

OBSERVATIONS ON KUNAMA TONE
(Barka Dialect)*

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Kunama has been reported by different scholars as having two or three tones, downstep (or not), contrastive length of both consonants and vowels, and lexical stress. Despite this range of reported phenomena, little in-depth research into the prosodic system of Kunama has been undertaken. The aim of the present study is to report such a detailed investigation and to establish on a solid footing basic aspects of the tonal system of Kunama. The work reported is preliminary in the sense that its scope is limited: we present phonological and phonetic evidence for the existence of three level tones, which can combine to form a number of contour tones. This is followed by discussion of tonal phenomena in the noun phrase. No evidence for lexical stress is found.

1. Introduction

Kunama is a Nilo-Saharan language spoken in western Eritrea by approximately 140,000 people. It comprises some seven dialects [John Abraha Ashkaba 1999]; the best known of these are Barka and Marda. The present study is based largely on Barka; however, we have been able to confirm that, with respect to the tonal phenomena examined here, there are no significant differences between these two lects.

* The third author was the primary consultant for the research reported here. We would like to express our appreciation to Macca Teclehaimanot and Padre Vittorio Antutu who also acted as consultants, particularly with regard to the Marda dialect and in helping to draw comparisons between the two lects. We are also grateful for the insightful comments received from an anonymous referee, certain of which we were unable to act on as they require data not available to us at present, and to Robert Botne, SAL editor, for his comments.

2. Previous treatments of prosodic features in Kunama

Several linguists have written descriptions of Kunama phonology, generally based on the two lects referred to above. Although we limit this brief survey mainly to the last two decades, we may note that Tucker and Bryan [1966], presumably following unpublished work by R. L. Stevenson, observe that “[t]one and stress appear to be significant, both lexically and grammatically.” [1966: 337]. They illustrate this observation with forms marked for stress and, significantly, *three* tones.

Of the later work, however, we must first of all consider that of Thompson. Thompson’s article “Kunama: Phonology and Noun Phrase” [1983] clearly established the segmental inventory upon which subsequent work has attempted to build. In treating the prosodic phonology, Thompson was quite clear about the need to recognize consonant length (gemination) but admitted his uncertainty as to whether vowel length was distinctive, since he was of the opinion that there was a correlation between vowel length and stress [1983: 284]. This correlation, however, was only thought to be partial since stress was also said to occur without (vowel) length. Elsewhere stress is reported as usually occurring on syllables preceding geminates [1983: 283]. These statements would appear to suggest an accentual assignment that was sensitive to syllable weight. In the article, stress is marked on some, though by no means most, of the words used for exemplification. Interestingly, a few words are also marked with an acute accent. This is notationally distinct from the diacritic employed by Thompson for indicating stress, though no explanation is offered for this differentiation. In a subsequent detailed and instructive account of the Kunama verb system [1989], Thompson includes many more instances of the (still unexplained) acute accent diacritic. Although prosodic features other than consonant and vowel length are generally treated as stress [1989: 308, 326, 328, 336], there are references in a few places to “normal tone” [1989: 313] and “high tone” [1989: 314, 315, 344], as well as to “tone rise” [1989: 330], so that it would seem that an awareness was developing of a more pitch-based prosodic phenomenon.

In more recent descriptive work on Kunama, Bender [1996, 1997] gives clear recognition to tone. His inventory comprises two level tones and a falling tone. In earlier editorial comments to Thompson’s 1987 article, Bender had expressed doubts as to the existence of three tones in Kunama and had voiced a suspicion that the falling tone might turn out to be confined to word-final position. In a draft *Kunama–English Lexicon*, however, Bender [1997] records—albeit rather rarely—a falling tone in non-final syllables. Inspection shows that the nuclei of these syllables carrying falling tone are diphthongal, i.e., they are bimoraic syllables, which fact invites comparison with certain claims made in Section 2.2 of the present paper. Nevertheless, Bender also comes out in support of Thompson’s interpretation of many aspects of prosodic prominence in Kunama as involving stress, and even extends that view by distinguishing two degrees of stress [1996: 9].

The first mother-tongue speaker to pronounce on Kunama prosody was Niko-dimos Idris [1987]. In his view, Kunama is first and foremost a tone language,

and absolutely no mention is made of stress. Three tonemes are distinguished: rising, falling, and level, and there is also mention of the possibility of combinations of rises and falls. Unfortunately, Nikodimos' otherwise excellent overview of Kunama grammar does not mark tone at all regularly.

Banti & Nikodimos Idris [1994] present a somewhat different view: two tones, H and L, and downstep, with no mention of stress. This contribution was made in the form of a conference paper and we are not aware of its having been published. Thus, we are not in a position to offer much comment on their proposals. Suffice to say that our findings on the distributional patterns of the Mid tone in Kunama show none of the typical features that characterise the phenomenon of downstep as found, for example, in many West African languages.

All the early work on Kunama suggests very clearly that the language has an interesting non-segmental inventory, variously claimed as exhibiting length (both consonant and vowel), lexical stress, and tone. The recent opportunity afforded by the presence in London of a linguistically trained Kunama speaker (a co-author in the present study) during the 1998-9 academic session and two Kunama speakers in Oxford facilitated the undertaking of both oral fieldwork-type investigations coupled with laboratory phonetic techniques, and enabled us to make the present contribution to the intriguing debate about Kunama prosody. Our analysis confirms that stress does not play a role in lexical contrasts in Kunama, but we do find a rich tonal inventory: three level lexical tones that also combine to give a range of contours.

2. The tone inventory

2.1. Pitch phenomena. Kunama operates a register tone system in that its basic tones are level. There is no obvious downstep of the sort that leads to terracing, though utterances of sufficient length to determine whether, or to what extent, other downtrends exist have yet to be examined. However, that there is some downtrending is apparent from examples of possessive constructions presented later in the paper. In terms of surface pitch contrasts within single syllables, Kunama exhibits at least a seven-way potential. Three significant contrasts in relatively level pitches are widely in evidence. We identify these as High (H), Mid (M) and Low (L), and indicate them by means of conventional tone marking: H = á; M = ā; L = à.¹ Examples of these in monosyllabic, disyllabic, and trisyllabic words are given in (1) a, b, and c. We have found no monosyllabic words exhibiting the lowest pitch level. Kunama words longer than three syllables are not at all infrequent but these have not been investigated systematically. We suspect, however, that a proper examination of such longer items would not reveal any patterns at variance with the generalization of facts or the analysis proposed here.

¹ Transcriptions throughout the paper follow IPA conventions, with the following exceptions: y = IPA j; j = IPA dʒ; ʃ = IPA ʃ; c = IPA tʃ.

(1) a. monosyllabic words

<i>mā</i>	'tooth'
<i>bé</i>	'Or ...!'
<i>ú</i>	'Enter (sg.)!'

b. disyllabic words

<i>àbà</i>	'I/me'
<i>ātā</i>	'uncovering; leading'
<i>éŋá</i>	'Eat (pl.)!'

c. trisyllabic words

<i>lākādā</i>	'Stop still (sg.)!'
<i>āgāsā</i>	'centre, middle'
<i>élájí</i>	'Run (pl.)!'

The following paragraphs give instrumental data on the three tones and the contours they combine to form, as pronounced in citation forms. The phonetic data is presented in the first instance to provide a concrete instantiation of our description. Of equal or greater value, however, are the indications these data offer for further, more detailed, research on the relation between tonal phonetics and phonology in Kunama.

Phonetically, initial L tones are typically level, but may have a slight fall. Final Ls are typically falling; this appears to be characteristic and may constitute an important perceptual cue for distinguishing between final L and M. (cf. below, concerning falling contours on initial syllables, where final M may be in the tonal range of L, but remains level.) Low tones on intermediate syllables may also show a fall. Table 1 gives average values and standard deviations of five repetitions, from a male speaker, of disyllabic and trisyllabic words. Measurement criteria are explained in the appendix. Figure 1 shows sample pitch traces of a disyllabic and a trisyllabic word.

Mid tones may be level throughout, though tend to exhibit some movement. Where there is movement it tends to occur early in the word and is more likely to be a fall, as shown for the initial syllable values recorded in Table 2. However, rises have also been observed, as seen on the initial syllable of the two utterances shown in Figure 2. Table 2 gives average values and standard deviations of five repetitions of disyllabic and trisyllabic words. Figure 2 shows sample pitch traces.

Table 1. Average F0 values for Kunama Low tones for disyllabic and trisyllabic words.

	disyllabic		trisyllabic		
	initial	final	initial	medial	final
Mean	130.4–128.0	124.0–115.2	133.4–126.8	128.8–120.6	119.0–112.0
SD	1.7; 1.2	1.2; 3.0	4.6; 2.6	5.6; 4.8	2.1; 3.5

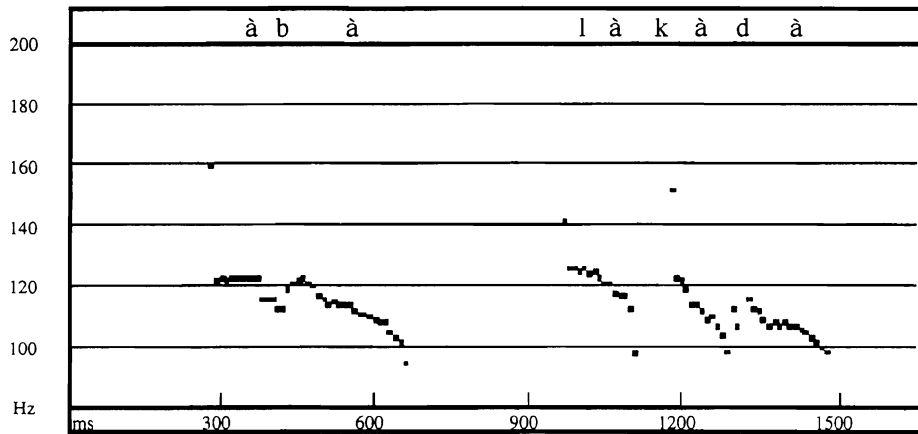
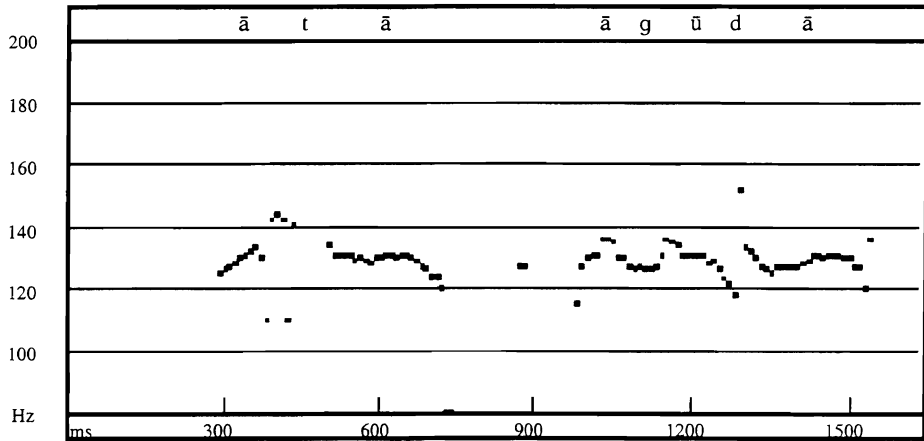
Figure 1: Sample pitch traces of Kunama Low tones for disyllabic and trisyllabic words: *àbà* 'I/me'; *làkàdà* 'stop still (sg.)!'.

Table 2: Average F0 values for Kunama Mid tones for disyllabic and trisyllabic words.

	disyllabic		trisyllabic		
	initial	final	initial	medial	final
Mean	146.6–141.2	140.0–142.4	144.2–139.8	138.6–136.6	140.0–141.6
SD	3.6; 1.6	3.9; 3.3	5.0; 2.6	2.1; 1.7	2.7; 2.3

Figure 2: Sample pitch traces of Kunama Mid tones for disyllabic and trisyllabic words: *ātā* ‘uncovering, leading’; *āgūdā* ‘waterpot’.

High tones tend to rise throughout the word. Table 3 gives average values of five repetitions of disyllabic and trisyllabic words. Figure 3 shows representative pitch traces of these words.

Table 3: Average F0 values for Kunama High tones for disyllabic and trisyllabic words.

	disyllabic		trisyllabic		
	initial	final	initial	medial	final
Mean	172.8–177.4	175.6–181.2	172.4–177.6	173.6–175.0	176.2–178.0
SD	5.8; 3.3	2.1; 4.6	4.8; 5.4	3.2; 3.7	3.6; 7.8

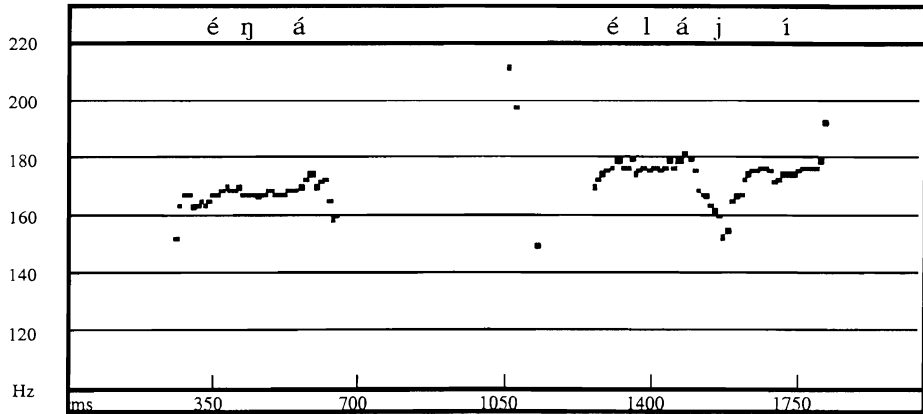


Figure 3: Sample pitch traces of Kunama High tones for disyllabic and trisyllabic words: *éηá* 'eat (pl.)!'; *élájí* 'run (pl.)!'.

In addition to these three level pitches, a number of contrastive pitch contours are also encountered on single syllables. In all, there are three falling contours and at least one rising contour. Since the beginning and end points of the contours give the auditory impression of coinciding with the relatively invariant pitch levels distinguished in the previous paragraphs, it has seemed appropriate to represent these contours in the transcription as sequences of H, M, and L tones; thus, \sim represents a contour in which pitch within the syllable falls from level H to level M. Examples of the three falling contours encountered in monosyllabic, disyllabic and trisyllabic words are given in (2). It is clear from these that falling contours are not restricted to final syllables, and therefore cannot be analyzed as the addition of a Low boundary tone to the word.

(2) Falling contours

a. monosyllabic words

HM	<i>má̃</i>	'love (n.)'
ML	<i>k^wā̀</i>	'Man! (vocative)'
HL	<i>yô</i>	'Take it! Here you are!'

b. disyllabic words

HM	<i>fāgá̃</i> <i>tállā</i>	'miracle, prophet' 'rock'
ML	<i>kášē̃</i> <i>āssī̀</i> <i>fēèdà</i>	'ones who returned' 'here' 'Stand up (sg.)!'
HL	<i>sàttê</i> <i>šóòdà</i>	'three' 'Find it (sg.)!'

c. trisyllabic words

HM	<i>kòsāsá̃</i> <i>nááj í̀kè</i>	'learning, telling' 'I ran'
ML	<i>àsárḕ</i> <i>mēèsābè</i>	'footprints' 'Did you (pl.) dig?'
HL	<i>àtālī</i> <i>kōntállē</i> <i>šáàdīyā</i>	a female anthroponym 'six' 'Exactly! That's right!'

Average F0 values and standard deviations for HM contours in final and initial position are given in Table 4, and pitch traces from sample utterances in Figure 4. Values for final HM are based on 10 tokens (5 repetitions x 2 words) and for initial HM on 5 tokens. In the latter case, measurement of M was taken midway through the /l/, since, as argued below, this consonant is tone bearing. The following points may be noted: first, while the HM pitch excursion in final position

Table 4. Average F0 values for Kunama High–Mid contours tones in final (left, n = 10) and initial positions (right).

Tone	final		initial	
	M	HM	HM	M
Mean	137.1	152.5–129.2	173–150.3	136.5
SD	5.0	6.7; 4.1	5.3–5.5	2.5

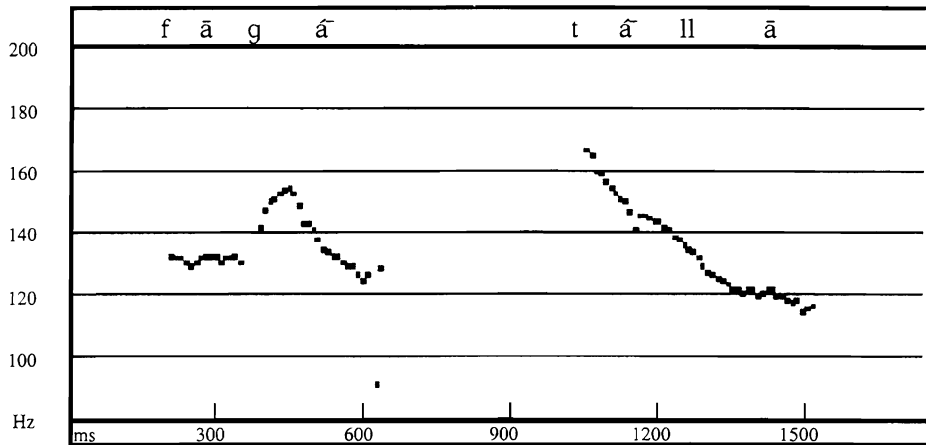


Figure 4. Sample pitch traces of Kunama High–Mid contours in final (left) and initial (right) syllables: *fāgā̄* ‘miracle/prophet’; *tāllā̄* ‘rock’.

Table 5. Average F0 values (n = 5) for Kunama Mid-Low contours tones in final (left) and initial positions.

Tone	final		initial	
	M	ML	ML	L
Mean	122.6	134.6–107.6	130.2–123.8	115.0–104.8
SD	2.7	8.7; 8.6	3.4–3.7	2.4–1.5

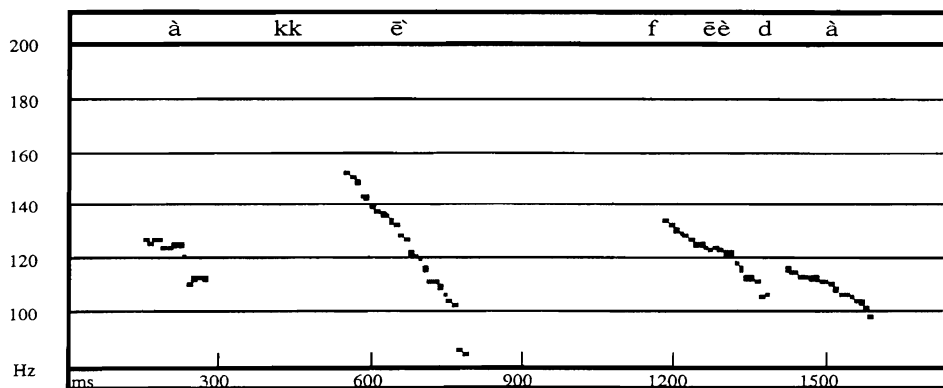


Figure 5. Sample pitch traces of Kunama Mid-Low contours in final (left) and initial (right) syllables: *àkkē* 'my children (voc.)'; *fēèdà* 'stand up!'.

appears to be greater than that in initial position, the difference is, in fact, slight and not statistically significant. Second, not only is the starting point for H higher in initial position, but the whole word is on a higher F0. It is tempting to speculate that the lower values of HM when following M are a result of a downstepping effect of initial M, and this is suggested as an avenue for further research.

Average values and standard deviations for ML contours in final and initial position are given in Table 5, and pitch traces from sample utterances in Figure 5. Again, the pitch excursion in final position appears greater, though the starting point of M in initial position does not parallel that of H; it is, in fact, lower than that seen in final position. However, as with the preceding case, if the ultimate values for (in this case) L are taken into account, values for the two contexts are virtually identically.

Table 6 presents data on the High–Low contour, illustrated in Figure 6, as realized in final and initial positions. As with the HM contour, the difference in pitch excursions is slight and not statistically significant. Again, H begins higher in initial position, and this may be due to a downstepping effect of initial M.

In contrast to the falling contours, rising contours are comparatively rare, though as we shall see below, word-final rises have a significant role as boundary markers within sentences. In word-internal contexts the only rising contour encountered seems to be MH. Word-finally a MH rise is also commonly encountered, and there are some cases where LH seems optionally pronounceable. In our data the optional LH occurs only in final position and only in some words. Examples of word-final MH are given in (3).

(3) Rising contours

a. monosyllabic words

tā́ ‘What?!’ (interjection of surprise/indignation)

b. disyllabic words

tātā́ ‘Grandmother!’ (vocative)

ānī́ a male anthroponym

gḗérḕ ‘tall’ (pl.)

bā́árè ‘two’

mā́ídá́ ‘good’

c. trisyllabic words

àbìšī́ a male anthroponym

àgārḗ ‘people ...’

sàllḗ ~ *sàllè́* ‘four ...’

kā́átām̀mè ‘pair of pregnant females’ (dual)

mṓónàkè ‘I quarrelled’

ā́kkúbè ‘camels’

mī́šàbè ‘Are you (pl.) coming?’

Table 6. Average F0 values (n = 5) for Kunama High–Low contours tones in final (left) and initial positions.

Tone	final		initial	
	M	HL	HL	L
Mean	138.0	159.4–115.4	171.4–127.6	115.0–99.0
SD	3.8	9.2–6.2	6.5–14.0	9.7–4.6

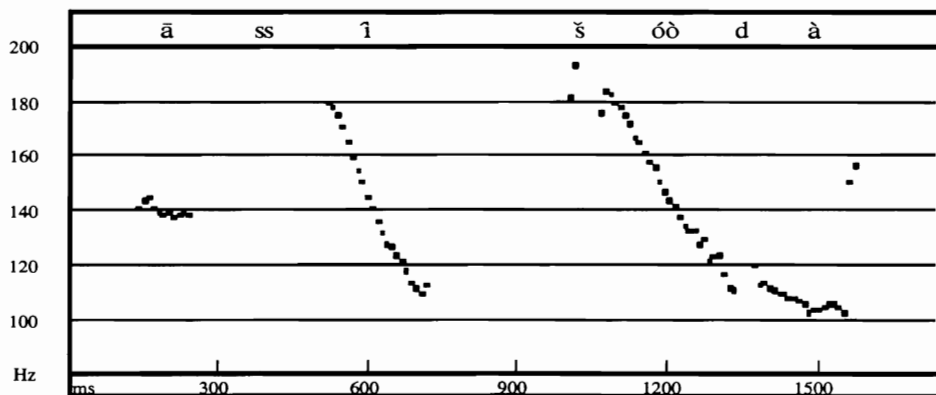


Figure 6. Sample pitch traces of Kunama High-Low contours in final (left) and initial (right) syllables. *āssî* 'here'; *šóòdà* 'get it!/find it!'.

Data for the MH contour are presented in Table 7, and representative pitch traces in Figure 7. As can be seen, in both final and initial position the excursion associated with MH is virtually identical.

Such a rich inventory of pitch distinctions might be expected to give rise to a good many contrasts among segmentally homophonous items, and this is indeed the case. The largest set of which we are aware is the following nonplet: *ālā* 'putting down'; *á-lá-* 'lizard'; *à-lā-* 'Am I beautiful?'; *ālá* 'Leave me (sg.)!'; *á-lá* 'Leave me (pl.)!'; *álâ* 'Did you (sg./pl.)/they leave me?'; *ālâ* 'Did he leave me?'; *à-lā-* 'male anthroponym'; *á-lā-* 'knocking/bringing down, e.g., fruit from a tree'.

2.2. Analysis. It seems clear that, at the very least, three register tones need to be recognized in Kunama, viz: High, Mid, and Low. The complete lack of restriction on the distribution of Mid (apparent in the preceding examples) opposes any attempt to analyse it as a down-stepped High.

How then are the various falls and rises to be interpreted? First of all, the very fact that at least seven of the logically possible combinations of three register tones are actually attested in the language points in the direction of treating them as sequential combinations of the three register tones rather than as unit tones. Second, the end-points of falls and rises approximate the relatively steady-state pitch levels characteristic of the register tones. This observation is based on native speaker intuitions, i.e., that contours appear to begin and end at the same level as level tones. It is to some extent supported by comparing relevant values for level tones and contours tones in the preceding tables; for example, Tables 2 and 3, respectively, show M to be approximately 144 Hz in initial position and H to be around 175 Hz; Table 4 shows the HM contour to be 173 – 150 Hz. It must be acknowledged, however, that individual speaker variation and a range of factors involved in pitch scaling make such a comparison difficult. Third, the phenomena of tone spreading and replacement, and the fact that often one component of the contour is clearly an independent tonal morpheme, as discussed in detail below, provides strong evidence of the appropriateness of an analysis seeing surface contours as sequences of underlying level tones.

Distributional facts also support the analysis we are proposing. Simple examination of the forms adduced in (2) and (3) leads to the observation (which seems to be a very general one for Kunama) that, in non-final syllables, pitch contours generally occur only in heavy syllables, i.e., in syllables having the shapes (C)VV (where VV represents either a long vowel or diphthong) or (C)VC. Certain cases that seem to contradict this statement are discussed later in the paper. The obvious generalization to be made in the case of bimoraic syllables containing long vowels or diphthongs is that each pitch component of a sequence is associated with a distinct mora. The same statement can be made in the case of heavy syllables closed by nasal or liquid consonants. However, it is equally clear that the second tone of a sequence is not associated with a closing obstruent in a heavy syllable. In such cases the entire contour is realized on the nuclear vowel of

Table 7. Average F0 values for Kunama Mid–High contours tones in final (left, n = 10) and initial (right, n = 5) positions.

Tone	final		initial	
	L	MH	MH	HL
Mean	123.6	141.6–171.2	141.2–170.2	164.8–119.8
SD	4.7	6.3; 13.3	7.1; 6.6	5.1; 6.3

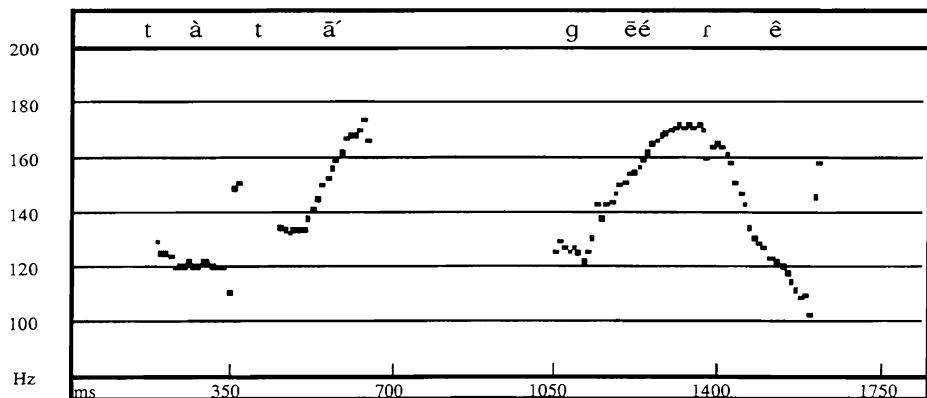
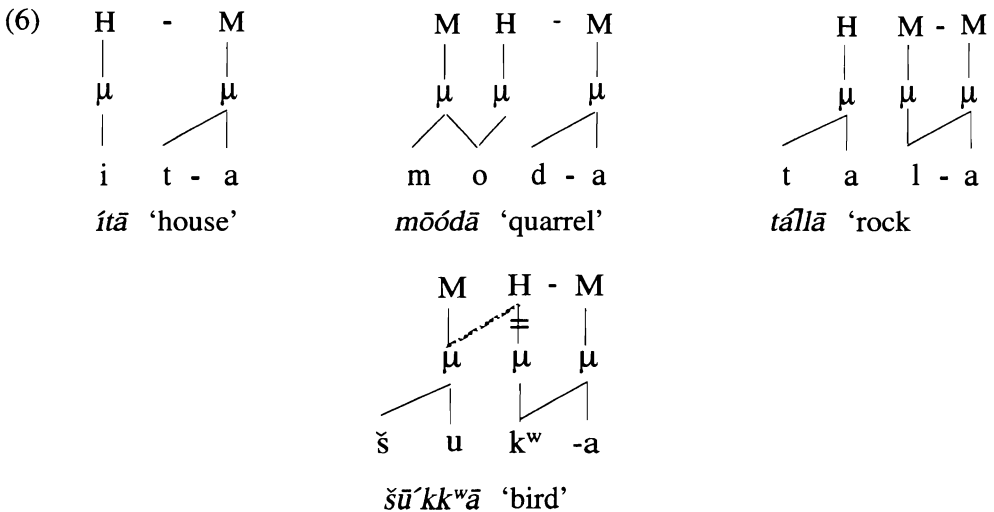


Figure 7. Sample pitch traces of Kunama Mid–High contours in final (left) and initial (right) syllables: *tâtā* ‘grandmother (voc.)’; *gēérê* ‘tall (pl.)’.

the syllable, which is necessarily a short one.² In cases like this the term ‘tone-bearing-unit’, commonly employed in autosegmental analyses, could hardly be equated with the mora in Kunama, for although obstruent moras are quite common, they do not actually ‘bear tone’. On the other hand, where there is a sonorant mora (e.g., nasals or liquids), it does carry the tone. It would be more appropriate to say that tones are assigned on a mora-counting basis but that in cases where the assignment involves an obstruent mora, tones are shifted to the preceding vowel mora. A similar analysis of tone in syllables closed by obstruents has been proposed for another Nilo-Saharan language, Nara [Hayward, in press]. The notation of the various diagrams employed in this study adopts the assumptions of segment-to-mora and mora-to-syllable associations originally proposed by Hyman [1985]. To facilitate an appreciation of the independence of morphological boundaries on the segmental and tonal tiers, boundaries (indicated by hyphens) are marked on each tier separately. In the final example in (6), we can be sure that the syllable-final obstruent is indeed moraic as it involves a geminate, i.e., a heavy, consonant.

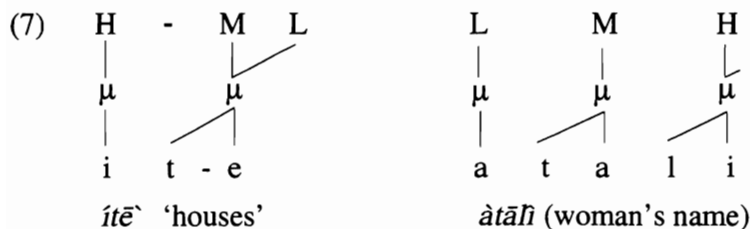


There are, however, some instances of something like a MH rise which occurs in a light syllable word-internally, and would thus appear to run contrary to what has been said about the tone-to-mora assignment being one-to-one in this context. Examination of all such cases reveals that these rising contours are always found

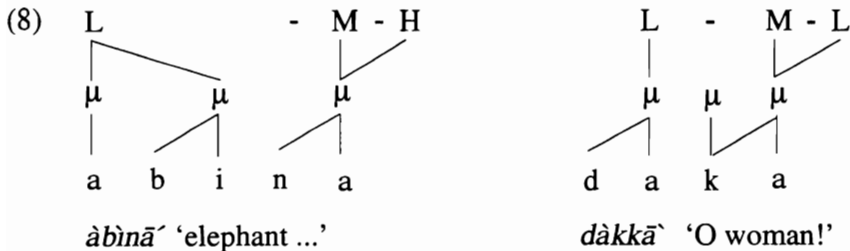
² Kunama has very few “super-heavy” syllables. Three words of which we are aware are: *āūŋg^wá* ‘hyaena’, *àùŋk^wā* ‘boat’, and *àùgg^wā* ‘cat’. A plausible explanation might be to see the labial vowel not as a distinct segment so much as simply a contextual feature of the pronunciation of the low vowel when followed by a consonant sequence containing labialization, for example as *à^wgg^wā*, etc. Support for this would be the fact that these are the only three words of the language that appear to violate the veto on super-heavy syllables, and they all show virtually the same curious sequence of segments, which is also not found elsewhere.

when the preceding tone is a Low. An example would be *lâg-ē'y-ā* 'your (pl.) land', where what is in other contexts a High tone possessive determiner suffix *-éy* 'your' attaches to the Low tone stem *lâg-* 'land'. That the tone of *-éy* really is High is evident if it is affixed to Mid or High tone stems, e.g., *ūg-éy-ā* 'your (pl.) stone', *ít-éy-ā* 'your (pl.) house'. The anomaly is resolved if we interpret this particular MH rise simply as the realization of a High tone when it follows a Low tone. Examination of tone sequences within words reveals fairly conclusively that there are no instances of a Low tone followed by a level high pitch, though there are many where a Low is followed by a MH rise (cf. the examples in (3b)). We conclude then that, in this context, the MH rise represents a High tone.

Many of the examples showing falling and rising contours that were adduced in Section 2.1 involved word-final short vowels. In such cases it is clear that the one-to-one assignment of tones to moras just outlined cannot be sustained. Kunama appears to be a language exhibiting strong tonal stability³ and dumping of string-final tones on the last (rightmost) tone-bearing unit is invoked to account for such forms, as, for example, in (7).



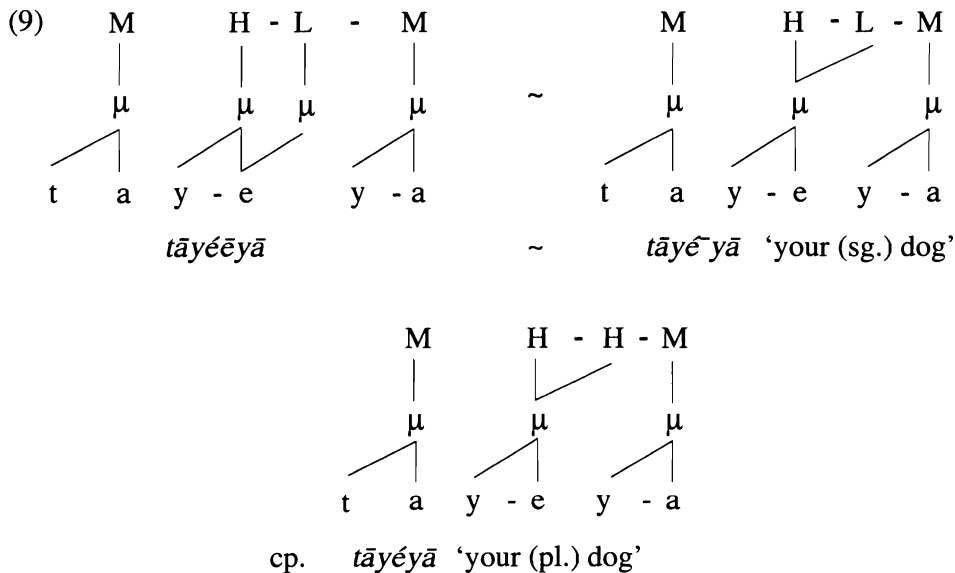
Within utterances, natural breaks occurring after sense groups that are not final in the utterance may occur. When they do, they are signalled by a High boundary tone. Where the pre-boundary vowel carries a Mid tone, a rise to High is heard. In the case where the pre-boundary vowel bears Low tone, a short rise to High is sometimes heard, though this generally contracts its range to that of a MH rise. Likewise, vocative address is signalled by suffixation of a final Low tone. If this suffixation occurs on a noun ending in a vowel bearing a Mid tone, a short falling



³ In a diachronic sense; thus we assume that there must have been a general loss of vowel length in word-final position but that this was not accompanied by a loss of the final tone of the tonal melody of such words.

contour results. Both these phenomena are accounted for by allowing these purely tonal morphemes to dock onto the word-final mora.

It was claimed earlier that word-internal rising and falling contours, i.e., two-tone sequences, were only to be found associated with heavy syllables.⁴ An interesting morphological alternation in possessive determiners appears to be motivated by this constraint. There are four possessive determiners: *-aaŋ* '1st person exclusive', i.e., 'I (\pm one or more others if plural) but not you'; *-iŋ* '1st person inclusive', i.e., 'I and you'; *-ey* '2nd person'; *-iy* '3rd person'. Number in these determiners is expressed tonally, where Low and High tones indicate singular and plural,⁵ respectively. Thus: *āil-ā̀aŋ-ā* 'my cow', *āil-ā̀aŋ-ā* 'our (excl.) cow'; *lāg-èy-ā* 'your (sg.) land', *lāg-éy-ā* 'your (pl.) land'; *ít-iy-ā* 'his/her house', *ít-iy-ā* 'their house'. (Since "inclusivity" necessarily requires two or more persons, *-iŋ* always carries High tone.) Now, there is a class of nominals that is distinguished by the presence of a High tone morpheme that is manifested not on the stem itself but on the vowel of any morpheme that is suffixed to the stem; thus: *mās-ā̄* 'spear', *tāy-ā̄* 'dog'. The analysis of these forms will be considered in section 3, but what interests us here is the fact that, when monomoraic singular possessive determiners occur with such nominals, a situation arises in which a High – Low sequence would be expected to occur on a short vowel. In such a case, the vowel



⁴ One clear exception to this statement occurs in the penultimate syllable of the word *búúbí'y-ē* 'all'.

⁵ In the possessive determiners the plural forms include dual number reference; i.e., there is not a distinct form for dual determiners.

is sometimes pronounced longer, thereby accommodating the tone sequence in a way appropriate for a word-internal environment. With the corresponding plural determiner, no such sequence would arise, and the vowel observed is always pronounced short, as in (9). As the transcription of the singular form suggests, its representation is not the same as for the pronounced form; in fact, it is affected by a tonal assimilation process which will be discussed in Section 3.1.

3. Tone in the noun phrase

Already, from the account given so far, it will have become clear that tone functions significantly in all aspects of the Kunama language, in both lexicon and grammar, as well as in areas that might be considered as belonging to intonation. Nevertheless, even a cursory examination of the nine-fold set of tonal contrasts possible on the segmental string *ala*, which was adduced at the end of section 2.1, suggests that these contrasts rest heavily on what we may distinguish as the grammatical functions of tone. The four forms of the verb 'leave' cited there may be divided morphologically and tone:segment associations indicated as far as possible, but it is still obvious that some morphemes are tonal only, and this fact is increasingly impressed upon us as we investigate Kunama grammar.

As yet, our understanding of Kunama grammar as far as it relates to tone⁶ is still very incomplete. Nevertheless, in order to give some indication of the role of tone, we devote the remainder of this paper to a brief account of tone in the noun phrase. The first subsection deals with tone in nominal words; the second subsection considers some short NP expansions.

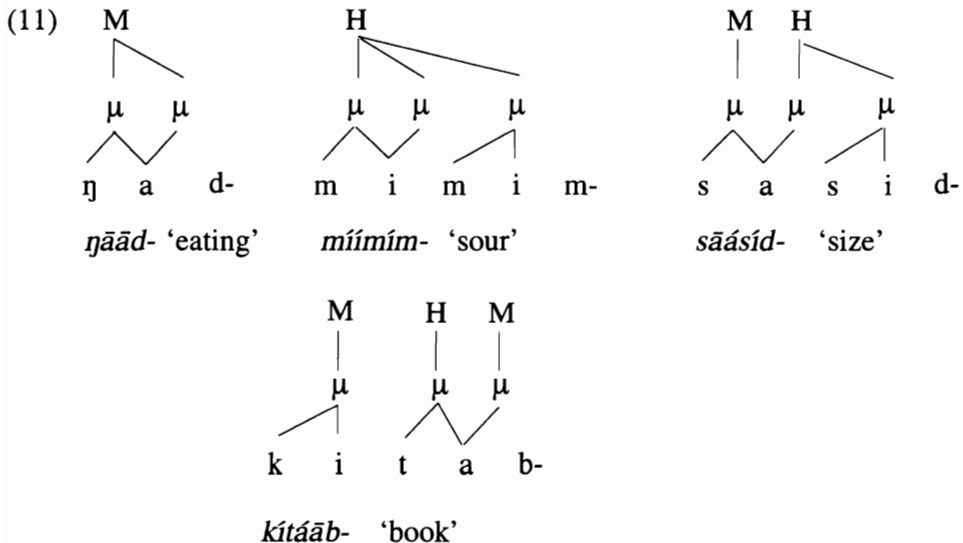
3.1. Nominals. As far as their segmental morphology and tonal behaviour are concerned, nouns and adjectives behave identically, and this is given recognition here by treating them under a common label of "nominals".

Simple nominal stems always end in a consonant and may range from zero to three moras in length. The lower limiting case of nominals where it could be maintained that the stem consists of just a consonant will require separate consideration later, but as far as the generalities to be presented here are concerned they fall in with all other nominals.

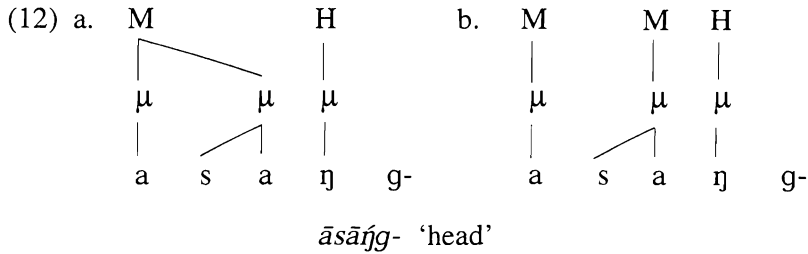
Considerably more work needs to be done and the set of stem tone melodies in (10) is almost certainly not exhaustive. Moreover, we have not extended our investigation to any of the many obvious compound nominals found in the language. In all the examples in (10), and indeed, in our survey of nominals generally, the location of stem tone melodies can regularly be accounted for on the assumption of a left-to-right association convention [Goldsmith 1976; but cp. Pulleyblank 1986], as shown in (11).

⁶ Many of the non-tonal aspects of Kunama grammar have, of course, been already very well described by Thompson [1983; 1989], Nikodimos Idris [1987], and Bender [1996].

- (10) L: *lāg-* ‘land’, *àbìn-* ‘elephant’, *ànd-* ‘big’, *bòbòn-* ‘nose’
 M: *ūg-* ‘stone’, *ḡāād-* ‘eating’, *ācc-* ‘dead’, *fātākād-* ‘interrupting’,
kōbōrōll- ‘foreman’
 H: *jīb-* ‘debt’, *úkún-* ‘owl’, *úúd-* ‘firewood’, *ábíiš-* ‘male’,
míímím- ‘sour’
 LM: *àšūr-* ‘straight’
 MH: *āsár-* ‘footprint’, *lūúš-* ‘pure’, *sū’kk-* ‘bird’, *ā’kkúb-* ‘camel’,
sāásíd- ‘size’
 HM: *táll-* ‘rock’, *fúūc-* ‘lung’
 HL: *láššààd-* ‘goat-herd’
 MHM: *kítáāb-* ‘book’



We have encountered only a small handful of items where something like a tonal pre-association would be required to ensure the correct surface pattern, e.g., *āsāḡg-* ‘head’, where pre-association of the High would allow association of the preceding Mid tone according to the association convention, as in (12a). Here we assume the Obligatory Contour Principle operates, as it appears to apply in the vast majority of cases. However, there is no clear evidence that OCP must be invoked, and an alternative analysis, that each tone is pre-linked as in (12b), while violating the OCP, has the advantage that the above exceptions would no longer be exceptional.



What we refer to as the nominal vowels (NVs) are vocalic suffixes; *-ā* in the case of singular and dual number, and *-ē* in the case of plural number. Although one or other of the NVs occur in every nominal form, their location depends upon the presence or absence of other morphemes in the nominal word. Thus, they follow the stem itself in undetermined nominals, but if a determiner is present, they attach to it. The determiner illustrated here is *-ām* 'this', which occurs with singular and dual forms, and *-ày* 'these', which occurs with plural. These points are illustrated here with the two nouns *lāgā* 'land' and *āgūdā* 'water-pot', and the adjective *tūrūdā* 'fat'. In each example the nominal vowel is underlined.

(13) undetermined

singular	<i>lāg-ā</i>	<i>āgūd-ā</i>	<i>tūrūd-ā</i>
dual	<i>lāg-ā-mèmè</i>	<i>āgūd-ā-mèmè</i>	<i>tūrūd-ā-mèmè</i>
plural	<i>lāg-ē`</i>	<i>āgūd-ē`</i>	<i>tūrūd-ē`</i>

determined (Determiners shown are: *-ām* 'this', *-ày* 'these')

singular	<i>lāg-ām-ā</i>	<i>āgūd-ām-ā</i>	<i>tūrūd-ām-ā</i>
dual	<i>lāg-ām-ā-mèmè</i>	<i>āgūd-ām-ā-mèmè</i>	<i>tūrūd-ām-ā-mèmè</i>
plural	<i>lāg-ày-ē`</i>	<i>āgūd-ày-ē`</i>	<i>tūrūd-ày-ē`</i>

In the above words the tonal patterns are all straightforwardly compositional and only in the case of the dual forms do we observe something that might require a word of explanation. This is the occurrence of a Mid-to-Low fall on the penultimate syllables of these forms. This is readily explained in terms of the Low tone associated with the morpheme marking dual number, viz. *-mèmè* achieving a maximal realization. This can be taken as rather nice evidence that the domain of tone in Kunama is the morpheme. In this case we have a segmental morpheme which is bimoraic without being either a bimoraic syllable or a sequence of two monomoraic syllables, and its tonal melody associates fully with it without apparent regard for syllable boundaries. And yet, it must be observed that at the same time the syllable-based constraint governing the distribution of tone sequences word-internally is still maintained.

The nominals just considered are all of one type in that, whatever the tonal melody is, it aligns itself with the final mora of the stem. We shall refer to nominals of this type as Class I.

There is, however, another type of nominal where there is an additional High tone that does not align with the final mora of the stem, which means that its realization always takes place on the first element following the stem. In undetermined nominals this High tone is located on the nominal vowels, as in (14). In (14) b and c, the characteristic Mid tone elements of the nominal vowels ($-\bar{a}$, $-\bar{e}$) could be regarded as having been incorporated *en passant* in the High-to-Low falls on the syllable following the stem.

(14) a. singular

$\acute{a}\acute{s}\bar{a}\bar{a}$ ‘old - of thing’; $\acute{u}\acute{u}\bar{d}\bar{a}$ ‘firewood’; $\acute{a}\acute{r}\bar{d}\bar{a}$ ‘intestines’; $t\bar{o}m\bar{a}$ ‘fire’;
 $\acute{a}\acute{a}\bar{f}\bar{a}$ ‘grandmother’; $\acute{a}\acute{u}\bar{\eta}g\bar{a}$ ‘hyaena’; $k\bar{o}s\bar{a}s\bar{a}$ ‘learning’

b. dual

$t\bar{o}m\bar{a}\bar{m}\bar{m}\bar{e}$ ‘two fires’; $t\acute{u}kk\bar{a}\bar{m}\bar{m}\bar{e}$ ‘two guns’

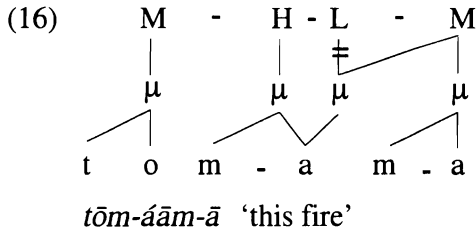
c. plural

$t\bar{o}m\bar{e}$ ‘fires’; $t\acute{u}kk\bar{e}$ ‘guns’

Could this additional High tone not be analysed as a component of the nominal vowels? Such a view might require, for example, that we set up two tonally distinct sets of nominal vowels distributed with different stems on a lexically determined basis. That this is incorrect is easily understood when we observe that this High tone appears on other vocalic suffixes—as occurs, for example, in nominal words containing determiners. An example of this has already been seen earlier in (9); the same otherwise unexpected High tone appears in other determiners also, as shown in (15). Here, optional lengthening of the vowel of the determiner is explained as previously (cf. example (9), i.e., as a response to the constraint promoting optimal word-internal association of tone sequences and syllables.

(15) $t\bar{o}m\bar{a}\bar{m}\bar{a} \sim t\bar{o}m\bar{a}\bar{a}\bar{m}\bar{a}$ ‘this fire’;
 $t\acute{u}kk\bar{a}\bar{m}\bar{a} \sim t\acute{u}kk\bar{a}\bar{a}\bar{m}\bar{a}$ ‘this gun’

The examples in (15) also illustrate another common tonological process of Kunama, namely the spreading of Mid tone to replace a preceding Low when the latter is preceded by a High tone. In these examples, the Low tone of $-\bar{a}\bar{m}$ is affected, as shown by the schema in (16). This assimilation has the effect of smoothing the overall contour. It is an interesting question whether assimilation of this sort occurs more generally, e.g., when the sequence H-M-L occurs with each tone on its own syllable. Our data does not include relevant examples, which must be very rare among nouns in the language if they exist at all. The sequence might well occur in verbal constructions, and this remains an area for further research.



As demonstrated above, the association of tone melodies with nominal stems in Kunama generally follows a left-to-right operation, and it will be noticed that if the extra High tone were analysed just as part of the stem tone melody, its behaviour in words such as *āīm-ā* 'laugh (n.)' (*ā mīm-ā), and *īš-ē* 'fish (pl.)' (*īš-ē) would run contrary to that generalization. Moreover, as we have said, this High tone never attains association within the stem. We conclude that this floating tonal element represents an independent and purely tonal morpheme. It appears to add nothing to the semantics of the nominals where it is found, and is considered here simply as a marker of a second lexical class which we shall refer to as Class II, exemplified in (17).⁷ The claim that these are indeed two nominal classes receives rather striking confirmation when we consider possessive constructions (cf. section 4.2.4.).

(17)	<u>Class II</u>		<u>Class I</u>	
	M - H	LM - H	M	HM
	<i>tom-</i>	<i>kosas-</i>	cp. <i>kut-</i>	<i>fuuc-</i>
	'fire'	'learning'	'breast'	'lung'

We have already made the observation that some nominal stems in Kunama seem to consist simply of a single consonant, which we refer to as 'mono-consonantal' stems. It might be expected that such stems would have no tonal melody of their own, and the tone pattern of a word in which they occurred would be supplied entirely by other morphemes that were present; and this appears to be the case, as shown by the examples in (18).

(18)	<u>singular</u>	<u>plural</u>	cp. <u>dual</u>
	<i>m-</i> 'tooth'	<i>m-ē</i>	<i>m-ā-nīmè</i>
	<i>ny-</i> 'meat'	<i>ny-ē</i>	<i>ny-ā-nīmè</i>

Nevertheless, there are some facts that suggest that such stems are not really without tone. Firstly, we find that these nominals divide into two classes, according to tonal behaviour, just like nominals with longer stems. This fact is apparent simply in listening to citation forms, as in (19). Examples of those that have the High tone class marker are given in (20).

⁷ Thus it would be comparable to a thematic vowel defining a distinct inflectional class in more familiar languages.

- | | | | | |
|------|------------------------|---|-------------|--------------------------|
| (19) | <i>w-ā</i> | ‘eye’ | <i>s-ā</i> | ‘giving’ |
| | <i>k^w-ā</i> | ‘man’ | <i>w-ā</i> | ‘leaving off’ |
| | <i>b-ā</i> | ‘hole’ | <i>t-ā</i> | ‘building, constructing’ |
| | <i>c-ā</i> | ‘death’ | <i>d-ā</i> | ‘returning’ |
| | <i>n-ā</i> | ‘drinking’ | <i>f-ā</i> | ‘leaf vegetables’ |
| | <i>k-ā</i> | ‘taking, accepting’ | <i>f-ā</i> | ‘collecting’ |
| | <i>ŋ-ā</i> | ‘eating’ | | |
| (20) | <i>m-á̃</i> | ‘love’ | <i>s-á̃</i> | ‘closing’ |
| | <i>k-á̃</i> | ‘hate’ | <i>t-á̃</i> | ‘breaking (tr.)’ |
| | <i>b-á̃</i> | ‘raising, ploughing,
sexual intercourse’ | <i>t-á̃</i> | ‘planting, inserting’ |
| | <i>w-á̃</i> | ‘entering’ | | |

At first blush it would appear that the nominals in (19) and (20) belong, respectively, to Classes I and II as previously established for other nominals. Indeed, there seems to be no real difficulty in considering the nominals in (20) as members of Class II. Thus, a nominal such as *má̃* ‘love’ behaves exactly like a typical Class II nominal such as *tāyá̃* ‘dog’, as shown in (21). It would seem reasonable, therefore, to analyse the nominals of (20) as having stems such as *m’*- ‘love’, *s’*- ‘closing’, etc.

- | | | | | |
|------|------------------|----------------------------------|------------------|-----------------|
| (21) | ‘dog’ | <i>tāy-á̃</i> | <i>m-á̃</i> | love |
| | ‘dogs (dual)’ | <i>tāy-á̃-m̄mè</i> | <i>m-á̃-m̄mè</i> | loves (dual) |
| | ‘dogs (pl.)’ | <i>tāy-ê</i> | <i>m-ê</i> | loves (pl.) |
| | ‘this dog’ | <i>tāy-á̃ m-ā̃ ~ tāy-á̃ām-ā̃</i> | <i>m-á̃ām-ā̃</i> | this love |
| | ‘your (pl.) dog’ | <i>tāy-éy-ā̃</i> | <i>m-éy-ā̃</i> | your (pl.) love |

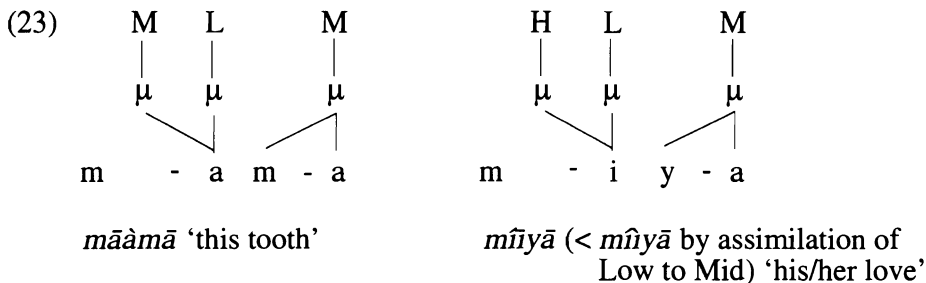
There is, however, a problem with identifying the nominals of (19) with Class I. Forms of the nominals listed in (19) should—if they are really members of Class I—show no evidence of either a stem tone melody (they have, after all, mono-consonantal stems) or a post-stem tone (a post-stem High tone being the defining property of Class II nominals). Unexpectedly, however, we find both falls and rises on determiners affixed to these nominals, as shown in (22).

- | | | | |
|------|-----------------------------|-------------------|----------------------------------|
| (22) | <i>k^w-āām-ā̃</i> | ‘this man’ | (* <i>k^w-àām-ā̃</i>) |
| | <i>k^w-āáŋ-ā̃</i> | ‘our (excl.) man’ | (* <i>k^w-ááŋ-ā̃</i>) |
| | <i>m-ŋy-ē̃</i> | ‘his teeth’ | (* <i>m-ŋy-ē̃</i>) |
| | <i>ny-ééy-ā̃</i> | ‘your (pl.) meat’ | (* <i>ny-ééy-ā̃</i>) |

Such forms reveal a parallelism in behaviour to nominals of Class II rather than to Class I, and we suggest that a similar analysis be applied to them by claiming that they also have a floating tone following the stem. In this case, however, that

tone is a Mid. We shall refer to this type as Class III. They could be represented as m^- ‘tooth’, ny^- ‘meat’, etc.

Are we correct though in assuming these stems to be mono-consonantal? An argument in favour of this analysis would be the fact that the vowel that follows the consonant of the stem appears always to be of a quality as would be furnished by whatever suffix occurs; compare the examples in (21) and (22). An argument for considering them not as mono-consonantal but as consisting of a consonant followed by a short vowel of some sort comes from the fact that vowels of determiner suffixes that attach to them are always long. In other cases it has been noted that such suffixes only show optional vowel lengthening when the derivation creates a tone sequence to be associated with them. Perhaps the constant factor of length in these mono-consonantal nominals could be accounted for by positing a mora in association with the post-stem tones. This would allow the segmental content of any suffix to associate with this mora, and so account for the vowel quality encountered, as in (23).



The fact that the citation form contains only a short vowel cannot be considered to constitute a serious objection to such an analysis, for it is a fact about Kunama that there simply are no word-final long vowels. So, any long vowel derived by suffixing a nominal vowel to this stem vowel might be expected to be pruned to length. A similar observation to the effect that there are no super-heavy syllables in the language would counter any objection based on the fact that the nominal vowel is always short in dual forms, such as *m-ā-nîmē* ‘teeth (dual)’, for which one imagines a closed syllable contraction process eliminating potentially trimoraic syllables.

An analysis of these stems in this way would be to acknowledge that not all stems end in consonants. This would present a synchronic irregularity but, viewing the proposal positively, it might also go some way towards understanding how post-stem floating tones came about in Kunama, for one could then see such tones as relics of earlier tone-bearing vocalic suffixes. The fact that rather more of the substance of such suffixes was retained in monoconsonantal stems would be similar to the frequent retention of, say, otherwise lost noun class prefixes with monosyllabic noun stems in Bantu, e.g., Swahili Class 9/10 *n-ta* ‘wax’ but *tembo* ‘elephant’.

3.1.1. Numerals. Numeral quantifiers can also certainly be regarded as a subgroup of nominals, though from the point of view of tone there is a slight difference. Thus, while the nominal vowels of all other nominals bear a Mid tone, the nominal vowel of most numerals bears a Low tone. The numerals 1 – 10 operate within a quinary system, whereas from 10 upward the system is clearly decimal.

(24)	one	<i>éllá̃</i>	eleven ⁸	<i>šḗbnáàlà éllá̃</i>
	two	<i>bāárè</i>	twelve	<i>šḗbnáàlà bāárè</i>
	three	<i>sāttê</i>	eighteen	<i>šḗbnáàlà kṓnsāttê</i>
	four	<i>sàllè</i>	twenty	<i>šḗbbáárè</i>
	five	<i>kūssúmè</i>	twenty-one	<i>šḗbbáárè éllá̃</i>
	six	<i>kṓntáállê</i>	thirty	<i>šḗbsāttê</i>
	seven	<i>kṓntábáárè</i>	forty	<i>šḗbsàllè</i>
	eight	<i>kṓnsāttê</i>	fifty	<i>šḗbkūssúmè</i>
	nine	<i>éldāúðè</i>	sixty	<i>šḗbkṓntáállê</i>
	ten	<i>šḗébè</i>	hundred	<i>mújá̃</i>

Two things will be observed. Firstly, the only numerals to have the nominal vowel *-a* are *éllá̃* ‘one’ and *mújá̃* ‘one hundred’; all the others have the nominal vowel *-e*. It seems clear from this that ‘one’ is just like any other singular nominal morphologically⁹, while all the numerals higher than ‘one’ behave like plural nominals. The second thing to be noted is that, like other nominals, the numerals are subdivided into those with a floating High tone following the stem (*éllá̃* ‘one’, *sāttê* ‘three’, *kṓntáállê* ‘six’, *mújá̃* ‘hundred’) and those that do not have a post-stem vowel.

The attributive quantifying use of numeral quantifiers will be considered in Section 3.4.2, but it is pertinent here to mention the rather special behaviour of *éllá̃* ‘one’ in attributive function. When functioning in this way, *éllá̃* attaches to the noun it quantifies. The latter drops its nominal vowel, though when the tone of this vowel is simply Mid (i.e., with no post-stem High superimposed on it) it may be detected as a component of a rise on the numeral, as in (25).

(25)	<i>áléllá̃</i>	‘one lizard’	cp.	<i>álá̃</i>	‘lizard’
	<i>méllá̃</i>	‘one love’	cp.	<i>má̃</i>	‘love’
	<i>āgūdéllá̃</i>	‘one water-pot’	cp.	<i>āgūdā</i>	‘water-pot’
	<i>dàkké́llá̃</i>	‘one woman’	cp.	<i>dàkkā</i>	‘woman’
	<i>mḗllá̃</i>	‘one tooth’	cp.	<i>mā</i>	‘tooth’

⁸ The teens are formed by means of a postpositional phrase structure meaning ‘X ahead of ten’.

⁹ *mújá̃* ‘hundred’ is always quantified by another numeral, and the citation form listed here is a short form of *mújéllá̃* ‘one hundred’, which is why it appears with the singular nominal vowel.

The matter is considered here because it would not be unreasonable to see such forms as incipient “singulatives”. It is a feature of many Eritrean languages to have a singulative nominal category. In the case of Kunama, a profound linguistic influence has generally been exerted by its neighbour Tigre, which is a language well known for its wide deployment—and extensive use—of a singulative number category [cf. Palmer 1962].¹⁰

All other quantifiers, i.e., words such as *àtē* ‘many’, *áǰǰúǰē* ‘few, a little’, *búúǰí yē* ‘all’, and *búúǰí yā* ‘every’, behave entirely like adjectives and, like them, have fully regular nominal morphology; it should be noted that their nominal vowels do not pattern tonally like the numerals just considered.

3.2. Determiners. The possessive determiners (-*añ* ‘1st person exclusive’, -*in* ‘1st person inclusive’, -*ey* ‘2nd person’, -*iy* ‘3rd person’) and the proximal deictic determiners (-*àm* ‘this’, -*ày* ‘these’) have already entered into the discussion of the previous section. There is one further pair of determiners which occurs, like these, in post-stem position, namely -*ōōm* ‘that’ and -*ōy* ‘those’. This suffix also denotes previous reference within discourse, so that it functions somewhat like a definite article. The tonal behaviour of nominals containing -*ōōm* and -*ōy* is entirely straightforward.

The tables in (26) present the tone patterns of four representative nominals of the classes established in 3.1. containing the three determiners for the three number categories; it thus summarizes what has been discussed to this point.

(26) a. *ēlā* ‘tree’ (Class I)

		<u>possessive det</u>	<u>prox. deic. det</u>	<u>distal deic. det</u>
sg.	<i>ēl-ā</i>	<i>ēl-ààñ-ā</i>	<i>ēl-àm-ā</i>	<i>ēl-ōōm-ā</i>
du.	<i>ēl-ā-mìmè</i>	<i>ēl-ààñ-ā-mìmè</i>	<i>ēl-àm-ā-mìmè</i>	<i>ēl-ōōm-ā-mìmè</i>
pl.	<i>ēl-ē</i>	<i>ēl-ààñ-ē</i>	<i>ēl-ày-ē</i>	<i>ēl-ōy-ē</i>

b. *tāyá* ‘dog’ (Class II)

		<u>possessive det</u>	<u>prox. deic. det</u>	<u>distal deic. det</u>
sg.	<i>tāy-á</i>	<i>tāy-aáñ-ā</i>	<i>tāy-á m-ā</i> ~ <i>tāy-áám-ā</i>	<i>tāy-óōm-ā</i>
du.	<i>tāy-á-mìmè</i>	<i>tāy-ááñ-ā-mìmè</i>	<i>tāy-á m-ā-mìmè</i> ~ <i>tāy-áám-ā-mìmè</i>	<i>tāy-óōm-ā-mìmè</i>
pl.	<i>tāy-ē</i>	<i>tāy-ááñ-ē</i>	<i>tāy-á y-ē</i> ~ <i>tāy-ááy-ē</i>	<i>tāy-óy-ē</i> ~ <i>tāy-óóy-ē</i>

¹⁰ The location and behaviour of the dual number marker -*mmè* suggests that it could have had a similar origin. The fact that the final e vowel of this form is associated with a Low tone points up its affinity with the numerals.

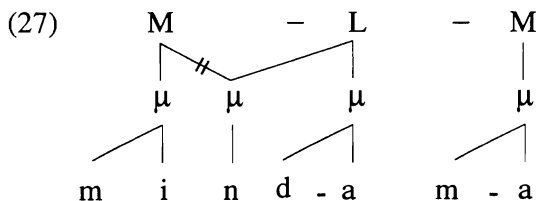
c. *mā* ‘tooth’ (Class III)

	<u>possessive det</u>	<u>prox. deic. det</u>	<u>distal deic. det</u>
sg. <i>m-ā</i>	<i>m-ā̀àṅ-ā̀</i>	<i>m-ā̀àm-ā̀</i>	<i>m-ṑom-ā̀</i>
du. <i>m-ā̀-ṁmè</i>	<i>m-ā̀àṅ-ā̀-ṁmè</i>	<i>m-ā̀àm-ā̀-ṁmè</i>	<i>m-ṑom-ā̀-ṁmè</i>
pl. <i>m-ḕ</i>	<i>m-ā̀àṅ-ḕ</i>	<i>m-ā̀ây-ḕ</i>	<i>m-ṑoy-ḕ</i>

d. *má* ‘love’ (Class II)

	<u>possessive det</u>	<u>prox. deic. det</u>	<u>distal deic. det</u>
sg. <i>m-á</i>	<i>m-á̀āṅ-ā̀</i>	<i>m-á̀ām-ā̀</i>	<i>m-ó̀om-ā̀</i>
du. <i>m-á̀-ṁmè</i>	<i>m-á̀āṅ-ā̀-ṁmè</i>	<i>m-á̀ām-ā̀-ṁmè</i>	<i>m-ó̀om-ā̀-ṁmè</i>
pl. <i>m-é</i>	<i>m-á̀āṅ-é̀</i>	<i>m-á̀ây-é̀</i>	<i>m-ó̀oy-é̀</i>

Finally, mention should be made of another assimilation that has been noted in connection with determiners. When the Low tone determiners (i.e., *-àm*, *-ây*, and the singular possessive determiners) attach to a Mid tone stem in which the last two moras form a heavy syllable, Low tone spreads leftwards to the second mora, replacing its association with Mid. Thus: *mī̀nd-àm-ā̀* ‘this leg’, cp. *mī̀nd-ā̀* ‘leg’. The process may be represented as in (27).



mī̀nd-àm-ā̀ ‘this leg’

3.3. Simple NP expansions. It is our purpose here to consider a small variety of NP expansions with a view to describing the behaviour of tone within syntax.

3.3.1. Adjectives in attributive function. Although adjectives and nouns form a common class in terms of morphology, their syntactic behaviour is quite distinct, and this distinction extends to tonal patterning as well. While attributive adjectives follow the head noun they qualify, nouns in possessor function precede the head noun.¹¹ What especially concerns us here is that within a noun-adjective sequence neither constituent shows any tonal change, as shown in (28).

¹¹ The point is of interest in terms of areal linguistic features, for within the Horn generally the syntactic location of adjectives vis à vis the noun they qualify and the possessor in a possessive construction correlate.

- (28) a. *ítā àndā* '(a) big house' cp. *ítā* 'house'; *àndā* 'big'
 b. *tāyá bībá* '(a) red dog' cp. *tāyá* 'dog'; *bībá* 'red'
 c. *ítā dāmádām̀m̀m̀* 'a couple of small houses'
 cp. *ítā* 'house'; *dāmádām̀m̀m̀* 'small (dual)'
 d. *kíšā gèēr̀* 'tall girls' cp. *kíšā* 'girl'; *gèēr̀* 'tall (pl.)'

As the last two examples (28c-d) show, number marking takes place on the adjective rather than on the noun head, but from the tonal point of view each word is fully explicable in terms of its morphology as an independent item.

3.3.2. Numerals and other quantifiers. The rather special behaviour of *éllá* 'one' as an attributive quantifier has already been seen (cf. 3.1.1.). When functioning to qualify a nominal, numerals follow the nominal, though they show no signs of cliticizing to it. The plural nominal vowel occurs obligatorily on the NP head, even when dual marking occurs; when this latter is present—necessarily with the numeral 'two'—it is suffixed to the stem of the numeral. Any determiners present are also suffixed to the numeral stem. With regard to tonal behaviour no changes are observed in either word, as shown in (29).

- (29) *dàkkē sāt̀t̀* 'three women' cp. *dàkkē* 'women', *sāt̀t̀* 'three'
àbìnē sàll̀ 'four elephants' cp. *àbìnē* 'elephants', *sàll̀* 'four'
dàkkē bāárām̀m̀ 'two women (dual)'¹²
 cp. *dàkkām̀m̀* 'women (dual)'
āgūdē sāt̀t̀ỳ 'these three water-pots'¹³
 cp. *āgūdē* 'water-pots', *sāt̀t̀* 'three', *-̀ỳ* 'these'
tāỳ sàll̀ỳ 'those four dogs' cp. *tāỳ* 'dogs', *sàll̀* 'four', *-̀ỳ* 'those'.

As was noted earlier, other quantifiers are formally just like nominals. When quantifying a nominal their behaviour—including tonal behaviour—is exactly like that of attributive adjectives.

3.4.3. The possessive construction. The possessive construction in Kunama has the order possessor–possessee. In such constructions, tonal changes may be very much in evidence. However, the changes seen in nouns of Classes I and II differ. As possessor, Class I nouns replace the Mid tone melody of the nominal vowel with a Low tone melody; this is clearly seen when the following word begins with a consonant, though when it begins with a vowel, assimilation to the tone borne by this vowel occurs. In possessee function, the tonal melody of the stem is

¹² The numeral *bāár̀* 'two' does not necessarily require dual morphology; thus, *dàkkē bāár̀* 'two women'. The semantic distinction conferred by this grammatical difference has not yet been investigated.

¹³ The leftward spreading of the final Low tone should be noted. From our observations to date all assimilations—whether tonal or segmental—operate regressively (leftwards) in Kunama.

replaced by a Mid-High melody, as in (30). The change in tone melody is illustrated clearly in Figures 8 and 9, with the former showing the citation forms and the latter the possessive construction.

- (30) a. *dàkkà sāmátā* ‘(a) woman’s grain-basket’
 cp. *dàkkā* ‘woman’; *sāmātā* ‘grain-basket’
- b. *àbinà ùkúnā* ‘(an) elephant’s ear’ cp. *àbinā* ‘elephant’; *ùkúnā* ‘ear’
- c. *gàm̀m̀m̀à mī̀ndā* ‘(a) sheep’s leg’ cp. *gàm̀m̀m̀ā* ‘sheep’; *mī̀ndā* ‘leg’
- d. *dàkkà gā̀m̀m̀ē* ‘(a) woman’s sheep (pl.)’
 cp. *dàkkā* ‘woman’; *gàm̀m̀m̀ē* ‘sheep (pl.)’
- e. *àbinà ùkúnā̀m̀m̀è* ‘(an) elephant’s two ears’
 cp. *àbinā* ‘elephant’; *ùkúnā̀m̀m̀è* ‘ear (du.)’
- f. *āgūdà ùkúnā* ‘(the) ear (= handle) of a waterpot’
 cp. *āgūdā* ‘waterpot’, *ùkúnā* ‘ear’
- g. *nyā` hāmá`* ‘(the) meat’s taste’ cp. *nyā* ‘meat’, *hāmā* ‘tastiness’
- h. *kī̀š̀š̀à āsā̀ŋ̀gā* ‘(a) girl’s head’ cp. *kī̀š̀š̀ā* ‘girl’, *āsā̀ŋ̀gā* ‘head’
- i. *ítà ùdā`* ‘(a) house’s door’ cp. *ítā* ‘house’, *ùdā`* ‘door’

It is important to notice in the examples in (30) that the Mid tone of the nominal vowel of the possessee undergoes no change. However, if the stem of the possessee noun consists of only one mora, assignment of the Mid-High melody forces an association of the second tone with the nominal vowel, so that the nominal vowels of such forms come to resemble those of Class II nominals, as in (31).

- (31) a. *ítà ùdā`* ‘(a) door of a house’ cp. *ítā* ‘house’; *ùdā`* ‘door’
- b. *mī̀ndà gātá`* ‘shape of a leg’¹⁴ cp. *mī̀ndā* ‘leg’; *gātā* ‘shape’
- c. *dàkkà ítā`* ‘(a) woman’s house’ cp. *ítā* ‘house’; *dàkkā* ‘woman’

Class II nouns behave in a distinct way in possessive constructions. In the possessor noun the post-stem High tone remains intact but the tone of the nominal vowel itself is not replaced by a Low tone melody as it is in Class I, so that the form appears to undergo no change at all, as in (32).

¹⁴ The Mid-Low fall in the first syllable of *mī̀ndā* results from the tonal assimilation described in section 3.2.

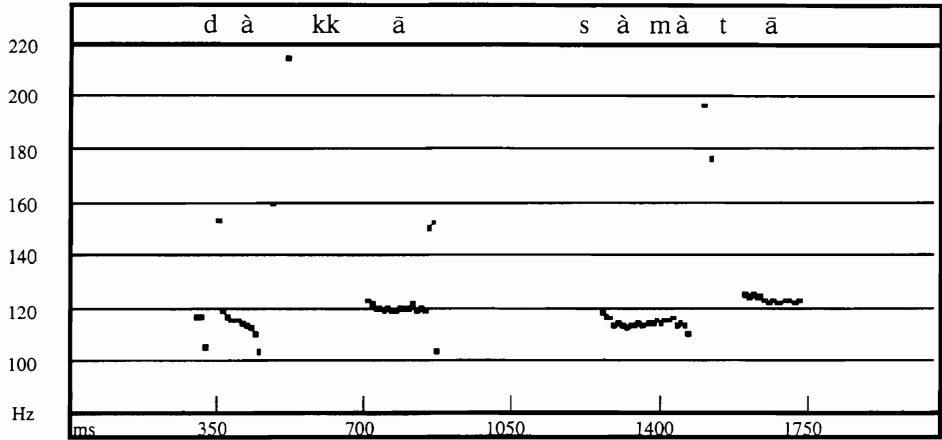


Figure 8: Representative pitch traces of Kunama words *dàkkā* 'woman' and *sàmâtā* 'grain basket' as citation forms.

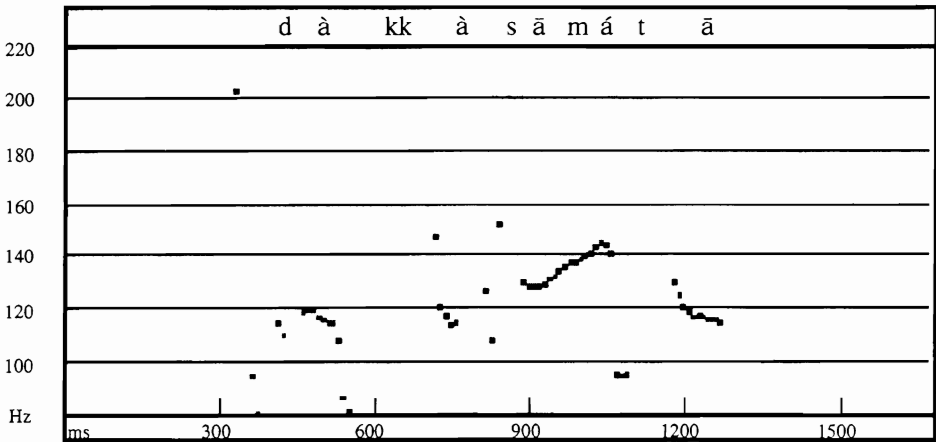


Figure 9: Pitch trace of *dàkkā* and *sàmâtā* as the possessive construction *dàkkā sàmâtā* 'a woman's grain basket'.

- (32) a. *álá̃ mīndā̃* ‘(a) lizard’s leg’ cp. *álá̃* ‘lizard’; *mīndā̃* ‘leg’
 b. *kāāsá̃ gātá̃* ‘shape of a belly’ cp. *kāāsá̃* ‘belly’; *gātá̃* ‘shape’

This difference in behaviour may possibly be explained by means of the raising to Mid of a Low tone preceded by High and followed by Mid, i.e., the assimilation process invoked in Section 3.1 to account for something rather similar in the tonal behaviour of Low tone determiners.

The most interesting difference however appears in the possessee noun, where, in addition to replacement of the stem tone melody by the Mid-High melody, the post-stem High tone is dropped too, as in (33). Illustrations of these are given in Figures 10 and 11.

- (33) a. *àbìnà kāāsā̃* ‘(an) elephant’s belly’ cp. *àbìnā̃* ‘elephant’; *kāāsā̃* ‘belly’
 b. *álá̃ šíimā̃* ‘(a) lizard’s tail’ cp. *álá̃* ‘lizard’; *šíimā̃* ‘tail’

The fact that in these forms the post-stem High tone is dropped along with the stem tone melody strongly supports the idea that although it is a separate morpheme, this element is part of the stem.

Some consideration needs to be given to the “monoconsonantal-stem” nouns, where their brevity of structure might be expected to impose constraints on the association of the Mid-High melody indicating possessee status. As in the case of Class I nouns with monomoraic stems considered above, the High tone of the melody is obliged to associate with the nominal vowel. However, there being no possibility of three tones associating with the nominal vowel the Mid tone element of the melody receives no phonetic realization. One consequence of the High tone element of the melody being realized on the nominal vowel is that the tonal distinction between Class III and Class II in monoconsonantal-stem nouns is neutralized in possessive constructions; cf. example (34c) below, for example.

- (34) a. *gàm̀m̀à wá̃* ‘(a) sheep’s eye’ cp. *gàm̀m̀ā̃* ‘sheep’, *wā̃* ‘eye’
 b. *tāyā̃ nyā̃* ‘(a) dog’s meat’ cp. *tāyā̃* ‘dog’, *nyā̃* ‘meat’
 c. *dàkkà mǎ̃* ‘(a) woman’s love’ cp. *dàkkā̃* ‘woman’, *mǎ̃* ‘love’
 or ‘(a) woman’s tooth’ cp. *dàkkā̃* ‘woman’, *mā̃* ‘tooth’

Finally, few examples of nested possessive constructions have been observed, and these (35) suggest that they involve essentially the same patterns as have just been described.

- (35) a. *kʷà dǎ̃kkà̃ ítá̃* ‘(a) man’s wife’s house’
 cp. *kʷā̃* ‘man’; *dàkkā̃* ‘wife (=woman)’; *ítā̃* ‘house’
 b. *gàm̀m̀à šíimā̃ šēbērā̃* ‘smell of a sheep’s tail’
 cp. *gàm̀m̀ā̃* ‘sheep’; *šíimā̃* ‘tail’; *šēbērā̃* ‘smell’

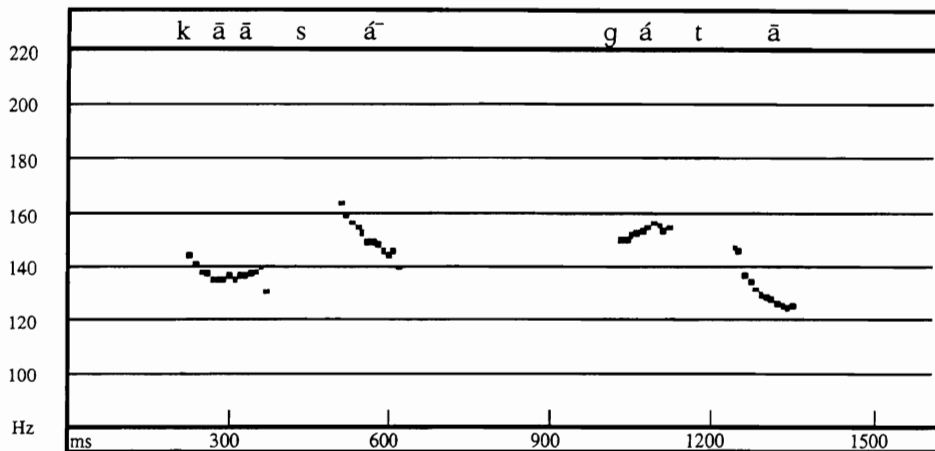


Figure 10: Representative pitch traces of Kunama words *k̄āsā́* 'belly' and *ḡátā́* 'shape' as citation forms.

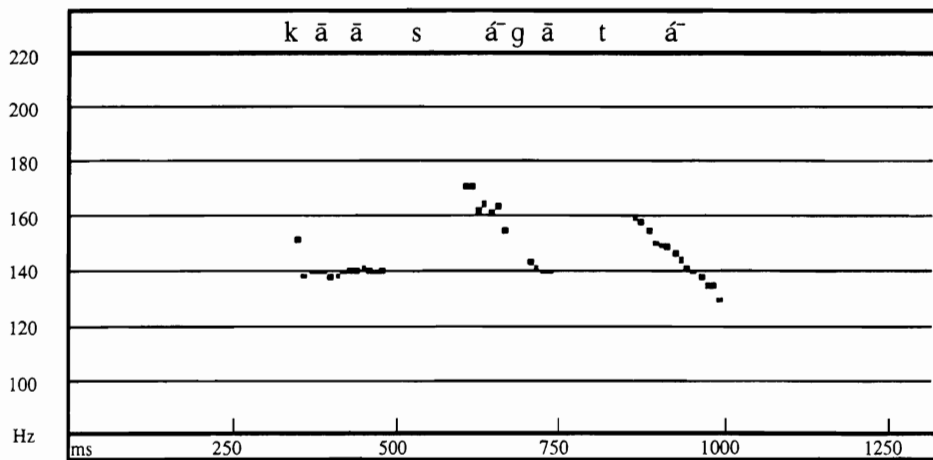


Figure 11: Pitch trace of *k̄āsā́* and *ḡátā́* as the possessive construction *k̄āsā́ ḡátā́* 'shape of a belly'.

4. Summary

Kunama has, in previous work, been claimed to have contrastive tone, length (both consonantal and vocalic) and lexical stress. The present study, while preliminary in the sense that much more remains to be explored regarding Kunama non-segmental phonology, finds no evidence at all for contrastive lexical stress. All lexical contrasts not attributable to segmental or durational differences can be accounted for in terms of three tones and tonal contours resulting from combinations of these three. Both descriptive phonetic data and phonological discussion have been presented concerning the realization of Kunama tone and how it functions in noun phrases. Further work should focus on completing the description of tone in Kunama. Among what we suspect will be many further instances of the grammatical use of tone, the investigation of the verb phrase should be of particular priority. Investigation into factors relating to pitch scaling in Kunama would also constitute important work since, while a small amount of work in this vein has been done on three-tone languages (e.g., Connell & Ladd 1990 and Laniran 1992 for Yoruba, Snider 1998 for Bimoba), the tonal system of Kunama appears to have interesting differences to these languages, and has the potential to contribute greatly to our general understanding of tonal phenomena.

APPENDIX

Measurements of Kunama Tones

Recordings of words illustrating Kunama tones in citation forms and in possessive constructions were recording in the Phonetics Laboratory at the School of Oriental and African Studies on Sept 30 and Oct. 8 1999. The speaker was John Abraha, the third author of this paper. The recordings were done using a Sony DTC ZE700 digital recorder, with the audio signal fed into the left channel and a laryngograph (EGG) signal to the right channel. We are grateful to Bernard Howard for his technical assistance and expertise. Subsequent processing and analysis was done using MacQuirer 4.7 software. Measurements for tones from a selection of citation forms are included in the text. Table A.1, below, presents the measurements done on possessive constructions. Citations forms included in this table were recorded separately from those used in the first part of the paper. Average measurements are based on a minimum of five repetitions of each item. Where the average is based on a greater number of repetitions, this is indicated. Generally two measurements were taken on each vowel, avoiding consonant perturbations and using the general criteria set out in Connell & Ladd [1990] to select landmarks for measurement. In cases of vowels not flanked by consonants, and where no obvious landmark was available, a point was chosen 30–65 ms from the beginning or end of the vowel.

Table A.1. Tone values (F0) for sample Kunama possessive constructions, showing tone changes from citation forms to possessor or possessee position.

Exx		Citation form	Possessor	Possessee
1	dàkkā	119-113; 120	119-115; 116-107	
1	sāmātā	116; 114-110; 126		128-132; 144; 118-115
2	àbinā	122-122; 118; 122	121; 121-114; 117	
2	ùkùnā	127-116; 124-121; 124-131		131-112; 150-156; 137-118
3	gàmmā	120-117; 124-127	125-121; 121	
3	mīndā	130; 124-127		135-154; 128-116
4	dàkkā	119-115; 127-123	120; 122-117	
4	gàmmē	121; 129-112		126-149; 128-104
5	àbinā	124-116; 126-122; 124-129	136-126; 125-120; 123-127	
5	ùkùnām̀m̀è	128-116; 126; 126-118; 106-100		134-123; 163-152; 134-116; 105-103
6	ítā	161-146; 134-124	163-148; 132-123	
6	ùdā	130-123; 127-136		124-123; 143-122
7	mīndā	133-135; 132-134	136-134; 123-115	
7	gátā	157; 138-127		122; 152-128
8	dàkkā	124-121; 133-134	127-122; 121	
8	ítā	169-171; 138-130		141-126; 154-133
9	álá	158-165; 160-134	163-170; 160-143	
9	mīndā	143; 138-142		145-156; 134-126
10	kāásá	135-137; 153-135	136-140; 164-151	
10	gátā	153-159; 136-125		138; 146-130
11	àbinā	129; 132-130; 134-138	131; 133; 128-122	

11	kāāsá̃	137–140; 156–133		136–160; 136–125
12	á alá̃	155-163; 149-129	154-160; 151-130	
12	šíímá̃	172-167; 153-132		138-148; 138-125
13	gà̀m̀m̀ā	133–136; 141–146	133; 136	
13	wā	139–143		159–134
14	tāyá̃	128; 138-117	128-137; 139-131	
14	nyā	128-122		131-133-116
15	dà̀kk̀ā	122–121; 132–129	123–122; 125	
15	má̃	149–123		146–123
16	dà̀kk̀ā	—	125–122; 127	
16	mā	134–125		147–122
17	kwā	137–141	136–117	
17	dà̀kk̀ā			133–148; 127–116
17	ítā	168; 132–129		131; 149–122
18	gà̀m̀m̀ā	—	129–125; 118	
18	šíímá̃	171; 146–123		141–154; 135–112
18	šè̀b̀è̀r̀ā	131; 130; 137–143–135		134; 148; 135–122

Table A.2. Tonal patterns of Possessee.

	Gloss	Cit	Class	Predicted	Observed	EXX
sàmàtā	grain basket	LLM	I	MHM	MHL	1
ùkùnā	ear	LLM	I	MHM	MLHML	2
šèbèrā	smell	LLM	I	MHM	MHML	18
mīndā	leg	MM	I	MHM	MHML	3
gàm̄mē	sheep (du.)	LML	I	MHML	MHML	4
ùkùnā̄m̄mè	ear (du.)	LLMLL	I	MHMLL	MHMLL	5
ùdā	mouth	LM	I	MHM	MHM	6
gátā	shape	HM	I	MHM	MHM	7
ítā	house	HM	I	MHM	HMHM	8
gátā	shape	HM	I	MHM	MHM	10
ítā	house	HM	I	MHM	MHM	17
mīndā	leg	MM	I	MHM	MHM	9
kāāsá̄	belly	MHM	II	MHM	MHM	11
šímá̄	tail	HHM	II	MHM	MHM	12

wā	eye	M	III	HM	HM	13
nyā	meat	M	III	HM	ML	14
mā	tooth	M	III	HM	HM	16
má̃	love	HM	II	HM	HM	15
dàkkā	woman	LM	I	MHL	MHML	17
šíimá̃	tail	HHM	II	MHL	MHML	18

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