

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 Tanzania, 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 extratonicity is rarer than extrametricality in stress systems, every example of extratonicity 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

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

(1) **Kimatuumbi**

- a. *ba-tyatyakĩkiyane* 'they should plaster for each other'
 b. *mw-áandĩki* '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 extratonicity of the final syllable—extratonicity being much rarer than extrametricality in stress systems, every example of extratonicity 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 [STEM (Object) [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**

$$\begin{array}{c} [+stress] \\ \sigma \\ | \\ | \\ \emptyset \rightarrow \mu \end{array}$$

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. *ánilya* '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**

$$\emptyset \rightarrow H / [_{STEM} \text{ — }]$$

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) <i>tuna</i> [<i>liíma</i> | 'we will cultivate' |
| <i>nna</i> [<i>teleéka</i> | 'I will cook' |
| <i>nna</i> [<i>pilikaána</i> | 'I will hear' |
| <i>nna</i> [<i>va + luúma</i> | 'I will bite them' |

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

<i>tuna</i> [<i>chi</i> + <i>teleéka</i>	‘we will cook it’
<i>nna</i> [<i>vaá</i> + <i>pa</i>	‘I will give them’
<i>u</i> [<i>líme</i>	‘you should cultivate’
<i>tu</i> [<i>pindikulilaáne</i>	‘we should turn for each other’
<i>u</i> [<i>teleéke</i>	‘you should cook’
<i>m</i> [<i>pwailaáji</i>	‘sweeper’
<i>n</i> [<i>telekaáji</i>	‘cooker’
<i>n</i> [<i>kalangaaji</i>	‘frier’
<i>chi</i> [<i>kalaángo</i>	‘frying tool’
<i>chi</i> [<i>tukuúlo</i>	‘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) <i>nikáa</i> [<i>lya</i>	‘if I eat’
<i>aka</i> [<i>liima</i>	‘if he cultivates’
<i>nika</i> [<i>teleéka</i>	‘if I cook’
<i>vaka</i> [<i>telekeláana</i>	‘if they cook for e.o.’
<i>nika</i> [<i>chíi</i> + <i>lya</i>	‘if I eat it’

<i>nika</i> [<i>va</i> + <i>limíila</i>	‘if I cultivate for them’
<i>vaka</i> [<i>ni</i> + <i>telekéela</i>	‘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 subjunctive+OP “might not” tense inst. nom.)
H´	
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	
	<i>nikavalimila</i>	<i>nnavalimila</i>	<i>output of Stem H Insertion</i>
	H		
	<i>nikavalimila</i>	NA	Stem Mapping
	H	H	
	<i>nikavalimiila</i>	<i>nnavalimiila</i>	Stress Lengthening
		H	
	NA	<i>nnavalimiila</i>	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>i</i> [<i>líimi</i>	‘I won’t cultivate’
<i>a</i> [<i>teléeki</i>	‘he won’t cook’
<i>a</i> [<i>líimi</i>	‘he won’t cultivate’

<i>atu</i> [<i>teléeki</i>	‘we won't cook’
<i>atu</i> [<i>chi + teléeki</i>	‘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>i</i> [<i>kuú + pi</i>	‘I won't give you’
<i>avaá</i> [<i>li</i>	‘they won't eat’
<i>ava</i> [<i>kuú + pi</i>	‘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**



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>i</i> [<i>tele(ki)</i>]	<i>avaku</i> [(<i>pi</i>)]	underlying
	H		
	<i>i</i> [<i>tele(ki)</i>]	NA	Future Negative Docking
	H	H	
	<i>i</i> [<i>telee(ki)</i>]	<i>avakuu</i> [(<i>pi</i>)]	Stress Lengthening

NA	H avakuu [(pi)]	Default Docking
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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 *naalya* 'I will eat' has no H tone: we would expect **naálya*, 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).

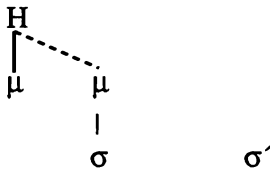
2.2. Secondary H tones: Doubling. Returning to the future tense with *na*, which we saw in (6), if the subject prefix is 3 person, we find a somewhat different tone pattern. Looking at the examples in (15), we see that these verbs have two H's, the first on the stem initial vowel and the second on the 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) <i>vana</i> [<i>chí</i> + <i>teleéka</i> | 'they will cook it' |
| <i>vana</i> [<i>pílikaána</i> | 'they will hear' |
| <i>vana</i> [<i>ní</i> + <i>fúkuziíla</i> | 'they will chase for me' |
| <i>vana</i> [<i>télékelaána</i> | 'they will cook for e.o.' |
| <i>vana</i> [<i>ví</i> + <i>télekelaána</i> | '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) <i>vana</i> [<i>kí</i> + <i>yuuma</i> | 'he will buy it' |
| <i>vana</i> [<i>téleeka</i> | '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

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

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

²Notations 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) *vanakíyuuúma* *output of initial tone mapping*
vanakíyuumá **Meussen's Rule**

Meussen'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 Meussen's Rule does delete the second H, the morae bearing the H tones are not adjacent.

- (20)
- | | | | | | |
|----|----|----|-----|----|-----|
| | | H | | H | → ∅ |
| | | | | | |
| μ | μ | μ | μ | μ | μ |
| | | | \ / | | |
| σ | 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 Meussen'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 Meussen's Rule.

- (22)
- | | |
|-------------------|---------------------------|
| HH | |
| | |
| <i>ana(lya)</i> | underlying |
| | |
| HH | |
| | |
| <i>ana a(lya)</i> | 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) *ńńí* [*teleéka* 'I cooked'
ńńí [*tu + telekeéla* 'he cooked for us'
vńńí [*telekelaána* 'they cooked for each other'
vńńí [*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
 |
anítuteleke (la) **underlying**
- H H
 | |
anítutelekee (la) **Stress Lengthening,
 Default Docking**
- H H
 / \ |
anítutelekee (la) **Doubling**

If the stem is disyllabic, as in *áni* [*liíma* or *áni* [*níí + 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* [*liíma* 'he cultivated'
áni [*níí + 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 + kálangiíla* '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.

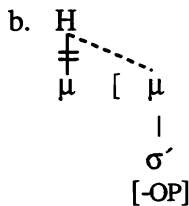
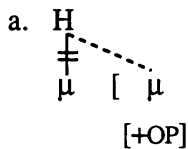
- (30) *nna* [*líima* 'I will cultivate'
nnaa [*lya* 'I will eat'
nna [*vaá + pa* 'I will give them'
nna [*pilikaána* 'I will hear'
nna [*chi + teleéka* 'I will cook it'

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**

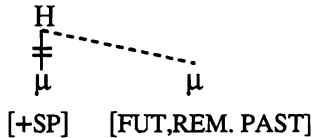


We do not find shifting of prefixal H tone to the stem initial syllable in every tense. Consider *akáni* [*tu* + *shoneéla* 'he might sew for us', *akána* [*tu* + *telekeéla* 'he always cooks for us', and *vání* [*telekelaána* 'they just cooked for each other'. The failure of shifting to apply here can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

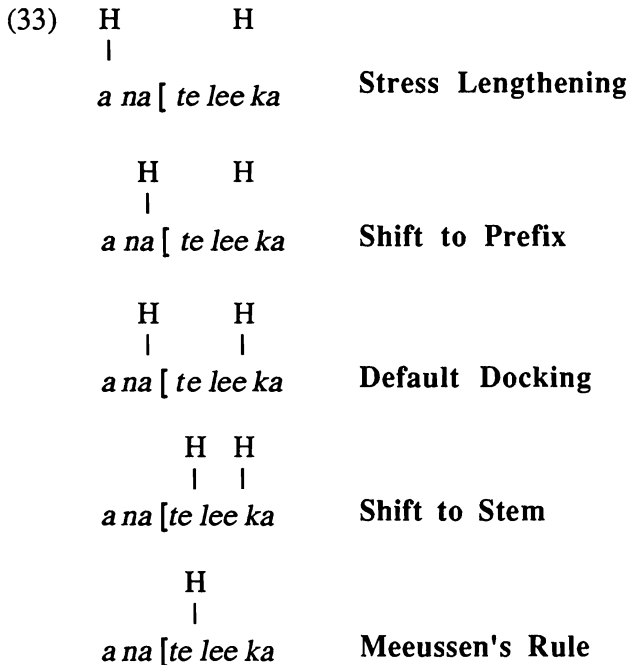
Thus far, we have reduced the future tense pattern to a set of rules and the distinction between H toned *-ná-* and toneless *-na-*. However, H appears on *na* when the subject prefix is 3 person, which suggests that underlyingly, the H actually comes from the subject prefix.³ The H of the subject prefix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

³It 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



This H may shift again to the stem initial syllable in the appropriate context. The complete derivation of *anatéleeka* is given in (33).



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 *nnaliĩma*. We have assigned H's, realized as a falling tone on the penult, in forms like *ivatelekekéli*, 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. | <i>nnaííma</i> | Default H |
| b. | <i>ivatelekéeli</i> | Assigned H |
| c. | <i>anatéleeka</i> | 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) | <i>aníi</i> [<i>lya</i> | ‘he has eaten’ |
| | <i>nńíi</i> [<i>lya</i> | ‘I have eaten’ |
| | <i>nńi</i> [<i>vaá + pa</i> | ‘I have given them’ |
| | <i>ani</i> [<i>nńi + pa</i> | ‘he has given me’ |
| | <i>tuni</i> [<i>vá + loola</i> | ‘we have seen them’ |
| | <i>aní</i> [<i>shoona</i> | ‘he has sewn’ |
| | <i>vani</i> [<i>nńi + loola</i> | ‘they have seen me’ |
| | <i>ani</i> [<i>vá + kálangiíla</i> | ‘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) | <i>anáa</i> [<i>lya</i> | ‘he will eat’ |
| | <i>ana</i> [<i>nńi + pa</i> | ‘he will give me’ |
| | <i>aná</i> [<i>shoona</i> | ‘he will sew’ |
| | <i>vana</i> [<i>nńi + loola</i> | ‘they will see me’ |
| | <i>ana</i> [<i>vá + kálangiíla</i> | ‘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) | <i>ku</i> [<i>líima</i> | ‘to eat’ |
| | <i>ku</i> [<i>télééka</i> | ‘to cook’ |
| | <i>ku</i> [<i>télékéláána</i> | ‘to cook for e.o.’ |

<i>ku</i> [<i>télékééla</i>	‘to cook for’
<i>ku</i> [<i>píndíkúlíláána</i>	‘to change for each other’

We find this same tone pattern in instrument nominalizations.

(38) <i>chishónéélo</i>	‘thing to sew with’
<i>chikúmbílílo</i>	‘thing to drink with’
<i>chipíndíkúlílo</i>	‘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



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.

⁴The 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* [*líile* 'they didn't eat'
níká [*kálángííte* 'I didn't fry'
áká [*ní + pwáyíííte* 'he didn't sweep for me'

páníchí [*télééka* 'when I was cooking'
páváchí [*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 + telekééla* '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 + télékééle* 'they might not cook for us'

u [*ni + yúmíile* 'you should buy for me'
u [*tu + télékééle* 'you should cook for us'
u [*va + pínǎkúúile* 'you should turn for them'

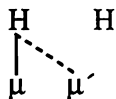
pátú [*líile* 'when we ate' (rec)
pátú [*kálángíláane* 'when we cooked for e.o.' (rec)
pátú [*ví + shóníite* 'when we sewed them' (rec)
pátú [*vá + píile* 'when we gave him' (rec)

<i>pání</i> [<i>vá + télékéela</i>	‘when I cook for him’
<i>pátúu</i> [<i>lya</i>	‘when we eat’
<i>pátú</i> [<i>shóona</i>	‘when we sew’
<i>pání</i> [<i>téléeka</i>	‘when I cook’
<i>pátú</i> [<i>vá + lóola</i>	‘when we look at them’
<i>patúnáa</i> [<i>lya</i>	‘when we will eat’
<i>páná</i> [<i>káata</i>	‘when he will cut’
<i>patúná</i> [<i>kúu + pa</i>	‘when we will give you’
<i>patúná</i> [<i>ví + shóona</i>	‘when we will sew them’
<i>patúná</i> [<i>vá + télékéela</i>	‘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’, *vanipíndíkulilaána* ‘they changed for each other (rem.)’, *anavápíndikulíila* ‘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 *kutélékéela* are given in (44).

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

(44)	H H	H H	
	<i>kulima</i>	<i>kutelekela</i>	underlying
	H H	H H	
	<i>kuliima</i>	<i>kutelekeela</i>	Stress Length
	HH	H H	
	<i>kul i ima</i>	<i>kutelekeela</i>	Stem Initial Docking, Default Docking
	HH	H H	
		^	
	<i>kul i ima</i>	<i>kutelekeela</i>	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)	<i>kaa</i> [<i>lye</i>	'let's go eat'
	<i>ka</i> [<i>liime</i>	'let's go cultivate'
	<i>ka</i> [<i>vaa + pe</i>	'let's go give them'
	<i>ka</i> [<i>va + telekeele</i>	'let's go cook for them'

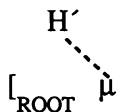
We would expect either a falling tone if this tense conditions Stem Mapping or a rising tone by Default Docking. The solution to this problem is simply to delete the stem H tone in this tense.

(46) **Stem H Deletion**

$H \rightarrow \emptyset / [\overline{\text{ka-SUBJUNCTIVE}}]$

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 p̄indikúliile* ‘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**



Thus, the intermediate form of *u [va p̄indikúliile* is *u [va' + p̄indikúliile*. It is not the case 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) <i>u [pilikaniile</i> | ‘you should listen’ |
| <i>u [teleéke</i> | ‘you should cook’ |
| <i>u [líime</i> | ‘you should cultivate’ |
| <i>uu [lyé</i> | ‘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 tone⁶ 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

⁶Aside 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) <i>vanikúsanya masandúuku</i>	‘they are packing me boxes’
<i>masandúuku</i>	‘boxes’
<i>anáyuma chikalaángo</i>	‘he will buy a vegetable pot’
<i>chikalaángo</i>	‘vegetable pot’
<i>anakámula chikaápu</i>	‘he will grab a basket’
<i>chikaápu</i>	‘basket’
<i>aníyuma ndíizi</i>	‘he bought me bananas’
<i>ndíizi</i>	‘bananas’
<i>áninitelekéla nyaáma</i>	‘he cooked me meat’
<i>nyaáma</i>	‘meat’
<i>atuteléki ndíizi</i>	‘we don’t cook bananas’
<i>atukuteléka ndíizi</i>	‘we didn’t cook bananas’
<i>unisáulile chikalaángo</i>	‘you should clean me the vegetable pot’
<i>nikániteléka malóombe</i>	‘I might cook maize’
<i>malóombe</i>	‘maize’

<i>vánáyúme majamáanda</i>	‘they might buy boxes’
<i>majamáanda</i>	‘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) <i>nimmingangitemááka</i>	‘I chased a cat’
<i>maáka</i>	‘cat’
<i>anitelekele nyááma</i>	‘he cooked me meat’
<i>nyááma</i>	‘meat’
<i>niyumite chikáláángo</i>	‘I bought a vegetable pot’
<i>chikalaángo</i>	‘vegetable pot’
<i>kuyúma chítélééko</i>	‘to buy a cooking pot’
<i>chítélééko</i>	‘cooking pot’
<i>kúlyá nyááma</i>	‘to eat meat’
<i>nyááma</i>	‘meat’
<i>kutúsúkumila líjámáanda</i>	‘to push us a box’
<i>kuyátélekateleka málóombe</i>	‘to cook maize repeatedly’
<i>usaule chítélééko</i>	‘you should clean the cooking pot’
<i>chítélééko</i>	‘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) <i>niyuma maáka</i>	‘I’m buying a cat’
<i>nikuyumila chikalaángo</i>	‘I’m buying you a vegetable pot’
<i>niteleka mayaái</i>	‘I am cooking eggs’
<i>niwinda vambutúuka</i>	‘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 chikáláángo '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) $\begin{array}{c} \text{H} \qquad \qquad \text{H} \\ | \qquad \qquad | \\ \text{ayuma chikalaango} \end{array}$ *output of Stress Lengthening*

$\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{ayuma chikalaango} \end{array}$ **Tone Shift**

$\begin{array}{c} \text{H} \quad \text{H} \\ \wedge \quad | \\ \text{ayuma chikalaango} \end{array}$ **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'
ǎnkúlííma 'he is eating'
ninkuvátélekeéla 'I am eating for them'
ǎnkúnitélekeéla 'he is eating for me'

⁷There 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.

<i>nivenkuúlya</i>	‘I am eating’
<i>avěnkúúlya</i>	‘he is eating’
<i>nivenkulííma</i>	‘I am eating’
<i>avěnkúlííma</i>	‘he is eating’
<i>ninkuvátélekeéla</i>	‘I am eating for them’
<i>avěnkúnítélekeéla</i>	‘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 níkulííma* and a *ńikulííma* surface as *avěnkúlííma* and *ńnkúlííma*.

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) <i>niyuma limbeende</i>	‘I’m buying a skin’
<i>ayumá limbeende</i>	‘he’s buying a skin’
<i>niteleka ntandaasa</i>	‘I’m cooking stiff cassava porridge’
<i>ateleká ntandaasa</i>	‘he’s cooking stiff cassava porridge’
<i>niisabu jikaanya</i>	‘I’m counting mouths’
<i>aisabú jikaanya</i>	‘he’s counting mouths’

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

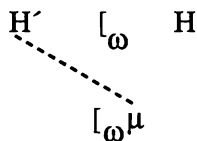
(56) <i>niyumité limbeende</i>	‘I bought a skin’
<i>uteleké ntandaasa</i>	‘you should cook stiff cassava porridge’
<i>kujjisabú jikaanya</i>	‘to count the mouths’

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 proceeds 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

⁸A similar situation arises in closely related Kimatuumbi [Odden 1984] and Makua [Stucky 1979].

⁹Since 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) <i>nnyáavi</i>	‘magician’	Stem Mapping
<i>mmĩli</i>	‘body’	Default Docking
<i>nnyéeni</i>	‘guest’	Default Docking + Spreading
<i>njénjéma</i>	‘mosquito’	Stem Mapping + Spreading
<i>chitéléeko</i>	‘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) <i>lí + tiingi</i>	‘pumpkin’
<i>chí + nduuli</i>	‘cassava leaf’
<i>yũnguula</i>	‘rabbit’
<i>chi + pwátaaka</i>	‘parcel’
<i>li + pápaaya</i>	‘papaya’
<i>li + vámbaala</i>	‘spleen’
<i>chi + wámbaaza</i>	‘wall’

The rising tone in *yũnguula* 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 (*ńńíteleéka* ‘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’, *pã + 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) <i>nnandi wanaáni</i>	'whose tree?'	<i>nnáandi</i>
<i>litikitiyanaáni</i>	'whose watermelon?'	<i>litíkíiti</i>
<i>ntandasa wanaáni</i>	'whose stiff cassava porridge?'	<i>ntandaasa</i>
<i>chiteleko chanaáni</i>	'whose cooking pot?'	<i>chitélééko</i>
<i>ng'ande gáani</i>	'what type house?'	<i>ng'áande</i>
<i>mvilingo gáani</i>	'what type circle?'	<i>mvííingo</i>
<i>litikiti gáani</i>	'what type watermelon?'	
<i>milandi mingáapi</i>	'how many trees?'	
<i>yang'avanga vangáapi</i>	'how many dogs?'	<i>ng'áváanga</i>
<i>viteleko vingáapi</i>	'how many cooking pots?'	
<i>nankatatambwe vangáapi</i>	'how many spiders?'	<i>nankatataambwe</i>
<i>nyama ntwáani</i> ¹⁰	'what kind of meat?'	<i>nyaáama</i>
<i>chitúvi chilíida</i>	'which load?'	
<i>chitéléko chilíida</i>	'which cooking pot?'	
<i>vang'aváanga valíida</i>	'which dogs?'	

We will assume a morpho-syntactically conditioned rule deleting a H tone before a [+WH] modifier, with the provision that *-líida* 'which' is an exception to this rule.¹¹

(61) WH-Modifier Lowering

$$\begin{array}{c}
 [_{NP} [_{N} \text{---}] [+WH] \dots] \\
 | \\
 H \rightarrow \emptyset
 \end{array}$$

¹⁰In connected speech, this surfaces as *nyamántwáani* due to syllable fusion.

¹¹The 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 *-líida* 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) <i>lilóombe</i>	‘maize’
<i>lilombé lyaangu</i>	‘my maize’
<i>nyaáama</i>	‘meat’
<i>nyamá yaangu</i>	‘my meat’
<i>chitúúvi</i>	‘load’
<i>chituví cheetu</i>	‘our load’
<i>vayũnguula</i>	‘rabbits’
<i>vayungulá veetu</i>	‘our rabbits’
<i>chitélééko</i>	‘cooking pot’
<i>chitelekó cheetu</i>	‘our cooking pot’
<i>méléméénde</i>	‘cockroach’
<i>melemendé waangu</i>	‘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.

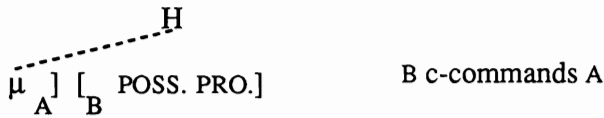
(63) <i>vyáangu</i>	‘mine’
<i>nilinga kuyú má</i> [_{NP} <i>vyáake</i>]	‘I’m trying to buy his’
<i>niyumite</i> [_{NP} <i>vyáake</i>]	‘I bought his’

Possessive pronouns have a floating H tone, which docks to the preceding word by (64).¹³

¹²The theoretical import of this rule is discussed in Odden [1990].

¹³The phrasemate condition on this docking rule will be ignored for the moment.

(64) Possessive Docking



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) | <i>nankatataambwe</i> | ‘spider’ |
| | <i>nankatatambwé weetu</i> | ‘our spider’ |
| | <i>kaanya</i> | ‘mouth’ |
| | <i>kanyá yaangu</i> | ‘my mouth’ |
| | <i>ntandaasa</i> | ‘stiff cassava porridge’ |
| | <i>ntandasá waangu</i> | ‘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) | <i>chínduuli</i> | ‘cassava’ |
| | <i>chindulí chaangu</i> | ‘my cassava’ |
| | <i>chínduli chibaáya</i> | ‘bad cassava’ |
| | <i>chinduli chibayá chaangu</i> | ‘my bad cassava’ |
| | <i>vayũnguula</i> | ‘rabbits’ |
| | <i>vayũngula vátaangu</i> | ‘old rabbits’ |
| | <i>vayungula vatangu voé vaangu</i> | ‘all my old rabbits’ |
| | <i>ng’áváanga</i> | ‘dogs’ |
| | <i>vang’avanga vatangú vangu vadógo</i> | ‘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 → ∅ / [_A ... ____] ... [_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’

<i>limbénde likúlu</i>	'large skin'
<i>mambénde mǎnne</i>	'four skins'
<i>limbénde lyoóte</i>	'the whole skin'
<i>jikánya jǐingi</i>	'many mouths'
<i>kánya ndóogo</i>	'small mouth'

Both the penultimate and final syllables of the noun have a H if the noun is followed by a demonstrative.

(71) <i>nankatatámbwé yúunó</i>	'this spider'
<i>limbéndé líiyá</i>	'that skin'
<i>kányá íinó</i>	'this mouth'
<i>kányá íiyá</i>	'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.

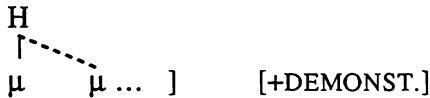
(72) <i>lipóndó líinó</i>	'this hole'	<i>lipoóndo</i>
<i>upíndé úunó</i>	'this bow'	<i>upíinde</i>
<i>lichúngwá líiyá</i>	'that orange'	<i>lichúngwa</i>
<i>yúngúlá yúunó</i>	'this rabbit'	<i>yǔnguula</i>
<i>vayúngúlá váayá</i>	'those rabbits'	<i>vayǔnguula</i>
<i>ng'ávángá yúunó</i>	'this dog'	<i>ng'áváanga</i>

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**

$$\begin{array}{c}
 [_{NP} [_{N} \dots \mu \mu] X] \\
 | \\
 \emptyset \rightarrow H
 \end{array}$$

Second, H spreads to the final syllable of a noun modified by a demonstrative.

(74) **Demonstrative Spreading**

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) <i>ayuma yúnguula</i> | ‘you are buying a rabbit’ |
| <i>ayumá yungula gáaní</i> | ‘which rabbit are you buying?’ |
| <i>ayuma míláángo</i> | ‘he is buying doors’ |
| <i>ayumá milango mingáapí</i> | ‘how many doors is he buying?’ |
| <i>asoma chítáabu</i> | ‘he is reading a book’ |
| <i>asomá chitabu chéepí</i> | ‘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) <i>ateleka nítándása mwíingi</i> ¹⁴ | ‘he’s cooking lots of stiff cassava porridge’ |
| <i>kulólá jíkányá jíingi</i> | ‘to see many mouths’ |
| <i>ayuma límbénde lyá iimba</i> | ‘he is buying a lion skin’ |
| <i>ayuma mámbéndé yáanó</i> | ‘he is buying those skins’ |
| <i>ayuma mámbéndé yáayá</i> | ‘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

¹⁴In connected speech, the vowel plus syllabic nasal fuse into one syllable, giving *atelekántándása 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 vayũnguula '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 mbĩili*] 'he eats twice'
- e. *avayambilá chikalángo chinitúmbuuka* (=c)
avayambila chikálángo 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



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 pânânkatatabaambwe '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'

¹⁵The 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) *kutéleká yáangu* ‘to cook mine’
tuvenkutéleká 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
<i>nnaalya</i>	<i>anáalya</i>	'eat'	--
<i>nnaváapa</i>	<i>anaváapa</i>	'give'	them
<i>nnalíima</i>	<i>análiima</i>	'cultivate'	--
<i>nnakiyuúma</i>	<i>anakiyuuma</i>	'buy'	it
<i>nnateleéka</i>	<i>anatéleeka</i>	'cook'	--
<i>nnachiteleéka</i>	<i>anachíteleéka</i>	'cook'	it
<i>nnapílikaána</i>	<i>anapílikaána</i>	'hear'	--
<i>nnaváfukuziíla</i>	<i>anaváfúkuziíla</i>	'chase for'	them

FAR PAST

1 subject	3 subject	Gloss	OP
<i>nníilya</i>	<i>aníilya</i>	'eat'	--
<i>nniváapa</i>	<i>aniváapa</i>	'give'	them
<i>nníliima</i>	<i>aníliima</i>	'cultivate'	--
<i>nnikíyuuma</i>	<i>anikíyuuma</i>	'buy'	it
<i>nnitéleeka</i>	<i>anitéleeka</i>	'cook'	--
<i>nnichíteleéka</i>	<i>anichíteleéka</i>	'cook'	it
<i>nnipílikaána</i>	<i>anipílikaána</i>	'hear'	--
<i>nniváfúkuziíla</i>	<i>aniváfúkuziíla</i>	'chase for'	them

NEAR PAST

1 subject	3 subject	Gloss	OP
<i>ńniilya</i>	<i>ániilya</i>	'eat'	--
<i>ńnivaápa</i>	<i>ánivaápa</i>	'give'	them
<i>ńnilíima</i>	<i>ánilíima</i>	'cultivate'	--
<i>ńńikiyuúma</i>	<i>ánikiyuúma</i>	'buy'	it
<i>ńńiteleéka</i>	<i>ániteleéka</i>	'cook'	--
<i>ńńichiteleéka</i>	<i>ánichiteleéka</i>	'cook'	it
<i>ńńipilikaána</i>	<i>ánipilikaána</i>	'hear'	--
<i>ńńivafukuziíla</i>	<i>ánivafukuziíla</i>	'chase for'	them

CONDITIONAL

1 subject	3 subject	Gloss	OP
<i>nikáalya</i>	<i>akáalya</i>	'eat'	--
<i>nikachíilya</i>	<i>akachíilya</i>	'eat'	it
<i>nikalíima</i>	<i>akalíima</i>	'cultivate'	--
<i>nikakiyúuma</i>	<i>akakiyúuma</i>	'buy'	it
<i>nikateléeka</i>	<i>akateléeka</i>	'cook'	--
<i>nikavitelekéela</i>	<i>akavitelekéela</i>	'cook'	them

FUTURE NEGATIVE

1 subject	3 subject	Gloss	OP
<i>íli</i>	<i>aáli</i>	'eat'	--
<i>ikuúpi</i>	<i>akuúpi</i>	'give'	you
<i>ilíimi</i>	<i>alíimi</i>	'cultivate'	--
<i>ikiyúumi</i>	<i>akiyúumi</i>	'buy'	it
<i>iteléeki</i>	<i>ateléeki</i>	'cook'	--
<i>ichiteléeki</i>	<i>achiteléeki</i>	'cook'	it

SUBJUNCTIVE

2 subject	Gloss	OP
<i>uulyé</i>	'eat'	--
<i>uvíilye</i>	'eat'	them
<i>uliíime</i>	'cultivate'	--
<i>ukilíime</i>	'cultivate'	it
<i>uteleéke</i>	'cook'	--
<i>uvatélékéele</i>	'cook for'	them

INFINITIVE

	Gloss	OP
<i>kuúlya</i>	'eat'	--
<i>kuvíilya</i>	'eat'	them
<i>kulííma</i>	'cultivate'	--
<i>kuchíshoona</i>	'sew'	it
<i>kutéleéka</i>	'cook'	--
<i>kuchíteleéka</i>	'cook'	it
<i>kupíndíkuúla</i>	'change'	--
<i>kuvátélekeéla</i>	'cook for'	them

APPENDIX 2

The rules cited above are recapitulated here, in their order of application.

(5) Stem H Insertion

$$\emptyset \rightarrow H / [_{\text{STEM}} \text{ — }]$$

(13) Future Negative Docking

$$\begin{array}{c} H \\ | \\ | \\ [_{\text{ROOT}} \dots \mu] \end{array} \quad \text{[Future Negative]}$$

(9) Stem Mapping (applies in: conditional subordinate tenses subjunctive+OP “might not” tense inst. nom.)

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

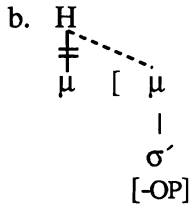
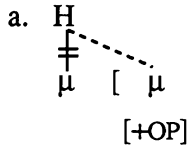
(4) Stress Lengthening

$$\begin{array}{c} [+stress] \\ \sigma \\ | \\ | \\ \emptyset \rightarrow \mu \end{array}$$

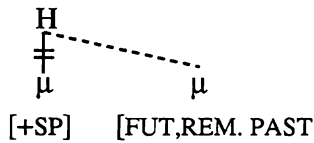
(7) Default Docking

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

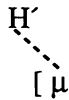
(31) **Shift to Stem**



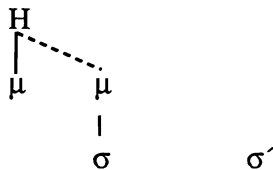
(32) **Shift to Prefix**



(39) **Stem Initial Docking**



(16) **Tone Doubling**



(18) **Meeussen's Rule**

$H \rightarrow \emptyset / H _$

(46) **Stem H Deletion**

$H \rightarrow \emptyset / [\overline{\text{ka-SUBJUNCTIVE}}]$

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

$$\begin{array}{c} H' \\ \vdots \\ [\text{ROOT } \mu \end{array}$$

(73) **Modified Noun H Insertion**

$$\begin{array}{c} [\text{NP } [\text{N } \dots \mu \mu] \text{X}] \\ | \\ \emptyset \rightarrow H \end{array}$$

(74) **Demonstrative Spreading**

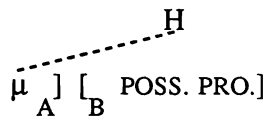
$$\begin{array}{c} H \\ | \vdots \\ \mu \quad \mu \dots \end{array} \quad [+ \text{DEMONST.}]$$

(61) **WH-Modifier Lowering**

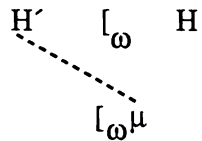
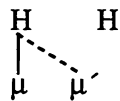
$$\begin{array}{c} [\text{NP } [\text{N } \text{---}] [+ \text{WH}] \dots] \\ | \\ H \rightarrow \emptyset \end{array}$$

(69) **Possessive Lowering**

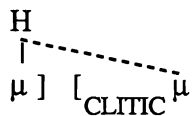
$H \rightarrow \emptyset / [A \dots \text{---}] \dots [B \text{ POSS. PRO.}] \quad B \text{ c-commands } A$

(64) **Possessive Docking**

B c-commands A

(57) **Floating H Docking**(43) **Rightward Spreading**

(blocked in [+ASSERTIVE] verbs)

(79) **Clitic Spreading**

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