A grammar of Makonde (Chinnima, Tanzania)

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3. PROSODY

3.1 Introduction to Makonde tone

The first to put tone marks on Makonde words (but only on verbs) is Nurse in his brief description of sample Bantu languages of Tanzania (1979), although he himself was not sure whether to call the "prominent syllables" tone or stress. The first article where tone is recognized as a characteristic for all Makonde words is Yukawa's tonological study of Makonde verbs (1989). He describes Tanzanian Makonde, but it is not clear which dialect is involved. The work is descriptive rather than analytical, it gives a broad overview of nouns classes and tenses with tonal description, but the author admits that the work contains insecurities and gaps. One year later, Odden follows with two articles about verbal and nominal tone in the Tanzanian Makonde dialects Chimaraba and Chimahuta. According to Odden, Makonde shares the following properties of verbal tone with the genetically close zone P-languages Yao (P.21) and Matuumbi (P.13) as well as with some other Bantu languages (like Makua (P.31), Olusamia (E.34), Kikuria (E.43), Kihehe (G.62), Kinga (G.65) and Safwa (M.25)):

- there are no lexical tone contrasts in verb stems;
- the tones realized on the verb depend on the morphological (tense-aspect) category of the verb.

Odden, as formulated in an earlier article (1988), handles such languages as follows.

- underlyingly, only H tones occur and are assigned (toneless TBU's receive a default L tone at a late stage in the derivation);
- one or two H tones are allowed per stem (and multiple surface H tones), and the H tones are assigned on the basis of a count of vowels, such as to the second vowel of the stem;
- specific tone rules (like High Tone Doubling and High Tone Spreading) apply to derive the surface patterns.

The (tense-aspect) category of the verb determines which positions are assigned H tones by a count of vowels. Once the count of vowels is known, as well as the phonological shape of the stem, the location of each H tone is predictable. Odden therefore calls such languages "predictable" tone languages. Makonde fits in such a typology, and he describes the dialects Chimaraba and Chimahuta as formulated above. The Chimaraba infinitive form **ku-télékéél**a 'to cook for', for example, has two underlying H tones which are assigned stem-initially and to the second mora of the lengthened penultimate syllable by default, and there is rightward spreading from the first to the second H.

```
    H   H
kutelekela          underlying

    H   H
kutelekeela         Stress Length

    H   H
    |   |
kutelekeela         Stem Initial Docking, Default Docking

    H   H
    /\  |
kutelekeela         Rightward Spreading
```

Two basic features of these dialects get much attention. The first is that the final syllable never has a H tone. To explain this characteristic, Odden treats the final syllable as extraprosodic, that is, invisible for the purposes of tone and other prosodic phenomena. Given this extraprosodicity, stress is assigned to the penultimate syllable. Then, the stressed syllable is lengthened with a second mora, and all words have penultimate lengthening. But only the stress of the last word in an utterance is

phonetically realized by lengthening, medial stress is either severly reduced or eliminated altogether by a late postlexical rule. The second characteristic is an adjacency constraint in phonology called Meeussen's Rule: whenever two adjacent syllables bear H tones, the second loses its H tone. The Chimahuta infinitive form **ku-lá-liima** 'to cultivate them', for example, also has two underlying H tones which are assigned stem-initially (to the object concord as first part of the macrostem) and to the second mora of the lengthened penultimate syllable by default, and the second H is deleted by Meeussen's Rule.

```
    H  H
ku-la-lima          underlying

    H  H
ku-la-liima         Stress Length

    H  H
    |  |
ku-la-liima         Stem Initial Docking, Default Docking

    H
    |
ku-la-liima         Meeussen's Rule
```

Liphola's description (2001) of Shimakonde of Mozambique is based on Odden's work as far as tone is concerned: one or two underlying H tones are assigned per stem, the penultimate syllable is the basis syllable for assignment, and specific tone rules (like High Tone Doubling and High Tone Spreading) apply to derive the surface patterns. Manus' description (2003) of a variant called Simakonde spoken by Mozambiqians who live on Zanzibar and in Tanga (Tanzania) varies from Odden's approach in that tone assignment includes underlying L tones, and that this assignment is restricted to the penultimate syllable of stems. Like Odden, Liphola and Manus assume that penultimate lengthening takes place as the result of stress, and Liphola agrees with Odden that penultimate lengthening occurs in all words; only utterance-final lengthening is realized, and utterance-medially, the lengthening is wiped out. Manus recognizes prosodic groups in the language where the penultimate lengthening occurs in the final word, not in the first words of such groups.

Just like Devos' excellent description (2004) of Makwe, a variant of Tanzanian Makonde (Chimaraba) spoken in Mozambique, our work is based on Odden's work as far as tone assignment is concerned. Underlyingly, every stem has zero, one or two H tones. H tones are assigned to the stem on the basis of the count of tone bearing units (TBU), and tone rules apply to derive the surface forms. But there are some big differences between our analysis and Odden's analysis. One difference concerns the

question which processes are lexical and which are post-lexical, resulting in a different rule ordering. In our analysis, H tone assignment takes place in the lexicon with word formation. Penultimate lengthening, however, occurs post-lexically, followed by the other tonal processes like Doubling and Spreading (which we call H Tone Bridge). Another difference concerns the extraprosodicity of the final syllable (which results in penultimate stress and ultimately in penultimate lengthening) in all words, and the resulting prosodic organization of the language. According to Odden, there is no final H tone, and all words have penultimate lengthening, although the lengthening is only phonetically realized in the last word of an utterance. In our analysis, the final syllable is only partially extraprosodic, viz., only in surface forms of words at the end of a specific prosodic unit called *phonological phrase* (p-phrase). Medial words in p-phrases do not undergo penultimate lengthening, only p-phrase-final words do. Underlyingly, the final syllable of p-phrase-final words may have a H tone assigned to it, and after penultimate lengthening, this final H tone retracts to the second mora of the penultimate syllable. We use the same examples as the Chimaraba and Chimahuta forms above to compare the analyses. The Chinnima infinitive form **ku-télékéél**a 'to cook for' has two underlying H tones which are assigned stem-initially and stem-finally. After penultimate lengthening, there is retraction of the final H tone to the second mora of the penultimate syllable, and there is a H Tone Bridge between the stem-initial H tone and the retracted final H tone.

```
    H   H
**kutelekela**        *underlying*

    H   H
    |   |
**kutelekela**        *Tone Assignment*

    H     H
    |     |
**kutelekeela**       *Penultimate Lengthening*

    H   H
    |   /
**kutelekeela**       *Retraction of the final H tone*

    H   H
    /\  |
**kutelekeela**       *H Tone Bridge*
```

The Chinnima infinitive form **ku-lá-liíma** 'to cultivate them' has two underlying H tones which are assigned stem-initially and stem-finally; the object concord has an

own H tone. the second mora of the lengthened penultimate syllable by default, and the second H is deleted by Meeussen's Rule.

```
  H  H  H
ku-la-lima          underlying

   H  HH
   |  | |
ku-la-lima          Tone Assignment

   H    H
   |    |
ku-la-lima          Meeussen's Rule

   H      H
   |      |
ku-la-liima         Penultimate Lengthening

   H  H
   |  |
ku-la-liima         Retraction of the final H tone
```

Medial words in p-phrases do not undergo penultimate lengthening and the final syllable of such words is not extraprosodic. It may have a H tone also on the surface, as the following example shows.

vachoná chiyewé chaángu
they see my chin

In our opinion, and in Devos' analysis (2004) which resembles the present work, penultimate lengthening is not a stress-induced rule, its main purpose is to signal the end of a phonological phrase. Furthermore, it is not the word but the phonological phrase which is the basic unit in the prosodic organization of the language, and this concept is worked out in the next section.

3.2 Prosodic domains

An important part of phonology consists of prosody. Prosody deals with phenomena as tone, intonation and vowel length. In the lexicon, there is one domain where prosodic phonology is active: the word; with word formation, H tone assignment occurs.

Post-lexically, prosodic phonology cooperates with syntax to produce the surface forms of phrases and sentences. For this purpose, prosodic phonology uses its own domains which partially fall together with syntactic phrases and sentences. There may be several reasons why prosodic phonology has its own domains. First, it does not seem unreasonable that phenomena like intonation do not necessarily have to be bound to syntactic criteria. Furthermore, as prosodic phonology and syntax are partners in the same process and each has its specific task, one can imagine that one such task for prosodic phonology is to mark special aspects of the information structure.

The prosodic domains we use are the word, the phonological phrase, the intonational phrase and the utterance. The terminology of the post-lexical domains (the phonological phrase, the intonational phrase and the utterance) derives from work done by Selkirk (1986) who cites earlier work (1978) as well as the work Nespor and Vogel (1982, 1986) and Hayes (1984). In their research, they argue that there is a level in sentence phonology at which the representation is organized hierarchically into prosodic constituents (larger than one word) and that there are phonological rules which have their characteristic domains defined in terms of this prosodic structure. According to them, this prosodic hierarchy is determined by syntactic structure, although it is not isomorphic to it. Below, we argue that the basic domain in Chinnima prosodic structure is the phonological phrase. The term itself is proposed by Hayes building on Kissebirth and Abasheikh (1974).

In Chinnima, the prosodic process Penultimate Lengthening (PUL) not only occurs at the end of a syntactic phrase, it also occurs within syntactic phrases, and this has something to do with Focus (in VP's) and something like Determination (in NP's). Concerning VP's, there are a number of pairs of tenses where both members of a pair have the same meaning, but where one tense of each pair has post-verbal focus (pvf), while the other tense of each pair has verbal focus (vf). The examples used below are of the Past and the Present Perfective; the focussed words are underlined.

tu-tóngólá chímákóonde	we spoke <u>Makonde</u>	pvf
tú-ná-tongoóla chimákóonde	we <u>spoke</u> Makonde	vf
tu-tongwele chímákóonde	we have spoken <u>Makonde</u>	pvf
tu-ni-tóngoóla chimákóonde	we have <u>spoken</u> Makonde	vf

The vf-tenses (or disjoint tenses) have PUL, although they are followed by the object. The pvf-tenses (or conjoint tenses) do not have PUL, but they form a unit with the focussed object (for more details, see 7.3 and 8.3.1).

Concerning NP's, there are specifiers which form a unit with the preceding noun while other specifiers don't. This probably has something to do with the extent of determination of the specifiers. Here, too, PUL marks the difference (for more details, see 8.2.1). Some examples are:

valúmé vááno	these men
valúmé veétu	our men

valúúme váanji	other men
valúúme vakúlúungwa	big men

We call the smallest domain which ends in PUL the phonological phrase (p-phrase). A syntactic phrase exists of one or two, or even more p-phrases, as the following example shows (the closing square bracket "]" indicates the end of a p-phrase).

nguvaing'ile válúúme] **ung'úuku**] **kukááya**]
I have given the men the chicken at home

A p-phrase consists of one to four words; in the following example, the noun of the first p-phrase is followed by a specifier within the same p-phrase.

nguvaing'ile válúmé vááno] **ung'úuku**] **kukááya**]
I have given these men the chicken at home

P-phrases are the domain where specific tone rules apply subsequently to PUL. Among them are Final H Tone Retraction, H Tone Bridge and H Tone Doubling. These tone rules are dealt with in the following sections. The larger prosodic domain is the intonational phrase (i-phrase). The i-phrase consists of one ore more p-phrases, and it can thus be smaller, equal or larger than a syntactic phrase. The end of an i-phrase is often marked by an intonational H tone on the final TBU of the final word (see 3.6.1). The largest prosodic domain is the utterance (U). The U consists of one or more i-phrases, often coinciding with a sentence. The end of an U is marked by register lowering of the final two TBU's of the final word. There are two other instances of U-final register lowering which are optional (see 3.6.2).

3.3 Surface tones

The basic surface tones are High (H) and Low (L). Each Tone Bearing Unit (TBU) bears one tone, a H tone or a L tone. The TBU in Chinnima is the mora, the unit on which tone rules work. In the remainder of this work, the terms 'TBU' and 'mora' are used indifferently. Generally, syllables have one mora, but penultimate syllables of phrase-final words have two morae by the automatic process Penultimate Lengthening. On such lengthened penultimate syllables, level tones as well as contour tones may occur. There are two level tones: a sequence of two H tones (HH) and a sequence of two L tones (LL). (H tones are indicated by an acute accent ´; L tones are generally left unmarked but in the rest of this chapter, they are indicated by a grave accent `.)

líínà	name	**lìimè**	dew
chìhúúvà	chest	**mìtùùpà**	holes
kùtóngóólà	to speak	**lùwáláhàànjì**	firewood
pànyéénjè	beside, aside	**chìihì**	only
tùkáályà	if we eat	**ng'àànà**	play!

There are two contour tones: Rising (R) and Falling (F). The contour tones are best analysed as a sequence of a L tone followed by a H tone (R) and a H tone followed by a L tone (F) on these TBU's of lengthened penultimate syllables.

mùúnù	person	**mwáànà**	child
ìndìílà	path	**lìtáàwà**	clan
ùnjénjèémà	mosquito	**chìmákóòndè**	Makonde language
kàdìíkì	a bit	**ùpéèhì**	quickly
tùng'àánè	we should play	**tùkáàlyà**	we do not eat

As noted in 2.8, a small number of phrase-final words have a penultimate syllable with three TBU's; two tonal sequences are possible: HLH and LHL.

mwéèénù	you (pl.)	**mòóòtò**	fire
lúùúndù	tomorrow	**mùúùndù**	chopper
tùpáàányà	we who beat	**chìlòóòngò**	pot

When not taking into account the Intonational H tone (see 3.6.1), a H tone on the mora of the final syllable of a phrase-final word is rare (but see certain Substitutives and Demonstratives, 5.2 and 5.3, and the Optative without object concord, 3.5.6).

The levels on which H and L are pronounced are phonetically fairly close. Especially words with only L tones such as **lìimè** 'dew' are hard to distinguish from words like **líínà** 'name' (and also from words like **mwáànà** 'child', see 3.6.1).

There are four phonetic levels of tone, mainly due to the instances of utterance-final register lowering (see 3.6); as a consequence, there are different phonetic contour tones (see 3.7).

3.4 Underlying tones and the lexicon

We assume that there is a first lexicon which is a list of grammatical morphemes, verbal roots, (pro)nominal stems and lexicalized verbal bases and stems. Grammatical morphemes are inflectional morphemes like tense markers, (pro)nominal prefixes and verbal prefixes; and derivational morphemes like extensions.

The information about some of these items in the first lexicon includes tonal instructions about H tones; L tones are default tones which are assigned post-lexically. Pronominal and nominal stems have information about which of the tonal profiles with H tones is to be placed on the stem, and about the prefix to be attached to the stem in case it gets a H tone. Tense markers carry tonal information when they themselves and/or the concords get a H tone; they also carry information about which of the tonal profiles is to be placed on the verbal stem. The other items in the first lexicon, such as verbal roots, prefixes and extensions, do not carry tonal information.

The actual H-tone assignment takes place in the second lexicon, with word formation, when the different parts of words are joined together.

In the second lexicon, verbal bases, stems and words are formed. Verbal bases are formed by adding expansions and extensions to verbal roots. Stem formation joins verbal bases and Finals. All sorts of phonological processes occur in the formation of verbal bases and stems, like prenasalization, (de)palatalization and vowel harmony. As soon as a verbal stem is formed, syllabification applies, which holds when a subsequent stem formation process like reduplication applies to it.

There are some building prescriptions for stems. One demand is that every syllable within a verbal stem, where one of the processes of verbal base and stem formation has occurred, must have an onset; if not, syllabificate in such a way that onsetless syllables disappear. We demonstrate this with monosyllabic stems. With verbal stem formation, vowel-final monomoraic roots (like **-li-** 'eat') and the Final **-a** or **-e** are joined together (˚**-lia**, ˚**-lie**). Syllabification determines that these whole stems form one syllable because every syllable must have an onset after such a process. Monosyllabic nominal stems also exist (e.g., **-yo** in **muyo** 'front'). But there is another building prescription on stems which says that a stem should at least have two syllables; if not, create a structural position left to a monosyllabic stem, which serves as the first syllable of the stem, also being the first tone bearing position of the stem (indicated by a period, ˚**-.lia**, ˚**-.lie**). When the Final is the Perfective **-ile**, the structure condition is met (˚**-liile** 'have eaten'), and no structural position is created to the left of the stem. Word formation provides phonetic content for this position from the vowel of the preceding morpheme (subject concord, object concord or tense marker). See the next section for more details.

The addition of Finals to verbal bases occurs in the first stage of stem formation. The second stage in the formation of verbal stems is reserved for 'vertical' (morphological) processes as the addition of the reciprocal **-an-**, the Pre-Final **-ang-** and the imbricated Perfective Final, which are infixed inside the penultimate syllable. After the formation of stems, words are formed. Verbal prefixes, (pro)nominal prefixes and tense markers are added to stems. Syllabification continues, but vowel coalescence/glide formation/vowel incorporation, glide insertion and syllable fusion are not carried out immediately but occur post-lexically (see 3.5.5). The next step is H-tone assignment (HTA): the tonal instructions are carried out, the prefixes and the tense markers get their H tone, and the stems get their tonal profile. When two primary H tones appear next to each other, the second H is deleted by Meeussen's Rule. There are four tonal profiles with H tones for stems, each profile having one or two H tones, and there is one profile without any H tone. Stems of all major categories have one of these five tonal profiles. There are some processes which occur after HTA, as the addition of certain outer NPx's to nominal stems and the formation of agent nouns and reduplicated nouns, and rules like the tone rule 'delete all H's' apply. Below, we try to give an overview of the main morphological and phonological (including prosodic) processes which occur in the second lexicon. All processes are described in this book.

main processes in the second lexicon			
word	addition	process	HTA
noun	-inner NPx to stem -outer NPx to stem -**na-** -locative NPx -pluralizing NPx -**chi-/mu-/va-**	prenasalization, homorganicity tone rule 'delete all H's'	before before after after after
instrument/ manner noun	NPx, Final to verbal base	vowel anticipation, vowel dissimilation, final vowel raising, **l → d**	before
augmentative/ diminutive	cl. 5/6, 12/13 NPx's to stem	prenasalization, homorganicity,	before
reduplicated noun	stem to stem	tone rule 'delete all H's'	after
agent noun	**mu-/va-** to Infinitive	vowel anticipation, vowel dissimilation, tone rule 'delete all H's'	after
verbal base	expansions, extensions to root	(de)palatalization, labio-velarization, vowel harmony	before
minisyllabic vs verb stem (vs) reduplicated vs	Final to root -Final to verbal base -reciprocal, Pre-Final to stem stem to stem	-create S1-position, copy preceding vowel -onset-syllabification **l → d** vowel harmony, imbrication, vowel dissimilation, create complex final syllable	before before (stage1) before (stage2) before
verbal **form**	SC, OC, TM to stem	prenasalization, homorganicity, Meeussen's rule	before
pronominal **form**	PPx to stem	prenasalization, homorganicity	before

3.4.1 Tonal profiles for stems

There are five tonal profiles for stems; their order is explained in 7.2.1.

A S1/SF : a H tone on the first and final TBU of the stem
B S1 : a H tone on the first TBU of the stem
C SF : a H tone on the final TBU of the stem
D no H : no H tones on the stem
E S2 : a H tone on the second TBU of the stem

As the TBU is the mora in Chinnima, the S1, S2 and SF are moraic positions in the stem.

Let us first show these five tonal profiles with words with four-syllable nominal and verbal stems (the prefixes preceding the stems are: NPx = Nominal Prefix, SC = Subject Concord, TM = Tense Marker, OC = Object Concord).

		NPx	-nominal stem	SC	-TM	-OC	-verbal stem
A	S1/SF	˚**li**	**-pélependé**	˚**ku**			**-pílikaná**
B	S1	˚**va**	**-lúmilanga**	˚**va**		**-li**	**-pílikane**
C	SF	˚**ma**	**-kolobekó**	˚**tu**	**-na**		**-pilikaná**
D	no H	˚**vi**	**-kokolowa**	˚		**li**	**-pilikane**
E	S2	˚**vi**	**-tukútuku**	˚**va**		**-li**	**-pilíkana**

Several tonal and other processes occur before these underlying forms reach surface level; these processes are dealt with one by one in this chapter, the most striking processes in the examples below are H Tone Bridge (from the S1-H tone to the SF-H tone) with the examples of A and H Tone Doubling (from the S1-H tone to the next TBU) with the examples of B.

A **lì-pélépéndé lyàákè** its cockroach
B **và-lúmílàngà váànjì** other widows
C **mà-kòlòbèkó lyàákè** its savannah
D **vì-kòkòlòwà víìnjì** other empty maize cobs
E **vì-tùkútùkù víìnjì** other things, substances, ingredients

A **kù-pílíkáná lìímò** to hear one (e.g. **lì-lóóvè** ‘word’)
B **và-lì-pílíkànè lìímò** they should hear the one
C **tù-nà-pìlìkàná lìímò** we (will) hear one
D **lì-pìlìkànè lìímò** hear the one!
E **và-lì-pìlíkànè lìímò** they who hear the one

We continue with the five tonal profiles as they occur with nouns and verbs having trisyllabic stems.

		NPx	-nominal stem	SC	-TM	-OC	-verbal stem
A	S1/SF	˚**u**	**-tútulí**	˚**ku**			**-tóngolá**
B	S1	˚**li**	**-híndili**	˚**va**		**-li**	**-tóngole**
C	SF	˚**li**	**-kumbatú**	˚**tu**	**-na**		**-tongolá**
D	no H	˚**n**	**-tandasa**	˚		**li**	**-tongole**
E	S2	˚**li**	**-putíla**	˚**va**		**-li**	**-tongóla**

Surface forms:

A	**ù-tútúlí wàángù**	my brain
B	**lì-híndìlì lîìnjì**	other cooking stone
C	**lì-kùmbàtú lyàángù**	my foot
D	**`n-tàndàsà úùnjì**	other cassava porridge
E	**lì-pùtílà lîìnjì**	other trap

A	**kù-tóngólá lìímò**	to speak one
B	**và-lì-tóngòlè lìímò**	they should speak the one
C	**tù-nà-tòngòlá lìímò**	we (will) speak one
D	**lì-tòngòlè lìímò**	speak the one!
E	**và-lì-tòngólà lìímò**	they who speak the one

We now show the five tonal profiles of words having disyllabic nominal and verbal stems.

		NPx	-nominal stem	SC	-TM	-OC	-verbal stem
A	S1/SF	˚**ma**	**-kálá**	˚**ku**			**-lólá**
B	S1	˚**a**	**-hímba**	˚**va**		**-li**	**-lóle**
C	SF	˚**ma**	**-halá**	˚**tu**	**-na**		**-lolá**
D	no H	˚**vi**	**-yewe**	˚		**li**	**-lole**
E	S2	˚**ma**	**-vaála**	˚**va**		**-li**	**-loóla**

One process which has to be described here is the tonal lengthening caused by the S2-H tone on disyllabic stems. The penultimate syllable is lengthened, and the S2-H tone is assigned to the second part of the lengthened vowel. In this way, the S2-H tone has a distinctive location on disyllabic stems, and it can be distinguished from the SF-H tone. This lengthening provides for a tonal environment where other (tone) rules occur, the most striking one in the examples with E below is tonal coalescence resulting in penultimate H (see 3.5.5, 3.5.6 and 3.5.9).

A	**mà-kálá làángù**	my charcoal
B	**à-hímbà váànjì**	other lions
C	**mà-hàlá làángù**	my fields
D	**vì-yèwè vîìnjì**	other chins
E	**mà-válà láànjì**	other shoulders

A	**kù-lólá lìímò**	to look at one

B	**và-lì-lólè lìímò**	they should look at the one
C	**tù-nà-lòlá lìímò**	we (will) look at one
D	**lì-lòlè lìímò**	look at the one!
E	**và-lì-lólà lìímò**	they who look at the one

In the examples above, the tones of the forms of B and E are the same, but they are distinct in other environments.

B	**à-hímbá vàákè**	his lions
E	**mà-vàlá làákè**	his shoulders

B	**và-lì-lóòlè**	they should look at it
E	**và-lì-lóólà**	they who look at it

It is evident that with H Tone Assignment (HTA), the syllable structure of the words must be clear, and that HTA takes it into account: the SF-H tone is always assigned to the mora of the final syllable, the S1-H tone and the S2-H tone are never assigned there. This has been shown by the tonal lengthening caused by the S2-H tone on disyllabic stems above. When the final syllable has two morae (e.g. ˚**-udia** 'ask'), lengthening of the penultimate syllable occurs when the S2-H tone is assigned, and the S2-H tone is not assigned to the first mora of the second (= final) syllable.

E S2 ˚**va -li -uúdia**

và-lì-údyà lìímò they who ask the one

We now come to monosyllabic stems. In the previous section we stated that due to a structure condition on stem formation (which says that a stem should at least have two syllables) monosyllabic stems get a structural position left to the stem which serves as the first syllable, and thus as S1-position. With word formation, this position is filled with a copy of the vowel of the preceding morpheme (NPx, subject concord, object concord or tense marker). So, these stems act as vowel-initial disyllabic stems, and they should therefore not be called monosyllabic. To distinguish them from "regular" disyllabic stems, we shall call them "minisyllabic" stems.

With tone assignment, the S1-H tone is thus assigned to the copy of the vowel of the preceding morpheme; this vowel and the remainder of the stem are separated by a dot below.

			NPx	-nominal stem	SC	-TM	-OC	-verbal stem
A	S1/SF	?	˚**u**	**-ú.chí**	˚**ku**			**-ú.liá**
B	S1	?			˚**va**		**-li**	**-í.lie**
C	SF		˚**vi**	**-i.nú**	˚**tu**	**-na**		**-a.liá**
D	no H		˚**mu**	**-u.yo**	˚		**li**	**-i.lie**
E	S2	?			˚**va**		**-li**	**-ií.lia**

With nouns consisting of a minisyllabic stem, the all-H tone pattern may result from either profile A or B or E (see 4.4.2), hence the question marks.

Minisyllabic stems are actually treated as (vowel-initial) disyllabic stems; they start with a vowel to which is assigned the S1-H tone, and the assignment of the S2-H tone causes lengthening. To show this, compare the minisyllabic stems with vowel-initial disyllabic stems like the verbal stem **-udya** (˚**-udia**) 'ask' and the nominal stems below.

		NPx	-nominal stem	SC	-TM	-OC	-verbal stem
A	S1/SF	? ˚**u**	**-únú**	˚**ku**			**-údiá**
B	S1	?		˚**va**		**-li**	**-údie**
C	SF	˚**mi**	**-ihí**	˚**tu**	**-na**		**-udiá**
D	no H	˚**chi**	**-anga**	˚		**li**	**-udie**
E	S2	?		˚**va**		**-li**	**-uúdia**

For the penultimate length of most disyllabic words in the examples below, see 8.2.2 and 8.3.1. The disappearance of the final H tone in verbal forms with profile C is explained in 3.5.6.

Minisyllabic stems:

A	?	**úúchí úúnò**	this honey
B	?		
C		**chìînú chàángù**	my thing
D		**mùùyò múùnjì**	other front
E	?		

A	**kúúlyá lìímò**	to eat one (e.g. **lí-tìínjì** 'pumpkin')
B	**và-lílyè lìímò**	they should eat the one
C	**tù-nàlyà lìímò**	we (will) eat one
D	**lììlyè lìímò**	eat the one!
E	**và-lílyà lìímò**	they who eat the one

Disyllabic vowel-initial stems:

A	?	**úúnú úúnò**	this plaster
B	?		
C		**mììhí yàángù**	my pestles
D		**chàngà chíînjì**	another galago
E	?		

A	**kúúdyá lìímò**	to ask one
B	**và-lyúdyè lìímò**	they should ask the one
C	**tù-nùdyà lìímò**	we (will) ask one
D	**lyùùdyè lìímò**	ask the one!
E	**và-lyúdyà lìímò**	they who ask the one

With the verbal forms above, vowel coalescence between the SC (or Infinitive marker) or the OC or the tense marker and a vowel-initial disyllabic stem is optional (see 2.7). Hence, next to the verbal forms given above, the following forms exist.

A **kù-údyá lìímò**
B **và-lì-údyè lìímò**
C **tù-nà-ùdyà lìímò**
D **lì-ùdyè lìímò**
E **và-lì-údyà lìímò**

Although the structure of minisyllabic stems is identical with the structure of vowel-initial disyllabic stems, there is a clear difference: vowel coalescence between the SC or OC or the tense marker and a vowel-initial disyllabic stem is optional, while vowel coalescence between the SC or OC or the tense marker and a minisyllabic stem is obligatory. We think that the difference is explained by syllabification in the second lexicon with word formation: syllabification with minisyllabic stems occurs in a different way than syllabification with other stems. With minisyllabic stems, the created S1-position and the preceding morpheme form one syllable, whereas with other stems, the S1-position and the preceding morpheme form two different syllables. Below, we give the examples of TG B above. The slash "/" indicates the edge of a syllable, the hyphen "-" indicates the edge of a morpheme (the morpheme structure within the final syllable is not indicated).

B S1 **˚va-/li-í/lie** **˚va-/li-/ú/die**

That the S1-position and the preceding morpheme with minisyllabic stems form one syllable is due to the fact that the S1-position is totally dependent on the vowel of the preceding morpheme to get phonetic content, and the two can therefore not be separated (although the morpheme structure remains intact: the OC and the S1-position are recognized as different grammatical positions). The syllable contains two morae, and vowel coalescence is obligatory, applying post-lexically.

There are good reasons to assume that the S1-position of minisyllabic verbs is filled with a copy of the vowel of the preceding morpheme and not with the vowel of the preceding morpheme itself. The assignment of the S1-H tone should be on a separate vowel in order to derive the correct tone patterns which are exactly the same as those of forms with disyllabic vowel-initial stems which have an original S1-position. That the first vowel of minisyllabic stems has the quality of the preceding vowel is demonstrated by verbal reduplication. With verbal reduplication, the whole stem is reduplicated, as the examples with trisyllabic stems illustrate.

A	**kù-tóngólátóngólá lìímò**	to keep on speaking one
B	**và-lì-tóngólètòngòlè lìímò**	they should keep on speaking the one
C	**tù-nà-tòngòlàtòngòlá lìímò**	we (will) keep on speaking one
D	**lì-tòngòlètòngòlè lìímò**	keep on speaking the one!
E	**và-lì-tòngólátòngòlà lìímò**	they who keep on speaking the one

Verbal reduplication occurs before tone assignment, the reduplicated stem as a whole is assigned a tonal profile; the second H tone with the examples of the profiles B and E is due to the process H Tone Doubling (3.5.6).

With minisyllabic stems, the reduplicated part includes the copy of the preceding vowel. First, we give the underlying forms, followed by the surface forms.

		SC	-TM	-OC	-stem-reduplicated stem
A	S1/SF	˚**ku**			**-ú.lia-uliá**
B	S1	˚**va**		**-li**	**-í.lie-ilie**
C	SF	˚**tu**	**-na**		**-a.lia-aliá**
D	no H	˚		**li**	**-i.lie-ilie**
E	S2	˚**va**		**-li**	**-i.liá-ilia**

A	**kúlyáúlyá lìímò**	to keep on eating one
B	**và-lílyéìlyè lìímò**	they should keep on eating the one
C	**tù-nàlyàlyà lìímò**	we (will) keep on eating one
D	**lìlyèìlyè lìímò**	keep on eating the one!
E	**và-lìlyáìlyà lìímò**	they who keep on eating the one

The form with profile E clearly shows that reduplication occurs before tone assignment. The stem is long enough, there is no S2-H tone lengthening, and the S2-H tone appears on the second TBU. The second H tone with the example of profile B is due to the process H Tone Doubling.

Compare these forms with forms with reduplicated disyllabic vowel-initial stems.

		SC	-TM	-OC	-stem-reduplicated stem
A	S1/SF	˚**ku**			**-údia-udiá**
B	S1	˚**va**		**-li**	**-údie-udie**
C	SF	˚**tu**	**-na**		**-udia-udiá**
D	no H	˚		**li**	**-udie-udie**
E	S2	˚**va**		**-li**	**-udiá-udia**

A	**kúdyáúdyá lìímò**	to keep on asking one
B	**và-lyúdyéùdyè lìímò**	they should keep on asking the one
C	**tù-nùdyàùdyà lìímò**	we (will) keep on asking one
D	**lyùdyèùdyè lìímò**	keep on asking the one!
E	**và-lyùdyáùdyà lìímò**	they who keep on asking the one

Without vowel coalescence, the verbal forms are as follows:

A	**kù-údyáúdyá lìímò**	to keep on asking one
B	**và-lì-údyéùdyè lìímò**	they should keep on asking the one
C	**tù-nà-ùdyàùdyà lìímò**	we (will) keep on asking one
D	**lì-ùdyèùdyè lìímò**	keep on asking the one!
E	**và-lì-ùdyáùdyà lìímò**	they who keep on asking the one

3.4.2 Prefix-H tone

In the examples of the previous section, the profiles of stems are combined with (default) L-toned nominal prefixes and verbal prefixes (or subject concords). Two of these profiles, however, may also be combined with a H-toned (pro)nominal prefix or verbal prefix (called Px-H tone), depending on the particular tense. These profiles are C (SF-H tone) and D (no H tones).

		NPx	-nominal stem	SC	-TM	-verbal stem
C	SF	?		**˚tú**	**-ni**	**-pilikaná**
		˚ú	**-njenjemá**	**˚tú**	**-ni**	**-tongolá**
		˚lí	**-tinjí**	**˚tú**	**-ni**	**-lolá**
		?		**˚tú**	**-ni**	**-udiá**
		?		**˚tú**	**-ni**	**-i.liá**
D	no H	?		**˚tú**	**-na**	**-pilikane**
		?		**˚tú**	**-na**	**-tongole**
		?		**˚tú**	**-na**	**-lole**
		?		**˚tú**	**-na**	**-udie**
		?		**˚tú**	**-na**	**-a.lie**

Since nouns do not appear in paradigms like verbal forms, it is not always possible to decide which underlying tones nouns have; for example, we can not decide whether nouns have profile B or D (with a H-toned NPx) since the resulting tone pattern would be the same (see 4.4.1 and 4.4.2). This is because the Px-H tone is not a stable one, but it shifts to the S1-position of the stem, or, when there is an object concord (with verbal forms), it shifts to the object concord; this is shown in 3.5.4.

After this shift, H Tone Bridge applies to the nouns in the examples below (triggered by the qualifier, see 8.2.2), but H Tone Bridge does not apply to verbal forms after this shift; the tones with verbal forms with minisyllabic stems below are explained with the process Coalescence (3.5.5).

C	**ù-njénjémá wàákè**	its mosquito
	lí-tínjí lyàángù	my pumpkin
C	**tù-nì-pílíkàná lìímò**	we have heard one
	tù-nì-tóngòlá lìímò	we have spoken one
	tù-ní-lòlá lìímò	we have looked at one
	tù-núdyà lìímò	we have asked one
	tù-nílyà lìímò	we have eaten one
D	**tù-nà-pílíkànè lìímò**	we should not hear one
	tù-nà-tóngòlè lìímò	we should not speak one
	tù-nà-lólè lìímò	we should not look at one
	tù-núdyè lìímò	we should not ask one
	tù-náalyè lìímò	we should not eat one

As vowel coalescence between a tense marker and a vowel-initial stem is optional (see 2.7), the forms with disyllabic vowel-initial stems may also be as follows: C **tù-nì-údyà lìímò**, D **tù-nà-údyè lìímò**.

3.4.3 Meeussen's Rule

There is an automatic rule which applies whenever the proper environment for its application appears: Meeussen's Rule (Goldsmith, 1984).

Meeussen's Rule (MR) says that when two primary H tones appear next to each other, the second H tone is deleted. MR is part of a family of constraints called the OCP (Obligatory Contour Principle), a concept developed in autosegmental literature which essentially rules out representations where two similar specifications are adjacent. Word formation provides proper environments for MR, but the rule also applies with post-lexical processes (see below) as well as across word boundaries (see 8.2.2 and 8.3.2). Primary H tones are the H tones which are assigned with word formation. H tones which are the result of a bridge or doubling (processes which are dealt with in this chapter) are not primary H tones.

With word formation, it happens that two primary H tones appear next to each other. In the first and third example, the H tone of the tense marker/Negative marker and the S1-H tone of the stem appear next to each other; in the second example, the Infinitive, the H tone of the object concord and the S1-H tone of the stem appear next to each other. MR deletes the second primary H tone, i.e. the S1-H tone in all examples.

A	S1/SF	˚**tu-chí-tóngolá**	>	˚**tu-chí-tongolá**
		˚**ku-vá-lólá**	>	˚**ku-vá-lolá**
B	S1	˚**tu-ká-lóla**	>	˚**tu-ká-lola**

A	**tù-chí-tòngòlá kàdìíkì**	we were speaking a bit
	kù-vá-lòlá kàdìíkì	to look at them (cl.2) a bit
B	**tù-ká-lòlà kàdìíkì**	we do not look a bit

When there is an object concord with the first and third example, there is no environment for MR to apply because the H tone of the tense marker/Negative marker and the S1-H tone are separated by an object concord without a H tone. On the other hand, when there is no object concord with the second example, there is also no environment for MR to apply because the Infinitive marker has no H tone.

A	S1/SF	˚**tu-chí-li-tóngolá**
		˚**ku-lólá**
B	S1	˚**tu-ká-li-lóla**

A	**tù-chí-lì-tóngólá lìímò**	we were speaking the one
	kù-lólá lìímò	to look at one
B	**tù-ká-lì-lólà lìímò**	we do not look at the one

The second examples with profile A, where the S1-H tone and the SF-H tone appear next to each other on a disyllabic stem, suggest that the combined S1-H tone and the SF-H tone are in fact manifestations of one H tone (with other manifestations of H tones in between in case of a H Tone Bridge).

One example of MR applying post-lexically concerns the Negative Present Perfective 1 (of TG A) where the H tone on the Negative marker (shifted from the SC) deletes the S1-H tone of the stem after the H Tone Bridge (a post-lexical rule) has taken place (see 7.1.1, 7.1.5 and 7.2.5).

A	S1/SF	**˚tú-ka-tóngwelé**	>	**˚tú-ka-tóngwélé**	>	**˚tu-ká-tóngwélé**	>	
						˚tu-ká-tongwélé		
		˚tú-ka-pílikené	>	**˚tú-ka-pílíkéné**	>	**˚tu-ká-pílíkéné**	>	
						˚tú-ka-pilíkéné		

A	**tù-ká-tòngwélé kàdìíkì**	we have spoken a bit
	tù-ká-pìlíkéné kàdìíkì	we have heard a bit

Here, too, MR does not apply when an OC is present. Note that the Negative marker has a block to prevent the H tone of the SC to shift to the OC.

A	S1/SF	**˚tú-ka-li-tóngwelé**	>	**˚tu-ká-li-tóngwélé**
		˚tú-ka-li-pílikené	>	**˚tu-ká-li-pílíkéné**

A	**tù-ká-lì-tóngwélé lìímò**	we have spoken the one
	tù-ká-lì-pílíkéné lìímò	we have heard the one

Note that the process H Tone Bridge on stems (which makes a bridge between a S1-H tone and a SF-H tone) occurs with the examples with profile A when there is no environment for MR; when MR applies, deleting the S1-H tone, the process H Tone Bridge is no longer applicable.

MR prohibits two primary H tones to appear on adjacent morae. The critical unit for applying is not the syllable, as the first example, the Infinitive form **ku-vá-loóla** 'to look at them' shows, where a H tone may appear on the second mora of the penultimate syllable which is preceded by a H-toned syllable (underlined in the example). The second example, a form of the Negative Present Perfective 1 **tu-ká-leedye** 'we have not laid down' shows that when a H tone appears on the first mora of the penultimate syllable which is preceded by a H-toned syllable, it is deleted since it appears on a mora adjacent to a mora with a H tone (underlined in the example).

ku-vá-loóla	<	**˚ku-vá-loolá**	<	**˚ku-vá-lolá**	<	**˚ku-vá-lólá**
tu-ká-leedye	<	**˚tu-ká-léedyé**	<	**˚tú-ka-léedíe**	<	**˚tú-ka-lédié**

3.5 Post-lexical processes with one-word p-phrases

The basic unit of prosodic phonology in syntax is the p-phrase. The end of a p-phrase is marked by lengthening of the penultimate syllable of its final word. P-phrases may consist of one, two, three or four words. Several post-lexical processes occur within each type of p-phrase. In this chapter, we restrict ourselves to processes which occur in one-word p-phrases, i.e., words in isolation (or: in citation form). Processes which occur in longer p-phrases (noun plus specifier(s), and verb plus complement or adjunct) are dealt with in 8.2 and 8.3. The processes that occur in one-word p-phrases are the following:

Penultimate lengthening
Complex final syllable and retraction of final H tone
H tone bridge
Prefix-H tone shift
Coalescence, resyllabification and OC-H tone retraction
H tone doubling, final H deletion and Structure Simplification
Default L tone insertion
Tone assimilation
Penultimate shortening

The processes are given in the right ordening. In the sections to come, we describe the different processes and we select several sets of examples to show how the processes operate. But to give a quick impression, we give an overview with the examples **tù-ká-pìlíkéénè** 'we have not heard' and **tù-kám´-pélékèdììdyè** 'we have not sent him'. The lexical forms after H tone assignment are resp. ˚**tú-ka-pílikené** and ˚**tú-ka-m-pélekediidié**. These forms of the Negative Present Perfective have a H-toned subject concord combined with stem profile A, a H tone on the first and last TBU of the stem. The form ˚**tú-ka-m-pélekediidié** has a complex final syllable, i.e., it has two morae in the final syllable; the H tone of the final TBU retracts to the preceding TBU in the final syllable instead of to the second mora of the penultimate syllable in case there is no complex final syllable. The shift of the H tone of the subject concord strands on the Negative marker because of a block (see 7.1.1). Meeussen's rule is an automatic rule, it applies whenever the proper environment is met. The underlining in the examples indicates where the processes apply.

˚**tú-ka-pílikeené**	˚**tú-ka-m-pélekediidié**	*Penultimate lengthening*
˚**tú-ka-pílikeéne**	˚**tú-ka-m-pélekediidíe**	*Retraction of the final H tone*
˚**tú-ka-pílíkéene**		*H tone bridge*
˚**tu-ká-pílíkéene**	˚**tu-ká-m-pélekediidíe**	*Prefix-H tone shift*
	˚**tu-kám-pélekediidyé**	*Coalescence, Resyllabification*
	˚**tu-kám-pélékediidye**	*H tone doubling, final H deletion*
˚**tu-ká-pìlíkéene**		*Meeussen's rule*
tù-ká-pìlíkéenè	˚**tù-ká`m-pélékèdìidyè**	*Default L insertion*
	tù- kám´-pélékèdìidyè	*Tone assimilation*
tù-ká-pìlíkénè	**tù- kám´-pélékèdìdyè**	*Penultimate shortening*

There are different domains of application for the tonal rules, the tonal domains: the syllable (e.g. Tone Assimilation), the stem (e.g. H Tone Bridge), the macrostem (e.g. H Tone Shift), the word (e.g. H Tone Doubling) and the phonological phrase (e.g. Regressive H Tone Dissimilation, to be dealt with in ch.8). When the domain of application is the (macro)stem, tone rules (like H Tone Assignment) have to take into account the syllable division as well. Other prosodic processes like Penultimate lengthening, Penultimate shortening and Structure simplification work on the (penultimate) syllable.

In the following sections, the different processes are informally described and presented with the help of examples which can be tracked down from the first process until the last to reach surface form.

3.5.1 Penultimate lengthening

The penultimate syllable of the final word of a phonological phrase is lengthened by PenUltimate Lengthening (PUL). PUL is not a stress-induced rule, its main purpose is to signal the end of a phonological phrase. In the sections to follow, the same examples are used as in 3.4.1, but other examples are added as well. Below, the forms with PUL are followed by the surface forms. The tone rules which apply to derive these surface forms are indicated in the last but one column (R = Retraction, TB = H Tone Bridge, DI = Default L tone Insertion, C = Coalescence and syllabification, TD = H Tone Doubling, PS = Prefix-H tone Shift, S = structure Simplification, TA = Tone Assimilation and F = Final H deletion). All tone rules are dealt with in the coming sections.

Nouns:

		lexical form		PUL	next rules	surface forms
A	S1/SF	˚**li-pélependé**	>	˚**li-pélepeendé**	R,TB,DI	**lì-pélépééndè**
		˚**u-tútulí**	>	˚**u-tútuulí**	R,TB,DI	**ù-tútúúlì**
		˚**ma-kálá**	>	˚**ma-káalá**	R,DI	**mà-káálà**
	?	˚**u-únú**	>	˚**u-úunú**	R,C,DI	**úúnù**
	?	˚**u-úchí**	>	˚**u-úuchí**	R,C,DI	**úúchì**
B	S1	˚**va-lúmilanga**	>	˚**va-lúmilaanga**	TD,DI	**và-lúmílààngà**
		˚**li-híndili**	>	˚**li-híndiili**	TD,DI	**lì-híndíìlì**
		˚**a-hímba**	>	˚**a-híimba**	DI	**à-híìmbà**
C	SF	˚**ma-kolobekó**	>	˚**ma-kolobeekó**	R,DI	**mà-kòlòbèékò**
		˚**li-kumbatú**	>	˚**li-kumbaatú**	R,DI	**lì-kùmbàátù**
		˚**ma-halá**	>	˚**ma-haalá**	R,DI	**mà-hàálà**
		˚**mi-ihí**	>	˚**mi-iihí**	R,C,DI	**mìíhì**
		˚**vi-inú**	>	˚**vi-iinú**	R,C,DI	**vìínù**
		˚**ú-njenjemá**	>	˚**ú-njenjeemá**	R,PS,DI	**ù-njénjèémà**
		˚**lí-tinjí**	>	˚**lí-tiinjí**	R,DI	**lí-tìínjì**
D	no H	˚**vi-kokolowa**	>	˚**vi-kokoloowa**	DI	**vì-kòkòlòòwà**
		˚**n-tandasa**	>	˚**n-tandaasa**	DI	**`n-tàndààsà**
		˚**vi-yewe**	>	˚**vi-yeewe**	DI	**vì-yèèwè**
		˚**chi-anga**	>	˚**chi-aanga**	C,DI	**chààngà**
		˚**mu-uyo**	>	˚**mu-uuyo**	C,DI	**mùùyò**
E	S2	˚**vi-tukútuku**	>	˚**vi-tukútuuku**	TD,DI	**vì-tùkútúùkù**
		˚**li-putíla**	>	˚**li-putíila**	DI	**lì-pùtíìlà**
		˚**chi-loóngo**	>	˚**chi-loóongo**	DI,TA	**chì-lòóòngò**
		˚**ma-vaála**	>	˚**ma-vaáala**	S,DI	**mà-váálà**

Verbal forms:

	lexical form		PUL	next rules	surface forms
A	˚**ku-pílikaná**	>	˚**ku-pílikaaná**	R,TB,DI	**kù-pílíkáánà**
	˚**ku-tóngolá**	>	˚**ku-tóngoolá**	R,TB,DI	**kù-tóngóólà**
	˚**ku-lólá**	>	˚**ku-lóolá**	R,DI	**kù-lóólà**
	˚**ku-údiá**	>	˚**ku-úudiá**	R,C,F,DI	**kúúdyà**
	˚**ku-úliá**	>	˚**ku-úuliá**	R,C,F,DI	**kúúlyà**
B	˚**va-li-pílikane**	>	˚**va-li-pílikaane**	TD,DI	**và-lì-pílíkàànè**
	˚**va-li-tóngole**	>	˚**va-li-tóngoole**	TD,DI	**và-lì-tóngóòlè**
	˚**va-li-lóle**	>	˚**va-li-lóole**	DI	**và-lì-lóòlè**

	˚va-li-údie	>	**˚va-li-úudie**	C,DI	**và-lyúúdyè**
	˚va-li-ílie	>	**˚va-li-íilie**	C,DI	**và-líílyè**
C	**˚tu-na-pilikaná**	>	**˚tu-na-pilikaaná**	R,DI	**tù-nà-pìlìkàánà**
	˚tu-na-tongolá	>	**˚tu-na-tongoolá**	R,DI	**tù-nà-tòngòólà**
	˚tu-na-lolá	>	**˚tu-na-loolá**	R,DI	**tù-nà-lòólà**
	˚tu-na-udiá	>	**˚tu-na-uudiá**	R,C,F,DI	**tù-nùùdyà**
	˚tu-na-aliá	>	**˚tu-na-aaliá**	R,C,F,DI	**tù-nààlyà**
	˚tú-ni-pilikaná	>	**˚tú-ni-pilikaaná**	R,PS,DI	**tù-nì-pílìkàánà**
	˚tú-ni-tongolá	>	**˚tú-ni-tongoolá**	R,PS,DI	**tù-nì-tóngòólà**
	˚tú-ni-lolá	>	**˚tú-ni-loolá**	R,PS,DI	**tù-ní-lòólà**
	˚tú-ni-udiá	>	**˚tú-ni-uudiá**	R,PS,C,F,DI	**tù-nyúúdyà**
	˚tú-ni-iliá	>	**˚tú-ni-iiliá**	R,PS,C,F,DI	**tù-níílyà**
D	**˚li-pilikane**	>	**˚li-pilikaane**	DI	**lì-pìlìkàànè**
	˚li-tongole	>	**˚li-tongoole**	DI	**lì-tòngòòlè**
	˚li-lole	>	**˚li-loole**	DI	**lì-lòòlè**
	˚li-udie	>	**˚li-uudie**	C,DI	**lyùdyè**
	˚li-ilie	>	**˚li-iilie**	C,DI	**lìílyè**
	˚tú-na-pilikane	>	**˚tú-na-pilikaane**	PS,TD,DI	**tù-nà-pílíkàànè**
	˚tú-na-tongole	>	**˚tú-na-tongoole**	PS,TD,DI	**tù-nà-tóngóòlè**
	˚tú-na-lole	>	**˚tú-na-loole**	PS,DI	**tù-nà-lóòlè**
	˚tú-na-udie	>	**˚tú-na-uudie**	PS,C,DI	**tù-núúdyè**
	˚tú-na-alie	>	**˚tú-na-aalie**	PS,C,DI	**tù-náályè**
E	**˚va-li-pilíkana**	>	**˚va-li-pilíkaana**	TD,DI	**và-lì-pìlíkáànà**
	˚va-li-tongóla	>	**˚va-li-tongóola**	DI	**và-lì-tòngóòlà**
	˚va-li-loóla	>	**˚va-li-loóola**	S,DI	**và-lì-lóólà**
	˚va-li-uúdia	>	**˚va-li-uúudia**	C,S,DI	**và-lyúúdyà**
	˚va-li-iília	>	**˚va-li-iíilia**	C,S,DI	**và-líílyà**

Note that the lengthened part of a vowel with a H tone does not have a H tone itself.

As noted earlier, vowel coalescence (C) between a tense marker and a vowel-initial stem is optional; also, vowel coalescence between the Infinitive marker and the vowel-initial stem is optional (see 2.7). The forms above with vowel coalescence exist of disyllabic vowel-initial stems with profiles A, C and D.

3.5.2 Complex final syllable and retraction of final H tone

Minisyllabic stems have a final syllable with two TBU's, e.g., ˚**-.lia**, ˚**-.lie** 'eat'. Causative stems and passive stems also have a final syllable with two TBU's: with the formation of causative stems and passive stems, vowel-final verbal bases (for

example ˚**-lim-i-** ‘make cultivate’ with causative ˚**i**, and ˚**-lim-u-** ‘be cultivated’ with passive ˚**u**) combine with the Finals **-a** or **-e** (˚**-limia**, ˚**-limie** and ˚**-limua**, ˚**-limue**). Also **-udya** ‘ask’, the disyllabic vowel-initial stem used in the examples, exists of a (lexicalized) causative extension, and should therefore be represented here as ˚**-udia**. We call such final syllables with two TBU’s complex final syllables. Nouns (and probably the other major categories as well) do not have complex final syllables; we assume that glides in the final syllable of nouns are lexicalised.

The existence of complex final syllables is best shown with the process Retraction of the final H tone (R). Stems with final H tone have profiles A or C. The final H tone is retracted to the preceding penultimate syllable, appearing on the lengthened part of the penultimate vowel, resulting in a penultimate rising tone. When the stem has a complex final syllable, the retracted tone appears on the first TBU of the final syllable (which shows that Retraction is a mora-based rule, not a syllable based rule), and disappears with Final H Deletion. We use the verbal stems with complex final syllable ˚**-pelekedia** (**-pelekedya** ‘send’), ˚**-kundania** (**-kundanya** ‘mix’) and ˚**-limia** (**-limya** ‘make cultivate’); the following examples are used:

			surface forms	
A	S1/SF	˚**ku-pélekediá**	**kù-pélékèèdyà**	to send
		˚**ku-kúndaniá**	**kù-kúndáànyà**	to mix
		˚**ku-límiá**	**kù-lîìmyà**	to make cultivate
C	SF	˚**tu-na-pelekediá**	**tù-nà-pèlèkèèdyà**	we (will) send
		˚**tu-na-kundaniá**	**tù-nà-kùndàànyà**	we (will) mix
		˚**tu-na-limiá**	**tù-nà-lììmyà**	we (will) make cultivate
		˚**tú-ni-pelekediá**	**tù-nì-pélékèèdyà**	we have sent
		˚**tú-ni-kundaniá**	**tù-nì-kúndáànyà**	we have mixed
		˚**tú-ni-limiá**	**tù-nì-lîìmyà**	we have made cultivated

Minisyllabic stems also have complex final syllables. Note that nominal stems never have a complex final syllable (we have not found examples of stems with three or four syllables with a glide in the final syllable); examples with disyllabic stems are:

		surface forms	
A	˚**di-nóndwá**	**dì-nóóndwà**	stars
C	˚**mi-utwé**	**myùútwè**	heads

We now demonstrate the retraction process:

Nouns:

	previous rule			next rules
	PUL		R	
A	˚**li-pélepeendé**	>	˚**li-pélepeénde**	TB,DI
	˚**u-tútuulí**	>	˚**u-tútuúli**	TB,DI
	˚**ma-káalá**	>	˚**ma-káála**	DI
	˚**di-nóondwá**	>	˚**di-nóóndwa**	DI
	? ˚**u-úunú**	>	˚**u-úúnu**	C,DI
	? ˚**u-úuchí**	>	˚**u-úúchi**	C,DI
C	˚**ma-kolobeekó**	>	˚**ma-kolobeéko**	DI
	˚**li-kumbaatú**	>	˚**li-kumbaátu**	DI
	˚**ma-haalá**	>	˚**ma-haála**	DI
	˚**mi-uutwé**	>	˚**mi-uútwe**	C,DI
	˚**mi-iihí**	>	˚**mi-iíhi**	C,DI
	˚**vi-iinú**	>	˚**vi-iínu**	C,DI
	˚**ú-njenjeemá**	>	˚**ú-njenjeéma**	PS,DI
	˚**lí-tiinjí**	>	˚**lí-tiínji**	DI

Verbal forms:

	previous rule			next rules
	PUL		R	
A	˚**ku-pílikaaná**	>	˚**ku-pílikaána**	TB,DI
	˚**ku-pélekeedіá**	>	˚**ku-pélekeedía**	C,TD,F,DI
	˚**ku-tóngoolá**	>	˚**ku-tóngoóla**	TB,DI
	˚**ku-kúndaaniá**	>	˚**ku-kúndaanía**	C,TD,F,DI
	˚**ku-lóolá**	>	˚**ku-lóóla**	DI
	˚**ku-líimiá**	>	˚**ku-líimía**	C,F,DI
	˚**ku-úudiá**	>	˚**ku-úudía**	C,F,DI
	˚**ku-úuliá**	>	˚**ku-úulía**	C,F,DI
C	˚**tu-na-pilikaaná**	>	˚**tu-na-pilikaána**	DI
	˚**tu-na-pelekeedіá**	>	˚**tu-na-pelekeedía**	C,F,DI
	˚**tu-na-tongoolá**	>	˚**tu-na-tongoóla**	DI
	˚**tu-na-kundaaniá**	>	˚**tu-na-kundaanía**	C,F,DI
	˚**tu-na-loolá**	>	˚**tu-na-loóla**	DI
	˚**tu-na-liimiá**	>	˚**tu-na-liimía**	C,F,DI
	˚**tu-na-uudiá**	>	˚**tu-na-uudía**	C,F,DI
	˚**tu-na-aaliá**	>	˚**tu-na-aalía**	C,F,DI
	˚**tú-ni-pilikaaná**	>	˚**tú-ni-pilikaána**	PS,DI
	˚**tú-ni-pelekeedіá**	>	˚**tú-ni-pelekeedía**	PS,C,TD,F,DI
	˚**tú-ni-tongoolá**	>	˚**tú-ni-tongoóla**	PS,DI

˚**tú-ni-kundaaniá**	>	˚**tú-ni-kundaanía**	PS,C,TD,F,DI
˚**tú-ni-loolá**	>	˚**tú-ni-loóla**	PS,DI
˚**tú-ni-liimiá**	>	˚**tú-ni-liimía**	PS,C,F,DI
˚**tú-ni-uudiá**	>	˚**tú-ni-uudía**	PS,C,F,DI
˚**tú-ni-iiliá**	>	˚**tú-ni-iilía**	PS,C,F,DI

With some examples, Coalescence is optional; both tracks (with and withhout C) can be followed in the sections to come.

As remarked above, retraction in verbal forms with and without complex final syllables leads to a different result. There is no H Tone Bridge when the H tone is in a complex final syllable (see next section). With nouns, there are no differences in surface forms since nouns do not have complex final syllables. There are also no differences in surface forms with the other profiles (B, D and E) with verbal forms. Their complex final syllables do not influence the tonal structure since verbal forms with profiles B, D and E lack a final H tone, hence there is no retraction.

3.5.3 H tone bridge

The process H Tone Bridge (TB) occurs in one-word p-phrases as well as in longer p-phrases. In this section, we concentrate on TB in one-word p-phrases (TB in the other types of p-phrases are dealt with in 8.2.2 and 8.3.2).

TB is a stem-based tonal rule which occurs between a S1-H tone and the retracted SF-H tone in the penultimate syllable. This process occurs in stems with profile A, but only those without a complex final syllable. Stems with a complex final syllable do not have a retracted H tone in the penultimate syllable, hence there is no TB. This shows that TB needs to take the syllable division into account when applying.

Nouns:

		previous rule			next rule
		R		TB	
A	S1/SF	˚**li-pélepeénde**	>	˚**li-pélépéénde**	DI
		˚**u-tútuúli**	>	˚**u-tútúúli**	DI

Verbal forms:

		R		TB	
A		˚**ku-pílikaána**	>	˚**ku-pílíkáána**	DI
		˚**ku-tóngoóla**	>	˚**ku-tóngóóla**	DI
cf.	˚**ku-pélekeedía**				
cf.	˚**ku-kúndaanía**				

Forms with disyllabic stems do not need TB to reach their surface forms since R (plus Default L-Insertion) already gives that result (see 3.5.2).

As noted in 3.4.3, when the S1-H tone is deleted by Meeussen's Rule, there is no TB. An example: when the verbal forms above have an object concord, which has a H tone in the Infinitive, the S1-H tone is deleted by Meeussen's Rule (MR). The result is that there is no TB.

			surface form
A	˚**ku-lí-tóngolá**		**kù-lí-tòngòólà**
	MR		PUL, R
A	˚**ku-lí-tongolá**	>	˚**ku-lí-tongoóla**

3.5.4 Prefix-H tone shift

The H tone of a (pro)nominal prefix or a verbal prefix (subject concord) shifts to the S1-position of the stem, or, when an object concord is involved, to the first position of the macrostem. This process is called Prefix-H tone Shift (PS). With nouns, similar tone patterns as verbal forms have led to the assumption that this shift happens to nouns in a similar way as to verbal forms. With verbal forms, the shift occurs via the tense marker. The shift does not occur, or it stops on the tense marker, when the disyllabic stem contains a R tone; this constraint, an instance of the OCP, prevents the H tone to shift next to the H tone on the second TBU of the penultimate syllable.

Nouns:

		previous rule			next rule
		R		PS	
C	SF	˚**ú-njenjeéma**	>	˚**u-njénjeéma**	DI
D	no H	?			

Verbal forms:

	previous rule			next rules
	R		PS	
C	˚**tú-ni-pilikaána**	>	˚**tu-ni-pílikaána**	DI
	˚**tú-ni-pelekeedía**	>	˚**tu-ni-pélekeedía**	C,TD,F,DI
	˚**tú-ni-tongoóla**	>	˚**tu-ni-tóngoóla**	DI
	˚**tú-ni-kundaanía**	>	˚**tu-ni-kúndaanía**	C,TD,F,DI
	˚**tú-ni-loóla**	>	˚**tu-ní-loóla**	DI
	˚**tú-ni-liimía**	>	˚**tu-ni-líimía**	C,F,DI

	˚tú-ni-uudía	>	**˚tu-ni-úudía**	C,F,DI
	˚tú-ni-iilía	>	**˚tu-ni-íilía**	C,F,DI

	PUL		PS	
D	**˚tú-na-pilikaane**	>	**˚tu-na-pílikaane**	TD,DI
	˚tú-na-tongoole	>	**˚tu-na-tóngoole**	TD,DI
	˚tú-na-loole	>	**˚tu-na-lóole**	DI
	˚tú-na-uudie	>	**˚tu-na-úudie**	C,DI
	˚tú-na-aalie	>	**˚tu-na-áalie**	C,DI

With some examples, Coalescence is optional; both tracks (with and without C) can be followed in the sections to come.

The shift of the Px-H tone is not to the S1-position when there is an object concord (with verbal forms); then, the shift is to the object concord. This shows that the rule has the macrostem as domain of application. The examples we use are the verbal forms above, but now with object concord. First, we give the lexical forms, followed by the post-lexical forms until the stage where PS applies.

		surface forms	
C	**˚tú-ni-li-pilikaná**	**tù-nì-lí-pílìkàánà**	we have heard it
	˚tú-ni-li-pelekediá	**tù-nì-lí-pélèkèèdyà**	we have sent it
	˚tú-ni-li-tongolá	**tù-nì-lí-tòngòólà**	we have spoken it
	˚tú-ni-li-kundaniá	**tù-nì-lí-kúndàànyà**	we have mixed it
	˚tú-ni-li-lolá	**tù-nì-lí-lòólà**	we have looked at it
	˚tú-ni-li-limiá	**tù-nì-lí-lîmyà**	we have made it cultivate
	˚tú-ni-li-udiá	**tù-nì-lí-úùdyà/**	
		tù-ní-lyúùdyà	we have asked (cl.5)
	˚tú-ni-li-iliá	**tù-ní-lîlyà**	we have eaten it
D	**˚tú-na-li-pilikane**	**tù-nà-lí-pílìkàànè**	we shouldn't hear it
	˚tú-na-m-pilikane	**tù-nám´-pílìkàànè**	we shouldn't hear it
	˚tú-na-li-tongole	**tù-nà-lí-tóngòòlè**	we shouldn't speak it
	˚tú-na-li-lole	**tù-nà-lí-lóòlè**	we shouldn't look at it
	˚tú-na-li-udie	**tù-nà-lí-úùdyè/**	
		tù-ná-lyúùdyè	we shouldn't ask (cl.5)
	˚tú-na-li-ilie	**tù-ná-lîlyè**	we shouldn't eat it

	previous rules			next rules
	PUL, R		PS	
C	**˚tú-ni-li-pilikaána**	>	**˚tu-ni-lí-pilikaána**	TD,DI
	˚tú-ni-li-pelekeedía	>	**˚tu-ni-lí-pelekeedía**	C,TD,F,DI
	˚tú-ni-li-tongoóla	>	**˚tu-ni-lí-tongoóla**	DI
	˚tú-ni-li-kundaanía	>	**˚tu-ni-lí-kundaanía**	C,TD,F,DI
	˚tú-ni-li-loóla	>	**˚tu-ni-lí-loóla**	DI

	˚**tú-ni-li-liimía**	>	˚**tu-ni-lí-liimía**	C,TD,F,DI
	˚**tú-ni-li-uudía**	>	˚**tu-ni-lí-uudía**	C,TD,F,DI
	˚**tú-ni-li-iilía**	>	˚**tu-ni-lí-iilía**	C,TD,F,DI
	PUL		PS	
D	˚**tú-na-li-pilikaane**	>	˚**tu-na-lí-pilikaane**	TD,DI
	˚**tú-na-m-pilikane**	>	˚**tu-na-m´-pilikaane**	C,TD,DI,TA
	˚**tú-na-li-tongoole**	>	˚**tu-na-lí-tongoole**	TD,DI
	˚**tú-na-li-loole**	>	˚**tu-na-lí-loole**	TD,DI
	˚**tú-na-li-uudie**	>	˚**tu-na-lí-uudie**	C,TD,DI
	˚**tú-na-li-iilie**	>	˚**tu-na-lí-iilie**	C,TD,DI

All subject concords, particpants and classes, have the same tones in the tenses above since there are no different surface forms in the paradigms. The assumption that the tone of the subject concords is H in the tenses above is explained as follows. The tones and their positions in the tenses above are similar to those in other tenses where we are sure that subject concords have a H tone; in these tenses, there is a distinction between H-toned subject concords (the classes) and non-H-toned subject concords (the participants). Such a tense is the Non-Past which we have used as an example of a tense with stem profile C (SF-H tone) from 3.4.1 onwards.

Participants (non-H-toned, see from 3.4.1):

		surface forms	
C	˚**tu-na-pilikaná**	**tù-nà-pìlìkàánà**	we (will) hear
	˚**tu-na-pelekediá**	**tù-nà-pèlèkèèdyà**	we (will) send
	˚**tu-na-tongolá**	**tù-nà-tòngòólà**	we (will) speak
	˚**tu-na-kundaniá**	**tù-nà-kùndàànyà**	we (will) mix
	˚**tu-na-lolá**	**tù-nà-lòólà**	we (will) look
	˚**tu-na-limiá**	**tù-nà-lìimyà**	we (will) make cultivate
	˚**tu-na-uudiá**	**tù-nà-ùùdyà/tù-nùùdyà**	we (will) ask
	˚**tu-na-aaliá**	**tù-nààlyà**	we (will) eat

Classes (H-toned):

		surface forms	
C	˚**vá-na-pilikaná**	**và-nà-pílìkàánà**	they (will) hear
	˚**vá-na-pelekediá**	**và-nà-pélékèèdyà**	they (will) send
	˚**vá-na-tongolá**	**và-nà-tóngòólà**	they (will) speak
	˚**vá-na-kundaniá**	**và-nà-kúndáànyà**	they (will) mix
	˚**vá-na-lolá**	**và-ná-lòólà**	they (will) look
	˚**vá-na-limiá**	**và-nà-líimyà**	they (will) make cultivate
	˚**vá-na-udiá**	**và-nà-úùdyà/và-núúdyà**	they (will) ask
	˚**vá-na-aliá**	**và-náályà**	they (will) eat

previous rules

	PUL, R		PS
C	˚**vá-na-pilikaána**	>	˚**va-na-pílikaána**
	˚**vá-na-pelekeedía**	>	˚**va-na-pélekeedía**
	˚**vá-na-tongoóla**	>	˚**va-na-tóngoóla**
	˚**vá-na-kundaanía**	>	˚**va-na-kúndaanía**
	˚**vá-na-loóla**	>	˚**va-ná-loóla**
	˚**vá-na-liimía**	>	˚**va-na-líimía**
	˚**vá-na-uudía**	>	˚**va-na-úudía**
	˚**vá-na-iilía**	>	˚**va-na-íilía**

With object concord:

		surface forms	
C	˚**vá-na-li-pilikaná**	**và-nà-lí-pílìkàánà**	they (will) hear it
	˚**vá-na-li-pelekediá**	**và-nà-lí-pélèkèèdyà**	they (will) send
	˚**vá-na-li-tongolá**	**và-nà-lí-tòngòólà**	they (will) speak it
	˚**vá-na-li-kundaniá**	**và-nà-lí-kúndàànya**	they (will) mix it
	˚**vá-na-li-lolá**	**và-nà-lí-lòólà**	they (will) look at it
	˚**vá-na-li-limiá**	**và-nà-lí-lîimyà**	they (will) make it cultivate
	˚**vá-na-li-udiá**	**và-nà-lí-úùdyà/**	
		và-ná-lyúùdyà	they (will) ask (cl.5)
	˚**vá-na-li-iliá**	**và-ná-lîilyà**	they (will) eat it

previous rules

	PUL, R		PS
C	˚**vá-na-li-pilikaána**	>	˚**va-na-lí-pilikaána**
	˚**vá-na-li-pelekeedía**	>	˚**va-na-lí-pelekeedía**
	˚**vá-na-li-tongoóla**	>	˚**va-na-lí-tongoóla**
	˚**vá-na-li-kundaanía**	>	˚**va-na-lí-kundaanía**
	˚**vá-na-li-loóla**	>	˚**va-na-lí-loóla**
	˚**vá-na-li-liimía**	>	˚**va-na-lí-liimía**
	˚**vá-na-li-uudía**	>	˚**va-na-lí-uudía**
	˚**vá-na-li-iilía**	>	˚**va-na-lí-iilía**

All these forms of the Non-Past with H-toned subject concords, from the underlying stages until the surface forms, are tonally identical with the Present Perfective *djt* and the Negative Optative which we use as examples in the processes we describe. We therefore do not present further forms of the Non-Past with H-toned subject concords in the following sections.

There are also pronominal forms with H-toned pronominal prefixes; among them are ˚^{H}**-.njí** 'other', and the Possessives. These forms are dealt with in 5.5 and 5.6.

There is also Px-H tone shift with p-phrases containing two words, but in these cases, the H tone shifts to the final TBU of the verbal form (see 8.3.2).

3.5.5 Coalescence, resyllabification and OC-H tone retraction

Vowel Coalescence/Glide Formation (VC/GF, including vowel incorporation) is optional in some environments and obligatory in others, and there are even environments where VC/GF may never occur. These environments are described in 2.7. VC/GF is obligatory in complex final syllables, where a glide appears, because there is a condition on syllabification that every syllable within a verbal stem, where one of the processes of verbal base and stem formation has occurred, must have an onset. As a result of tonal coalescence (see below), the final H tone (in case of TG A and C) appears on the Final, where the later process Final H Deletion deletes them. Resyllabification takes place. In the case of minisyllabic stems, their first vowel (S1) and the preceding morpheme form one syllable (see 3.4.1).

			previous rule		C	next rules
			R			
A	S1/SF	?	˚**u-úúnu**	>	˚**úúnu**	DI
		?	˚**u-úúchi**	>	˚**úúchi**	DI
			˚**ku-pélekeedía**	>	˚**ku-pélekeedyá**	TD,F,DI
			˚**ku-kúndaanía**	>	˚**ku-kúndaanyá**	TD,F,DI
			˚**ku-líimía**	>	˚**ku-líimyá**	F,DI
			˚**ku-úudía**	>	˚**ku-úudyá/**	F,DI
					˚**kúúdyá**	F,DI
			˚**ku-úulía**	>	˚**kúúlyá**	F,DI
			PUL			
B	S1		˚**va-li-úudie**	>	˚**va-lyúúdye**	DI
			˚**va-li-íilie**	>	˚**va-líílye**	DI
			R			
C	SF		˚**mi-uútwe**	>	˚**myuútwe**	DI
			˚**mi-iíhi**	>	˚**miíhi**	DI
			˚**vi-iínu**	>	˚**viínu**	DI
			˚**tu-na-pelekedía**	>	˚**tu-na-pelekeedyá**	F,DI
			˚**tu-na-kundanía**	>	˚**tu-na-kundaanyá**	F,DI
			˚**tu-na-limía**	>	˚**tu-na-liimyá**	F,DI
			˚**tu-na-uudía**	>	˚**tu-na-uudyá/**	F,DI
					˚**tu-nuudyá**	F,DI
			˚**tu-na-aalía**	>	˚**tu-naalyá**	F,DI

		PS			
		˚**tu-ni-lí-pelekeedía**	>	˚**tu-ni-lí-pelekeedyá**	TD,F,DI
		˚**tu-ni-pélekeedía**	>	˚**tu-ni-pélekeedyá**	TD,F,DI
		˚**tu-ni-lí-kundaanía**	>	˚**tu-ni-lí-kundaanyá**	TD,F,DI
		˚**tu-ni-kúndaanía**	>	˚**tu-ni-kúndaanyá**	TD,F,DI
		˚**tu-ni-lí-liimía**	>	˚**tu-ni-lí-liimyá**	TD,F,DI
		˚**tu-ni-líimía**	>	˚**tu-ni-líimyá**	F,DI
		˚**tu-ni-úudía**	>	˚**tu-ni-úudyá/**	F,DI
				˚**tu-nyúúdyá**	F,DI
		˚**tu-ni-lí-uudía**	>	˚**tu-ni-lí-uudyá/**	TD,F,DI
				˚**tu-ní-lyuudyá**	TD,F,DI
		˚**tu-ni-íilía**	>	˚**tu-níílyá**	F,DI
		˚**tu-ni-lí-iilía**	>	˚**tu-ní-liilyá**	TD,F,DI
		PUL			
D	no H	˚**chi-aanga**	>	˚**chaanga**	DI
		˚**mu-uuyo**	>	˚**muuyo**	DI
		˚**li-uudie**	>	˚**lyudye**	DI
		˚**li-iilie**	>	˚**liilye**	DI
		PS			
		˚**tu-na-m´-pilikaane**	>	˚**tu-nam´-pilikaane**	DI,TA
		˚**tu-na-úudie**	>	˚**tu-na-úudye/**	DI
				˚**tu-núúdye**	DI
		˚**tu-na-lí-uudie**	>	˚**tu-na-lí-uudye/**	TD,DI
				˚**tu-ná-lyuudye**	TD,DI
		˚**tu-na-áalie**	>	˚**tu-náálye**	DI
		˚**tu-na-lí-iilie**	>	˚**tu-ná-liilye**	TD,DI
		PUL			
E		˚**va-li-uúdia**	>	˚**va-lyuúudia**	S,DI
		˚**va-li-iília**	>	˚**va-liíilia**	S,DI

There are nine examples where VC/GF is optional since it concerns the merging of the infinitive marker or a tense marker or an object concord with a vowel-initial stem (see 2.7).

˚**ku-úudía**	> ˚**ku-úudyá**, ˚**kúúdyá**
˚**va-li-úudie**	> ˚**va-li-úudye**, ˚**va-lyúúdye**
˚**tu-na-uudía**	> ˚**tu-na-uudyá**, ˚**tu-nuudyá**
˚**tu-ni-úudía**	> ˚**tu-ni-úudyá**, ˚**tu-nyúúdyá**
˚**tu-ni-lí-uudía**	> ˚**tu-ni-lí-uudyá**, ˚**tu-ní-lyuudyá**
˚**li-uudie**	> ˚**li-uudye,** ˚**lyuudye**
˚**tu-na-úudie**	> ˚**tu-na-úudye**, ˚**tu-núúdye**
˚**tu-na-lí-uudie**	> ˚**tu-na-lí-uudye**, ˚**tu-ná-lyuudye**
˚**va-li-uúdia**	> ˚**va-li-uúdya**, ˚**va-lyuúdya**

The examples with VC/GF show that VC/GF may have consequences for the H tones, e.g., a zero-H-zero sequence becomes HH (first, third and fifth example). What happens to the H tone of a fused object concord is dealt with at the end of this section. More examples of VC/GF (which are obligatory or optional) show more consequences. Below, VC/GF is optional in all examples, except for the examples under 3. where VC/GF is obligatory. The examples are not included in the description of the rules which follow in the next sections. We call VC/GF with respect to tones tonal coalescence.

The results of tonal coalescence are the following:

1. Coalescence of two H tones results in a H tone:

HH → H

˚**pa-vá-ú-lóola → pà-vú-lóòlà** when they look at it (cl.3)

2. Coalesence of a H tone and a zero tone results in a H tone:

H zero → H

˚**tu-chí-oloóta → tù-chólòótà** we were pointing

We assume that this tonal coalescence also happens in complex final syllables with a final H tone. When the result of tonal coalescence is that two primary H tones appear next to each other, then the second H tone is deleted by Meeussen's Rule.

˚**tu-ká-i-lólííte → tù-kí-lòlíítè** we have not looked at it

3. Coalesence of a H tone, a zero tone and a H tone results in a H-zero sequence (a F tone after Default L tone insertion.

H zero H → H zero

This is in fact the same case as the final one of 2. above: the result of tonal coalescence is that two primary H tones appear next to each other, and the second H tone is deleted by Meeussen's Rule.

˚**lí-aángu > lyáàngù** mine (cl.5)
˚**mú-aána > mwáànà** child

4. Coalesence of a zero tone and a H tone results in two successive H tones, on two syllables as well as on one syllable (level H tones):

zero H → H.H
zero H → HH

˚**la-na-éneleedya → là-nénélèèdyà** it extends
˚**tu-na-íive → tù-níívè** we should not steal

When the result of tonal coalescence is that two primary H tones appear next to each other, the second H tone is deleted by Meeussen's Rule, i.e. the first H of the fused vowel; as a consequence, the second H resulted from the fused vowel is not realized, and a default L appears.

H.zero H → H.zero

˚**tu-chí-va-údíidya**	→ **tù-chí-vùdìidyà**	we were asking for them
˚**tu-chí-va-úudya**	→ **tù-chí-vùùdyà**	we were asking them

Processes of tonal coalescence also occur with Penultimate Shortening (3.5.9).

There is a rule connected to tonal coalescence which retracts the H tone of an object concord to the preceding tense marker. This rule is called the "OC-H tone retraction". With forms with an object concord which have a Px-H tone and a vowel-initial stem with profile C or D, the Px-H tone shifts to the object concord. When there is coalescence between the vowel of the object concord and the stem-initial vowel, the H tone of the object concord is retracted to the preceding tense marker.

C	˚**tu-ni-lí-uudía**	> ˚**tu-ní-lyuudyá**
D	˚**tu-na-lí-uudie**	> ˚**tu-ná-lyuudye**

This coalescence is optional, the non-contracted forms ˚**tu-ni-lí-uudyá** and ˚**tu-na-lí-uudye** follow their own tracks in the derivation (see above).

3.5.6 H tone doubling, final H deletion and Structure simplification

With H Tone Doubling (TD), a H tone generally doubles one mora to its right, irrespective of morpheme boundaries. It is a word-based tonal rule. With Final H deletion (F), the final H tone of a complex final syllable is deleted. With Structure Simplification (S), penultimate syllables with three TBU's, mainly due to S2 tonal lengthening on disyllabic stems (TG E), are reduced to two TBU's. These processes are dealt with together because they do not have a clear order of application relative to each other. Where both H Tone Doubling and Final H deletion apply, we have in the examples below arbitrarily chosen the order TD - F.

	previous rule		TD	F	next rules
	C				
A	˚**ku-pélekeedyá**	>	˚**ku-pélékeedyá**	˚**ku-pélékeedya**	DI
	˚**ku-kúndaanyá**	>	˚**ku-kúndáanyá**	˚**ku-kúndáanya**	DI
	˚**ku-líimyá**	>		˚**ku-líimya**	DI
	˚**ku-úudyá/**	>		˚**ku-úudya/**	DI

	˚**kúúdyá**	>		˚**kúúdya**	DI
	˚**kúúlyá**	>		˚**kúúlya**	DI
	PUL				
B	˚**va-lúmilaanga**	>	˚**va-lúmílaanga**		DI
	˚**li-híndiili**	>	˚**li-híndíili**		DI
	˚**va-li-pílikaane**	>	˚**va-li-pílíkaane**		DI
	˚**va-li-tóngoole**	>	˚**va-li-tóngóole**		DI
	PS				
C	˚**tu-ni-lí-pilikaána**	>	˚**tu-ni-lí-pílikaána**		DI
	C				
	˚**tu-na-pelekeedyá**	>		˚**tu-na-pelekeedya**	DI
	˚**tu-na-kundaanyá**	>		˚**tu-na-kundaanya**	DI
	˚**tu-na-liimyá**	>		˚**tu-na-liimya**	DI
	˚**tu-na-udyá**	>		˚**tu-na-uudya**	DI
	˚**tu-nuudyá**	>		˚**tu-nuudya**	DI
	˚**tu-naalyá**	>		˚**tu-naalya**	DI
	˚**tu-ni-pélekeedyá**	>	˚**tu-ni-pélékeedyá**	˚**tu-ni-pélékeedya**	DI
	˚**tu-ni-lí-pelekeedyá**	>	˚**tu-ni-lí-pélekeedyá**	˚**tu-ni-lí-pélekeedya**	DI
	˚**tu-ni-kúndaanyá**	>	˚**tu-ni-kúndáanyá**	˚**tu-ni-kúndáanya**	DI
	˚**tu-ni-lí-kundaanyá**	>	˚**tu-ni-lí-kúndaanyá**	˚**tu-ni-lí-kúndaanya**	DI
	˚**tu-ni-líimyá**	>		˚**tu-ni-líimya**	DI
	˚**tu-ni-lí-liimyá**	>	˚**tu-ni-lí-líimyá**	˚**tu-ni-lí-líimya**	DI
	˚**tu-ni-úudyá**	>		˚**tu-ni-úudya**	DI
	˚**tu-nyúúdyá**	>		˚**tu-nyúúdya**	DI
	˚**tu-ni-lí-uudyá**	>	˚**tu-ni-lí-úudyá**	˚**tu-ni-lí-úudya**	DI
	˚**tu-ní-lyuudyá**	>	˚**tu-ní-lyúudyá**	˚**tu-ní-lyúudya**	DI
	˚**tu-níílyá**	>		˚**tu-níílya**	DI
	˚**tu-ní-liilyá**	>	˚**tu-ní-líilyá**	˚**tu-ní-líilya**	DI
	PS				
D	˚**tu-na-pílikaane**	>	˚**tu-na-pílíkaane**		DI
	˚**tu-na-lí-pilikaane**	>	˚**tu-na-lí-pílikaane**		DI
	˚**tu-na-tóngoole**	>	˚**tu-na-tóngoole**		DI
	˚**tu-na-lí-tongoole**	>	˚**tu-na-lí-tóngoole**		DI
	˚**tu-na-lí-loole**	>	˚**tu-na-lí-lóole**		DI
	C				
	˚**tu-nam´-pilikaane**	>	˚**tu-nam´-pílikaane**		DI,TA
	˚**tu-na-lí-uudye**	>	˚**tu-na-lí-úudye**		DI
	˚**tu-ná-lyuudye**	>	˚**tu-ná-lyúudye**		DI
	˚**tu-ná-liilye**	>	˚**tu-ná-líilye**		DI

	PUL			
E	˚**vi-tukútuuku**	>	˚**vi-tukútúuku**	DI
	˚**va-li-pilíkaana**	>	˚**va-li-pilíkáana**	DI

previous rule		S		next rule
	PUL			
E	˚**ma-vaáala**	>	˚**ma-váála**	DI
	˚**va-li-loóola**	>	˚**va-li-lóóla**	DI
	C			
	˚**va-li-uúudia**	>	˚**va-li-úúdya**	DI
	˚**va-lyuúudia**	>	˚**va-lyúúdya**	DI
	˚**va-liíilia**	>	˚**va-líílya**	DI

With Structure Simplification, three TBU's are reduced to two TBU's (and two TBU's to one TBU). Three TBU's may appear after S2-tonal lengthening on disyllabic stems, other cases are mentioned in 3.5.8. The tonal coalescence we see here is probably the same as the fourth case described in 3.5.5: zero H → HH.

Final H Deletion is blocked with certain Substitutives and Demonstratives (see 5.2 and 5.3) as well as in case of the Optative without object concord (see 7.2.4). Some examples are the following (in the rest of this section, we give the surface forms because, after H Tone Doubling and Final H Deletion, only default L tones are needed to derive the surface forms):

ùnéènè	I (emphatic)
àyùùlá, **ààyú**	that (cl.1)
ánéèyó, **ààyó**	that (referential, cl.1)
tùùlyé	we should eat
tù(-)ùdyé	we should ask
tù-lìimyé	we should make cultivate
tù-kùndàànyé	we should mix
tù-pèlèkèèdyé	we should send

There is no H tone doubling to the final syllable. The following OCP effects are observed: H tone doubling may not create a H tone bridge, nor lead to a long syllable with a level HH tone; as a consequence, there is no H tone doubling to a TBU preceding a H tone, nor to the lengthened TBU in the penultimate syllable (the second example below shows both cases).

và-nà-tú-lòólà	they (will) look at us
và-ká-tù-lóòlà	they do not look at us

There is also no H tone doubling to the TBU preceding the penultimate syllable which contains a R tone.

	và-nà-ví-tòngòólà	they (will) speak them (cl.8)
	tù-ví-tòngòólà	we who speak them
cf.	**tù-ví-tóngòlà kàdìíkì**	we who speak them a bit

Finally, there is no H tone doubling to another word, which confirms that doubling is a word-based tonal rule (with one exception, concerning nouns without H tones which start with the word formation element **na-**, to be dealt with in 8.3.2 in the section about Regressive H Tone Dissimilation).

tòngòlá chìihì just speak!

Some tense markers block H tone doubling (see 7.1.5), but with larger stems with all L tones, H tone doubling is optional.

tù-chí-yàngàátà	we were helping
tù-chí-và-yàngàátà	we were helping them
tù-chí-kùndàànyà/tù-chí-kúndàànyà	we were mixing
tù-chí-vì-kùndàànyà/tù-chí-ví-kùndàànyà	we were mixing them
tù-ká-yàngèètè/tù-ká-yángèètè	we hadn't helped
tù-ká-và-yàngèètè/tù-ká-vá-yàngèètè	we hadn't helped them

In tenses where the TM does not block H tone doubling, there is an optional second H tone doubling if the remainder of the word is all-L.

	kù-vá-kúndànìidyà/kù-vá-kúndánìidyà	to mix for them
	kù-vá-pélèkèèdyà/kù-vá-pélékèèdyà	to send them
cf.	**kù-vá-pílìkànìílà**	to listen to them
	tú-ní-kàtàpààdyà/tú-ní-kátàpàtààdyà	we had cleaned
cf.	**tú-ní-pìlìkànìílà**	we had listened
	tú-ná-kàtàpààdyà/tú-ná-kátàpàtààdyà	we cleaned
cf.	**tú-ná-pìiikànìílà**	we listened

This second doubling is obligatory with all Indirect Relative tenses with object concord with stems with all L tones. Some examples:

	pà-tú-vá-yángàátà	when we help them
	pà-tú-vá-pílìkànìílà	when we listen to them
	pà-tú-vá-yángèètè	when we have helped them
	pà-tú-vá-pílìkànìílè	when we have listened to them
cf.	**pà-tú-yángàátà**	when we help
cf.	**pà-tú-pílìkànìílà**	when we listen
cf.	**pà-tú-yángèètè**	when we have helped
cf.	**pà-tú-pílìkànìílè**	when we have listened

3.5.7 Default L tone insertion

Default L tones are inserted. The forms of the sections 3.5.1 - 3.5.6 which were followed by DI under ‘next rules’ reach their surface forms.

		previous rule		DI
		TB		
A	S1/SF	˚**li-pélépéénde**	>	**lì-pélépééndè**
		˚**ku-pílíkáána**	>	**kù-pílíkáánà**
		˚**u-tútúúli**	>	**ù-tútúúlì**
		˚**ku-tóngóóla**	>	**kù-tóngóólà**
		˚**ku-lí-tongoóla**	>	**kù-lí-tòngòólà**
		R		
		˚**ma-káála**	>	**mà-káálà**
		˚**di-nóóndwa**	>	**dì-nóóndwà**
		˚**ku-lóóla**	>	**kù-lóólà**
		C		
		˚**úúnu**	>	**úúnù**
		˚**úúchi**	>	**úúchì**
		TD,F		
		˚**ku-pélékeedya**	>	**kù-pélékèèdyà**
		˚**ku-kúndáanya**	>	**kù-kúndáànyà**
		F		
		˚**ku-líimya**	>	**kù-líîmyà**
		˚**ku-úudya/**	>	**kù-úùdyà/**
		˚**kúúdya**	>	**kúúdyà**
		˚**kúúlya**	>	**kúúlyà**
		PUL		
B	S1	˚**a-híimba**	>	**à-hîmbà**
		˚**va-li-lóole**	>	**và-lì-lóòlè**
		C		
		˚**va-li-úudye**	>	**và-lì-úùdyè**
		˚**va-lyúúdye**	>	**và-lyúúdyè**
		˚**va-líilye**	>	**và-líílyè**
		TD		
		˚**va-lúmílaanga**	>	**và-lúmílààngà**
		˚**li-híndíili**	>	**lì-híndíîlì**
		˚**va-li-pílíkaane**	>	**và-lì-pílíkàànè**
		˚**va-li-tóngóole**	>	**và-lì-tóngóòlè**

		R		
C	SF	˚**ma-kolobeéko**	>	**mà-kòlòbèékò**
		˚**li-kumbaátu**	>	**lì-kùmbàátù**
		˚**ma-haála**	>	**mà-hàálà**
		˚**lí-tiínji**	>	**lí-tìínjì**
		˚**tu-na-pilikaána**	>	**tù-nà-pìlìkàánà**
		˚**tu-na-tongoóla**	>	**tù-nà-tòngòólà**
		˚**tu-na-loóla**	>	**tù-nà-lòólà**
		PS		
		˚**u-njénjeéma**	>	**ù-njénjèémà**
		˚**tu-ni-pílikaána**	>	**tù-nì-pílìkàánà**
		˚**tu-ni-tóngoóla**	>	**tù-nì-tóngòólà**
		˚**tu-ni-lí-tongoóla**	>	**tù-nì-lí-tòngòólà**
		˚**tu-ní-loóla**	>	**tù-nì-lòólà**
		˚**tu-ni-lí-loóla**	>	**tù-nì-lí-lòólà**
		C		
		˚**myuútwe**	>	**myùútwè**
		˚**miíhi**	>	**mìíhì**
		˚**viínu**	>	**vìínù**
		TD		
		˚**tu-ni-lí-pílikaána**	>	**tù-nì-lí-pílìkàánà**
		TD,F		
		˚**tu-ni-pélékeedya**	>	**tù-nì-pélékèèdyà**
		˚**tu-ni-lí-pélekeedya**	>	**tù-nì-lí-pélèkèèdyà**
		˚**tu-ni-kúndáanya**	>	**tù-nì-kúndáànyà**
		˚**tu-ni-lí-kúndaanya**	>	**tù-nì-lí-kúndàànyà**
		˚**tu-ni-lí-líimya**	>	**tù-nì-lí-lîmyà**
		˚**tu-ni-lí-úudya**	>	**tù-nì-lí-úùdyà**
		˚**tu-ní-lyúudya**	>	**tù-ní-lyúùdyà**
		˚**tu-ní-líilya**	>	**tù-ní-líîlyà**
		F		
		˚**tu-na-pelekeedya**	>	**tù-nà-pèlèkèèdyà**
		˚**tu-na-kundaanya**	>	**tù-nà-kùndàànyà**
		˚**tu-na-liimya**	>	**tù-nà-lìimyà**
		˚**tu-na-uudya**	>	**tù-nà-ùùdyà**
		˚**tu-nuudya**	>	**tù-nùùdyà**
		˚**tu-naalya**	>	**tù-nààlyà**
		˚**tu-ni-líimya**	>	**tù-nì-lîmyà**
		˚**tu-ni-úudya**	>	**tù-nì-úùdyà**
		˚**tu-nyúúdya**	>	**tù-nyúúdyà**
		˚**tu-níílya**	>	**tu-níílyà**

		PUL			
D	no H	˚**vi-kokoloowa**	>	**vì-kòkòlòòwà**	
		˚**n-tandaasa**	>	**`n-tàndààsà**	
		˚**vi-yeewe**	>	**vì-yèèwè**	
		˚**li-pilikaane**	>	**lì-pìlìkàànè**	
		˚**li-tongoole**	>	**lì-tòngòòlè**	
		˚**li-loole**	>	**lì-lòòlè**	
		PS			
		˚**tu-na-lóole**	>	**tù-nà-lóòlè**	
		C			
		˚**chaanga**	>	**chààngà**	
		˚**muuyo**	>	**mùùyò**	
		˚**li-uudye**	>	**lì-ùùdyè**	
		˚**lyuudye**	>	**lyùùdyè**	
		˚**liilye**	>	**lìilyè**	
		˚**tu-na-úudye/**	>	**tù-nà-úùdyè/**	
		˚**tu-núúdye**	>	**tù-núúdyè**	
		˚**tu-náálye**	>	**tù-náályè**	
		TD			
		˚**tu-na-pílíkaane**	>	**tù-nà-pílíkàànè**	
		˚**tu-na-lí-pílikaane**	>	**tù-nà-lí-pílìkàànè**	
		˚**tu-nam˝-pílikaane**	>	˚**tù-nàm˝-pílìkàànè**	> TA
		˚**tu-na-tóngoole**	>	**tù-nà-tóngòòlè**	
		˚**tu-na-lí-tóngoole**	>	**tù-nà-lí-tóngòòlè**	
		˚**tu-na-lí-lóole**	>	**tù-nà-lí-lóòlè**	
		˚**tu-na-lí-úudye**	>	**tù-nà-lí-úùdyè**	
		˚**tu-ná-lyúudye**	>	**tù-ná-lyúùdyè**	
		˚**tu-ná-líilye**	>	**tù-ná-líìlyè**	
		PUL			
E	S2	˚**li-putíila**	>	**lì-pùtíìlà**	
		˚**chi-loóongo**	>	˚**chì-lòóòngò**	> TA
		˚**va-li-tongóola**	>	**và-lì-tòngóòlà**	
		S			
		˚**ma-váála**	>	**mà-váálà**	
		˚**va-li-lóóla**	>	**và-lì-lóólà**	
		˚**va-li-úúdya**	>	**và-lì-úúdyà**	
		˚**va-lyúúdya**	>	**và-lyúúdyà**	
		˚**va-líílya**	>	**và-líílyà**	

	TD		
	˚vi-tukútúuku	>	**vì-tùkútúùkù**
	˚va-li-pilíkáana	>	**và-lì-pìlíkáànà**

3.5.8 Tone assimilation

There are two types of tone assimilation with one-word p-phrases (see 8.2.2 and 8.2.3 for tone assimilation with longer p-phrases). The first type concerns the raising of the mora preceding a syllabic nasal with a H tone, the second type concerns the raising of the mora preceding a HL or HH tonal sequence in the same syllable.

		previous rule		TA
		DI		
D	no H	**˚tù-nàm´-pílìkàànè**	>	**tù-nám´-pílìkàànè**
		DI		
E	S2	**˚chì-lòóòngò**	>	**chì-l̲óóòngò**

About the first type, with Coalescence and resyllabification, a syllabic nasal and the preceding syllable become one syllable. When the syllabic nasal has a H tone, the preceding TBU becomes H as well. Some more examples follow.

	˚kùń-pàpàátà	> **kúń-pàpàátà**	to follow her/him
cf.	**kù-vá-pàpàáta**		to follow them
	˚tù-nìń-pàpàáta	> **tù-níń-pàpàátà**	we have followed her/him
cf.	**tù-nì-vá-pàpàátà**		we have followed them
	˚pàm´-pàpààtà	> **pám´-pápààtà**	when you (pl.) follow
cf.	**pà-tú-pápààtà**		when we follow

Concerning the second type, the first L of a LHL and a LHH tonal sequence within a syllable is raised to the level of a lowered H (H̲). We found three other nouns and a verbal form where this process occurs.

u-l̲óóòngò	soil
m̲óóòtò	fire
m̲úúùndù	chopper

và-v̲ééń-kúlíímà they are cultivating

The verbal form above is a complex tense, the Present Progressive (see 7.4). It is derived from **và-vèléń-kúlíímà** 'they are cultivating', where the **l** of **-vele-** is omitted and three syllables are fused into one. Here, too, the L tone is raised to a level of a lowered H. Note that with the nouns, the process Structure Simplification has not occurred. The blocking of this process is the reason why the LHL tonal sequence survives on the penultimate syllable; in case of Structure Simplification, such a tonal

sequence ends up as a level H tonal sequence, as occurs in the other cases (see 3.5.5 and 3.5.6). In another dialect of Makonde, Chindonde, Structure Simplification is blocked with more words with a LHL tonal penultimate, including words where this process applies in Chinnima. Some examples (tone assimilation applies in Chindonde, too):

Chindonde	Chinnima	
kúúùlyà	**kúúlyà**	to eat
mà-váááàlà	**mà-váálà**	shoulders

There are other cases in Chinnima where Structure Simplification is blocked. These cases are nouns, IPP's and verbal forms (Direct Relative Present and Direct Relative Present Perfective) with a HLH tonal sequence on the penultimate syllable of their disyllabic stems.

lúùúndù	tomorrow
hwéèétù	we
à-íìívà	(s)he who steals
ndíìímà	I who cultivate
tù-wéèétè	we who have put on clothes

Some more information can be given about the cases above. With the verbal forms, a specific rule applies which causes an extra lengthening (see 7.2.2). The IPP's consist of two parts, the first one being a bound substitutive, the second one is the corresponding possessive stem (**hwé-** and **-eétu** in the example above, see 5.2).

3.5.9 Penultimate shortening

When there is one p-phrase (and no concatenation of p-phrases), the order of processes given in the preceding sections holds, with Tone assimilation as the last process. This is the reason why we have described the processes in the given order. But when there is a concatenation of p-phrases, the concatenation itself occurs after the processes H Tone Doubling, Final H deletion and Structure Simplification, and the two other processes, Default L tone insertion and Tone assimilation, apply when the concatenation is finished (see 3.6.1, 8.3.3 and 8.5).

As described in 3.2, PUL signals the end of a p-phrase. Thus, when two p-phrases are concatenated, PUL applies to both p-phrases.

vàlúúmè vàvìílì	two men
vàlúúmè vàkúlúùngwà	big men

This is also the case when several p-phrases are concatenated; the example below consists of a series of one-word p-phrases.

vàlúúmè vàvìílì vànìváìíng'à vàlúúmè vàkúlúùngwà àng'úùkù `nchèèchè kùkááyà
two men have given the big men four chickens at home

Every p-phrase is subject to PUL. But with fast speech, the penultimate syllable of a non-final p-phrase may be reduced. We call this process PenUltimate Shortening (PUS, see 2.9).

vàlúmè vàvìílì
vàlúmè vàkúlúùngwà

vàlúmè vàvílí vànìváìng'à vàlúmè vàkúlùngwà àng'úkù `nchèchè kùkááyà

Thus, PUL feeds PUS. One might think, that the forms without PUL can directly be derived from their underlying forms, but there are arguments for our analysis. We have stated in 3.2 that forms without PUL occur non-finally in longer p-phrases. These forms can directly be derived from their underlying forms. One example of a p-phrase consisting of two words in 3.2 was **vàlúmé váánò** 'these men'. The first word in this p-phrase without PUL can directly be derived from its underlying form °**valúmé** (tonal profile A: S1/SF). Compare this example with the example of the two concatenated p-phrases used above **vàlúúmè vàvìílì** 'two men' and its short variant **vàlúmè vàvìílì**. The first word of this short variant can not directly be derived from its underlying form. But it can directly be derived from the form with PUL: shortening of the penultimate syllable involves Coalescence (vowel coalescence and tonal coalescence), and, as we have seen in 3.5.5 with respect to tonal coalescence, tonal coalescence of HH results in H.

PUS applies after the processes H Tone Doubling, Final H deletion and Structure Simplification, and after PUS, the processes Default L tone insertion and Tone assimilation apply. The results of tonal coalescence found with PUS are the same as those found with Coalescence, most of which are exemplified in the sentence above:

°**valúúme**	→	**vàlúmè**	: HH → H	
°**vaviíli**	→	**vàvílí**	: zero H → H.H	
°**vaniváiíng'a**	→	**vànìváìng'à**	: H.zero H → H.zero (default L)	(MR)
°**vakúlúungwa**	→	**vàkúlùngwà**	: H.H zero → H.zero (default L)	(MR)
°**ang'úuku**	→	**àng'úkù**	: H zero → H	

Other examples of PUS are the following:

°**muúundu**	→ **múúndù**	: zero H zero	→ HH	
°**hwéeétu**	→ **hwéètù**	: H zero H	→ H zero (F after DI)	(MR)

Rarely, PUS may even apply again to the final two examples with very fast speech, e.g. in songs; even disyllabic words with penultimate length may then be shortened (we give one example).

˚**múúndu**	→ **múndù**	: HH → H
˚**hwéetu**	→ **hwétù**	: H zero → H
˚**uúmo**	→ **úmó**	: zero H → H.H

3.6 Post-lexical processes with i-phrases and utterances

One or more p-phrases constitute an intonational phrase (i-phrase), one or more i-phrases constitute an utterance (U). Penultimate lengthening marks the end of a p-phrase, and since an i-phrase consists of one or more p-phrases, there is also PUL at the end of an i-phrase. And since an U consists of one or more i-phrases, there is also PUL at the end of an U. But the characteristic to mark the end of an i-phrase is the intonational H tone, and the characteristic to mark the end of an U is register lowering of the final two TBU's.

3.6.1 The intonational H tone and utterance-final register lowering

In the previous section, we noted that concatenation of p-phrases occurs after the processes H Tone Doubling and Final H deletion, and the processes Default L tone insertion and Tone assimilation apply after concatenation. With concatenation of p-phrases, i-phrases are formed, and it turns out that Default L tone insertion and Tone assimilation apply after the formation of i-phrases.

In addition to PUL, the end of an i-phrase is often marked by an intonational H tone on the final syllable of its final word; the H tone on the preceding TBU is deleted, so the possible tone patterns of i-phrase-final words end with ...HL.H or ...LL.H. In the examples below, the end of an i-phrase is marked by a comma (the end of the larger unit, the Utterance, is marked by a period; the end of the smaller unit, the p-phrase, can be recognized by PUL).

˚**méédi**	→ **méèdí,**	water
˚**úúhu**	→ **úùhú,**	flour
˚**apaáno**	→ **àpàànó,**	here then
˚**likoong'we**	→ **lìkòòng'wé,**	pumpkin sp.
˚**livákwángiile**	→ **lìvákwángìílé,**	which has been scraped off

`nkùvíká méèdí, ùlápáàtà mòòtò. ...and take water, getting it on fire.

ùtàndìlìkà kùtípúlá úùhú, `nkùvíìkà.	you start to pound flour, and take it.
vìíno àpàànó, nìkùhàùlìlà	now here then, I tell you...
ùtwàlà lìkòòng'wé, `nkùkwáángà.	…you take a pumpkin, and scrape it off.
twàlá lìkòòng'wè lìvákwángìilé,	...take the pumpkin which has been
ùvìké ńchílòòngò.	scraped off, and put it in the pot.

A final H tone originating from an underlying final H may also occur i-phrase-finally, e.g., the final H tone of a demonstrative:

màchédó pààlá, pàvèlè múúnù nà-`ndyáàwè
some time ago, there was a man and his wife

The PUL of the final word of the i-phrase may be shortened in case of fast speech, e.g., **màchédó pàlá, ...** in the example above.

Nouns with all-L tones generally get final H tone before a **na-**phrase (see also 4.7). The examples come from text B3 of appendix B.

ntandaasá na-chínduúli	cf. **ntandaasa**
the cassava porridge and the cassava vegetable	
utay' úhuumbwé na-múúnyu	cf. **uhuumbwe**
you should put into it coconut milk and salt	

This final H tone, which we analyze as the intonational H tone, is not obligatory, as the numeral **nnyaano** 'five' shows in the examples below. Note that the numeral may have penultimate lengthening before a **na-**phrase, but this lengthening may also be shortened with fast speech.

malóóve nnyaanó / nnyanó na-maviíli	seven (five and two) words
malóóve nnyaano / nnyano na-maviíli	id.

It should be noted that there is no downdrift. But there may be register lowering i-phrase-finally: the intonational H tone as well as a final "underlying" H tone may be slightly lowered to a level between H and L. The lowered H is marked by an underscore symbol. So next to **màchédó pààlá,** LHH LL.H, the next form with register lowering occurs:

màchédó pààlá̲, LHH LL.H̲

In addition to PUL, the end of an Utterance is obligatorily marked by register lowering of the final two TBU's of its final word. With this process of U-Final Register Lowering (UFRL), the final two TBU's are slightly lowered: H → H̲, L → L̲. Thus, we distinguish a total of four phonetic levels (see also Tone assimilation). Words in citation form have the same form as U-final words. In the examples below, the end of an U is marked by a period.

HH.L.	→ HH̲.L̲.	**líí̲nà̲.**	name
LH.L.	→ LH̲.L̲.	**mùú̲nù̲.**	person

HLH.L.	→ HL<u>H</u>.<u>L</u>.	**mwéè<u>é</u>n<u>ù</u>.**	you (pl.)
HL.L.	→ H<u>L</u>.<u>L</u>.	**mwá<u>à</u>n<u>à</u>.**	child
LL.L.	→ L<u>L</u>.<u>L</u>.	**lì<u>ì</u>m<u>è</u>.**	dew
LHL.L.	→ LH<u>L</u>.<u>L</u>.	**mòó<u>ò</u>t<u>ò</u>.**	fire

When a penultimate syllable with level H tones is followed by a final syllable which starts with a prenasalized consonant, the second H of the penultimate syllable is lowered to L rather than to (lowered) <u>H</u>.

	lìwáángwà.	bone	LHL.<u>L</u>
cf.	**chìtúúvì.**	load	LH<u>H</u>.<u>L</u>
cf.	**àhíìmbà.**	lions	LH<u>L</u>.<u>L</u>

There is no full UFRL with forms having a final H tone (originating from an underlying final H tone); these forms are some demonstratives and the Optative without object concord. The final H tone itself is slightly lowered (<u>H</u>), the preceding TBU remains unchanged.

vàyéní ààvá.	those guests	LHH LL.<u>H</u>
tùùlyé.	let's eat	LL.<u>H</u>

There is no UFRL with forms with a question intonation (see 4.8, 5.6). The question intonation puts a penultimate F and final H on the final word of the question; in the first example, this final word is **vìngáàpì** 'how many'; in the second example, this final word is **vàlúúmè** 'men'.

vìínù vìngáàpí. how many things?	LH.L LHL.H
vìínù vìngáàpì vyá-vàlúùmé.	LH.L LHL.L H-LHL.H
how many things of the men?	

Since the levels on which H and L are pronounced are phonetically fairly close, UFRL complicates the situation very much. It is hard, for instance, to distinguish the following U-final words:

lìímè.	dew	L<u>L</u>.<u>L</u>	**mìtùùpà.**	holes	LL<u>L</u>.<u>L</u>
líínà.	name	H<u>H</u>.<u>L</u>	**kwíkáálà.**	to sit	HH<u>H</u>.<u>L</u>
mwáànà.	child	H<u>L</u>.<u>L</u>	**mwíkúùmbà.**	turkey	HH<u>L</u>.<u>L</u>

For larger examples of U's, see the beginning of this section, and Appendix B.

3.6.2 Two other instances of utterance-final register lowering

Two other instances of U-final register lowering are optional. The first instance slightly lowers the tones of the penultimate syllable of U-final words, the tones of whole U-final words and even the tones of the final couple of U-final words. This lowering comes on top of the obligatory U-final two TBU's lowering. In the

examples below, we indicate these lowerings by double underscore symbols, the first indicates the obligatory lowering, the second indicates the optional lowering. The results of the optional lowering are as could be expected: H → H, H → L and L → L; a lowered L can not be distinguished from a L. These results are given in parentheses below.

Optional U-final register lowering of last two syllables:

vàtwàlà vítéèngù.	they take chairs	LLL	HHL.L	(HHL.L)
tùchònà chìyèèwè.	we see the chin	LLL	LLL.L	(LLL.L)
vàtèndà mádééngò.	they work	LLL	HHH.L	(HHL.L)
tùlìmà lìhàálà.	we till a field	LLL	LLH.L	(LLL.L)

Optional U-final register lowering of the whole final word:

vàtwàlà vítéèngù.	they take chairs	LLL	HHL.L	(HHL.L)
tùchònà chìyèèwè.	we see the chin	LLL	LLL.L	(LLL.L)
vàtèndà mádééngò.	they work	LLL	HHH.L	(HHL.L)
tùlìmà lìhàálà.	we till a field	LLL	LLH.L	(LLL.L)

Optional U-final register lowering of final two words:

chìtéèng'ù chíìnjì.	other chair	LHL.L HL.L	(LHL.L HL.L)
ìkàànyà yá-chààngà.	mouth of Gal.	LLL.L H-LL.L	(LLL.L H-LL.L)
màlíínà lóóhè.	many names	LHH.L HH.L	(LHH.L HL.L)
tùnàlìímà màhàálà.	we till fields	LLLH.L LLH.L	(LLLH.L LLL.L)

The second optional instance of U-final register lowering only concerns U-final words with one or more H tones: all H tones are deleted. This second optional instance may occur without (first example) or together with (second example, **pàwéèlù**) the first optional instance of register lowering.

...àòngé kàdìíkì pàwèèlù.	LLH LLH.L	LLL.L	
...àòngé kàdìíkì pàwèèlù.	LLH LLH.L	LLL.L	(LLL.L)

...so he may take a short walk outside

With both instances of register lowering, penultimate syllables with three TBU's tend to loose the third TBU U-phrase-finally (as also often occurs with concatenation with penultimate shortening, see 3.5.9). This is seen with **mòóòtò** in the following example, where the second optional instance of U-final register lowering occurs.

...ùlápàtà mòòtò. LHLL LL.L
...while getting fire

3.7 Contour tones

Two different tones in one syllable are heard as a rise or as a fall. The Rise (LH) and Fall (HL) each have two different phonetic manifestations, depending on whether the penultimate syllable in which they occur belongs to an U-final word or not. When they occur in an U-final word, UFRL lowers the final two TBU's; when they occur p-phrase-finally or, as far as a F tone is concerned, i-phrase-finally, there is no lowering.

Rise (LH):	Fall (HL):
L<u>H</u>.	H<u>L</u>.
LH	HL

mùúnù.	person	L<u>H</u>.<u>L</u>
mùúnù wòhèwóóhè.	every person	LH.L LLH<u>H</u>.<u>L</u>
mwáànà.	child	H<u>L</u>.<u>L</u>
mwáànà àpélékèèdyà.	child who sends	HL.L LHHL<u>L</u>.<u>L</u>
...méèdí,	water,	HL.H

Moreover, there is no lowering with a F tone on a pre-penultimate syllable, nor on a penultimate syllable in case of question intonation.

vàchíìkàálà.	they were staying	LHLL<u>H</u>.<u>L</u>
vìínù vìngáàpí.	how many things?	LH.L LHL.H

Two more manifestations of a F tone occur in U-final words, exclusively due to the obligatory UFRL, which also lowers the second TBU of a level H as well as of a level L. Examples are the U-final words in the second and fourth examples above.

Fall (from HH, LL):

H<u>H</u>.
L<u>L</u>.

A HL sequence is also possible U-finally when a syllable with level H tones is followed by a final syllable which starts with a prenasalized consonant (see 3.6.1).

With the two optional instances of U-final register lowering, two more manifestations of a Rise (LH) are possible, depending on whether the penultimate syllable in which they occur belongs to an U-final word or not. Two more manifestations of a F tone (HL and from HH) occur in U-final words, exclusively due to UFRL. The L tone below is a H tone lowered twice: first by UFRL, second by the first optional register lowering.

Rise (LH):	Fall (HL, from HH):
L̲L.	H̲L.
L̲H̲	H̲L.

vàánù.	persons	L̲H̲.L̲
tùvònà vàánù.	we see the persons	L̲L̲.L̲ L̲L̲.L̲
vàánù váànjì.	other persons	L̲H̲.L̲ H̲L̲.L̲
vàánù vóóhè.	many persons	L̲H̲.L̲ H̲L̲.L̲

Penultimate syllables with three TBU's contain double contour tones. There are two double contour tones: LHL and HLH. As described in 3.5.8, the first L in a LHL double contour tone is raised to the level of a lowered H (H̲), resulting in another Rise: H̲H; this raising does not occur with the L in the double contour HLH nor in the "single" contour tone LH.

double LHL:	double HLH:
H̲HL̲.	HL̲H̲.
H̲HL	HLH

mòóòtò.	fire	H̲HL̲.L̲
mòóòtò úùnjì.	another fire	H̲HL.L H̲L̲.L̲
hwéèétù.	we	HL̲H̲.L̲
hwéèétù tù-vàmákóòndè.	we are Makonde	HLH.L L-LHHL̲.L̲

As noted earlier, penultimate syllables with three TBU's tend to loose one TBU with concatenation as well as with both optional instances of U-final register lowering.