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Liko phonology and grammar : a Bantu language of the Democratic Republic of the Congo

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4 Tone

4.1 Introduction

This chapter aims to describe the main characteristics of the tone system of the Liko language. The description uses concepts of the theory of autosegmental phonology. With respect to downstep phenomena, it will be shown that a Tone tier and a Register tier are necessary to adequately describe tonal behaviour in Liko.

Liko is a tone language with two underlying tones, High (H) and Low (L). A tone is associated with a tone-bearing unit (TBU). A Low and a High tone can be combined on one TBU. Tone in Liko has a distinctive function, both in the lexicon and in the grammar. In this book, 'primary' tone is used to refer, roughly, to H and L tones on verb roots specified in the lexicon. In this chapter, L tone is marked by means of a grave accent, H tone by means of an acute accent and LowHigh (LH) by an inverted circumflex. Elsewhere in this book, L tone is not marked, except in phonetic representations in square brackets.

TBUs in Liko have constraints on the number of associations and on the sequence of H and L tones: a constraint against triple linking to a single TBU and a constraint against a HL contour linked to a single TBU. A HL contour tone is not permitted on a single vowel in any environment.

The syllable is the TBU in Liko. The language has only short open syllables containing one vowel. A vocalic segment in a syllable nucleus does not consist of more than one mora, which implies that it is not necessary to posit the mora as the TBU.

Morpheme types in Liko are:

- morphemes consisting of both segment(s) and tone(s), e.g. noun and verb roots;
- morphemes consisting only of segment(s), e.g. certain verbal affixes;
- morphemes consisting only of tone(s), e.g. TAM (tense/aspect/mood) melody.

The tonal domain in Liko extends to more than one word in certain syntactic contexts, for instance:

- verb + object immediately to the right;
- noun + demonstratives of type I.

The tonal domain contains both the verb form and the first object. This can be seen in the case of non-automatic downstep. When non-automatic downstep occurs in the verb form, the register is not reset until after the object. In **á'kólá mémí** 'he untied the goat', the pitch of the first H tone of the object **mémí** is at the same level as the non-automatic downstepped High **kólá** of the verb form.¹⁷⁰ Examples of a noun and a demonstrative of type I are **li-ndímó ló**, 5-birdlime 5.DEM.I, 'this birdlime' and **ngága yo**, 9.chin 9.DEM.I, 'this chin', where the tone of the demonstrative depends on the final tone of the noun.

This chapter is structured as follows. After the inventory of tones and presentation of automatic downstep in the language in 4.2, it is shown that tone has a contrastive function both lexically and grammatically in 4.3. Tone patterns are presented in 4.4. Certain voiced obstruents, commonly called depressor consonants, affect or have affected the pitch realization of tone on the following TBU. The consonants concerned and their effects are presented in 4.5. In 4.6, separate sections are devoted to the following tone rules and phenomena: H-tone spreading, Reassociation of LH tones, Association of floating tones, L-tone deletion, Non-automatic downstep, Repairing would-be violations of the OCP and Polar tone. Low is assumed to be the default tone in the Liko system, which is assigned to any TBU that, after all phonological processes and tone rules have been applied, still lacks a tone. At the end of this chapter, section 4.7 evaluates the main similarities and differences of the Liko tone system with tone in Bantu (using Kisseberth and Odden 2003).

Tone levels cannot be defined in absolute Hz figures. Actual frequency varies

¹⁷⁰ The second underlying H tone of **mémí** surfaces as a L tone. At the end of an uninterrupted sequence of H tones on the verb and on the object, the final TBU of the object is changed to Low.

along the lines of many factors, e.g. gender of speaker and pragmatic use. For instance, tones tend to be produced at a higher pitch when words are read in lists, compared to when they occur in texts. There are individual differences according to gender and age; even for a given individual pitch varies.

4.2 Tone inventory

Liko is a tone language with two underlying tones, High (H) and Low (L). Surface realizations of tones are High, Low, LowHigh (LH) and non-automatic downstepped High, caused by a floating L tone, see 4.6.5. LH is analysed as a composite contour, a sequence of two level tones, Low and High. There are several reasons for the analysis of LH as a combination of L and H tones. Firstly, LH is not a unit; it surfaces as a level tone in those instances where one part can merge with an adjacent identical tone across a morphological boundary, see 4.6.2. Secondly, the language has only two tonal classes of verb roots, High and Low, see 7.3.¹⁷¹ Thirdly, surface LH tones can be the result of association of two tones to one TBU, after vowel loss or vowel coalescence in morphosyntactic environments, see 4.6.3.

In Liko, LH is distinctive in the noun system: there are tonal contrasts between High, Low and LowHigh, see 4.3. Within noun stems, Low or High of a LH tone do not merge with an adjacent identical tone. Tonal patterns on disyllabic nouns show that positing a combined LH on one TBU is necessary to account for the number of possible patterns. The frequency of occurrence of combined LH tones in nouns is much lower than that of single level H and L tones.

Automatic and non-automatic downstep are common in Bantu languages. When language-specific conditions are met, the second H tone of a H L H sequence is

¹⁷¹ All Low-toned -CVC- verbs in my data (about 120) where a primary LH tone would be disguised in the Infinitive form (because the High part of a LH tone can merge with an adjacent High) have been checked using a tone frame with Future TAM melody in which the tone on the final vowel is L. In such a frame, the High part of a LH tone cannot merge with an adjacent High. This test shows that none of these verbs has a surface LH tone on the vowel of the verb root.

realized at a lower pitch than the first in automatic downstep. In non-automatic downstep, the pitch level of the second H tone is realized lower than that of the first H tone, without there being a L tone on the surface between the two H tones. Instead, a floating Low precedes the second H tone and causes the non-automatic downstep, see 4.6.5.

Automatic downstep occurs in words and in phrases, as well as at clause level. Frequency measurements¹⁷² of different constructions exemplify this. In the noun phrase **mùlìkà ǎémòtí** 'one trapper', both words end with a H.L.H tone pattern. The second H tone in both words is realized at a lower pitch than the first one:

- (4.1) mù-lìkà ǎé-mòtí
 1-trapper 1.NUM-one
 234.272.235.244 259.220.245

When a possessive pronoun with L.H tone pattern, like **kàkí** 'his, her', follows High-toned adverbial **kú** 'there', as in **kú kàkí** 'at his place', the second H tone is lower than the first one (tone frequencies in this case were 294 239.275).

In verb forms with sequences of High, Low and High, the H tone following a L tone is realized at a lower pitch than the preceding H tone. The tones in **wàmíní** 'you (sg) have seen him' have the following frequencies:

- (4.2) wàm-ín-ì-ní
 2SG:1.O-see-FV.ANT-PFV
 220.267.221.244

In the complex noun phrase **kúmbúsò wàmàsyé** 'the back of days', i.e. some time later, several vowels with a L tone occur between H tones. The final H tone in this phrase has a lower pitch than the first one:

- (4.3) kú-mbúsò wà-mà-syé
 17-back 17.ASS-6-day
 310.302.237 228.235.263

¹⁷² The voice is that of a young woman.

4.3.1 Lexical tone contrasts

In this section, I will give tone contrasts of nouns, verbs and other word classes.¹⁷³ Nine tone contrasts are theoretically possible in disyllabic roots and up to twenty seven in trisyllabic roots.

(4.7) *Lexical tone contrasts for nouns - one tone is different*

a.	ngbángá	'1a.accusation'	ngbángà	'1a.court'
	bálá	'9.herd, family'	bàlá	'9.camp'
	ngándá	'9.plant, sp. (pl)'	ngàndá	'9.placenta'
	pété	'9.ring'	pèté	'9.witchcraft'
	títì	'1a.bird, sp.'	bí-títì	'MOD-thick'
b.	pàmbàlá	'9.eruption'	pàmbàlá	'9.tree'
	lì-lùlùmbó	'5-funeral'	lì-lùlùmbó	'5-smell'
	nyíkísó	'9.extraction'	nyíkísó	'9.ridicule'

(4.8) *Lexical tone contrasts for nouns - two tones are different*

kángà	'1a.guinea-fowl'	kàngá	'9.bed'
lì-kókò	'5-cough'	lì-kòkó	'5-rice harvest'
pílì	'1a.mourning wear'	pílí	'1a.dance'
séngì	'9.small squashed piece'	sèngí	'9.village (pl)'
mù-pámù	'3-bark (dog)'	mù-pàmù	'1-fly, sp.'
à-mbámá	'1b-nice border'	mbámá	'9.plants, sp.'
nzénzé	'9.instrument with strings'	nzènzè	'9.leaf, sp.'
mù-títí	'3-unripe fruit'	mù-títì	'1-swelling'
kpòmù	'1a.goat kid'	kpòmó	'9.riverside'
yǐngà	'9.feast'	mù-yìngá	'3-shinbone'

In order to present (near) minimal pairs, I have used several nominalizations derived from verbs, e.g. **lì-lùlùmbó** from **-lùmb-** 'bury', **lì-lùlùmbó** from **-lùmb-**

¹⁷³ A tone difference does not often lead to lexical tone contrasts in the language. Roots that differ in tone only can be found in nouns (between 1 and 2%), in verbs (roughly 4%) and rarely in other word classes. No more than two segmentally identical noun stems have been found in my data that are differentiated only by tone.

'smell', **lì-kòkò** from **-kò-** 'cough, pick fruit or vegetables' and **lì-kòkò** from **-kò-** 'cut, harvest'.

When monosyllabic nouns contrast tonally, one of the nouns has a surface LH tone in nearly all cases. Here is an exhaustive list of these contrasts in my data, including nouns, nominal modifiers and adverbials:

(4.9) *Lexical tone contrasts for monosyllabic nouns*

ì-ká	'9a-odd one'	ì-kà	'9a-drying rack'
lì-dí	'9.two dozen'	lì-dí	'5-edible mushroom'
lì-fú	'5-lump on the head'	lì-fú	'5-foam'
lì-gà	'5-bundle of sticks'	lì-gǎ	'5-epilepsy'
mù	'9.goal, objective'	mǔ	'3:head'
ndì	'ADV, earlier than about a week ago'	ndí	'9.beard'
-ngbú	'nominal modifier, red'	ngbǔ	'1a.squirrel, sp.'
-nzà	'nominal modifier, nice, good'	nzǎ	'9.hunger, famine'

I will now look at tone contrast in verb roots. In the examples below, **ká-** is the class 9b prefix and **-a** is the final vowel of the Infinitive. The Infinitive TAM melody has a H tone on the final vowel. Recall that with [+ATR] verb roots, the affix vowel assimilates to the [ATR] value of the verb and is changed into /o/.

(4.10) *Lexical tone contrasts for verbs*

ká-bák-á	'9b-grow, sprout-FV'	ká-bàk-á	'9b-cut, to sharpen-FV'
kó-lík-ó	'9b-dry-FV'	kó-lìk-ó	'9b-grab-FV'
kó-lúmb-ó	'9b-bury-FV'	kó-lùmb-ó	'9b-smell-FV'
ká-púk-á	'9b-leave quietly-FV'	ká-pùk-á	'9b-prick-FV'
ká-sík-á	'9b-insult-FV'	ká-sìk-á	'9b-pick leaves-FV'

Tone contrasts for other word classes include:

(4.11) *Lexical tone contrasts for other word classes*

-tú	'nominal modifier, bright, white'	bí-tù	'MOD-big'
-mbíyà	'nominal modifier, new'	mbìyà	'ADV, soon'
-tówǎ	'ADJ, salted'	bí-tùwà	'MOD-tall'

Adjectives take a prefix according to the class of the noun they modify. In adjectives derived from verbs, like **-tówǎ** above, from **-tów-** 'sting, bite', the final vowel surfaces with a LH tone after the association of the word-final floating H tone, see 7.12.2.

4.3.2 Grammatical tone contrasts

Tonal contrasts in affixes involve two pairs of prefixes: the second person singular object prefix **ò-** vs. the class 2 object prefix **ǔ-** as in (4.12) and the first person singular object prefix **ì-** vs. the reflexive prefix **ĩ-** as in (4.13). For a description of the object prefixes and the reflexive prefix, see 7.5.

- (4.12)a. ò-tùngbùl-à 3SG:2SG.O-support-FV 'he will support you (sg)'
 b. ǔ-tùngbùl-à 3SG:2.O-support-FV 'he will support them'

- (4.13)a. è-tùngbùl-à 3SG:1SG.O-support-FV 'he will support me'
 b. ñĩ-tùngbùl-à 1SG:REFL-support-FV 'I will support myself'

In (a), height coalescence of the vowels of the third person singular subject prefix **à-** and the first person singular object prefix **ì-** results in a mid vowel (see 3.3.2), which means that in context, the tonal contrast with the reflexive prefix **ĩ-** does not occur.

Liko has four pairs of verbal forms distinguished only by tone contrast, see 7.6. An important tonal contrast is the one between past and future time reference:

- (4.14)a. ná-dìkìt-à 1SG^P-throw-FV 'I threw'
 nà-dìkìt-à 1SG-throw-FV 'I will throw'
 b. nó-yúkùm-ò 1SG^P-breathe-FV 'I breathed'
 nò-yúkùm-ò 1SG-breathe-FV 'I will breathe'

In order to analyse the complexity of tone in verbal conjugations, I introduce the concept of a tone melody that is expressive of a "tense", a verbal conjugation paradigm. The so-called TAM (tense/aspect/mode) melody is an overlay over the primary tone on the verb root and affixes in the verb form. Affixes are segmental

with a tone, tonal only¹⁷⁴, or segmental only (underlyingly toneless). The TAM melody consists of one or two tones: a tone on the leftmost prefix¹⁷⁵ and/or a tone on the final vowel. The prefixal tone is the result of initial tone association to the leftmost TBU. The tone on the final vowel is the result of initial tone association to the final vowel. After that, a H tone spreads rightward and leftward to toneless syllables. Any tone that, after spreading, lacks a tone association surfaces with the default L tone.

In the first row of (4.14a, b), the H tone on the subject prefix is the result of the association of the Past TAM melody, with its prefixal H tone. Superscript "P" is the notation in this book for a High TAM tone which has a time reference to the past.

4.4 Tone patterns

4.4.1 Tone patterns on nouns

The tone patterns on nouns consists of L and H tones and of the combined LH tone. I will first present data on disyllabic nouns.

(4.15) *Tone patterns on disyllabic nouns*

H	kókú	'1a.big fish, sp.'
L	kpòzyò	'9.plant, sp.'
H.L	kúkpè	'1a.termite, sp.'
H.LH	móngwǒ	'1a.arrow'
L.H	kpìmí	'9.soft sand'
L.LH	ngbùndǔ	'9.mud'
LH.H	-	
LH.L	kpǒmò	'1a.goat kid'
LH.LH	_ ¹⁷⁶	

¹⁷⁴ The class 1 object prefix may consist of only a L tone, see 7.5.1.

¹⁷⁵ In this book, the tone on the leftmost prefix of the verb form is also referred to as prefixal tone.

¹⁷⁶ Two cases of two LH tones on disyllabic nouns have been attested. The first one, **yígyǎ** '9a:habit', is a derivation from **-gi-** 'do, make'. In the second one, **mu-bíbí** '3-plant, sp.' both

Liko disyllabic nouns have more than the four tone patterns which result from only L and H tones. The LH tone occurs in three additional patterns: H.LH, L.LH and LH.L. On disyllabic nouns, the L.H pattern occurs most frequently, followed by the H.L pattern and the H pattern. The LH.L and L.LH patterns also occur frequently. Low and H.LH are relatively rare.

The surface LH tone in the examples in (4.15) follows consonants which do not belong to the set of voiced obstruents /b d g gb v z/. These voiced obstruents have caused many H tones to be realized as a rising tone, see 4.5. This implies that, in these cases, the LH tone cannot be attributed to the effect of the preceding consonant. Other examples of disyllabic nouns with a LH tone and no depressor consonant include:

(4.16)a.	H.LH	kúkǔ	'1a.parrot, sp.'
		mù-ǒútǔ	'3-bush, shrub, sp.'
b.	L.LH	lì-ǎkǐ	'5-clay pot'
		sì-kǎndǐ	'sɜ:1-bird, sp.'
c.	LH.L	mù-lǔmù	'3-pillar'
		pǐsì	'9.path, road'

One of the parts of a LH tone is often reassociated with an adjacent identical tone across a morpheme boundary, see 4.6.2. As (b) shows, the Low part of the LH tone does not merge with the preceding identical tone within a noun stem.

Tone patterns on monosyllabic noun roots consist of a H tone, a L tone, or a combined LH tone.

(4.17) *Tone pattern on monosyllabic noun roots*

H	kù-lí-kò	'15-knee-15'
	lì-bí	'5-group, clan'
	mù-nzó	'1-bee'
L	mù	'9.goal, objective'
	ì-kà	'9a-drying rack'
	mù-ndù	'1-fish, sp.'

LH tones are preceded by a voiced obstruent, see 4.5.

LH	lì-tǐ	'5-big stone'
	mù-kǔ	'3-spider's web'
	mǔ	'3:head'
	pǎ	'9.place'
	sì-sǎ	'st:1-fish, sp.' ¹⁷⁷

In some cases, the LH tone may be the result of a historical process in which the medial consonant or an entire syllable was lost¹⁷⁸, or of a process of vowel hiatus resolution in which a sequence of two vowels is reduced to a single vowel.

The following tone patterns have been attested on trisyllabic noun stems (possible patterns which do not occur in my data are not listed).

(4.18) *Tone patterns on trisyllabic noun stems*

H		mù-sámǐlá	'3-vine, sp.'
L		mù-gbùkùdyà	'1-termite, sp.'
H.L	H.H.L	sálálì	'1a.scorpion'
	H.L.L	gúlùdè	'1a.can'
L.H	L.H.H	mù-vànzǐbó	'1-small ant, sp.'
	L.L.H	kùbùkú	'1a.duck, sp.'
H.L.H		mù-lúkùtú	'3-bundle of leaves'
L.H.L		mù-tòmǐtò	'3-vine, sp.'
LH.L.H		pǎpùyí	'9.something empty'
LH.H.H		pǎpángá	'9.bush, sp., broom'
H.L.H.L		kúgbǒndò	'1a.roof'
L.L.H.H		fù-ngàngǎbú	'14-tree, sp.'
L.L.H.L		lì-tùmbùwà	'5-pastry ball'
H.H.L.H		kúngbóngǒ	'1a.crab'

¹⁷⁷ For the proclitics *sì-* and *nà-*, see 5.1.1.

¹⁷⁸ E.g. Liko *mù-gǐ* 'village' vs. Proto-Bantu **gù* 'village', *lì-yǒ* 'voice' vs. **jó* 'voice, word', *fù-dǐ* '14-cold' vs. **dǐdǐ* 'cold', *ku-gǔ-kò* '15-leg, foot-15' vs. **gòdù* 'leg, hind leg'.

Most frequent on trisyllabic nouns is the L.H pattern. Occurrence of the H.L pattern is less frequent than H, H.L.H and L.H.L. As for the H.L and L.H patterns on trisyllabic nouns, they occur most often as a pattern in which the final tone of the noun is different from the preceding tones. Realizations of the L pattern and of patterns containing a LH tone are not frequent in trisyllabic noun stems.

A surface LH tone on trisyllabic nouns is often found in forms with reduplication. Examples in which the L.H pattern is copied to the TBU of the reduplicated CV-structure are:¹⁷⁹

(4.19) *Reduplication of L.H tone pattern*

lì-ḃḃḃḃkí	'5-vine, sp.'
lì-tětèndé	'5-vine, sp.'
mù-gǔgùmá	'3-tree, sp.'
mù-ndĩndikó	'3-vine, sp.'
mù-kpǒkpǒdǒ	'3-vine, sp.'
mù-nzěnzèmbí	'3-vine, sp.'

In several other trisyllabic nouns with reduplication, the surface LH tone does not occur on the first syllable, but on the second. In these cases, there seems to be no tone copying involved. Examples are **kyḃkyḃḃ** '1a.bird, sp.', **lì-kòkòtá** '5-rice crust', **lì-nànsì** '5-pineapple and **lì-ngbèngbèlò** '5-tree, sp.'.

Noun-class prefixes and noun-class enclitics are Low, except the noun-class prefixes of classes 9b and 17 which are High. Adjective, enumerative and associative prefixes are High, except for the class 1 adjective prefix **mù-** and the class 1 associative prefix **wà-**. The first TBU of complex class 2+9 prefixes (consisting of class 2 **ḃà-**+ class 9 prefixes, see 5.1.1) is Low: e.g. the adjective prefix **ḃàyí-**, the enumerative prefix **ḃàyí-** and the associative prefix **ḃàyá-**.

Most noun-class prefixes of classes 1b **a-**, 1c **ɿ-** and 9a **ɿ-** have a L tone, but a sizeable minority has a H tone. A satisfactory explanation for the H tone on these

¹⁷⁹ The examples in my data are all vines or trees.

prefixes has not yet been found.¹⁸⁰ The following examples show that prefixes with H and L tones occur preceding different patterns of H and L tones:

(4.20) *class 1b nouns*

- a. à-línzyá '1b-tree, sp.'
 ò-ngútù '1b-metal bracelet'
 à-sòsú '1b-tasty food'
 à-dùlà '1b-leprosy'
- b. á-búlá '1b-monkey, sp.'
 á-dúbà '1b-dance'
 á-dùká '1b-deaf person'
 á-gbàlà '1b-dance'

(4.21) *classes 1c and 9a nouns*

- a. ì-nzímbí '9a-mouth without teeth'
 ì-kpákù '9a-shoe'
 ì-pèmbé '9a-tree, sp.'
 ì-dìmà '9a-lake'
- b. _¹⁸¹
 í-pígò '9a-kind, species'
 í-màngé '1c-starling'
 í-dàngà '1c-insect'

¹⁸⁰ Explanations that I have found in the literature do not explain why these *a-* prefixes have a H tone with some nouns and a L tone with other nouns. These prefixes cannot be analysed as augment. The nouns concerned do not constitute a semantic group. Grégoire (2003:360): "Several other characteristics of the class system deserve some discussion. One of these is the existence of a class 1 with nominal prefix *a-* in a series of languages generally situated in the northeast of the forest. This subclass groups a small number of nouns designating animals and plants, and, more rarely, members of the family." In Liko, it concerns a large number of nouns, more than 100 in my data and there is no shared semantic feature.

¹⁸¹ A noun with noun-class prefix *ɪ-* with a H tone preceding a disyllabic noun with H tone pattern has not been attested.

4.4.2 Tone patterns on verbs

Verb roots have one of two underlying tone patterns: High or Low. The primary H or L tone is associated with the first CV-syllable of the verb root. Examples were given in lexical tone contrasts for verbs, see 4.3.1. Vowel-initial verbs have the primary tone also on the first CV-syllable, not on the initial vowel.

Syllables in the verb root which follow the first CV-syllable are underlyingly toneless. They receive their surface tone by the TAM melody on the verb form. This can be seen, for instance, in the verb root **-ngòul-** 'breathe with difficulty', in which the first CV-syllable, /ngù/, is associated with the primary L tone. If the TAM melody has a H tone on the final vowel, then the syllables between the first CV-syllable and the final vowel all surface with a H tone through H-tone spreading, see 4.6.1. For example, in the verb form **àngòulyá** 'he breathed with difficulty', the tone on the second and third syllable of the verb root, /u/ and /l/, is High due to the final-vowel High of a Past TAM melody. In the Future form **àngòulyà** 'he will breathe with difficulty', however, all vowels surface with a L tone, because the Future TAM melody has no H tone.

Surface LH tone on the TBU which is associated with the primary tone of the verb is the result of a depressor consonant as C₁ (see 4.5), or - in case of monosyllabic verb roots - the result of vowel merger, vowel height coalescence, or desyllabification. In the following examples of vowel merger (4.22a) and of height coalescence (4.22b, c), the verb has a primary L tone. The primary L tone and the H tone on the final vowel of the Infinitive TAM melody combine to form a surface LH tone:

- | | | | |
|----------|-----------|-------|-------------------|
| (4.22)a. | /ká-pà-á/ | ká-pǎ | '9b-want:FV' |
| b. | /ká-tì-á/ | ká-tě | '9b-put aside:FV' |
| c. | /ká-pù-á/ | ká-pǒ | '9b-rot:FV' |

Likewise, after desyllabification has been applied, both the primary L tone of the verb and the H tone on the final vowel of the Infinitive TAM melody are associated with the remaining single TBU:

- | | | | |
|--------|-----------|---------|------------------------|
| (4.23) | /ká-mì-á/ | kó-my-ǒ | '9b-swallow-FV' |
| | /ká-mù-á/ | kó-mw-ǒ | '9b-have sex (man)-FV' |

4.5 Depressor consonants

Many LH tones in Liko show the effect of certain voiced obstruents, commonly called depressor consonants. These consonants are reported to affect the pitch realization of the following TBU in languages across the African continent.¹⁸² I follow Hyman (1998) and others in assuming that a depressor consonant inserts a L tone. Among other effects, this may cause a level H tone to be realized as a LH tone.

It is important to mention that the depressor consonants in Liko /b d g gb v z/ do not seem to be synchronically active. This can be seen in nouns in which a depressor consonant is followed by a surface H tone and in verb forms where the voiced obstruent /g/ of the Pluractional extension **-ag-** does not influence a following H tone. The effects that depressor consonants have had diachronically are visible in the lexicon.

Before presenting the data that show depressor effects in the lexicon, it is exemplified that a depressor consonant can be followed by a H tone. In the following examples, the noun stem-initial consonant is a depressor consonant and the tone on the first syllable of the noun stem is H:¹⁸³

(4.24)	bá lá	'9.herd'
	mù-básìn zí	'1-cockroach'
	dídò	'1a.valley'
	bu-díyongó	'14-bush, shrub, sp.'

¹⁸² Kutsch Lojenga (2000:2) mentions Chadic languages (Wolff, Pearce), the Kwa languages (Togo, Ghana, Ivory Coast) Ewe (Ansre and others) and Ebrie (Kutsch Lojenga), in the Central-African Republic Yaka (C10) (Kutsch Lojenga) and the Adamawa-Ubangi languages Suma and Gbaya (Bradshaw), Bila (Bantu D) in the Democratic Republic of the Congo (Kutsch Lojenga), the Coastal Bantu languages in Kenya, Digo (E73) and the Mijikenda languages (E72) (Kisseberth, Cassimjee and Kisseberth) and the Shona (S10) and Nguni (S40) subgroups of Bantu in southern Africa (Bradshaw, Cassimjee, Kisseberth, Odden, Hyman and Mathangwane).

¹⁸³ There is no example in my data of /v/ as C₁ followed by a H tone. /v/ as C₂ followed by a H tone is attested, e.g. **kuvó-kuvó** '1a.water animal, sp.'.

mù-gágà	'3-fishing'
lí-gbágbá	'5-bush, shrub, sp.'
gbóngò	'1a.bird, sp.'
lì-zézè	'5-small bush, sp.'

The H tone on the final vowel is not affected by a preceding depressor consonant:

(4.25) ká-bìb-á	9b-tell-FV	'to tell, praise'
kó-bùd-ó	9b-coat-FV	'to coat, smear'
ká-bùg-á	9b-sharpen-FV	'to sharpen'
ká-dìngb-á	9b-limp-FV	'to limp'

In the examples below, the extension is Pluractional **-ag-** and the final vowel has a H tone. Although /g/ belongs to the set of depressor consonants, it does not affect the H tone of the final vowel:

(4.26) <i>The Pluractional extension -ag-</i>		
ná-yìb-ág-á	1SG ^P -tear-PLUR-FV ^P	'I tore'
ná-dìkít-ág-á	1SG ^P -throw-PLUR-FV ^P	'I threw'
nó-bín-óg-ó	1SG ^P -dance-PLUR-FV ^P	'I danced'
nó-yúkúm-óg-ó	1SG ^P -breathe-PLUR-FV ^P	'I breathed'

I now turn to depressor effects visible in the lexicon, Hyman and Mathangwane (1998:208) report four effects of depressor consonants in Ikalanga. These voiced obstruents:

- block H-tone spreading
- cause H tone delinking
- convert H's to LH rising tones
- cause tones to be realized lower

Neither blocking of H-tone spreading nor systematic lowering effects are attested in Liko. The two other effects are presented below.

H tone delinking

H tone delinking in Liko is restricted to environments in which the depressor consonant is in C₁ position. The inserted L by the depressor consonant in C₁ position fed a H delinking rule. It can be observed most clearly in verb roots: a

verb root with a depressor consonant as C_1 never has a surface H tone nor a LH tone in Infinitive forms.

Table 10 Distribution of verb roots with a H and with a L tone in Infinitive forms

\underline{C}_1	\underline{H}	\underline{L}
no depressor	192	214
depressor	-	105

This has also been reported for Ebríé (Kwa, Ivory Coast) by Kutsch Lojenga (2000:16): "Verb roots, mostly monosyllabic, can have a L tone or a H tone underlyingly. When pronounced in isolation, verb roots with non-depressor consonants surface with a L or a H tone. However, verbs with a root-initial depressor consonant all surface with L tone."

The statistics in Table 10 should be treated with caution, because of the Infinitive TAM melody (a H tone on the final vowel) and the environment this creates for the High part of a LH tone to merge with a neighbouring H tone, see 4.6.2. The following examples show that for a relatively small number of -CVC- verbs, H tone delinking did not take place if C_1 is one of the voiced obstruents /b d g gb v z/ and inserts a L tone. The inserted L tone created a LH tone, of which the High part is linked to the following H in the Infinitive.¹⁸⁴ In each second form of the same verb, using Future forms that do not have a TAM melody with a final H tone, the underlying H tone of the verb root surfaces as a LH tone.

- (4.27)a. kó-bìs-ó 9b-put-FV 'to put'
 ò-bìs-ò 3SG-put-FV 'he will put'
- b. ká-dìm-á 9b-cultivate-FV 'to cultivate'
 à-dìm-à 3SG-cultivate-FV 'he will cultivate'
- c. ká-gàm-á 9b-cry-FV 'to cry'
 à-gàm-à 3SG-cry-FV 'he will cry'

¹⁸⁴ In Ikalanga (Hyman and Mathangwane 1998:210), the H deletion rule "says that LH rising tone becomes L when the H is linked to the next mora as well."

- d. ká-gbùm-á 9b-forbid-FV 'to forbid'
 à-gbǔm-à 3SG-forbid-FV 'he will forbid'
- e. ká-zùng-á 9b-heat up-FV 'to heat up'
 à-zǔng-à 3SG-heat up-FV 'he will heat up'

The next two sets list the other cases in my data of a depressor consonant as C_1 in verb roots followed by a surface LH tone. In the first column, the Infinitive form is given.

(4.28)

<u>Infinitive</u>	<u>Future</u>		
ká-bùmb-á	à-bǔmb-à	3SG-be tired-FV	'he will be tired'
ká-dǐgy-á	à-dǐgy-à	3SG-say-FV	'he will say'
ká-dǐngb-á	à-dǐngb-à	3SG-limp-FV	'he will limp'
ká-gǐng-á	à-gǐng-à	3SG-shell-FV	'he will shell'
ká-gǔm-á	à-gǔm-à	3SG-iron-FV	'he will iron'
ká-gbàm-á	à-gbàm-à	3SG-have a headache-FV	'he will have a headache'
ká-gbùnd-á	à-gbùnd-à	3SG-rekindle-FV	'he will rekindle'
ká-zàng-á	à-zàng-à	3SG-miss-FV	'he will miss the objective'

(4.29)

<u>Infinitive</u>	<u>Future</u>		
ká-bàily-á	à-bàily-à	3SG-agree-FV	'he will agree'
kó-gbùndùl-ó	ò-gbùndùl-ò	3SG-pound-FV	'he will pound'
ká-zùkán-á	à-zùkàn-à	3SG-jump up-FV	'he will jump up'
kó-zùkòs-ó	ò-zùkòs-ò	3SG-surprise-FV	'he will surprise'
ká-zùgùs-á	à-zùgùs-à	3SG-itch-FV	'he will itch'
ká-zàráníl-á	à-zàránìl-à	3SG-be delighted-FV	'he will be delighted'

When the depressor consonant is not in C_1 , but in C_2 position preceding a TBU with a H tone, the inserted L tone is associated with the following High, resulting in a surface LH tone. Examples are given in (4.31).

With respect to nouns, there is also no systematic H tone delinking when depressor consonants occur as C_1 . But nouns reflect the bias which is observed for verbs: the position of the depressor consonant in the word should be taken into account and

the same effect of the position is attested: the H tone is frequently delinked if the depressor consonant is in C₁ position. Examples of nouns in which a depressor is followed by a LH tone are given in (4.32) and (4.33). Table 11 gives statistics based on -CVCV noun stems in my data, of H, L and LH tone on vowels following either a depressor consonant or another consonant in C₁ or in C₂ position.

Table 11 -CVCV noun stems with H and L tone in my data

	<u>H</u>	<u>L</u>	<u>LH</u>
C ₁ is depressor	10	91	31
C ₁ is not a depressor	364	299	38
C ₂ is depressor	23	45	21
C ₂ is not a depressor	445	263	36

The figures in the first two rows refer to V₁ and the figures in the last two rows refer to V₂. The percentage of LH tones following a depressor consonant is much higher than the percentage of LH tones following another consonant.

There are few disyllabic and trisyllabic noun stems with a L tone pattern. Of these nouns, relatively many contain a depressor consonant:

(4.30) L tone pattern and depressor consonant

bèzè	'9.joke, stupidity'
didò	'1a.valley'
gùdũ	'1a.barricade'
zèbù	'9.south'
gbògòbò	'9.raffia cut to extract liquid'
mù-gbùkùdya	'1-termites'

H tone conversion to LH

Depressor consonants occur as C₂ or C₃ in -CVCVC- verbs, i.e. in a position within the domain of H-tone spreading, see 4.6.1. As can be seen in the following examples, the H tone assigned by H-tone spreading surfaces as a LH tone following a depressor consonant in C₂ position. This can be accounted for if insertion of a L tone is assumed. Interestingly, the H tone following C₂ is not

absorbed by the following H, although a H tone is available on the final vowel of the Infinitive.¹⁸⁵

(4.31)	ká-gùbǐt-á	9b-cover a roof-FV	'to cover a roof with leaves'
	kó-dùdǔl-ó	9b-gobble-FV	'to gobble, wolf'
	ká-zìgǐb-á	9b-sieve-FV	'to sieve'
	ká-gbùgbùt-á	9b-wake up suddenly-FV	'to wake up suddenly'
	kó-zùzúk-ó	9b-get up-FV	'to get up'

As far as nouns are concerned, relatively many instances of a LH tone are preceded by a depressor consonant, see Table 11.

Examples of LH tone following a depressor consonant as C_1 are:

(4.32)	bíkò	'9.salary'
	dǔdù	'1a.dragonfly'
	gǐtá	'9.hoe'
	ǒù-gbǐndì	'14-hardwood tree, sp.'
	ǒù-vǒlò	'14-plant, sp.'
	mù-zǐbà	'1-winged termite, sp.'

Examples of LH tone following a depressor consonant as C_2 are:

(4.33)	mù-bábǎ	'1-monkey, sp.'
	lì-dìdì	'5-edible plant, sp.'
	ndùgǎ	'1a.mole'
	mù-ndùgbǒ	'1-wasp'
	kù-kùvǐ-kò	'15-mushroom, sp.-15'

¹⁸⁵ I have no explanation yet for this phenomenon. In verb forms with Future TAM melody, without H tones, the second syllable of the verb root has a L tone as expected, e.g. **nàgòbità** 'I will cover a roof with leaves' (**nà-gòbit-à** 1SG-cover a roof-FV), **nòdùdùlò** 'I will gobble, wolf', **nàzìgìbà** 'I will sieve', **nàgbùgbùtá** 'I will wake up suddenly' and **nòzùzùkò** 'I will get up'.

4.6 Tone rules

In the following sections, tone rules in the Liko language are presented. I start section 4.6.1 with H-tone spreading. H-tone spreading occurs only in verb forms and is related to TAM (tense/aspect/mood) melodies (see 7.6). The second section, 4.6.2, describes reassociation of surface LH tones. One of the parts of a combined L and H tone may be reassociated with an adjacent identical tone.

The subsequent two sections, 4.6.3 and 4.6.4, deal with association of floating H and L tones and with deletion of floating L tones. The Anterior aspect has a TAM melody with a floating H tone preceding the final vowel. Vowel Sandhi processes (see 3.3) may result in floating H or L tones. A floating H tone can also be introduced by morphosyntactic constructions like the monosyllabic time adverbials cliticising to verbs or to adverbials. Whenever a floating tone is present, there are ways to link it to an available TBU or - only in case of floating L tones - to delete it. A floating L tones may be deleted if the constraint on triple linking to a TBU is met, or if there is no available TBU at the end of the word. A floating H tone must be linked.

Section 4.6.5 shows non-automatic downstep. Delinked or floating L tones that have not been dealt with by Association or by L-tone deletion influence the pitch of a following H tone, causing non-automatic downstep. After non-automatic downstep, both H and L tones are realized at a lower pitch level. At some morpheme boundaries, a floating L tone is assumed to account for the non-automatic downstep of the second H tone when the TBUs at both sides of the boundary are High.

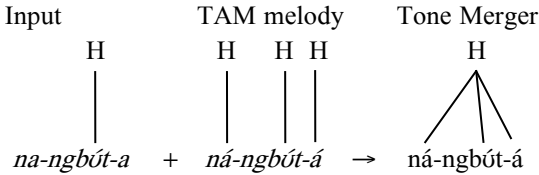
Section 4.6.6 describes the way the language deals with would-be violations of the OCP, in particular with a sequence of two H tones across a morphological boundary.

The final section, 4.6.7, presents cases of Polar tone in the language.

Tone Merger as part of the OCP and Stray Erasure are supposed to apply postlexically, but are usually not spelled out for the sake of economy. Tone Merger

assures that adjacent identical tones, whether they are associated or not, are merged into a single tone. Stray Erasure deletes all tonal features which are unassociated at the end of the postlexical component (Snider 1999:37). For example:

(4.34) **nángbútá** 'I sulked'



In the representations of tone in this section, 'Input' indicates underlying tone on roots, stems and affixes. Italic font in the representations indicates an underlying form at some stage.

4.6.1 H-tone spreading

As mentioned in the introduction to this chapter, Liko has underlyingly toneless morphemes consisting only of segments. These morphemes include all singular subject prefixes and only the first person plural subject prefix, the negative and Conditional prefixes, all verbal derivational suffixes including expansion, and the verb-final vowel.

The surface tone of underlyingly toneless verbal morphemes depends on the TAM melody on the verb form. The TAM melody consists of a tone on the leftmost prefix (also referred to as prefixal tone) and a tone on the final vowel. In the absence of a TAM melody tone, toneless morphemes surface with the default L tone. Compare the subject and negative prefixes in the examples below, where the surface tone of these prefixes is Low in (4.35a) and High in (4.35b). In (4.35a), the first person singular subject prefix **na-** and the negative prefix **ka-** occur in a verb form with the prefixal L tone of the negative Subjunctive TAM melody, whereas in (4.35b), they occur in a verb form with the prefixal H tone of the negative Future TAM melody:

- (4.35)a. *nà-kò-sìl-ò-ní-tò* 1SG-NEG-arrive-FV-NEGSUBJ-INS 'that I not arrive'
 b. *ná-kó-sìl-ì-gù* 1SG-NEG-arrive-FV-NEG 'I will not arrive'

The subject prefix and the Conditional prefix **ka-** surface with a L tone in (4.36a), in a verb form with the Conditional TAM melody (prefixal L tone and H tone on the final vowel). In (4.36b), the surface tone on these two prefixes is H, due to the prefixal H tone of the negative Conditional TAM melody:

- (4.36)a. *nà-kò-sìl-ó* 1SG-COND-arrive-FV 'if I arrive'
 b. *ná-kó-sìl-í* 1SG-COND-arrive-FV.NEG 'if I do not arrive'

The associative extension **-an-** and the final vowel surfaces with a L tone in (4.37a) and with a H tone in (4.37b). In (4.37a), the Future TAM melody does not have a H tone, whereas in (4.37b), the Infinitive TAM melody consists of a H tone on the final vowel:

- (4.37)a. *ǎá-múy-àn-à* 3PL-hate-ASS-FV 'they will hate e.o.'
 b. *ká-múy-án-á* 9b-hate-ASS-FV 'to hate e.o.'

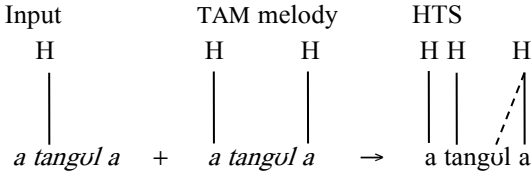
The Causative extension **-is-**, the Pluractional extension **-ag-** and the final vowel have a surface L tone in (4.38a), a verb form with the Future TAM melody. Lacking a TAM-melody H tone, they surface with the default L tone. With the Past (specific) TAM melody (prefixal High and final-vowel High), the final vowel and all preceding extensions surface with a H tone, as in (4.38b):

- (4.38)a. *ò-lùmb-ìs-òg-ò* 3SG-smell-CAUS-PLUR-FV 'it will cause to smell'
 b. *ó-lùmb-ís-óg-ó* 3SG^p-smell-CAUS-PLUR-FV^p 'it caused to smell'

After the linking of the primary tones and the TAM melody to a verb form, there may remain TBUs that lack tone, because they belong to underlyingly toneless morphemes. H-tone spreading (HTS) in Liko, which applies both rightward and leftward, links a H tone to toneless TBUs. If, for some reason, a toneless syllable is not associated with a H tone, it surfaces as a L tone.

The verb **-tángul-** 'read, recite' has an underlying H tone on the first TBU. The second TBU is underlyingly toneless. Inflected for Past (specific), the TAM melody prefixal High and final-vowel High are associated with the subject prefix and the final vowel. The H tone on the final vowel spreads leftward to the second TBU of the verbal base. Linking of the Past (specific) prefixal High and final-vowel High and HTS can be represented as follows:

(4.39) **átángólá** 'he read' (á-tángól-á 3SG^P-read-FV^P)

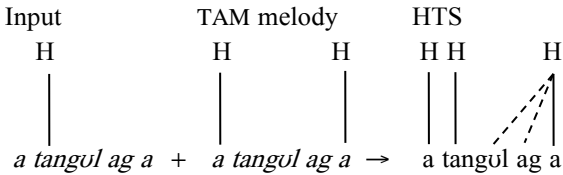


Tone Merger takes care of the adjacent identical H tones and merges them into one.

HTS is iterative as the following examples show, using the TAM melody of Past (specific). In the (4.40) and (4.41), HTS affects two toneless TBUs. In (4.42), three TBUs receive a H tone through HTS.

átángólágá, 'he read'¹⁸⁶ (á-tángól-ág-á 3SG^P-read-PLUR-FV^P) can be visualized as follows:

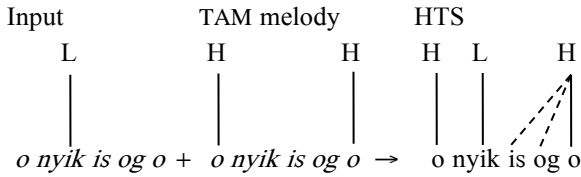
(4.40) **átángólágá** 'he read'



The verb **-nyik-** 'avoid' has an underlying L tone on the first TBU. The verb form **ónyikísógó** 'he filtered', literally, 'he caused to avoid', has the Causative extension **-is-** and the Pluractional extension **-ag-** (ó-nyik-ís-óg-ó 3SG^P-avoid-CAUS-PLUR-FV^P). The H tone on the final vowel of the Past (specific) TAM melody spreads to the adjacent toneless TBUs of the verbal base.

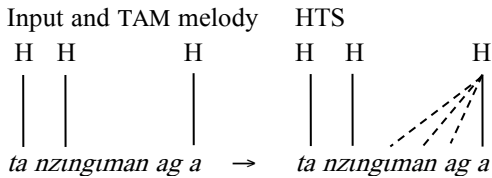
¹⁸⁶ The Pluractional extension **-ag-** in the case of this verb adds the meaning of reading habitually, a long passage or many books.

(4.41) **ónyíkísógó** 'he filtered'



In **tánzínígímánágá** 'we became scattered', (tá-nzínígímán-ág-á 1PL^P-become scattered-PLUR-FV^P),¹⁸⁷ the H tone on the final vowel spreads to three TBUs:

(4.42) **tánzínígímánágá** 'we became scattered'



In the case of **ónyíkísógó** (4.41) it is clear that HTS to the left must come from the H tone on the final vowel, because the verb root is Low toned. The following examples, using Future verb forms that do not have a TAM melody with a H tone, provide evidence that the H tone of a verb root does not spread to underlyingly toneless TBUs:

- | | | |
|--------------------|---------------------|------------------------|
| (4.43) à-tángùl-à | 3SG-read-FV | 'he will read' |
| à-tángùl-àg-à | 3SG-read-PLUR-FV | 'he will read' |
| tà-nzínígímàn-àg-à | 1PL-scatter-PLUR-FV | 'we will be scattered' |

In (4.43), all toneless morphemes preceding and following a High-toned verb root surface with the default L tone. A lexical H tone does not spread to adjacent toneless morphemes. HTS is restricted to the H tones of a TAM melody in Liko.

¹⁸⁷ The basic verb is **-nzínig-** 'cut up into small pieces'. The derivational suffix **-man-** is primarily attested in derivations from nominal modifiers and adjectives to verbs, see 5.2.2 and 5.3.3.

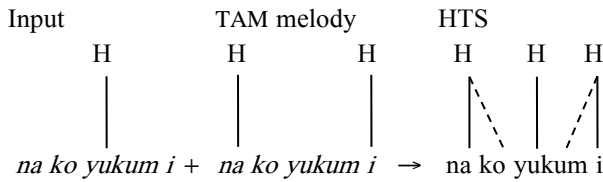
When a toneless verbal morpheme surfaces with a H tone, it is either associated with a H tone of a TAM melody, or it is linked to a H tone through HTS.

With respect to HTS on morphemes preceding the verb root, compare first the Conditional TAM melody with prefixal L tone and final-vowel H tone in (4.44a), and second, the negative Conditional TAM melody with a prefixal H tone and a final-vowel H tone in (4.44b):

- (4.44)a. *nà-kà-dìkít-á* 1SG-COND-throw-FV 'if I throw'
nà-kò-yúkúm-ó 1SG-COND-breathe-FV 'if I breathe'
- b. *ná-kó-dìkít-í* 1SG-COND-throw-FV.NEG 'if I do not throw'
ná-kó-yúkúm-í 1SG-COND-breathe-FV.NEG 'if I do not breathe'

The prefixal H tone of a TAM melody spreads to the Conditional prefix on the right. Tone association of *ná-kó-yúkúm-í*, from *-yúkúm-* 'breathe', can be visualized as:

(4.45) *ná kó yúkúm í* 'if I do not breathe'



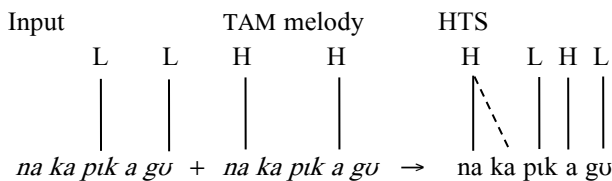
The prefixal H tone of the TAM melody spreads to the adjacent underlyingly toneless prefix.

Another example of HTS from TAM melody prefixal High is:

- (4.46)a. *ná-ká-pìk-á-gù* 1SG^P-NEG-throw-FV^P-NEG 'I did not throw'
 b. *á-ká-pìk-á-gù* 3PL^P-NEG-throw-FV^P-NEG 'they did not throw'

A visualization of (4.46a) is:

(4.47) *ná ká pìk á gù* 'I did not throw'

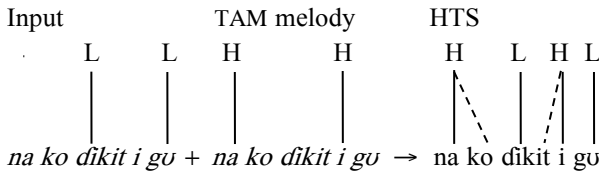


On the basis of the data presented, H-tone spreading (HTS) can be formulated as follows:

- (4.48) H-tone spreading in Liko iteratively links a TAM-melody H tone to an adjacent toneless TBU.

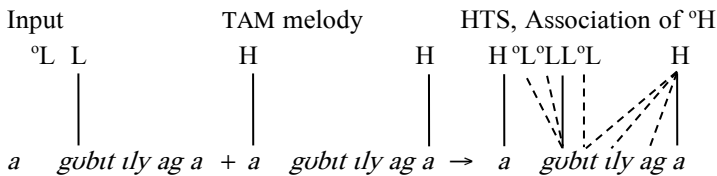
HTS will be further illustrated by the examples below. The TAM melody of negative Anterior aspect is prefixal High and final-vowel High. This can be seen in **nákódíktí-gù** 'I did not throw' (ná-kó-díktí-í-gù 1SG-NEG-throw-FV.ANT-NEG).

- (4.49) **nákódíktí-gù** 'I did not throw'



In **ágùbítílyá-gá** (/a-^h-gùbít-ítí-ag-a/ 3SG^P:1.O-thatch-BEN-PLUR-FV^P) 'he thatched the roof for s.o.', the Benefactive extension **-ítí** and the Pluractional extension **-ag-** are underlyingly toneless. The form has the Past (specific) prefixal High and final-vowel High TAM melody. The verb-final H tone spreads leftward to the TBU directly to the right of the TBU with the primary tone of the verb.

- (4.50) **ágùbítílyá-gá** 'he thatched the roof for someone'



The L tone of the object prefix and the L tone inserted by the voiced consonant /g/ (see 4.5) merge with the primary L tone of the verb. The L tone inserted by the voiced consonant /b/ causes the H tone, which is associated to the TBU by H-tone spreading, to surface as a LH tone. This shows, incidentally, that contrary to other floating L tones, a floating L tone inserted by a depressor consonant does not merge with a preceding Low.

4.6.2 Reassociation of LH tones

A LH tone may break up at a morpheme boundary. A TBU with LH tone generally surfaces with a L tone in the environment of a right-adjacent H tone across a morpheme boundary. There is also one context in which there is a preceding morpheme with a L tone, where a TBU with LH tone surfaces with a H tone.

Examples of monosyllabic nouns with a LH tone followed by an associative prefix with a H tone are **sǔ** '9.smell', **mǔ** '3.head' and **ndǐ** '9.beard':

- (4.51)a. sǔ yá-li-kísì 'smell of delicious food'¹⁸⁸
 9.smell 9.ASS-5-delicious dish
- b. mǔ má-sèngí 'first of a number of villages'
 3.head 3.ASS-9.village
- c. ndǐ yá-⁴mémí 'plant, sp.'
 9.beard 9.ASS-1a.goat

A LH tone on a numeral or a nominal modifier, e.g. **-bǎ** 'two', **-pólí** 'light (weight)' surfaces as a L tone when it precedes a morpheme with a H tone:

- (4.52)a. mǒngóni mǐ ní-mó má-bà mó
 6:news 6.DEM.III COP-6.DEM.I 6.NUM-two 6.DEM.I
 'these two news items'
- b. wò-pólì ábě ì-wàyá,
 1.ass-light (weight) like 9a-dried banana leaf
 'light as a dried banana leaf'

The High part of the LH tone of the class 2 object prefix **ǔ-** or the reflexive prefix **ǐ-** is reassociated with the following H tone of the verb root in, for instance:

- (4.53)a. nà-kù-kúl-à bǎ-mémí
 1SG-COND:2.O-untie-FV 2-goat
 'If I untie the goats.'
- b. nà-kì-kúl-á
 1SG-COND:REFL-untie-FV
 'If I untie myself.'

¹⁸⁸ Used for fresh meat or fish grilled or smoked.

In one environment, the Low part of a LH tone merges with a preceding L tone, i.e. when a type III demonstrative follows a TBU with a L tone, as **-bì** '2.DEM.III' and **-lí** '5.DEM.III' (see 6.1.2):

- (4.54)a. *bà-nzèkì bí ní-bà* 'these termites, sp. here'
 2-termites 2.DEM.III COP-2.DEM.II
- b. *lí-ngwálù lí ní-lì* 'this tree, sp. here'
 5-tree 5.DEM.III COP-5.DEM.II

4.6.3 Association of floating tones

Delinked tones, which are set afloat, originate from various processes of which the most common are V_1 -elision to resolve a situation of vowel hiatus (see 3.3.1) and vowel coalescence (see 3.3.2 and 3.3.3). Insertion of a floating H tone word-finally is part of verbal derivation to nouns and adjectives (see 7.12). The monosyllabic time adverbials **bì** and **ndì** have a floating H tone word-initially (see 7.7.1). The TAM melody of Anterior Aspect has a floating H tone preceding the verb-final vowel (see 7.6).

Options available in the language to host a delinked or floating tone are:

- a. association with a toneless TBU;
- b. merger with an identical adjacent tone;
- c. association with a different adjacent tone to form a LH tone;
- d. (delinked H tones only) association with the TBU to the right with a L tone and delinking its L tone.

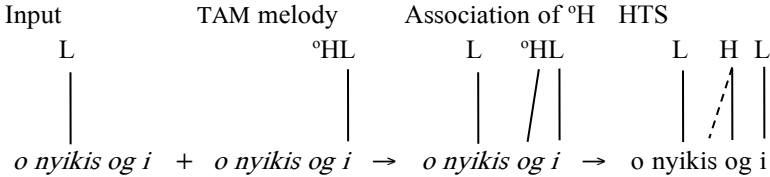
A floating H tone must be linked to a TBU in Liko, even if it causes the L tone on the final vowel of a TAM melody to be delinked, as seen with monosyllabic Low verbs in Anterior aspect (cf. option d in this section and L-tone deletion in 4.6.4). The options to get an association for a floating tone will be described in turn.

a. Association with a toneless TBU

The only context in which association of a floating tone with an underlyingly toneless TBU is attested is that of longer verb forms having the floating H tone of Anterior aspect preceding the final-vowel tone. In these cases, the L tone on the final vowel of the Anterior TAM melody is linked to the final vowel and the floating H tone is associated with the TBU preceding the final vowel. When there

are adjacent toneless TBUs, HTS applies. For example, **ònyíkísógi** 'he filtered recently' (/a-nyik-is-ag-i/ 3SG-filter-CAUS-PLUR-FV.ANT).

(4.55) **ònyíkísógi** 'he filtered recently'



b. Merger with an identical adjacent tone

When V_1 -elision has applied, the tone which is associated with the elided vowel is delinked from its segment and set afloat.

V_1 -elision or vowel-height coalescence occurs, for instance, when a noun-class prefix with the structure CV- precedes a noun with a stem-initial vowel. In their singular form, these noun stems are class 1b nouns with prefix **a-** or classes 1c or 9a nouns with prefix **ɿ-**. The plural prefix for classes 2 or 2+9 is **ɓà-**. The L tone of the prefix is delinked after V_1 -elision. The resulting floating L tone merges with the following L tone according to the OCP. Examples of V_1 -elision (4.56a) and vowel-height coalescence (4.56b) include:

- (4.56)a. /ɓà-à-tígbè/ → ɓà-tígbè '2:1b-sparrowhawk'
 /ɓà-ò-ngbùkó/ → ɓò-ngbùkó '2:1b-(pair of) bellows'
- b. /ɓà-ì-kpákù/ → ɓè-kpákù '2+9:9a-shoe'
 /ɓà-ì-ngùlì/ → ɓè-ngùlì '2:1c-caterpillar'

The floating H tone of the Anterior TAM melody is associated with a toneless TBU if available, e.g. in (4.55). Monosyllabic verbs without extensions do not have such a free TBU. If the primary tone of the verb is identical to the TAM floating tone, they merge as in **òtúngì** 'he invented s.th.' (**-túng-** 'invent').

c. Association with a different adjacent tone to form a LH tone

Forming a LH tone applies in the context of a floating L tone followed by a TBU with a H tone, or in environments in which a TBU with a L tone is followed by a

floating H tone. The environments are, for instance, nouns with a root-initial vowel with a H tone and Past verb forms followed by a monosyllabic time adverbial.

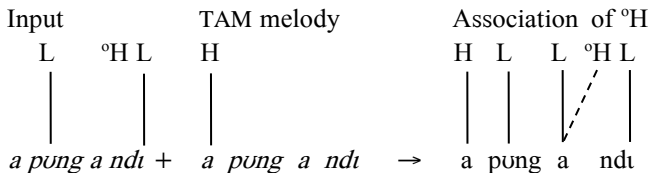
The nouns in the examples below have a H tone on the initial vowel and are preceded by classes 2 or 2+9 prefix **ɓà-**. The underlying L tone of the noun-class prefix is delinked after V₁-elision or vowel-height coalescence and is reassociated with the TBU on the right, forming a LH tone. Examples include:

- (4.57) /ɓà-á-kpákà/ → ɓǎ-kpákà '2:1b-vine, sp.'
 /ɓà-ó-bòsóní/ → ɓǒ-bòsóní '2:1b-hide-and-seek'
 /ɓà-í-ɓèɓí/ → ɓě-ɓèɓí '2:1b-snail, sp.'
 /ɓà-í-danga/ → ɓě-danga '2:1b-insect, sp.'
 /ɓà-í-bǎtu/ → ɓě-bǎtu '2+9:9a-moth, sp.'
 /ɓà-í-pedé/ → ɓě-pedé '2+9:9a-vine, sp.'

A floating H tone occurs between Past verb forms and a monosyllabic time adverbial. The TAM melody for Past is prefixal High. In the examples below, the third person singular subject prefix **a-** has a prefixal H tone; the final vowel as well as any vowels between the first TBU of the verb root and the final vowel surface with the default L tone. When ^H**ndi** follows the verb, the floating H tone is linked to the final vowel which is realized as a LH tone:

- (4.58) /á-pùng-à ^Hndì/ → ápùngǎ ndì
 3SG^P-start-FV P₃ 'he started'
 /á-tígòl-à ^Hndì/ → ótígòlǎ ndì
 3SG^P-stay-FV P₃ 'he stayed'

(4.59) **ápùngǎ ndì** 'he started'

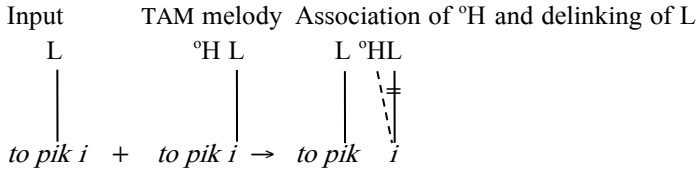


d. Association with the TBU to the right with a L tone and delinking its L tone

Delinking of a L tone to host a floating H tone occurs in case of -CVC- verb roots with Anterior aspect. In the example below, the floating H tone is not able to link

to the primary tone of the verb. It is linked to the first TBU on the right, which already has a L tone. By consequence, the L tone of the target TBU is delinked, because HL linked to a single TBU is not allowed.

(4.60) **tòpikí** 'we built'



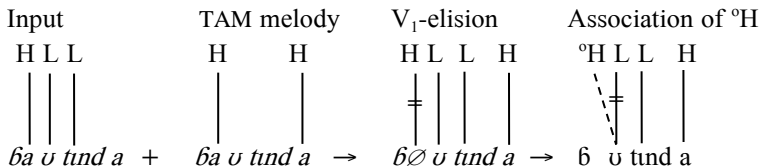
A second environment in which a floating H tone delinks a L tone constitutes a subject prefix or a prefix in TA position with a H tone followed by an object prefix with a L tone and no syllable onset.

In the following examples, the third person plural subject prefix **ḃá-** precedes the Low-toned second person singular object prefix **ù-** and a verb root with a L tone. When the vowel of the subject prefix is lost after V₁-elision, its H tone needs to be reassociated with the first available TBU, which in this case is the vowel **u-** of the Low-toned object prefix. The L tone of the target TBU is delinked.

- | | |
|--|--------------------------|
| (4.61) /ḃá-ù-tìnd-á/ | → ḃútìndá |
| 3PL ^P -2SG.O-tattoo-FV ^P | 'they tattooed you (sg)' |
| /ḃá-ù-mòkísy-á/ | → ḃúmòkísyó |
| 3PL ^P -2SG.O-dress-FV ^P | 'they dressed you (sg)' |

In these examples, the delinked L tone of the object prefix merges with the L tone of the verb.

(4.62) **ḃútìndá** 'they tattooed you (sg)'



Because the vowel of the subject prefix is elided, its H tone is delinked. It is reassociated with the following TBU, which in turn sets the L tone of the second person singular object prefix **ǝ-** afloat. By means of Tone Merger it merges with the adjacent L tone.

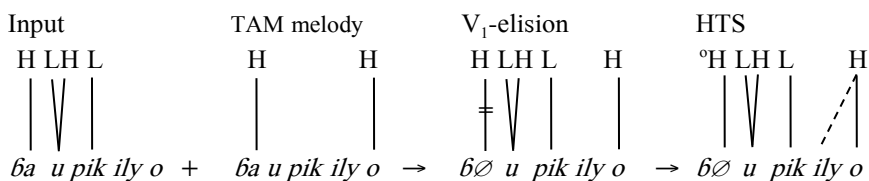
4.6.4 L-tone deletion

L-tone deletion removes delinked L tones that are left after the possibilities to get an association for floating tones in the language are exhausted. This situation occurs when a sequence of HLH needs to be associated with a single TBU.

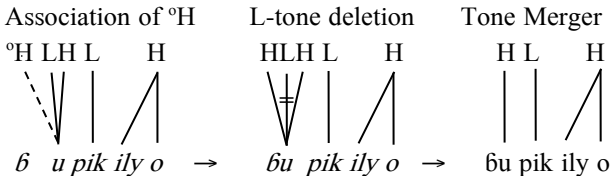
Liko has two verbal prefixes with a surface LH tone: the reflexive prefix **ʃ-** and the class 2 object prefix **ǝ-**. When these prefixes are preceded by another verbal prefix, i.e. a subject prefix or a prefix in TA position, the first of the two adjacent vowels undergoes V_1 -elision or the two vowels coalesce. As a result, only one TBU is available to host three tones: the delinked tone of the subject prefix or the prefix in TA position and the LH tone of the reflexive prefix or the object prefix. If a subject prefix or a prefix in TA position has a L tone, this delinked L tone merges with the first part of the LH tone. If, however, a subject prefix or a prefix in TA position has a H tone, the delinked H tone cannot be left floating and is associated with the TBU of the reflexive prefix or the object prefix. In this situation one TBU would surface with three tones, HLH, a situation which is not allowed in Liko. The maximum number of tones which can be associated with one TBU is two. Delinking and reassociating the second H is not a solution, because a HL contour tone on a TBU is not allowed either. The problem is resolved by delinking the L tone and subsequent L-tone deletion. Finally Tone Merger unites the adjacent H tones.

The example given below is of a subject prefix with a H tone followed by the class 2 object prefix with a LH tone. The TAM melody is Past (specific).

(4.63) **ǝúpíkilyó** 'they built for them'



continued:



A surface H tone on a prefix in TA position is due to underlying High, e.g. Inchoative aspect $^{-1}\text{ná}^{-1}$ -, or to HTS from a TAM melody prefixal H tone, e.g. Past. In (4.64), the vowel of the negative prefix in TA position is elided by V_1 -elision, resulting in a delinked H tone. The floating H tone is reassociated with the TBU of the object prefix $\check{\text{ř}}$ -. Association of three tones, in this case HLH, with one TBU is not permitted. The L tone of the LH contour is deleted and the two H tones merge:

- | | |
|---|---------------|
| (4.64)a. ná-kú-kúl-ág-gù | ḃà-mémí |
| 1SG ^P -NEG:2.O-untie-FV ^P -NEG | 2-goat |
| 'I did not untie the goats' | |
| b. ná-kú-pùn-ág-ù | ḃà-súkwa |
| 1SG ^P -NEG:2.O-gather-FV ^P -NEG | 2-caterpillar |
| 'I did not gather caterpillars' | |

Interestingly, in Liko, a delinked H tone by V_1 -elision does not simply merge with the H tone of a preceding TBU, but needs to be reassociated with a following TBU.

4.6.5 Non-automatic downstep

A floating L tone is involved in non-automatic downstep. The pitch level of the H tone following a floating L tone is perceived to be at a lower level than the pitch level which is associated with the previous H tone. A floating Low can be part of a morpheme, or the result of a L tone losing its association with a TBU or it can be inserted at certain morpheme boundaries.

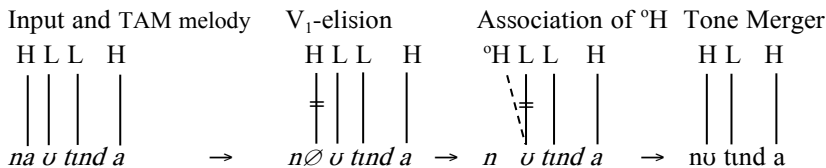
a. Non-automatic downstep as the result of a delinked L tone or of a floating L tone which is part of a morpheme

The delinking of a L tone, which in turn causes non-automatic downstep, is often initiated by the process of V_1 -elision, followed by reassociation of a delinked H tone to the TBU which is associated with a L tone.

Liko has three object prefixes with a L tone: first person singular **ĩ-**, second person singular **ũ-** and class 1 **ᶦ-** / **ᶗ-** without a vocalic segment¹⁸⁹. The first person singular object prefix **ĩ-** coalesces with the vowel of a preceding prefix (/Ca+v/ → /Cε/, see 3.3.2). When the second person singular object prefix **ũ-** is preceded by a subject prefix or a prefix in TA position, V₁-elision takes place (/Ca+v/ → /Cv/, see 3.3.1). The L tone of the class 1 object prefix needs to be linked. In each case, two tones are associated with one TBU, either the TBU of the object prefix or the one of the prefix preceding the object prefix. If the tone on the first prefix is High, then the association of a H and a L tone violates the Liko constraint on a HL sequence on a single TBU. By consequence, the L tone of the object prefix is either delinked in the case of the first and second person singular object prefixes or remains unlinked in the case of the class 1 object prefix. If the verb is Low toned, the floating L tone merges with the L tone of the verb as can be seen in the following examples:

- (4.65)a. /ná-ũ-tìnd-á/ → nótìndá
 1SG^P-2SG.O-tattoo-FV^P 'I tattooed you (sg)'
- b. /ná-ũ-mòkísí-á/ → nùmòkísyó
 1SG^P-2SG.O-dress-FV^P 'I dressed you (sg)'

(4.66) **nótìndá** 'I tattooed you (sg)'



The TAM melody prefixal H tone on the first person singular subject prefix **ná-** is delinked when its TBU is elided. It relinks to the TBU of the second person singular object prefix **ũ-** and sets the original L tone of the object prefix afloat. Because the verb root has a primary L tone, the floating L tone merges through the OCP.

Next look at examples in which both the TAM prefixal tone and the primary tone of the verb are High, whereas the object prefix has an underlying L tone:

¹⁸⁹ The class 1 object prefix **mũ-** occurs in Imperative forms.

- (4.67)a. /ná-ù-tík-á/
 1SG^P-2SG.O-send-FV^P
- b. /ná-ù-búnd-ág-á/
 1SG^P-2SG.O-watch over-FV^P

The L tone of the object prefix is delinked after V₁-elision and association of the H tone to the TBU of the object prefix; the surface realization is **nó'tíká**.

In 4.6.3, two ways to deal with delinked L tones are described. The first option, merger with an identical adjacent tone, is not applicable because there is none. The second option, association with a different adjacent tone to form a LH tone gives forms which are not acceptable to the Liko consultants I worked with: ***nó'tíká** and ***nóbúndágá**. If it would be allowed, the surface LH tone on the first CV-syllable of the verb would change the primary tone of the verb.

The other option is L-tone deletion, since the L tone of the object prefix is surrounded by H tones. In 4.6.4 this rule applies to a HLH sequence on a single TBU, e.g. /bá-ù-tind-á/ 3PL^P-2.O-tattoo-FV^P, which surfaces as **bótindá** 'they tattooed them'. Applying L-tone deletion to /ná-ù-tík-á/ and /ná-ù-búnd-ág-á/ yields the incorrect results ***nó'tíká** and ***nóbúndágá**. In the verb forms under discussion, the surface tone on the first TBU of the verb root is realized at a pitch level between High and Low. This can be seen in the following examples, in which the second person singular and the class 2 object prefixes differ only in tone, ù- vs. ũ-. The third column presents measurements in Hz.¹⁹⁰ Compare (4.68a, c) with (4.68b, d). In (4.68a, c), the L tone of the LH tone of the class 2 object prefix is subject to L-tone deletion, resulting in a surface H tone on the prefix vowel. In (4.68b, d), the L tone of the second person singular object prefix is delinked after V₁-elision and causes non-automatic downstep:

- | | | | | |
|----------|---|---|---------------|-----------------|
| (4.68)a. | /ná-ù-tík-á ndì/ | → | nó'tíká ndì | — — — — |
| | 1SG ^P -2.O-send-FV ^P P ₃ | | 'I sent them' | 192.196.185 157 |

¹⁹⁰ The voice is that of a man. Measurements are illustrative, because pitch varies according to many factors such as gender, age, reading, etc.

b.	/ná-ù-tík-á ndì/	→ n ^ú tíká ndì	— — — —
	1SG ^P -2SG.O-send-FV ^P P ₃	'I sent you (sg)'	190.167.164.140
c.	/ná-ù-búnd-ág-á ndì/	→ n ^ú búndágá ndì	— — — — —
	1SG ^P -2.O-watch-FV ^P P ₃	'I watched over them'	189.184.184.182 151
d.	/ná-ù-búnd-ág-á ndì/	→ n ^ú búndágá ndì	— — — — —
	1SG ^P -2SG.O-watch-FV ^P P ₃	'I watched over you (sg)'	193.164.165.161 139

After the non-automatic downstep, any following H and L tones in the tone phrase are realized at a lower register. In (4.68b) the pitch of the final vowel with the Past (specific) TAM H tone does not reach the same height as the first H tone of the verb form. The same can be observed for the TAM H tone on the final vowel of the verb form with the Pluractional extension **-ag-**. The L tone of the time adverbial ^H**ndì** (which is part of the tone phrase) has a higher pitch in (4.68a) and (4.68c) compared to forms where non-automatic downstep has occurred. This means that non-automatic downstep does not affect an individual tone, but changes the register and is indeed to be considered as non-automatic downstep and not as a Mid tone.

This analysis also applies to the other object prefix with a L tone, the class 1 object prefix [˘]- as in the following examples:

(4.69)a.	/bá- [˘] -tík-á ndì/	→ bá ^á tíká ndì	— — — —
	3PL ^P -1.O-send-FV ^P P ₃	'they sent s.o.'	171.150.154 129
b.	/bá- [˘] -búnd-ág-á ndì/	→ bá ^á búndágá ndì	— — — — —
	3PL ^P -1.O-watch-FV ^P P ₃	'they watched over s.o.'	172.146.147.145 128 ¹⁹¹

The phonetic difference in pitch in noun stems, attributable to moving from one tone to the other when the register is the same, is bigger than the difference in moving from one register to a lower one when the tone is the same. This register/tone ratio to pitch height is around 1/2 in the case of Liko.

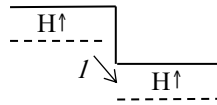
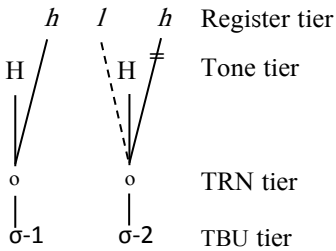
¹⁹¹ Pitch measurements show that the actual pitch of a tone is relative. These come from recordings of the same speaker as above, but this time he started at a lower pitch.

In order to draw representations that visualize this difference between tone and register, I will use elements of Snider's Register Tone Theory (RTT) (Snider 1999), because they are helpful to visualize what happens. By using them, I do not want to claim that other phonological theories would not be capable to capture the facts or that RTT would be able to account for all the facts in the language. It would be worthwhile to research the Liko tonal system using RTT, but that falls outside the scope of this book. RTT recognizes four tiers: the Tonal Root Node (TRN) tier with structural nodes to which features and TBUs are linked, the Tone-Bearing Unit (TBU) tier with the TBUs (syllables or moras), the Tonal tier with the tonal features H and L and the Register tier with the register features *h* and *l*. In RTT non-automatic downstep can be visualized as follows:

(4.70) Non-automatic downstep represented graphically in RTT

Structural representation

Phonetic representation

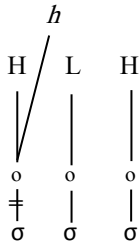


In the structural representation given above, a *low* register which is unassociated is present between two H tones which are both linked to a *high* register. The *low* register on the Register tier spreads to the TRN on the underlying H tone of σ -2. The original *h* of σ -2 is delinked, with the result that the H tone of σ -2 is realized at a lower register.

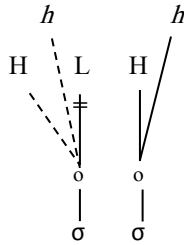
Snider (1999:25) defines a *low* register shift as lower relative to the preceding register settings. The tonal features H and L are realized at a pitch relative to the current register.

(4.71) Non-automatic downstep by the L tone of a first or second person singular object prefix which has been set afloat:

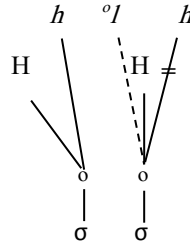
a. V₁-elision



b. °H association



c. °I association

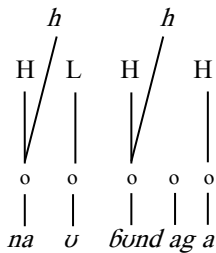


In (a), the prefix vowel preceding the object prefix is elided. In (b), the floating H tone and *high* register are reassociated with the remaining available TRN, delinking the L tone. The delinked L tone cannot be reassociated and triggers a floating *I* on the Register tier, which is associated with the TRN of the underlyingly High-toned verb root in (c). The original *h* of the verb root is delinked and the H tone is realized at a lower register. The delinked *high* register is finally removed by Stray Erasure.

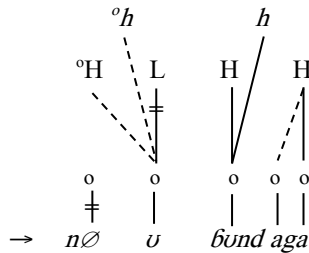
This is visualized for (4.68d), **nó'ḅúndága** 'I watched over you (sg)', a verb form in which non-automatic downstep occurs:

(4.72) **nó'ḅúndága** 'I watched over you (sg)'

Input and TAM

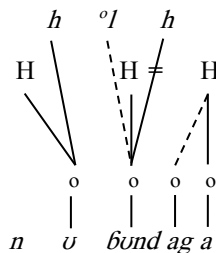


V₁-elision, HTS and Association of °H

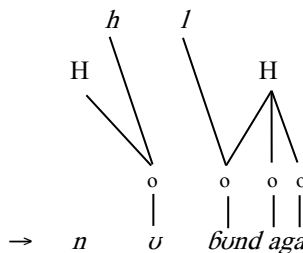


continued:

Association of °I



Merger and Stray Erasure



An initial H tone of classes 1a or 9 nouns is realized at a lower register in associative constructions, when the noun is preceded by a High-toned associative prefix. A floating L tone causes non-automatic downstep of the second H tone. The floating L tone is the tone of the associative stem.

Nouns in classes 1a or 9 do not have a segmental noun-class prefix. Examples are given in (4.73a, b). For comparison, in (4.73c), the plural form of **ndábù** '9.house' has noun-class prefix **ḅà-**, which prevents the H tone on the associative prefix from being adjacent to the H tone of the noun stem.

- (4.73)a. /mù-kùndú má^L-píyò/ → mòkùndú má^Lpíyò
 3-tail 3.ASS-1a.viper 'tail of a viper'
- b. /mà-ḅísò má^L-ndábù/ → mòḅísò má^Lndábù
 6-colour 6.ASS-9.house 'colours of the house'
- c. /mà-ḅísò má^L-ḅà-ndábù/ → mòḅísò máḅàndábù
 6-colour 6.ASS-2+9-house 'colours of the houses'

The root-initial H tone of a nominal modifier¹⁹² is realized at a lower register, i.e. non-automatic downstepped High, following an associative prefix with a H tone and a floating L tone:¹⁹³

- (4.74)a. /ḅà-nékókó ḅá^L-pólí/ → ḅànékókó ḅó^Lpólí
 2-instrument 2.ASS-light 'light (weight) musical instruments'
- b. /mù-ḅúkù má^L-pólí/ → mùḅúkù mó^Lpólí
 3-quiver 3.ASS-light 'a light (weight) quiver'
- c. /ḷ-sásá-sù sá^L-pólí/ → ìsásásù só^Lpólí
 19-feather-19 19.ASS-light 'a light (weight) feather'

¹⁹² This concerns polysyllabic nominal modifiers: the surface tone of monosyllabic modifiers is polar, see 4.6.7.

¹⁹³ Many nominal modifiers can also be preceded by the general modifier prefix **ḅí**, often with predicative usage, see 5.3.1. The H tone on the first TBU of nominal modifiers is not downstepped following **ḅí**, e.g. **kù-tú-kò kámì à ḅí-pólì**, 15-clothes-15 1SG.POSS 3SG:be MOD-light (weight), 'my piece of clothing is light'.

With respect to the surface LH tone on the final TBU of the nominal modifier: all nominal modifiers consisting of more than one syllable have a final LH tone.

The H tone of the enumerative prefix **yí-** surfaces with a non-automatic downstepped H tone, when it follows an associative prefix with a H tone and a floating L tone:

- (4.75)a. /ʃu-likí ʃá^L-yí-ʃǎ/ → ʃu-likí ʃá-⁺yí-ʃǎ
 14-chair 14.ASS-9.NUM-two '2nd chair'
- b. /ʃu-likí ʃá^L-yí-sáá/ → ʃu-likí ʃá-⁺yí-sáá
 14-chair 14.ASS-9.NUM-three '3rd chair'

The prefix of Inchoative aspect is **-^Lná^L-** which occurs in TA position in the verb structure. It has a floating L tone both preceding and following the prefix. If **-^Lná^L-** precedes a High-toned verb, a floating L tone causes the initial H tone of the verb to be realized at a lower register.

- (4.76)a. /à-^Lná^L-lál-á/ → àná⁺lálà
 3SG-INCH-sleep-FV 'he is about to sleep'
- b. /à-^Lná^L-píkìt-àg-á/ → àná⁺píkìtàgá
 3SG-INCH-flee-PLUR-FV 'he is about to flee'

Two subject prefixes have a H tone, i.e. second person plural **má-** and third person plural **ʃá-**. When these prefixes precede the Inchoative aspect prefix **-^Lná^L-**, the H tone of the Inchoative aspect prefix is realized at a lower register:

- (4.77)a. /má-^Lná^L-pìk-á/ → má⁺nápìká
 2PL-INCH-sway-FV 'you (pl) are about to sway'
- b. /ʃá-^Lná^L-kìn-á/ → ʃá⁺nákìná
 3PL-INCH-decorate-FV 'they are about to decorate'

In (4.78), the two floating L tones of Inchoative **-^Lná^L-** result in two consecutive non-automatic downsteps, the first one because of the floating L tone which precedes the Inchoative aspect prefix, and the second one because of the floating L tone which follows the Inchoative aspect prefix:

- (4.78)a. /má-^Lná^L-lál-á/ → má⁺ná⁺lálá
 2PL-INCH-sleep-FV 'you (pl) are about to fall asleep'

- b. /bá-^Lná^L-píkìt-àg-á/ → bá^Hná^Hpíkìtàgá
 3PL-INCH-flee-PLUR-FV 'they are about to flee'

b. Non-automatic downstep caused by a floating L tone at a morpheme boundary

There are two specific morphological contexts in Liko in which the final tone of two adjacent H tones (H + H) surfaces as a non-automatic downstepped H tone, i.e. at a lower register. These are:

- the boundary between an adjective prefix and an adjective which is derived from a verb and
- the boundary between an auxiliary and an Infinitive.

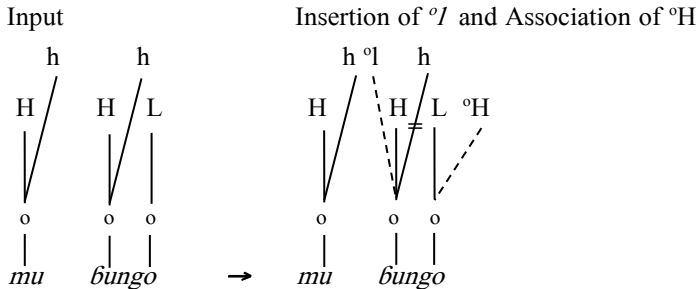
It was illustrated above that a floating *low* register, triggered by a floating L tone, provides a rationale for non-automatic downstep. The cases described below, can also be understood by assuming a floating L tone at a morpheme boundary, which causes the following H tone to surface at a lower register if the floating L tone is preceded by a H tone.

An adjective prefix and an adjective derived from a verb

Adjectives derived from verbs keep the primary tone of the verb (L or H on the first TBU) followed by a sequence of L tones until the final vowel, which is realized with a LH tone, see 7.12.2. Adjective prefixes with a H tone preceding an adjective derived from a verb root with a primary H tone, e.g. **-búng-** 'lose' and **-búnìk-** 'be broken', create an environment of two H tones across a morpheme boundary, separated by a floating L tone. As can be seen in the following examples, the second H is realized at a lower register:

- (4.79)a. /mù-^Lbúkù mú-^Lbúngǒ/ → mù^Hbúkù mú^Hbúngǒ
 3-quiver 3.ADJ-lost 'a lost quiver'
- b. /ì-sásá-sù sí-^Lbúnìkǒ → ìsásàsù sí^Hbúnìkǒ
 19-feather-19 19.ADJ-broken 'a broken feather'
- c. /kpòz̩yè yí-^Lbúnìkǒ/ → kpòz̩yè yí^Hbúnìkǒ
 9.plant 9.ADJ-broken 'a snapped plant, sp.'

This can be visualized as follows (taking (4.79a)):

(4.80) **mú^hʔúngǒ** '3.ADJ-lost'

If one of the tones at the morpheme boundary is L, no non-automatic downstep occurs. Look at the examples below, where (4.81a) has class 1 adjective prefix with a L tone and (4.81b) has a Low-toned verb root **-ʔák-** 'carve':

- (4.81)a. nyàmá mù-^Lǔǔyǎ → nyàmá mùǔyǎ
 1a.animal 1a.ADJ-ferocious 'a dangerous animal'
- b. dàgǎ-tù tí-^Lʔákǎ → dàgǎ-tù tíʔákǎ
 13.arrow-13 13.ADJ-carved 'carved arrows'

An auxiliary and an Infinitive

The second person plural subject prefix **má** and the third person plural subject prefix **ʔá** are suppletive forms (of the verb **-ík-** 'be'). When they precede an Infinitive form (expressing Progressive aspect, see 7.7.5), the H tone of the Infinitive prefix is changed into a non-automatic downstepped H tone.

Examples include:

- (4.82) /má^hká-sìl-á/ → má^hkósìlò
 2PL:be 9b-arrive-FV 'you (pl) are arriving'
- /ʔá^hká-ʔín-á/ → ʔá^hkóʔínó
 3PL:be 9b-dance-FV 'they are dancing'

c. Non-automatic downstep caused by a floating L tone when two clitics form a unit

The tone of the Insistive enclitic **-tǔ** is changed into a non-automatic downstepped H tone, when is preceded by the negative Subjunctive suffix **ní-** and followed by the negative enclitic **-gu**:

- (4.83) /wà-kà-pìk-à-ní ¹tɔ̄-gù/ → wàkòpìkòní ⁴tɔ̄gù
 2SG-NEG-sway-FV-NEGSUBJ INS-NEG 'that you not sway' /
 'Do not sway!'
 /wà-kà-sìl-à-ní ¹tɔ̄-gù/ → wàkòsìlòní ⁴tɔ̄gù
 2SG-NEG-arrive-FV-NEGSUBJ INS-NEG 'that you not arrive' /
 'Do not arrive!'

The two enclitics **-tɔ̄** and **-gù** form a unit which does not belong to the preceding word. This can be seen by the vowel of the Insistive clitic **-tɔ̄**: it does not assimilate to the preceding [+ATR] suffix **ní**-. When **-tɔ̄** is not followed by the negative clitic, its vowel always assimilates and is changed to /o/, see 3.2.4.2. The two enclitics **-tɔ̄** and **-gù** constitute an environment in which a L tone is inserted between two H tones, which causes the second H tone to be changed into a non-automatic downstepped H tone.

4.6.6 Repairing would-be violations of the OCP

There are specific morphological contexts in Liko in which the second of two adjacent H tones (H+H) surfaces as a L tone. This phenomenon reflects Meeussen's rule: the lowering, in some contexts, of the final tone of a pattern of two adjacent H tones (HH), resulting in the pattern HL. Meeussen noticed that in many Bantu languages, stem-initial H tones changed to L tones when they followed certain High-toned prefixes. Changing a second H tone to a L tone may occur in the context of two adjacent H tones at a word-final morpheme boundary. In this section, I will first briefly mention the cases in which a morpheme with a H tone followed by another High-toned morpheme does not lead to a change in pitch level of the second H tone. After that, I will present the environments in which the second underlying H tone surfaces as a L tone.

a. H tones across a morpheme boundary both surface as High

First, the second H tone surfaces as High in the context of High-toned subject prefixes (4.84a) or object prefixes (4.84b) preceding a High-toned verb root. Subject prefixes with a H tone are second person plural **má**- and third person plural **ḃá**-, object prefixes with a H tone are first person plural **tí**- and second person plural **mú**-:

- (4.84)a. má-túg-à 2PL-draw water-FV 'you (pl) will draw water'
 bá-túg-à 3PL-draw water-FV 'they will draw water'
- b. à-tí-kpág-à 3SG-1PL.O-comfort-FV 'he will comfort us'
 à-mú-kpág-à 3SG-2PL.O-comfort-FV 'he will comfort you (pl)'

Second, the H tone of a verb root surfaces as a H tone after a prefix with a TAM prefixal H tone, e.g. the subject prefix (4.85a) or the negative prefix (4.85b), or after the Infinitive prefixal with a H tone (4.85c):

- (4.85)a. ná-túg-á 'I drew water'
 1SG^P-draw water-FV^P
 wá-túg-á 'you (sg) drew water'
 2SG^P-draw water-FV^P
- b. ná-ká-túg-á 'I did not draw water'
 1SG^P-NEG-draw water-FV^P
 wá-ká-túg-á 'you (sg) did not draw water'
 2SG^P-NEG-draw water-FV^P
- c. ká-túg-á 'to draw water'
 9b-draw water-FV
 ká-wíw-á 'to fly'
 9b-fly-FV

Third, the initial H tone of a modifier root following the High-toned modifier prefix **bí-** surfaces as a H tone:

- (4.86) bí-tú MOD-white 'light (colour)'
 bí-pólì MOD-light 'light (weight)'
 bí-kpókódí MOD-narrow 'narrow'
 bí-nvé MOD-suddenly 'leave suddenly'
 bí-pélé MOD-stealthily 'stealthily'

Across word boundaries, H tones at both ends of the word boundary remain High, e.g. the general preposition **ká** preceded and followed by a H tone:

- (4.87)a. ó-sìl-ó ká kpáká
 3SG^P-arrive-FV^P PREP 9.trap
 'He arrived at the trap'

- b. 6ǎ-màky-á ká ndá6ù
 3PL^P:1.O-put in-FV^P PREP 9.house
 'They put him in the house'

b. The second of two H tones across a morpheme boundary changes to Low

The H tone of certain suffixes and enclitics is changed into a L tone, when they are preceded by a H tone. This concerns the Inchoative aspect final vowel **-á**, the Perfective aspect suffix **-ní**, the Insistive clitic **-tǒ** and the nominalization suffix **-á**.

The tone on the final vowel of the Inchoative aspect forms surfaces as a H tone following a L tone (4.88a), and is changed into a L tone following a H tone (4.88b, c):

- (4.88)a. à-ná-pìk-á 3SG-INCH-sway-FV 'he is about to sway'
 à-ná-đíkít-á 3SG-INCH-throw-FV 'he is about to throw'
- b. à-nú-kúl-à 3SG-INCH:2.O-untie-FV 'he is about to untie them'
 à-nú-kúmb-ò 3SG-INCH:2.O-carry-FV 'he is about to carry them'
- c. à-nǎ-⁴kúl-à 3SG-INCH:1.O-untie-FV 'he is about to untie him'
 à-nǎ-⁴kúmb-ò 3SG-INCH:1.O-carry-FV 'he is about to carry him'

The tone on the vowel of the Perfective aspect suffix **-ní** surfaces as a H tone in all contexts except when **-ní** follows the surface High tone on the final vowel **-i** of Anterior aspect. In the following examples, the tone on the preceding TBU is High or non-automatic downstepped High:

- (4.89) ó-pìk-ó-ní 3SG^P-sway-FV^P-PFV 'he has swayed'
 ó-đíkít-ó-ní 3SG^P-throw-FV^P-PFV 'he has thrown'
 ú-kúl-ó-ní 3SG^P:2.O-untie-FV^P-PFV 'he has untied them'
 ǎ-⁴kúmb-ó-ní 3SG^P:1.O-carry-FV^P-PFV 'he has carried him'

In verb forms with Anterior aspect, the tone of the Perfective aspect suffix **-ní** surfaces as a H tone when it follows the surface L tone on the final vowel **-i** (4.90a, b), but the tone of the Perfective aspect suffix **-ní** is changed into a L tone if the final vowel **-i** of Anterior aspect surfaces with a H tone (4.90c):

- (4.90)a. ò-6ín-ì-ní 3SG-dance-FV.ANT-PFV 'he has danced'
 ̀̀-^{̀̀}kúmb-ì-ní 3SG:1.O-carry-FV.ANT-PFV 'he has carried him'

4.6.7 Polar tone

Adjective prefixes (see 5.2) and monosyllabic nominal modifiers (see 5.3.1) have a polar tone: their surface tone is consistently the opposite of the adjacent following tone.

The surface tone of underlyingly High-toned prefixes of underived adjectives is consistently the opposite of the following tone. If the initial TBU of the underived adjective is Low, the adjective prefix surfaces with a H tone. If, on the other hand, the initial TBU is High, the tone of the adjective prefix is changed into a L tone.

Examples of prefixes preceding underived adjectives with a L tone on the first syllable are:

- | | | |
|--------|---------------------|----------------------|
| (4.93) | /úmó yí-dìngǐ/ | → úmó yí-dìngǐ |
| | 9.savanna 9.ADJ-big | 'a large savanne' |
| | /bù-mbúí bǔ-dìngǐ/ | → bǔ-mbúí bǔ-dìngǐ |
| | 14-tree 14.ADJ-big | 'a big "mbuti" tree' |

By contrast, in the examples below, the same adjective prefixes precede an adjective with a H tone on the initial TBU:

- | | | |
|--------|-----------------------|--------------------------------|
| (4.94) | /úmó yí-kúǎ/ | → úmó yì-kúǎ |
| | 9.savanna 9.ADJ-short | 'a short (stretch of) savanne' |
| | /bù-mbúí bǔ-kúǎ/ | → bǔ-mbúí bǔ-kúǎ |
| | 14-tree 14.ADJ-short | 'a short "mbuti" tree' |

The underlying L tone of monosyllabic nominal modifiers is changed into a H tone in the context of a preceding Low-toned associative prefix, whereas monosyllabic nominal modifiers surface with a L tone when they are preceded by a High-toned associative prefix.

The underlying tone of these nominal modifiers can be established by combining them with the general modifier prefix **bí-**, which does not influence the following tones. This can be seen in the popular saying **nò-lyól-ì bí-nyé**, 1SG-graze-FV.ANT MOD-bad, 'I ate very well!' and in **pǎ à bí-pí kǒnù**, 9.place 3SG:be MOD-dark towards here, 'it is dark here'.

In the examples below, the nominal modifiers **-pí** 'dark' and **-nyé** 'bad' surface with a H tone or with a L tone, depending on the tone of the associative prefix:

- (4.95)a. *nékókó* *wò-pí*
 1a.instrument 1.ASS-dark
 'a black musical instrument'
- b. *ḡà-nékókó* *ḡó-pìpì*
 2-instrument 2.ASS-dark
 'black musical instruments'
- c. *mù-bùyú* *wà-nyé*
 1-caterpillar 1.ASS-bad
 'a bad caterpillar'
- d. *ḡà-bùyú* *ḡá-nyè*
 2-caterpillar 2.ASS-bad
 'bad caterpillars'

4.7 Conclusion

The Liko tone system has many similarities to common Bantu tonology, but is also different in certain aspects. Based on the overview of Bantu tone given by Kisseberth and Odden (2003:59-70) and the description of the Liko tone system in this chapter, this section presents an account of the tone aspects that are similar or different.

The underlying tones in Liko are High and Low, which is common in Bantu languages. Tone contrasts involve H and L tones, as well as combined LH on a monosyllable. Tone patterns on nouns contain H, L and LH: canonical disyllabic noun stems have seven tone patterns H, H.L, L.H, L, H.LH, L.LH, and L.H.L,¹⁹⁴ monosyllabic noun stems have H, L or LH and trisyllabic stems have eight patterns of H and L combinations and six patterns with LH.¹⁹⁵ The tone on the verb root in Liko is either H or L, and is located on the first CV-syllable of the verb root.

¹⁹⁴ The patterns L.H.H and L.H.LH have not been attested on disyllabic noun stems.

¹⁹⁵ "The canonical stem is disyllabic, where four tone patterns are reconstructable to Proto-Bantu (PB): HH, HL, LL and LH." (...) "A trimoraic stem has eight patterns." (Kisseberth and Odden 2003:60).

Location of the stem tone on the first TBU of the root is assumed to be common in Bantu languages (Kisseberth and Odden 2003:61).

Different from what Kisseberth and Odden report for Bantu languages, i.e. "Class prefixes are typically toneless" (2003:60), is that noun-class prefixes in Liko have an underlying tone. Classes 9b and 17 prefixes have a H tone, classes 1b, 1c and 9a have a L tone or a H tone and other noun-class prefixes have a L tone. The noun-class prefixes of classes 1b, 1c and 9a keep their underlying tone in Sandhi environments preceding the classes 2 or 2+9 prefix, which results in a surface LH tone if the tone on the classes 1b, 1c or 9 prefix is High.

Liko has grammatical tone contrasts, which mark differences in tense, aspect and mood. Kisseberth and Odden (2003:61,62) mention the following characteristics of grammatical tone contrasts often found in Bantu languages:

- "Even in languages with a lexical contrast in the verb, there are tenses with what is usually referred to as 'grammatical tone', which involves assignment of H to a particular mora in the stem. (...)
- The favored locations of grammatical H are the final mora or the second stem mora. (...)
- Tone on prefixes can vary considerably, especially to mark differences in tense-aspect."

Grammatical tone contrasts in Liko, called "TAM melodies" in this book (see 7.6) consist of one or two H or L tones: a prefixal tone initially associated with the vowel of the subject prefix and a tone initially associated with the verb-final vowel. Affirmative and negative verb forms have separate sets of TAM melodies.

H-tone spreading is important in verb forms (see 4.6.1). According to Kisseberth and Odden (2003:62),

"The most fundamental phenomenon in Bantu tonology is the mobility of H. Specifically, even though H may be initially associated with a certain mora, very often that H will be realized (a) not just on that mora, but on one or more other moras to its right (less often left), or (b) will not be realized on that mora, but rather on some other moras to its right (or left)."

In Liko, H-tone spreading is attested on verb forms. If one wants to mention direction, the TAM prefixal tone spreads to the right and the TAM final tone spreads to the left. Important is that only TAM-melody H tones spread and that they iteratively affect toneless syllables.

Non-automatic downstep, described in 4.6.5, is caused by a L tone which has been set afloat, by a floating L tone which is part of a morpheme, or by a L tone at several morphological boundaries.

It is interesting to compare manifestations of the OCP in Liko with those in Bantu tonology as mentioned by Kisseberth and Odden (2003:65). The first manifestation is "To block movement, so an H which should spread may fail to do so if the target is followed by an H TBU (independent of whether the TBU phonetically realizes the H)". The second one is repairing would-be violations. In Liko, the first manifestation is not attested. Repairing would-be violations, however, are reflected in the cases in which the second of two H tones across a morpheme boundary surfaces as a L tone. It has been shown in 4.6.6 that this repair strategy is limited to certain morphosyntactic environments. Merging adjacent primary H or L tones is a feature of the Liko tone system exemplified at several places in the analysis of tone rules in the language.

Surface realizations of LH are remarkable, because HL on one TBU does not occur in Liko. According to Kisseberth and Odden (2003:66), "falling tones are generally preferable to rising tones". In Liko, a surface LH tone can be caused by the phonetic effect of voiced obstruents on a following H tone, see 4.5. Some surface LH tones can be predictably derived from level tones, see 4.6.3. Kisseberth and Odden (2003:66) state that "There is a particularly strong tendency to avoid rising tones in Bantu. (...) Even phonetically induced rising tones may be eliminated." In multiple environments in Liko, one of the parts of a surface LH tone shifts away and merges with an adjacent identical tone, thereby avoiding a rising tone.

At the end of a tone phrase, the final H tone of a sequence of H tones is often realized at a lower pitch, e.g. a disyllabic direct object with High pattern surfaces with a high pitch on the first and a low pitch on the second TBU, e.g. *ná'kólá mémì* 1SG^P:1.O-untie-FV^P 1a.goat (*mémì* in isolation). This resembles nonfinality, which

"refers to a preference that the end of certain phonological structures not be realized on a H tone." (Kisseberth and Odden 2003:64).

(Kisseberth and Odden 2003:67) report on the influence of the penultimate syllable which is said to play a key role in Bantu tone, and on 'plateau forming': "Working at cross-purposes to the OCP, there is also a strategy of avoiding HØH sequences, which we refer to as the Plateau principle: avoid a valley between two peaks." (*ibid*:67). These two phenomena are not found in Liko.