

DOWNSTEP IN PÄRI:
THE TONE SYSTEM OF A WESTERN NILOTIC LANGUAGE*

Torben Andersen
University of Aalborg

Päri, a Western Nilotic language, has a terraced-level tone system with total downstep. Although Päri could be analyzed as having three basic tone levels and automatic downstep, there is morphological evidence that it has two basic tone levels and non-automatic downstep. Furthermore, there is evidence that downstep is the manifestation of a floating high tone. Floating tones thus behave differently from tones of deleted vowels. In spite of many surface differences between Päri and Luo, a related language, a single tone change accounts for their underlying differences.

1. Introduction

Päri is a Western Nilotic language spoken by some 10,000 people around Lafon Hill in the Torit District of Eastern Equatoria Province in the southern Sudan.¹ In Köhler's [1955] genetic classification, Päri belongs to the Northern Luo subbranch of Western Nilotic along with Shilluk among others. In this article, I describe and analyze the tonal system of Päri. This part of its phonology is ignored in Simeoni [1978], the first published source on

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¹The Päri, who are called Lokoro by some of their neighbours, call themselves /pàrí/, their language /dhí pàrí/ (lit. 'mouth of Päri'), and their mountain /lìpòol/. Päri is different from Bari, a neighbouring Eastern Nilotic language.

Päri.

The tonal system of Päri is less straightforward than for instance the discrete-level systems of the neighbouring Moru-Madi languages, which belong to the Central Sudanic language family (see Andersen [1986a, 1986b, 1987]). Because of the complexity and, it seems, unusual character of tone in Päri, I present my analysis step by step, starting with a phonetic level of representation in terms of relative pitch level values and ending up with an underlying level of representation that involves floating tones as well as segmentally unspecified tone-bearing vowels.

In section 2, I define the notion of relative pitch level value as applicable to Päri.

In section 3, I classify words into tonal classes in terms of their sequences of relative pitch level values in various tonal contexts while also taking into account their segmental and morphological structures. Furthermore, I identify key lowering and pitch raising as two contextually determined phenomena.

In section 4, I show that the phonetic facts introduced in section 3 can be accounted for by positing three basic tone levels and automatic downstep. However, this analysis is rejected because it implies that one of the three tones has a highly defective distribution.

In section 5, I demonstrate that the data are also compatible with an analysis using two basic tone levels and non-automatic downstep. This analysis is accepted because it simplifies the description of morphology.

In section 6, I demonstrate that additional pitch patterns can be accounted for by positing underlyingly unspecified vowels which are deleted unless deletion would result in an impermissible syllable structure. When such vowels are deleted, their tones are reassociated rather than set afloat, and when the vowels are not deleted, they get a default value.

In section 7, I show that floating high tones may be manifested as downsteps, and I propose that all downsteps should be analyzed as floating high tones. In this analysis, surface tones may violate the Obligatory Contour Principle, but I demonstrate that only exceptionally is this principle vio-

lated at the underlying level.

In section 8, finally, I show that although the surface tonology of Pări differs in many respects from that of Luo, a closely related language, one single tone change accounts for the underlying differences in the two languages' representation of cognate lexical items.

2. Relative Pitch Level Values

Pitch in Pări can be described abstractly in terms of a set of relative pitch level values. This set consists of (i) an ultra high pitch level [U] near the higher limit of the speaker's pitch range, (ii) an extra low pitch [E] near the lower limit, and (iii) a subset of perceptually equidistant pitch levels in the middle of the speaker's pitch range. The use of the latter subset is illustrated by the sentence in (1).

(1)	nɛɛn	kuura	kanjo		'look at the ball there!'
	see	ball	there		
				U	
				x-2	
		-		x-1	
	-			x	
		-	-	x+1	
				x+2	
				E	

This sentence contains five vowels, each of which carries a level pitch. By assigning the pitch of the first vowel the integer value x , the following pitches can be described as having the integer values $x-1$, $x+1$, x , and $x+1$. It should be noted that the absolute pitch level of a vowel with a given integer value is perceptually exactly the same as all other vowels with the same integer value within an utterance, at least if the utterance is whistled.

The two extreme pitch levels, U and E , are immediately identifiable. Under normal circumstances, they are used only in prepausal position and not utterance-initially. The ultra-high pitch U is of an intonational rather than tonal nature, occurring for instance at the end of yes/no-questions. Since it is not pertinent to the tonal system as such, it will not be fur-

ther dealt with in the present article.

In the next section, I use sentence (1) as one tonal frame for classifying nouns into tonal classes by substituting other nouns for /kuura/. By such substitutions, no pitch will get an integer value lower than $x-1$. Hence I stipulate that $x = 2$, whereby [1] will indicate the highest pitch level apart from [U], and [2,3,4,...] successively lower pitch levels.

Instead of a level pitch, a vowel may carry a contour pitch, which consists in a movement between two or more pitch levels in successively alternating directions. Contour pitches will be indicated by juxtaposing the digit values of the pitch levels in question, e.g. [1E] and [232]. A space or a hyphen between two pitch level values indicates that they belong to different vowels.

As we shall see later, a monosyllabic word which has pitch [2] in utterance-initial position, like /neen/ in (1), does not affect the relative value of the (first) level of the first pitch of a following word. Hence, when a word occurs utterance-initially, for instance as an isolated word, I will represent the (first) level of its first pitch with the same integer as when that word occurs after an utterance-initial monosyllabic word with pitch [2].

3. Tonal Word Classes

3.1. Segmental word structure. In general, the segmental structure of a Pärí word conforms to the following formula, in which optional segments are enclosed in parentheses:

(2) ((C)V-) C(w)V(V)C((C) -V)
 prefix stem suffix

Thus a word consists of at most three segmental morphs: a stem and, optionally, a prefix and a suffix. The stem consists of three parts: an initial, consonantal part with a single consonant /C/ or a /Cw/ cluster; a medial, vocalic part with a short monophthong /V/, a long monophthong /V₁V₁/, or a diphthong /V₁V₂/; a final, consonantal part with a single consonant /C/ or a cluster /CC/, the latter option being available only if the stem is

followed by a suffix.² A prefix consists of a short monophthong optionally preceded by a single consonant.³ A suffix consists of a short monophthong.⁴

In the following, I shall examine the pitch sequences carried by words that consist of either a stem alone or of a stem and a suffix. Words with a prefix will be accounted for in section 7. I shall mainly use nouns as examples, but verbs and other lexical word classes behave tonally in the same way as nouns.

3.2. Pitch patterns. Nouns can be categorized into tonal classes on the basis of the pitches they carry in a frame like the following:

(3) neen ____ 'look at ____!'
2

For nouns consisting of a stem and a suffix, the number of possible pitch sequences in frame (3) is 17. Displaying these sequences in a two-dimensional array in accordance with their two pitches results in a system that may seem extremely erratic:

(4)	1-1	2-1	12-1	
		2-12		
	1-1E	2-1E	12-1E	
	1-2	2-2		23-2
			12-23	23-23
				23-2E
				13-3
				13-3E
	1-E	2-E		

²Following the orthographic tradition of Western Nilotic languages, I use the digraphs /th dh nh/ as symbols for interdental stops and nasal, respectively. /tth/ symbolizes a geminate voiceless interdental stop, /nnh/ a geminate interdental nasal, and /ndh/ an interdental nasal plus an interdental voiced stop. Other deviations from IPA are /y/, which is a palatal glide, and /j/, which is a voiced palatal stop. For an analysis of the consonant system, see Andersen [1988a].

³In nouns, a prefix actually belongs to the stem morphologically, but phonologically it behaves as a separate entity.

⁴In nouns with the absolute case, suffix vowels have no specific function apart from indicating the difference between the singular and the plu-

At this point, however, it can be observed that there are no [4]'s, no initial [3]'s and no rising contour pitches. Moreover, it should be noted that some classes with a final contour pitch contain only inflected forms. The classes in (4) are exemplified in (5), where the following suffixes have a separate meaning as indicated in the translations: /-ɛ/ ~ /-e/ 'his, her, its', /-a/ 'my', /-ɪ/ ~ /-i/ 'your' (2S), /-ɔ/ ~ /-o/ 'our' (1PIN), /-ɪ/ ~ /-i/ 'this, these'.^{5,6}

(5) [1-1]	kib-o	'boat'	bar-a	'heifer'
	pal-a	'ochre'	ciɪr-ɪ	'whip'
[1-1E]	dhaanh-ɔ	'person'	beey-o	'mosquito'
	jamm-ɪ	'things'	pɔɔ-ɔ	'bark'
[1-2]	dhaag-ɔ	'woman'	baad-ɔ	'lake'
	roomb-ɔ	'sheep'	lweɛd-ɔ	'finger'
[1-E]	kuur-a	'ball'	keɛd-ɛ	'his thread'
	gub-a	'basket'	gumm-e	'his basket'
[2-1]	wɪp-ɔ	'bird'	ceer-o	'star'
	reey-o	'fish'	naam-ɔ	'river'
[2-12]	lakk-a	'my teeth'	pitt-i	'your children'
	tiend-a	'my legs'	boott-i	'your handles'

ral, a difference that is very often also indicated by the stem. Phonologically, however, these vowels behave like other suffix vowels.

⁵Päri has vowel harmony in terms of the feature [ATR] (= Advanced Tongue Root). Thus, affix vowels agree with the stem vowel with respect to this feature, except that affixal /a/, which is [-ATR], can cooccur with both [-ATR] and [+ATR] stem vowels.

⁶The following abbreviations are used in morpheme-by-morpheme translations:

1PEX/1PIN = first person plural exclusive/inclusive
 1S/2S/3S = first/second/third person singular
 2P/3P = second/third person plural

AG = antigenitive
 AP = antipassive
 BEN = benefactive
 C = completive
 CP = centripetal
 ERG = ergative
 FOC = focus

LOC = locative
 M = multiplicative
 P = plural
 PAS = passive
 S = singular
 SUP = suffix

[2-1E]	tɔŋg-ɔ ʔɔɔn-ɩ	'our egg' 'we' (1PIN)	deend-i rwadh-o	'this skin' 'our chief'
[2-2]	ŋeed-o joob-i	'rib' 'buffalo'	cɪŋ-ɔ cuodh-o	'hand' 'mud'
[2-E]	pal-a reemb-o	'knife' 'expert'	pɔnd-ɔ mar-u	'boy' 'tortoise'
[12-1]	ɲuunn-o luub-o	'louse' 'word'	konnh-o larr-o	'seed' 'vein'
[12-1E]	rɔɔmm-ɔ konnh-i	'our sheep' 'this seed'	dhaannh-ɩ pall-ɔ	'this person' 'our ochre'
[12-23]	kɛɛtt-a kiicc-a	'my threads' 'my sacks'	jwaand-a bekk-a	'my small huts' 'my bags'
[13-3]	kɛɛd-a caann-a	'my thread' 'my watch'	kiiy-a gumm-a	'my sack' 'my basket'
[13-3E]	kɛɛd-ɔ gumm-i	'our thread' 'this basket'	kɛɛd-ɩ gumm-o	'this thread' 'our basket'
[23-2]	bub-a paaj-ɔ	'waterbuck' 'home'	lɔŋŋ-ɔ maal-ɔ	'fly' 'sky'
[23-23]	ɲɔŋ-e cookk-a	'crocodiles' 'my sisters'	ʔitth-i kwarr-e	'your ears' 'grandfathers'
[23-2E]	pall-ɔ kɛɛnnh-ɩ	'our knife' 'this bile'	buorr-a ʔitth-i	'kind of yard' 'these ears'

For words consisting of only a stem, at least the following eight pitches are possible:

(6)	1	(13)	1E		
	2	(21)	2E	(21E)	(232)

However, words carrying one of the four pitches that are enclosed in parentheses in (6) must be analyzed as having a suffix underlyingly (cf. section 6 below). The other four classes are exemplified in (7).

(7)	[1]	tɔŋ lɛɛp	'spear' 'tongue'	laac nim	'urine' 'face'
	[1E]	kɛɛt cuk	'thread' 'market'	jwaan warr	'small hut' 'night'
	[2]	guok lɛɛc	'dog' 'elephant'	bat buul	'arm' 'drum'
	[2E]	kɔɔy dak	'gourd' 'pot'	gwan jow	'wild-cat' 'people'

Whenever I cite a word without indicating its context, its pitch pattern will be understood to be that of frame (3) or of a similar frame in which the word occurs in prepausal position after an utterance-initial monosyllabic word with pitch [2]. These pitch patterns will also be used for naming the tonal word classes.

3.3. Key lowering and pitch raising. The pitches that words carry in frame (3) above may undergo changes in other tonal contexts. The contextual variation can be examined by comparing the pitches of each of the 21 tonal word classes in each of the following four sentences used as tonal frames:

- (8) I. nɛɛn ____ 'look at ____!' (= (3))
 2
 see
- II. nɛɛn ____ kɔɲɔ 'look at ____ there!'
 2 1 2
 see there
- III. a-nɛɛnd-a ____ 'I'm looking at ____'
 1 1 1
 1S-see+M-FOC
- IV. a-nɛɛnd-a ____ kɔɲɔ 'I'm looking at ____ there'
 1 1 1 1 2
 1S-see+M-FOC there

In Frames I and III, the word occurs in prepausal position after pitches [2] and [1], respectively. In Frames II and IV, the word is again preceded by pitch [2] or [1], but occurs in non-prepausal position before the word /kɔɲɔ/, which has the pitches [1-2] in isolation. Table 1 shows the pitch sequences carried by the four sentences when they contain a noun of each of the 21 tonal classes. From the pitch level values of /kɔɲɔ/, it can be inferred that some of the tonal word classes induce key lowering. Thus Pärí is a terraced-level tone language. Moreover, some of the classes that induce key lowering may be subjected to pitch raising, as can be seen by comparing Frames I-II with Frames III-IV.

In addition to the 17 tonal classes of disyllabic words mentioned already, there is one that cannot occur in the frames in (8). When not sub-

Table 1. Contextual pitch variation

			tonal frames				key lowering	pitch raising
			I neen __ 'look at __!'	II neen __ kanjo 'look at __ there!'	III aneenda __ 'I am looking at __'	IV aneenda __ kanjo 'I am looking at __ there'		
t o n a l w o r d c l a s s e s	ton	'spear'	2 1	2 1 1-2	1-1-1 1	1-1-1 1 1-2	-	-
	kib-o	'boat'	2 1-1	2 1-1 1-2	1-1-1 1-1	1-1-1 1-1 1-2		
	dhaag-o	'woman'	2 1-2	2 1-2 1-2	1-1-1 1-2	1-1-1 1-2 1-2		
	guok	'dog'	2 2	2 2 1-2	1-1-1 2	1-1-1 2 1-2		
	wip-o	'bird'	2 2-1	2 2-1 1-2	1-1-1 2-1	1-1-1 2-1 1-2		
	need-o	'rib'	2 2-2	2 2-2 1-2	1-1-1 2-2	1-1-1 2-2 1-2		
	lakk-a	'my teeth'	2 2-12	2 2-12 1-2	1-1-1 2-12	1-1-1 2-12 1-2		
	puunn-o	'louse'	2 12-1	2 12-1 1-2	1-1-1 12-1	1-1-1 12-1 1-2		
	keet	'thread'	2 1E	2 1 2-3	1-1-1 1E	1-1-1 1 2-3	+	-
	keed-a	'my thread'	2 13-3	2 13-3 3-4 ~ 2 12-2 2-3	1-1-1 13-3	1-1-1 13-3 3-4 ~ 1-1-1 12-2 2-3		
	kuur-a	'ball'	2 1-E	2 1-3 2-3	1-1-1 1-E	1-1-1 1-3 2-3		
	keett-a	'my threads'	2 12-23	2 12-23 2-3	1-1-1 12-23	1-1-1 12-23 2-3		
	dhaanh-o	'person'	2 1-1E	2 1-1 2-3	1-1-1 1-1E	1-1-1 1-1 2-3		
	tong-o	'our egg'	2 2-1E	2 2-1 2-3	1-1-1 2-1E	1-1-1 2-1 2-3		
	roomm-o	'our sheep'	2 12-1E	2 12-1 2-3	1-1-1 12-1E	1-1-1 12-1 2-3		
	keed-o	'our thread'	2 13-3E	2 13-3 4-5 ~ 2 12-2 3-4	1-1-1 13-3E	1-1-1 13-3 4-5 ~ 1-1-1 12-2 3-4		
	kooy	'gourd'	2 2E	2 23 2-3	1-1-1 1E	1-1-1 1 2-3	+	+
	bub-a	'waterbuck'	2 23-2	2 23-2 2-3	1-1-1 13-3	1-1-1 13-3 3-4 ~ 1-1-1 12-2 2-3		
	pal-a	'knife'	2 2-E	2 2-3 2-3	1-1-1 1-E	1-1-1 1-3 2-3		
	paη-e	'crocodiles'	2 23-23	2 23-23 2-3	-1-1 12-23	1-1-1 12-23 2-3		
	pall-o	'our knife'	2 23-2E	2 23-2 3-4	1-1-1 13-3E	1-1-1 13-3 4-5 ~ 1-1-1 12-2 3-4		

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jected to key lowering, it has pitches [12-12] as in the following example:⁷

- (9) a-nɛɛn pʌʌ||-e 'the python saw him'
 1 2 12 12
 C-see python-ERG

This class does not induce key lowering, nor can it undergo pitch raising.

In the two following sections, I propose and discuss two different analyses of the phonetic facts presented in this section. The analyses differ on the number of basic tone levels posited and on how key lowering is accounted for.

4. Three Tones and Automatic Downstep

In Frame I of (8), there is a binary pitch level contrast in some environments, for instance a contrast between [1] and [2] in words without a suffix:

- (10) tɔŋ [1] 'spear'
 guok [2] 'dog'

or a contrast between [3] and [E] in the contour pitches [23] and [2E] of suffixes after stems with [23]:

- (11) pʌŋ-e [23-23] 'crocodiles'
 pall-ɔ [23-2E] 'our knife'

But there are also instances of a ternary contrast, viz. between [1], [2] and [E] in suffixes after stems with [1]:

- (12) kib-o [1-1] 'boat'
 dhaag-ɔ [1-2] 'woman'
 kuur-a [1-E] 'ball'

and after stems with [2]:

- (13) wɪp-ɔ [2-1] 'bird'

⁷Päri is an ergative language, hence the terms "ergative (case)", "absolutive (case)", and "antipassive", cf. Andersen [1988b].

need-o [2-2] 'rib'
 pal-a [2-E] 'knife'

In no environment are there more than three contrasting pitch levels. This might be taken to indicate that what we are dealing with is a three-tone system. In the following, I shall refer to the three tones of such a system as H(igh), M(id), and L(ow).

Let us assume that the register values of H, M and L are [1], [2] and [3], respectively. In this way, we can take [1] and [2] to represent H and M in words whose pitch patterns consist of only [1]'s and/or [2]'s when they occur in Frame I:

- | | | | | | | |
|---------|---------|------------|-----|------|---------|--------|
| (14) a. | tɔŋ | 'spear' | a'. | nɛɛn | tɔŋ | kanjɔ |
| | 1 | | | 2 | 1 | 1 2 |
| | H | | | M | H | H M |
| b. | guok | 'dog' | b'. | nɛɛn | guok | kanjɔ |
| | 2 | | | 2 | 2 | 1 2 |
| | M | | | M | M | H M |
| c. | kib-o | 'boat' | c'. | nɛɛn | kib-o | kanjɔ |
| | 1 1 | | | 2 | 1 1 | 1 2 |
| | H H | | | M | H H | H M |
| d. | dhaag-ɔ | 'woman' | d'. | nɛɛn | dhaag-ɔ | kanj-ɔ |
| | 1 2 | | | 2 | 1 2 | 1 2 |
| | H M | | | M | H M | H M |
| e. | wɪŋ-ɔ | 'bird' | e'. | nɛɛn | wɪŋ-ɔ | kanjɔ |
| | 2 1 | | | 2 | 2 1 | 1 2 |
| | M H | | | M | M H | H M |
| f. | lakk-a | 'my teeth' | f'. | nɛɛn | lakk-a | kanjɔ |
| | 2 12 | | | 2 | 2 12 | 1 2 |
| | M HM | | | M | M HM | H M |
| g. | need-o | 'rib' | g'. | nɛɛn | need-o | kanjɔ |
| | 2 2 | | | 2 | 2 2 | 1 2 |
| | M M | | | M | M M | H M |
| h. | puunn-o | 'louse' | h'. | nɛɛn | puunn-o | kanjɔ |
| | 12 1 | | | 1 | 12 1 | 1 2 |
| | HM H | | | M | HM H | H M |

The sentences in the right column of (14) show the same words in Frame II, /neɛn __ kanjo/ 'look at __ there!', where they have the same pitches.

In words that have the pitch patterns [2E], [1-E], and [2-E] in Frame I, [E] is replaced by [3] in non-prepausal position. Moreover, the key of what follows such words is lowered by one pitch level, as shown by the fact that /kanjo/ 'there' has pitches [2-3] instead of [1-2] in the sentences in (15).

(15) a.	koɔy	'gourd'	a'.	neɛn koɔy kanjo	
	2E			2 23 2 3	
	ME	(L-lowering)		M ML! H M	(!-insertion)
	ML!	(!-insertion)		M ML H M	
	ML				
b.	kuur-a	'ball'	b'.	neɛn kuur-a kanjo	
	1 E			2 1 3 2 3	
	H E	(L-lowering)		M H L! H M	(!-insertion)
	H L!	(!-insertion)		M H L H M	
	H L				
c.	pal-a	'knife'	c'.	neɛn pal-a kanjo	
	2 E			2 2 3 2 3	
	M E	(L-lowering)		M M L! H M	(!-insertion)
	M L!	(!-insertion)		M M L H M	
	M L				

Given the assumption that L has the register value [3], these words can be analyzed as ending in L. Downstep (!) and [E] can then be accounted for by the following rules:⁸

(16) !-insertion
 $\emptyset \rightarrow ! / L_$

(17) L-lowering
 $L! \rightarrow E / __\|$

Rule (16) inserts a downstep after a low tone, and rule (17) lowers a low tone to an extra low tone utterance-finally.

Words that end in [1E] prepausally (Frame I) end in [1] non-prepausally

⁸In tone rules, "[_W " and " _W]" are boundaries of the unit that includes a stem and a suffix (if there is any) but not a prefix. "||" is an utterance boundary, and "T" is any tone.

(Frame II), and the key of what follows is lowered by one level:

(18) a.	kɛɛt	'thread'	a'.	neen kɛɛt kanjo
	1E			2 1 2 3
	HE	(L-lowering)		M H! H M (HL-simpl.)
	HL!	(!-insertion)		M HL! H M (!-insertion)
	HL			M HL H M
b.	dhaanh-ɔ	'person'	b'.	neen dhaanh-ɔ kanjo
	1 1E			2 1 1 2 3
	H HE	(L-lowering)		M H H! H M (HL-simpl.)
	H HL!	(!-insertion)		M H HL! H M (!-insertion)
	H HL			M H HL H M
c.	tong-ɔ	'our egg'	c'.	neen tong-ɔ kanjo
	2 1E			2 2 1 2 3
	M HE	(L-lowering)		M M H! H M (HL-simpl.)
	M HL!	(!-insertion)		M M HL! H M (!-insertion)
	M HL			M M HL H M
d.	roomm-ɔ	'our sheep'	d'.	neen roomm-ɔ kanjo
	12 1E			2 12 1 2 3
	HM HE	(L-lowering)		M HM H! H M (HL-simpl.)
	HM HL!	(!-insertion)		M HM HL! H M (!-insertion)
	HM HL			M HM HL H M

Pitch [1E] of these words can be analyzed as the manifestation of HL, the rule of L-lowering accounting for the extra low pitch component. But in order to account for the non-prepausal variant of [1E], we have to posit a rule which simplifies HL to H subsequent to !-insertion:

(19) HL-simplification

$$\widehat{HL} \rightarrow H / \text{---!}_W] T$$

In words with the pitch patterns [23-2], [23-23] and [23-2E] in Frame I, the stem pitch [23] must be analyzed as ML. From the rule of !-insertion (16), it follows that there is downstep after the stem of these words. Hence pitch level value [2] of their suffixes must be a manifestation of H. This analysis is confirmed by the fact that a following word shows key lowering:

- (20) a. bub-a 'waterbuck' a'. neen bub-a kanjo
 23 2 2 23 2 2 3
 ML! H (!-insertion) M ML! H H M (!-insertion)
 ML H M ML H H M
- b. paŋ-e 'crocodiles' b'. neen paŋ-e kanjo
 23 23 2 23 23 2 3
 ML! HM (!-insertion) M ML! HM H M (!-insertion)
 ML HM M ML HM H M
- c. pall-o 'our knife' c'. neen pall-o kanjo
 23 2E 2 23 2 3 4
 ML! HE (L-lowering) M ML! H! H M (HL-simpl.)
 ML! HL! (!-insertion) M ML! HL! H M (!-insertion)
 ML HL M ML HL H M

In (20c'), the key of /kanjo/ is lowered by two levels from [1-2] to [3-4]. This is due to the double downstep in the preceding word, where the underlying L in the suffix causes the second downstep.

Before analyzing the remaining three classes ([12-23], [13-3], and [13-3E]), let us consider the sentences in (21), which show five classes in Frame III, /a-neend-a ___/ 'I am looking at ___'. The sentences illustrate the fact that these five classes (and only these) change their pitch patterns after H:

- (21) a. kooy 'gourd' a'. a-neend-a kooy
 2E 1 1 1 1E
 ME (L-lowering) H H H HE (L-lowering)
 ML! (!-insertion) H H H HL! (!-insertion)
 ML H H H HL (M-raising)
 H H H ML
- b. pal-a 'knife' b'. a-neend-a pal-a
 2 E 1 1 1 1 E
 M E (L-lowering) H H H H E (L-lowering)
 M L! (!-insertion) H H H H L! (!-insertion)
 M L H H H H L (M-raising)
 H H H M L
- c. bub-a 'waterbuck' c'. a-neend-a bub -a
 23 2 1 1 1 13 3
 ML! H (!-insertion) H H H HL!! H (Extra !-insert.)
 ML H H H H HL! H (!-insertion)
 H H H HL H (M-raising)
 H H H ML H

d.	paŋ-e	'crocodiles'	d'.	a-neend-a paŋ -e	
	23 23			1 1 1 12 23	
	ML! HM	(!-insertion)		H H H HM! HM	(L-raising)
	ML HM			H H H HL!! HM	(Extra !-insertion)
				H H H HL! HM	(!-insertion)
				H H H HL HM	(M-raising)
				H H H ML HM	
e.	pall-ɔ	'our knife'	e'.	a-neend-a pall-ɔ	
	23 2E			1 1 1 13 3E	
	ML! HE	(L-lowering)		H H H HL!! HE	(L-lowering)
	ML! HL!	(!-insertion)		H H H HL!! HL!	(Extra !-insert.)
	ML HL			H H H HL! HL!	(!-insertion)
				H H H HL HL	(M-raising)
				H H H ML HL	

Common to the five classes in (21), and what distinguishes them from all other classes, is that they begin with a mid tone which is followed by a low tone. Common to the changes that occur is that the mid tone becomes a high tone. Hence we can formulate the following rule:

(22) M-raising

$$M \rightarrow H / H \left[\begin{smallmatrix} \text{W} \\ \text{---} \end{smallmatrix} L \right]$$

This rule accounts exhaustively for the change of [2E] to [1E] in (21a') and for the change of [2-E] to [1-E] in (21b'). In order to account for the change of [23-2] to [13-3] in (21c') and for the change of [23-2E] to [13-3E] in (21e'), we have to posit an additional rule which inserts an extra downstep before the suffix:

(23) Extra !-insertion

$$\emptyset \rightarrow ! / \left[\begin{smallmatrix} \text{W} \\ \text{HL!} \end{smallmatrix} \text{---} H \right]$$

This rule can also be taken to apply to class [23-23], which ultimately surfaces with [12-23] when subjected to M-raising in (21d'). In that case we need one more additional rule, which changes L to M before a double downstep and removes one of the downsteps. If the other two classes that undergo Extra !-insertion are not utterance-final, such a rule also applies optionally to them, cf. the variants in Table 1 above. The rule can therefore be formulated as follows:

(24) L-raising

$$\widehat{HL!} \rightarrow \widehat{HM} / \left\{ \begin{array}{l} [{}_W \text{ — } !\widehat{HM}] \\ [{}_W \text{ — } !H(!)] \text{ T , optionally} \end{array} \right\}$$

Note that M-raising together with the subsequent rules has the side effect of neutralizing the contrast between the five classes in question and five other classes: [2E] merges with [1E], [2-E] with [1-E], [23-2] with [13-3], [23-23] with [12-23], and [23-2E] with [13-3E]. This fact solves the problem of how to analyze classes [13-3], [12-23] and [13-3E]. Their underlying representation must be identical with the representation of classes [23-2], [23-23] and [23-2E], respectively, after M-raising but before the application of subsequent rules:

- (25) a. keed-a 'my thread' a'. neen keed-a kanjo
 13 3 2 13 3 3 4
 HL!! H (Extra !-ins.) M HL!! H H M (Extra !-ins.)
 HL! H (!-insertion) M HL! H H M (!-insertion)
 HL H M HL H H M
- b. keett-a 'my threads' b'. neen keett-a kanjo
 12 23 2 12 23 2 3
 HM! HM (L-raising) M HM! HM H M (L-raising)
 HL!! HM (Extra !-ins.) M HL!! HM H M (Extra !-ins.)
 HL! HM (!-insertion) M HL! HM H M (!-insertion)
 HL HM M HL HM H M
- c. keed-o 'our thread' c'. neen keed-o kanjo
 13 3E 2 13 3 4 5
 HL!! HE (L-lowering) M HL!! H! H M (Extra !-ins.)
 HL!! HL! (Extra !-ins.) M HL! H! H M (HL-simpl.)
 HL! HL! (!-insertion) M HL! HL! H M (!-insertion)
 HL HL M HL HL H M

In the three-tone analysis, downstep is predictable from the underlying representation. Basically, it occurs after Low before High or Mid, as exemplified by the following derivations:

- (26) wɪnɔ pɔndɔ a-neen-e 'the bird saw the boy'
- | | | | | | | | |
|-------------|------|-----|---|-------|----|---|---|
| Underlying | M | H | M | L | H | M | H |
| M-raising | M | H | H | L | H | M | H |
| !-insertion | M | H | H | L! | H | M | H |
| Pitches | 2 | 1 | 1 | 3 | 2 | 3 | 2 |
| | bird | boy | | C-see | 3S | | |

(27)	pɔndɔ	wɪɔ	a-nɛɛn-ɛ	'the boy saw the bird'		
Underlying	M	L	M H H	M	H	
!-insertion	M	L!	M H H	M	H	
Pitches	2	3	3 2 2	3	2	
	boy	bird	C-see-3S			

Thus we are dealing with "automatic downstep", which is also known as "down-drift".

Although the three-tone analysis works, it is not necessarily adequate. One problem is the defective distribution of Low, which can be observed in Table 2 (next page). While both High and Mid have a fairly unrestricted distribution, Low does not occur on stem vowels except as the second component of a composite tone. Low can occur on its own on a suffix vowel, but not after a composite tone on the stem vowel. Furthermore, a composite stem tone with Low is excluded before a suffix with Mid, and Low does not occur in a composite tone with Mid on suffix vowels. Thus the status of Low as an underlying tone would seem to be rather dubious.

5. Two Tones and Non-automatic Downstep

In view of the distributional oddities of the tones in the three-tone analysis, I shall now propose an alternative analysis. I shall demonstrate that the pitch value representations can be derived from a tonal level of representation which uses two tones and downstep. The two tones will be referred to as H(igh) and L(ow), and they will be assigned the register values [1] and [2], respectively. As in the three-tone analysis, a downstep lowers the key by one pitch level. The starting point will be the non-prepausal rather than the prepausal pitch value manifestations of the tonal word classes. Whenever possible, I shall be using the sentence /nɛɛn __ kanjɔ/ 'look at __ there!' as a tonal frame.

5.1. Non-prepausal pitches. In words that do not induce key lowering, the pitches [1], [2] and [12] can straightforwardly be analyzed as High, Low, and High-Low, respectively:

Table 2. Distribution of underlying tones in the tree-tone analysis

<div> <div>suf-</div> <div>fix</div> <div>stem</div> </div>	nil	H	M	L	HM	HL	ML
H	tɔŋ 1 'spear'	kib-o 1 1 'boat'	dhaag-o 1 2 'woman'	kuur-a 1 E 'ball'	—	dhaanh-o 1 1E 'person'	—
M	guok 2 'dog'	wɪŋ-o 2 1 'bird'	ŋeed-o 2 2 'rib'	pal-a 2 E 'knife'	lakk-a 2 12 'my teeth'	tɔŋg-o 2 1E 'our egg'	—
L	—	—	—	—	—	—	—
HM	—	puunn-o 12 1 'louse'	—	—	paall-e 12 12 'python' (ERG)	ɾɔɔmm-o 12 1E 'our sheep'	—
HL	keet 1E 'thread'	keed-a 13 3 'my thread'	—	—	keett-a 12 23 'my threads'	keed-o 13 3E 'our thread'	—
ML	kɔɔy 2E 'gourd'	bub-a 23 2 'waterbuck'	—	—	naŋ-e 23 23 'crocodiles'	paall-o 23 2E 'our knife'	—

(28) a.	nēen tɔŋ kaŋɔ	a'.	tɔŋ	'spear'
	2 1 1 2		1	
	L H H L			
b.	nēen guok kaŋɔ	b'.	guok	'dog'
	2 2 1 2		2	
	L L H L			
c.	nēen kib-o kaŋɔ	c'.	kib-o	'boat'
	2 1 1 1 2		1 1	
	L H H H L			
d.	nēen dhaag-o kaŋɔ	d'.	dhaag-o	'woman'
	2 1 2 1 2		1 2	
	L H L H L			
e.	nēen wɪŋ-o kaŋɔ	e'.	wɪŋ-o	'bird'
	2 2 1 1 2		2 1	
	L L H H L			
f.	nēen lak-k-a kaŋɔ	f'.	lak-k-a	'my teeth'
	2 2 12 1 2		2 12	
	L L HL H L			
g.	nēen ŋeed-o kaŋɔ	g'.	ŋeed-o	'rib'
	2 2 2 1 2		2 2	
	L L L H L			
h.	nēen puunn-o kaŋɔ	h'.	puunn-o	'louse'
	2 12 1 1 2		12 1	
	L HL H H L			

This also applies to words with the pitch sequence [12-12]:

(29)	a-nēen pʌʌll-e	'the python saw him'
	1 2 12 12	
	H L HL HL	
	C-see python-ERG	

The pitch sequence [2-3] can be accounted for by positing a downstep word-medially after Low:

(30)	nēen pal-a kaŋɔ	(30')	pal-a	'knife'
	2 2 3 2 3		2 E	
	L L! L H L			

Similarly, the pitch sequences [23], [23-2] and [23-23] can be accounted for

by positing a downstep between the two components of the stem tone, both of which are now analyzed as Low:

(31) a.	nɛɛn kɔɔy kɔɔjɔ	a'. kɔɔy	'gourd'
	2 23 2 3	2E	
	L L!L H L		
b.	nɛɛn bub-a kɔɔjɔ	b'. bub-a	'waterbuck'
	2 23 2 2 3	23 2	
	L L!L H H L		
c.	nɛɛn ɲaŋ-e kɔɔjɔ	c'. ɲaŋ-e	'crocodiles'
	2 23 23 2 3	23 23	
	L L!L HL H L		

The derivations in (32) illustrate how the pitch value representation of (31a) is arrived at in different ways with the three-tone analysis and the two-tone analysis:

(32)	3-tone analysis	2-tone analysis
	nɛɛn kɔɔy kɔɔjɔ	nɛɛn kɔɔy kɔɔjɔ
Underlying	M ML H M	L L!L H L
!-insertion	!	
Surface	M ML! H M	L L!L H L
Register values	2 23! 1 2	2 2!2 1 2
Key lowering	<u>1 1</u>	<u>1 1 1</u>
Pitches	2 23 2 3	2 2 3 2 3

Downstep must also be posited after High in some tonal word classes, either word-finally as in (33), or word-medially as in (34).

(33) a.	nɛɛn kɛɛt kɔɔjɔ	a'. kɛɛt	'thread'
	2 1 2 3	1E	
	L H! H L		
b.	nɛɛn dhaanh-ɔ kɔɔjɔ	b'. dhaanh-ɔ	'person'
	2 1 1 2 3	1 1E	
	L H H! H L		
c.	nɛɛn tɔŋg-ɔ kɔɔjɔ	c'. tɔŋg-ɔ	'our egg'
	2 2 1 2 3	2 1E	
	L L H! H L		

- | | | | | | | |
|----|--------------|-------|----|-----|---------|-------------|
| d. | neen roomm-ɔ | kanjo | | d'. | roomm-ɔ | 'our sheep' |
| | 2 | 12 | 1 | 2 | 3 | |
| | L | HL | H! | H | L | |
-
- | | | | | | |
|------|-------------|-------|-------|--------|--------|
| (34) | neen kuur-a | kanjo | (34') | kuur-a | 'ball' |
| | 2 | 1 | 3 | 2 | 3 |
| | L | H! | L | H | L |

Two downsteps must be posited in words that have the pitch sequence [23-2E] in isolation, one word-medially and another word-finally:

- | | | | | | |
|------|-------------|-------|-------|--------|-------------|
| (35) | neen pall-ɔ | kanjo | (35') | pall-ɔ | 'our knife' |
| | 2 | 23 | 2 | 3 | 4 |
| | L | L!L | H! | H | L |

As in developing the three-tone analysis, we are now left with the three tonal word classes that have the pitch patterns [13-3], [13-3E], and [12-23] in isolation. Using the elements H, L, and !, their pitch patterns could be analyzed in more than one way each. For instance, [13-3] could be analyzed as either H!L!-H or H!!H-H. In order to make non-arbitrary choices among the possibilities, again we first have to consider the effects of pitch raising.

The five classes that can undergo pitch raising do so when they follow a high tone, and what distinguishes them from all other classes is that they begin with a low tone followed by downstep. The ultimate effect of pitch raising is not the same for all of the five classes, but common to the effect in all five classes is that the initial low tone is raised to a high tone. These generalizations are expressed by the following rule:

(36) L-raising

$$L \rightarrow H / H [{}_W \text{ ---}]!$$

The effect of L-raising (and subsequent rules to be introduced below) is shown by the derivations in (37), 'I am looking at ___ there' (Frame IV).

- | | | | | | | |
|---------|-----------|------|-------|-----|------|---------|
| (37) a. | a-neend-a | kɔɔy | kanjo | a'. | kɔɔy | 'gourd' |
| | 1 | 1 | 1 | 1 | 2 | 3 |
| | H | H | H | H! | H | L |
| | H | H | H | H!L | H | L |
| | H | H | H | L!L | H | L |
- (H!L-simpl.)
(L-raising)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>b. a-neend-a pal-a kanjo
 1 1 1 1 3 2 3
 H H H H! L H L (L-raising)
 H H H L! L H L</p> | <p>b'. pal-a 'our knife'
 2 E</p> |
| <p>c. a-neend-a bub -a kanjo
 1 1 1 13 3 3 4
 H H H H!L! H H L (Extra !-ins.)
 H H H H!L H H L (L-raising)
 H H H L!L H H L</p> | <p>c'. bub-a 'waterbuck'
 23 2</p> |
| <p>d. a-neend-a naŋ -e kanjo
 1 1 1 12 23 2 3
 H H H HL! HL H L (H!L!-simpl.)
 H H H H!L! HL H L (Extra !-ins.)
 H H H H!L HL H L (L-raising)
 H H H L!L HL H L</p> | <p>d'. naŋ-e 'crocodiles'
 23 23</p> |
| <p>e. a-neend-a pall-o kanjo
 1 1 1 13 3 4 5
 H H H H!L! H! H L (Extra !-ins.)
 H H H H!L H! H L (L-raising)
 H H H L!L H! H L</p> | <p>e'. pall-o 'our knife'
 23 2E</p> |

When L-raising is applied to L!L in (37a), the result is H!L, whose pitch would be [13]. The actual pitch, however, is [1], so the surface tone must be H!. Therefore we have to posit a rule that simplifies H!L to H! non-prepausally subsequent to L-raising:

(38) H!L-simplification

$$\widehat{H!L} \rightarrow H! / \text{---}_W] T$$

Another rule is needed to account for the ultimate effect of L-raising applied to the words with L!L-H and L!L-H! in (37c) and (37e), since these words surface [13-3] rather than [13-2]. Given that the suffix tones remain H and H!, respectively, we need a rule that inserts a downstep before a high suffix tone subsequent to L-raising:

(39) Extra !-insertion

$$\emptyset \rightarrow ! / [_W \widehat{H!L} \text{---} H$$

This rule also accounts for L!L-HL in (37d), which surfaces [12-23], pro-

vided that its output is subjected to a rule that deletes the downstep in H!L:

(40) H!L!-simplification

$$\widehat{H!L!} \rightarrow \widehat{HL!} / [_W \text{ --- } \widehat{HL}]$$

Since the five L-raised classes merge with five other classes, we can infer that the underlying representation of the latter is identical with the representation of the former after L-raising but before subsequent rules:

(41) a. neen keet kapjo
 2 1 2 3
 L H! H L (H!L-simpl.)
 L H!L H L

a'. keet 'thread'
 1E

b. neen kuur-a kapjo
 2 1 3 2 3
 L H! L H L

b'. kuur-a 'ball'
 1 E

c. neen keed-a kapjo
 2 13 3 3 4
 L H!L! H H L (Extra !-ins.)
 L H!L H H L

c'. keed-a 'my thread'
 13 3

d. neen keett-a kapjo
 2 12 23 2 3
 L HL! HL H L (H!L!-simpl)
 L H!L! HL H L (Extra !-ins.)
 L H!L HL H L

d'. keett-a 'my threads'
 12 23

e. neen keed-o kapjo
 2 13 3 4 5
 L H!L! H! H L (Extra !-ins.)
 L H!L H! H L

e'. keed-o 'our thread'
 13 3E

Hence we have solved the above-mentioned problem of choosing among alternative surface representations of classes [13-3], [12-23] and [13-3E] in a non-arbitrary way. Their surface tone patterns are H!L!-H, HL!-HL and H!L!-H! , respectively, as shown by derivations (41c-e).

5.2. Prepausal pitches. By now, I have shown that it is possible to analyze all non-prepausal pitches in terms of the three elements H, L and !. What remains to be accounted for is the extra low pitch [E], which occurs prepaus-

ally only. Given the underlying representations arrived at so far, [E] could be described as the prepausal manifestation of two different tonal configurations: (i) a downstepped low tone, as in (42a), and (ii) a downstep, as in (42b).

- (42) a. kuur-a H!-L → H-E [1-E] 'ball'
 b. dhaanh-ɔ H-H! → H-HE [1-1E] 'person'

However, such an account would miss a possible generalization. Note that in the set of underlying tone patterns arrived at above, a word-final downstep occurs only after a suffixal high tone. But given the rule of H!L-simplification (38), which is independently motivated, suffixal H! can be conceived of as derived from H!L. Hence all instances of the extra low pitch level [E] can be derived from a downstepped low tone:

- (43) L-lowering
 !L → E / — W] ||

5.3. Stems with downstep. In the set of underlying tone patterns arrived at so far, downstep occurs in four tonal configurations in stems: H!L, L!L, H!, L!. However, there is morphological evidence that these four configurations should be reduced to two underlyingly.

Consider for instance the tonal behaviour of antigenitive noun stems.⁹ Such stems are always followed by a suffix, for instance a possessive person-number suffix as in (44)-(48). There are five tonal classes of antigenitive stems: H-, L- and HL-stems, and what may be referred to as H!L- and L!L-stems. While HL-stems can only be singular, the others can be either singular or plural. In the following examples, the tone symbols indicate non-

⁹In Pāri, the possessor of a possessive construction has the absolutive case and is thus morphologically unmarked while the possessed is morphologically marked (cf. section 6.1 below). For the case form of the possessed, I propose the term "antigenitive" on the analogy of "antipassive". The corresponding case form in other Western Nilotic languages has variously been referred to as "genitive" (Kohnen [1933:28], Okoth-Okombo [1982:32]), "appertentive" (Gregersen [1961:83]), and "status constructus" (Tucker and Bryan [1966:417]).

prepausal surface tones, while the pitch symbols indicate prepausal pitches of Frame 1.

(44)	H-stems:	singular			plural		
		'stone'			'fish'		
	1S	kitt-a	H-L	[1-2]	ricc-a	H-L	[1-2]
	3S	kitt-e	H-L	[1-2]	ricc-ε	H-H	[1-1]
	1PIN	kitt-o	H-H!	[1-1E]	ricc-ɔ	H-H!	[1-1E]
	2P	kitt-u	H-H	[1-1]	ricc-ə	H-H	[1-1]
(45)	L-stems:	singular			plural		
		'buffalo'			'teeth'		
	1S	joopp-a	L-H	[2-1]	lakk-a	L-HL	[2-12]
	3S	joopp-e	L-L	[2-2]	lakk-ε	L-H	[2-1]
	1PIN	joopp-o	L-H!	[2-1E]	lakk-ɔ	L-H!	[2-1E]
	2P	joopp-u	L-H	[2-1]	lakk-ə	L-H	[2-1]
(46)	HL-stems:	singular					
		'sheep'					
	1S	roomm-a	HL-H	[12-1]			
	3S	roomm-ε	H-L	[1-2]			
	1PIN	roomm-ɔ	HL-H!	[12-1E]			
	2P	roomm-ə	HL-H	[12-1]			
(47)	H!L-stems:	singular			plural		
		'basket'			'guinea-fowls'		
	1S	gumm-a	H!L!-H	[13-3]	a-weend-a	L-HL!-HL	[2-12-23]
	3S	gumm-e	H!-L	[1-E]	a-weend-ε	L-H!L!-H	[2-13-3]
	1PIN	gumm-o	H!L!-H!	[13-3E]	a-weend-ɔ	L-H!L!-H!	[2-13-3E]
	2P	gumm-u	H!L!-H	[13-3]	a-weend-u	L-H!L!-H	[2-13-3]
(48)	L!L-stems:	singular			plural		
		'knife'			'shields'		
	1S	pall-a	L!L-H	[23-2]	koott-a	L!L-HL	[23-23]
	3S	pall-ε	L!-L	[2-E]	koott-e	L!L-H	[23-2]
	1PIN	pall-ɔ	L!L-H!	[23-2E]	koott-o	L!L-H!	[23-2E]
	2P	pall-ə	L!L-H	[23-2]	koott-u	L!L-H	[23-2]

As shown by (44)-(46), the tones of H-stems, L-stems, and HL-stems are invariably H, L, and HL, respectively, except that HL is simplified to H before L as argued in section 5.5 below. The tones of H!L-stems and L!L-stems, on the other hand, vary according to the tone of the suffix, as shown by (47)-(48). The tones of H!L-stems are H! before L, H!L! before H and H!, and HL! before HL. Similarly, the tones of L!L-stems are L! before L, and they are L!L before H, H!, and HL. Thus, clearly, H!, H!L!, and HL! are different surface manifestations of one underlying tonal configuration, and so are L! and L!L. The variation H!L! ~ HL! has already been accounted for by means of H!L!-simplification, which derives HL! from H!L!, which is in turn derived from H!L by Extra !-insertion. H! and L! can be accounted for by the following rule, whereby the final low component of a compound tone T!L is absorbed by a following low suffix tone:¹⁰

(49) L-absorption

$$\widehat{T!L} \rightarrow T! / [{}_W \text{ ___ } L]$$

5.4. Morphological evidence. There is morphological evidence that the two-tone analysis is more adequate than the three-tone analysis. In the three-tone analysis, the tone of some suffixes alternates between Mid and Low, but in the two-tone analysis these suffixes invariably have a low tone. One example is the third person singular possessive suffix /-ε/ , which is added to a singular antigenitive noun stem:

(50)		3-tone analysis	2-tone analysis	
a.	lεεb-ε [1-2]	H-M	H-L	'his tongue'
b.	dh!εη-ε [2-2]	M-M	L-L	'his cow'
c.	kεεd-ε [1-E]	H-L	H!L-L	'his thread'
d.	kooγ-ε [2-E]	M-L	L!L-L	'his gourd'

What the three-tone analysis here describes as a difference in suffix tone (between M and L) is described by the two-tone analysis as a difference in stem

¹⁰The set of tone rules listed in Andersen [1988a:65] reflects an earlier version of the two-tone analysis, in which some of the generalizations captured here are missing.

tone (between H and H!L and between L and L!L). That the difference is actually in the stems rather than in the suffix can be seen by comparing the forms in (50) with the corresponding first person singular forms:

(51)		3-tone analysis	2-tone analysis	
a.	lɛɛb-a [1-2]	H-M	H-L	'my tongue'
b.	dhɛɛŋ-a [2-1]	M-H	L-H	'my cow'
c.	kɛɛd-a [13-3]	HL-H	H!L-H	'my thread'
d.	kɔɔy-a [23-2]	ML-H	L!L-H	'my gourd'

In (51), the two analyses agree that the stem tones of /lɛɛb-/ and /dhɛɛŋ-/ are different from those of /kɛɛd-/ and /kɔɔy-/, respectively. Thus the two-tone analysis captures a regularity (the tonal invariance of the suffix /-ɛ/) that cannot be expressed by the three-tone analysis.

Another example is the ergative suffix /-ɛ/, which is used in nouns whose absolutive form has no suffix:

(52)		3-tone analysis	2-tone analysis	
a.	lɛɛpp-ɛ [1-2]	H-M	H-L	'tongue'
b.	dhɛɛŋ-ɛ [2-2]	M-M	L-L	'cow'
c.	kɛɛtt-ɛ [1-E]	H-L	H!L-L	'thread'
d.	kɔɔyy-ɛ [2-E]	M-L	L!L-L	'gourd'

The situation in (52) is exactly like that in (50) above. The two analyses disagree on where to locate the tonal difference, but again they agree on locating it in the stem when the corresponding absolutive forms are analyzed:

(53)		3-tone analysis	2-tone analysis	
a.	lɛɛp [1]	H	H	'tongue'
b.	dhɛɛŋ [2]	M	L	'cow'
c.	kɛɛt [1E]	HL	H!L	'thread'
d.	kɔɔy [2E]	ML	L!L	'gourd'

In the two-tone analysis, the ergative forms differ tonally from the absolutive forms simply by having an L-suffix. In the three-tone analysis, on the other hand, the ergative forms have either an M-suffix or an L-suffix, and in the latter case, moreover, the tones of the ergative stems differ from

Table 3. Distribution of tones in the two-tone analysis

stem \ suf- fix	nil	H	L	\widehat{HL}	$\widehat{H!L}$	$\widehat{L!L}$
H	tɔŋ H 1 'spear'	kib-o H H 1 1 'boat'	dhaag-ɔ H L 1 2 'woman'	(+ H-L)	dhaanh-ɔ H H! 1 1E 'person'	—
L	guok L 2 'dog'	wɛp-ɔ L H 2 1 'bird'	need-o L L 2 2 'rib'	lakk-a L HL 2 12 'my teeth'	tɔŋg-ɔ L H! 2 1E 'our egg'	—
\widehat{HL}	—	puunn-o \widehat{HL} H 12 1 'louse'	(+ H-L)	paall-e \widehat{HL} \widehat{HL} 12 12 'python' (ERG)	roomm-ɔ \widehat{HL} H! 12 1E 'our sheep'	—
$\widehat{H!L}$	keet H! 1E 'thread'	keed-a $\widehat{H!L!}$ H 13 3 'my thread'	kuur-a H! L 1 E 'ball'	keett-a $\widehat{HL!}$ \widehat{HL} 12 23 'my threads'	keed-ɔ $\widehat{H!L!}$ H! 13 3E 'our thread'	—
$\widehat{L!L}$	kɔɔy L!L 2E 'gourd'	bub-a L!L H 23 2 'waterbuck'	pal-a L! L 2 E 'knife'	paŋ-e L!L \widehat{HL} 23 23 'crocodiles'	pa -ɔ L!L H! 23 2E 'our knife'	—

the tones of the corresponding absolutive stems. The two-tone analysis thus allows a much simpler formulation of morphological rules than does the three-tone analysis.

5.5. Distribution of tones. The two-tone analysis of the 22 tonal word classes is summarized in Table 3, which shows the possible combinations of underlying stem tones and suffix tones as well as the non-prepausal surface tones of these combinations and their prepausal pitch patterns. Clearly, the distribution of underlying tones is less defective here than in the three-tone analysis. Apart from three gaps, each of the five simple or compound stem tones combines with each of the four simple or compound suffix tones. Given the superiority of the two-tone analysis, the absence of words with the tone patterns HL, H-HL and HL-L is striking. In fact, however, there is morphological evidence that two of them do exist as underlying forms.

Consider for instance the formation of the ergative form of nouns that have a non-high vowel suffix in the absolutive form. With such nouns, the ergative is formed by replacing the suffix vowel of the absolutive with the mid front vowel /ɛ/ ~ /e/ while retaining the tone of the replaced vowel and adding a low tone. The application of this rule is shown by the following examples, in the last of which the rule applies vacuously:

(54) absolutive		ergative		
wɪp-ɔ	L-H [2-1]	wɪp-ɛ	L-HL [2-12]	'bird'
luub-ɔ	HL-H [12-1]	luub-ɛ	HL-HL [12-12]	'word'
kiitt-e	H-L [1-2]	kiitt-e	H-L [1-2]	'stones'

Apparent exceptions are words with H-H in the absolutive, their ergative forms having H-L:

(55) absolutive		ergative		
kib-ɔ	H-H [1-1]	kib-ɛ	H-L [1-2]	'boat'

However, the exception can be eliminated by assuming that the ergative forms of such words have the tones H-HL in the underlying representation. The realization of this underlying tone sequence can be handled in a natural way by a phonological rule to the effect that the H component of the suffixal HL is absorbed by the H of the stem:

(56) H-absorption

$$\widehat{HL} \rightarrow L / [_{\text{W}} H __]$$

Consider next the first and third person singular possessive forms of singular nouns. The tone of the first person singular suffix /-a/ is determined by a morphophonological rule: It is High if the stem ends in Low and Low if the stem ends in High. The third person singular suffix /-ε/ ~ /-e/ , on the other hand, always has a low tone. These distributional facts are illustrated by the following examples:

(57)	1S		3S		
a.	wɪɲj-a	L-H [2-1]	wɪɲj-ε	L-L [2-2]	'my/his bird'
b.	lwεɛtt-a	H-L [1-2]	lwεɛtt-ε	H-L [1-2]	'my/his finger'
c.	rɔɔmm-a	HL-H [12-1]	rɔɔmm-ε	H-L [1-2]	'my/his sheep'

In example (57c), the stem tone alternates between HL and H. If one of these alternants is to be conceived of as underlying both, it must be HL, since HL contrasts with H before the first person suffix. The alternation can then be accounted for in purely phonological, rather than morphophonological, terms by assuming that the L component of the stem tone HL is absorbed by the L of the suffix:

(58) L-absorption

$$\widehat{HL} \rightarrow H / [_{\text{W}} __L]$$

This rule is similar to the independently motivated rule of L-absorption in (49), which can be revised so that it subsumes (58):

(59) L-absorption (revised)

$$\widehat{T(!)L} \rightarrow T(!) / [_{\text{W}} __L]$$

6. Empty Vowels

6.1. Vowel deletion and tone reassociation. Several suffixes vary segmentally between /ɪ/ ~ /i/ and zero. The zero variant occurs after stems that end in a single consonant which is either a sonorant or a voiceless ob-

struent, while /ɪ/ ~ /i/ occurs after all other stems, i.e. after stems ending in a voiced obstruent or in a consonant cluster or in a zero consonant (cf. Andersen [1988a]). Although these suffixes may thus have no segmental manifestation, their tones can in most cases be shown to be present underlyingly.

Consider for instance the antigenitive suffix of singular nouns. When this suffix is followed by a possessor noun phrase, it has a low tone if the possessor is singular and a high tone if the possessor is plural. This is shown by the antigenitive forms in the left column of (60)–(64), which exemplify the five tonal classes of singular antigenitive stems. Thus the tone of the antigenitive suffix vowel /ɪ/ ~ /i/ is Low before the singular noun /dhaago/ H-L 'woman' in the (b)-phrases, and High before the plural noun /mʌʌn/ H 'women' in the (c)-phrases. The tone symbols indicate the surface tones of the antigenitive forms and of the corresponding absolutive form (in (a)) of each of the five singular nouns in question. (As shown by the forms in (60), an antigenitive stem does not necessarily belong to the same tonal class as the corresponding absolutive stem).

(60) H-stems

a.	L-H	kid-i 'stone'	a'. H	bur 'ashes'
		2 1		1
b.	H-L	kitt-i dhaago	b'. HL	bur dhaago
		1 2 1 2		12 1 2
c.	H-H	kitt-i mʌʌn	c'. HH	bur mʌʌn
		1 1 1		1 1

(61) L-stems

a.	L	deel 'skin'	a'. L	kwan 'food'
		2		2
b.	L-L	deend-i dhaago	b'. LL	kwan dhaago
		2 2 1 2		2 1 2
c.	L-H	deend-i mʌʌn	c'. LH	kwan mʌʌn
		2 1 1		21 1

(62) HL-stem

- a. HL-H |uub-o 'word'
 12 1
- b. H-L |uumm-l dhaago
 1 2 1 2
- c. HL-H |uumm-l maaŋ
 12 1 1

(63) H!L-stems

- | | | | |
|-----------|---------------|-----------|-------------------|
| a. HE | keet 'thread' | a'. HE | jwaan 'small hut' |
| | 1E | | 1E |
| b. H!-L | keed-t dhaago | b'. H!L | jwaan dhaago |
| | 1 3 2 3 | | 13 2 3 |
| c. H!L!-H | keed-t maaŋ | c'. H!L!H | jwaan maaŋ |
| | 13 3 3 | | 13 3 |

(64) L!L-stems

- | | | | |
|----------|---------------|----------|--------------|
| a. L-E | pal-a 'knife' | a'. LE | kooy 'gourd' |
| | 2 E | | 2E |
| b. L!-L | pall-t dhaago | b'. L!L | kooy dhaago |
| | 2 3 2 3 | | 23 2 3 |
| c. L!L-H | pall-t maaŋ | c'. L!LH | kooy maaŋ |
| | 23 2 2 | | 232 2 |

The right column of (60)–(64) shows the corresponding forms of nouns whose antigenitive stem ends in a non-geminate sonorant and whose antigenitive forms therefore have no suffix vowel. (I have not encountered any such stems that belong to the tonal class HL). By comparing corresponding antigenitive forms with and without the vowel of the antigenitive suffix in (60)–(64), it can be inferred that even forms without a suffix vowel have a suffix tone, which is manifested as an additional tonal component on the stem. This additional component can be perceived directly whenever the pitch level of the suffix tone is different from the pitch level of (the last component of) the stem tone:

- | | | | | | |
|------|------|-------|-----|------|--------------|
| (65) | H-L | [1-2] | HL | [12] | (cf. (60b')) |
| | L-H | [2-1] | LH | [21] | (cf. (61c')) |
| | H!-L | [1-3] | H!L | [13] | (cf. (63b')) |

L!-L	[2-3]	L!L	[23]	(cf. (64b'))
L!L-H	[23-2]	L!LH	[232]	(cf. (64c'))

In words with H!L!-H, the pitch of the high suffix tone is identical to the pitch of the preceding low component of the stem tone: [13-3]. Hence the last H component of antigenitive forms with H!L!H as in (63c') cannot be perceived directly, the pitch of such forms being [13]. However, as shown below, the presence of a final H in such words is evidenced by the fact that they cause L-raising to apply to a following L!L-stem. The additional H and L in the antigenitive forms with HH and LL, as in (60c') and (61b'), have no phonetic effect at all, and the evidence for their presence is thus only circumstantial.

In the following, I will assume that the suffix tone is carried by a suffix vowel underlyingly, but that this vowel is deleted and that at the same time, its tone is reassociated to the stem vowel. The interaction of V-deletion and T-reassociation with other rules is illustrated by the derivations in (66)-(67).

- (66) a. neen kooy kanjo
 L L!L H L Underlying and Surface
 2 23 2 3
 see gourd there
 'look at the gourd there!'
- b. neen kooy dhaago
 L L!L -L H L Underlying
 L L! -L H L L-absorption
 L L!L H L V-deletion & T-reassociation
 2 23 2 3
 see gourd-AG+S woman
 'look at the woman's gourd!'
- c. neen kooy mAAAn
 L L!L -H H Underlying
 L L!LH H V-deletion & T-reassociation
 2 232 2
 see gourd-AG+P women
 'look at the women's gourd!'

In the surface representation, the singular antigenitive form of an L!L-stem which is not followed by a suffix vowel may be identical to its absolutive form in non-prepausal position after a low tone. Thus, both the absolutive form in (66a) and the singular antigenitive form in (66b) of the word for 'gourd' have the surface tones L!L, while its plural antigenitive form in (66c) has the surface tones L!LH. However, the underlying difference between the absolutive and the singular antigenitive shows up in the surface representation when the forms are subjected to L-raising:

- (67) a. a-neend-a kɔɔy kanjo
 H H H L!L H L Underlying
 H H H H!L H L L-raising
 H H H H! H L H!L-simplification
 1 1 1 1 2 3
 1S-see+M-FOC gourd there
 'I am looking at the gourd there'
- b. a-neend-a kɔɔy dhaago
 H H H L!L -L H L Underlying
 H H H H!L -L H L L-raising
 H H H H! -L H L L-absorption
 H H H H!L H L V-deletion & T-reassociation
 1 1 1 13 2 3
 1S-see+M-FOC gourd-AG+S woman
 'I am looking at the woman's gourd'
- c. a-neend-a kɔɔy maan
 H H H L!L -H H Underlying
 H H H H!L -H H L-raising
 H H H H!L!-H H Extra !-insertion
 H H H H!L!H H V-deletion & T-reassociation
 1 1 1 13 3
 1S-see+M-FOC gourd-AG+P women
 'I am looking at the women's gourd'

Thus, in the sentences in (67), which parallel those in (66), the absolutive form has the surface tone H!, while the singular antigenitive has H!L. On the other hand, the two antigenitive forms are now identical in pitch, but their surface tones are different, as shown by the fact that the word following the singular antigenitive form in (67b) is downstepped by one level

while the word following the plural antigenitive form in (67c) is downstepped by two levels.

One verbal /ɿ/-suffix that behaves like the antigenitive suffix has a high tone and is used as an alternative to the high-toned third person singular subject suffix /-ɛ/ when the verb is followed by an obligatory non-subject constituent. Thus, it is used, for instance, with a transitive locative verb stem, which is obligatorily followed by an adverbial referring to the goal of the movement:

- (68) a. a-dɔɔg-ɿ kundo 'he returned it to that place'
 H L H H L
 1 2 1 1 2
 C-return+LOC-3S there
- b. a-ŋɔd -ɿ pɿŋ 'he cut it down'
 H H!L! H H
 1 13 3 3
 C-cut+LOC-3S down

When the suffix vowel is deleted and the suffix tone is reassociated, an L-stem gets the surface tones LH, corresponding to L-H in (68a):

- (69) a-lɔɔr wɔk 'he rolled it away'
 H LH HE
 1 21 1E
 C-roll+LOC+3S away

Similarly, an L!L-stem which has been subjected to L-raising gets the surface tones H!L!H, corresponding to H!L!-H in (68b):

- (70) a-tɛɛɿ kundo 'he pulled it to that place'
 H H!L!H H L
 1 13 3 4
 C-pull+LOC+3S there

As noted above, the last H-component of H!L!H is not directly perceptible, since H!L! without it would result in the same pitch. But the presence of this H is shown by the fact that it provokes L-raising of a following L!L-stem. In (71a) L-raising has thus applied to the adverb /wɔɔɔ/, which has the surface tones L!L-H when not preceded by a high tone as shown by (71b).

- (71) a. a-tɛɛ! wɔg -ɔ 'he pulled it away'
 H HL!H H!L! H
 1 12 24 4
 C-pull+LOC-3S away
- b. a-rɪŋg-ɪ wɔg-ɔ 'he ran away'
 H H! L L!L H
 1 1 3 34 3
 C-run+LOC-SUF away

The surface tones of (71a) are derived in the following way:

- (72) a-tɛɛ! wɔg -ɔ
 H L!L -H L!L H Underlying
 H H!L -H H!L H L-raising
 H H!L!-H H!L! H Extra !-insertion
 H HL! -H H!L! H H!L!-simplification
 H HL!H H!L! H V-deletion & T-reassociation
 1 12 24 4

There are other verbal /ɪ/-suffixes that vary with zero. One of them has a low tone and is used if the verb is followed by a subject noun phrase, as in (73)-(74). Another one is tonally H!L and indicates that the subject is unspecified, as in (75).

- (73) a. a-yap dhaag-ɛ 'the woman opened it'
 H L H L
 1 2 1 2
 C-open woman-ERG
- b. a-yaamb-ɪ dhaag-ɛ 'the woman opened it (repeatedly)'
 H H! L H L
 1 1 3 2 3
 C-open+M-SUF woman-ERG
- c. a-yʌb-ɪ dhaag-ɛ 'the woman opened it (in this
 H H! L H L direction)'
 1 1 3 2 3
 C-open+CP-SUF woman-ERG
- d. a-yʌpp-ɪ dhaag-ɛ rwath 'the woman opened it for the chief'
 H H! L H L L
 1 1 3 2 3 3
 C-open+BEN-SUF woman-ERG chief

- e. a-yamm-i dhaag-ε 'the woman opened for him'
 H L L H L
 1 2 2 1 2
 C-open+BEN+AP-SUF woman-ERG
- (74) a. root mΛΛnn-i rood-ɔ 'the women will grind it'
 HL H L L L
 12 1 2 2 2
 grind women-ERG grind-SUF
- b. rott-ɿ mΛΛnn-i rott-ɔ 'the women will grind it
 L L H L L L (repeatedly)'
 2 2 1 2 2 2
 grind+M-SUF women-ERG grind+M-SUF
- (75) a. a-yaap 'he was insulted'
 H HE
 1 1E
 C-insult+PAS
- b. a-yaɲj-ɿ 'he was insulted (repeatedly)'
 H H HE
 1 1 1E
 C-insult+M-PAS

The distribution of /ɿ/ ~ /i/ and zero of these two suffixes almost coincides with the morphological status of the transitive verb stem that they combine with. Simple verb stems end in either a single voiceless obstruent or a single sonorant and thus always take the zero variant (cf. the (a) sentences in (73)-(75)). Derived verb stems, on the other hand, cannot end in a single voiceless obstruent, and only centripetal stems can end in a single sonorant. Hence most derived stems take the segmental variant (cf. the other sentences in (73)-(75)).¹¹

There is an apparent exception to the rule that the tone of the deleted suffix vowel is reassociated to the stem vowel. When the verbal L-suffix

¹¹In Andersen [1988a], I analyzed intervocalic stem-final voiceless obstruents as being phonemically single rather than geminate, although I argued that in derived verb stems, they had developed from geminates historically. The present analysis presupposes that even synchronically, they are geminates in derived verb stems and in antigenitive noun stems, as indeed they are phonetically after a short vowel (at least).

exemplified in (73)-(74) above occurs after an H!L-stem (which is in fact an L!L-stem subjected to L-raising), the suffix tone is lost, whether the verb stem is simple, as in (76a), or derived, as in (76b).

- (76) a. a-thaal dhaag-ε 'the woman cooked it'
 H H! H L
 1 1 2 3
 C-cook woman-ERG
- b. a-teel dhaag-ε 'the woman pulled it (hither)'
 H H! H L
 1 1 2 3
 C-pull+CP woman-ERG

Note, however, that the suffix tone reappears if the verb is followed by an enclitic subject pronoun instead of by a noun:

- (77) a. a-teel gi 'they pulled it (hither)'
 H H!L LE
 1 13 3E
 C-pull+CP 3P+ERG
- b. a-ɲud-i gi 'they cut it (in this direction)'
 H H! L LE
 1 1 3 3E
 C-cut+CP-SUF 3P+ERG

The exception can be eliminated by ordering H!L-simplification after V-deletion and T-reassociation and by refining its structural description. In section 5.1, H!L-simplification was said to delete L of H!L in word-final position before another word. As such, the rule accounts for the missing L in (76). But since L is not deleted before an enclitic, as in (77a), nor before a possessor noun phrase, as in (63b') and (67b) above, H!L-simplification must be restricted to applying in phrase-final position only.

6.2. Unspecified tone bearing vowels. The question to be asked now is: what is the underlying representation of suffixes that alternate segmentally between /ɪ/ and zero? Clearly, the two alternants of each of the suffixes must have identical underlying representations since their distribution is phonologically predictable. An obvious suggestion would thus be that the underlying suffix vowel is /ɪ/. However, although /ɪ/ is the only vowel

that regularly alternates with zero, not all instances of /ɪ/ in suffix position are deleted in the specified environment. For instance, /ɪ/ is not deleted if it is the segmental part of a plural suffix, of a second person singular possessive or subject suffix, or of a demonstrative suffix:

- (78) tɔɔŋ-ɪ L-E [2-E] 'spears'
 tɔŋ-ɪ H-L [1-2] 'your spear'
 a-coɔl-ɪ H-H-E [1-1-E] 'you called him' (C-call-2S)
 tɔŋ-ɪ H-HE [1-1E] 'this spear'

V-deletion would thus have to be formulated as a morphologically conditioned rule.

Instead of an /ɪ/-deletion rule, I propose the following analysis of suffixes that vary segmentally between /ɪ/ and zero. Underlyingly, such suffixes consist of a tone (or a sequence of tones) and an "empty" vowel /V/, i.e. a tone bearing unit without any phonetic specification. Assuming an autosegmental framework, the suffix tone gets associated to the empty vowel in exactly the same way as it would get associated to a full vowel (cf. section 7.3 below). Then, if /V/ is preceded by a single sonorant or by a single voiceless obstruent, it is deleted and its tone is reassigned to the stem vowel. Otherwise /V/ gets the phonetic specification /ɪ/ ~ /i/.¹²

This analysis has several advantages. Firstly, it explains why not all /ɪ/-suffixes have a zero variant: only underlyingly empty vowels vary between /ɪ/ and zero. Secondly, it explains why /ɪ/ is the only vowel that varies with zero: /ɪ/ is a default value. Thirdly, it explains why /ɪ/ varies with zero at all: /V/ gets a phonetic specification if and only if an impermissible syllable structure would otherwise arise, i.e. a syllable ending in a consonant cluster or in a voiced obstruent.

There is independent evidence that the suffix vowel in question (the empty vowel) differs underlyingly from other vowels (full vowels). Full vowels

¹²Before the enclitic pronoun /wa/ 'we', /V/ surfaces as /o/ ~ /u/, cf. /paɪl-o wa/ L!L-H H [23-2 2] 'our knife' (knife-AG+P 1PEX) and /a-tuud-u wa/ H-H!-L LE [1-1-3 3E] 'we pulled it (hither)' (C-pull+CP-SUF 1PEX+ERG).

can undergo assimilation across a word boundary, the result being one phonetically long vowel. For instance, the completive prefix /a-/ is optionally assimilated to the final vowel of a preceding word (cf. section 7.1 below), as in the following example, where points indicate syllable boundaries:

- (79) rɔɔmb-ɔ a-nɛɛn-a → [rɔɔm.bɔɔ.nɛɛ.na]
 H L H L H H L! L H
 1 2 1 2 1 1 2 3 2
 sheep C-see-1S
 'I saw the sheep'

An empty vowel, by contrast, never assimilates a following vowel. On the contrary, a following vowel "replaces" the empty vowel in the sense that it acts as if it were a suffix vowel (cf. (80) and (81b)).

- (80) rɔɔmm-V a-nɛɛn-a → [rɔɔm.ma.nɛɛ.na]
 HL H H L H HL H L H
 sheep-AG C-see-1S 12 1 2 1
 'the sheep which I saw'

- (81) a. a-ɲud-V dhaag-ɛ → [a.ɲu.dɪ.ɔaa.ɔɛ]
 H H! L H L H H! L H L
 C-cut+CP-SUF woman-ERG 1 1 3 2 3
 'the woman cut it'

- b. a-ɲud-V uburr-i → [a.ɲu.du.bur.ri]
 H H! L L H L H H! L H L
 C-cut+CP-SUF Ubur-ERG 1 1 3 2 3
 'Ubur cut it'

Example (81a) shows that if there is no vowel with which the empty vowel can be replaced, then the latter gets the default specification /ɪ/ ~ /i/.

From (80) and (81b), it cannot be determined whether during V-replacement, the suffix tone is lost or whether it is reassigned to the immediately following vowel, since the latter carries the same tone as the suffix vowel. In (82), however, where the suffix is H and the following tone is L, we see that the suffix tone is in fact reassigned to the following vowel. The example in (82) illustrates another fact as well. Note that even if the empty suffix vowel of /kɔɔy-V/ were not followed by another vowel, it would be deleted,

since the stem ends in a single sonorant (cf. (64b'-c') above), and in that case its tone would be associated to the stem vowel.

- (82) kɔɔy-V a-bʌʌr-e → [kɔɔ.ya.bʌʌ.re]
 L!L H L H E L!L HL H E
 gourd-AG+P tall=women 23 23 2 E
 'the tall women's gourd'

Since in (82) its tone is associated to the following vowel, we can infer that V-replacement is ordered before V-deletion.

6.3. Additional tonal word classes. As mentioned in section 3.2, there are at least eight possible pitch patterns for a suffixless word in prepausal position. Four of them have been dealt with already. The others, which seem to be either rare or non-occurring in nouns, must be analyzed as having the surface tones indicated in (83).

- (83) a. [21] LH e.g. beet 'all'
 b. [2-13] L-H!L!H e.g. u-cuul 'mongoose'
 c. [232] L!LH e.g. baal 'dangling'
 d. [21E] LHE e.g. thuuth 'very deep'

These stem tone patterns are identical to otherwise attested sequences of stem tones plus suffix tones:

- (84) a. [2-1] L-H e.g. wɪp-ɔ 'bird'
 b. [2-13-3] L-H!L!-H e.g. a-bɛɛl-a 'stick'
 c. [23-2] L!L-H e.g. bub-a 'waterbuck'
 d. [2-1E] L-HE e.g. tɔŋg-ɔ 'our egg'

Hence the words in (83) can readily be analyzed as having an underlying suffix with an empty but tone-bearing vowel.

7. Downstep as a Floating High Tone

The simplifications resulting from analyzing Pāri as having two rather than three basic tone levels have been achieved at the expense of the predictability of downstep. However, as I intend to demonstrate in this section, there is evidence that downstep is in turn the manifestation of a floating

high tone. First I will show that there is independent evidence for floating high tones and that these are in some cases manifested as downstep. Then I will show that although analyzing all downsteps as floating high tones results in violations of the Obligatory Contour Principle, such violations only exceptionally occur in the underlying representation.

7.1. Floating high tones. Consider first the tonal effects of vowel assimilation across a word boundary in (85), and compare the tones with those in (86).

(85) a. mando a muur → [man.dɔɔ.muur] 'that is a duiker'
 H L H L H L! L
 1 2 1 2 1 2 3

 b. mando a kic → [man.dɔɔ.kic] 'that is a bee'
 H L H H H L H
 1 2 1 1 1 2 1

 c. mando a dak → [man.dɔɔ.dak] 'that is a pot'
 H L H HE H L HE
 1 2 1 1E 1 2 1E

(86) a. neen muur 'look at the duiker!'
 L L
 2 2

 b. neen kic 'look at the bee!'
 L H
 2 1

 c. neen dak 'look at the pot!'
 L LE
 2 2E

In (85), the vowel of the copula /a/ is optionally assimilated to the final vowel of the preceding word /mando/ 'that'. When vowel assimilation takes place, the assimilated vowel is dissociated from its high tone and reassociated to the low tone of the preceding vowel. Its high tone, which has now been set afloat, is manifested as a downstep before the low tone of /muur/ 'duiker' in (85a), while it is deleted (by "H-deletion") before the high tones of /kic/ 'bee' and /dak/ 'pot' in (85b-c). As shown by (86c), however, /dak/

is underlyingly an L!L-stem, whose high tone in (85c) has been brought about by L-raising conditioned by the high tone of the copula. Thus, although the high tone of the assimilated vowel is deleted in (85c), it leaves an effect there, too.

Similar evidence for floating high tones can be found in derived nouns with the prefix /o-/ ~ /u-/. This prefix is used productively for forming male names from simple nouns which refer to a salient feature of the situation in which the named child was born. As exemplified in (87), names derived from nouns with L!L-stems have H!L-stems.

(87)	u-gar	L-HE	[2-1E]	gar	LE	[2E]	'path'
	o-ŋaŋ	L-HE	[2-1E]	ŋaŋ	LE	[2E]	'cave'
	o-kɔɔŋ-ɔ	L-H-E	[2-1-E]	kɔɔŋ-ɔ	L-E	[2-E]	'beer'
	o-pal-a	L-H-E	[2-1-E]	pal-a	L-E	[2-E]	'knife'

The alternation between L!L and H!L can be accounted for in purely phonological terms by hypothesizing that the underlying tones of the prefix are LH rather than just L. The final floating high tone (H) of the prefix causes L-raising to apply and is subsequently deleted, just like in (85c) above. The hypothesis that the prefix is LH also predicts that names derived from simple nouns with L-stems surface with a downstep after the prefix when they occur after a low tone (cf. (85a) above). In fact, this is exactly what happens when such nouns occur after an antigenitive noun. Thus the name /o-kɔth/, which is derived from /kɔth/ L [2] 'rain', has the tones L!-L in the following examples, where the prefix vowel has replaced the underlying low toned antigenitive suffix vowel (cf. section 6 above):

(88) a.	kwan-u-kɔth	'Ukoth's food'
	L L! L	
	2 2 3	
b.	kɔɔy-o-kɔth	'Ukoth's gourd'
	L! L! L	
	2 3 4	
c.	kɪtt-u-kɔth	'Ukoth's stone'
	H L! L	
	1 2 3	

- d. keed-o-koth 'Ukoth's thread'
 H! L! L
 1 3 4

In other syntactic contexts, there are two possibilities for a noun like /o-koth/ after a low tone: either there is downstep after the prefix just as in (88), or the prefix surfaces with a high tone. Thus we find free variants like the following:

- (89) a. neen o-koth b. neen o-koth 'look at Ukoth!'
 L L! L L H L
 2 2 3 2 1 2
 see Ukoth

- (90) a. a-neen o-kotth-i b. a-neen o-kotth-i 'Ukoth saw him'
 H L L! L L H L H L L
 1 2 2 3 3 1 2 1 2 2
 C-see Ukoth-ERG

After a high tone, the prefix always surfaces with a high tone:

- (91) a-neend-a o-koth 'I am looking at Ukoth'
 H H H H L
 1 1 1 1 2
 1S-see+M-POC Ukoth

Names derived from nouns with a H-stem always surface with a low tone on the prefix, and they show no trace of the floating high tone, but again, this is what is predicted (cf. (85b) above). The following example contains /u-bur/, which is derived from /bur/ H [1] 'ashes':

- (92) kwan- u-bur 'Ubur's food'
 L L H
 2 2 1
 food+AG+S Ubur

Since we need a rule that interprets a floating high tone as a downstep phonetically, we can simply take all downsteps to be floating high tones.¹³ Assuming an autosegmental framework, where tones and tone bearing units con-

¹³In Andersen [1988a,b], I assumed downsteps to reflect floating low tones rather than floating high tones.

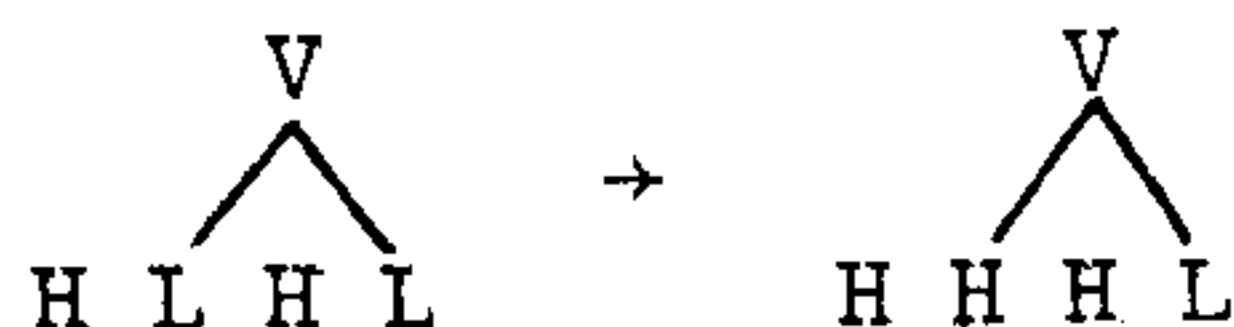
stitute separate tiers, we thus have surface representations like the following:

- (93) a. $\begin{array}{c} n\wedge n-e \\ \swarrow \quad \searrow \\ LHL-HL \end{array}$ 'crocodiles' = L!L-HL [23-23] b. $\begin{array}{c} k\epsilon\epsilon d-a \\ \swarrow \quad \searrow \\ HHLH-H \end{array}$ 'my thread' = H!L!-H [13-3]
- c. $\begin{array}{c} pa||-o \\ \swarrow \quad \searrow \\ LHL-HHL \end{array}$ 'our knife' = L!L-H!L [23-2E] d. $\begin{array}{c} o-k\epsilon\epsilon n-o \\ | \quad | \quad | \\ L-HH-L \end{array}$ 'Ukongo' = L-H!-L [2-1-E]

The previously established tone rules will have to be reformulated accordingly. In most of these rules, we can simply substitute a floating high tone (H) for downstep (!). However, two rules need revision: L-raising and L-lowering.

L-raising can be reformulated as follows:

(94) L-raising



According to this rule, an associated L is changed to H if (i) it is preceded by H, which may be associated or free and (ii) if it is followed by a free H which (iii) is itself followed by a L which is associated to the same vowel as the first L. When formulated in this way, L-raising does not apply to the L of LH-prefixes. Although this L can indeed change to H as seen in (89)-(91) above, this change is a different phenomenon, since no preceding H is needed and since the floating H is simultaneously deleted.

L-lowering can be reformulated as follows:

(95) L-lowering

$L \rightarrow E / [{}_W T_n H __] ||$, where T_n is one or more tones

When formulated in this way, L-lowering will correctly apply to (96a-b) and correctly fail to apply to (96c-d).

- (96) a. pal-a 'knife' b. kooy 'gourd'
- $\begin{array}{c} / \quad | \\ \text{LH} \quad \text{-L} \\ [2 \quad \text{'E}] \end{array}$
 $\begin{array}{c} \wedge \\ \text{LHL} \\ [2 \quad \text{E}] \end{array}$
- c. o -koth 'Ukoth' d. dhaanh-o dook 'the person will return'
- $\begin{array}{c} | \quad | \\ \text{LH-} \quad \text{L} \\ [2 \quad 3] \end{array}$
 $\begin{array}{c} | \quad | \quad | \\ \text{H} \quad \text{HH} \quad \text{L} \\ [1 \quad 1 \quad 3] \\ \text{person} \quad \text{return} \end{array}$

In the following, I use diacritics to indicate tones: /' / = High, /` / = Low, /^ / = High-Low, /v / = Low-High. When placed after the segment symbols of a morpheme, /' / indicates a floating High, while /^ / indicates a floating High followed by an associated Low.

7.2. L-raising and the Obligatory Contour Principle. In the examples of surface representations given in (93) above, the tonal tier of some morphemes contains the sequence HH, i.e. a sequence of two identical tones. Thus those morphemes violate what has come to be known as the Obligatory Contour Principle (cf. Goldsmith [1979]). Notice, however, that HH in (93d) derives from the sequence LHL, which does not violate the Obligatory Contour Principle. Moreover, there is evidence that many morphemes which appear to have the sequence HH underlyingly do in fact have the sequence LHL.

Note first that all nouns with a derivative L-prefix and an HHL-stem are derived from words with LHL-stems. In addition to names like those in (87) above, there are other nouns such as those in (97a), which are morphologically related to the words in (97b).

- (97) a. à-b^ΛΛr^ -à [2-1-E] 'tall woman'
- à-?ìdh^ -á [2-13-3] 'squirrel'
- ò-c^óon^ -ó [2-13-3] 'old thing'
- à-c^Λm^ -ê [2-12-23] 'left-handed females'
- b. b^ΛΛr^ [2E] 'he is tall'
- ?ìdh^ -ò [2-E] 'he will climb'
- c^óon^ -ó [23-2] 'early'
- c^Λm^ -ê [23-23] 'left-hand sides'

For such words, there is no problem in positing an LH₀-prefix and an LHL-stem. This analysis can be extended to nouns which have a similar prefix but for which no morphologically related word has been attested, e.g.

- | | | | |
|------|------------------------|-----------|----------------|
| (98) | à-déél [^] | [2-1E] | 'antelope' |
| | ò-píj [^] -à | [2-1-E] | 'mouse' |
| | à-béél [^] -á | [2-13-3] | 'stick' |
| | à-wéen [^] -ê | [2-12-23] | 'guinea-fowls' |

Proof that such nouns have an LH₀-prefix and an LHL-stem will be given in the following.

Nouns which have a prefix and an L-stem but which, again, cannot be proved to be derived nouns fall into two types. One type behaves like /ò'-kòth/ in (88)-(91) and must therefore have an underlying LH₀-prefix:

- | | | | |
|------|-------------|---------|-----------------|
| (99) | à'-cùth | [2-3] | 'vulture' |
| | ù'-dièk | [2-3] | 'hyena' |
| | à'-dàal-ò | [2-3-3] | 'type of gourd' |
| | à'-wèetth-á | [2-3-2] | 'pipe' |

In nouns of the other type, both the prefix and the stem surface with a low tone in all environments. In such nouns, the underlying prefix tone must be L:

- | | | | |
|-------|-----------|---------|---------|
| (100) | ù-bòw | [2-2] | 'lung' |
| | à-tòr | [2-2] | 'dust' |
| | à-thèer-ò | [2-2-2] | 'arrow' |
| | à-lòol-á | [2-2-1] | 'path' |

Nouns with an underlying L-prefix also occur among non-derived nouns with an LHL-stem:

- | | | | |
|-------|-------------------------|----------|----------------|
| (101) | à-tààŋ [^] | [2-2E] | 'god' |
| | ù-kòond [^] -ò | [2-2-E] | 'feather' |
| | ù-còomb [^] -ó | [2-23-2] | 'snail' |
| | à-mànd [^] -à | [2-2-E] | 'type of disc' |

Unlike the nouns in (97)–(98), these do not undergo L-raising, and hence their prefix cannot be LḤ. Thus, clearly, there is a contrast between L-prefixes and LḤ-prefixes.

Now consider a few facts about number inflection of nouns. The singular stem and the plural stem often have different tones. What is of relevance here is that prefixless nouns with an L-stem in the singular may have an LḤL-stem in the plural and that they cannot have an HḤL-stem in the plural:

(102)	Singular		Plural		
	bùul	[2]	bùnd [^] -ì	[2-E]	'drum'
	kùl	[2]	kùl [^] -ò	[2-E]	'wart-hog'
	nàan	[2]	nàn [^] -ê	[23-23]	'crocodile'
	gòol-ò	[2-2]	gòol [^] -ê	[23-23]	'fish hook'

In nouns with a prefix, by contrast, a singular L-stem may correspond either to a plural LḤL-stem, as in (103), or to a plural HḤL-stem, as in (104).

(103)	Singular		Plural		
	ò-gwàal	[2-2]	ù-gwàl [^] -ê	[2-23-23]	'frog'
	ò-kàar-ò	[2-2-2]	ù-kàr [^] -ê	[2-23-23]	'web of spider'
	à-rìt	[2-2]	à-rìd [^] -ò	[2-2-E]	'kind of tree'
	à-thèer-ò	[2-2-2]	à-thèer [^] -ê	[2-23-23]	'arrow'

(104)	Singular		Plural		
	à'-cùth	[2-3]	à'-cùdh [^] -ò	[2-1-E]	'vulture'
	à'-yòom	[2-3]	à'-yòom [^] -ò	[2-1-E]	'monkey'
	ò'-càam	[2-3]	ù'-càm [^] -ê	[2-12-23]	'left-handed male'
	à'-dùund-ò	[2-3-3]	à'-dùnd [^] -ê	[2-12-23]	'round thing'

However, the two classes of plural stems are in complementary distribution. The plural stem is LḤL when the prefix of the singular form is L, and the plural stem is HḤL when the prefix of the singular form is LḤ. These facts can be explained by assuming that the tone of the prefix is the same in the plural as in the singular and hence that plural HḤL-stems are derived from underlying LḤL-stems by L-raising conditioned by the preceding floating high tone.

Words with an HHL-stem and without a prefix seem to be far less frequent than those with an HHL-stem and a prefix. Most of them appear to be recent loanwords from Arabic (cf. the examples in (105)).¹⁴

(105)	kúur^-à	[1-E]	'ball'	Arabic	kuura
	gúb^-à	[1-E]	'basket'	Arabic	guffa
	kíic^	[1E]	'sack'	Arabic	kíis
	cúk^	[1E]	'market'	Arabic	suug

In suffix position, there is no contrast between HHL and LHL, since the latter sequence does not occur at all. Hence it is possible to derive HHL from underlying LHL. After H-stems, as in (106), the change from LHL to HHL can readily be seen as the effect of L-raising.

(106)	dháanh-ò^	→ dháanh-ó^	[1-1E]	'person'
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After stems ending in L, on the other hand, it might seem that an ad hoc rule is needed (cf. the examples in (107)).

(107)	ʔòon-í^	[2-1E]	'we' (1PIN)
	bùorr^-á^	[23-2E]	'type of yard'

However, there is evidence that even in some of these cases the suffix is preceded by H underlyingly and hence that L-raising applies.

Two nominal suffixes with a separate meaning have HHL, the first person plural inclusive possessive suffix /-ó^/ 'our' and the demonstrative suffix /-í^/ 'this, these'. Both of these suffixes are preceded by an anti-genitive stem (cf. (108a-b)).

(108)	a.	làkk-ó^	[2-1E]	'our teeth'
	b.	làkk-í^	[2-1E]	'these teeth'
	c.	làkk-â	[2-12]	'my teeth'
	d.	làkk-í dháag-ò	[2-1 1-2]	'the woman's teeth'
	e.	làkk-í mÁAn	[2-1 1]	'the women's teeth'

¹⁴The Arabic data are from Persson and Persson [1980].

In section 6, I showed that an antigenitive stem is followed by an empty suffix vowel /V/ before a possessor noun phrase, that this vowel may be replaced by a following vowel, and that in that case the tone of the empty vowel is reassigned to the following vowel. Examples (108d-e) show that the tone of the antigenitive suffix vowel is High when the antigenitive stem is plural. The first person singular form in (108c) provides evidence that the empty suffix vowel is underlyingly present even before possessive suffixes. While the first person singular suffix /-a/ has a single tone after a singular stem, it has the sequence HL after a plural stem (cf. (44)-(48) above). This alternation can be explained by taking H to be the tone of the antigenitive suffix and L to be the tone of the possessive suffix underlyingly:

(109) làkk-^ˈv-à → làkk-â [2-12] 'my teeth'

Since /-ɔ/ 'our' indicates a plural possessor, the antigenitive suffix preceding it has a high tone after both singular and plural stems, and this high tone causes L-raising of /-ɔ/ :

(110)	pàll ^ˈ - ^ˈ v-ɔ ^ˈ	làkk- ^ˈ v-ɔ ^ˈ	
	L HL H LHL	L H LHL	Underlying
	L HL H HHL	L H HHL	L-raising
	L HL HHL	L HHL	V-replacement & T-reassociation
	2 3 2 E	2 1 E	Pitches
	[pallɔ]	[lakɔ]	
	'our knife'	'our teeth'	

The surface tones of the demonstrative suffix /-íˈ/ can be explained in the same way, since it also follows an antigenitive stem. What we are left with, then, are morphologically simple (i.e. absolutive) nouns with HHL after a non-H stem such as those in (107). Such nouns appear to be rare.

7.3. Lexical representation and tone association. Note that there are no stems or suffixes with underlying LH or HH. Hence the last low tone in LHL-morphemes and HHL-morphemes is predictable. In order to avoid redundancy in the lexical representation of morphemes, this low tone should therefore be

accounted for by a rule which inserts it after TH in any morpheme which is not a prefix:

(111) L-insertion

$\emptyset \rightarrow L / [_{\text{Q}} \text{TH} __]$, where Q is a stem or a suffix

The association of tones to vowels can be accounted for by means of the following rule, which follows L-insertion and precedes L-raising and whose domain is the morpheme, i.e. a stem, a suffix, or a prefix:

(112) Tone Association

(i) Associate the first tone to the (first and only) vowel.

(ii) Associate any remaining free low tone to the vowel.

Note, finally, that the first tone of an empty suffix vowel cannot be a floating tone at any stage of the derivation after the application of Tone Association. If a morpheme-initial high tone were set afloat by V-deletion, it would incorrectly be manifested as a downstep:

- (113) a. $\text{búr-}\acute{\text{V}} \quad \text{má}\wedge\text{n} \rightarrow \text{búr}' \text{má}\wedge\text{n} \quad *[\text{1 } \text{2}] \quad \text{'the women's ashes'}$
 ash-AG+P women
- b. $\text{kw}\grave{\text{a}}\text{n-}\acute{\text{V}} \quad \text{má}\wedge\text{n} \rightarrow \text{kw}\grave{\text{a}}\text{n}' \text{má}\wedge\text{n} \quad *[\text{2 } \text{2}] \quad \text{'the women's food'}$
 food-AG+P women

Only by being reassociated simultaneously with V-deletion will the suffix tone be manifested correctly:

- (114) a. $\text{búr-}\acute{\text{V}} \text{má}\wedge\text{n} \rightarrow \text{búr} \text{má}\wedge\text{n} \quad [\text{1 } \text{1}]$
- b. $\text{kw}\grave{\text{a}}\text{n-}\acute{\text{V}} \text{má}\wedge\text{n} \rightarrow \text{kw}\grave{\text{a}}\text{n} \text{má}\wedge\text{n} \quad [\text{21 } \text{1}]$

8. Comparative Outlook

The tonal system of Pāri, as analyzed in this article, has a number of typologically unusual features: (i) downstep without downdrift, (ii) total rather than partial downstep, (iii) downstep between low tones (among others), (iv) downstep as the manifestation of a floating high tone rather than of a floating low tone, and (v) segmentally unspecified tone-bearing vowels. Interestingly, Pāri shares none of these features with Luo, a closely related

language, which is spoken in Kenya. Like Pärí, Luo has two tones, but as shown explicitly or implicitly by Tucker and Creider [1975] and Creider [1986], (i) Luo has downdrift as well as downstep, and (ii) downstep is partial, (iii) occurs only after a high tone, and (iv) is the manifestation of a floating low tone. Luo is thus a typologically more normal tone language.

The tonal information about Luo in Creider et al. [ms.] makes it possible to establish a set of regular tonal correspondences between this language and Pärí. Note first that H-stems in Luo correspond to H-stems in Pärí and vice versa (cf. the pairs of cognates in (115)-(116) and in (126)-(127) below). The same applies to H-suffixes, as in (116)-(117) and (123)-(125).

(115)	Pärí:	H	Luo:	H
	léep	[1]	lép	'tongue'
	máan	[1]	món	'women'
	tón	[1]	tón	'spear'
(116)	Pärí:	H-H	Luo:	H-H
	pál-á	[1-1]	pál-á	'ochre'
	à-gúl-ú	[2-1-1]	à-gúl-ú	'type of pot'
	à-gwátt-á	[2-1-1]	à-gwát-á	'type of gourd'

In all other cases, either the two languages have different surface manifestations of the same underlying tones, or there is no one-to-one correspondence between their underlying tones.

The low tone of HL-stems, which is manifested as a low tone in Pärí, is manifested as a downstep in Luo:

(117)	Underlying:	HL-H		
	Pärí:	HL-H	Luo:	H!-H
	páan-ó	[12-1]	niél!-ó	'python'
	gêed-ó	[12-1]	géd!-ó	'to build' (build+AP-SUF)
	kwáan-ó	[12-1]	kwén!-ó	'to count' (count+AP-SUF)

Conversely, underlying prefixal high tones which are manifested as downstep in Pärí are manifested as high tones on the stem in Luo:

(118) Underlying: LH-L

Pärì: L!-L	Luo: L-HL	
à!-cùth [2-3]	à-cùth	'vulture'
à!-cèl-ó [2-3-2]	à-cèl	'one'
à!-jò-ó [2-32] ¹⁵	à-jôog-á	'witch-doctor'

On the other hand, the floating high tones that exist in stems and suffixes in Pärì have been lost in Luo. In this way, LH-stems have merged with L-stems in Luo. That is the case whether there is no suffix, as in (119)-(120), or whether the suffix tone is L, as in (121)-(122), or H, as in (123)-(124).

(119) Pärì: L

Luo: L

bàt [2]	bàt	'arm'
guòk [2]	guòk	'dog'
dèel [2]	dèl	'skin'

(120) Pärì: LH

Luo: L

dàk' [2E]	dàk	'pot'
kòoy' [2E]	kò	'gourd'
cièth' [2E]	cièth	'excrements'

(121) Pärì: L-L

Luo: L-L

jòob-ì [2-2]	jòw-ì	'buffalo'
tièl-ò [2-2]	tièl-ò	'foot'
yàm-ò [2-2]	yàm-ò	'wind'

(122) Pärì: LH-L

Luo: L-L

dèer'-ò [2-E]	dèr-ò	'granary'
kòog'-ò [2-E]	kòg-ò	'beer'
pàl'-à [2-E]	pàl-à	'knife'

(123) Pärì: L-H

Luo: L-H

wìp-ó [2-1]	wìp-ó	'bird'
-------------	-------	--------

¹⁵In words without a stem-final consonant, the tones of the stem and of the suffix are manifested as one continuous pitch.

	puòdh-ó	[2-1]	puòdh-ó	'field'
	cò-ó	[21]	còg-ó	'bone'
(124)	Päri: LH-H		Luo: L-H	
	pàaj'-ó	[23-2]	pàc-ó	'home'
	màal'-ó	[23-2]	màl-ó	'upwards'
	thò'-ó	[232]	ò-thö	'desert date'

This merger has also taken place in stems preceded by an LH-prefix (cf. (118) above and (125)).

(125)	Päri: LH-LH-H		Luo: LH-L-H	
	à'-?ìdh'-á	[2-13-3]	à-îdh-á	'squirrel'
	ù'-mùu'-á	[2-13]	ò-mûg-á	'rhinoceros'

A similar merger has occurred in suffixes:

(126)	Päri: H-L		Luo: H-HL	
	róomb-ò	[1-2]	rómb-ô	'sheep'
	kóodh-ò	[1-2]	kódh-ô	'thorn'
	?óor-ò	[1-2]	ór-ô	'dry season'
(127)	Päri: H-LH		Luo: H-HL	
	dháanh-ò'	[1-1E]	dhán-ô	'person'
	yú-ù'	[1E]	yúg-î	'rubbish' (pl. in Päri)
	à-dúund-ò'	[2-1-1E]	à-dúnd-ô	'heart'

Creider [1986:141] shows that the surface tone pattern H-HL in Luo derives from H-L by a rule of High Spreading, which spreads the high stem tone to the low toned suffix. Thus the underlying suffix tone in Luo to which both L and LH in Päri correspond is L.

In conclusion, although there are many differences between Päri and Luo with respect to the manifestation of tones, the tones of their underlying representations of cognate lexical items are the same, except that one single change has taken place in Luo stems and suffixes, viz. LH > L.

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