cdot}}{[_R \ldots \acute{O}\ \acute{O}}$

$\overset{x\ \cdot}{/kere/}$

(16) Proposal B

U.R. /tabo/ Lexical Stress Rule:

/kere/
[+ stress]

$$\underset{[+\text{ stress}]}{\acute{O}} \rightarrow \overset{x}{\acute{O}} \,/\, [_R \_\_$$

I will briefly discuss these two proposals. In proposal A, stress is represented underlyingly on certain roots. In order to capture the generalization that, with few exceptions, underlying stress is borne by the initial syllable of the root, there is a morpheme structure constraint with states that a root cannot bear a stress on a non-initial syllable.

Proposal B maintains simply that roots are of two types underlyingly. This can be represented as above where one is marked [+stress] and the other not. On this proposal, then, there is a lexical rule which will assign a stress to the initial syllable of roots marked [+stress]. This captures the generalization of stress location without resorting to a morpheme structure constraint, which, I believe, should only be invoked when no rule can be formulated to account for the same generalization.

Consider how an exceptional item, such as the root of *e-barúa* 'letter' (cf. §3.3), would be represented under the two proposals. Under both proposals the item would underlyingly bear a stress on the second syllable of the root. Under proposal A, the exceptionality of such a root resides in the fact that it violates the morpheme structure constraint in (15). Under proposal B, no recourse to anything outside the body of lexical entries is necessary to show the exceptionality of such a root. These few roots are exceptional in that they are the only ones bearing an underlying stress.

I suggest that proposal B is the best one. Perhaps the strongest reason for this is that most stress languages assign stress by rule. Only as a last resort is stress borne underlyingly by some formative. (Many alleged cases of 'phonemic stress' can now be accounted for by the principle of extrametricality (cf. Hayes 1982).) In a 'true' tone system, tone (either H, L, or both) is marked lexically as its location is completely unpredictable. In an accentual system, accent is also specified underlyingly on a specific syllable, as its location is equally unpredictable. Since the location of prominence in Kinyambo *is* predictable, I see no reason to specify its location underlyingly.

The main difference, of course, between Kinyambo and other stress languages is that it is not the case in Kinyambo that each and every lexical item bears a prominence. Proto-Germanic had a stress rule very similar to the one in Kinyambo (stressing root-initial syllables). The difference between Proto-Germanic and Kinyambo, however, is that since every word received a stress in Proto-Germanic, the lexicon did not need to be bifurcated by a morphological distinction (such as [+/- stress]). Every word underwent the lexical stress rule. Kinyambo cannot work this way because some words must surface as toneless (< stressless).

Thus, whereas the properties of a) tolerating prominence-free words and b) unpredictability of the location of prominence are usually both positive or both negative, Kinyambo is positive for a) but negative for b). To complete the paradigm, a 'true' tone language will be [+a, +b], most stress languages will be [-a, -b]. Kinyambo is [+a, -b]. Languages where the location of stress must be lexically specified are [-a, +b].[6]

[6]Languages of this last type, having phonemic stress (such as Russian), are discussed in §4.1

3.7.5.2 Phrases with optional stress

There is one last class of lexical items which merits our attention. Though the bulk of the phrasal phonology will be discussed in Chapters Four and Five, I choose to examine one phrasal phenomenon here, which bears on the representation of underlying forms. Certain nouns with an underlying prominence optionally lose their prominence when found at the end of a phrase in which they are not the only member. Examples of this are found in (17) below.

(17)	Isolation	Gloss	Niñend' 'I want N'
a.	o-mu-góre	bride	Niñend' ómugóre ~ Niñend' ómugore
	e-ki-tébe	chair	Niñend' ékitébe ~ Niñend' ékitebe
	e-ki-kápo	basket	Niñend' ékikápo ~ Niñend' ékikapo
	o-mu-gúsa	sorghum	Niñend' ómugúsa ~ Niñend' ómugusa
	o-ru-fúfu	belt	Niñend' órufúfu ~ Niñend' órufufu
b.	e-ki-gúunju	animal	Niñend' ékigúunju ~ Niñend' ékiguunju
	o-ru-búumba	clay	Niñend' órubúumba ~ Niñend' órubuumba
	e-ki-zíinga	island	Niñend' ékizíinga ~ Niñend' ékiziinga

It is not the case, however, that every noun with an underlying stress optionally loses it when at the end of a phrase. Many nouns do not optionally lose their stress in such an environment as shown below in (18).

(18)	Isolation	Gloss	Niñend' 'I want N'
a.	o-mú-syo	knife	Niñend' ómúsyo (*Niñend' ómusyo)
	a-má-ta	milk	Niñend' ámáta (*Niñend' ámata)
b.	e-ki-fúba	chest	Niñend' ékifúba (*Niñend' ékifuba)
	o-mu-chúzi	broth	Niñend' ómuchúzi (*Niñend' ómuchuzi)
	o-bu-káma	kingdom	Niñend' óbukáma (*Niñend' óbukama)
	e-ki-húungu	eagle	Niñend' ékihúungu (*Niñend 'ékihuungu)
c.	o-mw-áana	child	Niñend' ómwáana (*Niñend' ómwaana)
	e-ch-áara	finger	Niñend' écháara (*Niñend' échaara)
	o-rw-óoto	fire	Niñend' órwóoto (*Niñend' órwooto)
	o-mu-káate	bread	Niñend' ómukáate (*Niñend' ómukaate)
	o-bu-swéere	marriage	Niñend' óbuswéere (*Niñend' óbusweere)
d.	a-má-ani (< /-áni/)	strength	Niñend' ámáani (*Niñend' ámaani)
	a-má-izi (< /-ízi/)	water	Niñend' ámáizi (*Niñend' ámaizi)
	e-rí-ino (< /-íno/)	tooth	Niñend' éríino (*Niñend' ériino)
	e-rí-iso (< /-íso/)	eye	Niñend' éríiso (*Niñend' ériiso)
e.	e-barúa	letter	Niñend' ébarúa (*Niñend' ébarua)
	e-ki-gongóro	millepede	Niñend' ékigongóro (*Niñend' ékigongoro)
	e-ch-akúrya	food	Niñend' échakúrya (*Niñend' échakurya)
	e-zawáadi	gift	Niñend' ézawáadi (*Niñend' ézawaadi)
	o-mu-tamíire	drunkard	Niñend' ómutamíire (*Niñend' ómutamiire)
	o-ru-huguhúgu	bat	Niñend' óruhuguhúgu (* ... óruhuguhugu)
f.	e-ságama	blood	Niñend' éságama (*Niñend' ésagama)
	o-mu-fágizo	broom	Niñend' ómufágizo (*Niñend' ómufagizo)
	o-mu-rúmuna	sibling	Niñend' ómurúmuna (*... ómurumuna)

If we compare the forms in (17) to those in (18) it is clear that not all stressed roots undergo optional Phrase-final Destressing. As was the case with the lexically specified optionally stressed isolation forms, any appeal to phonological conditioning is futile to predictably distinguish the forms in (17) from those in (18). I can, however, note several interesting things about this rule. The first thing is that it only (optionally) applies to a subset of one class of roots--those which are bisyllabic (and stressed). Its application in any other root type is ungrammatical (18a,f), even when the stress falls on a penultimate syllable (with a long or short vowel) as seen in (18e).

There is one more interesting aspect about the two classes of forms in (17) and (18). The first is that optional Phrase-final Destressing never applies to syllables

which obligatorily surface as Falling in isolation, with one systematic exception noted below. It is well known that syllable weight often interacts with stress (see Hayes 1981, Prince 1983, Selkirk 1984, Hyman 1985, among others). Although syllable weight does not directly influence lexical stress assignment in Kinyambo, it seems that vowel length 'protects' a stress from undergoing optional Phrase-final Destressing.

As shown in §2.3, surface length can be due to a number of factors. These are: underlying length, length through morphological concatenation, and compensatory lengthening arising from a) Devocalization, b) Vowel Elision, or c) Nasal Demorification. It turns out that the only long vowels which do not protect a stress from undergoing phrasal destressing are those derived by Nasal Demorification. It should be recalled that in §2.3.3.3, I pointed out that, phonetically, these were the shortest of the long vowel types enumerated above (as is the case in other Bantu languages). Thus (18c,d) show long vowels which never lose their stress phrase-finally. In (17b) it is seen that the only long vowels which can undergo phrasal destressing are those derived by nasal demorification.[7] (This of course does not mean that long vowels derived by nasal demorification must undergo phrase-final destressing, only that they can.)

How, then, does one best represent the forms in (17)? First the forms listed in (17) are not of the type whose isolation forms are variably pronounced, discussed above in (13). None of the forms in (17) can be pronounced all-Low in isolation.

---

[7] As one possible way to formally account for these forms, it was suggested to me that the rule of Nasal Demorification (discussed in §2.3.3.3) might be reformalized to account for the fact that the resulting vowel is not fully bi-moraic (as are other compensatorily lengthened vowels). This could be achieved by not delinking the association line from the nasal to its mora node. The resulting moraic structure, for example, of *eente* 'cow' would then be as in (i) and not (ii).

```
i.  μ  μ          ii.  μ μ
     \/\                \/
     e nte              ente
```

It could then be said that *fully* bimoraic syllables which are prominent in isolation will never undergo Phrase-final Destressing.

Moreover, the variably pronounced forms discussed in (13) *obligatorily* undergo Phrase-final Destressing, a matter which will be accounted for below and in Chapter Four.

First, I will first attempt to account for these facts using the binary morphological features [+/- stress] (describing isolation form) and [+/- destressing] (describing phrase-final form). The noun types which exist are the following:

(19) a.	[+ stress, - destressing]	(forms in (18))
b.	[+ stress, + or - destressing]	(forms in (17))
c.	[+ or - stress, + destressing]	(forms in left-hand column of (13))
d.	[- stress]	(forms in right-hand column of (13))

Let us entertain an analysis which makes use of the principle of underspecification. Under standard assumptions of underspecification the four possibilities of lexical items are given in (20).

(20) a. [o stress, o destressing]
b. [o stress, + destressing]
c. [+ stress, o destressing]
d. [+ stress, + destressing]

Consider the rules which would be needed to arrive at the specifications listed in (19):

(21) a. If [+ stress], ø --> [+ or - destressing]
b. If [+ destressing], ø --> [+ or - stress]
c. ø --> [- destressing]
d. ø --> [+ stress]
e. [+ stress, + destressing] --> [- stress, - destressing]

(21a) would correctly produce (19b). (21b) would correctly produce (19c). (21c,d) would correctly produce (19a). The problem is that (21e) is completely arbitrary, and very unintuitive. Logically, there is no reason why there could not be certain roots which are obligatorily stressed and obligatorily undergo Phrase-final Destressing. While (21a-d) are possible rules, they certainly do not fall out from any theory-internal principles. It would seem, then, that underspecification enables us to

achieve descriptive adequacy, but certainly little explanatory adequacy is achieved. Moreover, it seems odd to allow such an elaborate apparatus for manipulating morphological diacritic features.

Given these problems, I propose the following alternative analysis. I will argue that stress is not binary but *n*-ary in Kinyambo. It will then be possible to lexically mark roots from strongest to weakest (along the lines of Halle & Vergnaud 1987): [3 stress], [2 stress], [1 stress], and [0 stress]. These would be pronounced in isolation and in phrase-final position as follows:

(22)

	Root Type	Isolation	Phrase-final	Surface Forms
a.	/-tabo/ [0 stress]	not stressed	not stressed	**ekitabo** 'book' **Niñend' ékitabo** 'I want the book'
b.	/-rimi/ [1 stress]	optionally stressed	not stressed	**omurimi ~ omurími** 'farmer' **Niñend' ómurimi** 'I want the farmer'
c.	/-kapo/ [2 stress]	obligatorily stressed	optionally stressed	**ekikápo** 'basket' **Niñend' ékikápo** 'I want **~ ékikapo** the basket'
d.	/-kama/ [3 stress]	obligatorily stressed	obligatorily stressed	**omukáma** 'chief' **Niñend' ómukáma** 'I want the chief'

The rule of Lexical Stress (to be formalized in §4.4) would add one or more grid marks to the initial syllable of the root according to the 'strength' of the diacritic stress marking on that root. Roots which are [3 stress] will receive grid marks up to level three. Roots which are [2 stress] will receive a level one and level two grid mark. And, roots which are [1 stress] will receive a single grid mark. This is illustrated below.

(23)

[$_R$kama [3 stress]	[$_R$kapo [2 stress]	[$_R$rimi [1 stress]	[$_R$tabo [0 stress]	Underlying Rep.
x x x .	x x .	x .	. .	Lexical Stress Rule
[$_R$kama	[$_R$kapo	[$_R$rimi	[$_R$tabo	

A tone assignment rule would then assign a High tone obligatorily to [2 stress] and [3 stress] forms. It would assign a High tone optionally to syllables which are [1 stress] and a Low tone to [0 stress] forms. This rule, to be discussed again in §4.4, is formalized below.

(24) *Tone Assignment*

```
a.          H          b.          H          c.
  (x)       |                      |
  x         μ                      μ                        L
  x         |/         x           |/                       |
  Ó --> Ó              Ó --> Ó                   μ --> μ
                       (optional)
```

The rule of Phrase-final Destressing will a) never have phonetic effects for the 'strongest' stressed roots (i.e. [3 stress]), b) optionally cause a [2 stress] root to be realized as Low and c) obligatorily cause the 'weakest' stressed roots (i.e. [1 stress]) to be realized as Low. [0 stress] roots could either vacuously undergo the rule, or be exempt from it on general principles. The rule is formalized as follows.[8] (R = root, W=word, P=phrase).

(25) *Phrase-final Destressing (first attempt)*

x --> ø / [W [[___ .]$_R$]$_W$]$_P$ (apply once at the highest level)

As formulated this rule will simply remove the topmost grid mark from the initial syllable of a bisyllabic root of the final word in a phrase in which it is not the only member. This is illustrated below.

[8] The formalization of this rule was suggested to me by Brian McHugh.

(26)

	x	x	Underlying
	x	x	Representation
. . x .	. . x .	. . x .	
...o-mu-rimi	...e-ki-kapo	...o-mu-kama	
		x	Phrase-final
. . . .	. . x .	. . x .	Destressing
...omurimi	...ekikapo	...omukama	(25)
...omurimi	...ekikápo ~ ekikapo	...omukáma	Tone Assign. (24)

This rule will correctly predict the surface forms given the rule of Tone Assignment (24) in which a High tone is optionally assigned to a syllable bearing a level one grid mark and obligatorily assigned to a syllable bearing a level two grid mark (or higher).

I find the above approach which posits an underlying hierarchy of stress levels appealing for a couple of reasons. First it captures the fact that there is a linear gradation of roots which intuitively corresponds to 'stress strength'. It predicts there would not be a rule which affected, say [0 stress] and [2 stress] in one way, but affected [1 stress] and [3 stress] in another. That this is true will be seen as we examine the rules of the phrasal phonology in Chapter Four.

Second, the above analysis captures the fact that while there are no phonetic gradations of prominence in Kinyambo, as is found in many stress languages which have secondary (and sometimes tertiary) stress, there are gradations in the underlying forms which are manipulated by the phonology. Thus, it can be claimed that Kinyambo *does* have stress gradations like many (or possibly most) other stress languages, but that it does so *phonologically*. This is consistent with my proposal that underlyingly and phonologically Kinyambo has all the essential properties of a stress language. Some of these properties are masked, however, as the late rule of Tone Assignment translates the stress system into a tone system containing a simple High/Low opposition.

3.8 Summary

In this chapter I have suggested specific underlying representations of the prominence patterns of Kinyambo words. First, I argued that while the domain of surface tone is the mora, the domain of stress in Kinyambo is the syllable. This claim was based on the fact that both monomoraic and bimoraic stressed syllables have only one surface form ([v́] and [v́v] respectively). Next, I showed that, with the exception of certain borrowed and reduplicated forms, a stress in a word occurs on the first syllable of the root. I then assigned specific underlying representations to the different types of roots found in the language. I noted that a rule of Phrase-final Left Shift is needed to correctly predict the surface prominence pattern of words having a stressed monosyllabic root.

Finally I showed that certain words were optionally stressed. Specifically, I noted the existence of words which are optionally stressed in isolation, and words which optionally lose their stress phrase-finally. I argued that an account which posited underspecified morphological stress features, although descriptively adequate, was arbitrary and unilluminating. I suggested, on the basis of the optionally stressed words, that stress in Kinyambo is actually an *n*-ary property which is realized by the assignment of differing numbers of grid marks on the initial syllable of the root.

In Chapter Four I will attempt to show, especially through an examination of the phrasal phonology, that Kinyambo truly is a stress language underlyingly, possessing the hallmark metrical properties which distinguish it from tonal and accentual systems. I will also provide additional, independent evidence for positing an underlying hierarchy of stress levels.

Chapter Four

The Metrical Nature of Prominence in Kinyambo

4.0 Introduction

In Chapter Three I established the underlying prominence patterns of lexical items. In this chapter I will show that prominence in Kinyambo shares certain properties characteristic of "pure" tone languages while it shares other properties characteristic of stress languages. While different linguists have proposed different prototypical qualities and diagnostics of stress, tonal, and accentual languages, it is not at all clear that there is a general consensus on what exactly distinguishes these three types of systems.

The first part of this chapter will consist of a brief presentation of some of the most basic distinctions between tone systems, stress systems, and accent systems. I will briefly reconsider the isolation forms with these distinctions in mind. Then, I will make an in-depth examination of the phrasal phonology. I will claim that the rules which account for the complex phrasal prominence patterns are metrical in nature. At the end of the chapter I will review the reasons for which a metrical account is descriptively and explanatorily more adequate than a tonal or accentual account of the same facts.

4.1 Basic properties of tone systems

Although tonal systems are extremely diverse cross-linguistically, let us briefly consider four common properties of such systems.

(1) Properties of tonal systems:

a. Pitch is the general acoustic signal of tone
b. In an ideal tone situation, each tone may freely combine with each other tone
c. Tones may be associated with the mora, syllable or even the morpheme
d. Tones may have various effects on adjacent tones

It is fairly non-controversial that the best correlate of tone is pitch or in acoustic terms, F_0. Such is not the case for stress languages, in which more phonetic factors play a role in the signal.

The second property listed (1b) is perhaps slightly more controversial. In certain tone languages each tone may indeed combine freely with each other tone. Such, for example, is the case in Hausa. Consider the bisyllabic words in (2a) below where each of the four logically possible tonal combinations is attested.

(2a) Hausa bisyllabic words

Tone Pattern	Word	Gloss
LL	yaayaa	'how'
LH	tooróó	'male duck'
HL	túútaa	'flag'
HH	búúzúú	'Tuareg'

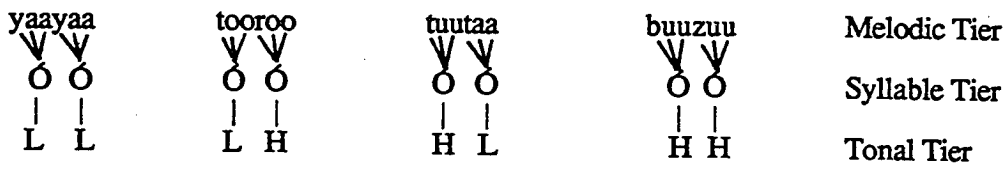
Such systems, in which members of the tonal inventory can be freely combined, have been dubbed by some (e.g. McCawley 1978) as 'true' tone systems.[1] Perhaps we could simply consider such a system at one end of a continuum. Other languages, which are indisputably tonal as well, use only a proper subset of the full range of possible tonal combinations. One such example is Mende, in which Leben (1973) claims that the only surface tonal sequences within a noun, irrespective of the number of syllables, are: H, L, HL, LH, and LHL. Still other languages, including many Bantu languages, have an even more restricted range of tonal combinations,

[1]At different points in this thesis, the term 'true tone' language will be employed. It simply mean a language in which tones freely combine. (I intend the term to have neither a positive nor negative connotation with respect to other types of tone languages.)

assigning a maximum of one High tone per morpheme. Languages of this latter type have been sometimes classified as tonal, sometimes accentual, sometimes metrical, and sometimes a combination of these.[2] We will return to this situation in the discussion of accent below.

With regard to (1c) it has been clearly shown that the tone assignment domain can be at least: the mora, the syllable, and the morpheme.[3] For the case of Mende, briefly mentioned above, one way of capturing the tonal distributional facts is to simply assume that the language has five tonal 'melodies', one of which is lexically assigned to every noun. Some tone languages might assign tone to the syllable, while others assign it to the mora. For heuristic purposes let us assume that the domain of tone in the words in (2a) is that of the syllable. Their autosegmental representation would then be as in (2b), where individual tones are linked to syllable nodes (which are in turn linked to melodic segments) by association lines (see Goldsmith 1976).

(2b) *Autosegmental* representation of words in (2a)



Principle (1d) is a very general statement: Tones may have various effects on adjacent tones. The phonologies of tone systems have been shown to be very rich. In their article "Universals of Tone Rules: Evidence from West Africa," Hyman & Schuh (1974) list no fewer than seven general synchronic tonal processes which often occur in tone systems. I very briefly describe them here to give some idea of the wide range of

[2]For a more full discussion of these different systems in Bantu from both a synchronic and historical perspective see Clements & Goldsmith (1984).

[3]Additionally, a language might stipulate just how many tones could be assigned on that domain and in what combination. Such, for example, is true of Haya (Hyman & Byarushengo 1984) in which a short (=monomoriac) vowel can bear either a High tone or a Falling tone, but not a Rising one.

tonal processes, and refer the reader to their article for a thorough explanation of them accompanied by numerous examples.

(3) Natural Synchronic Tone Rules (paraphrased from Hyman & Schuh 1974)

a. *Downstep*: a High is pronounced on a lower register if preceded by a Low tone, even though that Low gets deleted.

b. *Shifting*: a tone originally associated with one syllable spreads to an adjacent syllable, replacing the original tone of that syllable.

c. *Copying*: an underlyingly toneless syllable receives its tone from an adjacent syllable.

d. *Polarization*: an underlyingly toneless syllable receives the opposite tone of an adjacent syllable.

e. *Dissimilation*: a syllable with an underlying tone receives the opposite tone of an adjacent syllable.

f. *Replacement*: a grammatical process assigns a certain tone to a syllable, replacing its original tone.

g. *Displacement*: tonal contrasts are consistently realized on the syllable to the right of their original position.

To sum up, then, tone languages differ widely on the number of High (or Low) tones which can be associated underlyingly to a mora, syllable, morpheme, or word. Second, there seems to be a rather wide repertoire of tonal processes which occur fairly commonly in tone languages.

4.2 Stress systems

4.2.1 Basics of grid theory

Before examining the general properties of stress systems, let me make explicit the metrical formalism I will employ throughout this chapter. I have chosen to cast the Kinyambo facts in the theory of the metrical grid. This does not necessarily mean that the Kinyambo facts would not be equally well described in an arborial framework or a tree cum grid framework. I make no claim in that regard, as such is beyond the scope of this chapter. The grid framework that I will assume is based largely on Selkirk

(1984) although elements of Prince (1983), Hayes (ms.), and Halle & Vergnaud (1987) will be employed as well. The basics of the framework which I will assume are as follows. Following the notation of Hayes (ms.), a period will act as a placeholder for an unstressed syllable on the first metrical level.

(4a)

```
. . . . .        Grid Level 1
σ σ σ σ σ        Syllable Tier
```

This represents the fact that the syllable is the domain of stress. Through the course of the lexical and postlexical phonology, metrical grid marks (represented by x's) can be added on top of syllables or existing grid marks. Grid marks, then, may stack up vertically as shown in (4b).

(4b)

```
        x        Grid Level 2
x . x . x .      Grid Level 1
σ σ σ σ σ σ      Syllable Tier
1 2 3 4 5 6
```

According to Prince (1983) a representation is well formed as long as there is no beat on level *n* without a corresponding beat (i.e. a beat associated with the same syllable) on level *n-1*. Hayes (ms.) has termed this the Continuous Column Constraint.

(5) *The Continuous Column Constraint* (Hayes ms.)

A grid containing a column with a mark on level *n + 1* and no mark on level *n* is ill-formed. Phonological rules are blocked when they would create such a configuration.

Thus, a representation such as (6) is ill-formed.

(6) Example of *Continuous Column Constraint* (Hayes ms.)

```
*       x        Grid Level 3
x                Grid Level 2
x . x . x        Grid Level 1
σ σ σ σ σ        Syllable Tier
```

Syllables, then, are stressed according to the relative number of grid marks associated with them. For example, a configuration such as the one in (4b) represents the fact that the penultimate syllable will bear the greatest or *primary* stress. The first

and third syllables bear a stress less than the penultimate syllable, but greater than the second and fourth and sixth syllables. This might (but not necessarily) be interpreted as secondary stress by the phonetic component. The second and fourth and sixth syllables are phonologically stressless and might be subject to language specific rules of reduction or even deletion.

How, then, can metrical grids be built up? Prince (1983) has suggested that stress languages have access to only three grid building principles. These are listed below.

(7) Parameters of grid building rules from Prince (1983) (paraphrased here)

a. End Rule (E;L): add a grid mark at edge E (initial or final) at a given level L (1, 2, 3, etc.).

b. Perfect Grid (D;A): lay down alternating grid marks, moving in direction D (right to left, left to right) starting with altitude A (peak or trough).

c. Quantity Sensitivity: heavy syllables (as defined by the language) may receive a grid mark.

Let us reconsider the configuration presented in (4b). This grid could be built as follows. First, on level one, apply Perfect Grid, right to left, trough first. Then on level two, apply End Rule final. Note that the second rule will only see the existing level one grid marks as its domain. This follows automatically from the Continuous Column Constraint (5) which would block the laying down of any grid mark on level two which did not have a level one grid mark immediately underneath it.

As noted in Chapter Three, Kinyambo does not have phonetic secondary stress. However, I have claimed that phonologically there are as many as three grid levels present in the phonology.[4] In §3.7.5, I showed that on the basis of two rules, viz. the

[4]Goldsmith (1987) has reason to posit three metrical levels in his analysis of Kintandu. As H tone insertion and grid building are at some point independent, he posits three grid levels to insure that in the event a form has one floating High, but two syllables with grid marks above level one, the H will associate only with the syllable having the highest grid. (Also see fn. 2 of Chapter Three.)

Lexical Stress Rule and Phrase-final Deletion, there was reason to suppose that there are stressless roots and stressed roots of three strengths. I will show that other rules in Kinyambo as well refer to stress strength in a way not explained were there only a simple stressed vs. unstressed opposition.

I will use a slightly modified version of the stress numbering convention found in Halle & Vergnaud (1987). Syllables which bear no grid marks are labeled [0 stress]. Those bearing one grid mark are labeled [1 stress]. Those bearing two grid marks are labeled [2 stress], etc.

4.2.2 Properties of stress systems

The following are general properties of stress systems, though the list is certainly not exhaustive. Moreover, not every stress language will exhibit all of these properties. The properties I have chosen to discuss are especially those which tend to distinguish stress systems from other prominence systems.

(8) Properties of stress systems:

a. The acoustic signal may be a change in pitch, duration or intensity (or some combination)

b. The prominence is culminative--every lexical item will have one main prominence

c. There may be stress reduction rules producing different degrees of stress

d. Clash avoidance--avoidance of two stressed syllables in close proximity

e. Trigger-target distance effects--the application of clash resolving rules depends on the phonological 'distance' between the clashing stresses

(8a), I believe, is fairly uncontroversial. Whereas the general acoustic signal of tone is pitch, it has been shown that stress languages tend to use more phonetic 'cues' including duration and intensity (cf. Beckman 1986, Nakatani & Aston 1978).

It has long been noted that stress tends to be culminative (8b). That is, there will be a single most prominent syllable in every word or sense unit. Although certain

stress languages have been claimed to have words which have either no prominence or more than one prominence of equal strength (see §4.4 for examples) certainly, in the typical case, each lexical form will have exactly one main stress. Formally, this generally follows from the grid building principles discussed above. The application of End Rule will always make one syllable most prominent. Regarding Perfect Grid, it has been suggested by Selkirk (1984:104) that there is a Prominence Preservation Condition which essentially insures that whichever syllable was the most prominent before the application of Perfect Grid, will, by convention, remain the most prominent syllable after its application. Finally, if it is stipulated that the application of Perfect Grid on the first metrical level must be followed by an application of End Rule, we have a formal explanation of culminativity in the grid framework. I will, however, argue later that exceptions to culminativity do arise in Kinyambo which brings the above formal account of its existence into question.

In addition to a main stress, many stress languages contain words which have subsidiary stress as well (8b). These subsidiary stresses (e.g. secondary stress and tertiary stress) have usually been derived by some instantiation of the principle of stress subordination.[5] Let us consider an example of phrasal stress subordination in English, as shown below in (9).

[5]But, see Roca (1986) who argues that, in Spanish, secondary stress is not derived (from primary stress), but is instead built on primary stressed structures.

(9) <u>Stress Subordination</u> as seen in: [[finger [licking]] good]

a.	x . licking	Word Stress
b.	x . x . finger-licking	Cycle One
c.	x x . x . finger-licking	Compound Stress Rule (make stress in leftmost word most prominent)
d.	x x . x . x finger-licking good	Cycle two
e.	x x x x . x . x finger-licking good	Nuclear Stress (make stress in rightmost word most prominent)
f.	fìnger-lìcking góod	Surface form

First, I will assume that phrasal stress assignment is cyclic. On the first cycle the most embedded phrase [finger-licking] is concatenated. Since it is a compound (both constituents being dominated by a lexical category (i.e. N, V, A) and not a syntactic category (i.e. X', X"), the Compound Stress Rule applies, making the strongest stressed syllable in the first word the strongest stress of the compound, as shown in (9c). The final word [good] is added to the phrase, and this time, since the two constituents are dominated by a syntactic category, the Nuclear Stress Rule applies, making the strongest stress in the final word the strongest stress of the phrase, as shown in (9e).

What I especially wish to note here is that what were the primary and secondary stresses respectively in (9c) (i.e. *fin* and *lick*) become subordinated to secondary and tertiary stresses in (9e) after another element receives primary stress. The fact that they still stand in the same relational opposition is considered by some to be evidence for the cyclic application of these phrasal stress rules.

Let us now consider the next characteristic of stress: clash avoidance (8d). It has been shown that stress languages generally discriminate against two prominences in close proximity. In other words, if, through the course of morphological or syntactic concatenation, two stressed syllables become adjacent (or nearly adjacent) the language may employ a rule of 'clash resolution' which will eliminate the 'clash'. Formally a clash may be defined as follows:

(10) "Clash" is defined, in general terms, as two grid marks on a level *n* which are not separated by at least one grid mark on level *n-1*. (Selkirk 1984)

Stress languages generally employ one or both of two clash resolving strategies. Either one of the stresses moves, or one simply deletes. Schematic examples of these two processes are illustrated below.

(11) <u>Two ways of resolving a clash</u>

a. *Beat Movement*

```
        x              x
   x -- x  --->  x     x
x  x    x        x  x  x
```

b. *Beat Deletion*

```
x              x
x -- x   --->  x  .
```

In both (11a) and (11b) the clash is indicated by hyphens. In (11a) the clash is eliminated by simply moving the leftmost level two grid mark onto the nearest landing site to its left. The clash is (11b) is resolved by simply deleting the rightmost level one grid mark. One might now ask: why are clashes unfavored configurations in stress languages? It has been suggested that stress languages are motivated by the principle of 'eurhythmy' (cf. Prince 1983, Hayes 1984) which is roughly defined as in (12) below.

(12) <u>Principle of *eurhythmy*</u>: a tendency towards an alternation of strong and weak beats

Thus, one finds that the phonological rules of a stress language will tend to conspire to produce strong-weak patterns (i.e. ...SWSWSW...). Thus, configurations in which there are too many consecutive strong beats (i.e. 'clashes') (cf. Liberman & Prince 1977:314) or too many consecutive weak beats (i.e. 'lapses') (cf. Selkirk 1984:49) will be disfavored. 'True' tone languages, not bound by eurhythmy, clearly constitute a typologically different system in this regard as witnessed by their free combination of prominences (as seen above in (2)).[6]

Consider again the two offending configurations in (11) and their resolutions. Note that in each case it was the clashing element with the least number of grid marks which was either moved or removed.

If it is assumed that when Beat Deletion applies, it takes the form of : x --> ø / x (i.e. an x on a given level deletes in the presence of an adjacent x on the *same* level) then the Continuous Column Constraint (6) will insure that the weaker stress will always delete. This is illustrated in (13)

(13) <u>*Beat Deletion* under the *Continuous Column Constraint*</u>

```
 x                  x                 * x
 x  x               x                     x
 x  x      --->     x                     x
...Ó  Ó...         ...Ó  Ó...        ...Ó  Ó...
```

Let us now consider two examples of clash resolution in English. The first illustrates Beat Movement (often referred to in the literature as the Rhythm Rule or

[6]I wish to reiterate here that I recognize that there are a wide variety of tone languages. A language such as Hausa, which I have dubbed a 'true' tone language, in which tones freely combine, does not have rules which conspire to eliminate lapses or clashes. Other languages, which must be considered tonal as well, may, as one of many logical possibilities, have a rule of High Insertion or High Deletion. It is then necessary to examine the productivity of such rules (e.g. do they only apply in certain lexical classes or in one certain syntactic environment), and the extent to which really constitute a rule of 'clash' or 'lapse' resolution. For example, many Bantu languages have Meeussen's rule, by which one of two adjacent High tones delete in a finite verb form. This, I would claim, does not constitute clash resolution at all if such a rule is confined solely to verbal complexes. To the extent that the grammar phonologizes a morphologically conditioned rule of this kind, the phenomenon can be said to be one of 'clash resolution' and not simply 'High Deletion in the presence of another High'.

Iambic Reversal) at the level of the phrase, while the second illustrates Beat Deletion at the level of the word.

(14) *Beat Movement* in English (Selkirk 1984) as seen in [[gòod [looking]]bóy]

```
a.          x                    Cycle 1--Nuclear Stress
         x  x .
      good looking

b.                  x             Cycle 2--Nuclear Stress
            x  ---  x
         x  x  .    x
      good looking boy

                    x             Beat Movement
c.       x          x
         x  x .     x
      good looking boy

d.       gòod looking bóy         Surface Form
```

In (14a) we see that the Nuclear Stress Rule will assign to the first syllable of *looking* the greatest stress of the phrase. On the second cycle *boy* will be assigned the greatest stress of the phrase by the same rule. Note that in (14b) there is now a clash (the location of which is indicated by the dashes). English will then employ the rule of Beat Movement to move the beat of the weaker clashing stress to the left. The surface result is therefore that given in (14d).

It turns out that English also employs Beat Deletion as a mechanism for resolving clashes. Consider the following derivation of morphologically complex American English words.

(15) Example of *Beat Deletion* in American English

a.	x . x . x . prelimin+ary	x x x . bin +ary	Suffixation
b.	----------	x x . . bin +ary	Beat Deletion (optional in this form)
c.	prelíminàry	bínàry ~ bínary	Surface Form

When *+ary* is suffixed to these two bases, a clash results in the case of *binary*, but not in *preliminary* as a syllable intervenes between the stresses in the latter case but not the former. Beat Deletion optionally applies to alleviate such clashes in American English. That it may apply is seen in the fact that *binary* can be pronounced with a reduced vowel in the penultimate syllable indicating that it has undergone destressing.

Two things should be noted about these English examples. First, the Continuous Column Constraint (see (5), (13)) correctly predicts which stress will either delete or move. Second, it seems necessary to stipulate in English that if the weaker stress is on the left it moves, while if the weaker stress is on the right, it simply deletes. Note, for example, that applying Beat Movement to the *binary* case (15) would yield an ungrammatical surface form as the final syllable would bear secondary stress. Similarly, applying Beat Deletion in the phrase *good-looking boy* (14) would predict the equal stressing of the two words of the compound which is not the unmarked case.[7]

The last property of stress presented in (8) is that of 'trigger-target distance effects' (as they were dubbed in Bickmore (forthcoming b)). Such a principle may be formalized as follows.

(16) *Trigger-target distance effects:* the closer the clashing stresses, the more likely clash-resolving rules are to apply.

[7]It does not seem that the clash resolving mechanism can be predicted by the domain of application either. For example, Selkirk (1984) shows that Beat Deletion applies at the level of the phrase when its structural description is met. The phrasal example she gives is *sports contest* in which the stress on the initial syllable of *contest* may be optionally reduced to the level of the final syllable.

Intuitively, principle (16) simply predicts that the closer the two clashing elements are in a given word or phrase, the more likely the language-specific clash resolution rule is to apply. With this in mind let us reconsider the rule of Beat Movement in English illustrated above. It turns out that, in English, Beat Movement applies not only in cases where the clashing elements are found on adjacent syllables, but that this rule may optionally apply in cases where at least one syllable intervenes between the clashing stresses. Specifically, Beat Movement obligatorily applies when the offending stresses are on adjacent syllables, optionally applies when one or two syllables intervene, and does not apply when three (or more) syllables intervene. The following examples illustrating these trigger-target distance effects are taken from Hayes (1984). In each case the phrase is /Tennessée X/ and the clashing syllables are underlined.

(17)

Applying Beat Movement	Not applying Beat Movement
a. Tènnessee rélatives	e.(?)Tennessèe rélatives
b. Tènnessee connéctions	f. Tennessèe connéctions
c. Tènnessee legislátion	g. Tennessèe legislátion
d.(?)Tènnessee abbreviátions	h. Tennessèe abbreviátions

Hayes (1984) notes that as the inter-stress interval of the underlying representation decreases, the propensity to apply Beat Movement increases. In other words Beat Movement is very likely to apply in the case of *Tennessee relatives*, and not likely at all to apply in *Tennessee abbreviations*. As for the two intermediate forms, both pronunciations seem possible. Perhaps additional factors such as the rate of speech and focus will ultimately determine the pronunciation of these forms in a given instance.[8] The point I wish to make here is that Beat Movement as a method of clash

[8]As noted by Hayes (1984), the rate of speech certainly plays a role in the application of clash resolving rules. In fast speech, for example, the actual number of syllables which may intervene between the clashes, and still trigger clash resolution, becomes greater. This is equally true in Kinyambo (cf. §4.5.3.3).

resolution does not represent a case of an 'discrete' rule whose structural description is either met or not. Rather its structural description is more 'continuous', varying directly or inversely with respect to a particular factor. Finally, that trigger-target distance effects play a role in the application of clash resolution is supported not only by the English stress facts presented in Hayes (1984), but also the Polish stress facts presented in Hayes and Puppel (1985).

4.3 Accent systems

At this point in time, there does not seem to be any clear consensus in the linguistic community at large as to the defining characteristics and best formal account of 'accent'. Hyman (ms.) noted in his paper presented at the 20th Annual Conference on African Linguistics that in the field of African Linguistics alone, the use and method of employment of the term 'accent' seems analysis-specific and without cross-linguistic consistency.

Given that stress and tone are, perhaps, better defined as possible prominence systems, 'accent' has often been argued to simply be a specialized variety of one of these two types of systems. Some feel that an accentual system is basically a tonal system with certain peculiarities: namely a) that only one tone (usually High) exists underlyingly, and b) that a maximum of one High can be linked to a given syllable (or mora) in any morpheme. Poser (1984), for example, adopts such assumptions in his analysis of Japanese.

What, to me, still seems unclear about such an approach, is whether it is possible to motivate, from some more basic principle, these two properties which supposedly distinguish accentual systems from truly tonal ones. Or, must these simply be stipulated? Let us consider logical variants of these stipulations. First, are there languages in which there is at most one High tone per morpheme underlyingly, but in

which this High is always floating (and hence whose location is predictable)? Second, are there systems in which exactly two High (or Low) tones are usually associated to morphemes underlyingly? Finally, and perhaps most importantly, can these two principles alone account for other consistent and predictable differences between 'true' tone languages and accentual ones?

Another logical approach is to assume that accentual languages are basically like stress languages, but with certain peculiarities. Beckman (1986) adopts such an approach. She claims that stress and non-stress accent are fundamentally different from tone on at least four grounds which I only list here, referring the reader to her work for additional elucidation: 1) speaker's attitudes, 2) historical development, 3) distinctive load, 4) alternations and restrictions. She claims that on these grounds, among others, 'accent' functions more like stress than tone. Since she does not present what a complete and detailed phonological account of a prototypical 'accent' language (like Japanese or Norwegian) looks like (as Poser (1984) did within an autosegmental tonal framework), it is difficult to judge what phonological facts remain unaccounted for or unmotivated under an approach in which accent is completely represented in a metrical framework.

I make the above statements only to show that cases have been made for analyzing 'accent' in both metrical and autosegmental frameworks. To the extent that 'accent' shows certain properties of both stress and tone systems, certain aspects of accentual behavior will be unmotivated and arbitrarily stipulated if cast exclusively in either framework. Perhaps Kinyambo will ultimately be best defined as an 'accentual' language, but until some consensus is reached regarding its defining properties, I submit that the language is best described, given the two available options of either a metrical or autosegmental tonal approach, as a stress system. As a final note regarding

accent, at the end of this chapter (in §4.6.2) I will present Poser's (ms.) proposed distinguishing characteristics of accent and stress systems, and the Kinyambo facts will be reviewed in that light.

Let us now consider the Kinyambo data, evaluating the prominence patterns of both single words as well as longer phrases.

4.4 Prominence in isolation forms

Simply looking at the isolation forms in Kinyambo would indicate that one is dealing with a system lying somewhere in between a typical tone and stress language. First, let us consider the number of prominences per word. The table given in Chapter Three is repeated below. Nouns are listed according to number of syllables and tone pattern.

SIR	TS	All Low	One High	One Falling
1	2	ee-n-**te** 'cow'	í-**fa** 'famine' (U.R. i-fá)	ée-m-**bwa** 'dog' (U.R. e-m-**bwá**)
1	3	e-kii-**ntu** 'thing'	o-mú-**ti** 'tree' (U.R. o-mu-tí)	
2	3	ee-n-**goma** 'drum'	ee-n-**jóka** 'snake'	o-mw-**áana** 'child'
				a-má-**iso** 'eyes' (U.R. a-ma-**íso**)
2	4	e-ki-**tabo** 'book'	o-mu-**káma** 'chief'	o-mu-**káate** 'bread'
3	4	ee-n-**dagano** 'agreement'	ee-n-**kókora** 'cough'	
3	5	o-mu-**sogoro** 'bean leaf'	o-mu-**rúmuna** 'sibling'	

Table I

(SIR = syllables in root; TS = total syllables. Hyphens indicate morphological boundaries. Roots are in boldface.)

One of the striking generalizations about isolation forms in Kinyambo is that there is a maximum of one prominence per word. As the table contains only nouns, let me note that the situation is identical for verbal infinitives. The following examples are illustrative of the prominence patterns I have found in Kinyambo verbs. (FV= Final Vowel)

Syllables in root+FV	All Low	One High	One Falling
1	o-ku-s-a 'gind'	o-kú-f-a 'die'	
2	o-ku-hik-a 'arrive	o-ku-kóm-a 'tie'	o-ku-réèt-a 'bring'
3	o-ku-hakan-a 'argue'	o-ku-kárang-a 'fry'	
4	o-ku-sisimuk-a 'awake	o-ku-tékerez-a 'think'	

Table II

The other lexical class, adjectives, also conforms to this generalization as shown below.

Syllables in root	All Low	One High	One Falling
1	ki-ra 'long'	kí-ke 'small'	
2	ki-ruungi	ki-kúru 'old'	ki-háàngo 'big'

Table III

Even non-lexical items such as adverbs, prepositions, and interrogative words conform to the restriction of no more that one mark of prominence per word.

Certainly, this type of prominence distribution is more like a stress or accentual system than a true tone system. Stress and accentual systems typically allow no more than one underlying prominence per stem or word. In a true tonal system, however, given a simple High-Low opposition, there should theoretically be 2^s tonal patterns where s is the number of syllables in the word, as stated in (1b) (cf. (2)). Again, I am

not claiming that a language must have 2^s tonal patterns to be a tone language. However, I am claiming that a language like Kinyambo which has a maximum of one prominence per word, could be considered to be more like a stress or accentual language than a 'true' tone language *in this respect.*

While it is true that Kinyambo nouns, adjectives, and verbal infinitives have a restriction of no more than one prominence per word, there are (at least) two groups of isolation forms which do not obey this restriction. The first is the set of proper nouns. Consider the following proper nouns which have more than one prominence:

(18) Byéngózi
Kambuzémyáanya
Kókuháabwa
Tíbwómo
Tínkalégaire

Even these proper nouns, however, seem to be exceptions statistically. Out of 52 proper nouns which I have collected, these five are the only ones which do not conform to the generalization of one prominence per word.

The other set of words which are exceptional in this regard are finite verbal forms (to be examined in §4.5.10). Two examples are given below: (Roots are in boldface.)

(19) a. bá- ka- **kóm**-a
3pl PAST tie FV (final vowel)
'they tied'

b. ba-rá- mu- **kóm**-ir- e
3pl FUT 3sg. tie INCEPT FV
'they have ever tied him'

Again, it should be noted that the vast majority of the members of the complete verbal paradigm have at most one prominence, however there are certain cases, such as those listed above which do not conform to the generalization. It could be further noted

that even in the forms in (18) and (19) there is a maximum of two prominences. No word I have found has three or more.

Although stress is assigned lexically on the domain of the root, phonological rules (to be discussed in detail below) conspire against two prominences surfacing in the same stem, which for the moment I will define as the root plus any suffixes. This fact holds true of the lexical roots in Tables I-III, and the finite verbal forms in (19) as well, as one prominence is inside the stem while one is outside the stem in each case. It should be noted, in this regard, that some linguists have established the existence of 'multiple-stress languages' where more than one stress may surface in a single word. Several of these are listed in Hyman (1977), viz. Campa (Pike and Kindberg 1956), Nimboran (Anceaux 1965), Sarangani Manobo (Meiklejohn and Meiklejohn 1958), Tahltan (Cook 1972) and Yuma (Halpern 1946a-b). Hyman (1977:38) claims that these languages, "have restricted or exceptional cases where a word has two phonemic primary stresses, sometimes even on adjacent syllables."

In addition to the above generalization, it has been shown that in Kinyambo the position of the prominence, where it occurs, is predictable. It should be remembered that number of prominences and the predictability of the location of the prominence are independent parameters. There are languages which also have the restriction of no more than one prominence per word, but in which the prominence (where it occurs) cannot be predicted.[9] In Kinyambo, if a root has a prominence, it occurs on the first syllable of the root.[10] To simply have the prominence be located at the edge of a domain (in Kinyambo, the root) is not uncommon in stress languages. For example,

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[9]This, of course, is the case for languages which are claimed to have phonemic stress (i.e. one in number, but unpredictable in location). A well known language of this type is Russian. Hyman (1977:67-68) lists 113 languages which may be of this type, but notes that these are simply languages where it was not possible "to ascertain any dominant stress placement."

[10]Both apparent and real exceptions to this generalization are discussed in §3.3.

main word stress in Proto-Germanic was also located on the initial syllable of the root or stem.

While Kinyambo is stress- and accentual-like in having a maximum of one prominence per word, it is less stress-like in allowing isolation forms to surface with no prominence at all. In Kinyambo stressless roots (and words) abound. This surface fact is clearly more tone-like or accentual-like than stress-like. Somehow, the fact that Kinyambo is a tone language phonetically, permits it certain un-stress-like characteristics, one of which is the lisencing of all Low isolation forms. It should be noted, however, that some stress languages have been claimed to tolerate stressless words. Hyman (1977:38) mentions three such languages: Kitsai (Bucca and Lesser 1969), Saho (Welmers 1952), and Seneca (Chafe 1960). Other examples include Yup'ik (Krauss 1985) and Sierra Miwok (Freeland 1959). As will be seen in §4.5.2, however, Kinyambo words which are stressless in isolation will generally receive a prominence when they occur in phrases. As words are most often pronounced in phrases, the fact that there are prominent-free isolation forms might be viewed as only mildly inconsistent with the prototypical stress language.

Finally, Kinyambo does not have a hierarchy of *phonetic* prominence levels. While many stress languages have phonetic secondary (and sometimes tertiary) phonetic stress, such is not to be true of Kinyambo. In the forms in (18) and (19), for example, the two prominences seem to be of equal strength. It is hard to say if 'most' stress languages have secondary stress or not. This is partially due to the fact that there are more sophisticated measuring techniques now, and thus when older grammars claim that there is but one level of stress, such may need to be empirically verified today. This, then, is a matter for further research.

I argued, however, in §3.7.5 that a case can be made for positing a hierarchy of phonological stress levels in Kinyambo. I will further justify this position below. Thus Kinyambo differs not in the fact that it does not have a hierarchy of stresses, but only in the component in which such a gradation exists.

To summarize, the isolation forms seem rather un-tone-like in three respects when compared to a language, like Hausa, in which tone has a free distribution. First, for most words (and all lexical roots) there is a maximum of one prominence per word. Second, when the word does have a prominence, its location is completely predictable (being root-initial). As noted above, however, there are various exceptions to both of these tendencies. There are at least a few forms which have two prominences of equal strength (see (18) and (19)). And, as noted in Chapter Three, there are a few borrowed words which have a prominence in non-root initial position (E.g. *e-barúa* 'letter', *e-papái* 'papaya, *e-zawádi* 'gift'). Third, the prominence bearing unit is the syllable. This was discussed in §3.5 and illustrated in examples like *amáiso* 'eyes' (< /a-ma-íso/), in which the prominence contributed by the first syllable of the root is born not on the second mora of the penultimate syllable of the isolation form, but the initial mora, as is the case with all prominent bimoraic syllables. The isolation forms are un-stress-like in one respect, namely that there are many surface forms which bear no prominence at all.

On the basis of the isolation forms alone, it might be difficult to conclude with any certainty whether the underlying rhythmic system is one of stress, accent or tone. Below I will turn to an examination of the phrasal phonology which suggests which of these possible frameworks provides the most insightful analysis.

Let me first formally state how roots become stressed in the Lexical Phonology. Recall that at the end of Chapter Three I suggested that there were different underlying

degrees of stress which could be assigned to the initial syllable of lexical roots. To capture the generalization that the location of stress is predictable, I argued in §3.7.5.2 that the underlying roots are marked with a diacritic of (from strongest to weakest) either: [3 stress], [2 stress], [1 stress] or [0 stress]. Examples, then, of underlying forms are given below in (20).

(20)	[Rkama	[Rkapo	[Rrimi	[Rtabo	Underlying
	[3 stress]	[2 stress]	[1 stress]	[0 stress]	Representation
	'chief'	'basket'	'farmer'	'book'	

I will assume that there is a Lexical Stress Rule which applies at the level of the root which indicates how many times to apply Prince's End Rule Initial (see 7a). This captures the generalization that stress in Kinyambo is root initial. The Lexical Stress Rule can then formalized as follows.

(21) *Lexical Stress Rule*

Apply End Rule Initial (domain - root)

For [3 stress]: 3x
For [2 stress]: 2x
For [1 stress]: 1x

When this rule applies to the forms in (20) the following grids are generated.

(22)

```
  x                                          Lexical Stress Rule
  x          x
  x .        x .        x .        . .
[Rkama     [Rkapo     [Rrimi     [Rtabo
```

I then assume a late rule of Tone Assignment which has three sub-parts. The first subrule will obligatorily assign a High tone to the first mora of every syllable with a level two grid mark, which, due to the Continuous Column Constraint, will include syllables bearing grid marks above level two. The second subrule will optionally assign a High tone to the first mora of any syllable with only a level one grid mark. The final subrule will assign all other morae a Low tone. This is formalized as follows.

(23) *Tone Assignment*

```
a.        H          b.        H          c.
          |                    |
  x       μ                    μ                    L
  x       |/         x         |/                   |
  Ó --> Ó            Ó --> Ó              μ --> μ
                     (optional)
```

Recall from §3.2 that the reason for which the domain of stress is the syllable and not the mora, is that there is no contrast in Kinyambo between [v́v], [v́v́], and [vv́], as the latter two syllable/tone types do not exist. Assigning the High tone to the left-most mora of a stressed syllable accounts for these restricted surface facts.

4.5 Phrasal phonology

In this section I will examine the phrasal phonology. I will compare a metrical and tonal explanation of certain phrases, and then suggest that the facts are best accounted for within metrical theory. I will primarily (but by no means exclusively) examine the [noun - adjective] construction which nicely exemplifies the sandhi rules affecting the underlying prominences. In Chapter Five I will show that the phrasal phonological rules in Kinyambo do not apply across just any word boundary. They have specific, restricted domains determined in part by the syntactic constituency of the utterance. For now it is sufficient to know that the phrasal rules I will be looking at in this chapter apply between a head and its complement/modifier, as they are both part of a single prosodic phrase.

4.5.1 Data to be accounted for

Partial justification for the underlying hierarchy of stress levels lies in the behavior of the various lexical items in larger phrases. Let us now consider the possible patterns of combining nouns (of different stress levels) with a following adjective (also of differing stress levels). The surface realizations of these combinations

are listed in the table below. When one of multiple pronunciations is preferred this is indicated by (p).

Noun	Gloss	____ CP-ruungi 'good' [0 stress]	____ CP-ké 'small' [3 stress]
/e-n-te/ [0 str]	'cows'	enté ziruungi	ente zíke
/e-ki-ntu/ [0 str]	'thing'	ekintú kiruungi ekíntu kiruungi	ekintu kíke
/e-ki-tabo/ [0 str]	'book'	ekitabó kiruungi ekitábo kiruungi	ekitabo kíke
/e-ki-takuri/ [0 str]	'yam'	ekitakurí kiruungi	ekitakuri kíke
/o-mu-zi/ [1 str]	'root'	omuzí guruungi omúzi guruungi	omuzi gúke (p) omúzi gúke
/o-mu-rimi/ [1 str]	'farmer'	omurimí muruungi omurími muruungi	omurimi múke (p) omurími múke
/o-ru-papuro/ [1 str]	'paper'	orupapuró ruruungi orupápuro ruruungi orupápuró ruruungi	orupapuro rúke (p) orupápuro rúke
/e-ki-kapo/ [2 str]	'basket'	ekikápo kiruungi ekikapó kiruungi	ekikapo kíke (p) ekikápo kíke
/e-m-bwá/ [3 str]	'dogs'	embwá ziruungi	embwa zíke
/o-mu-tí/ [3 str]	'tree'	omutí guruungi omúti guruungi	omuti gúke omúti gúke
/o-mu-káma/ [3 str]	'chief'	omukáma muruungi	omukama múke (p) omukáma múke
/i-báare/ [3 str]	'stone'	ibáre riruungi	ibare ríke ibáre ríke
/o-mu-rúmuna/ [3 str]	'sibling'	omurúmuná muruungi omurumuná muruungi omurúmuna muruungi (p)	omurumuna múke omurúmuna múke (p)

Table IV

In the first column, the underlying representation of the noun is listed. In the second column the noun is followed by the stressless adjective *-ruungi* 'good'. In the third column the noun is followed by an adjective with a [3 stress], *-ké* 'small'. Three points should be mentioned immediately. First, as discussed in §2.1, adjectives always agree with the noun they modify. They are listed as roots in the lexicon, and by a rule of morphological agreement, they bear a prefix which agrees with the noun class of their phrasal head. Second, a rule of Phrase-final Left Shift (see (8) of Chapter Three) will move a phrasal-final prominence to the syllable to its left. In the above forms this rule has applied to each instance of *-ké* 'small' as it is phrase-final, moving the prominence to the adjoining class prefix. Finally, in the case of *ibáare* 'stone', when a word with a long penult vowel is not phrase-final, the rule of Phrasal Vowel Shortening (see (42) of Chapter Two) applies, deleting a mora in the penultimate syllable and hence rendering it short as represented in the table above.

Perhaps the most interesting aspect of the noun-adjective phrases in Table IV is that in many cases there is more than one possible surface form. Moreover, when there is more than one possible pronunciation of the phrase, sometimes one variant is preferred (marked '(p)') over the other(s). This, I will claim, is central in understanding the "organizing principle" of Kinyambo phrasal phonology.

4.5.2 Beat Addition

Let us first consider the phrases listed in (24) below, taken from Table IV, all of which contain nouns and adjectives, both with [0 stress].

(24) <u>Noun with stressless root ## Adjective with stressless root</u>

a. /e-n-te##zi-ruungi/ --> enté ziruungi 'cows--good' (cf. ente 'cow'; ziruungi 'good')

b. /e-ki-ntu##ki-ruungi/ --> ekintú kiruungi 'thing--good' (cf. ekintu 'thing'; kiruungi 'good')

c. /e-ki-tabo##ki-ruungi/ --> ekitabó kiruungi 'book--good' (cf. ekitabo 'book')

On the basis of phrases like these I will postulate a rule which adds a prominence to the last syllable of a word when that word is not phrase final. In the grid framework the rule could be formalized as in (25). The fact that two grid marks are added (versus one or three) will be justified below in §4.5.3.2.

(25) Beat Addition (w = word p = phrase (to be defined in Chapter Five))

$$\begin{array}{l} \quad\;\; x \\ .\ \text{-->}\ \ x\ /\ \_\_\_\_\ ]_w\ [_w \ldots\ ]_p \end{array}$$

The equivalent tonal rule would be as follows:

(26) $\mu \text{-->} \underset{\underset{H}{|}}{\mu}\ /\ \_\_\_\_\ ]_w\ [_w \ldots\ ]_p$

Although both rules are plausible, let us take a broader look at what is happening in the examples in (24). The underlying representation of *ekintú kiruungi* 'good thing' in a tonal and metrical framework respectively would be as in (27) and (28). (I ignore the moraic and syllabic tiers in each case.)

(27) Melodic tier - ekintu kiruungi

Tonal tier -

(28) . . . . . .
ekintu kiruungi

What might motivate the existence of rule (27) or (28)? There is nothing in the framework of autosegmental phonology which favors or discriminates against a phrase such as (27). The rule in (26), then, would be completely "non-marked" (neither marked nor unmarked).

A phrase such as (28), however, is extremely disfavored in the grid framework. Such a configuration is defined as a "lapse" (see Selkirk 1984:49). A lapse is defined as a series of beats on level *n* with no corresponding beats on level *n+1*.[11] These are

[11]In our framework in which a lack of stress is represented by a period, a period can, for these purposes, be considered a weak beat on metrical level 0.

often called 'weak beats'. In the case of (28), there are six consecutive weak beats. In the framework of the metrical grid, a rule of Beat Addition (Selkirk 1984:55) is usually called upon to add a beat or beats on the next metrical level. The exact algorithm for Beat Addition will be language specific.

Let us review a documented case of "lapse resolution". According to Selkirk (1984), in English a lapse is "corrected" by Perfect Grid, right to left, trough first. Consider the word *Apalachicola*. First, the initial syllable receives a level one grid mark by the Initial Basic Beat Rule (Selkirk 1984:84), and *co*, the penultimate syllable receives a grid mark because it is long. The partial grid at this stage is given in (29).

(29) x . . . x .
Apalachicola

There is now a lapse consisting of the three level one grid marks beginning with the second syllable. Perfect Grid, right to left, trough first will apply on level one giving (30)

(30) x . x . x .
Apalachicola

Main word stress (End Rule Final) then applies on level two giving (32).

(32) x
x . x . x .
Apalachicola

As is apparent, the lapse eradicating rule of Perfect Grid can now apply again on level two, giving the correct surface form. (The penultimate syllable, prominent on level three remains prominent by the Prominence Preservation Condition (Selkirk 1984:104).)

(33) x
x x
x . x . x .
Apalachicola

Now that we have seen a trough correcting rule in action, let us return to the Kinyambo data. I will claim that the rule given in (25) finds its motivation as a 'phrasal' lapse correcting rule of the sort exemplified above. It can be considered a rule of type (7a), in this case End Rule Final, applying at a word juncture. The derivation of *ekintú kiruungi* 'good thing', then, is as follows:

(34)

```
. . . . . .                    Underlying Representation
ekintu kiruungi

    x                          Beat Addition (25)
. . x . . .
ekintu kiruungi

ekintú kiruungi                Surface Form
```

The rule may apply more than once in the same phrase as shown in the derivation of (35) below. (Other examples of phrases greater than two words will be presented in Chapter Five.)

(35)

```
. . . . . . . . .
ekipanga kira kiruungi         Underlying Representation
knife    long good
'good long knife'

      x   x                    Beat Addition (25)
. . . x   .x . . .
ekipanga kira kiruungi

ekipangá kirá kiruungi         Surface Form
```

Let us now consider phrases in which a noun with a stressed monosyllabic root is followed by a stressless adjective. Consider the phrases *embwá ziruungi* 'good dogs', and *omutí guruungi* 'good tree'. Their representations (after the Lexical Stress Rules) are as follows.

(36)

```
      x                        x
      x                        x
.     x . . .            . . x . . .
e-m-bwa ziruungi         o-mu-ti guruungi
```

Here, I will simply assume that Beat Addition applies vacuously.

I will assume that [1 stress] roots receive a level two beat as shown below.

(37)

```
. . x . . .          Underlying Representation
o-mu-zi gu-ruungi
root    good

    x
. . x . . .          Beat Addition (25)
omuzi guruungi

omuzí guruungi       Surface Form
```

Several comments are now in order. First, Beat Addition in Kinyambo, as formalized in (25), does not simply apply everywhere. To be specific, it will never apply to the final word in the phrase. (Note the lack of second level grid mark in the phrase-final form *kiruungi* 'good'.) Second, the rule seems to have some syntactic restrictions. For example, in noun-adjective phrases the rule only applies (at the end of a word) when there is no stressed syllable *in the following word*. Compare (34)-(35) to *ekintu kikúru* 'old thing' and *ekintu kiháango* 'big thing' in (38) below where there is a [3 stress] in the adjective.

(38)

```
        x                  x          Underlying Representation
        x                  x
. . . . x .        . . . . x   .
ekintu ki-kuru     ekintu ki- haango
thing  CP-old      thing  CP-big

ekintu kikúru      ekintu kiháango    Surface
```

In the above cases, Beat Addition must not apply, as the forms in (39) below are not fully grammatical. To be specific my consultant gave the forms in (39) a 'C' (not an 'F') grade. Thus, they could be considered marginal. I will account for this below.

(39)

```
        x                  x
    x   x              x   x
. . x . x .        . . x . x   .
ekintu kikuru      ekintu ki-haango
?[ekintú kikúru]   ?[ekintú kiháango]
```

In other constructions, however, the presence of a stress in the final word does not prevent the application of Beat Addition as shown in the examples below in which underlying stress is represented as an acute accent.

(40) a. /o-ku-rip-a Rukendakénda/ --> okuripá Rukendakénda
pay
'to pay Rukendakenda'

b. /o-ku-rip-a Tibamánya orúndi/ --> okurpá Tibamánya orúundi
pay sometimes
'to help Tibamanya sometimes'

c. /a-ba-ntu ba-jun-ír-e/ --> abantú bajuníre
people help-RELATIVE
'the people who helped'

d. /o-ku-órech-a o-mu-ntu Tibamánya/ --> okworech' ómuntú Tibamánya
show man
'show the man Tibamanya'

For the present, I will assume that, in general, Beat Addition applies as formalized in (25). In noun adjective phrases, however, I will assume that Beat Addition productively applies when there is no stress in the following word as formalized below.

(41) *Beat Addition*

$$\cdot \rightarrow \overset{x}{x} \;/\; [_P \ldots [_W \ldots \_\_\_]_W [_W \varnothing]_W \ldots]_P$$

I will also stipulate that the application of the more general rule (25) in noun-adjective phrases produces marginal forms. This will account for the 'C' rating noted above.

Finally, it should be noted that the first word need not be prominence-free in order for Beat Addition to apply. This can be seen in one of the possible surface forms of the phrase *omurúmuná muruungi* 'good sibling' as shown in (42)

(42)

```
        x                    Underlying Representation
        x
.  .    x  .  .  .  .  .
o-mu-rumuna mu-ruungi
sibling        good
'good sibling'

      x                      Beat Addition (41)
      x     x
.  .  x  .  x  .  .  .
omurumuna muruungi

omurúmuná muruungi           Surface
```

It is clear that Kinyambo is much more permissive in the absolute number of consecutive weak beats it permits before a lapse obtains. In fact, the rule, as I have stated it, would not "repair" a long string of *word internal* weak beats. Such is in fact true as seen in the following isolation forms: *ekitakuri* 'yam', *okusoborora* 'explain'.

Therefore, I will not claim that Beat Addition in Kinyambo is exactly the same kind of lapse resolution rule that is found in a language like English and other languages which employ a rule of Perfect Grid (7b) at the level of the word which would eliminate any sequence of three weak beats. Whereas languages such as these have rules which resolve lapses at the level of the word, Kinyambo has a phrasal rule which resolves lapses at the level of the phrase. And while it is true that not every application of Beat Addition resolves a phrasal lapse (e.g. (40), (42)), the existence of the rule does prohibit a phrasal lapse from ever occurring within a phrase (e.g. (34)-(35)).

In conclusion, I have suggested that Beat Addition is better described as a stress rule than a tonal rule because of the general property it has of preventing (phrasal) lapses which is a basic property of stress languages. It guarantees that no two consecutive words of a phrase could both surface without prominence. It does have several interesting properties though. First, it does not remedy word internal lapses.

Second, its structural description is slightly different in noun-adjective phrases than in other head-complement phrases of the language.[12]

4.5.3 Beat Deletion

4.5.3.1 Phrasal Beat Deletion and Nuclear Stress

Let us now consider a phrase containing a noun with a stressed monosyllabic root followed by an adjective with a stressed monosyllabic root..

(43) Noun with stressed monosyllabic root ## adjective with stressed root

a. /e-m-bwá##zi-ké/ --> embwa zíke 'dogs--small' (cf. éembwa 'dog'; zíke 'small')

The noun and adjective have [3 stress] roots. The stress in the adjective in this phrase shifts one syllable to the left by a rule of Phrase-final Left Shift, discussed in §3.7.2. This rule could be formalized as follows:

(44) *Phrase-final Left Shift*

```
 (x)      (x)
 (x)      (x)
. x ]P --> x . ]P
```

A partial derivation of *embwa zíke* then, would be as in (50).

(45)

```
        x   x          Underlying Representation
        x   x
.       x . x
embwa zike

        x x            Phrase-final Left Shift (44)
        x x
.       x x.
embwa zike
```

Note, however, that in phrases such as these, the underlying stress on the noun does not surface. On the basis of forms like these I claim that there is a rule of Beat Deletion in Kinyambo. In very general terms, this rule deletes the stress in a word

[12]Downing (1988) has shown that there is a High Insertion rule in Jita, a closely related language (see §1.2). The rule only applies in noun-modifier phrases. To generalize, in both languages the rule seems to affect noun-modifier phrases differently than other phrases.

when that word is followed by another word containing a stress. This is formalized below in (46).

(46) *Beat Deletion (first attempt)*

$x \rightarrow \emptyset \,/\, [_P \ldots [_W \ldots \_\_\_ \ldots]_W \; [_W \ldots x \ldots]_W \ldots]_P$ (applies simultaneously at all grid levels)

The derivation of *embwa zíke* 'small dogs', then, would be as in (47).

(47)

```
      x   x          Underlying Representation
      x   x
.     x . x
embwa zike
dogs  small
'small dogs'

      x x            Phrase-final Left Shift (44)
      x x
.     x x .
embwa zike

        x            Beat Deletion (46)
        x
.       x .
embwa zike

embwa zíke           Surface Form
```

Let us now compare the rule as given in (46) with its tonal and accentual counterparts given in (48) and (49) below (where accent is represented as an asterisk).

(48) $H \rightarrow \emptyset \,/\, [_p \ldots [_w \ldots \_\_\_ \ldots]_w \; [_w \ldots H \ldots]_p$

(49) $* \rightarrow \emptyset \,/\, [_p \ldots [_w \ldots \_\_\_ \ldots]_w \; [_w \ldots * \ldots]_p$

Again, it is illuminating to consider the underlying representations of the phrases that satisfy the structural description of this rule. Consider the tonal, accentual, and metrical underlying representations of *embwa zíke* 'small dogs' given in (50a), (50b), and (50c) respectively.

(50) a. embwa zike — Tonal Representation

```
embwa zike
    |   |
    H   H
```

b. Accentual Representation

```
    *   *
embwa zike
```

c. Metrical Representation

```
    x   x
    x   x
.   x . x
embwa zike
```

Phrase-final Left Shift (44) would then need to apply in each case giving the forms in (51a-c).

(51) a. embwa zike — Tonal Representation

```
embwa zike
    | |
    H H
```

b. Accentual Representation

```
    * *
embwa zike
```

c. Metrical Representation

```
    x x
    x x
.   x x .
embwa zike
```

We are now in a position to evaluate these structures, each of which would trigger a rule which will eliminate the first prominence. It should now be asked if there is anything about the autosegmental, accentual or metrical framework which would motivate such a rule. As far as the autosegmental theory of tone or accent is concerned, a rule such as the one in (48) or (49) is certainly not forced by the theory. To the extent that only High tones are present in the underlying representation (this being the case in an 'accentual' tone language (see §4.3)), such a rule could be motivated by the Obligatory Contour Principle which prohibits a sequence of two identical entries on the same tier. But note that there are other logical possibilities which would amend the situation. Just to name three: 1) the two syllables could simply be associated to a single High; 2) a Low tone could be inserted between the two Highs; 3) one of the two Highs could become Low.

Perhaps the most well known tonal/accentual rule of this kind is Meeussen's Rule (see Goldsmith 1982, 1984) which does delete a High tone or accent when adjacent to another High tone or accent (see fn. 4). Two things should be noted regarding this rule, however. First, as far as I know, it is found only in certain Bantu languages. Thus it does not appear to be a common rule type among tone languages in general (see §4.1 and Hyman & Schuh 1974). Second, Meeussen's Rule applies only when both High tones or accents are in the same verbal stem, which is not the case in the examples shown above in which Beat Deletion applies at the level of the phrase between a noun and an adjective. It is interesting to note that, in general, it is the very languages which have Meeussens's Rule which are claimed to be 'accentual' or becoming so. It is possible that it is the historic generalization of Meeussen's Rule which is responsible for the widespread productiveness of Beat Deletion as clash resolution in present day Kinyambo.

It is well known, as discussed in some detail in §4.2.2, that in metrical theory a grid configuration such as the one in (51c) is a classic case of a "clash", and thus a metrical clash resolving rule, such as the one found in (46) is well-motivated.

In Kinyambo, the rule of Beat Deletion across a word boundary within a phonological phrase must delete the stress in the leftmost word. For deleting the rightmost stress in the examples above would yield ungrammatical forms as shown below.

(52) *embwá zike
*omutí guke

This fact could be accounted for in one of two ways. First it could simply be stipulated that in a phrasal clash it is the leftmost stress which deletes, as is seen in the formalization of Beat Deletion in (47). The second way, and the one which I will pursue here, is to assume that, as in English, the Continuous Column Constraint (see

(5), (13)) correctly predicts which stress will delete. Let us reconsider the clashing configuration obtained in the phrase in (51c) repeated here as (53).

(53)

```
        x x
        x x
.       x x .
embwa zike
```

After Phrase-final Left Shift (44)

Suppose that it is now assumed that, like in English, there is a Nuclear Stress Rule (see (9), (14)). Although it could be formalized it in a number of different ways, for now I will simply assume that it has the effect of promoting the final stress of the rightmost word of the phrase to a [4 stress]. The reason for which it does not simply make such a stress the strongest stress of the phrase will be justified below in §4.5.3.3 The rule is stated in (54).

(54) *Nuclear Stress Rule (first attempt)*

Promote the final stress in the rightmost word of the phrase to a [4 stress].

Applying this rule to (53), the grid in (55) obtains.

(55)

```
          x
        x x
        x x
.       x x .
embwa zike
```

Nuclear Stress Rule (54)

The Continuous Column Constraint now correctly predicts that it will be the first of the two clashing stresses which will delete, as it is the weaker clashing element. For if the level 1-3 grid marks on the final word deleted, the Continuous Column Constraint would be violated as shown below (cf. (13)).

(56)

```
*         x
        x
        x
.       x .
embwa zike
```

Nuclear Stress Rule (54)

The deletion of the leftmost stress in a phrasal clash is seen in other constructions as well.

(57) <u>Beat Deletion in Verb - Adverb phrase</u>

a.	x x x x . . x . x o-ku-rya ku-bi eat poorly 'to eat poorly'	Underlying Representation
b.	x x x x . . x x okurya kubi	Phrase-final Left Shift (44)
c.	x x x x x . . x x okurya kubi	Nuclear Stress Rule (54)
d.	x x x . . . x okurya kubi	Beat Deletion (46)
e.	okurya kúbi	Surface Form
f.	*okuryá kubi	

(58) <u>Beat Deletion in Adjective - Adverb phrase</u>

```
a.        x     x                Underlying Representation
          x     x
        . x   . x
      zi-ke  muno
      small very
      'very small'

b.        x   x                  Phrase-final Left Shift (44)
          x   x
        . x   x .
      zi-ke  muno

c.            x                  Nuclear Stress (54)
          x   x
          x   x
        . x   x .
      zi-ke  muno

d.            x                  Beat Deletion (46)
              x
              x
        .  .  x .
      zi-ke  muno

e.    zike múno                  Surface Form

f.    *ziké muno
```

Since the Continuous Column Constraint insures that the left-most stress will delete in the cases above (as they are relatively weaker due to Nuclear Stress), the rule of Phrasal Beat Deletion need not stipulate that the left-most stress deletes. The rule can formalized as a mirror-image rule as follows.

(59) *Beat Deletion*

x --> ø / $[_P$...x...$]_P$ (applies simultaneously at all grid levels)
Condition: the trigger and target x are separated by a word boundary.

A note on the formalization of this rule is in order. Standardly, in mirror image rules, the environment line is simply removed (as suggested by Bach (1968)). However, in the typology established by Selkirk (1980a), this rule is a 'domain juncture rule', applying across one domain (here, the word) within another domain

(here, the phonological phrase).[13] There simply does not seem to be a straightforward way to succinctly formalize a mirror-image domain juncture rule, if Bach's formalism is to be maintained. I thus formalize Beat Deletion, albeit unelegantly, as in (59).[14]

4.5.3.2 Word-internal Beat Deletion

If Beat Deletion as a method of clash resolution is a productive process in Kinyambo, it might be expected to apply not only in phrasal clashes, as shown above, but in word-internal clashes as well. I will now show that it does. Let us first consider phrases in which the noun contains a root with [2 stress] followed by a stressless adjective.

Let us consider a partial derivation of 'good basket'.

(60) a. Underlying Representation

```
      x
. . x . . . .
e-ki-kapo ki-ruungi
basket    good
'good basket'
```

b. Beat Addition (41)

```
   x x
. . x x . . .
ekikapo kiruungi
```

There is now a word internal clash. It turns out that there is more than one possible pronunciation of phrases such as 'good basket' in Kinyambo. They are shown in (61)

(61) ekikápo kiruungi ~ ekikapó kiruungi 'good basket'

Both forms are readily accepted and produced by my consultant, and thus they must be accounted for in the grammar. The forms are straightforwardly accounted for if I assume two things. First, I will assume that the Nuclear Stress Rule, according to

[13]Phrasal rules of this type are fairly common. For additional examples of domain juncture rules, see Seïkirk (1980a) and Nespor & Vogel (1986).

[14]An alternative formalization, and one which may actually be clearer, would simply involve having two environment bars in the structural description of the rule. E.g. x--> ø / [...___...x...___...] As Bach's formalism is more standard, however, I will employ it consistently throughout this thesis.

its formalization as given in (54) above, will not apply to (60b), as there is no 'final stress in the rightmost word of the phrase'. Second, the Continuous Column Constraint predicts that Beat Deletion should be able to delete either stress in (60b) as the constraint is not violated in either case. A rule of word-internal Beat Deletion, formalized as a mirror-image rule, is given below in (62).[15]

(62) *Word-internal Beat Deletion*

x --> ø / [$_W$ ...x...]$_W$

The complete derivation of of 'good basket', then, is shown below.

(63) a.

```
      x
. . . x . . . .
e-ki-kapo ki-ruungi
basket    good
'good basket'
```

Underlying Representation

b.

```
    x x
. . x x . . .
ekikapo kiruungi
```

Beat Addition (41)

c.

```
      x                    x
. . . x .  . . .  . . . x . . .
ekikapo kiruungi ~ ekikapo kiruungi
```

Beat Deletion (62)

d. ekikápo kiruungi ~ ekikapó kiruungi — Surface Form

As seen in the derivation above Beat Deletion (62) can apply to (63b) to delete either of the two clashing stresses without violating the Continuous Column Constraint.

As was mentioned earlier in §4.2.1, the grid building rules in a language generally conspire such that stress is culminative at both the level of the word and the level of the phrase. Kinyambo, however, being phonetically a tone language, seems to be 'exempt' from certain restrictions placed on many stress language. One obvious exemption is the fact that certain words are allowed to proceed throughout the entire derivation and finally surface without any prominence. As this is true in Kinyambo,

[15] I will argue below that the domain of this rule is actually a sub-word prosodic level. For now, no generalization is lost if we simply consider the domain to be the word.

Nuclear Stress will fail to apply in phrases in which the final word is stressless, and thus, word-internally it is possible to have two equal stresses.

I now briefly return to the question of whether the process described above is better represented in a tonal or metrical framework. I have attempted to show in the discussion above that the Kinyambo facts, both at the level of the word, and at the level of the phrase, fall out directly from the principle of "clash resolution" found in stress languages (cf. §4.2.2). In a tonal framework, the directionality of High Tone Deletion would need to be stipulated. On the phrasal level, the leftmost High would be deleted, while word-internally, in cases such as (63), either High can delete. By assuming a Nuclear Stress Rule and the Continuous Column Constraint, both well-motivated in stress languages, the direction of deletion is directly predicted on my analysis without further stipulation.

To summarize up to this point, the principle of eurhythmy is a primitive in the theory of metrical stress (whether this be represented with a grid or with trees), while it certainly is not in the theory of autosegmental tone or accent. Following from the principle of eurhythmy is the unfavored state of clashes and lapses. To correct them, when they appear, the theory employs rules of Beat Addition, Beat Deletion, and Beat Movement. I have shown that the first two of these play a productive role in deriving the correct surface stress patterns in Kinyambo phrases. Finally, I have argued for a Nuclear Stress Rule, common in stress languages, which plays a crucial role with the Continuous Column Constraint in the determination of which stress deletes under clash resolution.

An additional strong piece of evidence for the underlying hierarchy of stress levels is seen when we contrast the behavior of [2 stress] and [3 stress] nouns followed by a stressless adjective. Above it was seen that by assuming that Beat Addition inserts

a [2 stress], two possible pronunciations of [2 stress] nouns are predicted when that noun is followed by a stressless adjective. Now let us examine nouns with [3 stress] in the same environment.

(64) <u>Noun with a [3 stress] followed by a stressless adjective</u>

omukáma muruungi 'chief--good' (cf. omukáma chief (isol.))

The derivation of this phrase is given below.

(65) a.

```
        x
        x
.   .   x   .   .   .   .
o-mu-kama mu-ruungi
```

Underlying Representation

b.

```
        x
        x x
.   .   x x   .   .   .
o-mu-kama mu-ruungi
```

Beat Addition (41)

c.

```
        x
        x
.   .   x   .   .   .   .
o-mu-kama mu-ruungi
```

Beat Deletion (62)

d. omukáma muruungi — Surface Form

The difference between this derivation and that of 'good basket' shown in (63) is that while both stresses are of equal strength in 'good basket', they are not in 'good chief'. In (65b) the first stress is three grid marks high while the second is only two. Consequently, Beat Deletion will delete the stress on the final syllable of the noun, and not either, as was the case when both stresses were of equal strength. This, of course, is predicted on my analysis in which different nouns with a surface High in isolation are set up with underlying differences in stress. It also supports the claim that Beat Addition adds a [2 stress]. Recall the independent justification for setting up *omukáma* 'chief' as [3 stress] and *ekikápo* 'basket' as [2 stress] is that the latter form undergoes Phrase-final Destressing while the former does not (see §3.7.5). That a [3 stress] behaves 'stronger' than a [2 stress] (in resisting deletion) both phrase-finally and with

respect to clash resolution seems to be strong evidence for an underlying hierarchy of stress levels.

While *omukáma muruungi* 'chief--good' is the preferred pronunciation, the phrase *omukamá muruungi* is far less ungrammatical than, say, *omúkama muruungi* or *ómukama muruungi*. As mentioned in Chapter One, I often found it helpful to ask my consultant to 'grade' the grammaticality of the phrase. In this case, while *omukáma muruungi* received an 'A', *omukamá muruungi* received a 'C', and *omúkama muruungi* and *ómukama muruungi* both received an unqualified 'F'. In the case of *ekikápo kiruungi* and *ekikapó kiruungi*, both pronunciations received an 'A', neither being judged superior to any recognizable extent.

This sort of gradation of grammaticality, I think, is present in other stress languages. Consider the English word *monotheism*. According to the principles of English stress, its stress pattern is *mònothéism*. If, however, the word were to be judged, stressed as *mónothèism* (in isolation), I think it would receive a 'C' at worst, while *monotheism̀* would receive an 'F' by any native speaker.

The Kinyambo facts above could be accounted for by assuming that a rule of Leveling (to be formalized below) can optionally add a grid mark to the weaker of the two clashing stresses in a form such as (65b), which will predict that either stress can delete, as was the case in (63). The application of Leveling in these forms is unpreferred and will produce marginal forms.

To summarize up to this point, I have shown that Beat Deletion resolves clashes at the level of the phrase (§4.5.3.1) as well as at the level of the word (§4.5.3.2). In every case the Continuous Column Constraint (5) will insure that the weaker stress deletes. In a phrasal clash, the Nuclear Stress Rule (54) will promote the stress in the right-most word to the greatest stress of the phrase. Therefore, in these cases the stress

in the previous word will delete. A word-internal clash arises when Beat Addition inserts a [2 stress] on the final syllable of a word which already bears a stress. In this regard, I examined the behavior of bisyllabic roots of different stress types. If the root bears a [3 stress], then the inserted [2 stress] deletes. If the root bears a [2 stress] then either of the two stresses can delete without violating the Continuous Column Constraint.

4.5.3.3 Optional Stress Shift

Let us now consider what happens in a word-internal clash containing a noun with a [0 stress] or [1 stress]. This will be done by contrasting the isolation and phrasal patterns of bisyllabic roots which are [0 stress], [1 stress], and [2 stress].

(66)	e-ki-tabo [0 stress] 'book'	o-mu-rimi [1 stress] 'farmer'	e-ki-kapo [2 stress] 'basket'	Underlying Representation
	ekitabo	omurimi/omurími	ekikápo	Isolation
	ekitabó kiruungi ekitábo kiruungi	omurimí muruungi omurími muruungi	ekikapó kiruungi ekikápo kiruungi	N -ruungi 'good' [0 str]
	'good book'	'good farmer'	'good basket'	
	ekitabo kíke	omurimi múke omurími múke	ekikapo kíke ekikápo kíke	N -ke 'small' [3 str]
	'small book'	'small farmer'	'small basket'	

It can be seen that, phrasally, [0 stress] and [1 stress] forms pattern with the [2 stress] forms when a stressless adjective follows, but not with [3 stress] forms (not shown) in which the rightmost word-internal clash always deletes, as demonstrated above in (65). However [0 stress] and [1 stress] forms pattern differently when followed by a stressed adjective.

First let us consider the [0 stress] nouns. The final syllable of *ekitabo* will receive a [2 stress] by Beat Addition when followed by *kiruungi* 'good'. One possibility, then, would be to have a rule which optionally shifts the word final stress

in a bisyllabic root one syllable to the left (or, alternatively, to root initial position). Note that it must be insured that the rule apply only to bisyllabic roots as there are *not* two possible surface forms in roots with one or three syllables.

(67)	e-n-te [0 stress] 'cow'	e-ki-tabo [0 stress] 'book'	e-ki-takuri [0 stress] 'yam'	U.R.
	enté ziruungi	ekitabó kiruungi ekitábo kiruungi	ekitakurí kiruungi	N -ruungi 'good [0 str]
	'good cow'	'good book'	'good yam'	

Where, then, would such a stress shift rule be ordered with respect to the other rules I have motivated. The rule ordering which we have seen is required in the examples above is given in (68).

(68) Phrase-final Left Shift (44)
Beat Addition (41)
Beat Deletion (word (62) & phrase (59))

(The first two rules precede the third, but are unordered with respect to each other.)

Suppose the rule was ordered after these three and simply formalized as follows: (R = Root)

(69) *Optional Stress Shift (first attempt)*

$$[_R\ .\ \overset{x}{x}\ ] \text{ --> } [_R\ \overset{x}{x}\ .\ ]$$

The rule would not affect any isolation forms as any stress would be root initial. It would not produce a penultimate stress in a noun when a stressed adjective follows, producing a form such as **ekitábo kíke* 'small book' (cf. (66)), because Beat Addition does not apply in these forms since there is a stress in the second word of the phrase (cf. (38), (39)). Therefore it would only operate in (66) on *ekitabó kiruungi* 'good thing', optionally producing *ekitábo kiruungi* . Below I will use an abbreviated version

of grid notation in which the number of grid marks on a syllable are simply noted by a numeral.

(70) a. e-ki-[$_R$tabo] ki-ruungi — Underlying Representation
book good
'good book'

b. 2
eki[$_R$tabo] kiruungi — Beat Addition (41)

c. 2 2
eki[$_R$tabo] kiruungi ~ eki[$_R$tabo] kiruungi — Optional Stress Shift (69)

d. ekitábo kiruungi ~
ekitabó kiruungi — Surface Form

Now let us consider the [1 stress] forms. A partial derivation of 'good farmer' is as follows.

(71) a. 1
o-mu-[$_R$rimi] mu-ruungi — Underlying Representation
farmer good
'good farmer'

b. 1 2
omu[$_R$rimi] muruungi — Beat Addition (41)

c. 2
omu[$_R$rimi] muruungi — Beat Deletion - phon. stem (62)

d. 2
omu[$_R$rimi] muruungi ~ — Optional Stress Shift (69)

2
omu[$_R$rimi] muruungi

e. omurími muruungi ~
omurimí muruungi — Surface Form

On this analysis, then, the Continuous Column Constraint predicts that in (71c) the weaker stress will delete. Optional Stress Shift then optionally applies, giving the two attested surface forms. I should note here that it is undesirable to have a post-lexical rule, such as Optional Stress Shift (69) referring to a morphological boundary

such as the root. I will show below that there is a sub-word *prosodic* level in Kinyambo which I call the 'phonological stem', which serves as the domain of this rule as well as others.

That the rule of Optional Stress Shift applies in constructions other than noun - adjective ones in shown below.

(72) Examples of Optional Stress Shift

a. Adjective - Adverb
mu-[$_R$rungí] mazima ~ mu[$_R$rúngi] mazima
good (CL3) truly
'truly good'

b. Verb - Adverb
o-ku-[$_R$rim-á] kuruungi ~ oku[$_R$ríma] kuruungi
farm well
'to farm well'

c. Verb - Adverb
o-ku-[$_R$jub-á] kuruungi ~ oku[$_R$júba] kuruungi
fish well
'to fish well'

To further illustrate the effects of Optional Stress Shift, let us now consider five phrases in table IV which are still not accounted for. They are underlined in (73) below.

(73) a. omutí guruungi ~ omúti guruungi 'tree--good' (cf. omúti 'tree' (isol.))
b. omuti gúke ~ omúti gúke 'tree--small'
c. omuzí guruungi ~ omúzi guruungi 'root--good' (cf. omúzi/omuzi 'root' (isol.))
d. omuzi gúke ~ omúzi gúke 'root--small'
e. ekintú kiruungi ~ ekíntu kiruungi 'thing--good'

The difference between *omúti* 'tree', *omúzi* 'root', and *ekiintu* 'thing' is that *omúti* is [3 stress], *omúzi* is [1 stress], and *ekiintu* is [0 stress]. Let us first examine (73a,b). Recall that the underlying representation of 'tree' is /o-mu-tí/. According to the rules I have motivated so far the derivation would be as follows.

(74)	3 o-mu-ti gu-ruungi tree good	3 3 o-mu-ti gu-ke tree small	Underlying Rep.
		3 3 omuti guke	Phrase-final Left Shift (44)
		3 4 omuti guke	Nuclear Stress (54)
		3 omuti guke	Beat Deletion (59)

The two phrasal forms predicted from the derivation above, viz. *omutí guruungi* 'good root' and *omuti gúke* 'good tree' are attested as shown in (73a-b). However, I must also account for the fact that the forms may also appear with a High tone on the class prefix *mu* as also shown in (73a-b).

I will now propose that the above facts can be accounted for by a slightly modified version of the rule of Optional Stress Shift formulated in (69) above, repeated below.

(75) *Optional Stress Shift (first attempt)*

$$[_R\ .\ \overset{x}{x}\ ] \rightarrow [_R\ \overset{x}{x}\ .\ ]$$

Suppose that, instead of formulating this rule in terms of a morphological root, the domain is renamed the 'phonological stem' which is defined as follows.[16]

(76) *Phonological Stem:*

a) A lexical root which contains at least two syllables

b) A monosyllabic lexical root plus the class prefix

The rule can also be modified so it applies, more generally, to any level of stress. The rule is formalized as in (77)

[16]Kidima (forthcoming) also has reason to postulate a sub-word prosodic level in Kiyaka which also entails combining a monosyllabic root with a prefix.

(77) *Optional Stress Shift*

```
     (x)        (x)
     (x)        (x)
[PS .  x ] --> [PS x . ]
```

The rule must be ordered after Beat Addition as seen in (71), repeated below.

(78) a. e-ki-[PStabo] ki-ruungi — Underlying Representation
book good
'good book'

b. 2
eki[PStabo] kiruungi — Beat Addition (41)

c. 2 2
eki[PStabo] kiruungi ~ eki[PStabo] kiruungi — Optional Stress Shift (77)

d. ekitábo kiruungi ~
ekitabó kiruungi — Surface Form

Beat Addition crucially feeds Optional Stress Shift in the derivation above, and must thus precede it. Let us now consider its application in words with monosyllabic roots and a syllabic class prefix, as such words also have a bisyllabic phonological stem. First we will consider: *omúzi guruungi ~ omuzí guruungi* 'good root'(73c).

(79) 1
a. o-[PSmu-zi] gu-ruungi — Underlying Representation
root good
'good root

b. 2
o[PSmuzi] guruungi — Beat Addition (41)

c. 2 2
o[PSmuzi] guruungi ~ o[PSmuzi] guruungi — Optional Stress Shift (77)

d. omuzí guruungi ~
omúzi guruungi — Surface Form

The derivation is similar in the phrases with a [3 stress] monosyllabic root, *o-mu-tí guruungi ~ o-mú-ti guruungi* 'good tree', the only difference being that Beat Addition applies vacuously as seen below.

(80)

a. o-[PSmu-ti] gu-ruungi — Underlying Representation
tree good
'good tree'

b. (vacuous) — Beat Addition (41)

c. o[PSmuti] guruungi ~ o[PSmuti] guruungi — Optional Stress Shift (77)

d. omutí guruungi ~ omúti guruungi — Surface Form

Next, I will derive *e-ki-ntú kiruungi ~ e-kí-ntu kiruungi* 'good thing' (73e) in which Optional Stress Shift affects a stress derived from Beat Addition.

(81)

a. e-[PSki-ntu] ki-ruungi — Underlying Representation
thing good
'good thing'

b. e[PSkintu] kiruungi — Beat Addition (41)

c. e[PSkintu] kiruungi ~ e[PSkintu] kiruungi — Optional Stress Shift (77)

d. ekintú kiruungi ~ ekíntu kiruungi — Surface Form

Note that when a stressed adjective follows a form such as *ekiintu* 'thing', Beat Addition will not apply (see §4.5.2 for discussion), and thus there is only one phrasal form in such cases, e.g. *ekintu kíke, *ekíntu kíke* 'small thing'.

Let us finally consider the derivations of *o-mu-zi gú-ke ~ o-mú-zi gú-ke* 'small root' (73d), and *o-mu-ti gú-ke and o-mú-ti gú-ke* 'small tree' (73b).

(82)	1 3 o[PS-mu-zi]PS gu-ke root good 'good root'	Underlying Representation
	1 3 o[PSmuzi]PS guke	Phrase-final Left Shift (44)
	1 3 ~ 1 3 o[PSmuzi]PS guke ~ o[PSmuzi]PS guke	Optional Stress Shift (77)
	1 4 ~ 1 4 o[PSmuzi]PS guke ~ o[PSmuzi]PS guke	Nuclear Stress (54)
	4 ~ (1) 4 o[PSmuzi]PS guke ~ o[PSmuzi]PS guke	Beat Deletion (phrasal) (59)
	omuzi gúke ~ omúzi gúke	Surface Form
(83)	3 3 o[PS-mu-ti]PS gu-ke root good 'good root'	Underlying Representation
	3 3 o[PSmuti]PS guke	Phrase-final Left Shift (44)
	(vacuous)	Beat Addition (41)
	3 3 ~ 3 3 o[PSmuti]PS guke ~ o[PSmuti]PS guke	Optional Stress Shift (77)
	3 4 ~ 3 4 o[PSmuti]PS guke ~ o[PSmuti]PS guke	Nuclear Stress (54)
	4 ~ (3) 4 o[PSmuti]PS guke ~ o[PSmuti]PS guke	Beat Deletion (phrasal) (59)
	omuti gúke ~ omúti gúke	Surface Form

Additional evidence that the class prefix forms part of the phonological stem can be seen in adjective - adverb combinations. Consider the derivation of 'very small'.

(84)

3 [$_{PS}$mu-ke] mazima CP small truly 'truly small'	Underlying Representation
(vacuous)	Beat Addition (41)
3 3 [$_{PS}$muke] mazima ~ [$_{PS}$muke] mazima	Optional Stress Shift (77)
muké mazima ~ múke mazima	Surface Form

That Optional Stress Shift applies in infinitival verbal forms followed by an adverb is shown below.

(85)

3 o-[$_{PS}$ku-rya] kuruungi CP small well 'eat well'	Underlying Rep.
(vacuous)	Beat Addition (41)
3 3 o[$_{PS}$kurya] kuruungi ~ o[$_{PS}$kurya] kuruungi	Optional Stress Shift (77)
okuryá kuruungi ~ okúrya kuruungi	Surface Form

I will now show that the phonological stem must be defined as a monosyllabic root plus its class prefix. This definition makes different predictions made about forms such as [o-[$_{PS}$mú-ti]] 'tree' and [ée-[$_{PS}$m-bwa]] 'dog'. In the former case the phonological stem has two syllables and thus meets the structural description of Optional Stress Shift, while in the latter case the phonological stem has only one syllable and will not undergo the rule. That such forms do not undergo Optional Stress Shift (77) is illustrated below.

(86)

a.	3 e-[PSm-bwa] zi-ruungi dogs good 'good dogs'	Underlying Representation
b.	(vacuous)	Beat Addition (41)
c.	----------	Optional Stress Shift (77)
d.	embwá ziruungi ~	Surface Form
e.	*émbwa ziruungi	

If such forms underwent Optional Stress Shift, both (86d) and (86e) would be generated. However (86e) is ungrammatical. This is accounted for under the definition of the phonological stem in (76). The structural description of Optional Stress Shift is not met in the derivation above as the phonological stem of *éembwa* 'dog' has one syllable and not two. This makes the correct predictions when a stressed adjective follows as well, as can be seen below.

(87)

a.	3 3 e[PS-m-bwa]PS zi-ke dogs good 'good dogs'	Underlying Representation
b.	3 3 e[PSmbwa]PS zike	Phrase-final Left Shift (44)
c.	(vacuous)	Beat Addition (41)
d.	----------	Optional Stress Shift (77)
e.	3 4 e[PSmbwa]PS zike	Nuclear Stress (54)
f.	4 e[PSmbwa]PS zike	Beat Deletion (phrasal) (59)
g.	embwa zíke	Surface Form
h.	*émbwa zíke	

Again, Optional Stress Shift must not apply, in order to avoid generating (87h). Therefore, I will assume that is it not possible, for example, to define the phonological

stem as a monosyllabic root and the *syllable* to its left, for if this were done, then the entirety of *éembwa* 'dog' would be a bisyllabic phonological stem, and Optional Stress Shift would then apply, generating incorrect surface forms.

To summarize this subsection, I have shown that a process of stress shift (to the left) optionally applies in words with both bisyllabic ((70)-(72)) and monosyllabic ((79)-(85)) roots. I have accounted for these facts by postulating a rule of Optional Stress Shift (77) which has as its domain the 'phonological stem' which was defined in (76). Although their structural changes are similar, it does not seem possible to collapse the rules of Phrase-final Left Shift (44) and Optional Stress Shift. Phrase-final Left Shift is obligatory as phrase-final prominences are strictly prohibited (e.g. *o-mú-ti*, **o-mu-tí* 'tree' (isolation) < /o-mu-tí/). Optional Stress Shift (77), as its name suggests, is not obligatory, but applies optionally in a bisyllabic phonological stem regardless of its location within the string. That Phrase-final Left Shift is bounded by the 'phonological phrase' while Optional Stress Shift is bounded only by the 'phonological stem' will be shown in Chapter Five.

4.5.4 Trigger-target distance effects in Beat Deletion

We have seen above that Kinyambo employs a rule of Beat Deletion to resolve clashes. At the beginning of this chapter (§4.4.2) it was suggested that the probability of application of a clash resolving rule in a stress language sometimes depends on the phonological distance between the two clashing elements (i.e. 'trigger-target distance effects'). I will now show that such is the case in Kinyambo.

Let us now consider the following forms, taken from Table IV, all of which contain [3 stress] nouns followed by a [3 stress] adjective.

(88) <u>Nouns with a [3 stress] followed by an adjective with [3 stress]</u>

a. omurúmuna múke ~ omurumuna múke 'sibling--small'

b. omukáma múke ~ omukama múke 'chief--small'

c. embwa zíke 'dogs--small'

According to the rules I have motivated thus far, let us contrast the partial derivations of 'small sibling', 'small chief', and 'small dogs' as given below:

(89)

3 3 o-mu-rumuna mu-ke sibling small 'small sibling'	3 3 o-mu-kama mu-ke chief small 'small chief'	3 3 e-m-bwa zi-ke dogs small 'small dogs'	U.R.
3 3 omurumuna muke	3 3 omukama muke	3 3 embwa zike	P-Final Left Shift
3 4 omurumuna muke	3 4 omukama muke	3 4 embwa zike	Nuclear Stress
omurumuna múke ~ omurúmuna múke	omukama múke ~ omukáma múke	embwa zíke	Surface

I noted above that the only surface form of 'small dogs' is *embwa zíke,* that is to say that Beat Deletion obligatorily applies. However there are two possible surface forms for 'small sibling' and 'small chief'. I suggest that the reason for this difference is explained by the principle of 'trigger-target distance effects' (16) as discussed in §4.2.2 above. I will show below that, in general, if the two clashing beats are in adjacent syllables then Beat Deletion must apply, whereas if the clashes are further apart, Beat Deletion is optional.

We saw above in §4.2.2 that the application of Beat Movement in English depended on the phonological distance between the two clashing elements. I suggest that the same state of affairs obtains in Kinyambo, providing further evidence that the prominence system is more like a stress one than a tonal or accentual one, as these type

of trigger-target distance effects, to the best of my knowledge, have never been found in the latter two types.[17]

Specifically, I suggest that in Kinyambo the probability of application of Beat Deletion depends on the "distance" between the two clashing beats, where distance is defined as the number of level one grid marks intervening between the two.[18] This can be provisionally stated as in (90) below.

(90) *Probability Principle of Rule Application (first attempt)*

The application of Beat Deletion in Kinyambo is:

a. obligatory if no syllable intervenes between the clashing stresses
b. optional (yet slightly preferred) if one syllable intervenes
c. optional (yet slightly unpreferred) if two or more syllables intervene

As is obvious from the formulation of (90) this statement represents, at best, a rough approximation in describing the nature of clash resolution in Kinyambo. Thus, in (89) while Beat Deletion will obligatorily delete the stress in the noun in 'small 'dogs' such deletion will be optional, yet preferred in 'small chief' and optional, yet unpreferred in 'small sibling'.

Let us now consider the application of Beat Deletion in phrases containing nouns of different stresses.

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[17]In tone languages, rules in which one tone affects another tone are usually of two types. In one type, the rule only applies if the trigger and target tones are adjacent (e.g. Meeussen's Rule in Shona (Meyers 1987)). In the other type the rule may apply regardless of the phonological 'distance' between the trigger and target (e.g. Low Tone Deletion in Luganda (Hyman et al. 1987)). To the best of my knowledge no tone rule has been proposed whose likelihood of application changes as the distance between the trigger and target changes, which seems to be the case in the clash resolving rules of English (Hayes 1984), Polish (Hayes & Puppel 1985), and Kinyambo.

[18]As was the case with the English Rhythm Rule, in fast speech the rule is more likely to apply across greater distances.

(91) Influence of different stress strengths on Beat Deletion

	[3 stress]	[2 stress]	[1 stress]	
a.	x x x x . . x . x . o-mu-kama mu-ke chief small	x x x . . x . x . e-ki-kapo ki-ke basket small	x x . . x . x . o-mu-rimi mu-ke farmer small	After Left-Shift (44)
b.	x x x x x . . x . x . omukama muke	x x x x . . x . x . ekikapo kike	x x x . . x . x . omurimi muke	Nuclear Stress (54)
c.	omukáma múke ~ omukama múke	ekikápo kíke ~ ekikapo kíke (preferred)	omurími múke ~ omurimi múke (highly preferred)	

It turns out that although Beat Deletion is optional in each case, as predicted by the Probability Principle of Rule Application as given in (90), the larger the interval between the stress levels of the two clashing stresses, the more likely Beat Deletion is to apply. I now propose a modified version of the Probability Principle as stated above as follows.

(92) *Probability Principle of Rule Application*

The application of Beat Deletion in Kinyambo becomes more likely:

a. the smaller the interval between the clashing stresses

b. the larger the interval between the stress levels of the two clashing stresses

It should now be apparent why the Nuclear Stress Rule was formalized as it was in (54) in terms of promotion to [4 stress] instead of promotion to the greatest stress of the phrase. If the latter approach were taken, the preferences noted in (91c) would have to be accounted for by some other principle of the grammar.

In (89) above we saw trigger-target distance effects playing a role in phrasal clash resolution. If these effects constitute a productive principle in the grammar, they

might be expected to play a role in word-internal clashes as well. I will now show that they do. Consider the following phrases from Table IV.

(93) a. ekikápo kiruungi ~ ekikapó kiruungi 'good basket'

b. omukáma muruungi 'good chief'

c. omurúmuna muruungi ~ omurumuná muruungi ~ omurúmuná muruungi 'good sibling'

Derivations for these forms are given in (94).

(94) <u>Trigger-target distance effects in word-internal clashes</u>

a.	b.	c.	U.R.
2 e-ki-kapo ki-ruungi basket good 'good basket'	3 o-mu-kama mu-ruungi chief good 'good chief'	3 o-mu-rumuna muruungi sibling good 'good sibling'	
2 2 ekikapo kiruungi	3 2 omukama muruungi	3 2 omurumuna muruungi	Beat Addit.
ekikápo kiruungi ~ ekikapó kiruungi	omukáma muruungi	omurúmuna muruungi~ omurumuná muruungi~ omurúmuná muruungi	Surface Form

The derivations of 'good basket' and 'good chief' were illustrated above in (63)-(65). Let us now compare them to the derivation of 'good sibling' which seems to share certain properties of each. (Recall that, as noted in §3.7.5.2, [2 stress] roots are always bisyllabic, and thus trisyllabic [2 stress] roots do not exist, are not available for comparison in this regard.) According to the Probability Principle of Rule Application as given in (92), it is predicted that Beat Deletion will be optional since there is one syllable intervening between the two clashing elements. The Continuous Column Constraint ((5), (13)), however, predicts that if the rule does apply, the second stress should delete as it is weaker.

It turns out that the preferred pronunciation of (94c) is *omurúmuna muruungi*, in which the second stress deletes. If the rule does not apply, as it is optional, the phrase *omurúmuná muruungi* obtains which is also attested. However, there turns out

to be a third pronunciation in which the first stress deletes, namely, *omurumuná muruungi*. Thus, this phrase seems to be acting as if the noun had [2 stress], like 'good basket' which would explain why either stress could delete. It is known, independently, however, that *omurúmuna* 'sibling' has [3 stress], because it does not undergo destressing phrase-finally (as *eikápo* 'basket' does). (See §3.7.5.2 for further discussion).

Before I consider possible analyses for this phenomenon, let us consider the case of a noun with a [1 stress] trisyllabic root followed by a stressless adjective.

(95)	1 o-ru-papuro ru-ruungi	Underlying Representation
	1 2 orupapuro ruruungi	Beat Addition (41)
	orupápuro ruruungi ~ orupapuró ruruungi ~ orupápuró ruruungi	Surface Forms

Here, again, it seems that the difference in stress strengths of the two clashing elements does not irrevocably dictate the direction of destressing, as the Continuous Column Constraint would suggest.

The clash resolution facts, then, seem to be as follows. In a phrasal clash, if we assume the Nuclear Stress Rule in (54), then the Continuous Contour Principle makes correct predictions, regardless if the clashes are adjacent or not, as the leftmost stress always deletes (cf. (53)-(56)). Word-internally, when the clashing stresses are on *adjacent syllables,* it was seen that the Continuous Column Constraint makes correct predictions in the case of a [3 2] and [2 2] clash as shown in (63), (65). In the case of an adjacent [1 2] clash, I assumed above that the [1 stress] deletes according to the Continuous Column Constraint, and then a rule of Optional Stress Shift (77) optionally shifts the word-final stress one syllable to the left onto the initial syllable of the root.

(The rule of Optional Stress Shift was independently necessary to account for the fact the [0 stress] bisyllabic roots which undergo Beat Addition can surface with a stress either on the initial or final syllable of a bisyllabic root). However, word-internally, when the clashes are *not adjacent*, as in the case of (94c) and (95), it seems that either clash can delete, even though one is stronger than the other.

Another way to summarize what is happening is as follows. First, stresses on syllables which receive Nuclear Stress never delete, period. Second, obligatory clash resolution is strictly constrained by the Continuous Column Constraint. Finally, optional clash resolution (i.e. non-adjacent clashes) is bidirectional (i.e. either can delete).

How, then, can one formally account for such observations? Several possibilities come to mind. The first option is to simply *stipulate* that word internally, when at least one syllable intervenes between the clashing elements, the Continuous Column Constraint does not dictate which stress deletes, but rather, either can delete.

A second option would be to eliminate the use of the Continuous Column Constraint altogether (and the Nuclear Stress Rule), and simply stipulate that in a phrasal clash, it is always the leftmost beat which deletes, and word-internally either beat can delete. It has been shown, however, that this is descriptively inadequate in the case of a word-internal [3 2] clash (arising from [3 stress] nouns followed by a stressless adjective, which triggers Beat Addition) in which the weaker stress deletes, as opposed to [2 2] clashes in which either beat can delete.

The third option, and the one which I will adopt here, is to introduce a rule of Leveling which adds one beat to the weakest clashing element in a word-internal non-adjacent clash. This is formalized as follows: (a '.' represents an unstressed syllable)[19]

[19]Again, if we were to abandon Bach's formalism, the structural description of (96) could be written as [...___ . x . ___...].

(96) *Leveling*

```
        x       x
x --> x /  [w . x . ]w
```

This mirror image rule will predict that the [1.2] and [3.2] configurations (where the '.' represents the intervening unstressed syllable) will become [2.2] and [3.3] respectively. It is important that a syllable intervene between the two stresses, as the rule must not apply to adjacent [32] clashes. In non-adjacent clashes, then, the Continuous Contour Principle correctly predicts the three attested pronunciations in each case. This is illustrated below.

```
(97) a.                                  x                    Underlying
                                         x                    Representation
     . . x . . . . .          .   . x . . .   . .
     o-ru-papuro ru-ruungi    o-mu-rumuna mu-ruungi
     paper       good         sibling     good
     'good paper'             'good sibling'

     b.                                  x                    Beat Addition (41)
               x                         x   x
     . . x . x . . .          .   . x . x .   . .
     orupapuro ruruungi       omurumuna muruungi

     c.                                  x   x                Leveling (96)
         x   x                           x   x
     . . x . x . . .          .   . x . x .   . .
     orupapuro ruruungi       omurumuna muruungi

     d. orupapuró ruruungi ~  omurumuná muruungi ~           Surface Form
        orupápuro ruruungi    omurúmuna muruungi
```

Unfortunately, it does not seem possible for Leveling (96) to also account for the Optional Stress Shift (77) facts. Although the case of an adjacent [12] clash (such as (71)) could be accounted for by Leveling (in exactly the same way that 'good paper' was), the [02] forms could not. In forms described in (70) such as *e-ki-tabó ki-ruungi ~ e-ki-tábo ki-ruungi* 'good book' (< /e-ki-tabo ki-ruungi/) in which a [0 stress] nominal root undergoes Beat Addition, the structural description of Leveling (96) is not

met. Likewise, it is not possible to account for the facts above in (97) by appealing to Optional Stress Shift (77). Thus, both rules seems necessary.

4.5.5 Summary of Beat Addition and Beat Deletion

In the preceding subsections I have suggested that the complex patterns of phrasal stress in Kinyambo illustrated in Table IV can largely be derived on the basis of two rules, while are independently well motivated in stress languages. These are Beat Addition (41) and Beat Deletion ((59) &(62)). Beat Addition, among other things, guarantees that there will be *at least* one prominence in any sequence of two words in the same phrase (e.g. even when there is no underlying stress in either of the two words.) The structural change of Beat Addition is uncomplicated. It is basically a version of End Rule Final (7a) at the level of the word, a rule which Prince (1983), among others, shows is well motivated in a variety of stress languages.

Even more "metrical" is the rule of Beat Deletion in Kinyambo which has all the properties of a clash resolution rule. This rule was shown to eliminate both word-internal and phrase-internal clashes, something which would be expected of a stress language. The rule is also subject to trigger-target distance effects (16), not unlike the Beat Movement rule in English (Hayes 1984) and Polish (Hayes & Puppel 1985). Once the structural description of Beat Deletion is met, the Probability Principle of Rule Application (92) determines if the rule should obligatorily or optionally apply. It was shown that the Continuous Column Constraint made correct predictions about what stress must delete. I noted, however, that three additional rules were necessary to predict the correct array of surface forms, namely, Nuclear Stress Rule (54), Optional Stress Shift (77) and Leveling (96). Regarding the Nuclear Stress Rule, I should note that the rule neutralizes the degree of stress of the adjective in noun-adjective constructions as any stressed adjective will be promoted to a [4 stress]. This accounts

for the fact that Beat Deletion will always affect the noun in such constructions, and never the adjective.

4.5.6 Phrase-final Left Shift

One rule which I employed above, but did not 'metrically' motivated is Phrase-final Left Shift. Kinyambo has a clear dislike for phrase final stress. This could be due to several factors. One is that stress in Kinyambo always falls on the initial syllable of the root. Thus, in the vast majority of words, stress is not underlyingly word-final. Thus, perhaps what was once a statistical generalization (i.e. the relative absence of phrase-final prominence) has become grammaticized.

Another factor is that there are no monosyllabic lexical words in Kinyambo at all. The only monosyllabic forms are function words, and to the best of my knowledge, they are all pronounced as stressless in isolation. Thus, since there are no monosyllabic words which "must" be pronounced with a stress (regardless of their position in the phrase), Kinyambo generalizes this fact about monosyllables to the final syllable of all words (cf. McCarthy & Prince 1986).

Note that if it is assumed that stress can never be borne by the last syllable of a phrase, it follows that the stress should shift and not simply be deleted. This is because I will assume that Beat Deletion only applies to resolve clashes. The stress on a phrase-final monosyllabic root is not subject to phrasal Beat Deletion since it will undergo Nuclear Stress. Thus, since it cannot be deleted it simply moves.

Hyman (1977) offers a hypothesis which correctly predicts the Kinyambo facts. He emphasizes the 'importance of a pitch fall as a perceptual cue or stress'. In other words, he maintains that a stress is perceived as a *Fall* (High + Low) and not simply as a High. This accounts for the great number of languages in which stress in found initially or penultimately, as an unstressed (=phonetically Low) syllable will follow.

What then, of the languages in which stress is final? Hyman (1977:46) states that "if stress is final, this pitch fall will have to be identified within the stressed syllable" (underlining Hyman's).

In a typical stress language, phonological stress can be interpreted by the phonetic component in a number of different ways (including pitch, volume, length, etc.) According to (my interpretation of) Hyman's analysis, then, the pitch contour of a monosyllabic stressed word such as *play* is geometrically the same as it is in a bisyllabic word such as *hockey*. In both cases the pitch is High-Low. In the case of *hockey* the High can be associated with the first syllable, while the Low can be associated with the second. In the case of *play*, however, both the High and Low are associated with the single syllable which constitutes the word. The pitch fall then, is realized *within* the final (and only) syllable.

I have claimed, however, that Kinyambo is different from a language such as English in that phonetically it is a strict tone language in which the mora is the domain of tone. The mora in Kinyambo will always bear one level tone. If a syllable is bi-moraic then it will surface as 'Falling'. However, as shown in Chapter Two, phrase-final syllables in Kinyambo are always monomoraic. I motivated a rule of Final Shortening ((39) of Chapter Two) to take care of cases where compensatory lengthening would normally create a long vowel. This is shown in the derivation of *omunwa* 'mouth' below.

(98)	o-mu-nua 'mouth'	Underlying Representation
	omunwaa	Gliding & Compensatory Lengthening
	omunwa	Final Shortening

Thus, since final syllables in Kinyambo are always short, an underlying stress in phrase-final position would result in a High tone on a phrase-final mora, violating

Hyman's proposal that stress results phonetically in a falling pitch. Therefore, in order to insure that the underlying stress results in a falling pitch, Kinyambo has a rule which shifts the phrase-final stress one syllable to the left. Note that this analysis also predicts the fact that no such surface shift is necessary on stressed word-final syllables if that word is followed by another word in a phrase. Such is indeed true as shown below.

(99) i-jwí ryaange 'ashes--my' (cf. í-jwi 'ashes')
i-swí riruungi 'thorn--good' (cf. í-swi 'thorn')
i-fá riruungi 'famine--good' (cf. í-fa 'famine')

In a true tone language there is nothing motivated by autosegmental theory which favors or discriminates against a phrase-final High (again, see the Hausa words in (2) above).[20] I believe this to be equally true of accentual languages. If the unmarked case is that a) any syllable can bear an accent and b) the possible tonal patterns associated with that accent are unconstrained, then there is nothing to discriminate against rules which would produce a phonetic phrase-final High.

4.5.7 Preprefixes

4.5.7.1 Behavior in isolation and phrasal forms

It turns out that preprefixes behave idiosyncratically with respect to the stress rules formalized above. I will first review the status of the preprefix itself. In Chapter Two I mentioned that all nouns, adjectives, and verbal infinitives always appear with a class prefix. (In the case of adjectives it agrees with the noun which it modifies.) In addition to the class prefix, nouns and verbal infinitives also bear a preprefix which is a vowel whose quality depends on the vowel in the class prefix.[21] This is illustrated in

[20]Again, this is not to say that tone languages *cannot* have such a rule, only that such rules are not non-marked in the sense of following directly from some principle of the theory. In the same article cited above, Hyman (1977) uses the following as evidence that 'final position is phonologically weak': he states that 'in many African languages, a H tone is subject to lowering in utterance-final position, and a L tone typically undergoes what Stewart (1971:185) terms "downglide" '.
[21] See §2.1 for a formalization of this process and examples.

the forms below (Hyphens represent morphological boundaries; PP=preprefix; CP = class prefix).

(100) e- kii- ntu
PP CP thing
'thing'

a- ma- huri
PP CP egg
'eggs'

o- ku- kóma
PP CP tie
'to tie'

When these preprefixes are found phrase-initially they are stressless, as shown in (100). The major exception to this, discussed earlier, occurs in the case of the isolation forms of nouns which have a stressed monosyllabic root and whose preprefix plus class prefix is equal to one syllable. This will be the case with class 9/10 nouns which have the class prefix /N/ (as in *éembwa* < /e-N-bwá/), and class 5/6 nouns whose preprefix /e-/ has elided before the class prefix /i-/ (e.g. *í-fa* 'famine' < /i-fá/). Thus if the rule of Phrase-final Left Shift (44) applies to one of these words, the stress will shift from the monosyllabic root to the syllable to the left which will have as a nucleus the preprefix. This is illustrated in the derivation of *ífa* 'famine' as shown below in (101).

(101)

3 i-fa 'famine'	Underlying Representation
3 ifa	Phrase-final Left Shift (44)
ífa	Surface Form

While the preprefix of nouns other than those of the type in (101) will be Low toned when phrase-initial, it surfaces as High toned when phrase-medial as shown in

the forms below, which should be contrasted with their isolation forms given in (100). (Preprefixes are underlined.)

(102) okwend' <u>é</u>kiintu
to-want thing
'to want the thing'

okwend' <u>á</u>mahuri
to-want eggs
'to want the eggs'

okwend' <u>ó</u>kukóma
to-want to-tie
'to want to tie

The isolation form of 'to want' is *o-kw-eend-a*. In Kinyambo all infinitival verbs end in *-a* . The final vowel of the verb has elided due to a vowel elision rule which applies whenever two vowels become string adjacent through syntactic concatenation. This mirror image rule, discussed in §2.3.3.2, is given below.

(103) *Vowel Elision*

$$[\text{-cons}] \rightarrow \emptyset \;/\; \begin{array}{c}\mu\\ |\\ [\text{-cons}]\end{array}$$

I will argue below that, in cases like these, the stress placed on the final vowel of the verb (by the rule of Beat Addition) is not lost when the final vowel elides, but instead simply reassociates with the preprefix through a process of 'stress migration'. Consider the derivation of *okumañ' ómuguumba* 'to know the barren woman' (cf. *okumaña* 'know' (isolation)).

(104)

```
. . . . . . . .
o-ku-mañ-a o-mu-guumba      Underlying Representation
know       barren woman
'to know the barren woman'

      x                     Beat Addition (41)
. . . x . . . .
okumaña omuguumba

      x                     Vowel Elision (103)
. . . x . . . .
okumañ  omuguumba

        x                   Stress Migration
. . .   x . . .
okumañ  omuguumba

okumañ' ómuguumba           Surface
```

When the preprefix deletes, the stress inserted by Beat Addition appears on the final vowel of the verb, as illustrated below.

(105)

```
o-ku-mañ-a o-mu-guumba      Underlying Representation
know       barren woman
'to know the barren woman'

      x                     Beat Addition (41)
. . . x . . . .
okumaña omuguumba

      x                     Vowel Elision (103)
. . . x   . . .
okumaña muguumba

okumañá muguumba            Surface
```

4.5.7.2 Stress Migration

Although this process of elision and migration in (104) could be formalized in a number of different ways, I will assume that the elision of the final syllable which deletes in cases such as (104) will strand the level one and level two grid marks. I assume in the (104) the grid marks move in the direction of the trigger, which, in this case, is the next syllable to the right.

It has been shown that this process of prominence preservation and subsequent reassociation is extremely common in tone languages (cf. Williams 1971, Leben 1973, Goldsmith 1976). In fact it follows directly from the autosegmental nature of tone itself. What about stress languages? Do they exhibit the same characteristics in this regard? The answer is 'yes', at least some do. Al-Mozainy et al. (1985) show that in Bedouin Hijazi Arabic, if a syllable after having received stress is later deleted, the stress is borne by the syllable immediately to the right. Halle & Vergnaud (1987) illustrate stress migration under syllable dissolution in Russian and Sanskrit. They (1987:30) cite Kenstowicz (1983), Rappaport (1984) as providing "additional examples of stress shift triggered by deletion or desyllabification." Hayes (ms.) shows that stress migration also occurs in Yup'ik Eskimo and Cyrenaican Bedouin Arabic. Thus the fact that stress in Kinyambo is not deleted with the vowel in these cases is not inconsistent with my claim that it is underlyingly a stress language. In fact, the rule of Phrase-final Left Shift (44), motivated above, could be seen as a type of stress preservation under a constraint which prohibits phrase-final stresses.

4.5.7.3 Preprefixes and Beat Deletion

Now that we have discussed Vowel Elision, let us examine the interaction of the reassociated stress with other stresses in "clash" contexts. We will see that it is necessary to modify the rules of Word-internal Beat Deletion (62) and Nuclear Stress (54) to account for the phrasal facts in which vowel elision and migration take place. Let us first consider cases where the reassociated stress triggers Beat Deletion. This is illustrated in the phrases below.

(106) Migrant stress in a position to trigger Beat Deletion

3 o-ku-bon-a o-mu-ntu see person 'to see the person'	Underlying Representation
3 2 okubona omuntu	Beat Addition (41)
3 2 okubon omuntu	Vowel Elision (103)
3 2 okubon omuntu	Stress Migration
3 4 okubon omuntu	Nuclear Stress Rule (54)
okubon' ómuntu ~ *okubón' omuntu	Surface Form

If Nuclear Stress Rule is ordered after Stress Migration, then it is correctly predicted that the stress which has reassociated to the preprefix will never delete in a phrasal clash, but rather, will trigger the deletion of a stress in the previous word. In the example above, Beat Deletion is optional (but preferred), as one syllable intervenes between the clashing stresses, in accordance with the Probability Principle of Rule Application (92).

Now let us consider the case in which a reassociated stress should *undergo* Beat Deletion. Such a situation arises, for example, when the noun in a verb - noun construction has underlying stress. According to the rules above, we would expect the following partial derivation of the concatenation of *okuripa* 'pay' [0 stress] and *omukáma* 'chief' [3 stress].[22]

[22]Recall that, as noted in (40) in §4.4.2, Beat Addition takes place even when there is a stress in the second word in all phrases (including verb-noun phrases) except noun-adjective ones.

(107) Migrant stress in a position to undergo Beat Deletion

a.	3 o-ku-rip-a o-mu-kama pay chief 'to pay the chief'	Underlying Representation
b.	2 3 okuripa omukama	Beat Addition (41)
c.	2 3 okurip omukama	Vowel Elision (103) & Migration
d.	2 4 okurip omukama	Nuclear Stress Rule (54)
e.	okurip' ómukáma	Surface Form
f.	*okurip' omukáma	
g.	*okurip' ómukama	

According to its formalization above in (54), Nuclear Stress would promote the [3 stress] of the final word to a [4 stress]. The [2 stress] on the preprefix should then (optionally) undergo Beat Deletion. Such, however, produces the ungrammatical (107f). In this case, the only grammatical surface form is (107e). (107g) is ungrammatical because, as was noted in the discussion of Phrase-final Destressing in §3.7.5.2, a root-internal [3 stress] never deletes at the end of a phrase.

4.5.7.4 The phonological stem as a domain for Beat Deletion

As a solution to this dilemma, I propose that the lower domain of Beat Deletion is not the word (as in (59)), but the phonological stem, as defined in (76). The rule may then be renamed and reformalized as (108).

(108) *Beat Deletion (domain: phonological stem)*

$x \rightarrow \emptyset \ / \ [_{PS} \ldots x \ldots]_{PS}$

On this assumption the derivation in (107) would proceed as follows

(109) a. 3 — Underlying Representation

o-ku-rip-a o-mu-[PSkama]PS
pay chief
'to pay the chief'

b. 2 3 — Beat Addition (41)

okuripa omu[PSkama]PS

c. 2 3 — Vowel Elision (103) & Migration

okurip omu[PSkama]PS

d. 2 4 — Nuclear Stress Rule (54)

okurip omu[PSkama]PS

e. ---------- — Beat Deletion (phon. stem) (108)

f. ---------- — Beat Deletion (phrase) (59)

g. okurip' ómukáma

In the derivation above, Beat Addition provides the stress which migrates onto the preprefix of the noun. Beat Deletion will not apply at the level of the phonological stem, as the phonological stem contains only one stress (viz. the [4 stress] in (109d)). Beat Deletion will not apply at the level of the phrase because the clashing stresses are not separated by a word boundary as required by the rule's formalization in (59).

Given that the domains of Beat Deletion are the phonological stem and the phrase as formalized above, the stress which migrates onto a preprefix will never delete, even if there is a stress on the syllable immediately to its right. This is shown below.

(110) a. 3 — Underlying Representation

o-ku-gur-a e-n-[PSkoko
buy chicken
'to buy the chicken'

b. 2 3 — Beat Addition (41)

okugura en[PSkoko

c. 2 3 — Vowel Deletion (103) & Reassociation

okugur en[PSkoko

d. okugur' énkóko — Surface Form
*okugur' enkóko

To further illustrate the descriptive adequacy the analysis outlined above, let us consider associative constructions, which, in Kinyambo, take the form: noun possessed##Class Prefix of noun possessed + *a* ##possessor.

As was mentioned above Vowel Elision applies in Kinyambo when two vowels become adjacent through syntactic concatenation. And, as illustrated in (104) and (105) above, Vowel Elision is often bidirectional. Bearing this in mind, let us consider the associative phrase 'the book of the chief', noting both elision possibilities:

(111) <u>Clash Resolution in Associative Construction</u>

a.	e-ki-tabo ki + a [wo-mu-[ps kama book CP assoc. chief 'the book of the chief'		Underlying Rep.
b.	ekitabo ch [womu[ps kama (2, 3)	b'. ekitabo cha [wmu[ps kama (2, 3)	Vowel Elision (& Migration)
c.	ekitabo ch [womu[ps kama (2, 4)	c'. ekitabo cha [wmu[ps kama (2, 4)	Nuclear Stress
d.	----------	d'. ----------	Beat Deletion (phon. stem)
e.	----------	e'. ekitabo cha [wmu[ps kama (2) 4	Beat Deletion (phrase)
f.	ekitabo ch' ómukáma	f'. ekitabo chá mukáma	
g.	*ekitabo ch' omukáma	g'. ekitabo cha mukáma	

(Recall that, as discussed in §2.3.3.1, /ki/ --> [č] / __ V)

Let me first state that my consultant finds no meaning differences between (111f) and (111f'-g'). I thus assume that both derive from the same underlying representation in which the preprefix is present, vowel elision being bidirectional.

There seems to be no motivation for assuming that a noun could be lexically produced without a preprefix and subsequently be inserted into the phrase marker.[23]

In the case where the vowel of the associative marker deletes (111b-f) the structural description of Beat Deletion is met at neither the level of the phonological stem nor the level of the phrase, as was the case in (109-110) above. In the case where the preprefix deletes (111b'-g'), the structural description of Beat Deletion is not met at the level of the phonological stem, but it is met at the level of the phrase, as the clashing stresses in (111e') are separated by a word boundary.

4.5.7.5 Arguments against underlyingly stressed preprefixes

At this point it is appropriate to consider an alternative analysis of the preprefix itself, namely that preprefixes are underlyingly stressed. Such, for example, was assumed for Haya, a neighboring language, by Hyman & Byarushengo (1984), Byarushengo et al. (1976) and Chagas (1977).

The first problem with positing underlying stress on preprefixes is the fact that they are stressless phrase-initially. Prima facie, it might seem possible to simply posit a rule of phrase-initial beat deletion. This would account for the difference in the forms below in (112).

(112) a. omuguumba 'barren woman' (< /ómuguumba/)
b. okumañ' ómuguumba 'to know the barren woman'

There are two major problems with positing a general rule of phrase-initial beat deletion. The first is theoretical while the second is empirical. Recall that Kinyambo does not tolerate phrase-final stress. It resolves this by shifting the stress to the syllable to the left. A priori, then, one would think that if stress cannot be born by the first

[23]In Haya, a closely related language, Chagas (1977) shows that there are systematic semantic and syntactic differences between a noun with a preprefix and one without it. No such distinction appears to exist in the dialect of Kinyambo examined here.

syllable in a phrase, it would shift, not delete. Recall that Beat Deletion only applies in the event of a clash. Even under vowel elision, the stress remains. It is clear in an isolation form of a noun with a stressless root such as *omuguumba* 'barren woman', under this analysis the only underlying stress would be on the preprefix. Since there is no clash, deletion would not follow from any general principle. Stress shift then would be the most likely candidate to apply, but it does not (**omúguumba*).

The second argument against a *general* phrase-initial beat deletion rule is that it would generate ungrammatical forms in every case except that of the preprefix. In (113) I present forms in which the initial syllable is underlyingly stressed, but cannot be deleted.

(113)	bwáancha	*bwaancha	'morning'
	mbwéènu	*mbweenu	'today'
	mpóra	*mpora	'slowly'
	nkáha	*nkaha	'where'
	ñéencha	*ñeencha	'tomorrow'
	táàta	*taata	'my father'
	Múta	*Muta	'Muta'
	Síma	*Sima	'Sima'
	Kénya	*Kenya	'Kenya'

Thus, a general phrase-initial stress deletion rule cannot be posited. The rule would have to refer to morphological information in the first word of the phrase, applying if the first syllable was a preprefix, but otherwise not.

The last problem with an analysis in which preprefixes are underlyingly stressed is seen in the slow pronunciation of phrases such as the one in (111). This slow pronunciation is given in (114).

(114) ekitabo chá omukáma 'chief's book'

It should be noted that a slow pronunciation in which neither vowel elides is not as natural as one in which deletion takes place. Nevertheless, in such a pronunciation it is the associative marker which is stressed and not the preprefix. This is exactly what

would be expected if the preprefix was underlyingly stressless. If the preprefix were underlyingly stressed the slow pronunciation of (114) would be expected to be **ekitabo cha ómukáma*. Importantly, it cannot be said that (114) is simply a pronunciation of three consecutive isolation forms, as if there were a phrase boundary between every word, because the isolation pronunciation of the associative marker is *cha*, not **chá* (regardless if it is assumed to be stressed or not in the underlying representation).

I think, then, that the arguments above are sufficient on both theoretical and empirical grounds to justify dismissing an analysis in which the preprefix is underlyingly stressed, especially in light of the fact that Beat Addition and Vowel Elision are independently motivated, each being able to occur in the absence of the other. Moreover, an analysis in which the preprefix was underlyingly stressed (whether it be a [2 stress], [3 stress] or [4 stress]) would still require the revised domains of Beat Deletion argued for above (cf. 109-110).

4.5.8. Nuclear Stress and Phrase-final Destressing

In §3.7.5.2, I motivated a rule of Phrase-final Destressing, which can be formalized as follows.

(115) *Phrase-final Destressing*

x --> ø / [$_P$W [[... ___ ...]$_{PS}$]$_W$]$_P$ (apply once at the highest level)

The effects of this rule are that a [3 stress] (becoming a [2 stress]) will always be realized as a High in a phrase-final word, a [2 stress] (becoming a [1 stress]) will optionally be realized as a High tone, and a [1 stress] (becoming a [0 stress]) and [0 stress] will always be realized as a Low tone.

In §4.5.3.1 I motivated a Nuclear Stress Rule (54) which was formalized as follows.

(116) *Nuclear Stress Rule (first attempt)*

Promote the final stress in the rightmost word of the phrase to a [4 stress].

It should be obvious that these two rules are logical opposites. One strengthens a prominence near the end of a phrase, while the other weakens it. Since both have been shown to be necessary in generating certain phrases, we should now explore their interaction. First, I will suggest that Phrase-final Destressing precede Nuclear Stress, in order that the latter rule not neutralize the underlying stress distinctions in the final word of a phrase.

I will assume that Phrase-final Destressing remain formalized as it is in (115) above. It will be necessary, however, to complicate the rule of Nuclear Stress in order to adequately describe the surface facts. Let us first consider constructions in which the final vowel of the verb deletes. The phrase below contains a noun with [2 stress], which as noted above should optionally surface with a High tone in phrase-final position. If the rules were to apply exactly as formalized above the following derivation would obtain.

(117) a.	2 o-ku-mañ-a o-mu-gore know bride 'to know the bride'	Underlying Representation
b.	2 2 okumaña omugore	Beat Addition (41)
c.	2 2 okumañ omugore	Vowel Elision (103) & Migration
c.	2 1 okumañ omugore	Phrase-final Destressing (115)
d.	2 4 okumañ omugore	Nuclear Stress Rule (116)
e.	okumañ' ómugóre ~	Surface Form
f.	okumañ' ómugore	

As seen in the derivation above, Nuclear Stress incorrectly predicts that only (117e) should surface, whereas both (117e) and (117f) are grammatical. This problem can be obviated if it is assumed that Nuclear Stress applies to the leftmost stress in the final word of the phrase. This proposal would make the correct predictions in the derivation above. Moreover, it is supported by derivations such as the following.

(118)	a.	3 3 o-kw-eges-a o-mu-kama teach chief 'to teach the chief'	Underlying Representation
	b.	3 2 3 okwegesa omukama	Beat Addition (41)
	c.	3 2 3 okweges omukama	Vowel Elision (103) & Stress Migration
	d.	3 4 3 okweges omukama	Nuclear Stress (116)
	e.	(3) 4 3 okweges omukama	Phrasal Beat Deletion (115)
	f.	okwéges' ómukáma ~	Surface Form
	g.	okweges' ómukáma (preferred)	

In this phrase, Beat Deletion may apply in (118e) to delete the [3 stress] from the verb. Although it is conceivable that it is the [3 stress] in the noun which precipitates the deletion, the fact that the preferred pronunciation of phrases such as this is the one in which the stress does delete supports the suggestion that the Nuclear Stress Rule affects the left-most stress in the final word of the phase (cf. Probability Principle of Rule Application (92)).

Now let us examine the case in which the preprefix deletes. The above analysis makes correct predictions when the phrase-final noun has a [3 stress] as shown below.

(119)	a.	3 o-ku-rip-a o-mu-kama pay chief 'to pay the chief'	Underlying Representation
	b.	2 3 okuripa omukama	Beat Addition (41)
	c.	2 3 okuripa mukama	Vowel Elision (103)
	c.	2 2 okuripa mukama	Phrase-final Destressing (115)
	d.	2 4 okuripa mukama	Nuclear Stress Rule (116)
	e.	(2) 4 okuripa mukama	Phrasal Beat Deletion (59)
	f.	okuripá mukáma ~	Surface Form
	g.	okuripa mukáma	

This analysis also makes correct predictions regarding phrases ending in noun with [1 stress] as shown below.

(120)	a.	1 o-ku-rip-a o-mu-rimi pay farmer 'to pay the farmer'	Underlying Representation
	b.	2 1 okuripa omurimi	Beat Addition (41)
	c.	2 1 okuripa murimi	Vowel Elision (103)
	c.	2 okuripa murimi	Phrase-final Destressing (115)
	d.	----------	Nuclear Stress Rule (116)
	e.	----------	Phrasal Beat Deletion (59)
	f.	okuripá murimi	Surface Form

Nouns which are stressless will be unaffected by Nuclear Stress and Phrasal Beat Deletion. (E.g. *okuripá muguumba* 'to pay the barren woman')

The present analysis, however, does not make correct predictions with respect to phrase-final nouns containing a [2 stress]. Consider the derivation below.

(121)	a.	2 o-ku-mañ-a o-mu-gore know bride 'to know the bride'	Underlying Representation
	b.	2 2 okumaña omugore	Beat Addition (41)
	c.	2 2 okumaña mugore	Vowel Elision (103)
	d.	2 1 okumaña mugore	Phrase-final Destressing (115)
	e.	2 4 okumaña mugore	Nuclear Stress Rule (116)
	f.	(2) 4 okumaña mugore	Phrasal Beat Deletion (59)
	g.	okumañá mugóre ~	Surface Form
	h.	okumaña mugóre ~	
	i.	okumañá mugore	

As it stands, the Nuclear Stress Rule as formalized in (116) correctly predicts (121g) and (121h). However, (121i) is also a possible pronunciation of this phrase, and is unaccounted for. To handle this case, I propose the following reformulation of Nuclear Stress.

(122) *Nuclear Stress (Final Version)*

Locate the leftmost stress in the final word of the phrase. If it is a [2 stress] or greater, obligatorily promote it to a [4 stress]. If it is a [1 stress], optionally promote it to a [4 stress].

The derivation in (121) above will then proceed from (121d) as follows.

(123)	d.	2	1					Phrase-final Destressing (115)
		okumaña	mugore					
		know	bride					
		'know the bride'						
	e.	2	1	~	e'.	2	4	Nuclear Stress Rule (122)
		okumaña	mugore			okumaña	mugore	
	f.	2	(1)		f'.	(2)	4	Phrasal Beat Deletion (59)
		okumaña	mugore			okumaña	mugore	
	g.	okumañá mugóre ~			g'.	okumaña mugóre		Surface Form
		okumañá mugore				okumañá mugóre		

The revised formulation of Nuclear Stress in (122) applies in (123e) above, optionally promoting the [1 stress] to a [4 stress]. In the event there is no promotion (123f), it appears (for the first time) that Phrasal Beat Deletion can actually delete the right-most stress of a phrase. It turns out that even if such a deletion did not take place the correct surface forms would be produced as a [1 stress] is optionally assign a High Tone by Tone Assignment (23). In the event Nuclear Stress does promote the [1 stress] (123e'), then Phrasal Beat Deletion will optionally follow (123f'). The three attested surface forms are all generated (*okumañá mugóre* being generated in two ways).

To summarize, I have argued above that the Nuclear Stress Rule follows Phrase-final Destressing in order not to bleed it. Furthermore, I argued that the Nuclear Stress Rule affects not simply any prominence in the final word of the phrase, but the left-most one. Finally, I showed that to account for the full range of surface variant pronunciations of certain phrases, it was necessary to stipulate that the Nuclear Stress Rule apply optionally to forms with [1 stress].

4.5.9 Optionality combinations

It can now be noted that multiple optional rules combine freely in Kinyambo phrases. We have seen several instances of postlexical optional rule application. Tone Assignment, as formalized in (23) states that [1 stress] roots are optionally assigned a

High tone, accounting for the class of forms which can be pronounced in their isolation form as with a High tone or as all Low. Another example is the rule of Beat Deletion. This rule is optional if one or more syllables intervenes between the two clashing elements. It was also seen that two rules are 'bidirectional', and thus share a property of optional rule application in that they produce more than one possible surface form from the same underlying representation. The bidirectional rules in question are Vowel Elision (103), and Beat Deletion (108) when the clashing stresses are of equal strength.

Consider the possible pronunciations of the phrase 'the cats of the bride'. If the vowel on the associative marker deletes, the derivation proceeds as follows.

(124)	a.	3 2 2 e-n-jangwa z-a o-mu-gore cats of bride 'the cats of the bride'	Underlying Representation
	b.	3 2 2 enjangwa z' omugore	Vowel Elision (103) & Stress Migration
	c.	3 2 1 enjangwa z' omugore	Phrase-final Destressing (115)
	d.	3 4 1 enjangwa z' omugore	Nuclear Stress (122)
	e.	(3) 4 1 enjangwa z' omugore	Phrasal Beat Deletion (59)
	f.	enjángwa z'ómugóre ~	Surface Form
	g.	enjangwa z'ómugóre ~	
	h.	enjángwa z'ómugore ~	
	i.	enjangwa z'ómugore	

Tone Assignment (23) stipulates that a [1 stress] is optionally assigned a High tone. (124f-g) result if the [1 stress] on the final word is realized as a High tone, while (124h-i) result if the [1 stress] is realized as a low tone. (124f,h) result if Phrasal Beat Deletion applies while (124g,i) result if it does not. The application of Phrasal Beat

Deletion is optional due to the fact that a syllable intervenes between the clashing element, in accordance with the Probability Principle of Rule Application formalized in (92).

Here, I wish only to show that the optional rules in Kinyambo will often combine to produce a large number of possible surface phrases, all having the same underlying representation.

4.5.10 Finite Verbal Forms

The last thing I wish to discuss before reconsidering the general metrical, accentual, and tonal properties of Kinyambo is the finite verbal system. The goal of this subsection will be very narrow. I will present evidence that the same hierarchy of underlying stress levels argued above to be present in nominal system, is also present in the verbal system. I will show that there is a four-way stress distinction in verbal infinitives (as diagnosed by the isolation and phrase-final forms), and that this distinction is also present in the finite verb forms. This, I believe, can easily and adequately be shown to be true, regardless of the specific analysis of the verbal morphology. In this regard, I will only examine a small portion of the entire system, (viz. the affirmative, non-relative, verbal forms) as a discussion of these will suffice to illustrate the gradient nature of stress in verbs. Thus, I do not intend or pretend to give a full accounting of the verbal system here. The presentation and nomenclature for the tenses follows Hyman & Byarushengo's (1984) work on Haya.

I suggested in §3.7.5 that there was a four-way stress distinction in nouns based on their isolation and phrase-final behavior. The summary found in (25) of that section is repeated in (125) below.

(125)

	Root Type	Isolation	Phrase-final	Surface Forms
a.	/-tabo/ [0 stress]	not stressed	not stressed	**ekitabo** 'book' **Niñend' ékitabo** 'I want the book'
b.	/-rimi/ [1 stress]	optionally stressed	not stressed	**omurimi ~ omurími** 'farmer' **Niñend' ómurimi** 'I want the farmer'
c.	/-kapo/ [2 stress]	obligatorily stressed	optionally stressed	**ekikápo** 'basket' **Niñend' ékikápo** 'I want **~ ékikapo** the basket'
d.	/-kama/ [3 stress]	obligatorily stressed	obligatorily stressed	**omukáma** 'chief' **Niñend' ómukáma** 'I want the chief'

Recall that the rule of Phrase-final Destressing (115) removes one grid mark from the word when it is found at the end of a phrase in which it is not the only member. I would now like to suggest that the same distinctions exist in verbal infinitives. This can be seen in (126), which should be compared, point by point, to (125) above.

(126)

	Root Type	Isolation	Phrase-final	Surface Forms
a.	/-chuumb-/ [0 stress]	not stressed	not stressed	**okuchuumba** 'to cook' **Niñend' ókuchuumba** 'I want to cook'
b.	/-jun-/ [1 stress]	optionally stressed	not stressed	**okujuna ~ okujúna** 'to help' **Niñend' ókujuna** 'I want to help'
c.	/-rum-/ [2 stress]	obligatorily stressed	optionally stressed	**okurúma** 'bite' **Niñend' ókurúma** 'I want **~ ókuruma** to bite'
d.	/-kom-/ [3 stress]	obligatorily stressed	obligatorily stressed	**okukóma** 'tie' **Niñend' ókukóma** 'I want to tie'

The same analysis argued for in §3.7.5 for the nominal forms seems perfectly applicable to the verbal infinitives. The differing behavior of the isolation and phrase-final forms can be predicted on my analysis in which there are four underlying levels of

stress. What I would now like to show it that the underlying hierarchy of stress levels seen in the verbal infinitives is also present in the finite verbal forms. Below in Table V, I present the third person plural forms of the four verbs whose infinitival forms appear in (126). Only the forms in the far left column are glossed, the glosses of the other forms being easily interpolated. (FV=Final Vowel)

VERB TENSES

-chumb- 'cook' [0 stress]	-jun- 'help' [1 stress]	-rum- 'bite' [2 stress]	-kom- 'tie' [3 stress]
Habitual			
ba- chúumb-a 3pl cook FV	ba-jún-a	ba-rúm-a	ba-kóm-a
Past 1			
bá- chuumb-a 3pl cook FV	bá-jun-a	bá-rúm-a	bá-kóm-a
Past 2			
ba- chuumb-ír- e 3pl cook PAST 2 FV	ba-jun-ír-e	ba-rum-ír-e	ba-kom-ír-e
Past 3			
bá- ka- chuumb-a 3pl PAST 3 cook FV	bá-ka-jún-a ~ bá-ka-jun-a	bá-ka-rúm-a ~ bá-ka-rum-a	bá-ka-kóma
Past Habitual			
ba- chuumb-ág- a 3pl cook HABIT FV	ba-jun-ág-a	ba-rum-ág-a	ba-kom-ág-a
Future 1			
ba-ra- chúumb-a 3pl FUT 1 cook FV	ba-ra-jún-a	ba-ra-rúm-a	ba-ra-kóm-a
Future 2			
ba-ri- chúumb-a 3pl FUT 2 cook FV	ba-ri-jún-a	ba-ri-rúm-a	ba-ri-kóm-a
Progressive			
ni- ba- chúumb-a PROG 3pl cook FV	ni-ba-jún-a	ni-ba-rúm-a	ni-ba-kóm-a
Inceptive			
ba- rá- chummb- ir-e 3pl-FUT 1-cook-PAST 2-FV	ba-rá-jun-ir-e	ba-rá-rum-ir-e	ba-rá-kom-ir-e
Persistive			
ba- chá- chuumb-a 3pl PERS cook FV	ba-chá-jun-a	ba-chá-rum-a ~ ba-chá-rúm-a	ba-chá-kom-a ~ ba-chá-kóm-a
Perfective			
bá-chuumb-ir- e 3pl cook PAST 2 FV	bá-jun-ir-e	bá-rum-ir-e	bá-kóm-ir-e

Table V

The rough semantic breakdown of the tenses which might be otherwise hard to interpret are as follows: Past 1 describes the recent past (e.g. something done earlier that day). Past 2 describes the middle past (e.g. something done yesterday). Past 3 describes the distant past (e.g. something done a week or month ago). Future 1 describes the near future (e.g. something to be done tomorrow). Future 2 describes the distant future (e.g. something to be done next week). The Inceptive is usually translated 'to have ever X-ed'. The Persistive is usually translated 'to still be X-ing'. My consultant translates the Perfective as 'having already X-ed'.

As can be seen in the table above, some tenses are distinguished segmentally (e.g. Future 1 and Future 2) while others are distinguished solely by their prominence pattern (e.g. Habitual & Past 1; Past 2 & Perfective). It will be seen that in all but the boxed tenses the surface tone patterns of the four finite verb forms are identical. Moreover, even in the boxed forms, the surface tone patterns in all the material except for the verbal root are identical. Thus, the only differences in surface prominence in all of the finite verbal forms listed in Table V are confined to the verbal root. Specifically, sometimes a root will obligatorily bear a Low tone, sometimes it will bear either a High or a Low tone and sometimes it will obligatorily bear a High tone.

Let us examine the behavior of the verbal roots found in the four boxes in closer detail. Let us assume, consistent with the Tone Assignment Rule given above in (23), that an obligatory surface High derives from a [2 stress] or [3 stress], an optional High derives from a [1 stress], and an obligatory Low derives from a [0 stress]. The final grid level on the roots (before undergoing Tone Assignment) can then be summarized as follows:

(127) Root type	[0 stress]	[1 stress]	[2 stress]	[3 stress]
Past 1	[0 stress]	[0 stress]	[2/3 stress]	[2/3 stress]
Past 3	[0 stress]	[1 stress]	[1 stress]	[2/3 stress]
Persistive	[0 stress]	[0 stress]	[1 stress]	[1 stress]
Perfective	[0 stress]	[0 stress]	[0 stress]	[2/3 stress]

There is a striking generalization here. It is the case in every tense that a stronger underlying stress is never realized as weaker on the surface than a weaker underlying stress. In other words, the surface stress strengths within each tense are 'progressive' and never regressive, parallel to the underlying stresses. In no tense do we find an underlying [2 stress] surfacing as High ([2/3 stress]), while a [3 stress] surfaces as either High or Low ([1 stress]). We never find a [0 stress] or [1 stress] surfacing as High ([2/3 stress]), while a [2 stress] surfaces as low ([0 stress]). To summarize, in the course of the phonological derivation, neutralizations can occur, but a 'metathesis' of stress strengths cannot.

Although there is no four-way surface tonal distinction in any one tense, it is apparent by simply looking at the Past 1 and Past 3 forms that there must be a four-way underlying contrast in stress strength. In the Past 1, there is a neutralization of the [0 stress] and [1 stress] forms, and a neutralization of the [2 stress] and [3 stress] forms. In the Past 3 tense, however, the neutralization is between the [1 stress] and [2 stress] forms. This four-way surface distinction reflects the four-way underlying distinction, independently motivated on the basis of the isolation and phrase-final pronunciations of the verbal infinitives.

I believe that my assertion that the finite verbal forms reflect a four-way underlying contrast is justified on the basis of the discussion above of the forms in Table V. The only other point I wish to make regarding the finite verbal forms is the parsing of those forms into prosodic units. In the case of the four boxed tenses, I will

assume that one phonological stem consists of the verb root and its Final Vowel (not unlike the definition given for other lexical items). This will account for the fact that two stresses can surface on adjacent syllables. This is illustrated below for the verbal forms of *o-ku-kóm-a* 'tie' in Past 1, and the Perfective.

(128) a. [[bá]$_{PS}$[-kóm-a]$_{PS}$]$_{W}$
3pl. tie FV
'they tied' (Past 1)

b. [[bá]$_{PS}$[-kóm-ir- e]$_{PS}$]$_{W}$
3pl tie PAST 2 FV
'they already tied' (Perfective)

Beat Deletion at the level of the phonological stem (108) will not apply as the clashing elements in (128a-b) are not both phonological stem internal. Phrasal Beat Deletion (59) is inapplicable as no word boundary intervenes between the two stresses.[24]

4.5.11 Epilogue: Stress, accent, or tone?

Now that we have examined both Kinyambo isolation forms and phrases in some detail, let us reconsider the question of whether the facts are best accounted for in a tonal, accentual or metrical framework. I think that it is uncontroversial that the surface forms are best described in a tonal framework. There is a simple High/Low distinction. Prominence seems to be acoustically signaled by pitch only. In words where there are two prominences, both are equal. In the metrical framework which I have proposed, the number of grid marks on a syllable above level two is irrelevant to the phonetic component. If the syllable bears a level two grid mark (or greater), then

[24]It is very apparent, just from looking at the small sample of finite verbal forms in Table V, that the verbal morphology is by no means trivial, and may well involve rules particular to that system of the grammar. It is certainly this author's hope and plans to present, at a later date, a detailed and descriptively adequate account of the Kinyambo verbal forms, as Hyman & Byarushengo (1984) did for Haya.

the first mora of that syllable receives a High tone. Syllables bearing a level one grid optionally receive a High tone. All other syllables are realized as Low.

The question, however, is how to best represent the underlying prominences and the phonological rules which manipulate them. At different points in this chapter I have contrasted a metrical, tonal, and accentual account of different phonological phenomena, and suggested that a metrical account was the most adequate both descriptively and explanatorily. At the beginning of this chapter I presented some general characteristics of stress, accent, and tone. Now that we have examined the phrasal phonology in some detail, I wish to consider several specific proposals which suggest different criteria and diagnostics which might be used in determining if a prominence system is one of stress, accent, or tone.

At times there seems to be almost as many definitions of stress, accent, and tone as there are linguists who write about them. For example, Goldsmith (1987) writes, "It is not a particularly controversial claim that English has an accentual system, though precisely what such a claim means is certainly open to dispute." Throughout the literature these terms for prominence have been used in many different ways to mean many different things. Therefore, the views presented below are by no means uncontroversial, and represent only two possible perspectives which might prove helpful in evaluating and categorizing Kinyambo prominence.

4.5.11.1 Hyman's view of stress and tone

Hyman (1977, 1978) discusses the nature of tone, stress, and accent. I have gathered and paraphrased statements from his two articles which characterize typical or general properties of tone and stress.[25] These statements are found in boldface. (As he

[25]Hyman (1977) states in his conclusion, "It should be clear, however, that this represents only a first attempt to characterize some of the universal properties of stress, and that much of what has been said must be taken as tentative." Hyman also notes that accent may be superimposed on tone (he cites

does not discuss pitch accent to any great extent, only statements on tone and stress are listed.)

I will first discuss stress.

(129a) **The prominence in culminative. There will generally be one and only one prominence per word, although in a few languages will have words with no prominence while others may have words with more than one prominence. (1977:38)**

As was shown in §3.1 Kinyambo roots have a maximum of one underlying prominence, which seems to conform to this culminative function. However, some words can surface in isolation without any stress, although these words will receive a stress when found in larger phrases by the rule of Beat Addition (see §4.5.2). Finally, some words (notably finite verbal forms) can surface with two prominences (see §4.5.10). Hyman, notes however, that the domain of stress is not always the word. Sometimes the domain may be smaller, sometimes larger. In Kinyambo it seems that the culminative function applies at the level of the phonological stem in some forms (e.g. finite verbal forms) and at the level of the phrase in others (e.g. when two words are underlyingly stressless).

(129b) **Stress is assigned to syllables (1977:38)**

I showed in §3.2 that stress in Kinyambo is assigned to the syllable. By a late rule of Tone Assignment (23) stress is realized as a High tone on the first mora of that syllable.

Mandarin and Haya as examples of this) and that tone may be superimposed on accent (he cites Fasu as an example.) Thus, he is not claiming that a language must be *either* a tone language or a stress one.

(129c) **Stress may be 1) free (i.e. the position of the prominence on words of a given language may be lexical), 2) demarcative (e.g. it always falls on a given syllable of a word), or 3) morphological (e.g. its position in a root is not affected by the addition of affixes). (1977:39)**

Stress in Kinyambo is, in Hyman's terminology, demarcative, being assigned to the first syllable of the root.

(129d) **Stress in utterance final position will be realized as a HL fall in pitch, rather than as a H level pitch. (1977:43)**

In §4.5.5 I discussed Hyman's views on this subject in some detail, showing that the rule of Phrase-final Left Shift can be motivated by this generalization.

(129e) **Stress placement rules may be sensitive to the specific structure (or weight) or a stressable syllable. (1977:47)**

Stress assignment in Kinyambo is not directly sensitive to syllable weight (as is the case in many other stress languages). Syllable weight does, however, play one role in this respect in the postlexical phonology. In §3.7.5.2 I claimed that certain roots are underlyingly marked as [2 stress], optionally undergoing a destressing process when phrase-final. I also showed that although this property is not phonologically predictable (and thus must be lexically determined), syllables obligatorily pronounced Falling in isolation are always [3 stress] (and never [2 stress]) and are thus 'protected' in this sense from Phrase-final Destressing.

(129f) **Perceptual strategies for the realization of stress include 1) a pitch change, 2) greater duration, or 3) greater intensity (1977:40), although pitch is the most reliable cue (1978:2)**

Kinyambo uses pitch change to indicate prominence. This is consistent with the claim that it is a tone language phonetically.

(129g) **The intonational features associated with a given utterance or utterance type will solely account for the realization of the abstractly marked stressed syllable. (1978: 4)**

As Kinyambo intonation is completely unstudied, no comment can be made in this regard.

(129h) **There may be stress reduction rules (1978:10)**

We have seen that the stress reduction in Kinyambo is manifested by a rule of Beat Deletion (§4.5.3), which operates productively on the levels of the phonological stem and the phrase.

Now I will discuss Hyman's views on tone.

(130a) **Pitch is the general acoustic signal of tone (1978:2)**

As Kinyambo is claimed to be a tone language phonetically, it is not surprising that it conforms to this generalization.

(130b) **The constant physical property associated with the prominence is distinct from (though possibly influenced by) the intonational features. (1978:4)**

See comments on (129g) above.

(130c) **In an ideal tone situation, each tone freely combines with each other tone (i.e. there are no neutralizations). The number of prominence patterns is the number of tones to the power of the number of syllables in the word. (1978:8)**

I have contrasted Kinyambo and Hausa in this regard noting that while this generalization is true for a 'true' tone language, such as Hausa, it certainly is not in Kinyambo (see §4.4). In Kinyambo, there is only one prominence per root, and its position within the root is predictable. Thus, there are only two prominence patterns in the domain in which it is assigned, 1) a prominent syllable followed by nonprominent ones, 2) all nonprominent syllables.

(130d) **There may be assimilatory tonal rules (1978:10)**

There are no prominence assimilation rules in Kinyambo at all. Thus, we find no rules of the type, give a syllable prominence when it precedes or follows another prominent syllable. Neither do we find rules which delete prominence when that prominence is adjacent to a nonprominent syllable. What we find, in fact, in both Beat Addition, and Beat Deletion is just the opposite, namely dissimilation.

4.5.11.2 Poser's view of stress and pitch-accent

Poser (ms.) discusses typological differences between pitch accent and stress. I repeat (in boldface) the following comparisons verbatim off of his conference handout.[26]

(131a) **<u>Melody Source</u>: In pitch accent systems the tonal melody is either fixed or lexically determined, whereas in stress systems the melody may be determined post-lexically by pragmatic considerations.**

I have not examined 'post-lexical pragmatic considerations' in Kinyambo in any great detail. However, they do not appear to dictate which of the variable pronunciations is used in a given context. In English an intonational tonal melody is assigned to a word based on its stress pattern (cf. Pierrehumbert 1980, Selkirk 1984). For example, the neutral, declarative tone melody associated to *Montana* is LHL, the High being associated with the stressed syllable. However, the 'surprise' tone melody is HLH, the Low being associated with the stressed syllable. In Kinyambo, no such pragmatically determined intonational melodies are assigned to words. Tones are assigned strictly according to the number of grids on each syllable (cf. Tone Assignment (23)).

(131b) **<u>Domain Delimitation</u>: In stress systems there is evidence for the creation of constituent structure by stress placement rules. None of the relevant phenomena are known to occur in pitch accent systems.**

One 'sub-word' constituent which seems relevant to Kinyambo stress is the phonological stem (as defined and discussed in §4.5.6.2 & §4.5.7.4). I argued that this was the domain of Optional Stress Shift (77) and Beat Deletion (62). As the domain of Beat Deletion, in general there will be a maximum of one stress per phonological stem, which of course is a property of the metrical foot, which Poser is

[26]To the best of my knowledge no accompanying paper was ever written.

undoubtedly alluding to in (131b). The only place we have seen two stresses surface in a phonological stem is when a syllable intervenes in a clash within that domain. Recall the example in (94) of 'good sibling' /o-mu-[$_{PS}$rúmuna$_{PS}$] mu-ruungi/ --> [o-mu-[$_{PS}$rúmunáp$_{S}$] muruungi] by Beat Addition. Beat Deletion will be optional in this case in accordance with the Probability Principle of Rule Application, and thus *omurúmuná muruungi* may surface. As can be seen at a glance in Table IV, these instances are very restricted, occurring only when a lexical item with a root of at least three syllables is followed by a stressless modifier.

As a final comment on (131b), it has been claimed that a wide range of stress phenomena (though not perhaps all) can be neatly accounted for in the grid framework which does not posit metrical constituent structure in the way that metrical trees do (cf. Prince 1983, Selkirk 1984).

(131c) **<u>Gradation</u>: Stress systems distinguish among different ranks of stresses and have rules whose effect is to reduce stresses. In pitch accent systems there is no such thing as a reduced accent, nor are there accent reduction rules.**

I have argued throughout this chapter that Kinyambo is best described as a system with a gradation of prominences *within the phonology*. I submit that this is weighty evidence in favor of analyzing Kinyambo as as stress language. If one had only accents to deal with there would be no way to describe the fact that Kinyambo has three types of stressed words which systematically differ in their phrasal and isolation properties. And although many stress languages do have *phonetic* secondary stress, it is by no means clear that all languages traditionally termed as stress languages exhibit such surface gradations.

(131d) **<u>Obligatoriness</u>: In stress systems, every polysyllabic word must have a stress on some syllable. In pitch accent systems, unaccented words are permitted.**

We have seen that there are stressless words in Kinyambo which can surface alone or in a phrase without any prominence (e.g. *muruungi* 'good'). First, in §4.4 I noted that there do appear to be some languages which have been classified as stress languages, but which do not strictly conform to (131d). Second, if one substitutes 'phrase (containing at least two words)' for 'polysyllabic word' in Poser's statement above, the statement will then correctly characterize Kinyambo, as I showed in §4.5.2 that Beat Addition insures that no two consecutive words in the same phrase will both surface without prominence.

As already noted above, the fact that phonetically Kinyambo is a tone language seems to permit it certain privileges not shared by other stress languages. One of these seems to be that a word can surface as all-Low. It is illuminating to note in this regard that even words with some (albeit little) phonological stress will surface as all-Low due to the rule of Tone Assignment (23). The first syllable of the root of /o-mu-rími/ 'farmer' has a [1 stress]. In isolation this word can surface without a High tone (*omurimi*), as Tone Assignment optionally assigns a High to a [1 stress]. Thus, this is a case of a word being 'stressed' in some sense, but permitted to be pronounced without surface prominence.

(131e) **<u>Domain</u>: Pitch accents may fall either on the syllable or the mora. In contrast, the domain of stress is always on the syllable.**

The domain of stress in Kinyambo has been clearly shown to be that of the syllable. A prominent monomoraic syllable is always realized as [v́], while a prominent bimoraic syllable is always realized as [v́v]. There are no sequences of [vv́], [v́v́], or [v̂]. A case which nicely exemplifies this (as illustrated in §3.5) is *amáiso* 'eyes' (< /a-ma-íso/). After a syllabification process (§2.2) makes the /ai/

sequence tautosyllabic, the prominent bimoraic syllable surfaces as a Falling tone, and not a Rising one which might be expected if the domain of underlying prominence was the mora.

(131f) **Quantity Sensitivity: Stress placement is frequently quantity sensitive, while pitch accent placement is not.**

Although stress placement is not strictly quantity sensitive it interacts with stress in the respect mentioned in §3.7.5 and (129e).

(131g) **Ictus: In stress systems, the location of the stresses is frequently relevant in rhymed poetry and in the alignment of tune to text in music. In pitch accent systems, the location of the accent plays no such role.**

I have no data regarding Kinyambo poetry.

(131h) **Clash Avoidance: In stress systems rules that prevent strong stresses from coming too close together, such as the English Rhythm Rule, are common. Such rules are unknown in pitch accent systems.**

In this respect Kinyambo clearly acts as a stress language. I have shown that Clash Avoidance is pervasive in both the domain of the phonological stem and the phrase (to be further defined in Chapter Five). The method of resolving clashes in Kinyambo is not to move a stress, which characterizes the rule of Beat Movement in English, but to simply delete one of the offending stresses.

With respect to Poser's distinctions above, Kinyambo could be considered more pitch accent-like with respect to (131d). It is definitely more stress-like with respect to (131c and 131h), while rather neutral with regard to (131a, 131b, 131e, and 131f).

4.6 Summary

I feel that the major argument in favor of analyzing Kinyambo in a metrical framework, as a stress language is that the phonological rules needed to derive the

surface forms metrical in nature. Specifically, the metrical aspects of Kinyambo phonology are the following:

(132) Metrical Properties of Kinyambo Phonology

a) Beat Addition as lapse resolution

b) Beat Deletion as clash resolution (at the level of the phonological stem and the phrase)

c) Trigger-target distance effects in clash resolution

d) Phrase-final Left Shift to realize stress as a fall in pitch

e) Nuclear Stress Rule

f) Multiple phonological degrees of stress

g) Clash resolution bound by the Continuous Column Constraint

Beat Addition insures that no two consecutive words in a phrase will be without any prominence, thus resolving phrasal 'lapses'. Beat Deletion insures (with surface exceptions noted in §4.5.7.4) that when two prominences are on adjacent syllables, one will delete. Furthermore, it has been shown that this type of clash resolution shows trigger-target distance effects (16), optionally taking place when the clashing elements are not syllable adjacent. In fact the closer the clashing elements, the more likely Beat Deletion will apply. This motivated the Probability Principle of Rule Application given in (92). Phrase-final Left Shift as a mechanism to realize a stress as a fall in pitch was discussed in §4.5.5. Nuclear Stress, as discussed in §4.5.3.1 and §4.5.8, has the effect of protecting the leftmost stress in the final word of a phrase from undergoing Beat Deletion.

It would, of course, be possible to recast (132a,b,d,e) in a tonal framework (although I think I have shown above that all of these rules find a clearer metrical motivation). (132c) could simply be stipulated to apply in tone systems, however it would be without precedence (see fn. 14). It is not at all clear, however, how (132f) and (132g) could be derived straightforwardly in a purely tonal (or accentual)

framework. If, for example, words which I claim contain a [3 stress] or [2 stress] simply had, in a tonal framework, a High on the initial syllable of the root, then, in order to account for the differing behavior of the two types of words in phonological stem-internal clash resolution, one of the two types would simply have to be diacritically marked to be an exception to High Deletion, however that was to be formalized. Furthermore, the same diacritic would need to serve to distinguish the behavior of theses two types of words with respect to Phrase-final Deletion, as the [3 stress] words do not undergo this rule, while the [2 stress] words optionally do so. If one diacritic was used to serve both of these purposes, it would essentially have the quality of marking 'weak' and 'strong' High tones, something better suited to a metrical analysis.

To summarize this one point, with respect to: a) Beat Deletion, b) Phrase-final Destressing, and c) isolation pronunciation, I have shown that the stronger stresses are more stable and less likely to delete than the weaker ones. Furthermore, I have shown that there is a four-way contrast in underlying stress levels in both nouns and verbs. It is not at all obvious how a tonal framework would make such a distinction. For example, a floating High, linked High, and no High gives only a three way distinction. Thus, some additional diacritic or mechanism would need to be employed.

Along these same, lines I think it would be very difficult to formulate the rule of Phrase-final Destressing in a tonal framework. I have shown above that in the metrical framework I have outlined, it is possible to 'weaken' a stress by one level. It is not clear how any single tonal rule could achieve the same results (however the four-way underlying contrasts were arrived at).

At the same time I recognize that the version of metrical phonology which I must assume to adequately account for the Kinyambo facts in non-standard in many

respects. Perhaps the major innovation in metrical theory which I must assume is that grid marks can be given some absolute value instead of a purely relative one. Consequences of this are that a) there can be underlying contrasts in stress strength (as opposed to allowing only derived contrasts through subordination) and b) rules can affect a subset of the individual grid marks on a single syllable, such as Phrasal-final Destressing which removes the topmost grid mark on a syllable, and Nuclear Stress which raises the grid marks on a syllable to the fourth metrical level (see (91)) for justification of promotion to [4 stress]). That this is a *possible extension* of the existing mechanisms in grid formalism is uncontroversial. What is controversial is whether it is desirable to allow such a parameterization of the theory.

To repeat what I stated at the outset of this chapter, it seems very clear that whatever *existing* framework the Kinyambo facts are cast into, certain phenomena will be well-motivated (by the primitives of the theory) while others will not be. This thesis is an attempt to show how metrical theory would need to be 'stretched' or modified to account for the Kinyambo facts. I believe the above account to be completely descriptively adequate, but, in certain respects, only partially explanatorily adequate. I believe, however, that although it would also be possible to formulate a tonal or accentual account for the above facts which would be descriptively adequate, any such account would not be *as* explanatorily adequate as the metrical account which I have presented above.[27] The question of whether this means that a new formalism needs to be developed or whether an existing one should be modified, will, ultimately, only be answered as more new data from different languages (of all prosodic types) is presented and analyzed.

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[27]A completely tonal treatment of certain facts was, in fact, assumed in Bickmore (forthcoming a, b). It was only after examining a much wider array of facts, that the metrical analysis presented above was felt to be much more explanatorily adequate.

Chapter Five

The Phrasal Phonology and the Prosodic Hierarchy

5.0 Introduction to Phonology Beyond the Word

In Chapters Two and Three I examined the general characteristics of words in Kinyambo. Underlying forms were set up which conformed to the following three basic parameters:

(1) a. Each noun is lexically associated to a noun class which determines its preprefix and class prefix in both the singular and plural forms.

b. Certain syllables are underlyingly bimoraic.

c. Roots are diacritically marked as to their stress ([0 stress]-[3 stress])

In Chapters Two and Three I outlined various restrictions and constraints which apply to words, largely (though not completely) based on the isolation forms. In Chapter Four I examined the behavior of Kinyambo words in phrasal contexts. I showed that although the lexical morphology (1a) does not change according to the noun's phrasal context, both its syllabic (1b) and tonal (1c) characteristics do. In the previous chapters I mentioned that certain syllabic/moraic rules (e.g. vowel shortening rules) and certain prominence changing rules (e.g. Leftward Shift, Beat Addition, and Beat Deletion) apply in certain 'prosodic/syntactic' environments but not others, even when the structural description of the rule is met. These rules, which take place between words, have traditionally been termed *external sandhi* rules. In this chapter I will define the domains in which these phrasal rules apply.

It will be very apparent, if it is not already (based on different examples in the first four chapters), that external sandhi rules play a major role in the phonology of Kinyambo. What, however, is the best way to analyze and formalize these external sandhi or phrasal rules? Cross-linguistically, certain sandhi rules only need to

distinguish between pause and lack of pause. For example, perhaps a rule applies in one word in the event that another word follows, or conversely, in the case where no word follows. In these cases a great deal of additional phonological apparatus in not needed. The ## and // symbols, meaning word boundary and pause respectively, can be used to formulate rules like those below.

(2) a. [-voice] --> [+voice] / ___ ## [+voice]

b. [s], [r] --> [ḥ] / ___ //

Rule (2a) describes a voicing rule of Sankrit (See Kaisse 1985, Selkirk 1980b, and Whitney 1889), while rule (2b) describes another rule in Sanskrit called Visarga at Pause (Selkirk (1980b)). Were these the only types of external sandhi rules found in languages, the "phrasal phonology" would be very straightforward, essentially having the same characteristics as internal sandhi (i.e. word-internal) rules. These, however, are not the only types of sandhi rules found to exist in language. Phonological facts have been presented and analyzed which show complex patterns in rule application. It has become evident that there are *phonological phrasal junctures* in between the word juncture on the one hand and pause on the other, and that different rules may refer to different junctures. These intermediate phrasal junctures seem to correspond, to some degree, to the syntactic phrasing of the sentence or utterance. For example, a rule might only apply between a head and its first complement. It is obvious that in a situation such as this, ## and // are no longer sufficient.

Currently, there seem to be two main approaches taken in dealing with phonological rules which refer to phrasal junctures. The first approach maintains that phonological rules have access to the syntactic phrase marker, and simply include the relevant aspects of the phrase marker in the structural description of the given phonological rule. This 'direct' approach has been advocated by Clements (1978),

Odden (1987), Kaisse (1985) and others. Though one can propose constraints on just 'how much' of the syntax is available to the phonology, certain linguists have felt that direct access to syntax renders the phonological component much too powerful.[1] This uneasiness has lead some to propose that phonological rules do not have direct access to syntax, but rather to *prosodic phrases* (and phrase boundaries) which have been constructed on the basis of the syntax, but which are not necessarily identical to it (i.e. to any existing syntactic phrase). One such approach is the theory of the *prosodic hierarchy*.

This theory was developed by E. O. Selkirk (1980a-b, 1984, 1986), and has recently received attention from other linguists including Nespor & Vogel (1982, 1983, 1986), Hayes (forthcoming a), and others.[2] Some of these theorists allow for a block of direct-reference rules to apply before the prosodic ones. A somewhat stronger hypothesis involves the elimination of all direct-reference rules, the non-prosodic phrasal phenomena being handled by other means, such as precompilation (see Hayes, forthcoming b). I have chosen to work within the prosodic hierarchy because it is a constrained theory which has been shown to be successful in predicting the phrasal facts in a variety of different languages (see, especially Nespor & Vogel 1986). Below, I will cast the Kinyambo facts in the framework of the theory of the prosodic hierarchy, both noting where the theory makes correct and incorrect predictions, and making suggestions for amending the theory when appropriate.

The outline of the chapter is as follows. First I will briefly describe the theory of the prosodic hierarchy assumed here. Second, I will discuss phonological phrases in particular, and suggest how this level in the prosodic hierarchy might be defined

[1]Kaisse (1985), for example, proposes a constrained 'direct' approach which relies heavily on the notion of C-command.

[2]For the most current articles on the subject, see especially the articles in *Phonology 4* (1987) and in (Inkelas & Zec forthcoming).

cross-linguistically. I will present some data from Kinyambo and suggest how their existence bears on the formulation of a parameterized universal phonological phrase construction rule. I will present and examine other rules which are also bounded by the phonological phrase. Finally, I will examine other levels of the prosodic hierarchy which serve as the domains for other rules in Kinyambo. In Chapter Four I suggested that there is a sub-word prosodic level in Kinyambo, that of the 'phonological stem'. This shall be discussed again below. Finally, I argue that rule ordering cannot be predicted on the basis of the prosodic levels at which the rules apply.

5.1 Description of the prosodic hierarchy

In the theory of the prosodic hierarchy the phonological string is exhaustively divided up into prosodic phrases based upon certain fundamental aspects of the string and its syntactic phrase marker (e.g. reference to heads and maximal projections). These prosodic phrases are in turn exhaustively combined into larger phrases, which are in turn combined into still larger phrases, etc. until the entire string is exhaustively parsed on every prosodic level. In this way a hierarchy of prosodic levels is obtained. Given the constraint that the string is exhaustively parsed at every level, and that a phrase on one level may belong to one and only one phrase on the next higher level, the phrases are said to be 'strictly layered' (see Nespor & Vogel 1986).

What, then, are the various prosodic levels, and how many are there? Different linguists have proposed different numbers of levels. I will assume that there are four levels above the word. This is shown below. (For language-specific examples showing independent justification of each level, see Nespor & Vogel 1986.)

(3) <u>The prosodic hierarchy</u>:

a. utterance
b. intonational phrase
c. phonological phrase
d. clitic group
e. word

A schematic example of an utterance parsed into prosodic levels is given in (4).

(4)

utterance					U				
intonational phrase		I1				I2		I3	
phonological phrase	P1	P2		P3		P4		P5	
clitic group	C1	C2		C3	C4	C5		C6	
word	w1	w2	w3	w4	w5	w6	w7	w8	

The claim concerning these levels is that phonological rules may make use of these phrases in their structural descriptions, but not may not directly access any aspect of the syntax. For example, a rule could be said to apply a) within a certain prosodic phrase, b) at the edge of a prosodic phrase, or c) at the boundary of two prosodic phrases, which are both part of a larger prosodic phrase. This type of theory makes the claim that the phrasal phonological rules of a given language will not each need to refer to arbitrary and distinct aspects of the syntax, but rather that the rules will tend to cluster into a small number of groups, each group needing to refer to the same syntactically constructed phrase. I will show that this is the case in Kinyambo below.

The final and perhaps most interesting claim that this theory makes is that the syntactic characterization of the different prosodic phrases may be able to be cross-linguistically specified, or at least parameterized. I now wish to pursue this idea with respect to the phonological phrase (3c).

5.2 A cross-linguistic survey of phonological phrases

5.2.1 Nespor & Vogel's Proposal

Let us now examine the make-up of phonological phrases (also written p-phrases) which linguists have proposed. In their book *Prosodic Phonology* Marina Nespor and Irene Vogel (1986) examine rules from a number of languages which refer

to phonological phrases. They state that all phonological phrases minimally include a head X and all elements on the non-recursive side of the head which are still within X^{max}. (E.g. for head-initial languages, all the material on the left side of the head within X^{max} would be included.) In addition to this they suggest two parameters along which languages might differ. First, a language may obligatorily include, optionally include, or obligatorily *not* include the first complement of the head X located on the recursive side of the head. Second, this complement either may or may not branch. This is summarized below.

(5) Phonological phrase construction rule (adapted from Nespor & Vogel 1986)

Phonological phrases contain: a head X and all elements on the non-recursive side of the head which are still within X^{max}.

Parameters: a) obligatory, optional, or prohibited inclusion of the first complement on the recursive side of X

b) this complement may branch or not

Given the above phonological phrase construction rule, there are five logical possibilities into which languages might fall, according to their selection of values of each of the two parameters. These are summarized below, each possibility being followed by a list of rules which Nespor & Vogel claim to necessitate a phonological phrase construction rule of that type.

(6) Five logical possibilities (page numbers from Nespor & Vogel 1986):

a. [prohibited complement]

Liaison in colloquial French (p. 179)
Extra High Tone Distribution in Ewe (p. 180)
Word-initial Voicing Assimilation in Quechua (p. 183)
Tone Assignment, Tone Shifting & Reduction in Japanese (p. 183)

b. [optional complement, -branching]

Raddoppiamento Sintattico in Italian (p. 165)
Stress Retraction in Italian (p. 174)
Rhythm Rule in English (p. 177)
Final Lengthening in English (p. 178)
Monosyllable Rule in English (p. 178)

c. [obligatory complement, +branching]

Vowel Shortening in Chimwiini (p. 180)
Certain rules in Kimatuumbi (p. 182)

d. [optional complement, +branching]

(none?)

e. [obligatory complement, -branching]

(none?)

It is interesting that Nespor & Vogel found no rules which would necessitate p-phrases of the type (6d) and (6e). If no such rules exist then it would seem that branchingness could be predicted by the optionality/obligatoriness of the complement or vice-versa.

5.2.2 Selkirk's Proposal

Elizabeth Selkirk (1986) has also suggested a possible cross-linguistic parameterization of a phonological phrase construction rule. Instead of describing how phrases are built up from heads, Selkirk maintains that phonological phrases are best described in terms of their endpoints. In this 'end-based' approach she suggests two parameters, each having two possible values. The first parameter determines whether it is the right or left edges of constituents which is relevant tc the construction rule. The

second parameter specifies the nature of the constituent itself, whether it is an X^{max} or X^{head}. This is summarized in (7) below.

(7) Phonological phrases: contain the material between

a) the right or left edges of

b) X^{max} or X^{head}

Given this rule, there are four logical possibilities into which languages might fall. These are listed below.

(8) Four logical possibilities

a. Right-edge X^{max}

Tone Sandhi in Xiamen (Selkirk 1986)
Vowel Shortening in Chimwiini (Selkirk 1986)
Tonal Phrasing in Papago (Hale & Selkirk 1987)

b. Left-edge X^{max}

Tone Sandhi in Ewe (Selkirk 1986)
Tone Sandhi in Shanghai (Hale & Selkirk 1987)

c. Right-edge X^{head}

Liaison in French

d. Left-edge X^{head}

(no examples given)

5.2.3 Branchingness

5.2.3.1 Branchingness and the two proposals

Now that I have briefly interpreted two different approaches toward establishing a cross-linguistic phonological phrase construction rule, let us consider the notion of branchingness and its possible relevance to such a rule. In the approach taken by Nespor & Vogel, branchingness is appealed to directly in the formulation of the second parameter (5b) which states that the complement of the head X either may or may not

branch. Thus, the languages listed under (6b) select the value [-branching complement], while those in (6c) select the value [+branching complement].

In the approach taken by Selkirk it can be noted that branchingness is not appealed to at all. The phonological phrase construction rule is based solely on the edge and type of constituent.

5.2.3.2 Branchingness in Mende phonological phrases

In a recent article by Cowper and Rice (1987) it is claimed that branchingness should be able to be referenced in Selkirk's end-based approach. I will briefly summarize their argument, which is based upon facts they cite from Mende. The data presented led them to postulate that the *branchingness* of an X^{max} constituent should be a third parameter (in addition to 7a & 7b) in the end-based approach.

The phonological rule in question has a fairly complex structural change and is simply dubbed 'Consonant Mutation'. Basically, the rule states that the initial consonant of a word undergoes some type of lenition if that word is preceded by another word in the same phonological phrase. For example /p/ -> [w], /mb/ -> [m], /f/ -> [v]. Below are two examples of its application. (In each case the mutated consonant is underlined, while the unmutated form is given to the right.)

(9) ndóláà wòtéà (cf. pòté)
baby turn
'the baby turned'

mú vèmbɛ́ílɔ́ ngúlí í hù (cf. fɛ̀mbɛ́)
we swung tree Det on
'We swung on the tree'

In Mende, phonological phrase boundaries are the left edges (see 7a) of X^{max} (see 7b), with the additional (and crucial) stipulation that the X^{max} is branching (written $X^{max\text{-}b}$). For additional examples of the application and non-application of this rule,

the reader is referred to Cowper & Rice (1987). Below, I cite some syntactic environments in which Consonant Mutation (CM) does and does not apply.

(10) Consonant Mutation in Mende

	Application of CM		Non-application of CM
a.	$[_S NP [_{VP} \underline{V}]]$	g.	$[_S NP [_{VP} \underline{V} PP]]$
b.	$[_{PP} P [_{NP} \underline{N}]]$	h.	$[_{PP} P [_{NP} \underline{N} Det]]$
c.	$[_{NP} N [_{AP} \underline{A}]]$		
d.	$[_{VP} NP \underline{V}]$		
e.	$[_{NP} [NP \underline{N}] Det]$		
f.	$[_{PP} NP \underline{P}]$		

In every case above where Consonant Mutation applies to the underlined category, the item immediately to the left is within the same phonological phrase. In the two cases in which Consonant Mutation does not apply, there is a phonological phrase boundary (i.e. a left-edge X^{max-b}) between the underlined target item and the trigger which precedes it, and hence the structural description is not met. If branchingness were not referred to then it would be predicted that Consonant Mutation would *not* apply in (10a-c) since in each case there is a left-edge X^{max} directly to the left of the target, intervening between it and the trigger of the rule. [3]

5.3 Rules bounded by the phonological phrase in Kinyambo

There are several rules in Kinyambo which I claim are bounded by the phonological phrase. To illustrate the constituents which form part of a phonological phrase, let us consider, in some detail, the phrasal application of the rule of Beat Deletion, which, arguably, is the most productive and pervasive rule of the phrasal phonology. After having established the nature of the phonological phrase in Kinyambo on the basis of the application and non-application of Beat Deletion in

[3] I should note here that Cowper & Rice's analysis, which I summarized above, has come under criticism by Koichi Tateishi (1987, 1988) who suggests that Consonant Mutation in Mende is not constrained by X^{max-b} boundaries, but is instead morphologically conditioned, being triggered by an agreement prefix which indicates that the head takes a nominal element in its own maximal projection.

various syntactic constructions, I will then present and briefly illustrate other rules whose domain is also the phonological phrase.

5.3.1 Beat Deletion

As was noted in Chapter Four, the rule of Beat Deletion states that a stress in one word will (after undergoing Nuclear Stress) precipitate the deletion of a prominence in the word to its left (due to Nuclear Stress), if the two words are both part of the same phonological phrase. The rule can then be formalized as in (11) below.

(11) *Beat Deletion*

x --> ø / $[_P$...x...$]_P$ (applies simultaneously at all grid levels)
Condition: the trigger and target x are separated by a word boundary.

Consider the derivation below in which Beat Deletion applies.

(12)

3 3 [$[_W$ o-mu-kama] $[_W$ mu-ke] $]_P$ chief small 'small chief'	Underlying Representation
3 3 omukama muke	Phrase-final Left Shift
3 4 omukama muke	Nuclear Stress
(3) 4 omukama muke	Beat Deletion
omukama múke ~ omukáma múke	Surface Form

(cf. *omukáma* , **omukama* 'chief' (isolation))

In the derivation above Beat Deletion accounts for the fact that the surface High tone which appears on the first syllable of the root of *omukáma* 'chief' in isolation is optionally not present when the same word precedes a word containing a prominence which is the case in (12) above.

The claim that this rule is bounded by the phonological phrase, and not simply the utterance, is based upon the fact that the rule applies in certain syntactic environments and not others. I will present examples below which both support my claims and illustrate the rule's application and non-application. At the end of this subsection I will give a representative, though certainly not comprehensive, list of environments in which Beat Deletion does and does not apply.

Before I define and justify the phonological phrase construction rule of Kinyambo, let me briefly state the diagnostic for phonological phrasing. As was stated, Beat Deletion is found to apply in certain syntactic phrases and not others. In those cases where the rule must not apply I assume that there is a (strong) prosodic phrasal boundary between the trigger and the target of the rule which prevents the rule from applying. In those cases in which the rule does apply, I assume that there is no such prosodic boundary. I propose that the phonological phrase construction rule for Kinyambo is as follows:[4]

(13) Kinyambo phonological phrase boundaries are the right edges of branching maximal projections.

As Cowper and Rice claimed for Mende (see §5.2.3.2 above), I claim that for Kinyambo it is necessary to directly invoke the property of branchingness to correctly predict the location of phonological phrase boundaries. I will justify this claim in two stages. First I will show that assuming X^{max} instead of $X^{max\text{-}b}$ as the relevant constituent for phonological phrase boundaries makes incorrect predictions. Then I will show that the rule is bounded by $X^{max\text{-}b}$ and not simply the sentence or utterance.

To illustrate that reference to X^{max} alone would make incorrect predictions regarding phonological phrase boundaries, let us examine three different syntactic

[4]In the case of one-word utterances, strict layering will insure that there is a phonological phrase boundary at the edges of such a word (in addition to word and utterance boundaries).

constructions. The first is a simple subject-verb sentence in which both subject NP and the verb are unmodified. The structure of such a sentence is as follows:

(14) <u>Subject-Verb</u> $[_S\ [_{NP}\ N\ ]_{NP}\ [_{VP}\ V\ ]_{VP}\ ]_S$

If P-Phrase boundaries in Kinyambo were simply right-edge X^{max} brackets, as is the case in many languages (e.g. see (8a)) it would be predicted that there would be a phonological phrase boundary between the subject NP and the verb, since there is a right edge X^{max} bracket (namely $]_{NP}$) between the two constituents. Thus one would expect Beat Deletion would *not* apply. That it can is illustrated in the examples below.

(15)	a.	abakózi [2 stress] 'workers' (isolation)	bákakóma 'they tied' (isolation)	[abakozi bákakóma]$_P$ 'the workers tied'
	b.	omukáma [3 stress] 'chief'	nejákwiija 'will come'	[omukama nejákwiija]$_P$ 'the chief will come'
	c.	omukázi [2 stress] 'wife'	nejákwiija 'will come'	[omukazi nejákwiija]$_P$ 'the wife will come'

The above examples are consistent with the claim that boundaries are right-edge X^{max-b} brackets. Since there is no branching maximal projection node between the subject and the verb, Beat Deletion is free to apply. Thus the stress in the verb optionally causes the underlying prominence on the root of the subject NP to delete. The only branching maximal projection in the examples above is $]_S$, which does not intervene between any two constituents. [5] Thus, according to the phrasing algorithm in (13) the whole sentence is a phonological phrase (as well as an intonational phrase and utterance) (see (3) and (4)).

Next let us consider the case where a verb is followed by two unmodified objects. If p-phrase boundaries were right-edge X^{max} boundaries, then Beat Deletion

[5] S = IP (INFL Phrase), a maximal projection in the Barriers framework (Chomsky 1986).

would be expected not to apply between the two objects as there is a right-edge NP bracket intervening.

(16) <u>Verb-Object-Object</u> $[_{VP}\ V\ [_{NP}\ N\ ]_{NP}\ [_{NP}\ N\ ]_{NP}\ ]_{VP}$

The rule of Beat Deletion may apply, however, as illustrated in the examples below. (Deleted stresses are marked by underlining)

(17)

Aráha	omukáma	émbwa
'he will give'	'chief'	'dog'
(isolation)	(isolation)	(isolation)

[Arah' ómukam' émbwa]$_P$
'He will give the chief the dog.'

(18)

Aráha	omukázi	ekitébe
'he will give'	'wife'	'chair'

[Arah' ómukaz' ékitébe]$_P$
'He will give the wife the chair'

(19)

Aráha	omutáhi	ebitóoke
'he will give'	'friend'	'bananas'

[Arah' ómutah' ébitóoke]$_P$
'He will give the friend bananas'

In (17) we see that the prominence on the first syllable of the second object *émbwa* 'dog' has caused the deletion of the stress on the first syllable of the root of the first object *omukáma* 'chief'. In (18) and (19) it is also the case that a prominence in the second object causes the deletion of the stress on the root of the first object. In addition, in each case the prominence on the first object has caused the deletion of the stress in the finite verbal form.

Consequently, I claim that there is no p-phrase boundary between the two objects. This follows automatically if p-phrase boundaries are assumed to be based on $X^{max\text{-}b}$ and not X^{max} boundaries. The only right-edge $X^{max\text{-}b}$ boundary in the example above is, again, $]_S$ which does not intervene between any two constituents.

Finally, let us consider a sentence in which the verb is followed by two objects and an adverb. Assuming a flat grammatical structure for VP, the bracketing of such a construction would be as follows:

(20) <u>Verb-Object-Object-Adverb</u> $[_{VP}\ V\ [_{NP}\ N\ ]_{NP}\ [_{NP}\ N\ ]_{NP}\ ADV\ ]_{VP}$

Here, there are two right-edge X^{max} boundaries, namely the $]_{NP}$'s following each of the two objects. These, however, are not right-edge X^{max-b} boundaries as neither object NP is modified. Thus, given the phonological phrase construction rule as stated in (13), Beat Deletion would be expected to apply three times in the VP, once between the verb and the first object, once between the two objects and once between the second object and the following adverb. That such is the case is illustrated in the example below:

(21)

Aráha	omukózi	ekitébe	mpóra
'he will give'	'worker'	'chair'	'slowly'
(isolation)	(isolation)	(isolation)	(isolation)

[Arah' ómukoz' ékitebe mpóra]$_P$
He-will-give worker chair slowly
'He will give the worker the chair slowly'

In (21) the prominence on the adverb causes the deletion of the stress on the first syllable of the root of *ekitébe* 'chair', while the stress on the preprefix of the second object causes the deletion of the stress in the root of the first object *omukázi* 'worker'. And, finally, the prominence on the preprefix of the first object precipitates the deletion of the stress in the verb.

I have shown that phonological phrase boundaries in Kinyambo are not right-edge X^{max} brackets. I also pointed out that the data thus far presented are consistent with the claim that p-phrase boundaries in Kinyambo are right-edge X^{max-b} brackets. However, based upon the examples given above it could be equally argued that High Deletion simply applies anywhere in the sentence when its structural description is met.

I will now show that such is not the case by providing examples of sentence-internal p-phrase boundaries. In each case it will be shown that reference to right-edge $X^{max\text{-}b}$ brackets makes the correct prediction of the location of the p-phrase boundary.

Let us first consider the case where the subject noun is modified by an adjective. This will be contrasted with an example in which the subject is unmodified. The two structures are presented below.

(22) a. Subject-Verb
$[_S\ [_{NP}\ N\ ]_{NP}\ [_{VP}\ V\ ]_{VP}\ ]_S$

b. [Subject-Adj]-Verb
$[_S\ [_{NP}\ N\ \ [_{AP}\ A\ ]_{AP}\ ]_{NP}\ [_{VP}\ V\ ]_{VP}\ ]_S$

There is no phrase-internal right-edge $X^{max\text{-}b}$ bracket in (22a), and hence Beat Deletion is free to apply. In (22b) however, there is a right-edge $X^{max\text{-}b}$ bracket in the sentence, namely $]_{NP}$. Whereas the right-edge NP bracket is a maximal projection in both cases, it is branching only in (22b). One would predict, then, that there is a p-phrase boundary between the adjective and the following verb, and hence Beat Deletion should not affect a stress in the adjective. This is illustrated in (23a-b).

(23) a. [abakozi bákóma]$_P$ (cf. *abakózi* 'workers')
workers they-tied
'The workers tied.'

b. [Abakozi bakúru]$_P$ [bákóma]$_P$ (**Abakozi bakuru bákóma*)
workers mature they-tied
'The mature workers tied.'

In (23a) it is seen that the stress on the first syllable of the verb causes the deletion of the underlying stress seen in the isolation form of *abakózi* 'workers'. In (23b) however, the stress of *bakúru* 'mature' does not delete in the presence of the stress in the verb. This is because there is a right-edge $X^{max\text{-}b}$ bracket after the adjective, which constitutes a p-phrase boundary as I have defined it. It should be

noted that Beat Deletion does apply in (23b) between the subject N and the modifying adjective as no p-phrase boundary intervenes there.

It is possible to provide a minimal pair which contrasts with (23b) above. Let us consider a case in which there is a null subject followed by an adjective. In such cases, Beat Deletion may apply as shown below.

(24) [bakuru bákóma]$_P$ (cf. *bakúru* 'mature')
mature they-tied
'The mature ones tied.'

The example above, however, raises the interesting and controversial question regarding the role that empty categories play in phrasal phonology. If, for example, the structure of the subject NP in (24) is $[_{NP}$ e AP $]_{NP}$, then technically Beat Deletion should not apply as there is a branching maximal projection (namely $]_{NP}$) which lies between the adjective and the finite verbal form. The phonological phrase construction rule in Kinyambo, however, appears to ignore the existence of the empty category for purposes of prosodic phrasing.[6]

There are several possible solutions to this dilemma. One alternative is to assume that at the time of p-phrase construction, the structure of the subject NP in (24) is either $[_{NP}$ N $]_{NP}$ (i.e. a deadjectival noun) or simply $[_{AP}$ A $]_{AP}$. Another alternative is to stipulate in the p-phrase construction rule that boundaries are right-edge brackets of branching maximal projections containing at least two non-null words or, alternatively, a branching prosodic structure.[7] I leave the matter open for further research.

Next, let us consider a case in which the first of two objects is modified by a prepositional phrase. This construction will be contrasted with the double object

[6]For an example of another Bantu language in which traces are ignored by the phrasal phonology , see McHugh (1987).
[7]This last possibility requiring both a branching syntactic and branching prosodic structure was suggested to me by Sharon Inkelas.

construction mentioned above in which neither is modified. The structures are given in (25a-b) below:

(25) a. Verb-Object-Object
$[_{VP}\ V\ [_{NP}\ N\ ]_{NP}\ [_{NP}\ N\ ]_{NP}\ ]_{VP}$

b. Verb-[Object-PP]-Object
$[_{VP}\ V\ [_{NP}\ N\ [_{PP}\ P\ [_{NP}\ N\ ]_{NP}\ ]_{PP}\ ]_{NP}\ [_{NP}\ N\ ]_{NP}\ ]_{VP}$

In (25a) no sentence-internal right-edge $X^{max\text{-}b}$ bracket is found, and hence Beat Deletion is predicted to apply. In (25b), however, there is a sentence internal right-edge $X^{max\text{-}b}$ bracket. In fact there are two: the right-edge PP and the right-edge NP which separate the object of the preposition (of the PP modifying the first object) and the second object of the verb. Thus one would predict a p-phrase boundary there, blocking the application of Beat Deletion between the two string-adjacent nouns. This is illustrated in the example below.

(26) a. [Arah' ábakoz' éembwa]$_P$ (cf. abakózi 'workers')
he-will-give workers dog
'He will give the workers the dog.'

b. [Arah' ómukama w'ábakózi]$_P$ [éembwa]$_P$
he-will-give chief of workers dog
'He will give the chief of the workers the dog.'

In (26b) the phrase ...*ómukama w'ábakózi*... is defined by Bantuists to be an "associative" construction. This type of phrase is sometimes interpreted by syntacticians as being N-PP (as I have given it) and sometimes as being N-NP. Both approaches are consistent with my thesis. If the phrase were interpreted as N-NP, then the following structure results:

(27) $[_{VP}\ V\ [_{NP}\ N\ [_{NP}\ x\text{-}N\ _{NP}]\ _{NP}]\ [_{NP}\ N\ _{NP}]\ _{VP}]$ (where x represents the associative clitic)

As can be seen, there is still a right-edge branching NP bracket which constitutes a p-phrase boundary between the final two nouns.

Whereas in (26a) the High tone on *éembwa* 'dog' causes the deletion of the underlying stress of *abakózi* 'workers (isolation)', the same word *éembwa* 'dog' in (26b) fails to cause the deletion of the stress in the same word due to the phonological phrase boundary.

Examples (23b) and (26b) show that Beat Deletion is not simply bounded by the sentence or utterance, but is bounded by a prosodic phrase greater than the clitic group, but smaller than the utterance. This is consistent with my claim that Beat Deletion is bounded by the phonological phrase, whose boundaries are isomorphic with right-edge $X^{max\text{-}b}$ brackets.

Finally let us consider another syntactic minimal pair. In the following examples, the string of lexical items is identical, but the syntactic bracketing is not. In each case, the prosodic bracketing is given first, then the syntactic bracketing.

(28) a. [Mbonir' émbw' érire muno Kénya]$_P$
Mbonir' [$_{NP}$ émbw' [$_S$ [$_{VP}$ érire muno [$_{NP}$ Kénya]$_{NP}$]$_{VP}$]$_S$]$_{NP}$
I-saw dog REL-ate well Kenya
'I saw the dog who, while in Kenya, ate well.'

b. [Mbonir' émbw' érire múno]$_P$ [Kénya]$_P$
Mbonir' [$_{NP}$ émbw' [$_S$ [$_{VP}$ érire múno]$_{VP}$]$_S$]$_{NP}$ Kénya
I-saw dog REL-ate well Kenya
'I saw, in Kenya, the dog who ate well.'

The only difference between (28a) and (28b) is the element which the locative adverb (or prepositional phrase) *Kénya* modifies. In (28a) *Kénya* modifies the verb *okúrya* 'eat' in the relative clause modifying *émbwa* 'dog'. In (28b) *Kénya* modifies the verb *okubóna* 'see' in the matrix clause. In the second case, there will be a right-edge $X^{max\text{-}b}$ bracket between the adverb *múno* 'well' and *Kénya* , while in the first there is not (again assuming a flat structure for the VP as I did in (20)). This explains why the High tone of *múno* 'well (isolation)' is deleted in (28a), but not in (28b).

Thus, whereas there would be a phonological phrase boundary between two object NP's in many languages described in the literature, such is not the case in Kinyambo when both objects are unmodified. However if the first object is modified (by an adjective or prepositional phrase, for example) then there will be a phonological phrase boundary between the modifier and the second object.

Similarly, the subject NP and its V may be part of the same phonological phrase in Kinyambo if the subject NP dominates no branching nodes, even though V is not, of course, within the domain of the maximal projection of the subject N. Again, if the subject is modified, thus requiring a branching node somewhere in the NP, then the subject and its modifier would belong to a different phonological phrase from the one containing the verb.

The following is a representative, though certainly not comprehensive, list of environments in which Beat Deletion does and does not apply. Under each syntactic structure, I will either direct the reader to an example which illustrates the application of Beat Deletion in this environment, or provide an example, with the contrasting isolation form given to the right in parentheses. The prominence on the target syllable will always be a [3 stress] or [2 stress].

(29) <u>Environments in which Beat Deletion applies</u>

a) $[_{NP}$ N $[_{AP}$ ADJ/NUM]]

a-ba-kama bá-na (cf. abakáma)
chiefs four
'four chiefs'

(for N-ADJ, see (47) of Chapter 3)

b) $[_{NP}$ N $[_{PP}$ CP + *a* NP]] (noun - 'associative' - noun)

o-mu-gore w-á Nkuna (cf. omugóre)
bride of
'bride of Nkuna'

c) $[_{VP}$ V NP]

(see (106) of Chapter 3)

d) $[_{VP}$ V ADV]

(see (57) of Chapter 3)

e) $[_{VP}$ V PP]

o-ku-ter-a n' é-ñuundo (cf. okutéera)
hit with hammer
'to hit with a hammer'

f) $[_{VP}$ V $[_{NP}$ N] PP]

o-ku-ter' ékitebe n' é-ñuundo (cf. ekitébe)
hit chair with hammer
'to hit a chair with a hammer'

g) $[_{VP}$ V $[_{NP}$ N] ADV]

o-ku-ter' ékitebe kúbi (cf. ekitébe)
hit chair poorly
'to hit the chair poorly'

h) $[_{VP}$ V $[_{NP}$ N] NP]

(see (17)-(19))

i) $[_{VP}$ V $[_{NP}$ N] $[_{NP}$ N] ADV]

(see (21))

j) $[_{XP}$ $[_{XP}$ X] *na/anga* XP] (X - conjunction'and'/'or' - XP)

e-ki-tebe n' ékitabo (cf. ekitébe)
chair and book
'the chair and the book'

k) $[_{S}$ $[_{NP}$ N] VP]

(see (15))

l) $[_{S}$ $[_{NP}$ N] $[_{VP}$ *ni* X]] (subject - copula - NP)

o-mu-kama ní Nkuna (cf. omukáma)
chief COP
'The chief is Nkuna'

(30) <u>Environments in which Beat Deletion does not apply</u>
('||' indicates rule is blocked across this boundary)

a) NP_{VOC} || S (vocative)

(see (71b) below)

b) $[_{VP}$ V $[_{NP}$ N PP] || NP]

(see (26b))

c) $[_{VP}$ V $[_{NP}$ N ADJ] || ADV]

o-ku-ter' ó-mu-rimi mú-ke mpóra
hit farmer small slowly
'to hit the small farmer slowly'

d) $[_{VP}$ V $[_{NP}$ N ADJ] || NP]

o-kw-orech' ó-mu-rimi mu-kúru ée-m-bwa
show farmer old dog
'to show the old farmer a dog'

e) $[_{NP}$ $[_{NP}$ N ADJ] || *na/anga* NP] (N-Adj - conjunction NP)

e-ki-tebe kí-sya n' ékitabo
chair new and book
'the new chair and the book'

f) $[_{S}$ $[_{NP}$ N ADJ] || VP]

(see (23b))

g) $[_{S}$ $[_{NP}$ N $[_{PP}$ CP + a NP]] || VP] (Assoc. NP as subject)

o-mu-tahi w' ó-mw-ána a-jun-ír-e
friend of child he-helped
'the friend of the child helped'

h) $[_{NP}$ $[_{NP}$ N $[_{PP}$ CP + a NP]] || na NP] (Assoc. NP in conjunction)

o-mu-tahi w' ó-mu-káma ná Nkuna
friend of chief and
'the friend of the chief and Nkuna'

i) $[_{VP}$ V $[_{NP}$ N $[_{S}$ ... ADV]] || ADV]

(see (28b))

In the analysis presented above I have attempted to show that that phonological phrase boundaries in Kinyambo are best described as the right-edges of branching maximal projections. I suggest that the Kinyambo facts support the claim made by Cowper & Rice (1987) that the parameters of a cross-linguistic phonological phrase construction rule must include the property of branchingness. In the end-based approach of Selkirk this means adding $X^{max\text{-}b}$ to the possible types of constituents whose right or left end constitutes a phonological phrase boundary. If this is done then the typology is expanded to include two new groups, both of which are claimed to exist in the literature. This is summarized in (31) after the pattern of (7) given above.

(31) Extension of Selkirk Typology in (7)

e. Left-edge $X^{max\text{-}b}$

Consonant Mutation in Mende (Cowper & Rice 1987)

f. Right-edge $X^{max\text{-}b}$

Beat Deletion in Kinyambo

The Kinyambo and Mende facts do not fit as easily into the Nespor & Vogel (1986) typology outlined above. Kinyambo, for example, would nearly fit into category (5c) if the VP could be thought of as the complement of the subject (see (17) and (25)). But if phrases are *always* built around heads, as Nespor & Vogel seem to suggest, then p-phrases like those in (17) and (25), in which a subject and verb form a phonological phrase, are unaccounted for. Additionally, the Nespor & Vogel parameters seem to suggest that one complement at most will be combined with a head to form a p-phrase. Even if this is permitted to be recursive (which is needed to account for the Chaga facts (McHugh, forthcoming)) such a system would not account for the inclusion of two (or more) objects of a single V into the same p-phrase which I showed to be the case in Kinyambo in (18) and (27).

In summary, it seems that we are still in search for a parameterized cross-linguistic p-phrase construction rule with descriptive adequacy (let alone explanatory adequacy). The Nespor & Vogel parameters account for *optional* inclusion of complements into p-phrases needed for the phenomena in (5b), something that Selkirk's parameters do not account for directly. On the other hand, I have shown above that the Kinyambo facts fall neatly into the expanded Selkirk typology, but do not find a place as readily in the Nespor & Vogel typology. Whatever shape the final p-phrase construction rule takes, it seems clear that branchingness plays an important role in Kinyambo. This property is already built into the Nespor & Vogel system, and Cowper & Rice have proposed to add it to Selkirk's system. It thus seems that any cross-linguistic p-phrase construction rule will have to account for the Kinyambo (and Mende) facts which, in the absence of some creative reanalysis of the data, seem to necessitate an appeal to the property of branchingness.

Now that I have examined, in some detail, a rule bounded by the phonological phrase, I will consider other phrasal rules in Kinyambo which are also bounded by the phonological phrase.

5.3.2 Beat Addition

As was seen in Chapter Four, the rule of Beat Addition inserts a level two stress on the last syllable of a word which is followed by another word. Here, I will claim that both words must belong to the same phonological phrase. The rule may be formalized as follows:

(32) *Beat Addition*

$$. \rightarrow \overset{x}{x} \;/\; [_P \ldots [_W \ldots \underline{\quad\quad}]\, [_W \ldots]_P \qquad \text{(CG = Clitic Group)}$$

Here are two derivations involving Beat Addition.

(33) $[_P\ [_W$ e-ki-tabo$]\ [_W$ ki-ange$]\ ]$ — Underlying Representation

book my

'my book'

2 — Beat Addition (32)

$[_P[_W$ekitabo$]\ [_W$chaange$]]$

ekitabó chaange — Surface Form

(34) $[_P\ [_W$o-ku-mañ-a$]\ [_W$o-mu-guumba $[_W$kuruungi$]]$ — Underlying Rep.

know barren woman well

'to know the barren woman well'

2 2 — Beat Addition (twice) (32)

$[_P[_W$okumaña$]\ [_W$omuguumba$]\ [_W$kuruungi$]]$

okujun' ómuguumbá kuruungi — Surface (after Vowel Elision)

It was seen, however, in §4.5.2 that the rule applies in [N -ADJ] phrases only when the adjective was stressless. However, in other head-modifier/complement phrases the rule applied whether the second word was stressless or not. This is exemplified below.

(35)	Underlying Representation		Surface
a.	/e-ki-tabo ki-ruungi/ book good 'good book'	-->	ekitabó kiruungi
b.	/e-ki-tabo ki-angu/ book my 'my book'	-->	ekitabó chaangu
c.	/e-ki-tabo ki-kúru book old 'old book'	-->	ekitabo kikúru (*ekitabó kikúru)
d.	/o-ku-rip-a Rukendakénda/ pay 'to pay Rukendakenda'	-->	okuripá Rukendakénda
e.	/o-ku-rip-a Muganyizi orúndi/ pay sometimes 'to pay Muganyizi sometimes'	-->	okuripá Muganyizí orúundi
f.	/a-ba-rimi ba-jun-ír-e/ farmers help (relative) 'the farmers who helped'	-->	abarimí bajuníre
g.	/o-ku-órech-a o-mu-ntu Tibamánya/ show man 'show the man Tibamanya'	-->	okworech' ómuntú Tibamánya

Of course, the penultimate word in phrases in (35d-g) can also surface all-Low since Beat Deletion will be optional in these cases. This reference to syntactic structure (in addition to prosodic structure) is, of course, not consistent with the basic claim of the theory of the prosodic hierarchy that phonological rules no longer have access to the syntax once the prosodic levels are constructed.

That Beat Addition is bounded by the phonological phrase and not the intonational phrase (cf. (3b) & §5.7) can be seen below.[8]

(36) a. /[o-ku-rip-a orúndi]$_P$/ --> okuripá orúundi
pay sometimes
'to pay sometimes'

b. /[o-mu-gumba a-jun-ír-e]$_P$/ --> omugumbá ajuníre
barren woman she-helped
'the barren woman helped'

c. /[[ní o-mu-ntu mu-ruungi]$_P$ [orúundi]$_P$]$_I$/ --> ni muntú murungi orúundi
COP person good sometimes (*ni muntú murungí orúundi)
'He's a good person sometimes'

d./[[o-mu-tahi wa o-mu-gumba]$_P$[a-jun-ír-e]$_P$]$_I$/ --> omutahi w'omugumba
friend of barren woman she-helped ajuníre
'The good barren woman helped' (*omutahi w'omugumbá ajuníre)

In (36a-b) Beat Addition applies as both words are members of the same phonological phrase. In (36c-d) it can be seen that Beat Addition does not occur across a phonological phrase boundary.

5.3.3. Nuclear Stress

The rule of Nuclear Stress was discussed in §4.5.8 and formalized as follows.

(37) *Nuclear Stress (Final Version)*

Locate the leftmost stress in the final word of the phrase. If it is a [2 stress] or greater, obligatorily promote it to a [4 stress]. If it is a [1 stress], optionally promote it to a [4 stress].

This rule makes three crucial predictions. First, in nearly all phrasal clashes which have been examined (see §4.5.8 for one exception), it is the stress in the first word which deletes. This is shown below.

[8]The likelihood of application of Vowel Elision between words depends to some extent on the rate of speech. The examples in (35) were elicited at a rather slow rate of speech and hence do not show the effects of Vowel Elision. If it does apply in these contexts, then Stress Migration, discussed in §4.4.7.2 also applies. (E.g. /okujuná orúundi/ --> [okujun' órúundi], etc.)

(38) a. 3 3 — After Phrase-final Left Shift
[[o-mu-kama]$_W$ [mu-ke]$_W$]$_P$
chief small
'small chief'

b. 3 4 — Nuclear Stress (37)
omukama muke

c. (3) 4 — Beat Deletion (11)
omukama muke

d. omukáma múke ~ — Surface
omukama múke
*omukáma muke

Second, the reason for which it is the leftmost of two word internal stresses which is promoted is because of derivations such as the one below.

(39) a. 2 — Underlying Representation
o-ku-mañ-a o-mu-gore
know bride
'to know the bride'

b. 2 2 — Beat Addition (32)
okumaña omugore

c. 2 2 — Vowel Elision & Migration
okumañ omugore

c. 2 1 — Phrase-final Destressing
okumañ omugore

d. 4 1 — Nuclear Stress Rule (37)
okumañ omugore

e. okumañ' ómugóre ~ — Surface Form

f. okumañ' ómugore

If the rule applied to promote the [1 stress] in (39d), then the surface possibility of (39f) would not be predicted.

Third the rule will not apply if there is no stress in the final word of the phrase. This is seen in the derivation below.

(40) a. 2 Underlying Representation
[[e-ki-kapo]$_W$ [ki-ruungi]$_W$]$_P$
basket good
'good basket'

b. 2 2 Beat Addition (32)
ekikapo kiruungi

c. ---------- Nuclear Stress (37)

d. 2 2 Beat Deletion
ekikapo ~ ekikapo kiruungi

e. ekikápo ~ ekikapó kiruungi Surface Form

If Nuclear Stress applied in the derivation above to the first word, it would bleed the bidirectional application of Beat Deletion in this instance, which is justified on the basis of the two grammatical surface forms.

Let us now consider a slightly longer structure.

(41) a. 3 3 After Phrase-final Left Shift
[[o-ku-mañ-a]$_W$ [o-mu-kama]$_W$ [mu-ke]$_W$]$_P$
know chief small
'to know the small chief'

b. 2 3 2 3 Beat Addition (32)
okumaña omukama muke

c. 2 3 2 3 Vowel Elision & Stress Migration
okumañ omukama muke

d. 2 3 2 4 Nuclear Stress (37)
okumañ omukama muke

e. 2 3 4 Beat Deletion (phonological stem)
okumañ omukama muke

f. 2 4 Beat Deletion (phrase) (11)
okumañ omukama muke

g. okumañ' ómukama múke Surface Form

The form in (41g) is the preferred pronunciation of this phrase. Recall that in all the previous examples we have seen, the Nuclear Stress rule has always 'protected' the migrant stress on the preprefix from deleting. However, if Nuclear Stress only

'protects' the leftmost stress in the *final* word of the phrase, then this raises the question of whether the [2 stress] on the preprefix of *omukáma* 'chief' can be deleted. It turns out that deleting the stress on the preprefix in the above example yields the 'C' graded (= marginal) sentence.

(42) ? okumañ' omukama múke 'to know the small chief'

This 'C' rating could be due to the long trigger-target distance between the two stresses in (41f) after Beat Deletion applies once on the phrasal level. Recall that, as discussed in some detail in §4.5.3.3, the larger the trigger-target distance the less likely Beat Deletion is to apply. Note also the long lapse which is created in (42). The 'C' rating of (42) should be contrasted with the 'F' rating in (43) of a sentence in which the stress on the preprefix is deleted in a phrase-final word where Nuclear Stress has applied.

(43) a. 3 Underlying Representation
[[o-ku-mañ-a]$_W$ [o-mu-kama]$_W$]$_P$
know chief
'to know the chief'

b. 2 3 Beat Addition (32)
okumaña omukama

c. 4 3 Vowel Elision & Stress Migration
okumañ omukama

d. 4 3 Nuclear Stress (37)
okumañ omukama

e. okumañ' ómukáma

f. *okumañ' omukáma

That Nuclear Stress applies within the phonological phrase, and not the intonational phrase is illustrated in the derivation below.

(44) a. 2 3 2 3 — After Phrase-final Left Shift
[[e-n-te z-a o-mu-kama]$_P$ [ni zi-bi]$_P$]$_I$
cow of chief COP bad

b. 2 2 3 2 3 — Beat Addition (32)
[[ente za omukama]$_P$ [ni zibi]$_P$]$_I$

c. 2 2 3 2 3 — Vowel Elision & Stress Migration
[[ente z omukama]$_P$ [ni zibi]$_P$]$_I$

d. 2 4 3 2 4 — Nuclear Stress (37)
[[ente z omukama]$_P$ [ni zibi]$_P$]$_I$

e. 4 3 4 — Beat Deletion (phrasal) (11)
[[ente z omukama]$_P$ [ni zibi]$_P$]$_I$

f. ente z'ómukáma ni zíbi — Surface

g. *ente z'omukáma ni zíbi

As seen in (44g) the high on the preprefix of *omukáma* 'chief' does not delete. If Nuclear Stress applied only at the level of the intonational phrase, the the preprefix of *omukáma* 'chief' would not be promoted to a [4 stress], and would be subject to deletion, triggered by the [2 stress] to its left.

5.3.4 Phrasal Vowel Shortening

The next rule in Kinyambo which is bounded by the Phonological Phrase is Phrasal Vowel Shortening, motivated in §2.4. It was formalized as in (45).

(45) *Phrasal Vowel Shortening*

$$\mu \text{ ---> } \emptyset \,/\, \begin{array}{c} \acute{\sigma} \\ / \backslash \\ \mu \ \_\_\_ \ldots \ \text{CG}]\ [\text{CG} \ldots\ ]_P \end{array}$$

This rule shortens any long vowel in a clitic group when that clitic group is followed by another clitic group in the same phonological phrase. As I have not discussed clitic groups up to this point, I will do so here. The Clitic Group as seen in (3d) above is the level of the prosodic hierarchy between the word and the phonological phrase. As seen in (4), sometimes it consists of a single word, while in other instances it will consist of two or more phonological words. The two clitics that will be relevant

in the examples in (49) below are the verbal post-clitic /-gé/, meaning 'well', and the pronominal post-clitic /CP-é/ 'his/her'. Both morphemes are unpronounceable on their own, but arguably occupy their own syntactic nodes. A derivation of *o-ku-s-á-ge* 'to grind well' is found below.

(46) a. 3 Underlying Representation
[[o-ku-s-a]$_W$ [ge]$_W$]$_{CG}$
grind well
'to grind well'

b. 3 Phrase-final Left Shift
[[okusa]$_W$ [ge]$_W$]$_{CG}$

c. okuságe Surface Form

Let us consider some examples of the application of Phrasal Vowel Shortening between clitic groups.

(47) a. [[o-mu-gumba]$_{CG}$ [mu-ruungi]$_{CG}$]$_P$ (cf. omuguumba 'barren woman')
barren woman good
'good barren woman'

b. [[o-kw-ijuk-á]$_{CG}$ [ku-ruungi]$_{CG}$]$_P$ (cf. okwiijuka 'remember')
remember well
'remember well'

c. [[o-kw-ikiriz-a]$_{CG}$ [kú-bi]$_{CG}$]$_P$ (cf. okwiikiriza 'agree')
agree poorly
'agree poorly'

That the rule does not apply across a phonological phrase boundary is shown below.

(48) a. [[Nejákworech' ómutahi w' ómuguumba]$_P$ [Tibamánya]$_P$]$_I$
he-will-show friend of barren woman
'He will show Tibamanya to the friend of the barren woman'

b. [[Erangi z'échooya]$_P$ [ni zíbi]$_P$]$_I$
colors of feather are bad
'the colors of the feather are bad'

c. [[Nejákworech' ómurimí muruungi]$_P$ [Muganyizi]$_P$]$_I$
he-will-show farmer good
'He will show the good farmer Muganyizi'

The following examples show that this rule applies between two clitic groups (and not simply words) which are part of the same phonological phrase.

(49) a. [[okwiitá]w-[ge]w]CG
kill well
'kill well'

a'. [[okwita]CG kúbi]CG]P
kill poorly
'kill poorly'

b. [[okutwaará]w-[ge]w]CG
carry well
'carry well'

b'. [[okutwara]CG kúbi]CG]P
carry poorly
'carry poorly'

c. [[omwaaná]w-[w-e]w]CG
chiid his
'his child'

c'. [[omwana]CG-múbi]CG]P
child bad
'bad child'

d. [[echaará]w--[ch-e]w]CG
finger his
'his finger'

d'. [[echara]CG-kíbi]CG]P
finger bad
'bad finger'

The examples in (49a-d) show that Penultimate Shortening does not simply apply at the end of a phonological word. The examples in (49a'-d') show that the rule does apply at the end of a clitic group when another clitic group follows in the same phonological phrase.

5.3.5 Phrase-final Destressing

The last rule which is I will claim is bounded by the phonological phrase is Phrase-final Destressing, motivated in §3.7.5.2.

(50) *Phrase-final Destressing*

x --> ø / [pW [[. ___]PS]W]P (apply once at the highest level)

The application of this rule is illustrated in (51) below.

(51)	4 1 ...o-mu-rimi	4 2 ...e-ki-kapo	4 3 ...o-mu-kama	After Nuclear Stress
	4 0 ...omurimi	4 1 ...ekikapo	4 2 ...omukama	Word-internal Destressing
	...ómurimi	...ékikápo ~ ékikapo	...ómukáma	Tone Assign.

This rule will correctly predict the surface forms given the rule of Tone Assignment ((23) of Chapter Four) in which a High tone is optionally assigned to a syllable bearing a level one grid mark and obligatorily assign to a syllable bearing a level two grid mark (or higher). That the rule applies at the phonological phrase, and not at the intonational phrase is shown by examples such as the following.

(52) a. 2 2 2 3 — After Phrase-final Left Shift
[[e-n-te z-a o-mu-gore]$_P$ [ni zi-bi]$_P$]$_I$
cow of bride COP bad
'the bride's cow is bad'

b. 2 2 2 2 3 — Beat Addition (32)
[[ente za omugore]$_P$ [ni zibi]$_P$]$_I$

c. 2 2 1 2 3 — Phrase-final Destressing (50)
[[ente z omugore]$_P$ [ni zibi]$_P$]$_I$

d. 2 2 1 2 3 — Vowel Elision & Stress Migration
[[ente z omugore]$_P$ [ni zibi]$_P$]$_I$

e. 2 4 1 2 4 — Nuclear Stress (37)
[[ente z omugore]$_P$ [ni zibi]$_P$]$_I$

f. 4 1 4 — Beat Deletion (phrasal) (11)
[[ente z omugore]$_P$ [ni zibi]$_P$]$_I$

g. ente z'ómugóre ni zíbi — Surface Form

h. ente z'ómugore ni zíbi

In the derivation above, if Phrase-final Destressing applied only at the level of the intonational phrase, then it would not apply at all in (52c) (to *omugóre* 'bride') as the final word of the intonational phrase does not have a bisyllabic root. This would predict only (52g)

5.4 Rules bounded by phonological stem

In §4.5.6 and §4.5.7.4, I argued for the existence of a prosodic domain which I labeled the phonological stem. It was defined as follows.

(53) *Phonological Stem:*

i) A lexical root which contains at least two syllables

ii) A monosyllabic lexical root plus the class prefix

It should be mentioned now that the Strict Layering Hypothesis briefly discussed in §5.1 above requires that the phonological string is exhaustively parsed at every prosodic level. Thus, the full prosodic bracketing (up to the level of the word) of a form such as *e-ki-tabo* 'book' and *o-mú-ti* 'tree' are, respectively, as in (54a) and (54b):

(54) a. $[[\text{e-ki}]_{PS}\,[\text{-tabo}]_{PS}]_{W}$

b. $[[\text{o-}]_{PS}\,[\text{mú-ti}]_{PS}]_{W}$

5.4.1 Beat Deletion

In §4.5.7.4 I showed that the lower domain of Beat Deletion is the phonological stem. The rule was formalized as a mirror-image rule as follows:

(55) *Beat Deletion (stem)*

$x \text{ --> } \emptyset \;/\; [_{PS} \ldots x \ldots]_{PS}$

One reason that the domain is not the word is because a stress which has migrated onto the preprefix never deletes or causes the deletion of another stress in the same word. This is shown below. (PP=preprefix, CP= class prefix)

(56) a.

3 [o-ku-gur-a]$_W$ [[i]$_{PS}$ [-baare]$_{PS}$]$_W$ buy stone 'to buy the stone'	Underlying Representation
2 3 [okugura]$_W$ [[i]$_{PS}$[baare]$_{PS}$]$_W$	Beat Addition (32)
2 3 [okugur]$_W$ [[i]$_{PS}$[baare]$_{PS}$]$_W$	Vowel Deletion & Migration
4 3 [okugur]$_W$ [[i]$_{PS}$[baare]$_{PS}$]$_W$	Nuclear Stress (37)
----------	Beat Deletion (phon. stem) (55)
okugur' íbáare *okugur' íbaare *okugur' ibáare	Surface Form

In the derivation above, both stresses will obligatorily surface as they are neither a) phonological stem internal, nor b) within the same phrase, separated by a word boundary.

5.4.2 Optional Stress Shift

The rule of Optional Stress Shift, motivated and discussed at length in §4.5.6, was formalized as follows.

(57) *Optional Stress Shift*

$$[_{PS}\ \cdot\ \overset{\substack{(x)\\(x)}}{x}\ ]_{PS} \rightarrow [_{PS}\ \overset{\substack{(x)\\(x)}}{x}\ \cdot\ ]_{PS}$$

The rule was seen to affect bisyllabic phonological stems as seen in (58) and (59) below.

(58) a. e-ki-[PSstabo] ki-ruungi — Underlying Representation
book good
'good book'

b. 2
eki[PSstabo] kiruungi — Beat Addition (32)

c. 2 2
eki[PSstabo] kiruungi ~ eki[PSstabo] kiruungi — Optional Stress Shift (57)

d. ekitábo kiruungi ~
ekitabó kiruungi — Surface Form

(59) 1
a. o-[PSmu-zi] gu-ruungi — Underlying Representation
root good
'good root

b. 2
o[PSmuzi] guruungi — Beat Addition (32)

c. 2 2
o[PSmuzi] guruungi ~ o[PSmuzi] guruungi — Optional Stress Shift (57)

d. omuzí guruungi ~ — Surface Form

e. omúzi guruungi

That the domain of Optional Stress Shift is the phonological stem and not the word is seen in derivations such as the following.

(60) 3
a. [we-[PSm-bwa]] zi-ruungi — Underlying Representation
dogs good
'good dogs'

b. (vacuous) — Beat Addition (32)

c. ---------- — Optional Stress Shift (57)

d. embwá ziruungi ~ — Surface Form

e. *émbwa ziruungi

Regarding the phonological stem as a prosodic domain, it seems that it is the domain in which a maximum of one underlying prominence is found. Although two High tones can surface in a finite verbal form, I suggested in §4.5.10 that the two

prominences were in different phonological stems underlyingly. Finally, although two High tones can surface in a phonological stem in forms such as [omu[$_{PS}$rúmuná] muruungi] 'good sibling' (cf. §4.5.3.2), the second High is derived and not underlying.

5.5 Rules bounded by the phonological word

I will now present the rules which are bounded by the phonological word.

5.5.1 Final Shortening

The rule of Final Shortening as discussed in §2.4 was formalized as follows:

(61) *Final Shortening*

```
μ ---> ø /    Ó
             / \
            μ   ___
             \ /
            [-cons]
```

That its domain is the word can be seen in the following examples.

(62) a. [[embwa]$_W$ [zikúru]$_W$]$_P$ (*embwaa)
dogs old
'the old dogs'

b. [[ijwi]$_W$ [rikúru]$_W$]$_P$ (*ijwii)
ashes old
'old ashes'

c. [[embwá]$_W$-[ye]$_W$]$_{CG}$ (*embwáaye)
dog his
'his dog'

d. [[ijwí]$_W$-[ye]$_W$]$_{CG}$ (*ijwíiye)
ashes his
'his ashes'

e. [[ebiñobwá]$_W$-[ye]$_W$]$_{CG}$ (*ebinyobwáaye)
peanut his
'his peanuts'

f. [[okuryá]$_W$-ge]$_W$]$_{CG}$ (*okuryáage)
eat well
'to eat well'

(62c-f) show that Final Shortening takes place at the end of a phonological word, and not simply a clitic group. The isolation form of [w[PSée][PSmbwa]] 'dog' shows that the domain of Final Shortening must be the word and not the phonological stem.

5.5.2 Prepenultimate Shortening

The rule of Prepenultimate shortening, discussed in §2.4, will shorten a long prominent vowel in any word if that vowel occurs in a prepenultimate syllable. The rule was formalized in (39) of Chapter Two as follows.

(63) *Pre-penultimate Shortening*

```
                x
                x
               Ó  Ó  Ó
               / \
μ ---> ø /     μ ___      ]w
```

The examples below illustrate its application.

(64)

	Underlying Rep.	Surface Form	Gloss	Position of High
a.	o-mu-ána	omwáana	'child'	penult Ó
b.	o-mu-ójo	omwóojo	'son'	penult Ó
c.	o-ku-étab-a	okwétaba	'answer'	antepenult Ó
d.	o-bu-kúatani	obukwátani	'relationship'	antepenult Ó
e.	o-mu-íjukuru	omwíjukuru	'grandchild'	pre-antepenult Ó
f.	o-ku-éhahamur-a	okwéhahamura	'yawn'	pre-pre-antepenult Ó
g.	yá íhuri	y'[w[PSí][PShuri]]	'of the egg'	antepenult

In the examples above the rule applies at the level of the word, and permitting long vowels to surface in penultimate position (64a-b), but shortens them in pre-penultimate position (64c-g). The rule cannot be said to apply at the level of the phonological stem, as the structural description of Pre-penultimate Shortening would then not be met in (64g). The rule must apply in this case, as the [i] surfaces as short (cf. **y'íihuri* 'of the egg', *y'íine* 'of the liver' (< /yá ine/)).

As far as a test to distinguish the word and the clitic group is concerned, the only two post-clitics of which I am aware obligatorily delete the stress on the left inside

that clitic group, rendering that syllable ineligible for Penultimate Shortening, as the syllable to undergo shortening must be stressed. (e.g. /o-mu-ána-w-é/ --> [omwaanáwe])

5.6 Rules bounded by the clitic group

Clitic groups in Kinyambo were discussed in §5.3.4. The only rule I claim is bounded by the clitic group is Devocalization which I will now discuss.

5.6.1 Devocalization

Devocalization was formalized in §2.3.3.1 as follows.

(65) *Devocalization*

```
 μ     μ                      μ     μ
 |     |        --->          |
[+ high ] [     ]            [+ high]  [     ]
```

When two vowels (the first of which is [+ high]) become adjacent through syntactic concatenation Vowel Elision, not Devocalization applies as seen in the interaction of the last two words of the sentence below.

(66) Ne-já-kw-orech-a o-mu-kúru e-bi-tabo — Underlying Representation
He will show adult books
'He will show the adult the books.

Nejákworech' ómukur' ébitabo ~ — Surface Form
Nejákworech' ómukurú bitabo

The examples in (66) above show that Devocalization occurs within the word. If demonstratives are considered to be clitics (and not suffixes, which seems reasonable as they arguably occupy their own syntactic node), then the domain of Devocalization must be the clitic group instead of the word.[9] (Note that the rule of Phrase-final Left Shift applies in each case.)

[9]It should be noted that examples such as (67b-c) show that the Nuclear Stress Rule applies to the final word of the phrase, and not, say, the clitic group, as *abakúrw'aaba is ungrammatical.

(67) a. [[e-sumu]$_W$ [e-gí]$_W$]$_{CG}$ --> esumw'éegi
poison this
'this poison'

b. [[o-ba-kúru]$_W$ [a-bá]$_W$]$_{CG}$ --> abakurw'áaba
adults these
'these adults'

c. [[o-mu-rími]$_W$ [o-gú]$_W$]$_{CG}$ --> omurimy'óogu
farmer this
'this farmer'

The examples in (67) clearly show that the domain of Devocalization could not be the phonological stem or the word, as the rule applies between a noun and a following demonstrative marker.

5.7 Rules bounded by the intonational phrase

Cross-linguistically, Intonational Phrase boundaries seem to occur at the edges of a "laundry list" of constructions. Members of this list include: parentheticals, tag questions, vocatives, expletives, and pre- and post-posed constituents. Impressionistically, these seem to be the strongest boundaries possible while continuing in the same utterance. In syntactic formalism it is very difficult to give a unified account of the Intonational Phrase. Some of the constructions listed above have been Chomsky-adjoined to CP (= S'); others are entirely unconnected to the phrase marker.

5.7.1 Phrase-final Left Shift

I will claim that Phrase-final Left Shift is bounded by the intonational phrase. The rule of Phrase-final Left Shift, discussed in §4.5.5, was formalized as in (68).

(68) Phrase-final Left Shift

(x) (x)
(x) (x)
. x]$_P$ --> x .]$_P$ (P= Phonological Phrase)

In previous chapters I used 'p', 'phrase', and 'phonological phrase' fairly generically to denote some phrasal unit. I would now like to suggest that Phrase-final

Left Shift takes place at the end of an intonational phrase. That the rule does not take place at the level of the clitic group is seen in the examples below.

(69) a. [[[ente]w-yé]CG ziruungi]P (*entéye zirugni)
cow his good
'his good cow'

b. [[[ekitabo]w-ché]CG kiruungi]P (*ekitabóche kiruungi)
book his good
'his good book'

c. [[[okujuna]w-gé]CG Nkuna]P (*okujunáge Nkuna)
help well
'know Nkuna well'

d. [[[okubona]w-gé]CG Nkuna]P (*okubonáge Nkuna)
see well
'see Nkuna well'

That the rule does not obligatorily apply at the end of a phonological phrase is shown in the derivation below.

(70) a. 3 2 3 3 3 Underlying Representation
[o-mu-tahi w-a e-m-bwa]P [ni Tibamanya]P
friend of dog is
'The friend of the dog is Tibamanya.

b. ---------- Phrase-final Left Shift

c. 3 2 2 3 3 3 Beat Addition (32)
[omutahi wa embwa]P [ni Tibamanya]P

d. 3 2 2 3 3 3 Vowel Elision & Migration
[omutahi w' embwa]P [ni Tibamanya]P

d. 3 2 4 3 3 4 Nuclear Stress (37)
[omutahi w' embwa]P [ni Tibamanya]P

e. 3 4 3 4 Beat Deletion (phrasal) (11)
[omutahi w' embwa]P [ni Tibamanya]P

f. omutáhi w'éembwá ni Tibamánya Surface

As seen above the stress originally associated to the root of *éembwa* 'dog' (70a) surfaces as shown in (70f). If Phrase-final Left Shift applied obligatorily in (70b) then

this surface High would be unaccounted for. (Note that the surface High cannot be attributed to Beat Addition, as that rule is bounded by the phonological phrase as shown above in §5.3.2.)

That Phrase-final Left Shift takes place at intonational phrase boundaries and not utterance boundaries is shown below.

(71) a. [Ni-ñ-end' ó-ru-papuro]$_I$ [ée-m-bwa]$_I$ [í-jwi]$_I$ [n' ébitabo]$_I$
I-want paper dogs ashes and books
'I want the paper, the dogs, the ashes and the books'

(cf. *Niñend' órupapuro, eembwá, ijwí, n' ébitabo.)

b. [O-mú-ña]$_I$ [ni-ny-end' ó-ku-ku-bón-a]$_I$ (< /o-mu-nyá/)
Lizard I-want see-you
'Lizard, I want to see you'

(cf. *Omuñá, niñend' ókukubóna)

5.7.2 Vowel Elision

The second rule which I will claim is bounded by the intonational phrase is that of Vowel Elision, motivated in §2.3.3.2, which was formalized as follows.

(72) *Vowel Elision*

$$[\text{-cons}] \rightarrow \emptyset \;/\; \underline{\quad\quad}\;]\;[\overset{\overset{\mu}{|}}{\text{-cons}}]$$

Its application is illustrated in the examples below.

(73) a. [Arah' ómukam' ékitabo]$_P$ — cf. Arára 'he will show'
he-will-give chief book — omukáma 'chief'
'He will give the chief thebook'

b. [Omugor ájuníre]$_P$ — cf. omugóre 'bride'
bride she-helped
'The bride helped'

c. [Bater' ómukam' órúundi]$_P$ — cf. Batéra 'they strike'
they-strike chief sometimes — omukáma 'chief'
'They strike the chief sometimes'

d. [[Nejákubon' ómurimí murung]$_P$ [orúundi]$_P$]$_I$ — cf. muruungi 'good'
he-will-see farmer good sometimes
'He will see the good farmer sometimes'

e. [[Omurimí murung]$_P$ [ajuníre]$_P$]$_I$ — cf. muruungi 'good'
farmer good he-helped
'The good farmer helped'

While (73a)-(73c) show that Vowel Deletion takes place within the phonological phrase, (73d)-(73e) show that the rule also applies across phonological phrase breaks. The following examples show that the rule is bounded by the intonational phrase.

(74) a. [Niñend' órupapuro]$_I$ [ebitabo]$_I$ [n'éembwa]$_I$
I-want paper books dogs
'I want the paper, the books, and the dogs'

b. [Omutáhi]$_I$ [ayend' ókukubóna]$_I$
friend he-wants see-you
'Friend, he wants to see you'

In (74), it can be seen that Vowel Elision does not apply when the vowel is at an intonational phrase boundary.

5.8 Rule ordering

The rules presented above, the domains in which they apply, and the other domains which they must have access to in their structural descriptions are summarized as follows. (Where it was noted that it was impossible to tell if the rule applied in one of several prosodic domains, such is noted below)

(75)

Rule	Domain of application	Other domains needed in S.D.
Optional Stress Shift (OSS) (57)	Phonological Stem	
Beat Deletion (BD-S) (55)	Phonological Stem	
Final Shortening (FS) (61)	Word	
Prepenultimate Shortening (PS) (63)	Word/Clitic Group	
Devocalization (D) (65)	Clitic Group	
Phrase-final Deletion (PD) (50)	Phonological Phrase	Phon. Stem
Beat Deletion (BD-P) (11)	Phonological Phrase	Word
Beat Addition (BA) (32)	Phonological Phrase	Word
Nuclear Stress Rule (NSR) (37)	Phonological Phrase	Word
Phrasal Vowel Shortening (PVS) (45)	Phonological Phrase	Clitic Group
Phrase-final Left Shift (PLS) (68)	Intonational phrase	
Vowel Elision (VE) (72)	Intonational phrase	

The rule ordering which I propose is schematically given in the table below. The rules, due to restrictions in space, are abbreviated as given in (75) above. They apply from top to bottom as indicated by the lines which connect them.

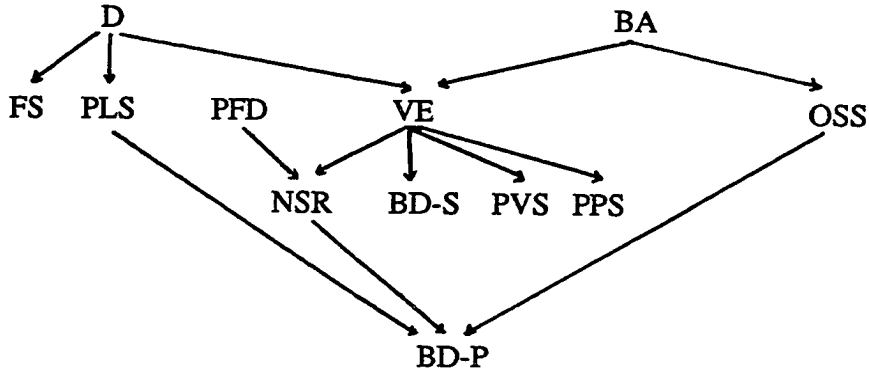

Table I

I will now briefly justify the individual orderings represented in the table above. Devocalization must precede both Phrase-final Left Shift and Final Shortening as seen in the derivation below as (76). (Vowel length is represented segmentally.)

(76)

3 ó ó ó i-j u i ashes	Underlying Representation
3 ó ó i jw i i	Devocalization (65) & Compensatory Lengthening (§2.3.3.1)
3 ó ó i jw i i	Phrase-final Left Shift (68)
3 ó ó i jw i	Final Shortening (61)
íjwi	Surface Form

In (76) it is clear that Phrase-final Left Shift cannot apply to shift a phrase-final prominence until Devocalization applies to cause the stress to be located on the last syllable of the word. Devocalization also feeds Final Shortening, creating the long vowel to be shortened.

The rule of Devocalization will precede Vowel Elision, as Vowel Elision occurs if Devocalization doesn't in the event two vowels are contiguous as shown below. (This is true if the maximally general formulation of Vowel Elision is to be adopted, as formalized above in (72).)

(77)

a.	o-mu-ójo son	a-ba-ójo sons	Underlying Representation
b.	omwóojo	----------	Devocalization (65) (& Compen. Leng.)
c.	----------	abóojo	Vowel Elision (72)

I will now show that both Phrase-final Left Shift and Nuclear Stress must precede phrasal Beat Deletion.

(78)	3 3 i-fa ri-bi famine bad 'a bad famine'	Underlying Representation
	3 3 i fa ri bi	Phrase-final Left Shift (68)
	3 4 i fa ri bi	Nuclear Stress (37)
	4 i fa ri bi	Beat Deletion (11)

That Phrase-final Left Shift must precede phrasal Beat Deletion is necessary in order to insure that Beat Deletion apply obligatorily in examples such as (78), in accordance with the Probability Principle of Rule Application ((92) of Chapter Four). Nuclear Stress must precede Beat Deletion in order that the left stress delete, in accordance with the Continuous Column Constraint ((5),(13) of Chapter Four).

I will now show that Beat Addition must precede Vowel Elision.

(79)	o-ku-mañ-a o-muu-ntu know person 'to know the person'	Underlying Representation
	2 okumaña omuuntu	Beat Addition (32)
	2 okumañ omuuntu	Vowel Elision (72) & Stress Migration
	okumañ' ómuuntu	Surface Form

In §4.5.7.2, I argued for a process of stress migration under vowel deletion. The stress must be present before it can migrate. If the order of the rules were reversed an ungrammatical form would be generated, viz. **okumáñ' omuntu*.

Beat Addition must also precede Optional Stress Shift as shown below.

(80)	a.	e-ki-tabo ki-ruungi book good 'good book'	Underlying Representation
	b.	2 ekitabo kiruungi	Beat Addition (32)
	c.	2 2 ekitabo kiruungi ~ ekitabo kiruungi	Optional Stress Shift (57)
	d.	ekitábo kiruungi ~ ekitabó kiruungi	Surface Form

In the derivation above, the stress must first be inserted by Beat Addition before it can shift. That Optional Stress Shift must precede phrasal Beat Deletion is seen below.

(81)	a.	3 3 o-mu-ti gu-ke root good 'good root'	Underlying Representation
	b.	3 3 omuti guke	Phrase-final Left Shift (68)
	c.	3 3 3 3 omuti guke ~ omuti guke	Optional Stress Shift (57)
	d.	3 4 3 4 omuti guke ~ omuti guke	Nuclear Stress (37)
	e.	4 (3) 4 omuti guke ~ omuti guke	Beat Deletion (phrasal) (11)
	f.	omuti gúke ~ omúti gúke	Surface Form

As can be seen in the derivation above, if Beat Deletion applied to (81b), before Optional Stress Shift applied, the stress in the first word would obligatorily delete and could therefore not be subsequently shifted, as is necessary to generate the two grammatical forms in (81f).

The interaction of Phrase-final Deletion and Nuclear Stress was discussed in some detail in §4.5.8. To summarize, Nuclear Stress must follow Phrase-final Deletion in order not to neutralize the stress strength distinctions which must be visible to the latter rule.

That Nuclear Stress must follow Vowel Elision is shown below.

(82)	a.	3 o-kw-eges-a o-muu-ntu teach person 'to teach the person'	Underlying Representation
	b.	3 2 okwegesa omuuntu	Beat Addition (32)
	c.	3 2 okweges omuuntu	Vowel Elision (72) & Stress Migration
	d.	3 4 okweges omuuntu	Nuclear Stress (37)
	e.	(3) 4 okweges omuuntu	Beat Deletion (11)
	f.	okwéges' ómuuntu ~	Surface Form
	g.	okweges' ómuuntu	

If Nuclear Stress preceded Vowel Elision it would not apply in (82d), as there is no stress in the final word of the phrase in (82b). We can also deduce from the example above that Vowel Elision must precede Beat Deletion at the level of the phonological stem, for if it did not the [2 stress] would incorrectly delete in (82b).

I will now show that Phrasal Vowel Shortening must follow Vowel Elision.

(83) a. 2 — Underlying Representation
y-a i-ne ri-ruungi
of liver good
'of the good liver'

b. 2 2 — Beat Addition (32)
ya i ne riruungi

c. 2 2 — Vowel Elision (72) & Compens. Lengthening (cf. §2.3.3.2)
y ii ne riruungi

d. 2 2 — Phrasal Vowel Shortening (45)
y i ne riruungi

e. y'íné riruungi
*yíiné riruungi

In the derivation above, Vowel Elision of the associative marker /-a/ results in a compensatory lengthening of the following /i/. As the lengthened vowel is in a word which precedes another word in the same phonological phrase, Phrasal Vowel Shortening applies as seen in (83d).

Finally, I will show that Vowel Elision must precede Prepenultimate Shortening.

(84) a. 2 — Underlying Representation
y-a i-huri
of egg
'of the egg'

b. 2 — Vowel Elision (72) & Compens. Lengthening (cf. 2.3.3.2)
y iihuri

c. 2 — Prepenultimate Shortening (63)
y ihuri

d. y' íhuri — Surface Form
*y' íihuri

In the derivation above, the elision of the /a/ results in the compensatory lengthening of the following /i/. Prepenultimate Shortening then applies to shorten the [ii] as seen in the resulting surface form in (84d).

Now that I have examined the ordering of the phonological rules in Kinyambo, it should be clear that it is certainly not the case in Kinyambo that the lower level prosodically bounded rules precede the higher level ones. Rules discussed above which apply apply within a higher domain than a following rule are shown below.

(85) Higher level rules preceding lower level rules

a. Beat Addition (P-phrase) --> Optional Stress Shift (Phon. Stem)
b. Devocalization (Clitic Group) --> Final Shortening (Word)
c. Phrase-final Left Shift (I-Phrase) --> Beat Deletion (P-Phrase)
d. Vowel Elision (I-Phrase) --> Nuclear Stress Rule (P-Phrase)
e. Vowel Elision (I-Phrase) --> Beat Deletion (Phon Stem)
f. Vowel Elision (I-Phrase) --> Phrasal Vowel Shortening (P-Phrase)
g. Vowel Elision (I-Phrase) --> Prepenultimate Shortening (Word/C.G.)

That at least some higher level prosodic rules must feed (and thus precede) lower level rules is true in other Bantu languages as well: Kimatuumbi (Odden 1987) and Kiyaka (Kidima, forthcoming). In fact I know of no study of a single language which first motivates a fairly large number of rules requiring prosodic phrase boundaries and then shows that all the rules on the lowest level apply first, then those of the next higher level, etc. When more studies of this type are done, perhaps one will be in a better position to evaluate ordering patterns and constraints of prosodically bounded rules. For now I can only suggest that the rule ordering necessary to generate the correct surface forms shows little to no patterning with respect to the prosodic levels within which they apply.

5.9 Summary

There are three interesting aspects of the prosodic domains in Kinyambo. First, as discussed in §5.3.1, the phonological phrase construction must refer to branchingness. I thus proposed that this be a parameter in any cross-linguistic phonological phrase construction rule.

Second, I have shown that at least two phrasal rules must have access to a domain I have defined as the phonological stem (Beat Deletion and Optional Stress Shift). At the moment it is unclear to me whether this can simply be redefined, in a cross-linguistically consistent way, as a metrical 'foot'. Although it is true that there will generally be no more than one stress per phonological stem, in certain surface forms there is no stress (e.g. [[e-ki]$_{PS}$ [-tabo]$_{PS}$]$_{W}$ 'book'), while in other cases there are two (e.g. [[o-mu]$_{PS}$-[rúmuná]$_{PS}$]$_{W}$ [mu-ruungi]$_{W}$ 'sibling--good'). In any event I seem to have evidence for the following prosodic levels.

(86) Prosodic Levels in Kinyambo

Intonational Phrase
Phonological Phrase
Clitic Group
Word
Phonological Stem

Finally, as discussed in §5.8 above, the extrinsic ordering of the rules does not seem to correlate in any systematic way with the prosodic levels within which the rules apply.

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