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Articles

FINAL VOWEL SHORTENING IN LUGANDA

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A process by which long vowels are shortened in "final position" has been noted by a number of linguists, e.g. Ashton et al [1954], Tucker [1962], Cole [1967], Stevick [1969], Katamba [1974], Clements [1986]. It is generally assumed that this shortening is characteristic of word-ends such that the process can even serve as a criterion for phonological word division. Despite the attention given to final vowel shortening (FVS), the relevant facts have not been exhaustively described. In this descriptive account, we show that FVS is a much more complex phenomenon than the Luganda literature suggests. We observe, for instance, that FVS does not work the same on nouns as it does on verbs and that an empirically adequate analysis must take into account the source of such word-final length, e.g. underlying vs. derived. In our solution, FVS first applies at the end of a phonological word (PW) and then again at the end of a clitic group (CG). In order for the facts to fall out from this analysis, we argue that at the PW level (1) the final vowel of verb forms is not affected because it is extrametrical, i.e. "invisible" and (2) the second mora of a monosyllabic stem is not affected because it is accented.

0. Introduction[*]

For quite some time, the literature on Luganda phonology has referred to a process by which long vowels are realized short in final position: "...the final syllable of a word spoken in isolation is always short ... Within the sentence too, final syllables of words are usually short, and this fact has been of great value in assessing word division ..." [Tucker 1962:155]. While "final position" is

generally assumed to mean "at the end of a word", all researchers are aware that such "words", postulated to account for final vowel length, may consist of a "full" word (or "host") and one or more proclitics or enclitics. Thus, speaking of *àsòmyê* 'he has read', Stevick [1969:4] states: "... the last syllable of the isolated word is short. Before an enclitic, however, it receives the expected two moras ..." Or, to take another example, although the final vowel [*a*] is phonetically short in (1a), its phonological length is preserved in (1b), where it is followed by the locative enclitic =*kô*:[1]

(1) a. *kùlábwà*   'to be seen'

   b. *kùlábwàà=kô*   'to be seen a little'

   c. *kùlábwà wàlúsìmbí*   'to be seen by Walusimbi'

In (1c), on the other hand, final length is not preserved on *kùlábwà*, since the noun object 'Walusimbi' is not an enclitic. Related facts are observed when the host word is preceded by a proclitic, as seen in (2).

(2) *bìkópó byáá=wálúsìmbí*   'cups of Walusimbi'

In this case it is the length of the proclitic genitive linker *byaa=*, rather than the host word, that is preserved in non-final position.

    Virtually all researchers comment on the role of such clitics in determining whether underlying word- or clitic-final length will surface.[2] Lists of environments where phonological vowel length is preserved on or by a clitic are provided in Ashton et al [1954], Tucker [1962], Cole [1967], Stevick [1969], and Hyman, Katamba and Walusimbi [1987]. Although Tucker speaks of a

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[1]In these and other examples, an acute accent (*á*) marks high (H) tone, a grave accent (*à*) marks low (L) tone, and a circumflex (*â*) a HL falling tone. Long vowels are transcribed as double throughout this study. The symbol (=) separates proclitics and enclitics from their host. Hyphens, when present, mark morpheme boundaries, though not all internal morphology is marked in the examples.

[2] In standard Luganda orthography, vowel length is written only when it is not predictable from the surrounding segmental environment. Tucker [1962:156] points out that the conventions for marking word division in standard Luganda orthography are only partially successful in capturing whether "final" length will be realized (cf. also Stevick 1969:4). Thus, (1b) is appropriately written as the single word *okulabwako* (the length of [aa] being predictable from the preceding consonant + glide sequence—see §1.1). Example (2) is written *bikopo bya walusimbi*. As Tucker observes, the word space after *bya* should result in the [a] being short. Since it is in fact long, a more adequate practice would be to write a single word *byaWalusimbi*. There are other cases where standard orthography would have to be modified to account for the complexity of vowel length phenomena described below. In our transcriptions, all surface length is explicitly marked with a double vowel except for the length that automatically occurs before a nasal + consonant sequence.

"lengthening rule" (p.157), the examples in (3a) show that enclitics do not automatically induce length on their host.

(3) a. *kùlábà*   'to see'

   kùlábà=kô   'to see a little'

   kùlábà wàlúsìmbí   'to see Walusimbi'

   b. *kù=wàlúsìmbí*   'on Walusimbi'

   nà=wàlúsìmbí   'with Walusimbi'

Similarly, the examples in (3b) show that proclitics do not automatically acquire length from their host. Such observations lead us to conclude that the rule is one of shortening. Following Hyman, Katamba, and Walusimbi, we accept the correctness of a rule of final vowel shortening (FVS) in Luganda.

In this paper we examine the rule of FVS in some detail. In the course of the investigation we will demonstrate that FVS takes place *both* at the end of a phonological word (PW) and at the end of a clitic group (CG). We will begin in §1 by identifying the structures which constitute CG's for the purpose of FVS. With these CG's firmly established, we then consider the exact operation of the FVS rule, first within nominal CG's (NCG's) in §2, and then within verbal CG's (VCG's) in §3. As we shall see, FVS applies differently within a NCG vs. a VCG according to the source of the final vowel length, e.g. underlying vs. derived. The generalization is that FVS must apply at the end of a nominal PW but not at the end of a verbal PW. An analysis involving "invisibility" (extraprosodicity) is presented in §4 that accounts for this difference. In §5 we extend the account of FVS to adjectives and test our claims against two other constructions (compounds and reduplications), which are shown to support the analysis. In §6 we conclude with some cases of apparent under- and overapplication of FVS, including possible word-internal applications.

1. The Clitic Group

In this section we shall enumerate what we believe to be an exhaustive list of phonological proclitics and enclitics in Luganda. As will be seen, whether a given "particle" will function as a phonological clitic (as defined by FVS and tonal criteria) or as a separate full word is not always predictable from its phonological shape or grammatical properties. We shall first consider proclitics, then enclitics, distinguishing in each case between those whose host is nominal vs. those whose host is verbal. We then consider the same distinction among enclitics.

1.1. Proclitics. The class of proclitics in Luganda consists of a limited number of particle-like elements that fall into a few well-defined classes. In (4) we list those proclitics whose host is "nominal".[3]

(4) a. *ba=*　'class 2a'　　　　　　*zi=*　'class 10a'

　　b. *ku=*　'class 17'　　　　　　*mu=*　'class 18'

　　c. *na/ne*　'with/and/even'

　　d. *-aa*　'genitive linker' (GL)

All proclitics have in common that they are toneless.[4]　Those in (4a) are plural class markers used with a restricted set of nominals, e.g. proper names (*bà=wàlúsìmbí* 'the Walusimbis'), borrowings (*zì=lòòlê* 'lorries') and other forms.[5]　Those in (4b) are locative markers, e.g. *mù=nnyúmbà* 'in the house', *kù=kìtábó* 'on the book' etc.,[6] while *na/ne* in (4c) is the versatile preposition having the indicated translations, e.g. *nà=wàlúsìmbí* 'with/and/even Walusimbi'.[7] Since none of the proclitics in (4a-c) have an underlying long vowel to be preserved within the CG, it is tone and not the FVS rule that tells us that these are proclitics rather than prefixes or independent words.

　This brings us to the genitive linker (GL) in (4d), as seen in examples such as (5):

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[3]By this is meant that the following host will either be an actual noun, e.g. *mù=bìkópò* 'in the cups', or will be a noun modifier functioning as head, e.g. *mù=bínò* 'in these'.

[4]This statement must be qualified somewhat, given the unique status of the so-called initial vowel or augment, e.g. *è-bítábó* 'books'. This morpheme has an underlying H tone which, however, is deleted at the beginning of a CG [Hyman and Katamba 1990]. Based on tonal criteria, a CG-initial (toneless) augment has the properties of a word-level prefix; when internal to a CG and therefore H-toned, it seems to be a proclitic. For reasons of simplicity, we have attempted to provide forms without the augment whenever possible.

[5]There may be a few class 8 *bi=* and class 14 *bu=* proclitics as well, e.g. *bù=kàmúnyé* 'hawks' (see Cole 1967:27).

[6]Of the very few forms with frozen locative class 16 *wa-*, the form *wà=ǹsî* 'on the ground' conceivably consists of a proclitic + host (since *ǹsî* by itself means 'earth, country'). In other cases, *wa-* clearly is a prefix, e.g. *wàlálá* 'elsewhere', *wàntú* 'someplace'. Class 16 *wa-* should not be confused with the class 1a *wa-* prefix of personification, e.g. *wáńjóvú* 'Mr. Elephant' (cf. *ńjóvú* 'elephant'). While this marker has some tonal peculiarities of its own, it must be analyzed as a prefix, not a proclitic.

[7]As shown in Hyman and Katamba [1990], the *ne* variant is used in contexts where the grammar requires an augment on the following host. As mentioned in note 4, the augment has an underlying (sometimes floating) H tone which it contributes to the proclitic, as in *né=mùlóndó* 'with Mulondo'.

(5) a. *kì kópó kyáá=wálúsìmbí*   'cup of Walusimbi'

    b. *lùggí lwáá=wálúsìmbí*   'door of Walusimbi'

    c. *bááná báá=wálúsìmbí*   'children of Walusimbi'

Here, the GL takes a noun class agreement prefix, respectively, class 7 *ki-*, class 11 *lu-* and class 2 *ba-*. In Luganda, as summarized in (6), high vowels glide and non-high vowels delete before another vowel which, if short, exhibits compensatory lengthening (see Tucker [1962]; Halle and Vergnaud [1980]; Katamba [1974]; Clements [1986], among others).

(6) a. /Ci+a/, /Cu+a/   → [Cyaa], [Cwaa]

    b. /Ce+a/, /Co+a/, /Ca+a/   → [Caa]

It is not possible to tell from (5) if the GL itself should be analyzed with underlying /a/ or /aa/. Since a syllable cannot exceed two moras, one would obtain the same surface realization [kyaa] from /ki+a/ or /ki+aa/, [lwaa] from /lu+a/ or /lu+aa/, and (baa) from /ba+a/ or /ba+aa/. Onsetless sequences of /i+a/ and /u+a/ undergo gliding without compensatory lengthening and are realized [ya] and [wa]. Thus, the proclitics in (7) must be analyzed as /i+aa/ and /u+aa/ in order to obtain the correct surface length:[8]

(7) a. *m̀bwá yáá=wálúsìmbí*   'dog [cl. 9] of Walusimbi'

    b. *mwááná wáá=wálúsìmbí*   'child [cl. 1] of Walusimbi'

We conclude that the GL is underlyingly /-aa/, not /-a/.[9] The preservation of two vowel lengths in (6) and (7) is thus attributable to the fact that the GL is a proclitic, not a self-standing word.

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[8]It should be noted that compensatory lengthening of /Cia/ and /Cua/ to [Cyaa] and [Cwaa] is possible only when there is an onset consonant. While this fact sometimes goes unmentioned in previous literature, Clements [1986:75] has suggested that forms such as [yàlábà] 'he saw' and [wàlábà] 'you (sg.) saw' (from /i+a/ and /u+a/, respectively) are derived by a special lexical rule. As we will see in the case of verbal proclitics, the onset requirement for compensatory lengthening is quite robust in Luganda, and hence, these forms are not exceptional.

[9]This conclusion has interesting consequences for possessive pronouns. Forms such as *byange* 'my', *byaffe* 'our', *byammwe* 'your pl.' and *byaabwe* 'their' show an internal GL and hence have the morphological divisions *bi-aa-nge*, *bi-aa-ffe*, *bi-aa-mmwe,* and *bi-aa-bwe* (sidestepping the question of whether the final [e] is also a morpheme). The remaining two possessive pronouns, *byo* 'your sg.' and *bye* 'his/her', have the internal structure *bi-aa-o* and *bi-aa-e*, i.e. with four underlying vowel lengths. The rules in (5) will require gliding of /i/ and deletion of /aa/, both with compensatory lengthening. The restriction of at most two moras to the syllable will require that hypothetical **byoooo* and **byeeee* be converted to *byoo* and *byee*, which may then undergo FVS to become *byo* and *bye* in the appropriate context. This two-step analysis whereby

As seen in (8), it is possible to get more than one GL in sequence with length preserved on each one:

(8) a. *bìkópó byáá=wáá=wálúsìmbí*   'the cups of the one of Walusimbi'

b. *bìkópó byáá=wáá=múlúlû*   'the cups of the greedy one'

bìkópò byàà=wàà=kìsá   'the cups of the kind one'

In (8) we have a double genitive construction with the second genitive lacking an overt head. In (8a) the second GL expresses possession, while in (8b) it expresses an attribute (literally, 'the cups of the one of greediness', 'the cups of the one of kindness'). Longer sequences of GL's, each with retained vowel length, are logically possible but pragmatically awkward.

We turn now to proclitics whose host is verbal.[10] The first concerns the subject cleft marker /-ee/, illustrated in (9).

(9) a. *kìkópò kyèè=kyáágwà*   'it's a cup that fell'

lùggì lwèè=lwáágwà   'it's a door that fell'

báánà bèè=báágwà   'it's children that fell'

b. *m̀bwâ yèè=yàgwâ*   'it's a dog that fell'

mwáánà yèè=yàgwâ   'it's a child that fell'

We see in (9a) that the marker /-ee/ agrees in noun class with the clefted noun phrase. Preservation of length in [kyee], [lwee] , and [bee] shows that this marker is procliticized onto the verb. The forms in (9b) show, first, that both classes 1 and 9 assign an /i-/ agreement to the subject cleft marker and, second, that this marker must be underlyingly long (cf. the discussion of the GL above).

A slightly different situation is observed when the host of this proclitic is nominal:

(10) a. *kìnò kyèè=kìkópò*   'this is the cup'

lùnò lwèè=lùggí   'this is the door'

bànò bèè=báàná   'these are the children'

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multiple vowel sequences are first pared to a maximally bimoraic syllable and then to a monomoraic syllable (in "final" position) seems preferable to an analysis whereby FVS may apply directly to **byoooo* and **byeeee* to delete all but one mora.

[10]The host will normally be a verb, though in the case of the zero copula, there is no overt verb on the surface.

b. *ènò yè=lòòlê*   'this is the lorry' [cl. 9][11]

   ònò yè=mwáàná   'this is the child'

The examples in (10a) parallel those in (9a), with appropriate surface vowel length on the proclitic. The examples in (10b), however, show a *short* vowel on *yè=* (which, recall, can mark either class 1 or class 9). In the examples in (10), then, the cleft marker must be set up as /-e/, i.e. with an underlying short vowel. While we have no explanation for this, the descriptively correct statement is that the subject cleft marker will be /-ee/ unless it is directly followed by a zero copula, used in the present, as in (10). When we change (10) to past tense, for instance, where an overt copula is required, the proclitic again has the underlying representation /-ee/, e.g. *ènò yèè=yàlî lóólê* 'this was the lorry'. In this example, *yèè=* is proclitic to *yàlî* '(it) was', which is a verb form parallel to *yàgwâ* '(it) fell' in (9b).[12]

It is appropriate to compare the marking of non-subject clefts, illustrated in (11).

(11) a. *kìkópò kyè yàlábà*   'it's a cup that he saw'

    lùggì lwè yàlábà   'it's a door that he saw'

    báánà bè yàlábà   'it's children that he saw'

  b. *m̀bwâ gyè yàlábà*   'it's a dog that he saw'

    mwáánà gwè yàlábà   'it's a child that he saw'

In these examples the clefted NP is object of the sentence. As seen in (11a), we do not get surface vowel length, even though the underlying representations include at least two vowel lengths, i.e. /ki-e/, /lu-e/, /ba-e /. While the subject cleft marker in (10b) was [yè] for both class 9 and class 1, we see in (11b) that the non-subject cleft marker is [gyè] for class 9 and [gwè] for class 1. The uniform shortness of the vowel [e] throughout (11) indicates that the marker is not a proclitic, but rather a separate word.[13] This and the segmental differences

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[11]In this example we have replaced *m̀bwâ* 'dog' from (9b) with *lòòlê* 'lorry, truck', since in the corresponding utterance, *ènò yè=m̀bwâ* 'this is the dog', the vowel on *yè* is phonetically long because of the following NC sequence (see Tucker [1962]; Herbert [1975]; Clements [1986], etc.).

[12]An alternative solution would be that /-ee/ is a proclitic unless (a) it is followed by a zero copula and (b) its noun class agreement is /i-/, i.e. a vowel without a preceding onset consonant, in which case it is a separate word (and undergoes FVS). We do not find anything to commend this analysis.

[13]This conclusion is supported by the fact that it functions as a separate PW within the tone group domain.

observed in (10b) vs. (11b) may suggest that these are entirely different markers, despite the obvious phonetic and grammatical similarities. Whatever the decision on this point, it is important to note two things about Luganda. First, one cannot predict the proclitic vs. word status of a "particle" on the basis of its phonetic shape, e.g. whether it is monosyllabic, for instance. Second, one cannot predict that a syntactically proclitic element will necessarily be a phonological proclitic. The data in (12) show this second point quite clearly:

(12) a. *kìkópò wàlúsìmbì kyè yàlábà*   'it's a cup that Walusimbi saw'

     b. *m̀bwâ wàlúsìmbì gyè yàlábà*   'it's a dog that Walusimbi saw'

In non-subject clefts, the subject of the lower clause appears before the cleft marker. As pointed out by Walusimbi [1976], the same observation pertains to non-subject relative clauses, which differ from their cleft counterpart in tonal ways only. In both constructions the complementizer must immediately precede the verb, suggesting that it is syntactically dependent ("leaning") on it. Yet, as we have seen, the phonology treats these markers as separate words. We arrive at the same conclusion reached by Klavans [1985], who observed that syntactic and phonological cliticization are logically independent of each other. This independence is also exemplified by Luganda *enclitics*, a topic to which we now turn.[14]

1.2. Enclitics. The complete set of nominal enclitics, given in (13), consists of one WH enclitic and the six personal possessive pronouns:

(13) a. *=ki*   'which'

     b. *-ange*   'my'   *-affe*   'our'

        -o   'your sg.'   *-ammwe* 'your pl.'

        -e   'his/her'   *-aabwe*   'their'[15]

Preservation of final noun length before these enclitics is illustrated with the class 9 noun *m̀bwâ* 'dog' in (14):

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[14]Although we were able to illustrate multiple nominal proclitics in (7), we cannot provide uninterrupted sequences of verbal proclitics due to their syntactic nature. It should be pointed out that there are fewer verbal proclitics in the language than there are nominal proclitics. In some cases, e.g. the main clause negative markers *te-/si-* and the narrative tense marker *ne-*, it is not possible to tell whether these are proclitics or merely prefixes that must occur initially within the verb.

[15]Possessive forms all contain the GL /aa/, as we noted above. In these forms it should be noted that length resulting from a following NC sequence, e.g. [-aange], is not transcribed; also, a vowel is automatically short before a geminate consonant, e.g. [-affe, -ammwe].

(14) a. m̀bwáà=kí   'which dog?'[16]

    b. m̀bwáá=yàngé   'my dog'

       m̀bwáá=yò   'your sg. dog'

       m̀bwáá=yè   'his/her dog'

       m̀bwáá=yàffé   'our dog'

       m̀bwáá=yàmmwé   'your pl. dog'

       m̀bwáá=yààbwé   'their dog'

    c. m̀bwá yáá=wálúsìmbí   'dog of Walusimbi'

The final length of 'dog' is realized before the enclitic *=ki* 'which' in (14a) and the six personal pronouns in (14b). In (14c) we demonstrate that final length is not preserved when m̀bwâ fails to be followed by an enclitic. As discussed in §1.1, *yaa=walusimbi* consists of a proclitic GL + host noun. Since this combination is not an enclitic, FVS applies, and the final vowel of 'dog' is short.

    There are no other enclitics on nouns in Luganda. Likely candidates are dismissed by the data in (15), where the length of the head noun 'dog' is not preserved:

(15) a. m̀bwá yáábyô   'their [class 8] dog'

    b. m̀bwâ yô   'as for the dog'

    c. m̀bwá ènó   'this dog'

    d. m̀bwá èmû   'one dog'

While the six personal possessive pronouns in (13b) are enclitics, we observe in (15a) that NON-personal possessives consisting of a GL + independent pronoun, here class 8 *byô*, are not. Although all clitics other than the six personal possessives are monosyllabic in Luganda, the monosyllabic topic marker *-o* in (15b) is not an enclitic. Finally, (15c) and (15d) are intended to show that demonstratives and numerals are also not enclitics.

    Although nominal enclitics are limited to those in (13), the example in (16a) shows that it is possible to get two nominal enclitics in sequence:

(16) a. kìkópó=kyéè=kí   'which cup of his/hers?'

    b. m̀bwáá=yàngè=kí   'which dog of mine?'

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[16]The enclitic *=kí* requires that the nominal m̀bwâ 'dog' occur with a surface HL contour, since a noun does not form a tone group with this enclitic (see Hyman, Walusimbi and Katamba [1987]).

In this case it is the length on the possessive pronoun *kyéè* 'his/her' that is preserved by the enclitic *=ki*. In (16b) we see preservation of final length on the noun 'dog', as before. Because of the way FVS affects nouns and their possessive enclitics (cf. (37)), the language does not provide any example with final length preserved on both the noun and the possessive pronoun. Taken together, however, (16a) and (16b) establish that each example consists of a single CG with two enclitics in sequence.

Turning now to verbal enclitics, these fall into two categories consisting, respectively, of the two WH enclitics in (17a) and the four "locative" enclitics in (17b).

(17) a. *=kí*   'what'

     =wá   'where'

   b. *=wô*   'there (particular place)   (class 16)

     =kô   'on, upon'   (class 17)

     =mû   'in, inside, within'   (class 18)

     =yô   'there (away from speaker)   (class 23)

The two WH enclitics in (17a) are illustrated in (18).[17]

(18) a. *yàsímá=kí*   'what did he dig?'

   b. *yàsímá=wá*   'where did he dig?'

As indicated, the locative enclitics in (17b) function as part of the noun class system and are identified as classes 16, 17, 18, and 23.[18]   Examples are given in (19).

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[17]One might consider adding other WH particles to the list of enclitics such as *=àní* 'who(m)' and *=ddí* 'when'. Like *=kí* and *=wá*, *=àní* and *=ddí* must come immediately after the verb in what we would claim is a focus position. However, with these latter enclitics it is impossible to use vowel length preservation as a criterion for enclitic status: with *=àní*, vowel length will always surface, since *=àní* begins with a vowel (and will always join the preceding vowel to form a bimoraic syllable); with *=ddí*, the geminate consonant requires that any preceding vowel be short, independent of the number of underlying moras (see Tucker [1962]; Katamba [1974]; Clements [1986]).

[18]These enclitics suggest a pronominal element *-o*. Classes 16 and 20 are then analyzed as */wa-o/* and */i-o/* and are phonologically regular. Class 17 */ku-o/* is exceptional, since this underlying representation would be realized incorrectly as **[kwo]*, not [ko]. Class 18 [*mu*] is exceptional in not taking *-o* at all. Underlying */wa-, ku-, mu-, i-/* is motivated by the rest of the noun class system (see Ashton et al [1954]; Cole [1967]).

(19) a. *yàtúúlá=wô*   'he sat there'

  b. *yàtúúlá=kô*   'he sat thereon'

  c. *yàtúúlá=mû*   'he sat therein'

  d. *yàtúúlá=yô*   'he sat yonder'

In addition to their locative meanings, the class 17 and 18 enclitics also have a partitive or attenuative function, as illustrated in (20).

(20) a. *yàlyáá=kô*   'he ate a little'

  b. *yàlyáá=kô èbílì* 'he ate two of them [class 4]'

  c. *yànywáá=mû*   'he drank a little'

Finally, (21) shows that any of the four locative enclitics may be lexicalized in combination with specific verbs, as in the following examples taken from Snoxall [1967]:

(21) a. *òkûddá*   'to come back'

   òkúddà=wô   'to go back'

   òkúddà=kô   'to be born, come next in order'

   òkúddà=mû   'to answer'

   òkúddà=yô   'to go back there, return'

  b. *òkúggyá*   'to take' (cf. *òkwêggyá* 'to take oneself')

   òkwéggyá=wô 'to start' (take oneself away)

   òkwéggyá=mû 'to think of' (take within oneself)

  The forms in (17) can be shown to be enclitics by the criterion of vowel length preservation, as will be further examined in §3. To conclude this section, consider the examples in (22).

(22) a. *yátéésé kú=múpûngà mù=kì byá* 'he put some rice in the bowl'

  b. *yákítééséé=mû kù=mùpûngá* 'he put some rice in it'

  c. *yákítééséé=múù=kô*   'he put a little in it'

  d. *yákítééséé=múù=kóò=kí* 'what did he put a little of in?'

In (22a) we have a verb form followed by two full words, each beginning with a locative *proclitic*. As seen in (22b), the verb has underlying final length

preserved by the locative enclitic =*mû*.[19] We thus conclude that FVS has applied in (22a), where the verb is not followed by an enclitic. (22c) shows that when there are two enclitics in sequence, final length is preserved both on the verb and on the first enclitic. Finally, in (22d), where there are three enclitics in sequence, again final length is preserved on each element within the CG except the last.

As in the case of proclitics and nominal enclitics, one cannot predict which syntactic enclitics are also phonological enclitics. In (23a) final length is preserved on a verb before the phonological enclitics =*kô* and =*kî*:

(23) a. *yàlyáá=kô*   'he ate a little'

     yàlábwáá=kî   'what was he seen by?'

  b. *yàlyá kyô*   'he ate IT [class 7]'

     yàlábwá yê   'he was seen by HIM'

Example (23b), on the other hand, shows that emphatic pronouns are not phonological enclitics, since FVS has applied to the preceding verbs. This is striking for two reasons. First, emphatic pronouns, when postverbal, must immediately follow the verb, suggesting that they are syntactically "leaning" on the verb.[20]   Phonologically, however, they do not lean on the verb, but rather are full words in their own right. Second, emphatic pronouns share with all verbal enclitics the property of being monosyllabic. Any form that is plurisyllabic will automatically not be a verbal enclitic, as seen from the comparison of the WH-forms in (24).[21]

(24) a. *yàlyáá=kí*   'what did he eat?'
    b. *yàlyá kíkí*   'what (class 7 sg.) did he eat?'
    c. *yàlyá bíkí*   'what (class 8 pl.) did he eat?'

Example (24a) utilizes the WH-enclitic =*kí*, which is unmarked for number. On the other hand, the WH-words are marked by a singular class 7 prefix *ki-* in

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[19]The verb stem consists of the root -*teek*- 'put' followed by the "modified base" ending -*ie* [Ashton et al 1954]. In this case, there is consonant mutation (-*teesie*-) followed by gliding with compensatory lengthening (-*teesyee*-), *y*-aborption after [*s*] (-*teesee*-) and, in (22a), FVS. Note also that the class 17 proclitic *ku*= in (22a,b) has the same partitive meaning as its enclitic counterpart =*kô* in (20a).

[20]WH-enclitics also must immediately follow the verb. As a result, they may not cooccur with emphatic pronouns. Finally, Luganda does not permit more than one WH-enclitic or emphatic pronoun in sequence.

[21]Given the requirement of monosyllabicity, it seems unlikely that *àní* 'who(m)' would be an enclitic (cf. note 17). The plural form *bààní* clearly is not an enclitic, e.g. *yàlábwá báání* 'who (pl.) was he seen by?'.

(24b) and the corresponding plural class 8 prefix *bi-* in (24c). Because of their bisyllabicity, *kìkí* and *bìkí* cannot be verbal enclitics. Instead, they are full words, and FVS applies to the verb. This contrasts with bisyllabic personal possessives, which, as we saw in (14b), are nominal enclitics, not full words. As we shall now see, there are other differences between nominal vs. verbal CG's.

2. FVS in the Nominal Clitic Group (NCG)

In the preceding section we distinguished between nominal and verbal CG's and established that each admits a limited set of proclitic and enclitic elements. It has been assumed up to this point that there is a rule of FVS that applies at the end of a CG, as stated informally as follows:

$$ VV \rightarrow V \ / \ \underline{\qquad} \ ]_{CG} $$

In this section we shall see that while the above rule is a correct statement, as far as it goes, it does not by itself account for all of the complexities of FVS. As we shall now see, FVS sometimes applies *within* the CG. In order to give a complete account of FVS, it will be necessary, first, to consider NCG's separately from VCG's, as we do in this and the next section. Second, we must recognize that the application of FVS is affected by the specific *source* of the final vowel length. In particular, the following three sources of final vowel length must be distinguished: (a) monosyllabic vowel length; (b) contour tone vowel length; (c) underlying vowel length. We shall now consider each of these in turn.

2.1. Monosyllabic vowel length. As stated by Stevick [1969:5], "...so-called monosyllabic stems all have two moras". Similar observations had been made by Ashton et al [1954:401,423], Tucker [1962:157], and Cole [1967:61]. The motivation for requiring two moras for all monosyllabic stems comes from noun forms such as in (25).

(25) a. *ǹté*   'cow'   *ǹtéé=kí*   'which cow?'

  màtá   'milk'   *màtáá=kí*   'which milk?'

  kìdé   'bell'   *kìdéé=kí*   'which bell?'

 b. *ǹtéé=yàngé, ǹtéé=yò*   'my cow, your sg. cow', etc.

  màtáá=gàngé, màtáá=gò   'my milk, your sg. milk', etc.

  kìdéé=kyàngé, kìdéé=kyò   'my bell, your sg. bell', etc.

The nouns in (25) consist of a noun class prefix and a monosyllabic stem, i.e. *ǹ-té, mà-tá, kì-dé*. In (25a) we see that the stem vowel is long before the WH enclitic =*kí*, while in (25b) we see that the stem vowel is long before a personal possessive enclitic (here, 'my' and 'your sg.'). The interpretation of these facts is the following: all stems in Luganda must have at least two moras, perhaps the effect of an accent on the second stem mora (see Hyman [1989]). Either monosyllabic stems are represented underlyingly with two moras, i.e. */-tee, -taa, -dee/*, or there is a rule introducing the second mora. In either case, this "monosyllabic length" is preserved when the stem is followed by an enclitic, since this length is not CG-final.

2.2. Contour tone vowel length. The second source of final vowel length comes from the realization of contour tones [Ashton et al 1954:424,452; Tucker 1962:157; Cole 1967:67-68,88; Stevick 1969:6; Hyman 1982:13]. Ignoring an utterance-level downstepping phenomenon, Luganda has two surface tones, H(igh) and L(ow), which, conditions being met, can combine to form a HL falling contour tone. (Luganda does not allow LH rising tones.) Within a word this HL contour will always be realized on two separate moras. The two moras may either be two vowels, as in (26a), or one vowel + the first half of a geminate consonant, as in (26b).

(26) a. *mwáàná*   'child'

        kìjíìkó   'spoon'

    b. *mázzí*   'water'

        kíssí   'bait'

At the end of a word, the situation is considerably more complex. As seen in (27a), a final HL falling tone may be realized on a short vowel:

(27) a. *mùsòtâ*   'snake'

        kìsìkî   'log'

    b. *mùsòtáà=kí*   'which snake?'

        kìsìkíì=kí   'which log?'

As soon as the HL is found within a CG, however, the expected two moras surface, as seen in (27b).[22] In this case we do not want to say that this vowel length is underlying, since the second mora is predictable from the tone rules of Luganda. Following Hyman [1982], we propose to introduce this vowel length by rule. The only underlying tone in Luganda is H, and words may have one, more than one or no underlying H tone at all. Nouns such as in (27a) begin with a single underlying H tone on their final mora, as seen in the inputs in (28).

(28) a. *musota*   →   *musota*   →   *musotaa*
           H   HL   HL

   b. *kisiki*   →   *kisiki*   →   *kisikii*
           H   HL   HL

The drop to L is accomplished by a general rule of L tone insertion (see Hyman, Katamba and Walusimbi [1987]). Since in these forms there is no tone-bearing unit for the L to link to, a mora is inserted to accommodate it. The output forms in (28) thus serve as potential inputs to the FVS rule, hence the final short vowels observed in (27a). In (27b), however, the vowel length in the HL syllables is not affected by FVS, since these nouns are immediately followed by an enclitic.

A similar situation is observed when the same two nouns are followed by a possessive pronoun:

(29) a. *mùsòtáá=gwàngé*   'my snake'
      kìsìkíí=kyàngé   'my log'

   b. *òmùsótà=gwàngé*   'my snake'
      èkìsíkì=kyàngé   'my log'

As seen in (29a), the final vowel of these nouns is long before the possessive 'my'. Although the word-final HL is not actually realized in these examples, there can be no doubt that it is responsible for the length in (29a).[23] Now note the forms in (29b). When the augment (initial vowel) is present, the nouns *òmùsótà* 'snake' and *èkìsíkì* 'log' have a H-L pattern realized over their last two syllables. Since their tonal derivation does not involve a HL fall on their last syllable, there is no mora-insertion and, hence, they end short before an enclitic.

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[22]As pointed out in (3) above, an enclitic never introduces new length on a preceding vowel. Thus, *mùkázì* 'woman' is realized with a final short vowel in the CG *mùkázì=kí* 'which woman?'.

[23]The reason why the HL is not preserved has to do with the realization of tone within a tone group (see Hyman, Katamba and Walusimbi [1987] and §4.2).

Other tone patterns that end in a falling tone also show the length when internal to a CG:

(30) a. *mùsíkâ*   'heir'

      mùsíkáà=kí   'which heir?'

      mùsíkáá=wàngé   'my heir'

   b. *mùvúbúkâ*   'young adolescent'

      mùvúbúkáà=kí   'which adolescent?'

      mùvúbúkáá=wàngé   'my adolescent'

Since contour tone length is derived, the correct ordering statement will have to be with mora-insertion applying before FVS. In other words, forms such as *mùsòtâ* 'snake' start out with a final short vowel with underlying H, undergo L tone insertion, acquire length to accommodate the floating inserted L, and then lose this length by FVS whenever in CG-final position.[24]

2.3. Underlying vowel length. We now turn to nouns that end in a sequence of underlying vowels. We can infer an underlying vowel sequence most readily from the presence of a surface consonant + glide + vowel sequence, where the glide comes from an underlying high vowel. Examples are given in (31).

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[24]There is actually possible variation. Monosyllabic length is always preserved when followed by an enclitic. So is contour tone length always preserved *if* the contour actual surfaces. In both cases the length is both obligatory and markedly greater in duration than a corresponding short vowel. If the contour does not surface, some speakers require that the vowel be long, while others accept either a long or short vowel, e.g. either *kìsìkíí=kyàngé* or *kìsìkí=kyàngé* 'my log'. More perplexing than this are the following putative minimal pairs cited, respectively, by Cole [1967:7] and Tucker [1962:163]:

     mùwàláá=wàngé   'my girlfriend'   (*mùwàlá* 'girl, daughter')
     mùwàlá=wàngé   'my daughter'
     mùgòléé=wàffé   'our bride'   (*mùgòlê* 'bride, mistress of house')
     mùgòlé=wàffé   'our lady employer'

These data are puzzling for a number of reasons. First, there is no obvious basis for such a length distinction, since the same noun with the same underlying tone is involved in both forms in each pair. (The glosses of the nouns in isolation given to the right are taken from Snoxall [1967].) Second, both the second author and our principal language consultant (Mr. Semwogerere) accept only a *short* vowel in these phrases, whatever the meaning. Third, we have not been able to find anyone who accepts these distinctions. We cannot explain why only these two H-final nouns should be realized with a short vowel before a possessive pronoun. (Before the enclitic =*kí* a HL fall is realized over two moras, e.g. *mùwàláà=kí* 'which girl?, which daughter?'.) A possible solution would be to set up underlying *toneless* allomorphs of these two nouns used only with a possessive pronoun, which would assign a H to the preceding (short) vowel.

(31) a. *kíkòlwá*   'deed'

    mùgwáágwá   'fool'

    kìnyéèbwá   'groundnut'

   b. *kìwábyò*   'sickle'

    m̀mámbyà   'dawn'

    ǹgóbyá   'deceit'

The nouns in (31a) end in /CuV/, while those in (31b) end in /CiV/. As was seen above in (6a), the expectation is that the high vowel will glide to [*w*] and [*y*] with compensatory lengthening of the following vowel, e.g. /*kikolua*/ → *kikolwaa*, etc. The long vowel then is subject to FVS at the end of a CG, as in the isolated forms in (31).

    The forms in (32), however, show these nouns with a final *short* vowel even though they appear internal to a CG:

(32) a. *kíkòlwà=kí*   'which deed?'

    mùgwáágwá=kí   'which fool?'

    kìnyéébwà=kí   'which groundnut?'

   b. *kìwábyò=kí*   'which sickle?'

    m̀mámbyà=kí   'which dawn?'

    ǹgóbyá=kí   'which deceit?'

Final short vowels are also observed when the same nouns are followed by a possessive enclitic, as seen in (33).

(33) a. *kíkólwá=kyàngé*   'my deed'

    mùgwáágwà=wàngé   'my fool'

    kìnyéébwá=kyàngé   'my groundnut'

   b. *kìwábyò=kyàngé*   'my sickle'

    m̀mámbyà=yàngé   'my dawn'

    ǹgòbyá=wàngé   'my deceit'

This is a surprising result: the whole literature on Luganda has assumed a bimoraic source of CGV sequences, and yet, other than the surface glide, (non-

derived) nouns provide no phonological evidence of there ever having been a final vowel sequence, i.e. two moras. CG-internally, other nouns stems may have final CGVV length not because of the glide, but because of their monosyllabicity (34a), their HL contour tone (34b), or both (34c):

(34) a. *kìkwáá=kí*   'which bad luck?'   (*kì-kwá*)

     kìbyáá=kí   'which bowl?'   (*kì-byá*)

  b. *kìbògwéè=kí*   'which partly ripened fruit?' (*kì-bògwê*)

     kìfúlúkwáà=kí   'which deserted place?'   (*kì-fúlúkwâ*)

  c. *mùtwéè=kí*   'which head?'   (*mù-twê*)

     kàmyúù=kí   'which hare?'   (*kà-myû*)

There are two possible interpretations of the facts in (32) and (33). The first is that a final CwV or CyV syllable is underlyingly monomoraic in nouns (but not in verbs, as we shall see in §3). The second interpretation is that noun-final CwV and CyV syllables are underlyingly bimoraic but undergo FVS (unless the noun stem is monosyllabic and/or acquires a HL contour). We will now argue that the second interpretation is correct.

According to the first interpretation, nouns such as *kíkòlwá* and *kìwábyò* end in an underlyingly monomoraic syllable. One way to effect this is to assume that the glides are underlying—alternatively that they "float" without a V or moraic support. In either case the analysis runs counter to the general syllable structure of the language: the first suggestion sets up underlying CG sequences that do not otherwise exist; the second sets up totally predictable non-moraic vowels that otherwise do not exist.[25] A second argument against the monomoraic analysis is first suggested by the noun *kíkòlwá* 'deed'. This noun derives from the relative verb form *èkíkòlwà* 'that which is done', consisting of the morphemes *e-ki-kol-u-a* (augment-subject prefix-verb-passive suffix-final vowel). Since there are clearly two moraic morphemes in this form, the passive *-u-* and the final vowel *-a*, the motivation for a bimoraic source in the corresponding noun form is clear.

Still, one could argue that *kíkòlwà* 'deed' is simply listed as a noun (with a final monomoraic syllable) not derived from the corresponding verb form. Fortunately there are productive means of forming deverbal nouns to which we

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[25]It is appropriate to mention certain [*ggwa*] and [*ggya*] sequences which also do not show vowel length internal to a CG: *ỳgwáníká* 'store', *kùggyá=mû* 'to take out of', etc. In this case the underlying representation is not /*gua*/ and /*gia*/. Instead, these sequences derive from intermediate **wwa* and **yya*, which obligatorily undergo hardening, since geminate glides are disallowed in Luganda (cf. §6.2).

can add nominal enclitics to test for underlying final bimoricity. The first of these is the very relative construction that is responsible for *kíkòlwá*, exemplified in (35).

(35) a. *à-bá-á-làb-w-á*   'the ones that were seen'

  b. *à-bá-á-láb-w-áá=kí* 'the ones that were seen by what?'

  c. *bá-á-làb-w-à=kí*   'which ones that were seen?'

In (35a), the verb stem is */lab-u-a/*, consisting of the root *-lab-* 'see', the passive suffix *-u-,* and the final vowel *-a* (henceforth FV). In (35b) we see that when the verbal WH enclitic *=kí* 'what' is placed after this relative form, indicating the agent of the passive, the final compensatory lengthening acquired through gliding to [*w*] is preserved. On the other hand, in (35c), where we place the *nominal* WH enclitic *=kí* 'which' after the same form (though obligatorily without its initial augment vowel *à-*), we see that the length is not preserved. Since the same morphemes are involved, and since the productively created form in (35c) should not be listed as an independent noun in the lexicon, we must conclude that the final syllable of such deverbal nouns is bimoraic, but subject to some version of FVS.[26]

 The same is seen in infinitives, the second source of productive deverbal nominals:

(36) a. *kùlábwà*   'to be seen' */lab-u-a/*

  b. *kùlábwàà=kô*   'to be seen a little'

   kùlábwàà=kí   'to be seen by what?'

  c. *kùlábwà=kwàngé* 'my being seen'

   kùlábwà=kí   'which being seen?'

(36a) gives the basic infinitive form with the same passive stem as seen in (35). In (36b) the verbal enclitics *=kô* and *=kí* preserve the final length of the infinitive. In (36c), however, the nominal enclitics *=kwàngé* and *=kí* do not. So, again, we have evidence that nominals must undergo a special FVS rule that verbs

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[26]The same vowel length discrepancy between verbal vs. nominal uses of relative forms is seen with other enclitics. Thus, final length is preserved by the verbal enclitic *=kô* in *àbáálábwáá=kô* 'the ones who were seen a little'. On the other hand, final length is not preserved by the nominal enclitic *=bààngé* in *àbáálábwá=bààngé* 'my ones that were seen'. Although speakers find the latter construction a bit awkward (and occasionally show inconsistency in the tonal realization), they are in agreement that the final syllable [*bwa*] must be realized short.

are not subject to. By extension, non-derived nouns such as *òmúgwáágwá*, *èkìwábyò* may also be entered in the lexicon with underlying final bimoraic syllables.

There is one final argument in favor of having a rule of FVS apply within NCG's, but not within VCG's. This is that the form undergoing this special FVS rule need not be a lexical noun—it may, in fact, be a possessive enclitic:

(37) a. *kìkópò=kyéè=kí*   'which cup of his/hers?'

     b. *kìtàbó=kyè=kí*   'which book of his/hers?'

     c. *kìkópò=kyààbwè=kí*   'which cup of theirs?'

     d. *kìtàbó=kyààbwè=kí*   'which book of theirs?'

In (37a) the length on *=kyéè* 'his/her' is preserved because of its HL falling tone before the nominal enclitic *=kí* 'which'. In (37b), on the other hand, L tone *=kyè* surfaces with a short vowel, though it is followed by the same enclitic. The morphology of *=kyè* is clear: class 7 *ki-* followed by the GL *-aa-* (see note 9) and the third person singular pronominal element *-e*. There can be no doubt, then, that the underlying representation of *=kyè* is polymoraic. Since there is no HL falling tone on it, as there was in (37a), and since *=kye* does not count as a "stem" for the purpose of monosyllabic length, the nominal FVS rule applies to it. The same is seen in (37c, d), where the possessive enclitic 'their' ends in a CGV. Since the [*bwe*] syllable never acquires a HL falling tone, its underlying bimoraic structure /*bue*/ will always be subject to nominal FVS. Thus, the same FVS rule applying to deverbal nominals applies as well to pronominals. Before providing an analysis of these facts in §4, we shall observe in the next section that the situation is quite different in the case of verbs.

3. FVS in the Verbal Clitic Group (VCG)

In the preceding section we distinguished three sources of final length on Luganda forms: monosyllabic length, contour tone length, underlying length. It was seen that length due to stem monosyllabicity or a HL contour tone will always be preserved within a NCG, while underlying length (manifested as a surface CGV sequence) is not. In this section we shall consider the fate of these three vowel lengths within the verbal clitic group (VCG), which we now discuss in reverse order.

3.1. Underlying vowel length. We begin by considering verbs whose final CGV sequence suggests an underlying sequence of vowels. Three verbal suffixes frequently produce final underlying length. The first is the passive suffix *-u-* (with its *-ibu-/-ebu-* variants). As seen in (38),

(38) a. *kùlábà*   'to see'

     kùlábwà   'to be seen' (*-lab-u-a*)

     kùlábwàà=kô   'to be seen a little'

     kùlábwàà=kî   'to be seen by what?'

   b. *kùlyâ*   'to eat'

     kulîìbwà   'to be eaten' (*-li-ibu-a*)

     kùlîìbwáá=mû   'to be eaten from' (partitive)

     kùlîìbwáá=wá   'to be eaten where?'

the length obtained when a /C*ua*/ sequence becomes [C*waa*] is preserved when followed by an enclitic.

The second verbal suffix is causative/instrumental *-i-*. As seen in (39),

(39) a. *kùlímá*   'to cultivate'

     kùlímyá   'to make cultivate' (*-lim-i-a*)

     kùlímyáá=kô   'to make cultivate a little'

   b. *kùsíbá*   'to tie'

     kùsíbyá   'to tie with' (*-sib-i-a*)

     kùsíbyáá=kî   'to tie with what?'

the length obtained when a /C*ia*/ sequence becomes [C*yaa*] is also preserved when followed by an enclitic.

    Finally, the so-called "modified base" of Luganda, deriving from Proto-Bantu **jd-e*, provides the third verbal ending. In most cases the proto **d* is missing in Luganda, thereby producing a /C*ie*/ sequence. As seen in (40),

(40) a. *tèbálàbá*   'they don't see'

     tèbáálàbyé   'they didn't see' (*-lab-i-e*)

     tèbáálàbyèè=kô   'they didn't see a little'

b. *tèbátèmá*   'they don't chop'

tèbáátèmyé   'they didn't chop' (*-tem-i-e*)

tèbáátèmyèè̱=kí   'what didn't they chop?' (echo Q)

this usually results in a [Cyee] ending, whose length is preserved before an enclitic. In cases such as in (41), where the preceding consonant has undergone mutation to [s] or [z], however, there is no surface glide on the modified base:

(41) a. *tèbálèètá*   'they don't bring'

tèbáálèèsé   'they didn't bring' (*-leet-i-e*)

tèbáálèèsèè̱=kô   'they didn't bring any'

b. *tèbásàlá*   'they don't cut'

tèbáásàzé   'they didn't cut' (*-sal-i-e*)

tèbáásàzèè̱=kí   'what didn't they cut?' (echo Q)

Still, the expected length is preserved before an enclitic.[27]

In short, underlying final length will *always* be realized internally to a VCG. This contrasts sharply with the situation in NCG's. As we saw in §2.3, underlying length does *not* guarantee surface length on the final syllable of a nominal within a CG. Instead, within the NCG, only contour tone length and monosyllabic length guarantee surface length. As we shall now see, the VCG also diverges from the NCG in the manner in which it treats contour tone length.

3.2. Contour tone length. In (42) we present verbs in the negative of the present and near future tenses:

(42) a. *tèbábálâ*   'they don't count'

tèbábáláà=kô   'they don't do much counting'

b. *tèbáágúlê*   'they will not buy'

tèbáágúléè̱=kí   'what will they not buy?' (echo Q)

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[27]All verbs that end in [sV] or [zV] show length when a verbal enclitic follows. We assume with Herbert [1976] and Halle and Vergnaud [1980] that the "absorption" of the [y] glide into a preceding [s] or [z] is a late phenomenon (see Ashton et al [1954:153-154] for more on consonant mutation).

As seen, the verbs end in a HL falling tone which accounts for the length that is realized before the enclitics =*kô* and =*kî*. So far this result is identical to that seen in the NCG.

Where the result is different is seen in (43).

(43) a. *àbàlâ*   'he who counts'

  àbàlá=kô   'he who counts a bit'

 b. *ànáábálâ*   'he who will count'

  ànáábálá=kî   'he who will count what?' (echo Q)

In these present and near future relative forms, the verb has a final HL falling tone in isolation. When followed by an enclitic, however, neither the fall nor the length is realized. We saw earlier in (29a) and (30) that contour tone length surfaces within NCG's even when the HL falling tone itself does not. VCG's thus differ from NCG's in requiring a *surface* falling tone in order to get contour tone length.

The second forms in each pair in (43) lose the L part of the HL falling tone when followed by an enclitic. As a result, the FV of the verb is realized with a H tone. The tonal alternations seen in (43) are part of a more general process of L tone deletion that applies between H's within a "tone group" (TG), as described by Hyman, Katamba and Walusimbi [1987]. Other examples are given in (44).

(44) a. *bábàlá*[28]   'they count'

  bábálá=kô   'they count a bit'

 b. *bánààgúlá*[28]   'they will buy'

  bánáágúlá=kî   'what will they buy?'

The conditions that must be met in order for two forms to join as a single TG are quite complex. Suffice it to say here that an affirmative verb + verbal enclitic constitute such a TG. Since both =*kô* and =*kî* have a H tone, the L is deleted from the underlined vowels in the examples.[29]

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[28]The prepausal H tone on these forms is intonational in nature and, being introduced late in the derivation, is not present at the time L tone deletion applies. Hence, these single word forms are allowed to surface with L surrounded by H's.

[29]L tone deletion does not apply in (38) or in (40-42) since neither an infinitive nor a negative verb joins with the enclitic to form a TG (see Hyman, Katamba and Walusimbi [1987]).

Finally, the examples in (45) show that the FV of the verb remains long after L tone deletion applies within a TG, *if* the length derives not from a final contour, but from an underlying vowel sequence:

(45) a. *túlàbwá*   'we are seen'

      túlábwáá=kô   'we are seen a little'

    b. *túnáálábwà*   'we will be seen'

      túnáálábwáá=kí   'what will we be seen by?'

The underlying length of the verb stem /*lab-u-a*/ 'be seen' is lost at the end of a VCG. Despite the formation of a TG and the application of L tone deletion, this length is not shortened internally to the VCG. We conclude, then, that it is only contour tone length that shows this split behavior on verbs: contour length will surface if the HL contour also surfaces.

3.3. Monosyllabic vowel length.   Before presenting our analysis of the above facts in §4, we have yet to consider the third source of final length: that arising from the requirement that a monosyllabic stem have at least two moras. Since all verbs end in a FV formative *-a* or *-e*,[30] and since all verb roots have at least one underlying vowel, it follows that all verb stems, including monosyllabic ones, will consist of at least two moras, as seen in (46).

(46) a. *kùgwá*   'to fall'   (*-gu-a*)

      kùmwá   'to shave'   (*-mo-a*)

      kùlyâ   'to eat'   (*-li-a*)

      kùkyâ   'to dawn'   (*-ke-a*)

    b. *kùbâ*   'to be'   (*-ba-a*)

      kùtâ   'to let go'   (*-ta-a*)

      kùwâ   'to give'   (*-Ca-a*)[31]

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[30]Except for part of the conjugation of the verb *kùmányá* 'to know', e.g. *m̀mànyî* 'I know'.

[31]The [w] of 'give' derives from historical **p*, which still surfaces in forms such as *m̀pâddé* 'I have given'. In the text we simply indicate that the verb root has a /Ca/ structure. Note that the identity of the vowel of a CV verb root can be determined from different parts of the verb paradigm, e.g. the modified base, which provides not only *m̀pâddé*, but also *ǹgúddè* 'I have fallen', *ǹdîddé* 'I have eaten', and so forth.

   c. *kùfâ*   'to die'   (*fu-a*)[32]

       kùsâ   'to grind' (*se-a*)

In (46a) the vowel of the root glides to produce a CGV syllable. In (46b) we obtain a CV syllable since the root vowel is /a/, which deletes before another vowel (here also /a/). Finally, in (46c), where we expect the stems *fwa and *sya, we observe that [w] is elided after a labiodental and [y] is elided after a sibilant (cf. (41) above). In all cases, the length of a monosyllabic stem is preserved when followed by a verbal enclitic:

(47) a. *kùgwáá=kô*   'to fall on (top of)'

       kùlyáà=kí   'to eat what?'

   b. *kùbáà=kô*   'to be on'

       ˌ*kùwáà=kí*   'to give what?'

   c. *kùfáà=kô*   'to be concerned with' (idiomatic)

       kùsáá=kí   'to grind what?'

However, this length is not due to the monosyllabicity of these stems, but rather is underlying (and reinforced by a HL contour tone in some of the examples).

    We conclude that there is no example where length could be unambiguously attributed to the monosyllabicity of a verb stem. In order to further support this conclusion, we end with a discussion of the copula *-li* which, appearing in certain tenses only, has been said to be a defective verb. If *-li* is a verb stem, we would expect it to show monosyllabic length when followed by an enclitic. Concerning *-li*, Ashton et al [1954:423] state that "lengthening is irregular". We reproduce in (48) their table from the bottom of p. 423 with tone marks added and vowel length explicitly marked:

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[32]The verb root 'die' derives historically from *ky, where the "superclosed" *y causes labiodentalization of a preceding non-nasal consonant (cf. discussion in Katamba [1974]; Herbert [1975, 1976]). Nearly all instances of [f] and [v] have this source in Luganda and hence appear only before present-day /u/ (whose glided realization [w] may be elided). In cases where the labiodental alternates with another consonant, e.g. *kùyúlíká* 'to tear (intr.)' gives rise to the adjective *-yùlífù* 'torn', the underlying consonant can be determined. When root internal, as in *-fu-* 'die', however, one cannot establish the source of the [f] or [v] on purely synchronic grounds.

(48) <u>Present Tense</u>   <u>General Past Tense</u>

Affirmative	Negative	Affirmative	Negative
ǹdì=mû	*sílíì=mû*	*ǹnàlí=mû*	*sááIì=mû*
òlì=mû	*tólíì=mû*	*wàlí=mû*	*tèwàlíì=mû*
àlì=mû	*tálíì=mû*	*yàlí=mû*	*tèyàlíì=mû*
túlí=mû	*tètúlíì=mû*	*twáálí=mû*	*tètwálíì=mû*
múlí=mû	*tèmúlíì=mû*	*mwáálí=mû*	*tèmwááIì=mû*
bálí=mû	*tèbálíì=mû*	*bááli=mû*	*tèbáálì=mû*

'I, you sg., he/she, we, you pl., they {are in, aren't in, were in, weren't in}'

In this table the copular forms are given in the present and general past tenses, affirmative and negative. The rows correspond to the six personal pronouns appearing in subject position. A close examination of these forms reveals that length will surface if a HL contour tone is realized on the copula. As in the case of full verb forms (see §3.2), an affirmative copula joins with the following enclitic =*mû* to form a single TG within which L tone deletion applies. Thus, the only possibility for a HL contour tone on the copula is in (some of) the negative forms. We now see that length on -*li* is not irregular, but rather follows the pattern for (verbal) contour tone length in general. In conclusion, -*li* does not have monosyllabic length, presumably because it is not a verb stem.

4. An Analysis

The preceding two sections have produced the following facts concerning final vowel length in (49):

(49) a. A vowel will always be short at the end of a CG.

b. A PW-final[33] vowel will be long *within* a CG, if

i. the length-bearing PW is a proclitic,[34]

ii. within a NCG the length is due to stem-monosyllabicity or a HL contour tone,

iii. within a VCG the length is underlying or due to a HL contour tone that is realized on the surface.

In order to account for (49a), we have asserted all along that there is a rule of FVS that applies at the end of a CG. Such a rule cannot account for the facts of

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[33]Recall that PW-final means occurring at the end of a phonological word, where the PW may be a full (host) word, a clitic, or other so-called non-affixal "particle".

[34]We assume that the length on a GL, e.g. *byaa=*, and on the subject cleft marker, e.g. *byee=*, is due to the underlying vowel sequences in /*bi-aa*/ and /*bi-ee*/, not due to the monosyllabicity of these forms, which are not lexical stems.

(49b), however. In order to capture the intra-CG length facts, we can either introduce new rules of FVS or we can try to extend the rule of FVS that we already have to the CG-internal environments. Since an analysis with one FVS rule representing a single generalization is to be preferred a priori over an analysis with two or more separate FVS rules, our proposal will be that there is one rule applying not only at the end of a CG, but also at the end of a PW. It is the application of this one FVS rule at the PW level that produces the complex distribution of final lengths within the CG. As we shall see, the introduction of invisibility (extraprosodicity) at the end of a verbal PW produces all of the desired effects.

4.1. Underlying length in the NCG vs. VCG. There are two separate discrepancies in the treatment of FVS within a NCG vs. VCG. First, underlying long vowels are shortened finally on nominals, but not on verbs. Second, contour tone length is shortened on verbs when the HL contour does not surface but is retained on nominals (but see §4.2). We now treat each of these in turn.

The first question to resolve is why FVS applies to the underlying length of nouns, but not verbs. Consider the following examples:

(50) a. *kíkòlwá* 'deed' $[ki\text{-}kol\text{-}u\text{-}a]_N$

  kíkòlwà=kí 'which deed?'

 b. *kíkòlwá* 'it is done' $[ki\text{-}kol\text{-}u\text{-}a]_V$

  kíkòlwáá=kí 'what is it done by?'

In both (50a) and (50b), the form *kíkòlwá* consists of a class 7 prefix *ki-*, the verb *-kol-* 'do, work', the passive suffix *-u-*, and the FV *-a* (cf. discussion in §2.3). However, as seen, underlying length is not preserved before the nominal enclitic *=kí* 'which', but is preserved before the verbal enclitic *=kí* 'what'.

The most concrete solution is one that refers directly to the N vs. V distinction, as shown to the right in (50). In this approach, FVS shortens the underlying length of a PW only if it is marked [+N]. This immediately raises the question of why nouns and verbs should differ in just this way, rather than, say, the reverse, with FVS affecting only PW's that are [+V]. In addition, a major drawback of this morphological solution is that it does not lead one to expect that there will be other discrepancies between NCG's and VCG's, e.g. that concerning contour tone length. Since we believe that the two are connected (see below), a phonological solution that reveals this connection is to be preferred.

Since we opt for a phonological solution, our strategy must be to establish phonological representations for nouns and verbs from which the length

discrepancies follow. One possibility would be for verbs (but not nouns) to be assigned a phonological accent on their last mora, as in (51).

(51) a. *ki-kol-u-a*   'deed'   b. *ki-kol-u-á̆*   'it is done'

It would then be stipulated that this accent blocks the application of PW-level FVS on verbs. Note, however, that there is no phonological evidence for such an accent except the length facts we are attempting to account for. Such a verb-final accent is thus nothing more than an ad hoc diacritic. Furthermore, it is of no help in accounting for the differential behavior of nouns vs. verbs in the realization of final contour tone length within a CG.

The same problems are associated with a second attempt, which is to assume different internal structure in nouns vs. verbs. Specifically, we could say that the stem is bracketed off differently in nouns vs. verbs, as shown in (52).[35]

(52) a. [*ki-* [*kol-u-a*]]   'deed'

b. [*ki-* [[*kol-u*] - *a*]]   'it is done'

The intuition we are trying to capture is that the FV of verbs is separated by a stronger boundary from the rest of the word than it is in the case of nouns—even nouns whose FV is a derivational suffix, e.g. *mùlími* 'farmer', derived from the verb root -*lim*- 'cultivate' + the agentive FV -*i*). In (52a), PW-level FVS applies, since the affected input /ua/ precedes a right bracket (in fact two). In (52b), on the other hand, /u/ and /a/ are interrupted by a right bracket which, according to this analysis, *blocks* the PW-level application of FVS. While this accounts reasonably well for the data, the representations in (52) again are ad hoc, serving only the purpose of accounting for noun vs. verb realizations of underlying final length. Also, as in the preceding analyses, the device of bracketing does not straightforwardly account for noun vs. verb differences in the realization of contour tone length. By contrast, the analysis that we shall now present accounts for all noun/verb length discrepancies in a natural way.

We propose an analysis in terms of "invisibility", a term that Poser [1984] and Inkelas [1989] give to the various manifestations of extraprosodicity (extrametricality, extratonality, etc.). Specifically, the FV of verbs (but not nouns) is invisible, as shown by the parentheses in (53b):

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[35]Bantuists traditionally apply the term *stem* to the span that goes from the verb root to the end of the word. The part of the stem that precedes the final vowel is called the *base* (see, for instance, Meeussen [1967]). In (52) the claim is made that the base is phonologically relevant (exists?) only in verbs, not in nouns.

(53) a. *ki-kol-u-a*   'deed'

     b. *ki-kol-u (-a)*   'it is done'

PW-level FVS will apply in (53a), since final length is always visible in nouns. In (53b), on the other hand, PW-level FVS will not apply, since the last visible vowel is /u/, which is short. This solution utilizes a device frequently needed in prosodic analysis. That invisibility should be restricted to a specific morphological class (verbs) should not be surprising, since the most famous application of invisibility (English stress), must also recognize a noun/verb dichotomy [Hayes 1982]. The present application is well-formed, given that it obeys Hayes' peripherality condition. Since the verb form in (53b) is realized with a final short vowel when not followed by an enclitic, we assume that invisibility is removed at the CG level, where we know FVS applies without regard to grammatical category (cf. (49a)).[36]

4.2. Contour tone length in the NCG vs. VCG. There are many more issues that arise in connection with the above proposal, e.g. how does invisibility of the FV of verbs affect the rest of the phonology? Rather than going into that issue now, we first show that unlike other solutions, invisibility readily accounts for the differential effects of FVS not only on underlying length, but also on contour tone length.

From data such as in (54a), it will be recalled that contour tone length is always realized within a NCG, whether or not the HL contour is itself realized on the surface:

(54) a. *kìsìkî*   'log'

       lìsìkîî=kí   'which log?'

       kìsìkíí=kyàngé   'my log'

     b. *tágúlâ*   'he doesn't buy'

       tágúláà=kô   'he doesn't buy any'

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[36]According to Inkelas' [1989] interpretation of invisibility, the final vowel of a Luganda verb is invisible because it is not part of the PW at all, as in the following prosodic bracketings:

     (i)   [[*ki-kolu-a*]$_{PW}$]$_{CG}$ 'deed'

     (ii)   [[*ki-kolu*]$_{PW}$ *-a*]$_{CG}$ 'it is done'

As can be seen, FVS would apply to the noun form at the PW level, but not to the verb form, where the final vowel -a lies outside the PW. If no enclitic is added, the verb form will undergo FVS at the CG level. Note that the above representations give a principled basis to the bracketing analysis we just rejected.

   c. àgùlâ   'he who buys'

     àgùlá=kô   'he who buys a bit'

In (54b) we see that contour tone length is preserved within a VCG when the HL contour itself also surfaces. In (54c), however, where the HL is not realized, we obtain a surface short vowel on the verb.

    The first question is why the PW-level FVS rule fails to shorten contour tone length on nouns. Recall from (29) that contour tone length results from the interaction of two rules: (1) L tone insertion (applying whenever the last H of a word is not followed by a L) and (2) mora insertion (applying whenever there is no mora for the inserted L to link to, i.e. whenever the H is on the last mora of the word). In order to preserve contour tone length within a NCG, the natural move to make is to order L tone insertion and mora insertion to follow the PW-level application of FVS, as in (55).

(55) a. [[*kisiki*]$_{PW}$ [*ki*]$_{PW}$]$_{CG}$ PW-LEVEL RULES:
         H   H

   . . . .   FVS (inapplicable)

   b. [*kisiki*]   [*ki*]   L-tone insertion
         HL   HL

   c. [*kisikii*]   [*kii*]   Mora insertion
         HL   HL

The output of (55) is then subjected to the CG-level application of FVS and the vowel of the enclitic =*kî* is shortened.[37]

    Although it works for a VCG such as in (54b), where both the HL contour and the length are preserved, we do not think that the same derivation applies to verbs. In order to see why, consider the following representation of the VCG in (54c):

(56) a. [[*a-gul* (-*a*)]$_{PW}$ [*ko*]$_{PW}$]$_{CG}$ PW-LEVEL RULES:
         H   H

   . . . .   FVS (inapplicable)

   b. [*a-gul* (-*a*)]   [*ko*]   L-tone insertion
         HL   HL

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[37]Its HL tone is also modified to H as in WH-intonation [Stevick 1969:27].

c. [*a-gul* (-a)]   [*koo*]   Mora insertion
     HL   HL

d. [*a-gul-a*   *koo*]   CG-LEVEL RULES:
     HL   HL

e. [*a-gul-a*   *ko*]   FVS
     HL   HL

f. [*à-gùl-á*   *kô*]   L-tone deletion
     H   HL

In (56a), the FV of the verb is marked invisible. In (56b), L-tone insertion applies twice, since its only requirement is that the last tone of the PW be H. For L-tone insertion to apply to the verbal PW, we assume that the tone is visible, while the mora/V-slot is not. Because invisibility prevents it from seeing that this H is linked to a final mora, mora insertion cannot apply to the verb, although it does apply to the enclitic in (56c). In (56d) we see the invisibility has been removed, since it now occurs nonperipherally within the CG. CG-level FVS applies to the enclitic in (56e) and, finally, in (56f), a rule of L-tone deletion removes the floating L that appears between two H's within a TG (see Hyman, Katamba and Walusimbi [1987]).

Now, returning to the VCG in (54b), the derivation proceeds as in (57):

(57) a. [[*t-a-gul* (-a)]_{PW} [*ko*]_{PW}]_{CG}   PW-LEVEL RULES:
        H   H
    . . . .   FVS (inapplicable)

b. [*t-a-gul* (-a)]   [*ko*]   L-tone insertion
       HL   HL

c. [*t-a-gul* (-a)]   [*koo*]   Mora insertion
       HL   HL

d. [*t-a-gul-a*   *koo*]   CG-LEVEL RULES:
       HL   HL

e. [*t-a-gul-a*   *ko*]   FVS
       HL   HL

f. [*t-á-gúl-áà*   *kô*]   Mora insertion
       HL   HL

In (57a) the FV of the verb is marked invisible. In (57b) L-tone insertion applies to both PW's, and in (57c) mora insertion applies to the enclitic =*koo*, but not to the verb. This yields the CG-level representation in (57d), where invisibility has been removed. CG-level FVS applies to shorten the long vowel of the enclitic in (57e). Note that L-tone deletion cannot apply to (57e) because a negative verb does not form a TG with what follows it (Hyman, Katamba and Walusimbi [1987]). Instead, mora insertion applies internally to the CG, yielding a long vowel with a HL contour in (57f). With this derivation we see that invisibility accounts for all of the noun/verb differences in the realization of final length.

4.3. Monosyllabic length. So far we have accounted for the realization of underlying length and contour tone length. We still need to explain why PW-level FVS does not apply to monosyllabic noun stems.[38] Since the FV of nouns is not invisible, a representation such as /kì-déé/ 'bell' would automatically become [kì-dé], and we would obtain CG realizations such as *kìdé=kí 'which bell?'. However, the correct realization is kìdéé=kí, so we must find a way to exempt monosyllabic stems from FVS at the PW level.

There are two logical possibilities. The first is to assume a rule ordering solution as was proposed for contour tone length: PW-level FVS does not apply to monosyllabic noun stems, because they have a *short* vowel at the point where the rule applies. This analysis necessarily commits us to the view that the vowel of monosyllabic noun stems is underlyingly short, e.g. /-de/ 'bell'. That this cannot account for all of the data is seen from morphologically complex monosyllabic nouns stems, such as in (58).

(58) a. *mùmwí*   'barber'   (cf. *kùmwá* 'to shave')

       mùsí   'miller'   (cf. *kùsá* 'to grind')

   b. *mùmwíí=kí*   'which barber?'

       mùsíí=kí   'which miller?'

The deverbal noun stems in (58a) have the underlying structures /mo-i/ and /se-i/, where -*i* is an agentive FV morpheme.[39] As seen in (58b), the length of these

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[38]Recall from §3.3 that the issue of monosyllabicity does not arise in verbs, since all monosyllabic verb stems have the structure CV + FV and hence *underlying* length, which will always be preserved within a CG.

[39]Recall from (6) and §3.1 that high vowels glide before another vowel and produce compensatory lengthening. Within a stem, however, /e/ and /o/ also glide, as seen in the verb stems -*mwa* 'shave' and -*sa* 'grind'. As also was exemplified in §3.1, the expected [y] glide in the latter form is elided because of the preceding sibilant.

monosyllables is preserved before the nominal enclitic =*kî*. These stems clearly have a bimoraic underlying structure of two different vowels in sequence. If FVS first applies, it will therefore delete the second mora, leaving the vowel [*i*] floating. Since a long vowel is required on the surface, the second mora will have to be put back by an insertion rule that undoes the first rule.

   Given the roundabout complexity of the rule ordering account (cf. also note 41), an alternative is to adopt the suggestion of Hyman [1989] that there is an accent on the second mora (M2) of every stem which exempts it from shortening at the PW-level:[40]

(59) a. [*mu-* [*mo-ĭ*]]

   b. [*mu-* [*se-ĭ*]]

   c. [*ki-* [*de-ĕ*]][41]

Since Hyman presents five separate arguments for this M2 accent, we need not worry that the asterisk is an unmotivated diacritic. Assuming this second stem-mora accent, our analysis can account for all of the final length data presented thus far.[42] The question which we shall raise in the next section is whether it can be extended to account for the rest of the language.

5. FVS in Other Constructions

   In the preceding sections we have presented and analyzed the facts of FVS within NCG's and VCG's. In this section we test our results against other parts of the grammar of Luganda where there are complexities in the realization of final

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[40]This exemption would be visible only to PW-level FVS, since all long vowels are shortened by CG-level FVS.

[41]In this analysis also, 'bell' and other such non-derived stems could technically be set up with either one or two underlying moras. One could argue for the one mora solution on the basis that the second stem mora is redundant and should thus not appear in lexical entries. However, this solution necessitates a separate rule of mora insertion for monosyllabic stems that is not needed in the two mora analysis. Note that there are other possible interpretations, given the parameters we have introduced. One could assume, for example, the bimoraic representations /-mo-i/ 'shaver' and /-dee/ 'bell', which first undergo PW-level FVS (which deletes the moraic support, but not the vowel phoneme) and then are subject to the additional mora insertion rule affecting monosyllabic stems. For reasons of simplicity, we choose the solution presented in the text.

[42]We would like to point out also that proclitics such as the GL do not undergo PW-level FVS because (for the purposes of FVS) proclitics are not PW's. This is motivated by the facts of TG formation. While TG's are formed on a word by word basis in Luganda (see Hyman [1988]), the one exception is that any number of proclitics join the host to constitute a single word for this purpose. The situation is actually more complex than this. Since the tone rules themselves require that proclitics be treated differently from prefixes, we apparently need to specify them as distinct both from PW's and from affixes.

length. As we shall see, there is considerable generality to the conclusions we have reached thus far. We begin with adjectives and then treat compounds and reduplications.

5.1. Adjectives.   In §2 we found that nouns and pronouns follow the same pattern with respect to FVS. In §3 we saw that verbs follow another pattern. We have not yet examined other parts of speech in Luganda. One reason is that some of these are never followed by an enclitic. Thus, we cannot know for sure if the underlying length of demonstratives such as in (60a) or the contour tone length of those in (60b) would be preserved before an enclitic:

(60) a. *kìkópò èkyó*   'that cup' (near hearer) */e-ki-o/*

      lùggí òlwó   'that door'   */o-lu-o/*

      báàná àbó   'those children'   */a-ba-o/*

   b. *kìkópò kìlî*   'that cup' (yonder)   */ki-li/*

      lùggí lúlî   'that door'   */lu-li/*

      báánà bàlî   'those children'   */ba-li/*

   c. *kìkópò kìnó*   'this cup'   */ki-no/*

      lùggí lùnó   'this door'   */lu-no/*

      báàná bànó   'these children'   */ba-no/*

It also is not possible to tell whether any of the demonstrative stems, e.g. */-no/* in (60c), would show monosyllabic length, since, as we have just said, demonstratives occur finally within their CG.[43]

    We can test adjectives (and to some extent numerals) for their final length properties. As has often been noted in many Bantu languages, adjectives show most or all of the morphological properties of nouns, e.g. the same ("primary") noun class prefixes. While adjectives are scarce in some Bantu languages, they are quite plentiful in Luganda, many of the adjective stems being derived from a corresponding verb root plus a FV *-u* or *-e*:

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[43]On the other hand, it is possible to find proclitics preceding almost any part of speech, e.g. *kìkópó kyáá=bànó* 'cup of these (e.g. children)', *byèè=bìnó* 'it's these', etc. These cases are of limited interest, however, since it is the length of the proclitic that occurs internally to the CG (as expected), not that on the demonstrative.

(60)	d.	*-kál-ù*	'dry'	cf.	*kù-kál-à*	'to become dry'
		-zíb-ú	'difficult'		*kù-zíb-á*	'to obstruct'
		-vúnd-ú	'rotten'		*kù-vúnd-á*	'to rot'
	e.	*-sìb-ê*	'tied up'		*kù-síb-á*	'to tie up'
		-fúmb-è	'cooked'		*kù-fúmb-á*	'to cook'
		lônd-é	'elected'		*kù-lônd-á*	'to elect'

In the following two subsections we shall examine the final length properties of adjectives first in the NCG, then in the VCG.

5.1.1. FVS on adjectives in the NCG. In (61) we provide three adjectives followed by the nominal enclitic *=kí* 'which':

(61) a. *kìkópò kìsáá=kí*　　　　'which empty cup?'

　　 b. *kìkópò kìgùmúù=kí*　　　'which durable cup?'

　　 c. *mùkázì mwààgálwà=kí*　'which beloved woman?'

In (61a) the adjective stem *-sá* 'empty' shows monosyllabic length before *=kí* In (61b), *-gùmû* 'durable' shows length on the surface HL contour tone. Finally, in (61c), the adjective *-àgálwà* fails to realize its underlying length. This is particularly noteworthy, since this adjective is derived from the passive verb stem *-agal-u-a* 'to be loved', which provides two underlying moras: the passive suffix *-u-* and the FV *-a*. Despite this, FVS applies at the PW-level and we obtain the short FV on the adjective in (61c).[44]

　　The same length phenomena are observed in (62), where each of the three adjectives is directly followed by a possessive enclitic:[45]

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[44]Similar examples showing shortening of underlying length include:

　　(i) *mùkázì mwéésìgwá=kí*　'which trustworthy woman?'

　　(ii) *màtá mábúgùmyè=kí*　'which warm milk?'

In (i) the source verb consists of the reflexive *-ee-* prefix plus a verb stem *-sig-u-a*, meaning 'to be trustworthy', where *-u-* again is the passive suffix (cf. *-éé-sìg-á* 'to trust', without the passive suffix). In (ii) the source verb is *-búgùm-í-á* 'to cause to be warm', where *-i-* is the causative suffix (cf. *-búgùm-á* 'to be warm'). See also the infinitive forms in (67).

[45]The reason for not including the head noun in these examples is that the enclitic would have to immediately follow it: *kìkópò=kyàngè kìsá* 'my empty cup'. The reverse order, **kìkópò kìsá kyàngé*, is ungrammatical. Instead, an augment vowel would be required, in which case it would no longer be an enclitic (*kìkópò kìsá ékyàngé* 'my empty cup which...'). As seen from the gloss, the phrase needs to be completed, e.g. by a relative clause.

(62) a. *kìsáá=kyàngé*   'my empty one'

    b. *kìgùmúú=kyàngé*   'my durable one'

    c. *mwààgálwà=wàngé*   'my beloved'

Monosyllabic length is preserved in (62a); contour tone length is preserved in (62b), even though the HL contour is not; and in (62c), we again see that underlying length is not preserved on an adjective within a NCG.

    The facts in (61) and (62) mirror exactly those seen for nouns in §2. The analysis provided in §4 for NCG's thus holds also when the host is an adjective.

5.1.2. FVS on adjectives in the VCG. Although adjectives are morphologically nouns (and thus share a [+N] feature), unlike nouns, they potentially can host verbal enclitics, specifically the locative enclitics *=kô* and *=mû*.[46] We saw in §1.2 that these enclitics can have an attenuative effect on the action of a verb, e.g. 'to buy a little, to see a bit' etc. As seen now in (63), *=kô* and *=mû* have the same attenuative effect on adjectives:

(63) a. *kyéélú=kô*   'rather white'   (*-éélú*   'white')

      kìtélévú=kô   'rather straight'   (*-télèvú*   'straight')

      kìtálávvú=kô   'rather rusty'   (*-tálàvvú* 'rusty')

    b. *kìzító=mû*   'rather heavy'   (*-zító*   'heavy')

      kìyónjó=mû   'rather clean'   (*-yónjò*   'clean')

      kìwánvú=mû   'rather high'   (*-wánvù*   'high')

The adjectives in (63) are given with a class 7 *ki-* prefix. Some adjectives can only take one or the other enclitic, while others can take either one. For the purpose of determining the effects these enclitics have on the final length of adjectives, we cite adjectives with *=mû*.

    The example in (64a) shows that monosyllabic length is preserved on adjectives not only before a nominal enclitic, but also before a verbal enclitic:

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[46]Speakers generally accept *=kô* or *=mû* on some but not all adjectives. All of our consultants, however, were able to provide judgments on how a long list of adjectives would be pronounced if followed by one of these enclitics. Perhaps some of the variation we obtained is due to the fact that many such combinations are rare, if not questionable. Another factor, we believe, has to do with whether speakers view these adjectives as nouns or verbs when followed by *=kô* or *=mû*, a decision that will affect whether the FV is invisible, as we have seen.

(64) a. *kìsáá=mû*   'rather empty'[47]   (*-sá* 'empty')

 b. *kìbíí=mû*   'rather bad'   (*-bî* 'bad')
    kìbîi=mû

 c. *kìtóò=mû*   'rather young'   (*-tô* 'young')
    kìtóó=mû

As seen in (64b,c), the length of monosyllabic adjective stems having a HL contour is also preserved before =*mû*, whether or not the HL itself surfaces.[48] This too is consistent with the nominal facts. However, consider now the realization of final length on the adjectives in (65).

(65) a. *kìgàzîi=mû*   'rather wide'   (*-gàzî* 'wide')
    kìgàzíí=mû
    kìgàzî=mû

 b. *kìgìmúù=mû*   'rather fertile'   (*-gìmû* 'fertile')
    kìgìmúú=mû
    kìgìmú=mû

 c. *kìlàmúù=mû*   'rather healthy'   (*-làmû* 'healthy')
    kìlàmúú=mû
    kìlàmú=mû

As seen, when a HL contour falls on the last syllable of a bisyllabic adjective stem, there are three possible realizations: long vowel with HL contour (if CG is treated as two TG's), long vowel with H tone or short vowel with H tone (the latter two realizations both treating the CG as one TG).[49]   The first two

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[47]Although this phrase is phonologically well-formed, it is semantically odd in Luganda, since something is either empty or it is not. Unfortunately, all of the other monosyllabic adjective stems have an underlying H tone which develops a HL tone, as seen in (64b,c). In these latter examples final length can be attributed either to the monosyllabicity of the adjective stem or to its HL contour tone.

[48]Whether an adjective + *kô/mû* will be a single TG (with L tone deletion) depends on a number of factors. In (63) it can be seen that a single TG is formed whenever the adjective has an *internal* H to L pitch drop in isolation. Whenever there is a HL contour on the last syllable of the adjective, however, speakers treat these forms in a number of ways, as indicated in the examples cited in this section.

[49]The fourth possibility, where there is a final short vowel, but two TG's, e.g. **kìgàzí=*[!] *mû* ([!] = tonal downstep caused by unlinked L tone) has not been attested. Note in the following examples

realizations are not surprising. The third, however, seems to require that these adjectives be treated with their FV invisible, as was proposed for verbs in §4.

Now compare the realization of underlying length on the adjectives in (66).

(66) a. *kìkámbwé=mû*   'rather fierce'   (*-kámbwé*   'fierce')

     b. *kìbúgúmyéé=mû*   'rather warm'   (*-búgùmyé*   'warm')

        kyààgálwáá=mû   'rather loved'   (*-àgálwà*   'loved')

        kyéésígwáá=mû   'rather faithful'   (*-ésìgwá*   'faithful')

The adjective *-kámbwé* 'fierce' is produced without variation with a final short vowel, as in (66a). The remaining adjectives in (66b) must be realized with length before *=mû*. The difference between these is that *-kámbwé* is not a deverbal adjective, whereas the others are, as seen in the corresponding infinitive forms in (67).

(67) a. *kùbúgùmá*   'to be warm'

      kùbúgùmyá   'to warm'   /-bugum-i-a/

     b. *kwààgálá*   'to like, love'

        kwààgálwá   'to be liked, loved'   /-agal-u-a/

     c. *kwéésìgá*   'to trust'

        kwéésìgwá   'to be trusted'   /-ee-sig-u-a/

From these forms it can be seen also that the underlying length of the deverbal adjectives derives from the *-i-* causative or the *-u-* passive followed by the FV *-a*. It thus appears that this FV too must be marked invisible in the derived adjectives as in the corresponding verbs. We must assume that the FV of *-kámbwé is*

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that when the final HL is preceded by a H tone, the adjective + enclitic must be treated as two TG's:

(i) *kìfúndáà=mû*   'rather narrow'   (*-fúndâ* 'narrow')
     **kìfúndáá=mû*
     **kìfúndá=mû*

(ii) *kìsílísèè=mû*   'rather quiet'   (*-sílìsê* 'quiet')
     **kìsílìséé=mû*
     **kìsílìsé=mû*

One speaker did provide the alternate form *kìfúndá=!mû*, i.e. two TG's, with FVS applying to the adjective. Since she did not give the same pronunciation for other adjectives with comparable tone patterns, it is hard to know how to interpret this form.

visible (and hence subject to PW-level FVS), because it does not have a verbal source.[50]

To summarize our findings, adjectives exhibit the same length properties as nouns when they appear in a NCG. In a VCG, on the other hand, there is some variation. We have suggested (cf. note 46) that some of this is due to the marked nature of the construction (adjective=*mû*, adjective=*kô*). This and the whole question of how adjectives should be analyzed in general result in speakers in some cases not being sure whether to apply the nominal pattern or the verbal pattern to FVS. This is clearest in the data in (65), where the second line of each triplet is the NCG realization and the third line is the VCG realization. Of course, the first realization with a long HL contour tone on the surface, is consistent with FVS in both types of CG's. As we shall see in the next section, there is less variation in the realization of final vowel length on compounds.

5.2. Compounds. In this section we shall investigate the length properties of compounds. By compound we shall mean any syntactically complex nominal that can stand for a noun. Frequently this means a N+N compound, but, in fact, as seen in the examples in (68),

(68) a. *mùgénzí - tázzê*   'delinquent debtor' (lit. traveler hasn't returned)

b. *mwáámì - àkóóyè*   'easy chair' (lit. chief has tired)

c. *kyáálà - kímpáddè*   'thief' (lit. fingernail has given me)

the source of the complex nominal ("compound") may be a complete sentence, as seen also in the proper names in (69) from proverbs:

(69) a. *ǹsí - yàléètá*   (lit. country brought)

b. *túlíná - ómùbéèzí*   (lit. we have a helper)

c. *sílìvá - kùnó*   (lit. I will not leave here)

In cases such as (68) and (69), where the nominals have an overt sentential structure, the realization of final length internal to the compound will be exactly as it would have been in the corresponding sentence. The noun *ǹsî* 'country' in (69a) has two reasons for being long: its stem is monosyllabic, and it has a HL contour tone. As seen, however, it is realized short, because it is not followed by

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[50]Although we have not found speakers who realized the CG's in (66b) with a final short vowel on the adjective, the following tonal variants have been noted:

(i)   *kyààgálwàà=mû*   'rather loved'
(ii)   *kyéésìgwàà=mû*   'rather faithful'

Here the single CG is treated as two TG's, each with its own H to L pitch drop.

an enclitic within the compound. Similarly, in (69c), the verb stem is /vu-a/ 'leave', whose underlying (and monosyllabic) length fails to surface because it is followed by a full word, not an enclitic.

This result can be contrasted with the preservation of pre-enclitic length in the following compounds:

(70) a. *ǹdábílwáá=mû*   'mirror' (lit. I am seen in it)

     b. *wáálábyèè=kí*   (proper name—lit. what have you seen yet)

     c. *lwé - ńbáá=wô*   (proper name—lit. [day] when I am there)

In (70a,b) underlying length is preserved on the verb; in (70c), the verb stem is /ba-a/ 'be', which has both underlying and monosyllabic length. Finally, (71a,b) show the corresponding preservation of length on a proclitic:

(71) a. *kyàà=kùlábìlá=kô*   'example' (lit. that to see from)

     b. *zàà=bàsâjjá*   (proper name—lit. those of the men)[51]

     c. *gwè - bátákígámbyê*   (proper name—one that they haven't said it to)

In (71c), however, the underlying length on /gu-e/ is not preserved, since, as we saw in §1.1, non-subject cleft and relative markers are not phonological proclitics (cf. (12) above).[52]

As seen now in (72),

(72) a. *mùlwá - kújjúlá*   'woman slow to serve food'
       delayer   to serve food

     b. *kàtwé - kàsá*   'stupid person'
       small head empty

     c. *ǹkyá - mùzí*   'type of bark-cloth tree'
       morning small root

the first of two nominals (noun, adjective, infinitive) ends short, despite the monosyllabicity and underlying length and, in (72b,c), the HL contour of the

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[51]We know from the tone that the noun *bàsâjjá* 'men' is appearing here without the augment vowel a- (cf. *èzáá=ábàsâjjá*, with both parts augmented).

[52]We do have one example in our corpus of over 400 compounds that shows length variation on a relative clause marker: *kyè(è) - wàlyângá* (proper name—lit. that which you used to eat). Interestingly, the length is possible only in the proper name usage of this form and does not appear in the proverb from which the name is taken (or, of course, in literal speech where it is not a name).

noun in isolation (*kàtwê* 'small head', *ǹkyâ* 'morning'). All of the above cited compounds must, of course, be listed in the lexicon. In the noun + noun compounds which we have productively created in (73),

(73) a. *mùlyá - màtóóké*   'plantain-eater'
        eater   plantains

    b. *mùnywá - mwèngé*   'beer-drinker'
        drinker   beer

    c. *mùmwá - mítwê*   'head-shaver'
        shaver   heads

the first noun again shows a final short vowel. Since monosyllabic stems are exempt from PW-level FVS, as we saw in §4.3, it would not work to say that the forms in (72) and (73) have two PW's forming a single CG. We therefore conclude that such compounds consist of *two* CG's, with CG-level FVS removing the final length of the first nominal in all cases.[53]

Having established that internal final length in compounds behaves as one would expect from the analysis in §4, we now consider the realization of final length on the *second* part of the compound, when followed by an enclitic. Because all compounds are nominal, i.e. there are no compound verbs, we are limited to examining enclitics within the NCG.

We begin by considering compounds where the second member ends in a HL falling tone that is realized before the enclitic =*kí* 'which':

(74) a. *mùgénzî - tázzéè=kí*   'which delinquent debtor?'
        traveller   hasn't returned

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[53]We have, however, found the following exceptions which, we assume, must be listed as such (and curiously both involve the same first member):

(i) *kìnywáá - bwîno*   'blotting paper' (lit. drinker + ink)
(ii) *kìnywáá - mù=nté*   'tick bird' (lit. drinker from cattle)

In addition, there is the form *kàtwéé-wùngú* 'madness, folly', which consists of *kàtwê* 'small head' + a non-independently occurring base whose derivative is seen in the verb *kùwúngútúká* 'to be null and void, mentally deficient'. Perhaps there has been a reanalysis of this compound into a single CG, given that -*wungu* does not exist on its own. Finally, there is the interesting case of the *mùlyáá - záá*=*máànyí* 'swindler, a cheat' (lit. eater those-of strength). Here it is the length on *mùlyáá-* that is surprising. Note that the FV of the word *máànyí* 'strength' is homophonous with the -*i* deverbal agentive morpheme (e.g. -*lim*- 'cultivate', *mùlímí* 'farmer'). As a result, Luganda speakers back-formed a verb *kùlyáàzáámáányá* 'to swindle' whose tones unambiguously indicate that it is a single PW. Perhaps it is this interplay that leads to the unexpected length on [*lyaa*] on the noun form.

    b. *kàmàlá - byònnáà=kí*   'which Prime Minister?'
       finisher everything   (e.g. where the buck stops)

    c. *ǹnámpá - wè - ǹgwáà=kí*   'which neutral person?'
       Mr. nowhere that I fall   (i.e. a fence-sitter)

However, if the falling tone does not surface, e.g. preceding a possessive enclitic, speakers vary and tend to accept both realizations of the final vowel on the compound:

(75) a. *mùgénzí - tázzé(é)=wàngé*   'my delinquent debtor'

    b. *kàmàlá - byònná(á)=wàngé*   'my Prime Minister'

    c. *ǹnámpá - wè - ǹgwá(á)=wàngé*   'my neutral person'

The same facts are observed when the compounds are productively formed, as in (76).

(76) a. *mùtémá - bísíkî*   'log-chopper'   (lit. chopper + logs)

    b. *mùtémá- bísíkîì=kí*   'which log-chopper?'

    c. *mùtémá- bísíkí(î)=wàngé*   'my log-chopper'

We already pointed out that there is variation of just this sort on non-compounds (see note 24). So again, there is no surprise.
    The major surprise comes from the realization of monosyllabic length not supported by a (surfacing or non-surfacing) falling tone. As seen in (77),

(77) a. *kìnywáá-mù=nté*   'tick bird'
                         (lit. drinker from cattle—cf. fn. 53)

      kìnywáá-mù=nté(é)=kí   'which tick bird?'

      kìnywáá-mù=nté(é)=kyàngé 'my tick bird'

    b. *ǹkyá-mùzí*   'type of bark-cloth tree'

      ǹkyá-mùzí(î)=kí   'which bark-cloth tree?'

      ǹkyá-mùzí(î)=yàngé   'my bark-cloth tree'

c. *mùtúndá-bídé* 'bell-seller' (lit. seller + bells)

   mùtúndá-bídé(é)=kî 'which bell-seller?'[54]

   mùtúndá-bídé(é)=wàngé 'my bell-seller'

the stems *-té* 'cow', *-zí* 'small root', and *-dé* 'bell' appear either long or short as second part of a compound followed by a nominal enclitic. As will be recalled from §2.1, such monosyllabic noun stems must appear long before these enclitics when not in a compound. It thus appears that the monosyllabicity of a noun stem in second position in a compound is not always "accessible", as far as length goes. The facts are the same whether the compounds are lexicalized, as in (77a,b), or whether they are newly created, as in (77c). However, we have found that compounds that are names almost never realize length on a final monosyllabic syllable, as seen in (78a,b):

(78) a. *kíttà-èngó* (proper name—lit. it kills leopard)

   kíttà-èngó=kî 'which K.?'

   kíttà-èngó=wàngé 'my K.'

   b. *àkìsá-ènté* (proper name—lit. he who hides cow)

   àkìsá-ènté=kî 'which A.?'

   àkìsá-ènté=wàngé 'my A.'

   c. *mùzâddè-tályà* (proper name—lit. parent doesn't eat)

   mùzâddè-tályà=kî 'which M.?'

   mùzâddè-tályà=wàngé 'my M.'

The same is true when the last form in the compound is not a noun, as in (78c).[55] This example also shows what we have known all along, namely that underlying length is not realized before a nominal enclitic (§2.3).

The issue we now face is how to account for the observed variation. One approach that must be rejected from the start is the idea that =*kî* and the possessives are sometimes enclitic, sometimes not, and that length differences follow from this. The reason is that a surfacing compound-final HL contour

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[54]The realization with a long vowel [*bídéé*] gives the impression that it is the bells that are being questioned, i.e. 'seller of which bells?'

[55]Because of the nominal status of the compound, the only reason for expecting length on the verb stem -*lyà* in (78c) is its monosyllabicity. However, we have to admit that we never were able to demonstrate beyond a doubt that monosyllabicity plays a role in determining vowel length on verb stems.

always requires a long vowel before =kí, as we saw in (74). Thus, we would have to say that the clitic/non-clitic distinction depends on the tonal configuration of the host: =kí would be obligatorily enclitic on compounds that end in a surface HL contour; both =kí and the possessives would be optionally enclitic on compounds that end either in a (non-surfacing) HL contour or a monosyllabic stem. Since we have not yet seen such conditions on cliticization, we judge this solution to be undesirable.

Assuming that we can account for the variable duration of *non-realized* contour tone length (cf. note 24), this leaves monosyllabic length to be accounted for. Consider a simple (productive) compound such as we saw in (77c), which, informally, has the structure in (79).

(79) N_1
                        / \
                      N_2 N_3
          [mùtúndá] [bídé]   'bell-seller'

As seen, a single compound N_1 is composed of the two simplex nouns *mùtúndá* 'seller' (N_2) and *bìdé* 'bells' (N_3). The enclitics =kí 'which' and *wàngé* 'my' (class 1) have been called "nominal" because they are *syntactically* subcategorized to attach to a nominal immediately to their left, in this case N_1. Phonologically, however, such enclitics form a CG with a host *full word* that occurs immediately to their left, in this case N_3. It should be clear, then, that the variation is caused by the non-isomorphism of the syntactic and phonological hosts (N_1 vs. N_3). No all or nothing principle can in itself account for the variable length realization in forms such as (77c). However, what we can say is that the more transparent the bond between the internal elements of the compound, the more likely speakers will accept a bimoraic realization of a compound-final monosyllabic stem.

The internal structure of a compound is maximally transparent when the compound is productively created. Examples such as *mùtúndá-bídéé̱=wàngé* 'my bell-seller' are apparently always acceptable with the indicated length. Names, on the other hand, rarely if ever show monosyllabic length, as we saw in (78). This presumably means that in everyday speech speakers do not normally decompose names into their grammatical parts, though etymologies can frequently be provided upon demand. Finally, consider the forms in (80).

(80) a. *ŋ̀ŋùmyá-mùtwé*   'solid person'

     ŋ̀ŋùmyá-mùtwé=kí   'which solid person?'

     ŋ̀ŋùmyá-mùtwè=wàngé   'my solid person'

b. *ɲjògélà-m̀bí*   'bad talking'

    ɲjògélà-m̀bɪ̀=kí   'which bad talking?'

    ɲjògélà-m̀bɪ̀=yàngé   'my bad talking'

In (80) the first member of the compound is underlyingly toneless (cf. *kùgúmyá* 'to make solid', *kwòògélá* 'to talk'[56]), while the second part of each compound ends in a monosyllabic stem which, in isolation, would have carried a falling tone, i.e. *mùtwê* 'head', *m̀bî* 'bad' (class 9). Two things correlate here. First, the underlying H of the final syllable (*-twê*, *-bî*) is realized on the second mora of the first noun stem (exactly as it would be realized if it were a suffixal H by the regular rules of Luganda tonology). Second, the monosyllabic length of the second noun stem cannot be realized. We suggest that the absence of length on *-twè* and *-bì* is directly attributable to the fact that these compounds are single "tone words". According to the general rules of Luganda tonology (see Stevick [1969], Hyman [1982]), whenever a tone word has a final H tone and a toneless initial stem vowel, the H is realized on the second mora of the stem. In (80), the first stem of the compound is toneless, and the second stem provides the final H tone. Although the etymology of these compounds is transparent, in this case it is the phonology (tone) that requires them to be treated as one indivisible unit for the purpose of FVS. In other words, the option of accessing N_3 is precluded.

5.3. Reduplication

In this section we shall examine the effects of FVS internally and externally to reduplicated forms. We shall begin by considering nouns and adjectives in §5.3.1, then verbs in §5.3.2.

5.3.1. Nominal reduplication. By nominal we refer to both nouns and adjectives, which as seen in (81), can be reduplicated with a diminutive (and often pejorative) sense:

(81) a. *mùl̀ímí*   'farmer'   *mùl̀ímíl̀ímí*   'sort of a farmer'

    kìtábó   'book'   *kìtàbó.tàbó*   'not much of a book'

    mùlámúzí 'judge'   *mùlàmúzì.làmùzí* 'mere judge'

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[56]Toneless or non-tonic words generally realized with one L syllable followed by all H tone, as seen in these infinitives.

b. *kìzító*   'heavy'   *kìzìtó.zìtó*   'rather heavy'

   kìnénè   'big'   *kìnéné.nénè*   'somewhat big'

   kìsányùfú   'happy'   *kìsányúfú.sànyùfú* 'rather happy'

The two parts of the reduplication are separated by a dot (.). It is observed that only the noun or adjective stem (and not the prefix) is involved in reduplication.[57] Since the diminutive or pejorative meaning is predictable, we shall not gloss reduplications to follow.

Turning to FVS, we consider first the realization of underlying final length in the reduplications in (82).

(82) a. *kíkòlwá*   'deed'   *kíkólwá.kòlwá*

        kìnyéèbwá   'groundnut'   *kìnyéébwá.nyéèbwá*

        kìwábyò   'sickle'   *kìwábyó.wábyò*

   b. *kìkámbwé*   'fierce'   *kìkámbwè.kàmbwé*

        kìbúgùmyé   'warm'   *kìbúgúmyé.bùgùmyé*

        kyààgálwà   'beloved'   *kyààgálwà.yàgàlwà*[58]

   c. [[*kíkólwá*]PW *kòlwá*]PW etc.

As seen, the first stem ends in a CGV sequence with a short vowel. We account for this by recognizing the dot in the above transcriptions as separating these forms into two parts. With the bracketing as indicated in (82c), PW-level FVS will apply at the end of each PW, creating the surface short vowels as needed.[59]

Consider now the examples in (83), whose unreduplicated forms have shown contour tone length within the CG:

(83) a. *mùsòtâ*   'snake'   *mùsòtá.sòtá*

        kìsìkî   'log'   *kìsìkísìkí*

        mùvúbúkâ   'adolescent' *mùvúbúká.vùbùká*

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[57]There also are some tonal changes which are interesting but irrelevant to the issue of FVS.

[58]The [y] of [*yàgàlwá*] is part of the stem.

[59]The bracketing in (82a), which is further justified by the tonology, involves a self-embedded PW, something which is outlawed by the strict layer hypothesis [Selkirk 1984; Nespor and Vogel 1986]. A separate paper is in preparation on the subject of PW's and will deal with this issue in some detail.

b. *kìgàzî*   'wide'   *kìgàzígàzí*

   kìgìmû   'fertile'   *kìgìmú.gìmú*

   kìlàmû   'healthy'   *kìlàmú.làmú*

Again, PW-level FVS is responsible for the final short vowel on the first stem.

The reduplication of monosyllabic noun and adjective stems is somewhat different. As seen in (84),

(84) a. *kìdé*   'bell'   *kìdéé.dè.dé*

   màtá   'milk'   *màtáá.tà.tá*

   mìtî   'tree'   *mìtíítí.tî*

b. *kìsá*   'empty'   *kìsáá.sà.sá*

   kìtô   'young'   *kìtóó.tó.tô*

   kìbî   'bad'   *kìbíí.bí.bî*

monosyllabic nominals must undergo a *double* reduplication in this construction. On the surface, only the first syllable of the reduplicated stem has a long vowel. To account for this, we propose that double reduplication is obtained in cyclic fashion, as shown in (85).

(85) a. *ki-* [[[*deé*] *dee*] *dee*]

b. *ki-* [[[*saá*] *saa*] *saa*]

On the first cycle, the M2 accent preserves the length on the first stem. When it is reduplicated, the long vowels of the second *-dee* and *-saa* successfully undergo FVS, since they are not protected by an M2 accent. The same holds for the third *-dee* and *-saa*.

We thus see that our analysis of FVS correctly predicts the surface lengths within nominal reduplications. As seen in (86), final length on reduplicated forms is identical to the facts we have observed in previous sections:

(86) a. *kíkólwá.kòlwà=kí*   'which mere deed?'

   kìkámbwè.kàmbwè=kí   'which rather fierce one?'

b. *mùsòtá.sòtà=kí*   'which excuse for a snake?'

   kìgàzígàzì=kí   'which somewhat wide one?'

c. *kìdéé.dè.dè=kí*   'which miserable ol' bell?'

   kìsáá.sà.sà=kí   'which rather empty one?'

In (86a), underlying length is not preserved before the nominal enclitic *=kí* 'which', nor is contour tone length preserved in (86b), since the reduplicated forms, unlike the corresponding simplex ones, do not have a final HL contour (cf. (83)). In (86c), monosyllabic length is preserved only on the first [CVV], showing that the cyclic analysis in (85) is correct. Finally, when reduplicated adjectives occur with the verbal enclitic *=mû*, also a diminutizer, again only monosyllabic length is preserved:

(87) a. *kìkámbwé.kámbwé=mû*   'rather fierce'

   b. *kìgàzígází=mû*   'rather wide'

   c. *kìsáásá.sá=mû*   'rather empty'

As we shall now see, similar facts are found in verbal reduplication.

5.3.2. Verbal reduplication. As seen in (88), verb stems may also be reduplicated, expressing actions which are done frequently or repeatedly.[60]

(88) a. *kùlíímá*   'to spy on'   *kùlíímá.líímá*

   kùsásúlá   'to pay'   *kùsásúlá.sásúlá*

   kùbálágáná   'to count e.o.'   *kùbálágáná.bálágáná*

   b. *kùléètá*   'to bring'   *kùléètá.léétá*

   kùwúlìlá   'to hear'   *kùwúlìlá.wúlílá*

   kùlábàgáná   'to see e.o.'   *kùlábàgáná.lábágáná*

As in the case of nominals, prefixes are never copied in verbal reduplication.[61] On the other hand, any suffixes on the stem are copied, as seen in the stems [bal-agan-a] 'count each other' in (88a) and [lab-agan-a] 'see each other' in (88b).

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[60]As in the case of nominal reduplication, there is sometimes a diminutivizing or pejorative connotation. Thus, Ashton et al [1954:426] gloss *kùfúmbá.fúmbá*, the reduplication of *kùfúmbá* 'to cook', as 'to play at cooking'.

[61]Unlike nominal reduplication, reduplicated verb stems have exactly the same tonal pattern as their non-reduplicated counterparts, as seen in the two tonal patterns of infinitive stems realized either all H in (88a) or a single H + L followed by the rest H in (88b).

Returning to the issue of FVS, we see that underlying final length is not preserved on the first verb stem in reduplication:

(89) a. *kùlíimwá*   'to be spied on'   *kùlíimwá.líimwá*

     kùsásúlwá   'to be paid'   *kùsásúlwá.sásúlwá*

   b. *kùléètwá*   'to be brought'   *kùléètwá.léétwá*

     kùwúlìlwá   'to be heard'   *kùwúlìlwá.wúlìwá*

   c. *àlíimyè*   'he has spied on'   *àlíimyè.lììmyé*

     àsítàmyé   'he has squatted'   *àsítàmyè.sìtàmyé*

The stems in (89a, b) all contain the passive suffix *-u-*, which in conjunction with the FV *-a* provides the underlying length, e.g. *-liim-u-a* 'be spied on'. The forms in (89c) involve the so-called modified base which, in these examples, ends in a /Cie/ sequence, providing underlying length. As seen, the first stem ends in a short Cwa or Cye syllable, indicating that PW-level FVS has applied to it.

As expected from the nominal pattern, monosyllabic length is preserved in verbal reduplication:

(90) a. *kùsá*   'to grind'   *kùsáá.sá*

     kùmwá   'to shave'   *kùmwáá.mwá*

     kùgyá   'to fit in'   *kugyáá.gyá*

   b. *kùtâ*   'to let go'   *kùtáà.tá*

     kùnywâ   'to drink'   *kùnywáà.nywá*

     kùlyâ   'to eat'   *kùlyáà.lyá*

However, unlike the examples in (84), monosyllabic verb stems normally do not undergo double reduplication.[62]

It is difficult, if not impossible, to determine whether contour tone length is preserved at the end of the first verb stem. One reason is that the reduplicated stem receives its tonal pattern as a whole. Consider, for example, the relative affirmative present tense forms in (91).

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[62]Occasionally speakers have offered us doubly reduplicated verb stems, but never as their first option. In any case, whether the infinitive is treated as nominal or verbal, a single reduplication is the rule, e.g. *kùsáá.sàà=kwàngé* 'my repeated grinding'. When occasionally provided, doubly reduplicated verb stems show the same length pattern as their nominal counterpart, e.g. *kù-sáá.sá.sáá=kô*.

(91) a. àlíímà   'he who spies on'   àlíímà.lìimà

     àsàsúlà   'he who pays'   àsàsúlà.sàsùlá

     àgùlíílá   'he who bribes'   àgùlíílà.gùlílílá

   b. àléétâ   'he who brings'   àléétá.léétâ

     àwúlílâ   'he who hears'   àwúlílá.wúlílâ

     àlábílílâ   'he who looks after'   àlábílílálábílílâ

The examples in (91a), which have a toneless verb root, show a H tone on the
second mora of the stem (underlined). As seen, this position is calculated from
the beginning of the first stem in the reduplicated forms. In (91b), where the
verb roots have underlying H tone, this tense calls for a HL fall on the FV. In the
case of reduplicated stems, this means the FV of the second verb stem. We note
also in the reduplicated forms in (91b) that there is no length on the FV of the
first stem. We cannot draw any conclusions concerning the (non-)preservation of
contour tone length, however, since there is no evidence that the first FV ever
had a contour.

Since the FV HL verb tone pattern cannot provide evidence for or against
preservation of contour tone length, consider the following verb stems in (92).

(92) a. àbàlâ   'he who counts'   àbàláá.bàlá

   b. àgùlâ   'he who buys'   àgùláá.gùlá

   c. àlìmâ   'he who cultivates'   àlìmáá.lìmá

The verb roots -bal- 'count', -gul- 'buy', and -lim- 'cultivate' are underlyingly
toneless. Hence, the stems in (92) receive a second mora H tone, exactly as in
(91a). In (92), however, the second mora is also the FV, because these CVCV
stems have only two moras. As seen, the first stem ends in a long vowel.
However, it would be wrong to conclude that this unambiguously represents the
preservation of contour tone length, because of the forms in (93).

(93) a. kùbálá   'to count'   kùbáláá.bálá

     kùgúlá   'to buy'   kùgúláá.gúlá

     kùlímá   'to cultivate'   kùlímáá.límá

b. *kùlábà*	'to see'	*kùlábàà.lábá*
kùtémà	'to chop'	*kùtémàà.tèmá*
kùsímà	'to dig'	*kùsímàà.sìmá*

Verb reduplication has the curious idiosyncrasy of requiring that the FV on the verb stem be long if the stem consists of only two moras.[63] Thus, the final length observed on the first stem of the reduplications in (92) may be due to this requirement, not to contour tone length.[64] As soon as another mora is added to any of the above stems, the FV of the first verb stem is short, as seen in (94).

(94) a.	*kùbálílá*	'to count for'	*kùbálílá.bálílá*
	kùlímísá	'to cultivate with'	*kùlímísá.límísá*
b.	*kùlábìlá*	'to see for'	*kùlábìlá.lábílá*
	kùsímìsá	'to dig with'	*kùsímìsá.símísá*

The examples in (94) show the addition of an applied *-il-* or causative/instrumental *-is-* suffix. (cf. also the reciprocal *-agan-* suffix illustrated in (88)). Finally, consider the examples in (95).

(95) a.	*kùbálwá*	'to be counted'	*kùbálwáá.bálwá*
	kùgúlwá	'to be bought'	*kùgúlwáá.gúlwá*
	kùlábwà	'to be seen'	*kùlábwà.lábwá*

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[63]This idiosyncrasy provides a good test for mora counting within verb stems. First, as can be seen in the following reduplications,

(i)	*kùgéndá*	'to go'	*kùgéndá.géndá*
	kùfúmbá	'to cook'	*kùfúmbá.fúmbá*
(ii)	*kùbûmbá*	'to mould'	*kùbûmbá.búmbá*
	kùlôndá	'to choose'	*kùlôndá.lóndá*

the nasal of -CVNC- roots, which is a tone-bearing unit in Luganda, counts as a mora for this purpose as well. As a result, the final vowel of the first verb stem is short in these reduplications. On the other hand, the examples such as the following demonstrate that the initial vowel of -VC-roots is monomoraic:

(iii)	*kwèèlá*	'to sweep'	*kwèèláá.yélá*	/-el-/
	kwààlá	'to spread'	*kwààláá.yálá*	/-al-/
(iv)	*kwóòtá*	'to bask'	*kwóótàà.yótá*	/-ót/
	kwáàlá	'to increase'	*kwáálàà.yálá*	/-ál-/

The length of the FV of the first verb stem is thus long (and the length of the [*kw*VV] syllables due to gliding of the infinitive /u/ + compensatory lengthening).

[64]Actually, the rules we are assuming would not have produced contour tone length on the first FV in any case, since it is not final within the whole (reduplicated) verb stem.

b. *àlìmyê*   'he has cultivated' *àlìmyéé.lìmyé*

 àlábyè   'he has seen'   *àlábyèè.làbyé*

 àtémyè   'he has chopped' *àtémyèè.tèmyé*

Length on the final CGV is preserved on the passive stems in (95a) and on the modified base stems in (95b). However, this is due not to the underlying length of these final syllables, but rather to the fact that these are (after PW-level FVS) bimoraic verb stems. We must assume that the underlying length of such forms is removed, but replaced just in case the stem is bimoraic.

 With the addition of the bimoraic lengthening rule, our analysis covers the facts of FVS in verbal reduplications. However, in order not to preserve underlying length on the first verb stem, we have to ensure that its FV is not invisible to PW-level FVS (as it is in the case of simplex verb stems). We suggest that the reduplicated stem is created before the marking of invisibility. Thus, only the FV of the entire stem will be invisible.[65] By marking this FV invisible, we make the prediction that it will have the same length realizations as the FV of simplex verb stems. We now briefly show that this is correct.

 In (96) we see that underlying length is preserved before a verbal enclitic:

(96) a. *kùlíímwá.líímwáá=kô*   'to be spied on a little'

  kùléètwá.léétwáá=kô   'to be brought a bit'

  kùfúmbwá.fúmbwáá=kô   'to be somewhat cooked'

 b. *àlíímyé.líímyéé=kô*   'he has spied a little'

  àsítámyé.sítámyéé=kô   'he has squatted a bit'

  àfúmbyé.fúmbyéé=kô   'he has cooked a little'

As before, we have illustrated both [Cwaa] passive endings and [Cyee] modified based endings. In order for the length to be protected from PW-level FVS, the FV of the entire reduplicated verb stem must be invisible, as discussed in §4.1.

 Since underlying length is present in all monosyllabic verb stems, it is not surprising to observe in (97) that monosyllabic stems are likewise long before the enclitic *=kô*:

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[65]If the FV of the stem is marked invisible before reduplication, we would first have to ensure that the FV, although invisible, is in fact copied. If it is copied, its invisibility would then automatically be removed from the first stem by the peripherality condition.

(97) a. *kùsáá.sáá=kô*   'to grind a little'

       kùmwáá.mwáá=kô   'to shave a bit'

       kùgyáá.gyáá=kô   'to fit in somewhat'

    b. *kùtáà.táá=kô*   'to let go a little'

       kùnywáà.nywáá=kô   'to drink a bit'

       kùlyáà.lyáá=kô   'to eat a bit'

Finally, (98) presents the realization of contour tone length.

(98) a. *mùlèètè.lèètéè=kô*   '(you pl.) bring a little!'

       mùwùlìlè.wùlìléè=kô '(you pl.) hear a bit!'

       mùlàbìlìlè.làbìlìléè=kô '(you pl.) look after a bit!'

    b. *àléétá.léétá=kô*   'he who brings a little'

       àwúlílá.wúlílá=kô   'he who hears a bit'

       àlábílílá.lábílílá=kô 'he who looks after a bit'

In (98a) the plural imperative form requires a final HL contour tone which is preserved, along with its length, before the enclitic =*kô*. The verb forms in (98b) were seen with a final HL falling tone in (91b). When they are followed by an enclitic, neither the fall nor the length surfaces, as we expect from the verbal pattern.

    To summarize this subsection, our analysis accounts for all of the length realizations both on the first and the second stem of reduplicated nouns and verbs.[66]

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[66]All other reduplications (e.g. of numerals) in Luganda involve repetition of full words:

(i)	*bìbílì*	'two'	*bìbílí- bíbílì*	'two by two'
	bìsátù	'three'	*bìsátú - bísátù*	'three by three'
	bìtáànó	'five'	*bìtáánó - bítáànó*	'five by five'
(ii)	*kìmû*	'one'	*kìmú - kímû*	'one by one'
	bìnâ	'four'`	*bìná - bínâ*	'four by four'

As such the above reduplicated numerals (given with *ki-/bi-* noun class 7/8 prefixes) are similar to compounds. Notice that neither monosyllabic nor contour tone length is realized on the first occurrence of the numerals in (ii).

6. Conclusion

In the preceding sections we have provided a rather detailed account of FVS, which has been discovered to be considerably more complex than previous literature suggests. In particular, we have found it necessary to establish two applications of FVS: one at the end of a PW, one at the end of a CG. In addition, we have had to invoke the device of invisibility to account for the differential effect of PW-level FVS on nouns vs. verbs. By restricting invisibility of the FV to verbs, we are able to capture the intuition that nouns undergo word-edge phonology earlier than verbs. The analysis also recognizes a stem second mora accent to protect monosyllabic length at the PW level and makes crucial use of rule ordering to predict the surface realization of contour tone length. The result is that PW-level FVS will apply differently according to grammatical category and according to the source of the final length, while CG-level FVS will apply across the board to all final long vowels.[67]

In this brief conclusion, we shall consider apparent counterexamples: first, cases of apparent underapplication of FVS, where a long vowel surfaces that should have been short; second, cases of apparent overapplication of FVS, where a short vowel surfaces that should have been long. After investigating these putative counterexamples we shall in fact conclude that there is relatively little residue left by the analysis.

6.1. Underapplication of FVS. As stated above, all vowels are short at the end of a CG. Of course, if there is a juxtaposition of vowels *across* a CG, length will always surface, as in (99).

(99) a. *òmùlìmì* + *òmû*   →   [*òmùlìmyòòmû*]   'one farmer'
       farmer   one

   b. *yàlábà* + *òmùlímí*   →   [*yàlábòòmúlímí*]   'he saw a farmer'
      he saw   farmer

In (99a) the FV [*i*] of *òmúlímí* 'farmer' glides and the vowel [*o*] of [*òmû*] 'one' becomes long by compensatory lengthening. In (99b) the FV [*a*] of *yàlábà* 'he saw' elides with compensatory lengthening of the [*o*] of the following word 'farmer'. Although there is a long [*oo*] in each phrase, it can be seen from the inputs that each consists of two CG's, the first of which ends in a *short* vowel. In other words, FVS has no effect because the length is derived at the phrase level. Because many Luganda words begin with a vowel and all Luganda words end in a

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[67]In a paper we have planned on the PW in Luganda, we question whether the CG is needed in Luganda at all. At the very least one has to accommodate two different applications of FVS which in this paper we identify as PW-level vs. CG-level FVS.

vowel, phrasal length will be pervasive in surface forms. It does not, however, constitute an exception to FVS.

Also not a counterexample is any final length that results from intonation. In (100) we illustrate intonational lengthening that marks an intensification on adjectives:

(100) a. *kìzító*   'heavy'   *kìzítóóò*   '*very* heavy'

     b. *kìgàzî*   'wide'   *kìgàzíîì*   '*very* wide'

     c. *kìnénè*   'big'   *kìnénééè*   '*very* big'

Since this length is an intonational feature, we have a number of ways to prevent it from undergoing CG-level FVS, e.g. the length can be placed outside the CG, the length can be assigned after CG-level FVS has applied, etc.

We can assume that length appearing finally on ideophones also has an intonational source. This is seen clearly in the examples from Ashton et al [1954:427] in (101), where the ideophones show the same tone pattern and intensification as just seen on adjectives:[68]

(101) a. *èmmûndù né évùgá bè ddúúù*   'the gun went off *bang*'

     b. *ǹnássà èkíkkòwé bè wúúù*   'I sighed relief *whew*'

     c. *èkìtélèkè nè kígwá bè ggwááà*   'the parcel fell *kerplunk*'

We note in all of these examples that the final intonational length on adjectives or ideophones also violates the otherwise general syllable structure canons of the language. The above transcriptions are intended to indicate that there are more than two vowel lengths, i.e. more than the two moras that are permissible within a single syllable. The exact number of syllables and moras is not immediately obvious and probably can vary according to the degree of intensification.

6.2. Overapplication of FVS. With the above account of "exceptional" final length, we now consider cases where shortening appears to have applied internally to a PW, as in the examples in (102).

(102) a. *kwété*   'beer made from maize'

     b. *lwàkìpúmpúlú*   'cattle trypanosomiasis'

       ǹnábyèjééguùlá   'spendthrift'

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[68]Ideophones are frequently introduced by the particle (proclitic?) *bè*.

We know of only the one monomorphemic word in (102a) that has a short CGV sequence within it. We assume that it must simply be entered this way in the lexicon. The forms in (102b) are polymorphemic and each have an unexplained short CGV. The initial syllable [*lwa*] in *lwàkìpúmpúlú*   appears to be a combination of class 11 *lu-* plus the GL *-aa*. If so, it should have a long vowel (cf. §1.1) and the noun as a whole should be class 11, not class 1a. Instead, it again appears necessary to place this short CGV in the lexical entry.[69] Similarly, the short vowel in the syllable [*bye*] in (102c) cannot be explained. While it would be expected to be short if it were the object cleft or relative marker (cf. §1.1), the part that follows (*jééguùlá*) cannot be identified even as a stem, let alone a word.[70]

It thus seems necessary to enter a few exceptional short CGV sequences in the lexicon. Not to be included among these, however, are the following frequently cited "exceptions":

(103) a. *òkúggyá=kô* 'except'   (cf. *kùggyá* 'to take off, remove')

  b. *kú-ggyà=kô* 'to get burnt a bit' (cf. *mpîddé/ñjîddé* 'I have gotten burnt')

  c. *ǹgwísô*   'large needle'   (cf. *m̀písô* 'needle')

These all involve [*ggy*] or [*ggw*] sequences followed by a short vowel. In this case we do not have a CVV sequence, but rather a geminate glide: expected *-yy-* surfaces as [*ggy*] and expected *-ww-* surfaces as [*ggw*]. As seen in the comparisons in (103b,c), these glides are sometimes derived from historical *p. In any case, we need not view forms such as in (103) as cases where FVS has overapplied.

Another case of apparent overapplication can be seen in (104).

(104) a. *myámyámyá*   '*very* (shiny)'

  b. *myúmyúmyú*   '*very* (red)'

  c. *nywánywánywá*   '*very* (cold)'

These ideophones consist of a double reduplication of a CGV syllable possessing a short vowel. We can account for these short vowels if we recognize each occurrence of the CGV syllable as a separate PW. Since ideophones are not verbs, their FV will not be invisible, and hence PW-level FVS will correctly apply to each syllable.

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[69]The following part *kìpúmpúlú* does not exist by itself, but there is another entry *kìpúmpúlì* 'cattle plague' [Snoxall 1967:138] which is clearly related and where the initial *kì-* is the class 7 prefix.

[70]The formative *ǹná* frequently occurs before class 1a nouns, which this is.

With all of the above accounted for, we have left the most difficult and intriguing case for last. In (105) we give different realizations of verb stems containing both a causative [*y*] and a reciprocal suffix -*agan*-:

(105) a. *kùlímyá*   'to cause to cultivate'

       kùlímyágáná   'to cause each other to cultivate'

       kùlímágányá

       ?*kùlímyágányá*

     b. *kùlábyà*   'to cause to see'

       kùlábyàgáná   'to cause each other to see'

       kùlábágànyá

       ?*kùlábyàgányá*

     c. [[*kùlímyá*]$_{PW}$ *gáná*]$_{PW}$

       [[*kùlábyà*]$_{PW}$ *gáná*]$_{PW}$

As can be seen, there is some variation in the linear ordering of the two suffixes in Luganda. Speakers even occasionally accept the causative [*y*] before and after reciprocal -*agan*- in the same form. What is critical for us is that when it occurs before -*agan*-, the following vowel [*a*] is short, i.e. *kùlímyáágáná, etc. The question that confronts us is whether this is a case of word-internal FVS? In other words, do such verb stems consist of two PW's, as in (105c)? While this would help us obtain the short vowel we require, it raises questions about the internal structure of verb stems that extend beyond the scope of the present paper.[71] For this reason, we leave this issue open as a subject for further research.[72]

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[71]E.g. verb extensions are always vowel-initial. Hence the reciprocal extension should be -*agan*-, not -*gan*-.

[72]We cannot refrain from noting, however, that research completed after the writing of this paper suggests, first, that the causative suffix -*i*- and the passive suffix -*u*- are moraic (adding syllable weight) only when they are directly followed by the final vowel morpheme. Thus, when -*i*- precedes -*agan*- it is non-moraic. See Hyman & Katamba [1992] for discussion.

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TONE IN THE MAKONDE DIALECTS: CHIMARABA*

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This study presents data and an analysis of tone in the Chimaraba dialects of Makonde. It is shown that, as in many Bantu languages of Southern Tanzanian, verbs in Makonde have no lexical tone properties. Verb stems all select a single H tone, which is then mapped to some stem vowel, or is deleted, depending on the tense of the verb. Theoretical issues arise in the course of the investigation. The question of adjacency constraints in phonology is raised: Meeussen's Rule in Makonde requires that the involved tones be in adjacent syllables, although they need not be on adjacent morae. We also find evidence for treating the final syllable as extratonal. Since extratonality is rarer than extrametricality in stress systems, every example of extratonality has the potential to contribute to the theory of extraprosodicity.

1. Introduction

The purpose of this study is to make a small contribution to our understanding of tone, both cross-linguistically and in Bantu languages, by presenting data and an analysis of tone in dialects of Makonde, a Bantu language spoken in Tanzania and Mozambique. Makonde is assigned to P23 in the Guthrie [1967] classification of Bantu languages, making it genetically close to the better-attested languages Makua, Yao, and Kimatuumbi, which are "predictable tone" languages, that is, languages which lack lexical tone contrasts in verb stems and assign surface tone to verbs on the basis of verb tense. The details of tone assignment in Makua have been set forth in Cheng and Kisseberth [1979, 1980, 1981], and Kimatuumbi tone is analyzed in Odden [forthcoming]. For example, in Kimatuumbi, a single H is assigned to the third stem vowel of every stem in the subjunctive (1a), and in

agent nominalization (1b), H's are assigned to the first and third vowels of the verb.

(1) **Kimatuumbi**

    a. *ba-tyatyaķíķi yane*   'they should plaster for each other'

    b. *mw-áanḑíķi*   'writer'

Given the problems raised in describing Kimatuumbi-type systems (see Odden [1989] for discussion), we are driven to investigate languages with similar tone systems, especially closely related P-zone languages. A comparison of P-zone tone systems is hampered by the lack of basic descriptive materials for these languages: only a single partially tone-marked sketch of Makonde is available [Nurse 1979]. In his brief sketch of Tanzanian Bantu languages, Nurse suggests that in Makonde, nouns have penultimate stress, and verbs have stress whose position varies according to verb tense. The less than two dozen tone-marked forms provided by Nurse do not make it clear exactly how Makonde tone works.

    There are at least five dialects of Makonde, including Chimahuta, Chimaraba, Chinnima, Chimaviha, and Chimatambwe. Statements by speakers of Makonde suggest that the Chimahuta and Chimaraba dialects are on the margins of mutual intelligibility. This paper will present the basic facts from the Chimaraba dialect of Makonde: a subsequent paper will extend the analysis to the Chimahuta dialect and provide a comparison of the dialects. The general tonal typology of Makonde conforms to that of the "predictable tone systems", as seen in Makua and Kimatuumbi [Odden 1989]. Every verb stem takes a H tone, which is then mapped to an appropriate position in the verb (or deleted) depending on the tense of the verb: verbs in Makonde have no lexical tone properties.

    A number of interesting theoretical issues arise in the course of the investigation. For one, the problem of the "tone-bearing unit" arises, in that both the mora and the syllable act in ways suggesting that each is the tone-bearing unit. The question of adjacency constraints in phonology arises, since the version of Meeussen's Rule found in the language requires that the involved tones be in adjacent syllables, although they need not be on adjacent morae. Finally, we find evidence for extratonality of the final syllable—extratonality being much rarer than extrametricality in stress systems, every example of extratonality has the potential to contribute to the theory of extraprosodicity.

    Prior to embarking on our survey of tonal principles in Makonde, it is necessary to make explicit a terminological distinction in verb morphology. Two positions for tone shifting will be referred to, namely root initial position and stem initial position. The morphological representation of the verb stem is given in the Chimaraba example (2).

(2) [Subject - Tense [$_{\text{STEM}}$ (Object) [$_{\text{ROOT}}$ Root - (extensions) - final V]]]

n	*na* [va	+	*telekeéla*	'I will cook for them'
1SG SUBJ	FUT	3PL OBJ	cook-for	

The root initial position refers to the leftmost syllable of the lexical root, whereas the stem initial position refers to the syllable of the object prefix if there is one, otherwise to the leftmost root syllable. In this example, the syllable *te* is root initial and *va* is stem initial. The left edge of a stem will be marked with an opening bracket, and we will separate the object prefix from the root with a plus.

2. Verbal Tone

There are some important generalizations about surface prosody in the Chimaraba dialect which will guide our analysis. First, there are no vowel length contrasts, but due to a regular stress rule, the penultimate syllable of every word is lengthened. Although this lengthening is predictable, its presence is felt in the phonology and will be included in the transcriptions. Second, almost every verb tense and noun requires some kind of H tone on its penultimate syllable. Third, a word final syllable virtually never has H tone. Finally, there is a surface contrast illustrated in (3) between nouns with penultimate H, penultimate fall, and penultimate rise.

(3) *chi* [*túúvi*   'load'

   chi [*káapu*   'basket'

   va [*maáka*   'cats'

This contrast can be found in verbs as well and is governed by the tense of the verb. Furthermore, there is in my data only one lexical item with an underlying contour tone on a syllable prior to the penultimate, namely the rising tone of *yǔnguula* 'rabbit'.

The limited use of vowel length and the three-way tone contrast result in interesting problems in stating rules. It would seem that we must make the mora the tone-bearing unit, in order to give a principled representation of the contrasts in (3): these contrasts will be represented respectively as H on the leftmost mora, H on the rightmost mora, and as two H's, each linked to a mora of the penultimate syllable. If we link tones directly to the syllable node, we cannot even represent the contrast between rising and falling tone, barring the use of L tones (whose presence would, however, make it impossible to correctly apply Meeussen's Rule and other tonal rules). We will also see that some rules seem to be more easily stateable if tones are accessed at the level of the syllable.

To explain why final syllables never have H tone, the final syllable will be treated as extraprosodic, that is, invisible for the purposes of tone and other prosodic phenomena. Given this extraprosodicity, stress is assigned to the final syllable. Then, the stressed syllable is lengthened by (4).

(4)   **Stress Lengthening**

$$[+\text{stress}]$$
$$\sigma$$
$$|$$
$$|$$
$$\emptyset \rightarrow \mu$$

Stress with lengthening in utterance-medial words is not phonetically obvious, like utterance-final stress is, and is wiped out or severely reduced by a late postlexical rule. Therefore, in the transcription, only utterance-final stress-induced lengthening will be represented in the transcription (viz. *ániilya* 'he ate', *ánilya mayaái* 'he ate eggs').

2.1. Primary H Assignment. To explain why nearly every tense has a H somewhere in the stem, we will have a general Stem H insertion rule, (5), inserting one H tone into every stem.

(5)   **Stem H Insertion**

$$\emptyset \rightarrow H / [_{\text{STEM}} \underline{\hspace{1cm}}]$$

This H is docked to the appropriate vowel by later rules. A similar situation holds in Kimatuumbi, Kikuria, and Yao, where one or sometimes two floating H's are added to the stem and are docked to the appropriate vowel by later rules.

What amounts to a neutral context for tone assignment is seen in the future tense form of verbs in (6) with 1 and 2 person subject prefixes, in the subjunctive with no object prefix, and in nominalizations. In all these cases, the penultimate syllable has a rising tone.[1]

(6) *tuna* [*liíma*   'we will cultivate'
    nna [*teleéka*   'I will cook'
    nna [*pilikaána*   'I will hear'
    nna [*va + luúma*   'I will bite them'

---

[1]A summary of relevant examples from all verb tenses is given in the Appendix.

tuna [*chi + teleéka*	'we will cook it'
nna [*vaá + pa*	'I will give them'
u [*líime*	'you should cultivate'
tu [*pindikulilaáne*	'we should turn for each other'
u [*teleéke*	'you should cook'
m [*pwailaáji*	'sweeper'
n [*telekaáji*	'cooker'
n [*kalangaaji*	'frier'
chi [*kalaángo*	'frying tool'
chi [*tukuúlo*	'pushing tool'

To account for this rise, we will dock the H tone which is inserted by Stem H Insertion (5) to the penultimate syllable by the Default Docking rule, (7). Since word final syllables are extraprosodic at this stage of representation, the Default Docking rule may be formulated to map a free H to the final syllable, the true word-final syllable having been rendered invisible by extraprosodicity. In order to derive a rising tone, rather than a falling tone, Default Docking must be ordered after Stress Lengthening. This docking rule is then one of the rules where we want tones to be linked to the mora, not the syllable.

(7)   **Default Docking**

$$
\begin{array}{c}
H' \\
| \\
| \\
\mu]
\end{array}
$$

Turning to the conditional in (8), we find a different tone pattern, namely a falling tone on the penultimate syllable.

(8) *nikáa* [*lya*	'if I eat'
aka [*líima*	'if he cultivates'
nika [*teléeka*	'if I cook'
vaka [*telekeláana*	'if they cook for e.o.'
nika [*chíi + lya*	'if I eat it'

nika [*va + limíila*   'if I cultivate for them'

vaka [*ni + telekéela*   'if they cook for me'

We will assume that forms like those in (8) undergo a rule mapping the stem H to the rightmost syllable (modulo extraprosodicity). However, this mapping rule, which is morphologically conditioned, precedes Stress Lengthening.

(9)   **Stem Mapping**   (applies in: conditional
                                            subordinate tenses
           H′   subjunctive+OP
            | "might not" tense
            | inst. nom.)
           μ]

The derivation in (10) shows that by ordering Stress Lengthening between the two mapping rules, we can derive the contrast between the falling tone of the conditional and the rising tone of the future.

(10)   H   H

       nikavalimila   *nnavalimila*   *output of* **Stem H Insertion**

               H
               |
       nikavalimila   NA   **Stem Mapping**

               H   H
               |
       nikavalimiila   *nnavalimiila*   **Stress Lengthening**

                                  H
                                  |
           NA   *nnavalimiila*   **Default Docking**

    In a third verb tense shown in (11), the negative future, a H tone is assigned to the penultimate syllable and surfaces as a falling tone in most environments.

(11) *i* [*ḱiimi*   'I won't cultivate'

      a [*teléeki*   'he won't cook'

      a [*ḱiimi*   'he won't cultivate'

atu [*teléeki*	'we won't cook'
atu [*chi + teléeki*	'we won't cook it'

Interestingly, in this tense, the stem H is only assigned as a phonetic falling tone to a root syllable. If the object prefix or subject prefix constitutes the penultimate syllable, as in (12), that syllable does end up with the H, but manifests the H as a rise.

(12) *i* [*kuú + pi*   'I won't give you'

     avaá [*li*   'they won't eat'

     ava [*kuú + pi*   'they won't give you'

This requires putting a restriction on the docking rule used for this tense so that it only applies to root syllables. When the tone docking rule for this tense fails to apply, as in (12), the stem H remains unattached and later undergoes Default Docking. The docking rule for the future negative is given in (13).

(13)   **Future Negative Docking**

             H   [Future Negative]
              |
              |
   [$_{\text{ROOT}}$ ⋯ μ]

The derivations in (14) for *avakuúpi* and *iteléeki* illustrate how the rise versus fall contrast comes about in the future negative tense.

(14)   H   H

     i [*tele(ki)*]   *avaku* [*(pi)*]   **underlying**

             H
             |
     i [*tele(ki)*]   NA   **Future Negative Docking**

             H   H
             |
     i [*telee(ki)*]   *avakuu* [*(pi)*]   **Stress Lengthening**

$$
\begin{array}{c}
\text{H} \\
\mid
\end{array}
$$

NA   *avakuu* [(*pi*)]   **Default Docking**

   The rising and falling penult patterns exhaust the possibilities for verbs having a single H: the stem H always goes to the penult, either as a rise or as a fall. At least in this dialect, there are no forms where H is assigned to the second vowel from the end or the third vowel from the beginning, so in this way Makonde is different from Kimatuumbi and Yao.

   Before moving to rules of doubling and shifting, an account must be given for the fact that the future tense form of monosyllabic stems, such as *nnaalya* 'I will eat' has no H tone: we would expect *nnaálya , by application of Default Docking. This can be explained by marking the prefix *-na-* as an exception to Default Docking. The stem H tone cannot dock to it and remains unassociated after Default Docking (subsequently being deleted by Stray Erasure).

2.2. Secondary H tones: Doubling. Returning to the future tense with *na*, which we saw in (6), if the subject prefix is 3 person, we find a somewhat different tone pattern. Looking at the examples in (15), we see that these verbs have two H's, the first on the stem initial vowel and the second on the penultimate syllable—that tone is the primary H and is assigned by Default Docking (7). The stem initial H doubles to the second stem syllable, providing that the syllable which follows the recipient syllable is not also H toned. In other words, Doubling will not create adjacent H toned syllables. Note too that the penultimate H which blocks Doubling is not in fact on the mora which immediately follows the focus, insofar as the penult has a rising tone, not a falling tone. For this reason, the H tone blockage must be stated in terms at the level of the syllable rather than the mora.

(15) *vana* [*chí* + *teleéka*   'they will cook it'

   vana [*pílikaána*   'they will hear'

   vana [*ní* + *fúkuziíla*   'they will chase for me'

   vana [*télékelaána*   'they will cook for e.o.'

   vana [*ví* + *télekelaána*   'they will cook them for e.o.'

These data can be handled by mapping a H to the initial vowel, then applying the Doubling rule (16). For the sake of making the tonal blockage explicit, it is stipulated that the focus must be followed by a toneless syllable, indicated by the prime notation. We will leave unanswered the interesting question of how to

formalize this condition in a more principled way.[2] A consequence of requiring a following toneless syllable is that there must be a following syllable, where the extraprosodic word-final syllable does not count. This predicts correctly that Doubling cannot spread H between the two vowels of the penultimate and turn falling tone into level H in the conditionals of (8), so *nikateléeka* does not become **nikatelééka*.

(16)   **Tone Doubling**

How this H gets to the stem-initial vowel and why it appears with a 3 person subject but not a 1 or 2 person subject are matters to be considered later.

When we look at shorter stems in this tense, the trisyllabic stems in (17), we notice that if the stem initial vowel is the antepenultimate, the expected penultimate rising tone is missing.

(17)   *vana* [*kí + yuuma*   'he will buy it'

   vana [*téleeka*   'they will cook'

What happens is that the rightmost H deletes by a rule found in many Bantu languages, namely Meeussen's Rule [Goldsmith 1984].

(18)   **Meeussen's Rule**

   $H \rightarrow \emptyset / H \underline{\quad\quad}$

By applying Meeussen's Rule to the expected underlying form, we get the surface form as spelled out in (19).

---

[2]Notations like µ´ or T´ are informally taken in nonlinear phonology to mean 'toneless mora' or 'free tone'. More formally, such notation should be read as meaning 'mora not linked to a tone' or 'tone not linked to a mora'. The same notation is used outside of tonal studies, so that µ´ might also be taken to mean 'a mora not linked to a syllable' or 'a mora lacking (some) segmental feature'. The notation µ´ therefore should properly include an indication of what element the µ is not associated to. The problem with the notation σ´ then is that if tones associate to morae and morae are dominated by syllables, then tones never associate directly with syllables, therefore all syllables have the property described by σ´, i.e. being toneless. We will therefore interpret the expression σ´ as meaning 'syllable dominating no tone'.

(19) *vanakíyuúma*   *output of initial tone mapping*

      vanakíyuuma   **Meussen's Rule**

Meeussen's Rule must be constrained so that it does not delete the penultimate
H of forms like *vana* [*pílikaána* in (15). The rule is blocked there, because it
operates under an adjacency constraint on the H tones, and the H's in (15) are not
adjacent. The specific adjacency constraint is that the H's involved in the rule
must be in adjacent syllables. Notice that in (20), where Meeussen's Rule does
delete the second H, the morae bearing the H tones are not adjacent.

(20)   H   H   → Ø
                      | |
      μ   μ   μ   μ μ   μ
      | | | \ / |
      σ   σ   σ   σ   σ
      va   na   ki   yu   ma

The examples in (21) show that if the stem is monosyllabic or disyllabic, the
first H stays on the prefix *na*, and there is no stem H.

(21) *aná* [*liima*   'he will cultivate'

      anáa [*lya*   'he will eat'

The form *análiima* can be explained as follows. The penultimate syllable gets a
rising tone after Default Docking, and the prefix *na* takes the first H (rather than
the stem initial syllable), for reasons we will go into shortly, giving intermediate
análiíma. Then Meeussen's Rule applies to the H of the penultimate syllable,
giving *análiima*. The form *anáalya* is also derived quite easily, as seen in (22).
Parallel to *análiima*, H assigned to the prefix *na*; the stem H, which usually
appears on the penultimate vowel, has been deleted by Meeussen's Rule.

(22)   HH
          |
      ana(lya)   **underlying**

          HH
          |
      ana a(lya)   **Stress Lengthening**

```
HH
| |
ana a(lya)              Default  Docking


H
|
ana a(lya)              Meeussen's  Rule
```

Application of Meeussen's Rule where both H's are within the same syllable is to be expected on theoretical grounds, given the view that adjacency conditions state maximal separation between elements in a rule, not minimal conditions. This means that the syllable adjacency requirement of Meeussen's Rule blocks the rule from applying when the determinant and focus are separated by a syllable but does not require that the tones be in separate syllables.

For a moment, we will turn from the basic mechanics of tone assignment in Makonde to an overview of verb tenses to illustrate the generality of the rules proposed here. The next tense to be considered is the recent past, in (23), which is formed by adding the prefix *-ni-* after the subject prefix. The penultimate syllable has a rising tone, and the subject prefix has a H, as does the tense prefix.

(23) *nní* [*teleéka*   'I cooked'

     ání [*tu + telekeéla*   'he cooked for us'

     vání [*telekelaána*   'they cooked for each other'

     vání [*telekelanatelekelaána*   'they cooked for each other over and over'

The analysis of this tense, given in (24), is that Default Docking applies to give the penultimate rising tone, and the subject prefix has a H, which spreads to the following vowel by Doubling.

```
(24)  H        H
      |
      anituteleke(la)           underlying


      H        H
      |        |
      anitutelekee(la)          Stress  Lengthening,
                                Default  Docking


      H        H
     /\        |
      anitutelekee(la)          Doubling
```

If the stem is disyllabic, as in *áni* [*lĭíma* or *áni* [*nĭí* + *pa*, the stem H links to the penult by Default Docking and thus keeps the Doubling rule from applying (so Default Docking precedes Doubling). If the stem is monosyllabic, as in *ánii* [*lya*, Default Docking assigns the H to the syllable of the tense prefix, -*ni*-, and Meeussen's Rule then deletes that H.

(25) *áni* [*lĭíma*   'he cultivated'

     áni [*nĭí* + *pa*   'he gave to me'

     ánii [*lya*   'he ate'

Two additional tenses are seen in (26) which have a disyllabic prefix with H on the first syllable, a H which does not double. Apart from the failure of Doubling to apply to the second syllable of the prefix, these forms are derived in a manner analogous to that of the recent past. There is a H on the prefix, and the stem H is mapped to the penultimate syllable by Default Docking.

(26) *tukána* [*loóla*   'we always look'

     nikána [*va* + *loóla*   'I always look at them'

     akána [*tu* + *telekeéla*   'he always cooks for us'

     nikáni [*laála*   'I might sleep'

     ukáni [*anguúka*   'you might fall'

     vakáni [*ni* + *loóla*   'they might look at me'

     akáni [*tu* + *shoneéla*   'he might sew for us'

Finally, the further past illustrated in (27) also selects the prefix *ni*, but assigns H to the first stem vowel, and that H then doubles.

(27) *ani* [*vá* + *kálangĭíla*   'he has fried for them'

     vani [*télékelanatelekelaána*   'they have repeatedly cooked for each other'

     ani [*télekeéla*   'he has cooked for'

The last example illustrates, as we have seen before, that Doubling does not take place if the syllable to receive the H is immediately followed by a H toned syllable. The data in (28) show that if the stem initial syllable precedes the penultimate, Meeussen's Rule deletes the penultimate H. The question of why the leftmost H is manifested on *ni* in the last example, and not on the stem, will be considered in §2.3.

(28) *vani* [*ní* + *loola*   'they have seen me'

    nni [*kúmbiila*   'I have drunk'

    aní [*shoona*   'he has sewn'

The basic devices needed to account for tone assignment in verb tenses seen so far are as follows: a H is added to every verb stem, and that H may be mapped to the penult in certain tenses or else remain floating. After lengthening of stressed vowels, free H's dock to the final mora of the penult. In certain verb tenses, a second H appears at the lefthand edge of the stem and doubles to the following syllable if that syllable is not immediately followed by a H. Finally, Meeussen's Rule deletes a H if there is a H in the previous syllable.

2.3 Shift to Stem. We now return to the problem of the stem-initial H, as seen in the future tense. The examples in (29) show that the first H is on the tense prefix *-na-* in some forms and on the stem-initial vowel in others.

(29) *aná* [*liima*   'he will cultivate'

    anáa [*lya*   'he will eat'

    ana [*váa* + *pa*   'he will give them'

    vana [*pílikaána*   'they will hear'

    vana [*chí* + *teleéka*   'they will cook it'

To clarify what is going on, consider the examples in (30) where the subject is 1 or 2 person, and we only have a single H assigned to the penult by Default Docking.

(30) *nna* [*liíma*   'I will cultivate'

    nnaa [*lya*   'I will eat'

    nna [*vaá* + *pa*   'I will give them'

    nna [*pilikaána*   'I will hear'

    nna [*chi* + *teleéka*   'I will cook it'

The (near-)underlying tonal structure of the words in (29) is therefore that of the analogous form in (30) plus a H tone on the prefix *-na-*.

    We can explain lack of shift in monosyllabic *anáalya* , since word final syllables are extraprosodic; there is nowhere for the H of *anáalya* to shift to. For the remaining cases, the conditions for shifting are more complex: H shifts to an

object prefix unconditionally, as in *anaváapa* and *anachíteleéka*. It shifts to the root-initial syllable only if that syllable does not already have a H, as in *vanapílikaána*. H does not shift in *análiima* because the root initial syllable has a H. There being no compelling argument that this shift must be handled by one rule, two rules will be assumed, spelled out in (31). The rising tone on the root initial penult of *análiima* prevents H shift, so we will require root initial syllables to be toneless, notated in the rule with a prime. Again, we need a reference to tonal properties of syllables, not just tonal properties of morae.

(31)   **Shift to Stem**

a. H
    ╪╌╌╌╌
    μ [μ
        [+OP]

b. H
    ╪╌╌╌╌
    μ [μ
          |
          σ´
        [-OP]
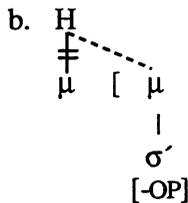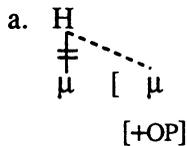
We do not find shifting of prefixal H tone to the stem initial syllable in every tense. Consider *akáni* [*tu* + *shoneéla* 'he might sew for us', *akána* [*tu* + *telekeéla* 'he always cooks for us', and *vání* [*telekelaána* 'they just cooked for each other'. The failure of shifting to apply here can be accounted for simply by requiring the H tone to be adjacent to the stem initial syllable.

Thus far, we have reduced the future tense pattern to a set of rules and the distinction between H toned *-ná-* and toneless *-na-*. However, H appears on *na* when the subject prefix is 3 person, which suggests that underlyingly, the H actually comes from the subject prefix.[3] The H of the subject prefix shifts to *na* (and to the prefix of the remote past *ni*, as we will see) by an early morphologically conditioned rule.

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[3]It is quite common in Bantu languages for the 3 person subject prefix to have H tone and the 1 and 2 person prefixes to have no tone, either across the board or in certain tenses.

(32)   Shift to Prefix

H
╞--------........
╪   ....
μ   μ
[+SP]   [FUT,REM. PAST]
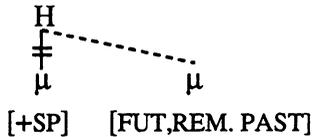
This H may shift again to the stem initial syllable in the appropriate context. The complete derivation of *anatéleeka* is given in (33).

(33)   H   H
        |
        a na [te lee ka   **Stress Lengthening**

           H   H
           |
        a na [te lee ka   **Shift to Prefix**

           H   H
           | |
        a na [te lee ka   **Default Docking**

             H H
             | |
        a na [te lee ka   **Shift to Stem**

             H
             |
        a na [te lee ka   **Meeussen's Rule**
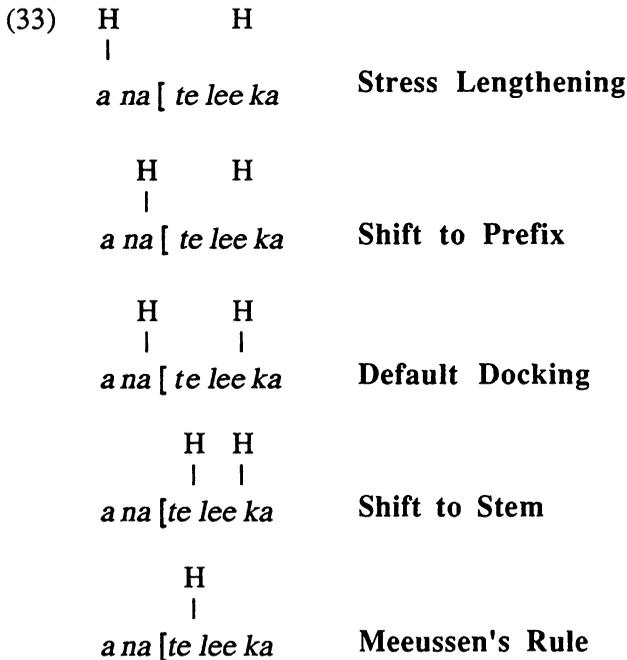
Stem-initial H's may thus all be derived by shifting tones off prefixes in the appropriate context.

The Shifting to Stem rule gives us three kinds of H's within stems in terms of their origin. We have default assignment of stem H, which is realized phonetically as a rising tone on the penult, in forms like *nnaliíma*. We have assigned H's, realized as a falling tone on the penult, in forms like *ivatelekéeli* , and we have shifted H's, like the initial H of *anatéleeka*, which originate from prefixes and are shifted to the stem in the right circumstances.

(34) a. *nnaliíma*   **Default H**

    b. *ivatelekéeli*   **Assigned H**

    c. *anatéleeka*   **Shifted H**

Other cases of stem-initial H tones are handled in an analogous fashion, such as the H of the further past tense in (35). In that tense, the past prefix *ni-* has a H tone (regardless of the subject marking of the verb), and that H shifts to the stem exactly as it does in the future tense.

(35) *aníi [lya*   'he has eaten'

    nníi [lya   'I have eaten'

    nni [vaá + pa   'I have given them'

    ani [níi + pa   'he has given me'

    tuni [vá + loola   'we have seen them'

    aní [shoona   'he has sewn'

    vani [ní + loola   'they have seen me'

    ani [vá + kálangiíla   'he has fried for them'

This tense has both the default-assigned H and a H on the prefix *-ni-*, a tone which shifts to the stem. This pattern is identical to that of the future, parallel examples of which are given in (36).

(36) *anáa [lya*   'he will eat'

    ana [níi + pa   'he will give me'

    aná [shoona   'he will sew'

    vana [ní + loola   'they will see me'

    ana [vá + kálangiíla   'he will fry for them'

2.4. H Spreading. To broaden the analysis of verbal tone, we will consider a set of tenses which have a string of H tones starting from a relatively leftward position up to the penult. This pattern shows up in the infinitive in (37). Note that the penult has a phonetic level H, not a rise or a fall.

(37) *ku [lííma*   'to eat'

    ku [télééka   'to cook'

    ku [télékéláána   'to cook for e.o.'

ku [*télékééla*	'to cook for'
ku [*píndíkúlíláána*	'to change for each other'

We find this same tone pattern in instrument nominalizations.

(38) *chishónéélo*   'thing to sew with'

    chikúmbílíílo   'thing to drink with'

    chipíndíkúlíílo   'thing to turn with'

The right edge of this H span marks the position where the stem H is assigned. Since the penultimate syllable has a level H tone, that is, a H on both morae, we may surmise that the rightmost H is assigned by Default Docking. Of the rules motivated so far, only Default Docking systematically assigns H to the righthand mora of the penultimate.

A H is also assigned to the stem initial vowel in the infinitive. We will account for the stem initial H by postulating a floating pre-stem H tone (inserted in infinitives and instrumental nominalizations, the two productive deverbal nominalizations). The rule Stem Initial Docking then maps that H to the first stem vowel.

(39)   **Stem Initial Docking**

$$H´$$
$$[\mu$$

The intermediate form of *kutélékééla* after this rule but prior to the spreading rule is then *kutélekeéla*.[4]

A similar pattern is found in certain inflected verb tenses.

---

[4]The infinitive of monosyllabic verbs does not undergo Stem Initial Docking—cf. *kuúlya* 'to eat'. Underlyingly we expect to find two tones, the stem H and the infinitive pre-stem H; on the surface, all we find is the rising tone derived by Default Docking. There are two independent explanations for this form. First, given that the word-final syllable is extraprosodic, Stem Initial Docking could not map the prefixal floating tone to the stem initial syllable, since that syllable is invisible. Second, if Default Docking applies before Stem Initial Docking, then the floating tone cannot dock with the syllable *lya* because of the association between the second tone and the syllable *kuú*. In either case, the prefix H tone is deleted by Stray Erasure.

(40) *váká* [*lííle*   'they didn't eat'

    níká [*kálángííte*   'I didn't fry'

    áká [*ní + pwáyílííte*   'he didn't sweep for me'

    pánichí [*télééka*   'when I was cooking'

    pává chí [*kálángíláána*   'when they were cooking for each other'

    páchí [*ní + télékééla*   'when he was cooking for me'

Supporting evidence for deriving the level H in the infinitive from Default Docking is the fact that when the infinitive has an object prefix, as in (41), this spreading process is blocked, and the rising tone surfaces. As expected, if the object prefix immediately precedes the H toned penult, the penultimate H is deleted by Meeussen's Rule.

(41) *ku* [*chí + shoona*   'to sew it'

    ku [*ví + teleéka*   'to cook them'

    ku [*vá + telekeéla*   'to cook for them'

    ku [*chí + télekelaána*   'to cook it for each other'

Additional data expand the range of cases where spreading is involved. In (42) we find other tenses with a similar pattern, except that the penultimate syllable has a falling tone rather than a level H tone.

(42) *váná* [*yúume*   'they might not buy'

    ńná [*kúu + pe*   'I might not give you'

    váná [*tú + télékéele*   'they might not cook for us'

    u [*ni + yúmíile*   'you should buy for me'

    u [*tu + télékéele*   'you should cook for us'

    u [*va + píndikúlíile*   'you should turn for them'

    pátú [*líile*   'when we ate' (rec)

    pátú [*kálángíláane*   'when we cooked for e.o.' (rec)

    pátú [*ví + shóníite*   'when we sewed them' (rec)

    pátú [*vá + píile*   'when we gave him' (rec)

pánî [*vá* + *télékéela*	'when I cook for him'
pátúu [*lya*	'when we eat'
pátú [*shóona*	'when we sew'
pánî [*téléeka*	'when I cook'
pátú [*vá* + *lóola*	'when we look at them'
patúnáa [*lya*	'when we will eat'
páná [*káata*	'when he will cut'
patúná [*kúu* + *pa*	'when we will give you'
patúná [*vî* + *shóona*	'when we will sew them'
patúná [*vá* + *télékéela*	'when we will cook for them'

In these tenses the penult has a falling tone, whereas in the infinitive it has a level H. These tenses therefore undergo Stem Mapping, hence the input to spreading in the case of *patúnávátélékéela* is *patúnavatelekéela*.

Apart from the fact that there must be two H tones in the verb, there is no obvious phonological characteristic which distinguishes the cases where spreading applies and where it does not, e.g. *ánítelekeéla* 'he just cooked for', *vanipíndikulilaána* 'they changed for each other (rem.)', *anavápíndikuliíla* 'he will change for them', *nikánavaloóla* 'I always look at them', *vakániniloóla* 'they might look at me'. These tenses might simply be marked as morphological exceptions to the spreading rule. However, it is also possible to morphologically characterize the tenses where spreading applies, since it applies in nominalizations and in subordinate or negative verbs;[5] we will refer to this group of verbs as the [-ASSERTIVE] verbs and the others, where spreading is blocked, as the [+ASSERTIVE] verbs. To handle the data in (37) and (42), we then require the Rightward Spreading rule (43).

(43)   **Rightward Spreading**
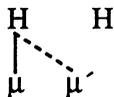
(blocked in [+ASSERTIVE] verbs)

The complete derivations of *kulíima* and *kutélékééla* are given in (44).

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[5]Subjunctives, negatives, and when-clauses form a tonal natural class in a number of Bantu languages.

(44)   H H   H   H

       kulima   *kutelekela*   **underlying**

       H H   H   H

       kuliima   *kutelekeela*   **Stress Length**

       H̶H   H   H
       | | | |
       kul i ima   *kutelekeela*   **Stem Initial Docking,**
                                              Default Docking

       H̶H   H H
       | | ⋀ |
       kul i ima   *kutelekeela*   **Rightward Spreading**

Since the output of Rightward Spreading has two adjacent H's, and Meeussen's Rule deletes the second of two adjacent H's, we can see that Meeussen's Rule precedes Rightward Spreading. If it did not, we would see a falling tone rather than a level H. We will encounter the opposite ordering relation between Meeussen's Rule and Rightward Spreading when we look at the Chimahuta dialect.

2.5. Special stem mapping problems. Two verb forms pose special analytic problems, which will be dealt with here. The simplest problem is posed by the "go and" subjunctive. In this tense, there is no H tone at all.

(45) *kaa [lye*   'let's go eat'
     ka [liime   'let's go cultivate'
     ka [vaa + pe   'let's go give them'
     ka [va + telekeele   'let's go cook for them'

We would expect either a falling tone if this tense conditions Stem Mapping or a rising tone by Default Docking. The solution to this problem is simply to delete the stem H tone in this tense.

(46)   **Stem H Deletion**

       H → Ø / [$\overline{ka\text{-SUBJUNCTIVE}}$]

The second problem also arises in a form of the subjunctive. We noted in (42) that subjunctive verbs with an object prefix assign the stem H by Stem Mapping and also have a root-initial (not stem-initial) H which spreads throughout the stem, e.g. *u [va píndíkúlíile* 'you should change for them'. We will assume an additional floating H in this tense. Docking the root-initial H will require a special rule.

(47)   **OP-Subjunctive H Docking**

$$
\begin{array}{c}
\text{H}' \\
\diagdown \\
[_{\text{ROOT}} \quad \mu
\end{array}
$$

Thus, the intermediate form of *u [va píndíkúlíile* is *u [va´ + pindikulíile*. It is not the çase that the object prefix never has a H tone in this tense: in *u [níi + pe* 'you should give to me', we find a H on the object prefix. However, that H derives by applying Stem Mapping, not (47).

The data in (48), where there is no object prefix, show a quite different pattern.

(48) *u [pilikaníile*   'you should listen'

   u [teleéke   'you should cook'

   u [líime   'you should cultivate'

   uu [lyé   'you should eat'

These examples pose two problems. First, the tone pattern of the subjunctive with an object prefix is different from that without an object prefix: the form with an object prefix has an extra H not found in the plain subjunctive, and whereas the subjunctive with object prefix undergoes Stem Mapping, the plain subjunctive undergoes Default Docking. The existence of separate tone patterns for the subjunctive and the subjunctive with object prefix is rather common in Bantu languages, showing up in such diverse languages as Kishambaa, Shona, and closely related Yao.

The second problem is the form *uulyé*. We would expect to find **uúlye* by application of Default Docking—cf. *kuúlya* 'to eat' and *íili* 'I won't eat'. In fact, the only circumstance where a word final vowel in verbs may have a H tone[6] is in the plain subjunctive of the monosyllabic verb *lya* 'eat'. This can be handled in various ways. One might postulate a rule re-affiliating a verb stem which is

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[6]Aside from the effect of sentence-level rules to be discussed in §3.

entirely extraprosodic in the subjunctive, with the effect that Default Docking assigns the stem H to the word final syllable. Or, after application of Default Docking, a rule might shift the stem H from the subject prefix in the subjunctive to the following word-final syllable. There is no evidence in the language which appears to bear on this choice or which suggests any other alternatives.

3. Sentence Level Tonology

This section analyzes tonal alternations induced by the concatenation of words. We will first see that certain tenses cause addition of a H tone to the following noun, a H which then spreads by Rightward Spreading. Next we investigate a set of rules adding, deleting, and spreading H tones within the noun phrase. Then we consider the interaction between these noun phrase tonal modifications and the rule adding a H to objects.

3.1. Shift of H from verbs. The rule Rightward Spreading can also be seen applying at the sentence level between verbs and nominal objects. Verb tenses can be divided into two types, those which do not affect the tone of the following noun and those which add a H to the following noun. The examples in (49) are of the former type; the isolation form of the noun is identical to the postverbal form.

(49) *vanikúsanya masandúuku*   'they are packing me boxes'
     masandúuku   'boxes'

     anáyuma chikalaángo   'he will buy a vegetable pot'
     chikalaángo   'vegetable pot'

     anakámula chikaápu   'he will grab a basket'
     chikaápu   'basket'

     aníyuma ndiízi   'he bought me bananas'
     ndiízi   'bananas'

     áninitelekéla nyaáma   'he cooked me meat'
     nyaáma   'meat'

     atuteléki ndiízi   'we don't cook bananas'
     atukuteléka ndiízi   'we didn't cook bananas'

     unisáulile chikalaángo   'you should clean me the vegetable pot'

     nikániteléka malóombe   'I might cook maize'
     malóombe   'maize'

vánáyúme majamáanda	'they might buy boxes'
majamáanda	'boxes'

The examples in (50) are from the perfective tense, the infinitive, and the subjunctive (without object prefix), all of which assign a H to the first syllable of the following noun. That H spreads rightward up to the lexical H of the noun stem, by Rightward Spreading. We will refer to this alternation as the "object H tone alternation", although not all nouns undergoing the alternations are syntactic direct objects.

(50)	*nimmingangitemááka*	'I chased a cat'
	maáka	'cat'
	anitelekele nyááma	'he cooked me meat'
	nyaáma	'meat'
	niyumite chíkáláángo	'I bought a vegetable pot'
	chikalaángo	'vegetable pot'
	kuyúmá chítélééko	'to buy a cooking pot'
	chitélééko	'cooking pot'
	kúlyá nyááma	'to eat meat'
	nyaáma	'meat'
	kutúsúkumila líjámáanda	'to push us a box'
	kuyátélekateleka málóombe	'to cook maize repeatedly'
	usaule chítélééko	'you should clean the cooking pot'
	chitélééko	'cooking pot'

An interesting complication seen here is that the stem H of the infinitive with object prefix and the stem H of the subjunctive are both lost.

Another tense where we find a H at the left edge of the object (followed by Rightward Spreading of that H) is in the present tense of verbs with 3 person subjects. The examples in (51) show that there is no added H and no Rightward Spreading in present tense verbs with a 1 or 2 person subject.

(51)	*niyuma maáka*	'I'm buying a cat'
	nikuyumila chikalaángo	'I'm buying you a vegetable pot'
	niteleka mayaái	'I am cooking eggs'
	niwinda vambutúuka	'I am hunting antelopes'

However, if the subject is 3 person, as in (52), the object gets an initial H, and Rightward Spreading then applies.

(52) *ayuma mááka*   'he is buying a cat'

     aniyumila chíkáláángo   'he is buying me a vegetable pot'

     ateleka máyáái   'he is cooking eggs'

     awinda vámbútúuka   'he is hunting antelopes'

The underlying reason for this difference is that in this tense, as in the future, a 3 person subject prefix has a H, and that H shifts to the object noun, setting off Rightward Spreading.

(53)   H   H

      | |

     ayuma chikalaango   *output of* **Stress Lengthening**

           H H

           | |

     ayuma chikalaango   **Tone Shift**

          H H

         ⋀ |

     ayuma chikalaango   **Rightward Spread**

There is a further context where this shifting and Spreading can be found, namely in the periphrastic present progressive tense, examples of which are given in (54).[7]

(54) *ninkuúlya*   'I am eating'

     ǎnkúúlya   'he is eating'

     ninkulííma   'I am eating'

     ǎnkúlíima   'he is eating'

     ninkuvátélekeéla   'I am eating for them'

     ǎnkúnítélekeéla   'he is eating for me'

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[7]There are two variants of this tense, one formed on the model SP -*n*- INFIN and the other formed on the model SP -*ve* -*n*- INFIN . The former was given as the more "correct" form for Chimaraba, the latter being viewed as influenced by Chimahuta, which uses exclusively the latter pattern.

nivenkuúlya	'I am eating'
avĕnkúúlya	'he is eating'
nivenkulíima	'I am eating'
avĕnkúlíima	'he is eating'
ninkuvátélekeéla	'I am eating for them'
avĕnkúnítélekeéla	'he is eating for me'

These examples can be accounted for by treating the construction as the combination of a present tense verb (with no stem, or the stem *ve*) plus the locative prefix *n-* on the infinitive of the verb. The locative prefix takes the H tone, which then spreads up the first H in the word. By general principles of syllable fusion in the language, intermediate *ave ńkúlíima* and *a ńkúlíima* surface as *avĕnkúlíima* and *ǎnkúlíima*.

There is an important condition to be imposed on this process: we do not find the object H tone alternation when the noun is toneless. Consider the following pairs of V + O sentences, the verb being present tense with the first sentence in the pair having 1 person subject (thus not adding a H) and the second having 3 person subject (adding a H). We find that the final vowel of the 3 person verb has a H tone, and the object has no H.

(55) *niyuma limbeende*   'I'm buying a skin'
     ayumá limbeende   'he's buying a skin'

     niteleka ntandaasa   'I'm cooking stiff cassava porridge'
     ateleká ntandaasa   'he's cooking stiff cassava porridge'

     niisabu jikaanya   'I'm counting mouths'
     aisabú jikaanya   'he's counting mouths'

The other verb tenses which induce addition of H to the object exhibit this same restriction.

(56) *niyumité limbeende*   'I bought a skin'
     uteleké ntandaasa   'you should cook stiff cassava porridge'
     kujiisabú jikaanya   'to count the mouths'

We cannot tell what pattern of tone assignment the perfective and the present would take in isolation. Both tenses are noun-focal tenses and always being

followed by the focus of the sentence, cannot appear in isolation.[8] However, we know that the infinitive and the subjunctive without object prefix undergo Default Docking rather than Stem Mapping. We will assume that the verbs which contribute a H to the object contain a floating H tone. This H is morphologically contributed by the 3 person subject prefix, but not by a 1 or 2 person subject prefix in the present tense. In the perfective, subjunctive and infinitive, the floating H will be assumed to be the stem H, which is not phonetically manifested on the stem; since the latter two forms manifest the stem H phonetically in isolation form (*uteleéke* 'you should cook', *kujíisaábu* 'to count them'), some rule is independently needed to account for loss of the stem H.[9]

The assignment and spread of H tone to the object then procedes in two steps. First, the floating H tone is docked to the initial syllable of the next word, providing there is a H tone somewhere in the word. Then, H Tone Spreading spreads that H rightward until it meets the lexical H. The H tone Docking rule can be formalized as (57).

(57)   Floating H Docking
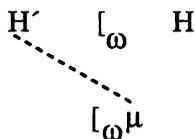
After consideration of rules changing the tones of modified nouns, we will see how addition and deletion of H tones in the noun complement affects applicability of this rule.

When the H tone does not dock to the object, as in *ayumá limbeende*, it then docks to the final vowel of the word. This can be handled by Default Docking. At the word level, the final syllable is extraprosodic, hence cannot take a H tone by Default Docking. However, at the sentence level, word-final extraprosodicity is lost, and the final syllable becomes eligible to receive a H.

3.2. The tonology of the noun and the NP. The majority of nouns in the Chimaraba dialect submit to a tonal analysis which is quite similar to that given to verbs. There are four main tone patterns for nouns: penultimate rise (by Default Docking) and penultimate fall (by Stem Mapping), either of which may be the sole H of the noun or may be combined with a H spreading from the stem initial vowel to the penultimate syllable. Since most nouns of the language have

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[8]A similar situation arises in closely related Kimatuumbi [Odden 1984] and Makua [Stucky 1979].
[9]Since perfective and present tense verbs cannot stand in isolation, we do not have this argument for these tenses.

disyllabic stems, most nouns have rising, falling, or level penultimate syllables: level penultimate in disyllabic stems derives from rising tone plus H tone Spreading, whereas falling tone combined with a spreading H is phonetically indistinguishable from simple falling tone in disyllables. The selection of one of these patterns is lexically determined.

(58) *nnyáavi* 'magician' **Stem Mapping**

  mmiíli   'body'   **Default Docking**

  nnyééni 'guest'   **Default Docking + Spreading**

  njénjéema 'mosquito' **Stem Mapping + Spreading**

  chitélééko 'vegetable pot' **Default Docking + Spreading**

There is another, rarer pattern: H on the antepenultimate alone. This may either be the stem initial syllable or the noun class prefix syllable. All of the known examples (which amount to 3% of the nouns in the corpus) are listed below.

(59) *lí + tiingi*   'pumpkin'

  chí + nduuli   'cassava leaf'

  yŭnguula   'rabbit'

  chi + pwátaaka 'parcel'

  li + pápaaya   'papaya'

  li + vámbaala   'spleen'

  chi + wámbaaza 'wall'

The rising tone in *yŭnguula* is, as noted earlier, unusual, since contour tones in this language so far arise only in the lengthened penultimate syllable, where there are two tone-bearing units. The rising tone in this word can be decomposed into level tones, one per tone-bearing unit, if the nasal *n* is assumed to be tone-bearing and to have underlying H tone (viz. *yuńguula*). Although there is no direct evidence showing that the nasal is underlying tone-bearing in this word, it is the case that nasals may be surface tone-bearing units (*ńníteleéka* 'I cooked'). Furthermore, the juxtaposition of a L-toned syllable plus following heteromorphemic H-toned nasal will result in a single rising-toned syllable, cf. *pa+túnáshóona* 'when we will sew', *pă+nnáshóona* 'when I will sew' from *pa+ńnáshóona*.

Finally, four nouns are known to have no H in the stem: *n+tandaasa* 'stiff cassava porridge', *kaanya* 'mouth', *nankatataambwe* 'spider', and *li+mbeende* 'hide'. Their significance for the object H tone problem has been seen already.

Nouns followed in their phrase by modifiers undergo certain tone rules. One of these rules is a rule deleting all H's in a noun followed by the WH-modifiers 'whose', 'how many', and 'what type' (but not before 'which').

(60) *nnandi wanaáni*   'whose tree?'   *nnáandi*

   litikitilyanaáni   'whose watermelon?'   *litíkíiti*

   ntandasa wanaáni   'whose stiff cassava porridge?' *ntandaasa*

   chiteleko chanaáni   'whose cooking pot?'   *chitélééko*

   ng'ande gáani   'what type house?'   *ng'áande*

   mvilingo gáani   'what type circle?'   *mvílíingo*

   litikiti gáani   'what type watermelon?'

   milandi mingáapi   'how many trees?'

   vang'avanga vangáapi   'how many dogs?'   *ng'áváanga*

   viteleko vingáapi   'how many cooking pots?'

   nankatatambwe vangáapi   'how many spiders?'   *nankatataambwe*

   nyama ńtwáaní[10]   'what kind of meat?'   *nyaáma*

   chitúvi chilíída   'which load?'

   chitéléko chilíída   'which cooking pot?'

   vang'ávánga valíída   'which dogs?'

We will assume a morpho-syntactically conditioned rule deleting a H tone before a [+WH] modifier, with the provision that -*líída* 'which' is an exception to this rule.[11]

(61)   **WH-Modifier Lowering**

   $[_{NP} [_{N} \underline{\quad\quad}] [+\text{WH}] \ ...]$
              |
           H → Ø

---

[10]In connected speech, this surfaces as *nyamǎntwáaní* due to syllable fusion.

[11]The exceptionality may be more syntactic in nature than pure lexical exceptionality. WH-modifiers agree with their heads using a characteristic nominal agreement series which is *u-* for class 1. However, the prefix selected by -*liida* in class 1 is *a-*, which is the class 1 verbal subject prefix.

Another alternation is found in words preceding a possessive pronoun in its phrase. As the following examples show, all H tones of a noun are lost before a possessive pronoun, and a H appears on the final vowel of the noun.

(62) *lilóombe*   'maize'
     lilombé lyaangu   'my maize'

     nyaáma   'meat'
     nyamá yaangu   'my meat'

     chitúúvi   'load'
     chituví cheetu   'our load'

     vayŭnguula   'rabbits'
     vayungulá veetu   'our rabbits'

     chitélééko   'cooking pot'
     chitelekó cheetu   'our cooking pot'

     méléméénde   'cockroach'
     melemendé waangu   'my cockroach'

This pattern arises by applying two rules. The first rule deletes all H tones in words C-commanded by a following possessive pronoun.[12] The second rule assigns a H tone to the last vowel of the word before a possessive pronoun in its phrase. Finally, as the following data show, if the possessive pronoun is not preceded by a word within its phrase, the pronoun bears a falling tone on the first vowel.

(63) *vyáangu*   'mine'
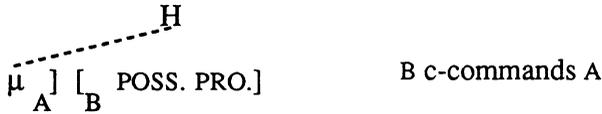
     nilinga kuyúmá [NP *vyáake*]   'I'm trying to buy his'

     niyumite [NP *vyáake*]   'I bought his'

Possessive pronouns have a floating H tone, which docks to the preceding word by (64).[13]

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[12]The theoretical import of this rule is discussed in Odden [1990].
[13]The phrasemate condition on this docking rule will be ignored for the moment.

(64)   **Possessive Docking**

B c-commands A

Nouns lacking lexical H tones also show this word final H, showing that the nouns in (62) do not simply involve shift of lexical H to the final vowel.

(65) *nankatataambwe*   'spider'
     nankatatambwé weetu   'our spider'

     kaanya   'mouth'
     kanyá yaangu   'my mouth'

     ntandaasa   'stiff cassava porridge'
     ntandasá waangu   'my stiff cassava porridge'

If the head noun of the phrase is separated from the possessive pronoun by other modifiers, the noun and the modifiers each lose their H tones. The word standing before the possessive pronoun (in bold face) receives a H tone, and modifiers after the possessive pronoun do not lose their H.

(66) *chínduuli*   'cassava'
     chindulí **chaangu**   'my cassava'

     chínduli chibaáya   'bad cassava'
     chínduli chibayá **chaangu**   'my bad cassava'

     vayǔnguula   'rabbits'
     vayǔngula vátaangu   'old rabbits'
     vayungula vatangu voé **vaangu**   'all my old rabbits'

     ng'áváanga   'dogs'
     vang'avanga vatangú **vangu** *vadóógo*   'my small old dogs'

The syntactic relationship between the pronoun which triggers tone loss and the word undergoing the rule is crucial. The examples in (67) show that tone loss applies to every word from the pronoun leftward to the head noun of the phrase which the pronoun modifies, but does not delete H tones beyond the phrase immediately dominating the pronoun.

(67) [_{VP} *akánavatelekéla*   [_{NP} *vavánu*] [_{NP} *nyamá yaangu*]]
      he-them-cooks-for   people   meat   my
      'he always cooks my meat for the people'

    [_{VP} *nivauyayila*   [_{NP} *vamáé*] [_{NP} *yungula wabayá weenu*]]
      I-them-kill-for   women   rabbit   bad   your
      'I'm killing your bad rabbit for the women'

    [_{VP} *unavalóla*   [_{NP} *vang'avangá vaangu*]]
      you-them-will watch   dogs   my
      'you will watch my dogs'

Finally, a possessive pronoun may serve as the only element within a headless noun phrase in sentences such as *he took mine*. Whether the word before the pronoun is an inflected verb form or an infinitive, lowering is blocked.

(68) *kutéléká yáangu*   'to cook mine'

    tuvenkutéléká vyáake   'we are cooking his'

    atuvatelekéla vyáangu   'we didn't cook mine for them'

The rule deleting H tones can be stated as follows:

(69)   **Possessive Lowering**

      $H \rightarrow \emptyset \,/\, [_A \ldots \underline{\quad}] \ldots [_B$ POSS. PRO.]   B c-commands A

By ordering Possessive Lowering prior to Possessive Docking, we avoid deleting the H tone contributed by the pronoun, and that H is then assigned to the final vowel of the preceding word in its phrase.

    Another tonal modification is encountered with the toneless nouns followed by modifiers. As the following examples show, a H is assigned to the penultimate syllable when followed by a modifier.

(70) *ntandása mwíingi*   'much stiff cassava porridge'

    ntandása wóóe   'all the stiff cassava porridge'

    nankatatámbwe véengi   'many spiders'

    nankatatámbwe vóóe   'all the spiders'

limbénde likúlu	'large skin'
mambénde mănne	'four skins'
limbénde lyoóte	'the whole skin'
jikánya jĭingi	'many mouths'
kánya ndóogo	'small mouth'

Both the penultimate and final syllables of the noun have a H if the noun is followed by a demonstrative.

(71)	*nankatatámbwé yúunó*	'this spider"
	limbéndé lĭiyá	'that skin"
	kányá ĭinó	'this mouth"
	kányá ĭiyá	'that mouth"

Finally, as (72) shows, the presence of a demonstrative after a noun with a lexical H causes spread of that H to the final syllable of the noun.

(72)	*lipóndó lĭinó*	'this hole'	*lipoóndo*
	upíndé úunó	'this bow'	*upíinde*
	lichúngwá lĭiyá	'that orange'	*lichúungwa*
	yúngúlá yúunó	'this rabbit'	*yŭnguula*
	vayúngúlá váayá	'those rabbits'	*vayŭnguula*
	ng'ávángá yúunó	'this dog'	*ng'áváanga*

This suggests an analysis of the data in terms of two rules. First, H is assigned to the penultimate syllable of any toneless noun followed by a modifier.

(73)   **Modified Noun H Insertion**

$$[_{NP} \ [_N \ ...\mu \ \ \mu \ ] \ X \ ]$$
$$|$$
$$\emptyset \rightarrow H$$

Second, H spreads to the final syllable of a noun modified by a demonstrative.

(74)   **Demonstrative Spreading**

H
┌----..
μ   μ ...]   [+DEMONST.]

3.3. Spreading to modified objects. We return now to the process assigning and spreading H tone to objects after verbs in certain tenses. In looking for examples of toneless nouns rejecting the object H tone, we are not limited to using the four lexical toneless nouns. When the postverbal noun is modified by one of the WH-modifiers which cause deletion of H tones in the noun, the derived tonelessness of the noun causes the floating H to be rejected.

(75) *ayuma yúnguula*   'you are buying a rabbit'

　　　ayumá yungula gáaní   'which rabbit are you buying?'

　　　ayuma míláángo   'he is buying doors'

　　　ayumá milango mingáapí   'how many doors is he buying?'

　　　asoma chítáabu   'he is reading a book'

　　　asomá chitabu chéepí   'which book is he reading?'

This motivates ordering WH-Modifier Lowering (61) before Floating H Docking.
　　On the other hand, the H assigned to a toneless noun with a following modifier by (73) will serve as the righthand conditioning H tone for application of Floating H Docking, showing that Modified Noun H Insertion must apply before the latter rule.

(76) *ateleka ńtándása mwíingi*[14]   'he's cooking lots of stiff cassava porridge'

　　　kulólá jíkánya jíingi   'to see many mouths'

　　　ayuma límbénde lyá iimba   'he is buying a lion skin'

　　　ayuma mámbéndé yáanó   'he is buying those skins'

　　　ayuma mámbéndé yáayá   'he is buying these skins'

　　In addition to the tonal restriction that there must be a following H tone, Floating H Docking must be given a morpho-syntactic restriction as well. The rule does not apply to a following complement which is not a noun. If the

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[14]In connected speech, the vowel plus syllabic nasal fuse into one syllable, giving *atelekǎntándása mwíingi.*

following noun phrase begins with a prenominal demonstrative, (57) does not apply (cf. 77a). If the complement is a WH-word, (57) is also blocked (cf. 77b), nor does the rule apply to a following (embedded) verb (cf. 77c). Adverbs do not trigger the rule (cf. 77d), and application of (57) is optional if the postverbal noun is in an embedded clause (cf. 77e).

(77) a. *ayakulá víinó vikáapu*   'he's taking these baskets'

        ayakulá víiyá vikáapu   'he's taking those baskets'

        niyumité váayá vayŭnguula   'I bought those rabbits'

   b. *ateleká cháaní*   'what is he cooking?'

        ansaidiyá náaní   'who is he helping?'

        achiyakulá chíipí   'which one is he taking?'

   c. *avayambilá* [$_V$ *chinitúmbuka*] *chikalaángo*

     'he's telling them the vegetable pot is broken'

   d. *alyá* [$_{ADV}$ *mála mbííli*]   'he eats twice'

   e. *avayambilá chikalángo chinitúmbuuka*   (=c)

      avayambila chíkálángo chinitúmbuuka   opt.

An interesting problem is posed by toneless nouns preceded by either the locative morpheme *pa-* 'at' or the instrumental *na-* 'with', namely that the final H tone of the verb spreads to the locative prefix as well. This pattern holds whether the noun is lexically toneless or undergoes (61).

(78) *aikalité pántandaasa*   'he's sitting near the stiff cassava porridge'

   avikité pákaanya   'he put it in the mouth'

   aviká pájamanda gáaní   'which box is he putting it by?'

   akalangá návikalango gáaní   'which vegetable pots is he frying with?'

   akologá náchijiko gáaní   'which spoon is he stirring with?'

We will assume that *pa-* and *na-* have a special status—we will treat them as clitics—and are subject to the following rule.

(79)   **Clitic Spreading**

H
┌----------
│   ╲
μ] [_{CLITIC} μ

The same tonal property is found with the toneless noun *nankatataambwe* 'spider': when this noun is the object of a verb with a floating H, the initial syllable has a falling tone,[15] the result of spreading from the preceding word-final H. When this noun is preceded by a locative prefix, Clitic Spreading applies twice.

(80) *aulayá nânkatataambwe*   'he's killing the spider'

   aimilá pánânkatabaambwe   'he's standing by the spider'

Historically, *na-* can be identified as a prefix attached to the names of certain animals and is used more productively in Makua and Kimatuumbi. Synchronically, there is little evidence for treating this noun as polymorphemic, although a more detailed analysis of the language may show that such a treatment is justified. If *na-* is given the same morphological treatment as instrumental *na-* and locative *pa-*, then these alternations can be explained by applying (79).

The final problem in interaction between Floating H Docking and NP-internal tonology is the interaction between H Docking and the possessive construction. The possessive construction involves both the addition of a floating tone and the deletion of tones before the pronoun. What we find is that H Docking and Rightward Spreading apply beginning with the noun and extending through other modifiers up to the possessive pronoun. Consider the following pairs of sentences, the first sentence in each having a 2 person subject which does not have the requisite floating H for Floating H Docking.

(81)   a.   *uyuma chikalangó chaangu*   'you are buying my pot'

   ayuma chíkálángó chaangu   'he is buying my pot'

   b. *uulaya nankatatambwé weetu*   'you are killing our spider'

   aulaya nánkátátámbwé weetu   'he's killing our spider'

---

[15]The preconsonantal nasal is tone bearing, so it receives a default L tone. By syllable fusion, the spread H and the nasal's L combine to give a falling tone.

     c. *uniyumila vayungula vabayá veetu*   'you are buying our bad rabbits for me'

       aniyumila váyúngúlá vábáyá veetu   'he's buying our bad rabbits for me'

What is surprising is that, although the object noun does not have a H tone—as we have seen, an important condition for application of Floating H Docking—the rule applies. Example (b), which uses an underlying toneless noun, shows that the rule is not triggered by the underlying H tone of the noun; the rule applies to all nouns modified by a possessive pronoun.

    This mystery can be solved by making more precise the nature of the tonal condition on the docking rule. Docking does not apply when there is no H tone at all following the floating H (*ayumá mambeende* 'he is buying skins') or when the following H is not associated with the noun (*ayumá milango mingáapí* 'how many doors is he buying?'). Docking does apply if the following H is associated to the noun itself (*aniyumila chíkáláángo* 'he is buying me a vegetable pot') or if the H is floating (*aniyumila váyúngúlá vábáyá veetu* 'he's buying our bad rabbits for me', from *aniyumila vayungula vabaya ΄ veetu*).

    The constraint to be imposed on Floating H Docking is that the H to be docked must be followed by an 'adjacent' H. Parallel to other adjacency conditions, this condition states the maximum separation allowed between determinant and focus. As is the case with all adjacency conditions, it is not sufficient to inspect the terminal features (tones) alone to determine if the adjacency condition is satisfied. Rather, we must also follow a path of nodes dominating the tone to a certain level in the phonological representation (mora, syllable, or word) to ascertain that no other mora, syllable, or word intervenes between the determinant and focus. In other words, adjacency conditions are negative filters, blocking rule application when elements in a string are too far separated. However, a floating tone is not linked to anything else in the phonological representation; a floating tone will then satisfy any adjacency requirement.

    We will consider a last problem in the interaction between Floating H Docking and Spreading and the possessive construction. Infinitive verbs in Makonde are nouns, and their phrases may be modified with a possessive. The data in (82) show infinitive verbs followed by object nouns which are modified by a possessive. The infinitive does not lose its H tones. H is assigned to the first vowel of the noun, which spreads up to the pronoun. Failure of lowering to apply to the infinitive itself is a consequence of the fact that the pronoun is in the same phrase as its head noun (as are the intervening modifiers) but is not in the same phrase as the preceding verb.

(82) *kutéléká nyámá yaake*   'to cook his meat'

      kutéléká nyámá yátángú yaake   'to cook his old meat'

> *kuníúlayila vánánkátátámbwé vóé vaake*   'to kill all his spiders for me'
>
> *ulembela kutéléká nyámá yóé yangu*   'you like to cook all my meat'

When infinitives are the head of a phrase modified by a possessive, they do lose their H tones.

(83)   *kuteleká kwaake*   'his cooking'

       kuvaulayá kwaangu   'my killing them'

       kutuyumilá kwaake   'his buying for us'

An infinitival head noun may have multiple complements, including a full (object) noun phrase and a possessive pronoun. In such a case, the possessive pronoun will cause loss of H tones throughout the object noun phrase and in the infinitive head itself.

(84)   *kukalanga mikambé kwaangu*

       'my frying sweet potato'

       ulola kuyuma ndizí kwaangu

       'you're watching my buying bananas'

       ulola kuyuma ndizi jatangú kwaake

       'you're watching his buying old bananas'

       ulembela kuteleka nyama yoé kwaangu

       'you like my cooking all the meat'

Since the verb, object noun phrases, and the pronoun are in the same phrase, lowering is possible.

Finally, a possessive pronoun may serve as the only element within a headless noun phrase in sentences such as *he took mine*. Whether the word before the pronoun is an inflected verb form or an infinitive, lowering is blocked.

(85)   *kutéléká yáangu*   'to cook mine'

       tuvenkutéléká vyáake   'we are cooking his'

       atuvatelekéla vyáangu   'we didn't cook mine for them'

These restrictions all follow from the fundamental constraint that Possessive Lowering may only apply to elements in the same phrase as the possessive pronoun.

APPENDIX 1

Paradigm-style examples of the verb tense are given here, including appropriate stem-length, subject prefix, and object prefix contrasts.

FUTURE POSITIVE

1 subject	3 subject	Gloss	OP
nnaalya	*anáalya*	'eat'	--
nnavaápa	*anaváapa*	'give'	them
nnaliíma	*análiima*	'cultivate'	--
nnakiyuúma	*anakíyuuma*	'buy'	it
nnateleéka	*anatéleeka*	'cook'	--
nnachiteleéka	*anachíteleéka*	'cook'	it
nnapilikaána	*anapílikaána*	'hear'	--
nnavafukuziíla	*anaváfúkuziíla*	'chase for'	them

FAR PAST

1 subject	3 subject	Gloss	OP
nníilya	*aníilya*	'eat'	--
nniváapa	*aniváapa*	'give'	them
nníliima	*aníliima*	'cultivate'	--
nnikíyuuma	*anikíyuuma*	'buy'	it
nnitéleeka	*anitéleeka*	'cook'	--
nnichíteleéka	*anichíteleéka*	'cook'	it
nnipílikaána	*anipílikaána*	'hear'	--
nniváfúkuziíla	*aniváfúkuziíla*	'chase for'	them

NEAR PAST

1 subject	3 subject	Gloss	OP
ńniilya	ániilya	'eat'	--
ńnivaápa	ánivaápa	'give'	them
ńnilííma	ániliíma	'cultivate'	--
ńníkiyuúma	áníkiyuúma	'buy'	it
ńníteleéka	áníteleéka	'cook'	--
ńníchiteleéka	áníchiteleéka	'cook'	it
ńnípilikaána	anípilikaána	'hear'	--
ńnívafukuziíla	anívafukuziíla	'chase for'	them

CONDITIONAL

1 subject	3 subject	Gloss	OP
nikáalya	akáalya	'eat'	--
nikachíilya	akachíilya	'eat'	it
nikalíima	akalíima	'cultivate'	--
nikakiyúuma	akakiyúuma	'buy'	it
nikateléeka	akateléeka	'cook'	--
nikavitelekéela	akavitelekéela	'cook'	them

FUTURE NEGATIVE

1 subject	3 subject	Gloss	OP
iíli	aáli	'eat'	--
ikuúpi	akuúpi	'give'	you
ilíimi	alíimi	'cultivate'	--
ikiyúumi	akiyúumi	'buy'	it
iteléeki	ateléeki	'cook'	--
ichiteléeki	achiteléeki	'cook'	it

SUBJUNCTIVE

2 subject	Gloss	OP
uulyé	'eat'	--
uvíilye	'eat'	them
ulíime	'cultivate'	--
ukilíime	'cultivate'	it
uteleéke	'cook'	--
uvatélékéele	'cook for'	them

INFINITIVE

	Gloss	OP
kuúlya	'eat'	--
kuvíilya	'eat'	them
kulíima	'cultivate'	--
kuchíshoona	'sew'	it
kutélééka	'cook'	--
kuchíteleéka	'cook'	it
kupíndíkúúla	'change'	--
kuvátélekeéla	'cook for'	them

APPENDIX 2

The rules cited above are recapitulated here, in their order of application.

(5)　**Stem H Insertion**

$$\emptyset \ \rightarrow \ H \,/\, [_{STEM} \underline{\quad}]$$

(13)　**Future Negative Docking**

$$
\begin{array}{ll}
\quad H & \qquad \text{[Future Negative]} \\
\quad | & \\
\quad | & \\
[_{ROOT} \cdots \mu\,] &
\end{array}
$$

(9)　**Stem Mapping**　　(applies in:　conditional
　　　　　　　　　　　　　　　　　　subordinate tenses
　　　　　　　H´　　　　　　　subjunctive+OP
　　　　　　　|　　　　　　　"might not" tense
　　　　　　　|　　　　　　　inst. nom.)
　　　　　　　μ]

(4)　**Stress Lengthening**
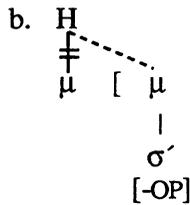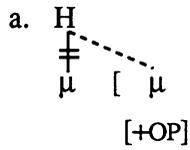
$$
\begin{array}{c}
\text{[+stress]} \\
\sigma \\
| \\
| \\
\emptyset \ \rightarrow \ \mu
\end{array}
$$

(7)　**Default Docking**

$$
\begin{array}{c}
H´ \\
| \\
| \\
\mu]
\end{array}
$$

(31)   **Shift to Stem**

a. H
        ╪----___
        μ   [μ
              [+OP]

b. H
        ╪----___
        μ   [μ
               |
               σ´
              [-OP]

(32)   **Shift to Prefix**

H
╪------------___
μ   μ
[+SP]   [FUT,REM. PAST

(39)   **Stem Initial Docking**

H´
  ----___
   [μ

(16)   **Tone Doubling**

H
  ----___
μ   μ
       |
       σ   σ´
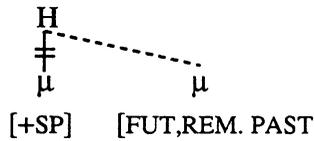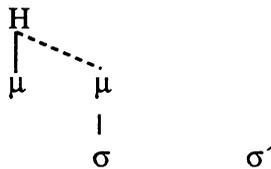
(18)   **Meeussen's Rule**

H →   Ø / H ___

(46) **Stem H Deletion**

$$H \rightarrow \emptyset \ / \ [\overline{ka\text{-SUBJUNCTIVE}} \ ]$$

(47) **OP-Subjunctive H Docking**

$$\begin{array}{c} H' \\ \diagdown \\ [_{\text{ROOT}} \quad \mu \end{array}$$

(73) **Modified Noun H Insertion**

$$[_{\text{NP}} \ [_{\text{N}} \ ... \mu \ \mu \ ] \ X \ ] \\ | \\ | \\ \emptyset \rightarrow H$$

(74) **Demonstrative Spreading**

$$\begin{array}{c} H \\ \uparrow \diagdown \\ \mu \quad \mu \ ... \ ] \end{array} \qquad [\text{+DEMONST.}]$$

(61) **WH-Modifier Lowering**

$$[_{\text{NP}} \ [_{\text{N}} \ \underline{\quad} \ ] \ [\text{+WH}] \ ... \ ] \\ | \\ | \\ H \rightarrow \emptyset$$

(69) **Possessive Lowering**

$$H \rightarrow \emptyset \ / \ [_{\text{A}} \ ... \ \underline{\quad} \ ] \ .... \ [_{\text{B}} \quad \text{POSS. PRO.}] \qquad \text{B c-commands A}$$

(64)   **Possessive Docking**

$$\text{μ}_A] \; [_B \; \text{POSS. PRO.}] \quad\quad \text{B c-commands A}$$

with a dashed line from H to μ_A.

(57)   Floating H Docking

H′ $[_ω$ H

$[_ωμ$

(43)   **Rightward Spreading**

H   H   (blocked in [+ASSERTIVE] verbs)

μ   μ′

(79)   **Clitic Spreading**

H
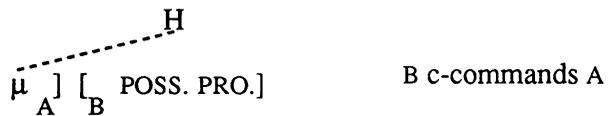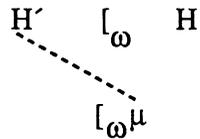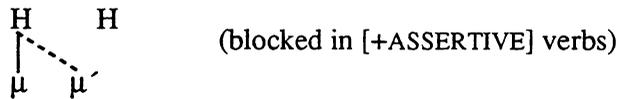
μ] $[_{CLITIC}$ μ
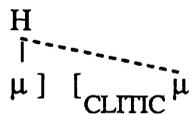
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TONE IN ABIDJI VERB MORPHOLOGY*

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This article is a description of the morphology of the regular verbs in Abidji. It shows how segmental and tonal rules interact to produce the realization of 14 tense-aspect combinations in 2 different classes of verbs. Each tense or aspect is represented by a specific tone pattern on the verb root and causes the occurrence of a certain tone on the prefix. I start with the description of the verbal structure and the presentation of the various tense-aspect combinations and of the 3 classes of verbs. Then I describe the tonal realization of each tense-aspect combination on the stems of Class 1 and Class 2 verbs (leaving out the third class of irregular verbs). Finally, I describe the phonological rules that create the tone-pattern found on the prefix.

O. Introduction

Abidji[1] has a straightforward two-tone system which plays a very important role in the language mainly because of its use in tense-aspect derivations of verbs.

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[1] The Abidji language is spoken by about 30,000 people in the southeast part of Côte d'Ivoire in a region situated 80 kms north of Abidjan. Abidji, under the name of Ari, was classified by Westermann and Bryan in the Lagoon Group of the Kwa languages. In Greenberg's classification, Abidji is called Ari and belongs to the Congo-Kordofanian group, Niger-Congo

The goal of this article is to describe how the two tonemes (H and L)[2] interact within the verbal word to produce the various forms of a verb. The approach chosen for this description is that of Autosegmental Phonology, where tone is considered as a tier independent from the segmental one and behaving according to its own set of rules before it is associated with the next tier, which is that of the segments. This approach suits perfectly the description of the tonal facts existing in Abidji since the analysis revealed the following:

(1) In Abidji, the process of tone mapping conforms to the Tone Mapping Rule described by Williams[3] (and referred to in this paper by the term "Association Convention").

However, the following stipulations need to be added:

(2) The Tone Bearing Unit (TBU) is the syllable, i.e. a unit of *timing* made up of one of the following segmental combinations: V, CV, CrV,[4] and CVV. In the last combination, the vowel sequence is always of the type:

$$C \qquad V_1 \qquad V_2$$
$$\text{[+high]} \quad \text{[-high]}$$

(3) A TBU which is immediately followed by a word boundary or by a TBU carrying its own intrinsic tone is allowed to carry 2 tones but not more. If such a TBU has only one vowel, that single vowel will carry the tone glide, but if it has two, the tone glide will be distributed over the two vowels:

```
   T             T             T
   |             |             |
   σ             σ             σ
   Λ            /Λ            /Λ
   CV           CrV           CVV
```

---

family, sub-family Kwa, sub-group b: Lagoon Languages (I.A.4.b). The Abidji themselves do not use this word "Abidji", which is the term used by the Administration and by the other ethnic groups. They themselves use only the names of the 2 dialects, Enyembe, spoken in the southern and western parts of the area, and Ogbru in the east.

[2] In order to avoid possible confusion, I have always used capitals H, L to refer to tones and features within square brackets, e.g. [+high], to refer to segmental vowel height.

[3] I have referred to a 1971 prepublication version of Williams [1976]. Williams' Tone Mapping Rule is as follows:

   (1) It maps from left to right a sequence of tones onto a sequence of syllables.
   (2) It assigns one tone per syllable until it runs out of tones,
   (3) then it assigns the last tone that was specified to the remaining untoned syllables on the right
   (4) until it encounters the next syllable to the right belonging to a morpheme with specified tone.

[4] The symbol *r* stands for the 2 phonemes /r/ and /l/, which are the only two consonants that can appear as C_2 in a syllable initial consonant cluster.

$$
\begin{array}{ccc}
\text{T}_1\ \text{T}_2 & \text{T}_1\ \text{T}_2 & \text{T}_1\ \text{T}_2 \\
\backslash/ & \backslash/ & \backslash/ \\
\sigma & \sigma & \sigma \\
\wedge & /\!\!\wedge & /\!\!\wedge \\
\text{CV} & \text{CrV} & \text{CVV}
\end{array}
$$
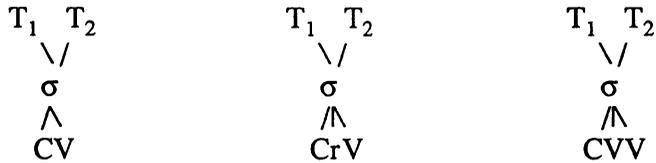
There is a language specific restriction that no TBU can carry three tones. Thus, it is never possible for the final V in a CVV syllable to carry a tone glide.

(4) In the verbs, the domain of association of a tone pattern starts with the first Tone Bearing Unit of the stem. Thus the prefixes that are inherently toneless (the pronoun and the Aspect Vowel) are outside this domain of association and will require special phonological rules to determine the tone that they will bear in each environment.

1. Generalities

In order to describe the different realizations of tone on the verbs, we need to divide the verbs into three classes on the basis of their tonal behaviour, but before we do this, we must state the properties that all three classes have in common, i.e. the structure of a verb form, and the different tenses and aspects.

1.1. The structure of the verb.

1.1.1. Roots and reduplicated stems. The obligatory element of a verb is the *root*. A root is always monomorphemic, but it can be either monosyllabic or disyllabic:[5]

(5)   MONOSYLLABIC   DISYLLABIC

ye	'to show'	*tɔpɔ*	'to send someone'
fɔɛ	'to laugh'	*kɔatɔ*	'to remind'
kpra	'to look'	*bɔka*	'to help'

A root can be expanded by the addition of a reduplication prefix which is made up of the first consonant of the root, but since consonant clusters C_1C_2 in which C_2 is not /r/ or /l/ are forbidden in the language, a vowel epenthesis rule is necessary. This rule inserts a [+high] vowel in the C_1C_2 sequence when a

---

[5] Abidji has the following phonemes: 21 consonants /p, b, f, w, m, t, d, s, l, r, n, c, j, y, ɲ, kp, gb, k, g, ʔ, h /; 9 vowels, divided into 2 series [+ATR] *i, e, u, o* and [-ATR] *ɪ, ɛ, ɔ, ɔ, a.*

reduplicative prefix is added to a verb root. The epenthetic vowel agrees in backness and ATR with the first vowel of the root.

(6)   VOWEL EPENTHESIS

$$\emptyset \rightarrow \begin{bmatrix} V \\ +high \\ \alpha F \end{bmatrix} \quad / \quad \underset{PFX}{C_1} \_ C_2 \quad \underset{[\alpha F]}{V} \quad X$$

The presence of the reduplicative prefix means that the action is performed by several agents or has several objects. In the case of the reduplicated form of a verb, we will no longer talk about the verb *root*, but about the verb *stem*.

(7)   ROOT   REDUPLICATED STEM

ye	'to show'	*yi-ye*	'to teach'
kpra	'to look'	*kpɪ-kpra*	'to inspect'
fie	'to wash'	*fi-fie*	'to wash many clothes'
tɔpω	'to send someone'	*tω-tɔpω*	'to send many people'

In addition to the reduplicative prefix, some verb roots need an intensive suffix -U.[6] This suffix is also counted as part of the stem in the mapping of the different tone patterns.

(8) ROOT   REDUPLICATED STEMS WITH INTENSIVE SUFFIX

pa	'to buy'	*pɪ-pa-ω*	'to buy many things'
fɔɔ	'to give'	*fω-fɔɔ-ω*	'to give many presents'

Then to the stem (or root when non-reduplicated) can be added several prefixes and suffixes.

1.1.2. Prefixes.   (a) *Aspect Vowel (AV)*: This vowel, which is [+high] for some tense-aspect combinations and [-high] for others (as shown in (31), (32), (33), and (34) of §1.2), comes immediately to the left of the stem. It is inherently toneless and so derives its tone from the Tone Mapping Rules that will be described in §3.

---

[6] Since the phonetic realization of a vowel depends on the vowel harmony specifications of the word it belongs to, *U* represents the two [+high,+back] vowels [*u*] and [*ω*]. *I* represents the two [+high,-back] vowels [*i*] and [*ɪ*].

(9) a. *ɔ́-tɔ̀tɔ́pɔ́*[7]   'to send several people'   (INFINITIVE)
    AV-STEM

   b. *n-ó-bùtú*   'he has asked'   (ACCOMPLISHED)
    S-AV-STEM

   c. *f-ì-yê*   'you show'   (HABITUAL)
    S-AV-STEM

(In 9b and 9c, S- represents the subject pronoun.)

(b) *Aspect Morpheme (AM)*: In addition to the AV, some aspects also require an Aspect Morpheme, which comes directly to the left of the AV in the verb structure. Unlike the AV, the AM carries its own inherent tone. However, when the segmental representation of this AM is a phoneme carrying the feature [-syll], the tone that is associated with it will have to dock onto the nearest element on the segmental tier carrying the [+syll] feature. This element is always the AV, and the rule that accomplishes this is called the Aspect Morpheme Tone Docking Rule (AMTD).

There are four Aspect Morphemes. Three of them are sonorant consonants, and one is an obstruent. The sonorants may undergo certain phonological changes when another consonant (the subject pronoun) is also present in the prefix.

The PROGRESSIVE aspect morpheme is attached to the PROGRESSIVE and the PROGRESSIVE NEGATIVE. It takes the following form:

$$
\begin{array}{ll}
\text{tonal tier} & \text{L} \\
& | \\
\text{segmental tier} & n \\
& \begin{bmatrix} \text{-syll} \\ \text{+son} \\ \text{+alv} \end{bmatrix}
\end{array}
$$

Its segmental representation is the nasal alveolar sonorant /n/. On the segmental tier, it undergoes a deletion rule when a subject pronoun is present:

---

[7] In all the examples given in this section, the surface tone pattern of each tense or aspect is indicated because it is part of this particular form, but for a full justification of its realization, see §2 and §3.

(10) SONORANT ASPECT MORPHEME DELETION RULE (SAMDR)

$$\begin{bmatrix} C \\ \text{-syll} \\ \text{+son} \\ \text{AM} \end{bmatrix} \rightarrow \emptyset \ / \ \begin{bmatrix} C \\ \text{-syll} \\ \text{PRN} \end{bmatrix} \_V$$

(11)   PROGRESSIVE without subject pronoun

Underlying	*Kìrî*	*n`-é-sî*	
	Subject	AM-AV-stem	
AMTD	*Kìrî*	*n-ĕ-sî*	'Kere is bringing'

(12) PROGRESSIVE with subject pronoun

Underlying	*f-n`-è-sî*		
	PRN-AM-AV-stem		
SAMDR	*f`-è-sî*	[*fèsî*]	'you are bringing'
	PRN-AV-stem		

(13) PROG NEG without subject pronoun

Underlying	*Kìrî*	*n`-é-sì*	
	Subject	AM-AV-stem	
AMTD	*Kìrî*	*n-ĕ-sì*	'Kere is not bringing'

(14) PROG NEG with subject pronoun

Underlying	*f-n`-é-sì*	
	PRN-AM-AV-stem	
SAMDR	*f`-é-sì*	
	PRN-AV-stem	
AMTD	*f-ĕ-sì*	'you are not bringing'

The FUTURE aspect morpheme takes the following form:

$$
\begin{array}{ll}
\text{tonal tier} & \text{H} \\
& | \\
\text{segmental tier} & y \\
& \begin{bmatrix} \text{-syll} \\ \text{+son} \\ \text{FUT} \end{bmatrix}
\end{array}
$$

Its segmental representation is the palatal semi-vowel /y/. On the segmental tier, it also undergoes the deletion rule (10) when a subject pronoun is present:

(15) FUTURE without subject pronoun

> *Kìrî*   *y´-î-sî*   'Kere will bring'
> Subject   AM-AV-stem

(16) FUTURE with subject pronoun

> Underlying   *f-y´-î-sî*
>   PRN-AM-AV-stem
>
> FUT AM Deletion   *f´-î-sî*
>   PRN-AV-stem
>
> AMTD   *f-î-sî*   'you will bring'

The PROVISIONAL NEGATIVE aspect morpheme takes the following form:

$$
\begin{array}{ll}
\text{tonal tier} & \text{L} \\
& | \\
\text{segmental tier} & y \\
& \begin{bmatrix} \text{-syll} \\ \text{+son} \\ \text{PROV NEG} \end{bmatrix}
\end{array}
$$

Its segmental representation is again the palatal semi-vowel /y/, but its tonal and segmental behaviour when the subject is a pronoun is different from that of the preceding aspect morphemes in that it must undergo the Syllabification Rule (17) rather than the deletion rule (10), which must thus be revised as (10').

(17)   PROVISIONAL NEG. ASPECT MORPHEME SYLLABIFICATION

$$
\begin{bmatrix} y \\ \text{-syll} \\ \text{PROV NEG} \end{bmatrix} \rightarrow \begin{matrix} I \\ [\text{+syll}] \end{matrix} \Big/ \begin{bmatrix} C \\ \text{-syll} \\ \text{PRN} \end{bmatrix} \underline{\quad} V
$$

(10')   SONORANT ASPECT MORPHEME DELETION

$$
\begin{bmatrix} C \\ \text{-syll} \\ \text{+son} \\ \text{AM} \end{bmatrix} \rightarrow \emptyset \Big/ \begin{bmatrix} C \\ \text{-syll} \\ \text{PRN} \end{bmatrix} \underline{\quad} V
$$

Condition:
$$
\begin{bmatrix} C \\ \text{-syll} \\ \text{+son} \\ \text{AM} \end{bmatrix} \neq \begin{bmatrix} y \\ \text{-syll} \\ \text{+son} \\ \text{PROV NEG} \end{bmatrix}
$$

Rule (17) changes the semi-vowel /y/ into the vowel /I/ (cf. fn. 6) when a pronoun is added. By changing its feature from [-syll] to [+syll], this rule allows the PROV NEG AM to act as the segmental support for its own low tone, but it also obliges it to conform to the Vowel Harmony Rule (18).

(18)   VOWEL HARMONY RULE

$$
\begin{matrix} V \\ \text{PRF} \end{matrix} \rightarrow [\alpha\text{ATR}] \big/ C\underline{\quad}C \begin{bmatrix} V \\ \alpha\text{ATR} \\ \text{ROOT} \end{bmatrix}
$$

(A vowel occurring in an affix has ATR harmony with the vowel(s) of the root.)

Thus, the syllabified PROV NEG AM will be realized as the vowel /i/ in verbs carrying the feature [+ATR], and as the vowel /ɪ/ in verbs carrying the feature [-ATR], as shown in the following examples:

(19) PROVISIONAL NEGATIVE without subject pronoun

	a. [+ATR] root	b. [-ATR] root
Underlying	Kìrî y`-é-sî Subject AM-AV-stem	Kìrî y`-ɛ́-lî Subject AM-AV-stem
AMTD	Kìrî y-ĕ-sî	Kìrî y-ɛ̆-lî
	'Kere has not brought yet'	'Kere has not done yet'

(20) PROVISIONAL NEGATIVE with subject pronoun

	a. [+ATR] root	b. [-ATR] root
Underlying	f-y`-é-sî S-AM-AV-stem	f-y`-ɛ́-lî S-AM-AV-stem
AM Syllabification & Vowel Harmony	f-ì-é-sî S-AM-AV-stem	f-ì-ɛ́-lî S-AM-AV-stem
	'you have not brought yet'	'you have not done yet'

The PROHIBITIVE aspect morpheme consists of the alveolar voiced plosive /d/ on the segmental tier and a low tone on the tonal tier. This tone will of course dock onto the AV, but unlike the other AM, the consonant, probably because it is an obstruent and not a sonorant, will not delete in the presence of a pronoun. Instead, it will cause the insertion of an epenthetic vowel according to rule (6), just like the reduplicative prefix.

(21)   PROHIBITIVE with pronoun subject

Underlying	n-d`-è-sî PRN-AM-AV-stem	
Epenthesis	nì-d-è-sî	'don't let him bring'

This epenthetic vowel has no tone of its own, and since in the PROHIBITIVE the pronoun does not cause any specific tone to appear, this syllable always copies the tone of the next one, as will be shown in (74).

(c) *Subject Pronoun (S)*: It occurs as the very first element of the verb when the subject is not a Noun Phrase or in the DIRECT IMPERATIVE and PROHIBITIVE when the subject is not in the second person. This pronoun is an inherently toneless consonant with the following forms:

			S-AV-STEM	
(22)	*m-*	for 1st p. sg.	*m-ù-tútrù*	'I think'
(23)	*f-*	for 2nd p.	*f-ù-tútrù*	'you think'
(24)	*n-*	for 3rd p.	*n-ù-tútrù*	'he/she thinks'
(25)	*r-*	for 1st p. pl.	*r-ù-tútrù*	'we think'

1.1.3. Suffixes. Now, to the right of the stem one may add the following suffixes:

(a)   plural -*n*I. This suffix carries its own H tone:

(26)	*nîyê*	'he will show'	*nîyê-ní*	'they will show'
	flpá	'you (sg) buy'	*flpá-ní*	'you (pl) buy'

(b)   Object Pronouns (O):

(27)	-*m*U	for 1st p. sg.	*nùbútù-mù*	'he asks me'
(28)	-*f*U	for 2nd p. sg.	*nùbútù-fù*	'he asks you'
(29)	*n*I	for 3rd p. sg.	*nùbútù-nì*	'he asks him'

The 3rd person pronoun carries its own L tone, but the 1st and 2nd person pronouns change their tone according to the class of the verb they are attached to. Plural object pronouns are independent words, not suffixes.

(c)   Negative Morpheme -*m*U with a H tone appears in the negative group (see 32):

(30)   *n-é-yê-mú*   'he doesn't show'
       S-AV-ROOT-NEG

The only verbal suffix we will talk about in this article is the negative morpheme -*m*Ʊ.

We can sum up the position of the different elements of the verb in the following formula:

$$\pm\text{Subj. pron.} \pm\text{AM} \pm\text{AV} + \underbrace{\left|\pm\text{redupl.} +\text{ROOT} \pm\text{Intensive}\right|}_{\text{STEM}} \pm \begin{Bmatrix} \text{negative} \\ \text{plural} \\ \text{object} \end{Bmatrix}$$

1.2. Tenses and aspects. All verbs share the same combinations of tenses and aspects. These tense-aspect combinations all have an Aspect Vowel in their surface realizations apart from three exceptions: (31b), (33a) and (33b), in which the stem is found in isolation when the subject is not a pronoun. For some combinations, the Aspect Vowel is [+high], for others, it is [-high], as shown in (31-34) below.

The different tense-aspect combinations can be divided into four different groups according to the Tone Mapping Rules (TMR) that operate within them. I give the combinations belonging to the four groups here. By establishing these groups, the derivations of sections 2 and 3 will lead to the correct surface forms.

(31) Positive Group

			AV height
a.	HABITUAL	(HAB)	[+high]
b.	PERFECTIVE	(PERF)	[+high] with pronoun
c.	FUTURE	(FUT)	[+high] (except in 57b)
d.	PROGRESSIVE	(PROG)	[-high]
e.	ACCOMPLISHED	(ACC)	[-high]
f.	HYPOTHETICAL	(HYP)	[-high]

(32) Negative Group

			AV height
a.	ABSOLUTE NEGATIVE	(ABS NEG)	[+high]
b.	SPECIFIC NEGATIVE	(SPEC NEG)	[-high]
c.	PROGRESSIVE NEGATIVE	(PROG NEG)	[-high]
d.	PROVISIONAL NEGATIVE	(PROV NEG)	[-high]

(33) Imperative Group

			AV height
a.	DIRECT IMPERATIVE	(DIR IMP)	[+high] with pronoun
b.	INDIRECT IMPERATIVE	(IND IMP)	[+high] with pronoun
c.	PROHIBITIVE	(PROH)	[-high]

(34) The INFINITIVE (INF) with a [-high] AV constitutes the fourth category.

Within each of these groups, the same TMR's operate.

1.3. The three classes of verbs. The Abidji verbs are divided into three different classes according to the different tone patterns which appear on the verb stems to realize the various tense-aspect combinations.

   Class 1 contains the vast majority of Abidji verbs. Stems of class 1 can consist of up to 3 TBU's on which the tense-aspect combinations can be realized by tone patterns of one or two tones. The tone pattern realized on Class 1 stems is L for some tense-aspect combinations, HL for others, and LH for yet others, as shown in (35).

   Class 2 consists only of a few CV and CVV roots on which the tense-aspect combinations can be realized by tone patterns of one tone only, specifically L or H, as shown in (35).

(35)   Summary chart of stem tone patterns in Classes 1 and 2

Tone Pattern on Class 1 stems	Tense-aspect combination	Tone Pattern on Class 2 roots
HL	HAB PERF FUT PROG HYP SPEC NEG PROV NEG IND IMP	H
LH	PROH ACC ⎡NP Subj ⎣prn Subj INF	(H / L)
L	ABS NEG PROG NEG DIR IMP	L

   This table shows that for every tense-aspect combination (bar two exceptions), the single tone on Class 2 stems is identical to the first tone of the tone pattern on

Class 1 stems. The two exceptions in Class 2 are ACCOMPLISHED with a Noun Phrase Subject and PROHIBITIVE (see examples (76) and (77) of §3.4).

Note that none of the verbs belonging to Class 2 can have more than one TBU. Consequently, the reduplicated forms of all Class 2 roots will belong to Class 1.

Another characteristic of Class 2 verbs is the absence of the negative suffix -*mʊ́* in the negative group of tense-aspect combinations.[8]

(36) SPECIFIC NEGATIVE

	a.	Class 1	b.	Class 2
		n-á-kprâ-mɔ́		*n-ɔ́-tɔ́*
		S-AV-ROOT-NEG		S-AV-ROOT
		'he is not looking'		'he is not giving'

There is a 3rd class composed of the following 5 irregular verbs:

ʔa	'to go'
ʔɩ	'to eat'
ʔi	'to come'
ʔu	'to die'
ʔɷ	'to fight'

I will not treat them further here.

2. Tone on Verbal Stems

2.1. Class 1 verbs. In this class, the three tone patterns available are L, HL, and LH. With 14 tenses and aspects and only 3 tone patterns, several forms have to share the same tone pattern.

Class 1 is divided into 3 sub-classes, according to the CV structure of the segmental tier:

-Sub-class 1a consists of monosyllabic roots (only one TBU: CV, CVV, CrV).

-Sub-class 1b consists of disyllabic roots (2 TBU's).

-Sub-class 1c contains all expanded stems derived from roots of sub-classes 1a and 1b and from roots of class 2.

---

[8] The negative suffix reappears in Class 2 verbs, however, when another suffix is also present, such as the object pronoun or the plural.

2.1.1. The L tone pattern.

(37) Sub-class 1a:

	L	L	L
	|	|	|\
	CV	CrV	CVV
	ROOT	ROOT	ROOT

DIR IMP	yè	kprà	ɲὲ
2nd person sg	'show!'	'look!'	'hope!'

(38) Sub-class 1b:

	L	L
	/ \	/ | \
	CVCV	CVVCV
	ROOT	ROOT

DIR IMP	bùtù	kⱥ̀àtⱥ̀
2nd person sg	'ask!'	'remind'

(39) a. Sub-class 1c:
          (reduplicated)

	L	L	L
	∧	⋀	⋀
	CV-CV	CV-CVV	CV-CVCV
	rd-ROOT	rd-ROOT	rd-ROOT

DIR IMP	gⱥ̀-gↄ̀	bǐ-bì è	kù-kòtù
2nd person sg	'implore!'	'scratch!'	'praise!'

b.

	L	L
	∧	⋀
	CV-CrV	CV-CVVCV

DIR IMP	jǐ-jrὲ	sù-sùòpù
2nd person sg	'shine!'	'examine!'

Some CV and CVV roots add the intensive suffix -U to their reduplicated form. This suffix is still within the domain of the root tone pattern.

c.
<table>
<tr><td></td><td>L
⋀</td><td>L
⋀</td></tr>
<tr><td></td><td>CV-CV-U
rd-ROOT-intens.</td><td>CV-CVV-U
rd-ROOT-intens.</td></tr>
<tr><td>DIR IMP
2nd person sg.</td><td>kì -kè-ù
'shake!'</td><td>fɔ̀-fɔ̀ɔ̀-ɔ̀
'give many presents!'</td></tr>
</table>

2.1.2. The HL tone pattern

(40) Sub-class 1a:

<table>
<tr><td></td><td>HL
∖∣
CV
NPS ROOT</td><td>HL
∖∣
CrV
NPS ROOT</td><td>HL
∣∣
CVV
NPS ROOT</td></tr>
<tr><td>PERF</td><td>Áyɔ́ yê
'Ayo showed'</td><td>Áyɔ́ kprâ
'Ayo looked'</td><td>Áyɔ́ líὲ
'Ayo hoped'</td></tr>
</table>

(41) Sub-class 1b:

HL
∣ ∖
CVCV

NPS ROOT

PERF   Áyɔ́ bútù
'Ayo asked'

Since the Tone Bearing Units are syllables, the HL pattern is mapped onto a CVVCV root in the following way (see (3) of section 0):

(42) Underlying

H   L
∣   ∣
σ   σ
/∣∖ /∣
CVVCV

Surface Form

H   L
∣∖ ∣
CVVCV

PERF   Áyɔ́ kɔ́átɔ̀
NPS   ROOT
'Ayo reminded'

(43) a. Sub-class 1c   H L   H L
      (reduplicated) | | | ᐱ
                    CV-CV   CV-CVV
             NPS rd-ROOT NPS rd-ROOT

     PERF   *Áyó̟ gó̟-gò̟*   *Áyó̟ bí-bǐ è*
              'Ayo implored'   'Ayo scratched'

    b.   H L   H   L   H L
                  | | | /|\ | |\
                 CV-C*r*V   CV-CVVCV   CV-CVCV
            NPS rd-ROOT NPS rd-ROOT   NPS rd-ROOT

     PERF   *gbê jí-jrè*   *Áyó̟ sú-sùò̟pù* *Áyó̟ kú-kòtù*
            'the sun shone'   'Ayo examined'   'Ayo praised'

    c.   H L   H   L
                 | /\ | /\\
                 CV-CV-U   CV-CVV-U
            NPS rd-ROOT-intens.   NPS rd-ROOT-intens.

     PERF   *Áyó̟ kí-kè-ù*   *Áyó̟ fó̟-fò̟ò̟-ò̟*
            'Ayo shook'   'Ayo gave many presents'

2.1.3. The LH tone pattern. In sub-classes 1a and 1b, the LH tone pattern is mapped onto the number of TBU's available according to the association convention. Note that in the following examples (44) to (47c), the tone on the Aspect Vowel is H because of the Initial Stem Tone Polarization Rule formulated in (59) of §3.1.2.

(44) Sub-class 1a in the INFINITIVE ([-high] AV):

Underlying	LH	LH	LH
	e-ye	*a-kpra*	*ɛ-lɪɛ*
	AV-ROOT	AV-ROOT	AV-ROOT
Association	LH	LH	LH
Convention	|/	V	||
	e-ye	*a-kpra*	*ɛ-lɪɛ*
Surface Form	*éyě*	*ákprǎ*	*ɛ́ɲɛ́*
	'to show'	'to look'	'to hope'

(45) a. Sub-Class lb in the INFINITIVE ([-high] AV):

        Underlying   L H

                                      o-butu
                                      AV-ROOT

        Association   L H
        Convention | |
                                   o-butu

        Surface Form   *ó-bùtú*
                                  'to ask'

Again, as with example (42), a root initial CVV syllable carries the first tone of the tone pattern in (45b).

(45) b. Sub-class 1b in the INFINITIVE ([-high] AV):

        Underlying Form   L   H
        and | |
        initial associations   σ σ
                                 /ᛁ /|
                             a-kꞷatꞷ
                             AV-ROOT

        Surface form   *á-kꞷàtꞷ́*
                               'to remind'

But in sub-class 1c (the subclass of reduplicated stems in class 1), the LH tone pattern is not mapped onto the TBU's according to the association convention. In order to describe its behaviour, we need to state a rule for these reduplicated stems which links the first tone of the LH tone pattern to the first syllable of the verb root before reduplication.

(46) Linking Rule

$$
\begin{array}{cc}
\overset{*}{\text{L}} & \text{H} \\
| & \\
\overset{*}{\sigma_{r1}} & \sigma_{r2}
\end{array}
$$
      (σ_r represents the syllables of the root)

Next the association convention puts the rest of the tones of the root pattern on the remaining syllables of the root.

	monosyllabic root	disyllabic root
Association Convention	$\overset{*}{L}$ H $\vert$ / $\overset{*}{\sigma_1}$	$\overset{*}{L}$ H $\vert$ $\vert$ $\overset{*}{\sigma_1}$ σ_2

Then the reduplicative prefix copies the first tone of the root tone pattern.

(47) a. Sub-class 1c in the INFINITIVE ([-high] AV):

Underlying	LH	LH	L H
	gɔ	*bie*	*kotu*
	ROOT	ROOT	ROOT
Linking Rule	$\overset{*}{L}$H $\vert$ $\overset{*}{gɔ}$	$\overset{*}{L}$ H $\vert$ $\overset{*}{b\,i}\,e$	$\overset{*}{L}$ H $\vert$ $\overset{*}{kotu}$
Association Convention	$\overset{*}{L}$H $\vert$/ $\overset{*}{gɔ}$	$\overset{*}{L}$ H $\vert$ $\vert$ $\overset{*}{b\,i}\,e$	$\overset{*}{L}$ H $\vert$ $\vert$ $\overset{*}{kotu}$
Prefix Addition and Tone Copying	L $\overset{*}{L}$H $\vert$ $\vert$/ $\overset{*}{ɔ\text{-}gɷ\text{-}gɔ}$ AV-rd-ROOT	L $\overset{*}{L}$H $\vert$ $\vert$ $\vert$ $\overset{*}{e\text{-}bi\text{-}b\,i\,e}$ AV-rd-ROOT	L $\overset{*}{L}$ H $\vert$ $\vert$ $\vert$ $\overset{*}{o\text{-}ku\text{-}kotu}$ AV-rd-ROOT
Surface Form	ɔ́gɷ̀gɔ̌ 'to implore'	ébìbìé 'to scratch'	ókùkòtú 'to praise'

(47) b. Sub-class 1c with -U suffix in the INFINITIVE:

Underlying   L H

                              e-ki-ke-u
                            AV-rd-ROOT-intens.

Surface Form   *é-kì-kè-ú*
                            'to shake'

(47) c. Sub-class 1c in the INFINITIVE: Once again, in the case of a CVV root-initial syllable, the L tone is carried by the CVV syllable, as in (42) and (45b).

Initial Associations

$$
\begin{array}{cc}
* & \\
L & H \\
| & | \\
* & \\
\sigma & \sigma \\
/\!\!\backslash & /| \\
\end{array}
\quad\quad
o\text{-}su\text{-}suopu
\quad\quad\quad\quad
\begin{array}{cc}
* & \\
L & H \\
| & | \\
* & \\
\sigma & \sigma \\
/\!\!\backslash & | \\
\end{array}
\quad
\mathcal{o}\text{-}f\omega\text{-}f\omega\mathcal{o}\text{-}\omega
$$

                               AV-rd-ROOT   AV-rd-ROOT-intens.

Tone Copying   L L H   L L H
on the Prefix | /\ | | /\ |
                         o-su-suopu   *ɔ-fω-fωɔ-ω*

Surface Form   *ósùsùòpú*   *ɔ́fὼfὼɔ̀ώ*
                         'to examine'   'to give many presents'

2.2. Class 2 verbs. In this class, the only tone patterns available are H or L, each consisting of just one tone.

Class 2 has a H tone on

HAB	(where Class 1 had HL)	
PERF	"	
FUT	"	
PROG	"	
HYP	"	
SPEC NEG	"	
PROV NEG	"	
IND IMP	"	
PROH	(where Class 1 had LH)	

Class 2 has a L tone on   INF   (where Class 1 had LH)
                           PROG NEG   (where Class 1 had L)
                           DIR IMP   "
                           ABS NEG   "

The tense-aspect combination ACCOMPLISHED is not in the list above because the tone on the root of Class 2 verbs conjugated in the ACCOMPLISHED when the subject is a pronoun is different from what it is when the subject is a Noun Phrase. Specifically, Class 2 has a H tone on ACC with a NP subject and it has L tone on ACC with a pronoun subject.

(48)   The H tone pattern in Class 2 roots

	CV root	CVV root
Underlying Form	H	H
PERF	*Áyó pa* NPS ROOT	*Áyó fɔɛ* NPS ROOT
Association Convention	H | *Áyó pá*	H ⋀ *Áyó fɔɛ*
Surface Form	*Áyó pá* 'Ayo bought'	*Áyó fɔ́ɛ́* 'Ayo laughed'

(49)   The L tone pattern in Class 2 roots

	CV root	CVV root
Underlying	L	L
DIR IMP	*pa* ROOT	*fɔɛ* ROOT
Association Convention	L | *pa*	L ⋀ *fɔɛ*
Surface Form	*pà* 'buy!'	*fɔ̀ɛ̀* 'laugh!'

The ACCOMPLISHED aspect in Class 2 verbs: The tone on the [-high] AV is L in (50) and H in (51) because of the Initial Stem Tone Polarization Rule formulated in (59).

(50)   ACC without pronoun subject

	CV root		CVV root	
Underlying		H		H
	Áyó̄	*a-pa*	*Áyó̄*	*ɛ-fɔɛ*
	NPS	AV-ROOT	NPS	AV-ROOT
Association Convention		H ǀ		H ⋀
	Áyó̄	*a-pa*	*Áyó̄*	*ɛ-fɔɛ*
Surface Form	*Áyó̄*	*àpá*	*Áyó̄*	*èfɔ́ɛ́*
		'Ayo has bought'		'Ayo has laughed'

(51)   ACC with pronoun subject

	CV root	CVV root
Underlying	L	L
	n-a-pa	*n-ɛ-fɔɛ*
	S-AV-ROOT	S-AV-ROOT
Association Convention	L ǀ	L ⋀
	n-a-pa	*n-ɛ-fɔɛ*
Surface Form	*nápà*	*nɛ́fɔ̀è*
	'he has bought'	'he has laughed'

3. Tone on the Aspect Vowel

As was already mentioned (see 1.1.2.a and b), both the Aspect Vowel and the subject pronoun are inherently toneless, and so the tone of the syllable they form needs to be determined by the application of a rule which is different for each group of tense-aspect combinations. That is why we defined in §1.2 four

different groups of tense-aspect combinations: the positives, the negatives, the imperatives and the infinitive.

The negatives are the only aspects that do not take into account the initial stem tone for the determination of the prefix tone. The other three groups cause the prefix to either copy or polarize the first tone of the stem.

Since the first tone of the stem is the same for both classes of verbs apart from two exceptions (see chart (35)), the following rules, which determine the tone of the AV, are valid for Classes 1 and 2, and I will only use a Class 1 CVCV root to illustrate them.

The 2 exceptions in Class 2 (ACC with NP subject and PROH) will be treated separately in (76) and (77).

3.1. The positive group. This is the only group of tense-aspect combinations where two different rules are at work, because it is the only group in which the addition of the pronoun causes a tone polarization rule (59) to apply, while in the absence of the pronoun, the Aspect Vowel simply copies the first tone of the stem.

3.1.1. Initial Stem Tone Copying. The rule which applies in the positive group when there is no pronoun is called Initial Stem Tone Copying (ISTC), and can be formulated as follows:

($T_1 T_2$ represent the root tone pattern and σ_s the syllables of the stem.)

Underlying	T_1	T_2	Tonal tier
	AV- σ_s	σ_s	Segmental tier
Association Convention	T_1 | AV- σ_s	T_2 | σ_s	
(52) ISTC	$T_1\ T_1$ | \ \ | AV -σ_s	T_2 | σ_s	

Here, the Aspect Vowel duplicates the tone T_1, the first tone of the stem tone pattern.

Applications of the ISTC in the POSITIVE group:

TONE PATTERN ON THE ROOT: LH

(53) ACC with NP subject [-high] AV

Underlying		L H

Áyɔ́   o-butu
NPS   AV-ROOT

Association Convention		L H

Áyɔ́   o-butu

ISTC		L L H

Áyɔ́   o-butu

Surface Form   Áyɔ́   òbùtú   'Ayo has asked'

TONE PATTERN ON THE ROOT: HL

	(54) HAB [+high] AV	(55) HYP [-high] AV
Underlying	H L	H L
	Áyɔ́ u-butu NPS AV-ROOT	Áyɔ́ o-butu NPS AV-ROOT
Surface Form	H H L Áyɔ́ u-butu	H H L Áyɔ́ o-butu
	Áyɔ́ úbútù 'Ayo asks'	Áyɔ́ óbútù 'Ayo would ask'

Two other aspects in the positive group: PROG and FUT, need an Aspect Morpheme.

(56) **PROG [-high] AV:** The PROG Aspect Morpheme is *n-* with a L tone which eventually docks onto the AV by the Aspect Morpheme Tone Docking Rule

(AMTD) first mentioned in §1.1.2b. This Tone Docking, which is the reassignment of a tone to an element of the segmental tier different from the one it was initially assigned to, comes at the very end of the derivation, when all other tones have already been assigned, either by convention or by a rule.

		L	H L
Underlying	Áyɔ́	*n-o-butu*	
	NPS	AM-AV-ROOT	

Association
Convention

```
            L   H L
                | |
    Áyɔ́     n-o-butu
```

ISTC

```
            L H  H L
              |  | |
    Áyɔ́     n-o-butu
```

AMTD

```
            L H  H L
             \|  | |
    Áyɔ́     n-o-butu
```

Surface Form   Áyɔ́   *nɔ̆bútù*   Ayo is asking'

(57) **FUT without subject pronoun:** The Future tense without a pronoun has three different realizations, according to the dialect of the speakers. The first two realizations (57a) and (57b) have in common the fact that the AM (*y´-*) carries a H tone (§1.1.2b) and does not undergo any modification on the segmental tier.

The difference between these first two realizations is in the height of the AV. The FUTURE was presented in (31) as having a [+high] AV but with a qualification. In actual fact, when the subject is a pronoun (65), and in two realizations out of three when the subject is a Noun Phrase (57a) and (57c), it does have a [+high] AV. But the most common realization in the dialect I studied (57b), has a [-high] Aspect Vowel.

(57)

	a. FUT [+high] AV	b. FUT [-high] AV
Underlying	H H L	H H L
	Áyɔ́ *y-u-butu* NPS AM-AV-ROOT	*Áyɔ́* *y-o-butu* NPS AM-AV-ROOT

Association
Convention
	H H L
	     | |
	Áyɔ́ *y-u-butu*
		H H L
		     | |
		Áyɔ́ *y-o-butu*

ISTC	H H H L | | | *Áyɔ́* *y-u-butu*	H H H L | | | *Áyɔ́* *y-o-butu*
AMTD	H H H L \\\| | | *Áyɔ́* *y-u-butu*	H H H L \\\| | | *Áyɔ́* *y-o-butu*
fusion of 2 H's	H H L | | | *Áyɔ́* *y-u-butu*	H H L | | | *Áyɔ́* *y-o-butu*
Surface Form	*Áyɔ́* *yúbútù* 'Ayo will ask'	*Áyɔ́* *yóbútù* 'Ayo will ask'

In the third realization (57c), found in 2 or 3 villages in the dialect I studied, it seems that the underlying form of the AM carried a L tone (instead of a H) and, on the segmental tier, was deleted, even though there is no consonant in the environment. The L tone of the AM docks quite normally onto the AV.

(57) c.   FUT [+high] AV

Underlying	L H L
	Áyɔ́ *y-u-butu* NPS AM-AV-ROOT
AM Deletion	*Áyɔ́* *u-butu*

Association   L   H L
Convention | |
                    Áyɔ́   *u-butu*

ISTC   L H H L
                               | | |
                    Áyɔ́   *u-butu*

AMTD   L H H L
                               \| | |
                    Áyɔ́   *u-butu*

Surface Form   *Áyɔ́*   *ŭbútù*   'Ayo will ask'

(58) **The PERF with a NP subject** does not take any AV, but presents only
the root with a HL pattern:

           H L
           | |
Áyɔ́   *butu*   'Ayo asked'

3.1.2. Initial Stem Tone Polarization. The second rule at work in the
positive group applies when the subject is a personal pronoun prefixed to the
Aspect Vowel. This rule, called Initial Stem Tone Polarization (ISTP) causes the
AV to take the tone complementary to the first tone of the root. If we call $-T_1$
the complementary tone to T_1, then we have: $-H=L$ and $-L=H$, and we can
represent the polarization rule schematically as follows:

Underlying T_1 T_2 Tonal tier

            AV- σ_s σ_s Segmental tier

Association T_1 T_2
Convention | |
            AV σ_s σ_s

(59) ISTP $-T_1$ T_1 T_2 Surface Form
               | | |
               AV- σ σ

Applications of ISTP in the POSITIVE group:

TONE PATTERN ON THE ROOT: LH

(60) ACC [-high] AV

Underlying L H

f-o-butu
pm-AV-ROOT

Association L H
Convention | |
f-o-butu

ISTP -L L H (-L=H)
| | |
f-o-butu

Surface Form *fóbùtú* 'you have asked'

TONE PATTERN ON THE ROOT: HL

	(61) HAB [+high] AV	(62) HYP [-high] AV
Underlying	H L	H L
	f-u-butu	*f-o-butu*
	pm-AV-ROOT	pm-AV-ROOT
Surface Form	-H H L	-H H L (-H=L)
	| | |	| | |
	f-u-butu	*f-o-butu*
	fùbútù 'you ask'	*fòbútù* 'you would ask'

(63) **PERF with a subject pronoun** has a [+high] AV and behaves like all other aspects of the positive group with a pronoun subject, i.e., it is submitted to ISTP:

Underlying   H L

                f-u-butu
             prn-AV-ROOT

Surface Form   -H H L   (-H=L)
                 | | |
               f-u-butu

              fùbútù   'you asked'

(64) **PROG:** In this aspect, the Aspect Vowel has the feature [-high], and the progressive AM *n* `-, being a [+son] consonant in a context where it is preceded by another consonant (the pronoun, *f-* , in the example), undergoes the Sonorant AM Deletion Rule of (10').

Underlying   L   H L

               f-n-o-butu
          prn-AM-AV-ROOT

Association   L   H L
Convention | |
               f-n-o-butu

SAMDR   L   H L
                 | |
            f-o-butu

ISTP   L -H H L   (-H=L)
               | | |
            f-o-butu

AMTD   L L H L
              \| | |
            f-o-butu

Fusion of the 2 L's   L   H L
               | | |
            f-o-butu

Surface Form   *fòbútù*   'you are asking'

(65) **FUT:** Unlike what happened when the subject was an NP, there is only one realization for the FUT when the subject is a pronoun. Segmentally, the AV is a [+high] vowel, and the rule applied to the AM *y* ´- is the Deletion Rule of (10). On the tonal tier, ISTP puts a -H on the AV, then the H tone of the AM docks onto the AV, and the net result is a HL glide on the prefix.

Underlying	H H L
	f-y-u-butu
	prn-AM-AV-ROOT
SAMDR	*f-u-butu*
Association Convention	H H L 		 *f-u-butu*
ISTP	H -H H L (-H=L) 		| *f-u-butu*
AMTD	H L H L \\|		 *f-u-butu*
Surface Form	*fûbútù* 'you will ask'

3.2. The Infinitive. The same rule ISTP (59) also applies to determine the tone on the AV in the INFINITIVE form of the verb.

(66) INF [-high] AV

Underlying	L H
	o-butu
	AV-ROOT

```
Surface Form    -L   L H      (-L=H)
                 |   | |
                o-butu


                óbùtú        'to ask'
```

3.3. The negative group. In the negative group, the presence or the absence of the pronoun subject makes no difference to the tone on the Aspect Vowel. In all cases, the AV bears a H tone, and the Initial Stem Tone Copying and Polarization rules do not apply. A Negative Morpheme, -*mÚ* bearing a H tone, however, is also suffixed to the root. Schematically:

```
Underlying        H  T  T  H
                  |  |
                 AV-σ_r  σ_r-mU


Association       H  T  T  H
Convention        |  |  |  |
                 AV-σ_r  σ_r-mU


Surface Form      H  T  T  H
                  |  |  |  |
                 AV-σ_r  σ_r-mU
```

TONE PATTERN ON THE ROOT: L

(67) **ABS NEG**

	NP Subject	Pronoun Subject

Underlying	H L H
	  | |
	Áyɔ́ u-butu-mu
	NPS AV-ROOT-Neg
		H L H
		  | |
		f-u-butu-mu
		pm-AV-ROOT-Neg

Association
Convention
	H L H
	  | /\ |
	Áyɔ́ u-butu-mu
		H L H
		  | /\ |
		f-u-butu-mu

Surface Form	Áyɔ́ úbùtùmú 'Ayo doesn't ask'	fúbùtùmú 'you don't ask'

(68) **PROG NEG [-high] AV:** For the PROG NEG, the Sonorant AM Deletion Rule (10') is used when the subject is a pronoun. When there is no

pronoun, however, the AM does not delete. In both cases, the tone of the AM remains and docks onto the Aspect Vowel.

	NP Subject	Pronoun Subject
Underlying	L H L H | | Áyɔ́ n-o-butu-mu NPS AM-AV-ROOT-Neg	L H L H | | f-n-o-butu-mu prn-AM-AV-ROOT-Neg
SAMDR		f-o-butu-mu
Association Convention	L H L H | /\ | Áyɔ́ n-o-butu-mu	L H L H | /\ | f-o-butu-mu
ÁMTD	L H L H \\\| /\ | Áyɔ́ n-o-butu-mu	L H L H \\\| /\ | f-o-butu-mu
Surface Form	Áyɔ́ nŏbùtùmú 'Ayo isn't asking'	fŏbùtùmú 'you are not asking'

TONE ON THE ROOT: HL

(69) **SPEC NEG**

	NP Subject	Pronoun Subject
Underlying	H HL H | | Áyɔ́ o-butu-mu NPS AV-ROOT-Neg	H HL H | | f-o-butu-mu prn-AV-ROOT-Neg
Association Convention	H HL H | || | Áyɔ́ o-butu-mu	H HL H | || | f-o-butu-mu
Surface Form	Áyɔ́ óbútùmú 'Ayo hasn't asked'	fóbútùmú 'you haven't asked'

(70) **PROV NEG [-high] AV**: The AM *y*ˋ- which appears in the PROV NEG is not deleted when the subject is a pronoun, but it undergoes the Syllabification and Vowel Harmony Rules of (17) and (18) to make up a CVV syllable.

	NP Subject	**Pronoun Subject**
Underlying	L H H L H | | | *Áyɔ́* *y-o-butu-mu* NPS AM-AV-ROOT-Neg	L H H L H | | | *f-y-o-butu-mu* prn-AM-AV-ROOT-Neg
AM Syllabification		*f-i-o-butu-mu*
Association Convention	L H H L H | | | | *Áyɔ́* *y-o-butu-mu*	L H H L H | | | | | *f-i-o-butu-mu*
AMTD	L H H L H \| | | | *Áyɔ́* *y-o-butu-mu*	
Surface Form	*Áyɔ́* *yŏbútùmú* 'Ayo hasn't asked yet'	*fióbútùmú* 'you haven't asked yet'

3.4. The imperative group. The imperatives behave a bit differently than the positives and the negatives as regards the use of pronouns. First of all, the DIRECT IMPERATIVE with a 2nd person subject and the INDIRECT IMPERATIVE with a 3rd person Noun Phrase subject have neither a pronoun nor an Aspect Vowel, but present the stem in isolation, as was mentioned in (33).

(71) **DIR IMP**   (72) **IND IMP**

    L   H L
    |\ | |
    butu   *tɔ̀* *Áyɔ́* *butu*
    ROOT   NPS ROOT

    'ask!'   'make Ayo ask!'

    Secondly, DIR IMP and PROH take a pronoun in all persons but the second, even when the subject is specified by a Noun Phrase, as in (73).

    In the imperative group, the only tonal rule at work is the Initial Stem Tone Copying rule.

(52) ISTC T_1 T_1 T_2 Surface
                | | | Form
            AV-σ_s σ_s

This is an addition to the applicability of ISTC in the positive group without subject pronouns.

Here again, as in the negative group, the presence of the pronoun does not cause any other tone than the one copied from the stem to appear on the Aspect Vowel or on the epenthetic vowel inserted between the pronoun and the PROH AM.

Applications of ISTC in the IMPERATIVE group:

TONE PATTERN ON THE ROOT: L

(73) **DIR IMP [+high] Aspect Vowel**

Underlying   L

                      Áyɔ́   *n-u-butu*
                      NPS   pm-AV-ROOT

Association   L
Convention |\
                      Áyɔ́   *n-u-butu*

ISTC   L   L
                           | |\
                      Áyɔ́   *n-u-butu*

Surface Form   *Áyɔ́*   *nùbùtù*   'let Ayo ask'

TONE PATTERN ON THE ROOT: LH

(74) **PROHIBITIVE [-high] AV:** In the PROHIBITIVE, the Aspect Morpheme is *d-* with a L tone. For the 2nd person PROHIBITIVE, the pronoun is zero and the derivation is straightforward (see left hand column of the example data below). For the 3rd person PROHIBITIVE, however, (shown in the right hand column), since the [-son] Aspect Morpheme cannot delete, an epenthetic vowel is inserted between the 3rd person pronoun *n-* and the Aspect Morpheme

d-, in order to avoid the initial consonant cluster *nd*. (See §1.1.1 and §1.1.2.) Since this epenthetic vowel has no tone of its own, it also copies the L tone of the Aspect Morpheme.

	2nd person	3rd person
Underlying	L L H | *d-o-butu* AM-AV-ROOT	L L H | *n-d-o-butu* pm-AM-AV-ROOT
Association Convention	L L H | | *d-o-butu*	L L H | | *n-d-o-butu*
ISTC	L L L H | | | *d-o-butu*	L L L H | | | *n-d-o-butu*
AMTD	L L L H \\\| | | *d-o-butu*	L L L H \\\| | | *n-d-o-butu*
Fusion of the 2 L's	L L H | | | *d-o-butu*	L L H | | | *n-d-o-butu*
Epenthesis and Tone Copying		L L L H | | | | *nu-d-o-butu*
Surface Form	*dòbùtú* 'do not ask'	*nùdòbùtú* 'don't let him ask'

TONE PATTERN ON THE ROOT: HL

(75) **IND IMP [+high] Aspect Vowel**

2nd person

Underlying   H L

                      f-u-butu
                      pm-AV-ROOT

Association   H L
Convention | |
                      f-u-butu

ISTC   H H L
                       | | |
                      f-u-butu

Surface Form   *fúbútù*
                      '(to make) you ask'

3.5. Exceptions. As I said earlier, the preceding rules apply to all aspects of all verbs belonging to Classes 1 and 2, but there are two little exceptions, however, in Class 2: the ACC with NP subject, and the PROH. We would have expected from §3.1.1 which assigns ISTC to constructions with NP subjects in the positive group, and from §3.3 which assigns ISTC to all constructions in the imperative group, that both (76) and (77) would be subject to this Initial Stem Tone Copying rule. In fact, ISTP is what is needed to get the correct surface form.

The Aspect Vowel, of course, is [-high] from (31e) and (33c). The derivations follow:

CLASS 2	(76) **ACC with NPS.**	(77) **PROH**
Underlying	H	H
	Áyǫ́ *e-ye*	*d-e-ye*
	NPS AV-ROOT	AM-AV-ROOT
Association Convention	H | *Áyǫ́* *e-ye*	H | *d-e-ye*
ISTP	-H H | | *Áyǫ́* *e-ye*	-H H (-H=L) | | *d-e-ye*
Surface Form	*Áyǫ́ èyé* 'Ayo has vomited'	*dèyé* 'don't vomit!'

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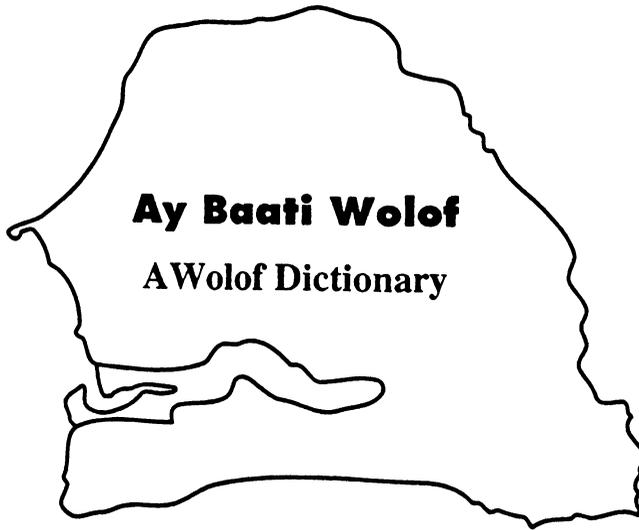
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