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THE PROSODY OF TENSE MARKING IN TEKE-EBOO

A Bantu B70 language of Congo-Brazzaville

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Abstract

Teke-Eboo is a Bantu B70 language spoken in Congo-Brazzaville, which displays complex tone melodies combining grammatical tone, subject agreement tone and lexical tone on verbs. This study of tense marking in Eboo identifies the tones which mark the recent past, general past and future tenses, and shows how the underlying high-low (H-L) contrastive tone system adds both downstepped H and mid (M) tones in surface realisations. Grammatical tone is also impacted by an intonational boundary L tone (L%), which causes lowering of grammatical tones utterance finally.

Much earlier analysis of the prosodic features of neighbouring Teke-Kukuya (Paulian 1975, Hyman 1987) provides a helpful reference point for this study. According to Paulian, Kukuya has a stem-initial stress accent, which affects the distribution of segments and tones, as well as five tone melodies which spread over stems and even onto prefixes on the following word. In this study of tense in Eboo, I show that there is also segmental evidence for a possible stress accent on the stem-initial syllable, and that the same tone melodies as in Kukuya operate across stems and beyond, providing the key to understanding how grammatical tone marks tense on Eboo verbs.

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Abbreviations

AM	aspect marker		sg	singular
AUX	auxiliary		STM	subject/tense marker
C	consonant		tr	transitive
C_1 C_2	first, second consonant		V	vowel
CON	consective conjugation		V_1 V_2	first, second vowel
CV-CV	hyphen shows syllable break			
c1 c5	noun class 1, noun class 5		ø	zero prefix
Fig.	figure		#	word boundary
FUT	future tense		1s 2s 3s	1st, 2nd, 3rd person singular
FV	final vowel		1p 2p 3p	1st, 2nd, 3rd person plural
G	glide			
HAB	habitual		Tones:	
intr	intransitive		L	low tone
N	homorganic nasal		L%	low boundary tone
PB	proto-Bantu		L*	extra L tone
pl	plural		M	mid tone
PFV	perfective (final vowel)		H	high tone
PST	general past tense		↓ or !	downstep
REC	recent past tense			

Acknowledgments

1. Introduction

This thesis describes how tense is marked in Teke-Eboo, with particular focus on tone as the main tense marker. The aim of my investigation is threefold:

- To identify the underlying tones marking the recent past, general past and future tenses;
- To show how this grammatical tone (marking tense) combines with subject agreement tone and lexical tone on verbs to produce the surface tone melodies;
- To show how intonation affects the realisation of tone on verbs utterance finally.

In order to achieve these aims, I refer to earlier research into the prosodic features of neighbouring Teke-Kukuya (Paulian 1975, Hyman 1987), which appear to be the same in Eboo and which provide the key to understanding how grammatical tone functions on verbs. Kukuya has a stem-initial stress accent resulting in stressed and unstressed syllables with segmental asymmetry, as well as five tone melodies which spread from stem-initial syllables, across stems, to prefixes on the next word.

In this study of Eboo tense, I examine the interaction between grammatical tone, subject agreement tones, and the two-way lexical tone contrast on verb stems. Given that underlying tone patterns are often quite different from surface realisations, the tone melodies identified for Kukuya provide a template which assists in "unearthing" the underlying tones for Eboo, and identifying the tonal processes producing the surface tones. The role of intonation as it impacts tone melodies utterance finally is also examined.

The thesis is organised as follows: Section 2 provides background information on the Teke cluster, and summarises the stress accent and tone melodies of Kukuya. I then give an overview of Eboo: firstly presenting the asymmetrical consonant and vowel inventories showing evidence for stress accent, then lexical tone on verbs, and finally the basic structure of verbs and subject agreement tones.

My method is outlined in section 3, and in section 4, I describe the three tenses which are the focus of this study: the recent past, general past and future. For each tense I present data showing the optional auxiliary and conjugated verb forms for both lexically L and H tone verbs. I then discuss the tones marking the tense, and the rules operating to produce the surface tone melodies.

Section 5 deals with intonation in Eboo. I present data showing verbs utterance finally, and discuss the impact of the utterance final boundary L tone (L%) on tone melodies. Section 6 compares the tone melodies and stress accent identified for Eboo with those of Kukuya. Some concluding remarks are then made in section 7.

2. Background

2.1 The Teke language cluster
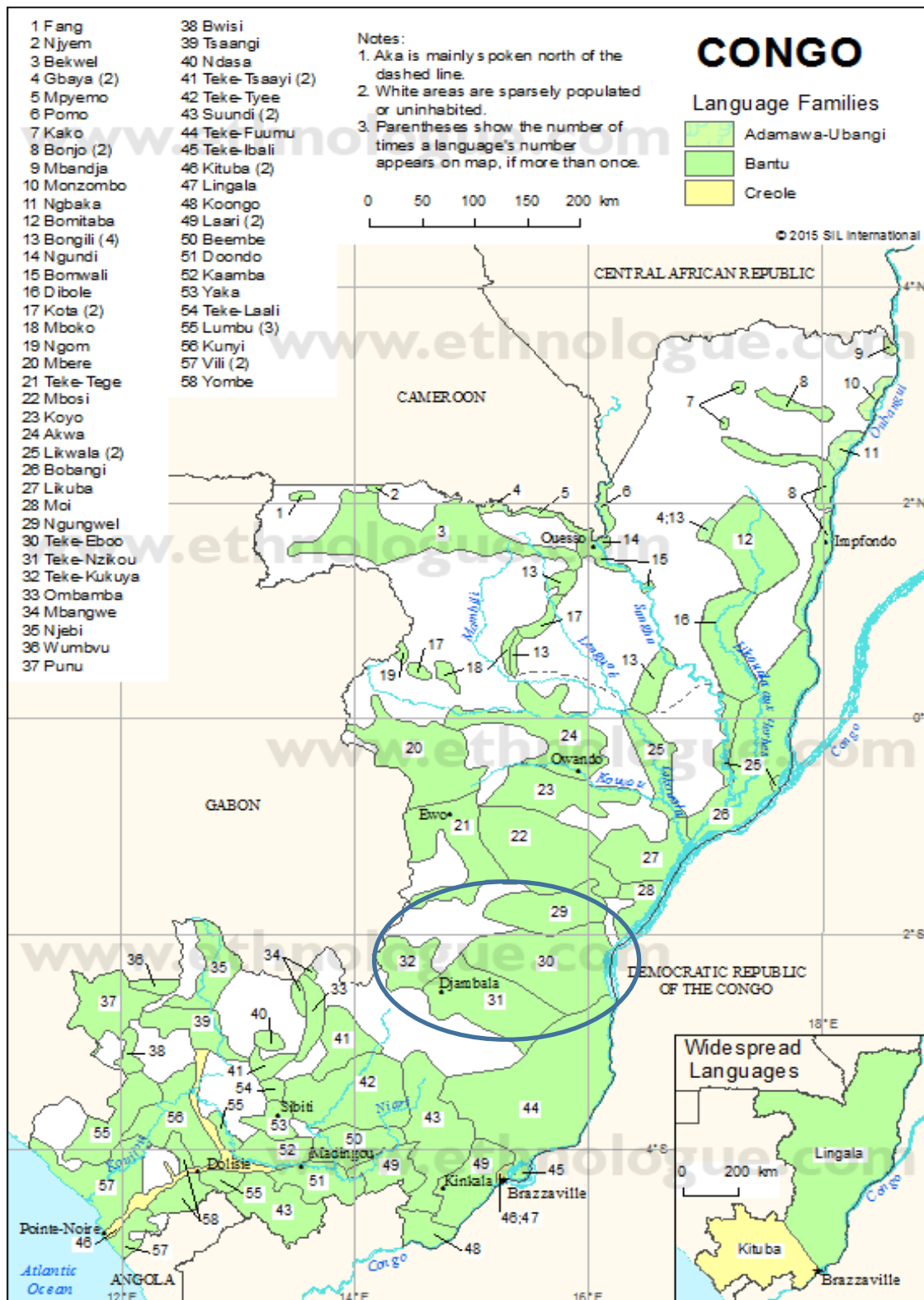
Fig 1: Linguistic map of Congo showing the area (encircled) where Ngungwel (29), Eboo (30), Nzikou (31) and Kukuya (32) are spoken. 21, 41, 42, 44, 45, 53 and 54 form the rest of the Teke cluster. (Lewis 2016)

The Teke group of languages consists of eleven or more closely related languages or dialects, forming the Bantu B70 cluster, as classified by Guthrie (Maho 2016: 643). Teke is spoken over a wide area in the Republic of Congo, as well as in neighbouring areas of the Democratic Republic of Congo (DRC) to the east, and Gabon to the west (cf. fig. 1). The number of speakers in the cluster as a whole is estimated at 740,000 (Lewis: 2016).

Table 1 presents the Guthrie classification (Maho 2006: 643), as well as the equivalent Ethnologue names and codes (Lewis 2016). The subdivisions a, b, c, etc. represent varieties of Teke with a high degree of similarity and mutual intelligibility, which many consider to be dialectal variants. However, I prefer to use the term 'variety' for the purposes of this study, to circumvent the difficulty of deciding what constitutes a dialect rather than a language.

Table 1: The Teke language group according to Guthrie (Maho 2016: 643) and the Ethnologue (Lewis 2016)

Guthrie's classification of Teke		Ethnologue name and code	
B71a	Tege-Kali	Teke-Tege	teg
B71b	Njining'i		
B72a	Ngungwel/Ngangulu	Ngungwel	ngz
B72b	Mpumpu		
B73a	Tsaayi	Teke-Tsaayi	tyi
B73b	Laali	Teke-Laali	lli
B73c	Yaa/Yaka	Yaka	iyx
B73d	Kwe	Teke-Tyee	tyx
B74a	Ndzindzui	Teke-Nzikou	nzu
B74b	Boo/Boma	Teke-Eboo	ebo
B75	Bali/Teke/Tio	Teke-Ibali	tek
B76a	Mosieno	(subgroups of Ibali)	
B76b	Ng'ee		
B77a	Kukwa	Teke-Kukuya	kkw
B77b	Fumu	Teke-Fuumu	ifm
B78	Wuumu/Wumbu	(subgroup of Fuumu)	

In this study, the Ethnologue names in Table 1 will be used to describe the different varieties of Teke, without the prefix Teke- (thus Ngungwel, Nzikou, Eboo, Kukuya, Tyee, etc.).

Having worked on languages in the Teke cluster for some years, I maintain that Eboo (B74b) and Nzikou (B74a) are essentially the same variety of Teke, with both populations able to use the same literacy manuals (Raharimanantsoa 2012a:16). In my earlier work I also refer to a dialect survey carried out in the northern Teke area by Ndamba (1996) to measure

the degree of proximity between varieties. For Eboo and Nzikou, the computer programme 'Wordsurv'[1] gave a very high degree of linguistic proximity: between 95.9% - 92.1% (Ndamba 1996: 44, 47). Ndamba concludes that Nzikou is a sub-variety of Eboo, since it is spoken in a much smaller geographical area around the regional centre of Djambala (see figure 2). He also identifies a second sub-variety, Isiise, not mentioned by Guthrie or the Ethnologue.
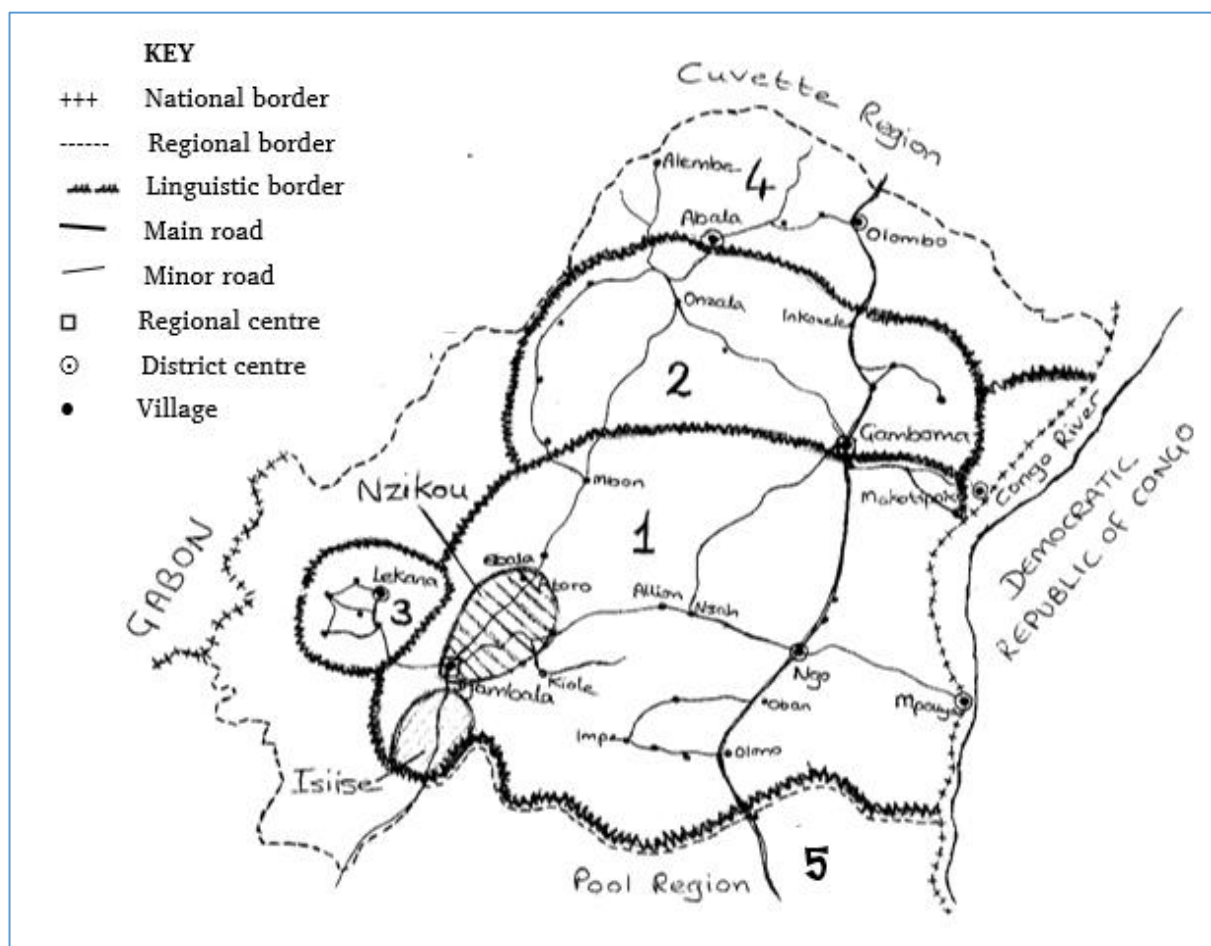
Fig 2: Map of the Plateaux region showing the language areas: 1. Eboo (including Nzikou and Isiise), 2. Ngungwel, 3. Kukuya, 4. Mbochi and 5. Fuumu (adapted from Ndamba 1996).

The Nzikou area appears in figure 1 to be nearly as large as the Eboo area, but it is actually much smaller geographically, as shown in figure 2. However, the fact that Nzikou is spoken in the regional centre of Djambala does give it extra status. In reality, the two dialects are influencing each other, and young people sometimes speak a hybrid of the two. For the remainder of this study, I refer to Eboo to mean the whole of area 1 in figure 2, which includes Nzikou and Isiise.

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[1] 'WordSurv' is a computer program developed by SIL International to aid in the collection and analysis of linguistic data.

2.2 Tone and stress accent in Kukuya

Kukuya (area 32 in fig.1), the Teke variety spoken directly to the west of the Eboo-Nzikou area, is closer to Proto-Bantu (PB) than varieties such as Eboo and Ngungwel which have contracted stems. Previous research into stress and tone in Kukuya (Paulian 1975, Hyman 1987) provides an indication of what we might expect to find in Eboo, and is therefore summarised below.

According to Gordon (2016: 213), the majority of the world's languages are said to have stress, and a good number of these languages also have contrastive tone. Kukuya is one such language which has both. Paulian (1994: 86) comments that many languages in the northwest Bantu group have a stress accent (which she calls an *accent d'intensité*), in addition to tone. Her research into Kukuya (1975) and Ngungwel (1994) (area 29 in figure 1) spoken to the north of Eboo, was carried out a long time ago, but still provides pertinent information about these two varieties. Paulian claims that the morphophonological structures of both Kukuya and Ngungwel are heavily impacted by the presence of a stem-initial stress accent.

A stress accent can be understood as a 'prominence asymmetry' (Downing 2010:3) whereby some syllables have enhanced phonetic properties, which may be pitch, intensity or duration, but can also be contrastive segmental features.

Paulian (1975: 139-153) considers that stress accent plays a major role in explaining the segmental system of Kukuya, since stress on the initial syllable of stems causes all other syllables to be weakened or unstressed. Hyman (1987: 325-326) identifies five different stems structures for Kukuya: CV, CVV, CVCV, CVVCV and CVCVCV, with long vowels only occurring in stressed, stem-initial syllables. Although all five vowels can also be found in unstressed syllables, /e/, /o/ and /u/ are only attested as V_2 if V_1 is an identical vowel. Hyman further notes that there is a large inventory of consonants occurring in the stressed syllable, whereas only six of them can be found in unstressed syllables: /p/, /t/, /k/, /m/, /n/ and /l/.

Thus the distribution of consonants and vowels in Kukuya is asymmetrical, with a significantly reduced inventory in unstressed syllables, which is a common feature of Bantu languages (Downing 2010: 29, Lionnet 2017).

With regard to tone in Kukuya, Paulian (1975: 124-136) shows that the surface realisations of lexical and grammatical tone form five tonal melodies which spread across stems: /L/, /H/, /LH/, /HL/ and /LHL/ (but not /HLH/). The tone melodies start on the stressed stem-initial syllable, not on the prefix, and Hyman (1987: 312) notes in particular

that there is no spreading of tone between a prefix and its following stem, in either direction – rather tone melodies spread onto prefixes in the next word.

Table 2 (Hyman 1987: 313-4) shows the five melodies on stems when occurring before another word without a prefix. Verbal stems are underlined, and prefixes are in brackets.

Table 2: The five surface tone melodies of Kukuya, mapped to the five stem types (CV, CVV, CVCV, CVVCV, CVCVCV) when another word without a prefix follows (Hyman 1987: 313-4) [2]

Tone melody	Noun or verb (prefix).stem	Mapped tone	Gloss
/L/	(kɪ).ba	L	grasshopper-killer
	(kɪ).baa	LL	jealousy
	(kɪ).bala	L-L	to build
	(kɪ).baala	LL-L	to cleave
	(kɪ).balaga	L-L-L	to change route
/H/	(ma).bá	H	oil palms
	(ma).báá	HH	cheeks
	(ma).bágá	H-H	show knives
	(ma).báámá	HH-H	liana
	(ma).bálágá	H-H-H	fence
/LH/	(mʊ).sǎ	L͡H	weaving knot
	(mʊ).saá	LH	seed necklace
	(mʊ).samí	L-H	conversation
	(mʊ).saabí	LL-H	roofing
	.mʷarəgí	L-L-H	younger brother
/HL/	(kɪ).kâ	H͡L	to pick
	(kɪ).káa	HL	to grill
	(kɪ).kára	H-L	paralytic
	(kɪ).káara	HL-L	to be just right
	(kɪ).káraga	H-L-L	to be entangled
/LHL/	(ndɛ́).bvɪ̌	L͡H͡L	he falls
	(ndɛ́).kaây	LH͡L	he loses weight
	(ndɛ́).palî	L-H͡L	he goes out
	(ndɛ́).baámi	LH-L	he wakes up
	(ndɛ́).kalə́gɪ	L-H-L	he turns around

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[2] Tone on data is marked as follows: L tone is unmarked, H tone is marked by an acute accent (á), M tone by a level bar above the vowel (ā), a rising-falling tone by a circumflex (â), a falling rising tone by an inverted circumflex (ǎ). Nasal vowels are marked by a cedilla under the vowel (ą). A dot separates prefixes from stems e.g. **kɪ.báá** 'cheeks'. H͡L with a line above indicates that both tones are realised on the same vowel.

The tone bearing unit in Kukuya is the mora[3], and if there are more moras than tones, L tone spreads rightwards to fill the remaining moras. If there are less moras than tones, two or even three tones may attach to the final mora, forming a contour tone.

Table 2 shows that a /LH/ or /HL/ melody on a monomoraic stem is realised as a contour tone. If the /LHL/ melody lacks three moras to attach itself to, the final vowel (FV) in bimoraic stems takes a contour tone, and this becomes a three-way contour in monomoraic stems -ǐ (although it may be realised as simply mid (M) tone). On trimoraic stems, /LH/ is mapped onto the three moras as LLH, whereas a /HL/ melody is mapped as HLL. In both cases, the L tone spreads to cover the three moras.[4]

In table 2, we see verb infinitives with /L/ or /HL/ tone melodies, and conjugated verbs with /LHL/ melodies. Conjugated verbs presumably have other tone melodies also, but this cannot be confirmed from the table, since the other examples provided are nouns.

The tone melodies in table 2 occur when a word without a prefix follows the stem. However, the data in Paulian (1975: 144-148) indicates that when a word with a H tone prefix follows the stem, the tone melody on the stem spreads across to that prefix, which is an unstressed syllable. The examples in 1 are taken from Hyman (1987: 319-325):

1. a. **témɛ**   'axe'   HL becomes HH before HH: **témé líí.mɛ**   'my axe'

    b. **pɪgí**   'raphia palm'   LH becomes LL before HH: **pɪgɪ líí.mɛ**   'my raphia palm'

    c. **kɪ.bɛnémɛ** 'newborn'   LHL becomes LLL before HH: **kɪ.bɛnɛmɛ kíí.mɛ** 'my newborn'

    d. **ko**   'banana'   L remains L before HL: **ko líɪ.bolō** 'the banana will rot'

In example 1a, the final L of the /HL/ melody on **témɛ** 'axe' becomes raised to H before the following H prefix, confirming that the melody /HLH/ is avoided. The tone melody is realised as only /H/. 1b shows spreading of the initial L tone of **pɪgí** 'raphia palm' before the H tone of the prefix to give an overall LLHH melody, and 1c shows a similar spreading of L tone on the stem, to give LLLHH with the prefix tone. In both 1b and 1c, HH on the prefix is maintained, showing that L tone spreading does not extend beyond the stem, but the basic tone melody in both cases is /LH/. In 1d there is no change to the L tone on the stem, but the melody together with the HL tone on the prefix becomes /LHL/.

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[3] Crystal (1992: 257) defines a mora as "A unit of phonological length". Thus a stem with a short vowel is mono-moraic, a stem with a long vowel or two short vowels is bimoraic, and a stem with three vowels is trimoraic.

[4] Zoll (2003) offers a detailed discussion of the asymmetrical mapping of tone melodies in Kukuya, analysed according to the principle of Optimal Tone Mapping, for readers who are interested in this.

Table 3 shows how the five tone melodies are mapped onto stems when a H tone prefix follows on the next word. The /HL/ melody becomes just /H/, since L tones between two Hs are raised to H, as we saw in 1a. All /LH/ and /LHL/ melodies are reduced to L, since the initial L tone spreads over the rest of the stem before the final H on the prefix, as we saw in 1b and 1c. There are no longer any contrastive tones on stems, with just the initial tone of the melody retained. Verbal stems in the table are underlined.

Table 3: The five surface tone melodies of Kukuya, mapped to the five stem types (CV, CVV, CVCV, CVVCV, CVCVCV) when another word with a H tone prefix follows (Hyman 1987: 320)

Tone melody	Noun or verb (prefix).stem	Mapped tone	Gloss
/L/	(kɪ).ba	L	grasshopper-killer
	(kɪ).baa	LL	jealousy
	(kɪ).bala	L-L	to build
	(kɪ).baala	LL-L	to cleave
	(kɪ).balaga	L-L-L	to change route
/H/	(ma).bá	H	oil palms
	(ma).báá	HH	cheeks
	(ma).bágá	H-H	show knives
	(ma).báámá	HH-H	liana
	(ma).bálágá	H-H-H	fence
LH/	(mʊ).sa	L	weaving knot
	(mʊ).saa	LL	seed necklace
	(mʊ).sami	L-L	conversation
	(mʊ).saabɪ	LL-L	roofing
	.mʷarəgɪ	L-L-L	younger brother
/HL/	(kɪ).ká	H	to pick
	(kɪ).káá	HH	to grill
	(kɪ).kárá	H-H	paralytic
	(kɪ).káárá	HH-H	to be just right
	(kɪ).kárágá	H-H-H	to be entangled
/LHL/	(ndɛ́).bvɪ	L	he falls
	(ndɛ́).kaay	LL	he loses weight
	(ndɛ́).palɪ	L-L	he goes out
	(ndɛ́).baami	LL-L	he wakes up
	(ndɛ́).kaləgɪ	L-L-L	he turns around

In section 4, I will provide Eboo data showing tone melodies before both prefix-less words and words with a prefix, to allow comparison with Kukuya. However, in Eboo, prefixes on words following verbal stems are L toned, not H toned, so the context is not identical.

We consider one more context for tone melodies on verbs before concluding this section. According to Paulian (1975: 130-131) tone melodies may be modified if the verb is utterance final, as shown in table 4.

Table 4: The five surface tone melodies of Kukuya, mapped to the five stem types (CV, CVV, CVCV, CVVCV, CVCVCV) when utterance finally (Hyman 1987: 317)

Tone melody	Noun or verb (prefix).stem	Mapped tone	Gloss
/L/	(kɪ).ba	L	grasshopper-killer
	(kɪ).baa	LL	jealousy
	(kɪ).<u>bala</u>	L-L	to build
	(kɪ).<u>baala</u>	LL-L	to cleave
	(kɪ).<u>balaga</u>	L-L-L	to change route
/H/	(ma).bā	M	oil palms
	(ma).bāā	MM	cheeks
	(ma).bāgā	M-M	show knives
	(ma).bāāmā	MM-M	liana
	(ma).bālāgā	M-M-M	fence
LH/	(mʊ).sā	M	weaving knot
	(mʊ).saā	LM	seed necklace
	(mʊ).samī	L-M	conversation
	(mʊ).saabī	LL-M	roofing
	.mʷarəgī	L-L-M	younger brother
/HL/	(kɪ).<u>ká</u>	H	to pick
	(kɪ).<u>káa</u>	HL	to grill
	(kɪ).<u>kára</u>	H-L	paralytic
	(kɪ).<u>káara</u>	HL-L	to be just right
	(kɪ).<u>káraga</u>	H-L-L	to be entangled
/LHL/	(ndɛ́).<u>bvī</u>	L͡H	he falls
	(ndɛ́).<u>kaáy</u>	LH	he loses weight
	(ndɛ́).<u>palí</u>	L-H	he goes out
	(ndɛ́).<u>baámi</u>	LH-L	he wakes up
	(ndɛ́).<u>kalə́gɪ</u>	L-H-L	he turns around

In table 4, we see final H tones realised as M tones, and if the melody is /H/ (as opposed to /LH/) all the H tones on the stem are realised as M. The other change occurring in utterance final stems is that the final L tone in /HL/ and /LHL/ melodies is no longer realised.

In section 5 on intonation, I will present Eboo verbs utterance finally to see what tonal changes occur in this context. I will argue that for Eboo, like Kukuya, the utterance final changes are caused by a boundary L% which triggers a process of final lowering.

This overview of Kukuya tone melodies shows the importance of analysing Eboo verb stems in three different contexts: before another stem, before a following prefix, and utterance finally, in order to identify underlying tones, since according to the Kukuya model, the surface realisations will be different in these three contexts.

My study of three tenses in Eboo (section 4) will show to what extent the features of stress and tone in Kukuya hold true for Eboo, whether the same tone melodies are attested and whether they spread in the same way. But first I give an overview of Eboo, including a look at consonant and vowel inventories.

2.3   Overview of Eboo

Previous studies on Eboo include phonological analysis (Kristensen & Kristensen 1986; Abandzounou 2012; Raharimanantsoa 2012a/b), a preliminary description of noun classes (Wesche 1994) and an introduction to the verb system (Kristensen & Kristensen 1987), which gives a brief but helpful overview of tense and aspect in Eboo[5]. I refer to Kristensen & Kristensen's research (1987), where pertinent, in this thesis.

2.3.1   Consonant and vowel inventories in the light of stress accent

In this overview of Eboo, I compare consonant and vowel inventories in stem-initial syllables with those in second syllables and prefixes, to investigate whether Eboo shows evidence of a stress accent such as that identified in Kukuya, at the segmental level. Words with more than two syllables in stems are generally loan words (e.g. *utombiili* 'vehicle'), reduplicated words (e.g. *kwɔ́lɔ-kwɔ́lɔ* 'forgiveness') or compounds (e.g. *ndzálá-ntsaa* 'arrogance'), and therefore I limit my data to words with just one or two syllables in addition to the prefix.

The consonant (C) and vowel (V) inventories in tables 5-8 are drawn from Raharimanantsoa (2012a/b), in which I reviewed the phonological studies by Kristensen & Kristensen (1986) and Abandzounou (2012).

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[5] Kristensen & Kristensen's verb analysis is based on a system of five vowels rather than nine, making comparison with my data difficult, but they make pertinent observations concerning tense and aspect.

Table 5 shows 21 stem-initial consonants:

Table 5: Inventory of stem-initial consonants
(Orthographic representations of IPA symbols are given in brackets)

Plosives	**p**	**b**	**t**	**d**		**k**	**g**
Fricatives	**f**		**S**		**ʃ(sh)**		
Affricates	**pf**	**bv**	**ts**	**dz**			
Nasals	**m**		**N**		**ɲ (ny)**	**ŋ**	
Approximants & laterals	**ɥ(yw)**		**L**		**j(y)**	**w**	

Sequences of nasal consonants (N) + other consonants (NC) are frequent in stem-initial position. e.g. ***ndʉ*** 'friend' and ***ngawa*** 'rain storm'. Sequences of consonants followed by /w/, /y/ or /yw/ (henceforth referred to as glides (G)) are also attested stem-initially. /yw/ is rare, but /w/ and /y/ occur frequently after virtually all consonants; e.g. ***u.kyɛ́ɛ́lɛ*** 'to wait', ***u.lwɔ́*** to put'. Thus not only NC and CG, but also NCG are often attested stem-initially; e.g. ***ndzwɔ́*** 'house', ***mbyeelí*** 'knife'.

In second syllable position (table 6), the number of consonants attested is drastically reduced to just four: /t/([ɾ]), /l/, /n/ and /b/, unless the word is borrowed or reduplicated. Furthermore, no sequences of NC, CG or NCG occur stem medially.

Table 6: Inventory of second syllable consonants in stems

Plosives	**b**	**t [ɾ]**
Nasals		**n**
Laterals		**L**

[ɾ] is an allophone of /t/ when in C_2 position; e.g. **taará** 'daddy'.

In subject/tense prefixes on verbs, the consonant inventory is even more limited: just /l/ and a homorganic nasal with the following stem-initial consonant: /m/, /n/ or /ŋ/.

Turning now to vowels, Raharimanantsoa (2012a/b) interprets Eboo as having nine oral and seven nasal vowels. A closer look reveals that the nine vowels qualities are in fact five 'normal' vowels, plus four diphthongs.

Tables 7 and 8 show vowels occurring in stem-initial syllables following C_1; firstly oral vowels and then nasal vowels.

Table 7: Short, long and diphthongised oral vowels in stem-initial syllables

High 1st level	**i**	**ii**			**u**	**uu**
2nd level		**ɨi**				**ʉu**
Mid close		**eɨ**				**oʉ**
Mid open	**ɛ**	**ɛɛ**			**ɔ**	**ɔɔ**
Low			**a**	**aa**		

> ➢ [ɨ] is an allophone of /ɨi/ when a different vowel follows. [6]
> ➢ [ʉ] is an allophone of /ʉu/ when a different vowel follows.
> ➢ [e, ee] are allophones of /ɛ, ɛɛ/ before stem final front high vowels /i/ or /ɨ/;
> ➢ [o, oo] are allophones of /ɔ, ɔɔ/ before stem final high vowels /i/,/ɨ/, /u/ or /ʉ/.

Table 8: Short and long nasal vowels and diphthongs in stem-initial syllables

High		**į̈į̈**				**ų̈ų̈**
		ɨ̈į̈				**ʉ̈ų̈**
Mid	**ɛ̈**	**ɛ̈ɛ̈**			**ɔ̈**	**ɔ̈ɔ̈**
Low			**ą**	**ąą**		

The five vowels /**i, ɛ, a, ɔ, u**/ can be realised short or long in stem-initial syllables, resulting in many contrastive verbal pairs, as in 2 below: (A dot separates prefixes and stems.)

2. /i/   **u.yila**   'to bring'   /ii/   **u.yiila**   'to spend a long time'

    /ɛ/   **u.kyélɛ**   'to filter'   /ɛɛ/   **u.kyéélɛ**   'to wait for'

    /ɑ/   **u.ká**   'to pick, pluck'   /ɑɑ/   **u.káa**   'to grill, fry'

    /ɔ/   **u.tɔ́**   'to boil (intr)'   /ɔɔ/   **u.tɔ́ɔ**   'to be pierced'

    /u/   **u.fura**   'to pay'   /uu/   **u.fuura**   'to go down, descend'

In summary, the vowel inventory in stem-initial syllables includes:

- five short oral vowels /i, ɛ, a, ɔ, u/;
- five long oral vowels /ii, ɛɛ, aa, ɔɔ, uu/;
- four diphthongs /eɨ, oʉ, ɨi, ʉu/;
- three short nasal vowels /ɛ̈, ą, ɔ̈/; and
- seven long nasal vowels and diphthongs /į̈į̈, ɨ̈į̈, ɛ̈ɛ̈, ąą, ɔ̈ɔ̈, ʉ̈ų̈, ų̈ų̈/.

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[6] I represent **[ɪ]** and **[ʊ]** as /ɨ/ and /ʉ/, since a high tone accent added above /ɨ/ makes the dot invisible and the two high front vowels become visually difficult to distinguish: e.g. **udzía** and **udzɨa**.

Table 9 shows the much reduced vowel inventory for second syllables in stems, which are either V or CV. In subject/tense prefixes, vowels are further limited to /i, ii, a, aa, u, uu/.

Table 9: Second syllable vowel inventory

High	ɨ			ʊ	
Mid	ɛ	eɪ		ɔ	oʊ
Low			a		

Only the five short oral vowels are attested in second syllables, apart from the mid diphthongs which occur in the limited context of perfective verb conjugations in CV-V stems. The diphthongs form the V_2 in disyllabic sequences of non-identical vowels (and are written raised to show they are not syllabic): e.g. /ieⁱ/, /aoᵘ/, /uoᵘ/.

3.   **u.búɔ**   'to break, be broken'   *but* **Ntálí í.búoᵘ.**   'The bed broke.'

   u.biɛ   'to ripen'   *but* **Aláárí áá.biéⁱ**.   'The oranges ripened.'

This overview of consonant and vowel inventories shows a significant contrast between first and second syllables in stems, with a greatly reduced subset of consonants and vowels in the latter. Thus Eboo has 'stronger' or more robust stem-initial syllables compared to other syllables, just like Kukuya, suggesting that a stem-initial stress accent is preventing weakening or deletion of the more complex forms such as NCG sequences and long nasal vowels which only occur in initial syllables.

It should be pointed out, however, that the diphthongs and nasal vowels in stem-initial syllables are almost exclusively the consequence of diachronic C_2 deletion, and should not be considered as originating in that syllable (Hombert 1986, Raharimanantsoa 2012a/b).[7] Setting aside vowels, the larger set of consonants and consonant sequences in stem-initial position, many of which can be shown to have suffered deletion from second syllables and prefixes, does seem indicative of a stress accent, and supports the claim (Downing 2010: 29) that NW Bantu languages may be characterised by asymmetry in their consonant inventories.

In sections 4 and 6, I will consider whether, in addition to stress accent, Eboo has the same tone melodies as Kukuya; melodies which are pertinent for identifying underlying tone.

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[7] Sequences of non-identical vowels are also the result of diachronic C_2 loss. They could potentially be interpreted as diphthongs, since they form a morphological unit with sequences of identical vowels. However, I interpret them here as disyllablic, since they are heard as such, contrary to the 4 diphthongs which I do identify. Grégoire (2006: 352) notes that northwest Bantu languages often show an 'extreme tolerance [...] for vowel sequences' and that a number of authors are convinced that the two different vowels belong to two different syllables.

2.3.2 Lexical and grammatical tone

According to Kisseberth and Odden (2003 [2006]: 59), "most Bantu languages are tonal, and many have complex tonal phonologies". Eboo is no exception to this, with tone providing both lexical contrast and grammatical information. Eboo has a two way lexical tone contrast of H and L tones, as is found in the whole of the Teke cluster, and which can be traced back to PB. The mora is the tone bearing unit (TBU). In nouns, the class prefix tone is L, and each stem mora carries a H or L tone, creating tonal melodies over multimoraic stems (cf. 4). There are no examples of HLH melodies, and each mora has just one tone assigned to it.

4. /L/ **i.la** 'intestines' **i.lili** 'tear' **i.dzuuni** 'shadow'

   /H/ **u.lá** 'village' **i.búbí** 'gorilla' **i.dzúúlí** 'ghost, spirit'

   /LH/ **buɔ́** 'fear' **i.kalá** 'mat' **a.mbyeelí** 'knives'

   /HL/ **i.kúu** 'axe' **i.búbi** 'liane' **i.bwóóni** 'prayer'

   /LHL/ -- -- **baána** 'children'

We see in 4 that the underlying tone melodies for nouns, L, H, LH, HL, LHL, are the same five melodies as found in Kukuya.

Long vowels and diphthongs between consonants in Eboo do not usually carry contrastive tones, and therefore the /LH/ and /HL/ melodies map onto trimoraic stems as LLH and HHL (rather than HLL in Kukuya), as the trimoraic examples in 4 show. There are however a handful of nouns which *do* show contrastive tones on long vowels between consonants, giving a LHL melody; e.g. *mwaána* 'child', *baána* 'children', *dziíni* 'tooth'. These nouns have undergone diachronic fusioning of the prefix with the stem-initial syllable.

With regard to verbs, the L tone prefix for infinitives is **u-**, the lexical tone contrast is marked on the stem-initial mora, giving it prominence as the stressed syllable, and the FV carries a default L tone. There are many verb pairs contrasting lexical H and L tone:

5. **u.nyɔ̂** 'to sulk, be upset' **u.búɔ** 'to overturn'

   u.nyɔ̌ 'to trample on' **u.bʉɔ** 'to weave'

   u.dzía 'to encircle, surround' **u.bála** 'to shine (sun, metal)'

   u.dzia 'to love, want' **u.bala** 'to create, found'

   u.kwéélɛ 'to cough' **u.kɔ́ɔ́lɔ** 'to tear (tr)'

   u.kwɛɛlɛ 'to break (tr)' **u.kɔɔlɔ** 'to turn, change into'

The first example in 5 shows a monomoraic H tone stem, where both the H lexical tone and the L FV tone must attach to the only vowel, forming a HL contour tone, as we saw in Kukuya (table 2). The stem-initial syllable is the only syllable where verbs show systematic tonal contrast, as is typical for Bantu verbs (Downing 2010: 29), with lexical tone disambiguating the minimal pairs.

Grammatical tone is referred to in this study as the tone which marks tense on verbs. There are three main ways of marking tense in Bantu: by segmental inflection, by tonal inflection, or by a verbal auxiliary (Nurse 2003 [2006]: 92). In Eboo, tense marking is not restricted to just one of these, and can involve all three, with tone being arguably the most important. Grammatical tone is not marked on just one mora, but may consist of a tone melody which spreads across the whole verb, as we will see in section 4.

2.3.3 Verb structures and subject agreement tones

In Eboo verbs, NC sequences are not attested stem-initially[8], and as already mentioned, second syllables only contain short vowels. Since stems are limited to two syllables, the possible structures for verb stems are CV, CVV/CV-V, CV-CV and CVV-CV. All of these structures can also contain a glide, but only in the first syllable, following C_1. There are many sequences of non-identical vowels, forming disyllabic stems: CV-V. These disyllabic stems are often variants or reflexes of monosyllabic CVV stems with long vowels, and therefore I group them together as bimoraic stems with just one consonant.

Table 10: L & H tone infinitives showing the four stem types: CV, CVV/CV-V, CV-CV & CVV-CV

L tone verbs	Example	Gloss		H tone verbs	Example	Gloss
L	u.bva	to fall		HL	u.kâ	to pick
	u.lwɔ	to place			u.ŋwâ	to drink
LL	u.sɔ̰ɔ̰	to enter		HL	u.káa	to grill, fry
	u.swaa/swaɔ	to wash (tr)			u.lwéɛ/lwéɔ	to initiate
	u.luɔ	to teach			u.bía	to refuse
	u.myʉɔ	to tempt			u.twía	to build
L-L	u.fura	to pay		H-L	u.sála	to work
	u.bwɔlɔ	to rot			u.kyélɛ	to filter
LL-L	u.bvʉurɔ	to return		HH-L	u.síila	to remain
	u.dzwaana	to fight			u.tyɔ́ɔ́nɔ	to stand

[8] Except for a homorganic nasal prefix occurring in certain first person singular verb forms, which has become part of the stem-initial consonant.e.g. **–sála** 'to work' *but* **mɛ̰ nsáli** 'I worked'; **-fura** 'to pay' *but* **mɛ̰ mfurí** 'I paid'.

Table 10 gives examples of L and H tone infinitives for each type of stem structure. The second example in each case contains a glide.

In Bantu generally, verbs typically have many prefix 'slots' before the root, marking relative, subject, tense/aspect, negation, object, etc. and after the root there is a slot for valency-changing extensions (cf. Nurse 2003 [2006]: 90-91). One example of this is Kagulu (Petzell 2008: 98) which has six possible slots for prefixes and 4 for affixes. In contrast to this however, Eboo verbs are short, since negation and object are never marked on verbs and only remnants of extensions can be found. Prefixes in assertive utterances are limited to a combined subject and tense marker (STM), and one (or occasionally two) optional aspect markers (AM), and there are no suffixes apart from the FV. Thus we can break down Eboo verbs into the following segmental components (with optional components in brackets):

6.   STM + (AM) + (AM) + ROOT + FV

The tone melody which spreads itself over the verb, forms a prosodic 'layer' operating above the segments. Although the initial STM prefix may show the presence (or absence) of tense segmentally, it is the tone melody over the verb which distinguishes between different tenses, as will become clear in section 4.

In 7, I give examples of verbs containing two common aspect prefixes: **-ká-,** marking habitual action, and **–ma-,** indicating that the action of the verb has *already* been completed:

7. a **Mɛ̧ áli   i-<u>ká</u>-sál-á   ku ulɔ́.**   'I used to work a lot (habitually).'
   1s.I AUX.PST   1s.PST-HAB-work-FV much

   b **Taará á-<u>ma</u>-fur-a   lí-kɔ́ɔlɔ.**   'Dad has already paid for schooling'.
   c1.dad c1.PST-ALREADY-pay-FV c5-school

However, since this thesis focusses on tense rather than aspect, I exclude data containing aspect prefixes from my analysis, leaving verbs with the following simple segmental structure, to which the prosodic layer is added:

8.   STM + ROOT + FV

In the following sections, I refer often to the root + FV together as the stem, with monomoraic stems combining the root vowel and the FV. The FV of infinitives and many other conjugations is **–a**, which is the typical 'neutral' suffix for Bantu (Nurse 2008: 118). Furthermore, if the verb includes an aspect prefix, the neutral FV is always attested. Vowel

height harmony occurs, as is common in Northwest Bantu: e.g. Bakweri A22, Tiene B81, Lingala C36d (Hyman 2003 [2006]: 47), whereby mid root vowels cause the FV to become mid also (cf. schema 9, where # is a word boundary).

9.　　　a → ɛ / ɛ C _#　　　　　e.g. not *ubɛ́ɛ́ra 'to hit'　but ubɛ́ɛ́rɛ.

　　　　a → ɔ / ɔ C _#　　　　　e.g. not *ubwɔla 'to rot'　but ubwɔlɔ.

Many of the CV-V stems (which have suffered diachronic C$_2$ loss) also take ɔ as their FV, even if the root vowel is not a mid vowel (cf. the LL tone examples in table 10).

In perfective or past conjugations, the FV becomes a high vowel: /i/, /ɨ/, /u/, or /ʉ/ (cf. 10). The perfective/past FV is labelled as PFV in the data examples in sections 4 and 5.

10.　**u.sála**　　'to work'　　　**Mɛ i.sáli.**　　'I worked.'

　　　u.kyɛ́ɛ́lɛ　'to wait'　　　**Mɛ i.kyɛ́ɛ́li.**　'I waited.'

　　　u.kɛɛ　　'to lose weight'　**Mɛ i.kei.**　　'I lost weight.'

　　　u.bvʉ́ʉ́rɔ 'to return'　　**Mɛ i.bvʉ́ʉ́ru.**　'I returned.'

　　　u.luɔ　　'to teach.'　　　**Mɛ i.luóʉ akéɨ.** 'I taught the women.'

There is a special category of verbs whose FV does not change in perfective past conjugations - those ending in a nasal vowel (marked by a cedilla under the vowel; e.g. *ukú̧ɔ̧* 'to sweep', *usɔ̧ɔ̧* 'to enter'), and a few verbs with **–aa** stems, which are a variant of **–aɔ** (e.g. *uswaa/uswaɔ* 'to wash' [tr]). In these cases, we must rely on tone melodies to distinguish tense and aspect, as the following sentences contrasting general past and future show:

11.　**Bɨí lii.kú̧ɔ̧ mbali.**　　[bɨí liikú̧ɔ̧ mbali]　'We swept the yard.'

　　　Bɨí lii.kú̧ɔ̧́ mbali.　　[bɨí liikú̧ɔ̧́ mbali]　'We will sweep the yard.'

　　　Bɨí lii.swaâ miɔ́.　　[bɨí liiswaā miɔ]　'We washed our hands.'

　　　Bɨí lii.swaá miɔ́.　　[bɨí liiswaá miɔ]　'We will wash our hands.'

The sentences in 11 are segmentally identical. The first pair shows L tone on the FV for the general past, and H tone on the FV for the future. In the second pair, the general past FV has a HL tone realised as M, and the future FV tone is again H.

As we will see in section 4, the FV may be devoiced or elided before a following word.

Before looking at verbs conjugated for the recent past, general past and future, it is important to identify the segments and tones which mark subject agreement on the STM prefix. The subject agreement prefixes for persons and noun classes, with zero tense marking, are presented in table 11. Singular person pronouns have nasal or zero prefixes with no visible

tone marking. However, first and second person plural subjects (1p, 2p) have L tone agreement prefixes on the verb, and third person plural subjects (3p) have H tone agreement prefixes, as do all the noun class prefixes which are not zero.

Table 11: Subject agreement prefixes for persons and noun classes (consecutive conjugation)

Pronouns and prefixes for persons				Prefixes for noun classes			
mę	'I'	1s	**N-**	c1	**ø-**	c7	**í-**
wɛ	'you'	2s	**ø-**	c2	**á-**	c8	**í-**
ndyɛ́	'he/she'	3s	**ø-**	c3	**ø-**	c9	**ø-**
bɨ́í	'we'	1p	**li-**	c4	**í-**	c10	**ø-**
byɛ́	'you'	2p	**li-**	c5	**lí-**	c14	**ú-**
bwɔ́	'they'	3p	**á-**	c6	**á-**		

The prefixes in table 11 are used for the consecutive conjugation, which could also be called the narrative present. Narratives make use of this conjugation after a clearly marked general past tense in the first sentence has put the context of the whole narration in the past, and therefore the conjugation itself can be considered unmarked for tense. In 12, I conjugate the sentence: **u.kúna ndzú** 'to plant peanuts' in the consecutive. The prefixes are underlined.

12. **Mę <u>n.</u>kúni ndzú.** 'I plant peanuts.'

    Wɛ kúni ndzú. 'You (*sg*) plant peanuts.'

    Ndyɛ́ kúni ndzú. 'He plants peanuts.'

    Bɨ́í <u>li.</u>kúni ndzú. 'We plant peanuts.'

    Byɛ́ <u>li.</u>kúni ndzú. 'You (*pl*) plant peanuts.'

    Bwɔ́ <u>á.</u>kúni ndzú. 'They plant peanuts.'

In the data in section 4, I assume that both singular and plural first and second person subjects underlyingly carry a L agreement tone on prefixes, and that third person pronominal and nominal subjects underlyingly carry a H agreement tone, since this is common in Bantu assertive sentences; e.g. Shona S10 (Kisseberth & Odden 2003 [2006]: 68). This is also the underlying tonal pattern identified by Kristensen & Kristensen (1987: 7) for narratives.

2.4 Motivation and research questions

In working together with speakers of Eboo to develop the written form of the language, it became clear that grammatical tone marking is needed on verbs in the orthography to facilitate reading. In order to mark tone appropriately in the orthography, the grammatical tones for each tense must first be clearly identified.

This study is motivated by the fact that grammatical tones are difficult to identify by just listening to surface realisations. Furthermore, surface tone melodies for different tenses can appear to be confusingly similar. I therefore address in sections 4 and 5 the following research questions:

- What are the underlying tones marking the recent past, general past and future tenses?
- How do subject agreement, lexical and grammatical tones on verbs combine to produce the surface tone melodies?
- How does intonation affect the realisation of tone on verbs utterance finally?

3. Method

3.1 Material

The data for this study comes from my own data collected whilst working with Eboo speakers over the past ten years. I recorded two kinds of data in particular, for verb analysis.

In 2012, I devised a set of forty sentences in French, in order to elicit verbal phrases in Eboo (and other Teke varieties) for analysis of tense and aspect in general. These sentences were elicited with five different speakers of Eboo, and provided verbs in natural speech which helped to determine the temporal range of each tense, as well as to hear overall tone patterns.

For this study, I put to one side sentences including aspect prefixes, which complicate tone melodies, in order to identify tense markers more easily. This left me with just seven sentences expressing future tense, and seven sentences in either the recent or general past. The two sentences lacking a temporal adverb in French to indicate the degree of 'pastness' produced different responses; some used the recent past and others the general past. The fourteen sentences were a useful starting point for my analysis, but provided insufficient data for comparing tone on verbs with different pronominal and nominal subjects, as well as in the three different contexts in which Kukuya tone melodies were identified (Paulian 1975, Hyman 1987), as presented in section 2.2: before another word with no prefix, before another word with a prefix, and utterance finally.

The data which was most useful for this study was taken from verb paradigms, elicited and recorded on two different occasions (2008 and 2016), with different speakers. I also had access to limited recordings of verb paradigms made in 2002. These sets of recordings provided clearly pronounced utterances which were more suitable for acoustic analysis.

In the recordings made in 2016 in particular, I made sure to elicit verbs with both lexical H and L tone, with the four different syllable structures, and in the same three contexts described in section 2.2 for Kukuya, including utterance finally. Personal pronouns were

chosen as the subject for the verbs, thus covering noun classes 1 and 2 at the same time. I made more limited recordings for the different noun classes, in order to compare STM prefixes. Paradigms were recorded for the consecutive (or narrative present), the recent past, the general past, and the future. Given that the latter three tenses can all be marked by optional auxiliary verbs, recordings were made both with and without the auxiliaries. However, I focused on conjugations without the auxiliary, in order to see what distinctive tense markers were present on the verb itself.

3.2   Informants

The five Eboo speakers chosen for the elicitation of the forty verbal phrases were mother-tongue speakers of different ages who had spent at least their childhood in the language area, but who were living in the capital, Brazzaville, at the time of the recordings. The informants consisted of four men and one woman, with an age range between 21 and 70. (Cf. the appendix at the end of this study for full metadata.)

Raw data is always messy, containing imperfections, elisions, etc. The data collected sometimes showed evidence of language loss, especially if the speaker was younger or had spent more time in Brazzaville than in the language area. In some cases, tonal patterns were inconsistent, and in such cases I gave greater consideration to recordings made by speakers who had spent longer in the language area.

The verb paradigms were recorded with two male informants aged 28 and 43 respectively. The informant for the recordings made in 2002 was a man in his late twenties. (Cf. full metadata in the appendix.)

3.3   Procedure

The data was elicited in French, and recorded using a Samsung Handy digital voice recorder, with the verbal phrases pronounced twice by each speaker. In most cases, a good quality recording was obtained by working with each informant in a simple recording studio. In a few cases I needed to visit the speaker in his home (e.g. the 70 year old man), and in these cases the recording quality was significantly lower, with background noise.

The recordings were transferred to computer and transcribed. The computer programme PRAAT[9] was used for acoustic analysis, as well as measuring contrastive vowel length. The pitch curves produced by PRAAT were useful for transcribing tone where this was not clear by just listening. A number of pitch curves are included in sections 4 and 5.

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[9] PRAAT is a computer programme for the phonetic analysis of speech, designed by Paul Boersma and David Weenink, at the University of Amsterdam.

4. Eboo tenses

A typical feature of tense in Bantu is the existence of 'multiple degrees of location in time' (Nurse 2008: 88), i.e. Bantu languages often have several past tenses, corresponding to different degrees of temporal distance from the present, as well as several future tenses, although the number of future tenses is generally less than past tenses. Present conjugations may be unmarked for tense.

In Eboo main clauses, there are two different past tenses; the recent past (covering approximately a period 24 hours prior to the time of speaking), and the general past (covering all remaining past time); and one future tense. The past tenses are also marked for perfective or imperfective aspect.

This study looks at tone in the more straight-forward perfective past tenses with a past perfective FV (thus excluding those containing an aspect prefix). The future tense is also analysed. All three of these tenses can be marked by an optional auxiliary.

4.1 The recent past

The recent past tense in Eboo usually refers to events which happened earlier in the day, or on the previous day.

4.1.1 The recent past auxiliary

A non-variable auxiliary *áli* can be placed before the verb to mark recent or general past tenses, although this auxiliary is used far more frequently for the general past than for the recent past. Kristensen & Kristensen (1987: 12) suggest that *áli* marks an earlier past (*plus que parfait*) within the recent or general past, which might explain why it is less common within the limited time span of the recent past. However, Eboo speakers today perceive *áli* to be just an optional auxiliary marking the general or recent past.

As can be seen from the pitch curves in fugure 3, the absence or presence of this auxiliary does not change the tone or structure of the verb. In both cases, there is a H tone on the sole prefix filling the combined STM (subject/tense marker) slot before the root. The L tone verb *ufura* 'to pay', is underlined in the utterance: *[líífuri]*). The FV is *–i* to mark perfective aspect.

a. Bɨ́í áli lɨ́í-fur-i   ku ulɔ́.

   1p.we AUX 1p.REC-pay-PFV much

   'We paid a lot.'

   [bɨ́í áli lɨ́ífuri kuulɔ]

b. Bɨ́í lɨ́í-fur-i   ku ulɔ́

   1p.we 1p.REC-pay-PFV much
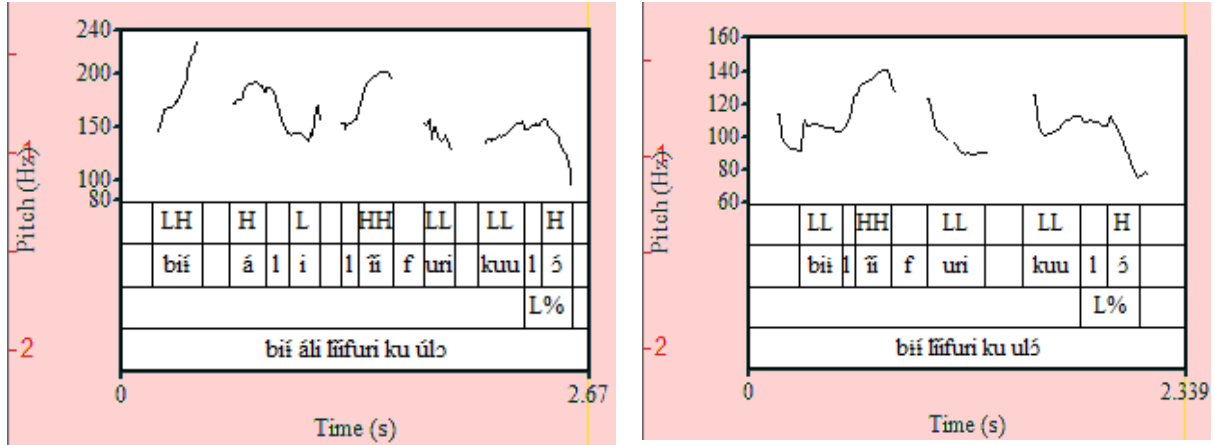
   'We paid a lot.'

   [bɨ̀ɨlɨ́ífuri kuūlɔ]

*Fig. 3: Pitch curves contrasting L tone utterances with and without the past auxiliary **áli***

The final tone in the above utterances is H: ***ku ulɔ́,*** which is however realised as L, descending even lower than previous L tones. This can be attributed to the process of final lowering mentioned when presenting Kukuya tone melodies (section 2.2) where H tones are lowered utterance finally. Finally lowering will be discussed in section 5, but I show the process at the end of each utterance by adding a boundary L tone (L%) to all the pitch graphs.

I note in passing that the LH tone melody of the 1p personal pronoun **bɨ́í** 'we', is pronounced clearly as such in fig. 3a, with a slight pause between the pronoun and the following auxiliary. However, in fig. 3b there is no pause between the pronoun and the following STM prefix, and the tone of the pronoun becomes LL. This suggests that the tone of the pronoun links to the STM prefix to give a /LLH/ melody, as we saw happening in Kukuya (cf. 1b in section 2.2). The same tonal change on the pronoun **bɨ́í** 'we' occurs throughout my data for the recent past, when there is no pause before the STM prefix.

We look now at the pitch curves for the H tone verb **usála** 'to work'. In fig.4a, the FV of the auxiliary **áli** meets the STM prefix vowel **á-,** causing the FV of the auxiliary to delete, along with its L tone. However, in both cases, the verb (underlined) maintains a H tone on the STM prefix, as well as H tones on the stem vowels: *[á-sálɔ́].* The perfective FV is weakened to 'schwa' in both cases.

a. **Ndyé áli   á-sál-i   ku ntsyóʉ.**

3s.he   AUX.PST 3s.REC-work-PFV in   c9.field

'He worked in the field.'

[ndyéálásálǝ́ ku ntsyōʉ]

b. **Ndyé á-sál-i   ku ntsyóʉ.**

3s.he   3s.REC-work-PFV in   c9.field

'He worked in the field.'

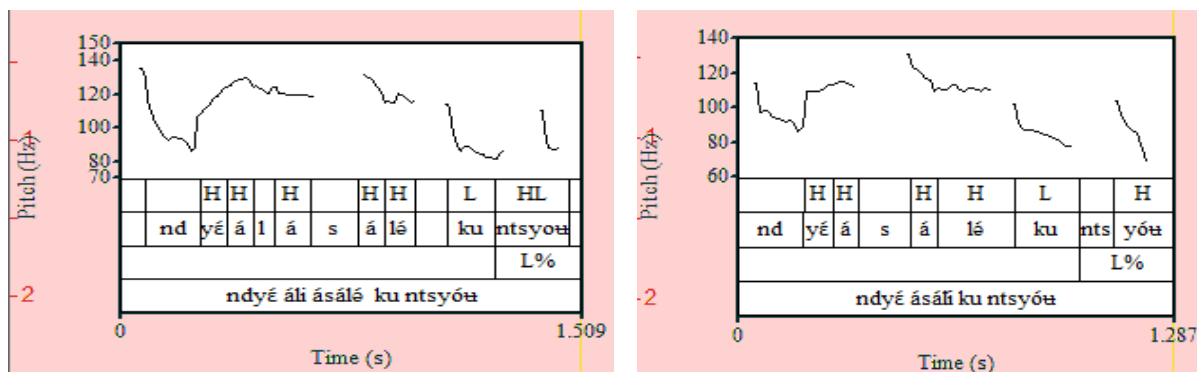**[ndyéásálǝ́ ku ntsyóʉ]**

*Fig. 4. Pitch curves comparing H tone utterances with and without the recent past auxiliary **áli***

Since my aim is to show what distinguishes tense when the auxiliary is *not* present (as is usually the case for the recent past), the data presented from this point on for the recent past is without the auxiliary *áli.*

4.1.2   Recent past verbal conjugations

In this section I will provide data which shows that the underlying grammatical tone marking the recent past is a H tone on the STM prefix, as we saw in figures 3 and 4 above. In addition to this, there is a grammatical floating L tone on the FV of the stem.

Table 12 shows how the underlying subject agreement tone, grammatical tone marking the recent past, and lexical tone position themselves on the verb prefix and stem. The table indicates that first and second person prefixes in the recent past have an underlying LH tone melody, whereas third person prefixes have just H tone. The lexical tone on the root is followed by the floating L, if there are remaining moras to which it can attach.

Table 12: Underlying subject agreement, grammatical & lexical tones on recent past tense verbs

STM prefix		ROOT	FV + prefix
Subject agreement	Grammatical tone	Lexical tone	Grammatical tone
1st/2nd persons: L 3rd persons: H	H	L/H	Floating L

In tables 13-16 below, I provide examples of the recent past for L and H tone stems, with each of the four stem structures, CV, CVV/CV-V, CV-CV and CVV-CV. In tables 13 and 14, the word following the verb has a zero prefix, and in tables 15 and 16, the word following

the verb has a L tone prefix. I limit the subject of the verbs to the third person pronoun ***ndyɛ́*** 'he', and the first person pronoun ***bɨí*** 'we'.

In each table, the Eboo verb is transcribed in the second colomn with its assumed underlying subject agreement, grammatical and lexical tones, according to table 12. Underlying tone is also marked on other words in the sentence. The transcription in the third column shows the phonetic realisation of the phrase, with the gloss beneath. The far right-hand colomn gives the surface tone melody of the STM prefix (in brackets) and the stem.

Table 13: Recent past verb conjugations for L tone verbs before a word with a zero prefix

Stem type	Recent past L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **dzwa** *kill*	**Ndyɛ́ á-dzwi ntaali.** 3s.he 3s.REC-kill-PFV c1.snake	**[ndyɛ́ádzwintaali]** 'He killed the snake.'	**(H).L**
CVV/CV-V **luɔ** *teach*	**Bɨí lɨí-lu-oᵘ baána.** 1p.we 1p.REC-teach-PFV c2.children	**[bɨɨlɨíluoᵘ baāna]** 'We taught the children.'	**(HH).LL**
CV-CV **fura** *pay for*	**Bɨí lɨí-fur-i ntsyóʉ.** 1p.we 1p.REC-pay.for-PFV c9.house	**[bɨɨlɨífuri ntsyóʉ]** 'We paid for the field.'	**(HH).LL**
CVV-CV **dzaara** *crush*	**Ndyɛ́ á-dzaar-i pfimbala.** 3s.he 3s.REC-crush-PFV c5.beetle	**[ndyɛ́ádzaaripfimbala]** 'He crushed the beetle.'	**(H).LLL**

In table 13 (L tone stems), there is a H tone on the STM prefix in each example, with no trace of the L tone marking subject agreement after the first person plural subject. Only L tones follow the lexical L tone on the stem-initial syllable, as expected.

The H tone stems in table 14 again show only H tone on all the STM prefixes, and the lexical H tone on the stem-initial syllable. On the CV stem *[ŋwí]*, there is no additional FV to which the floating L tone can attach, and on the CV-V stem *[twíí]*, the lexical H tone spreads over the long vowel; thus only the H tone is heard in both cases. The FV on the CV-CV stem *[sálə́]* is weakened to 'schwa', with again a H tone. However, the CVV-CV stem shows a L tone on the fully realised FV; *[ábééri]*. In some recordings of even this last example, the FV was elided; *[ábéermɛ̣]*. However, the FV carries a L tone when not elided.

Table 14: Recent past verb conjugations for H tone verbs before a word with a zero prefix

Stem type	Recent past H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **ŋwâ** *drink*	**Bɨí** <u>lií-ŋwí`</u> **mali.** 1p.we 1p.REC-drink.PFV c6.wine	[bɨi<u>lííŋwí</u> mali] We drank wine.	**(HH).H**
CVV/CV-V **twía** *build*	**Ndyé** <u>á-twí-i</u> **ndzwɔ́.** 3s-he 3s.REC-build-PFV c9-house	[ndyé<u>átwíí</u>ndzwɔ] 'He built the house.'	**(H).HH**
CV-CV **sála** *work*	**Bɨí** <u>lií-sál-i</u> **ntsyóʉ.** 1p.we 1p.REC-work-PFV c9.field	[bɨi <u>líísálə́</u>ntsyōʉ] 'We worked the field.'	**(HH).HH**
CVV-CV **béérɛ** *hit*	**Ndyé** <u>á-béér-i</u> **mɛ̰.** 3s.he 3s.REC-hit-PFV 1s-me	[ndyé<u>ábééri</u> mɛ̰] 'He hit me.'	**(H).HHL**

Like the previous pitch graphs (figs 3 & 4), tables 13 and 14 also show final lowering at the end of the utterance; e.g. following the CV-V stem in table 14, **ndzwɔ́** 'house' is realised as **[ndzwɔ]** with a L tone. The penultimate mora may also be lowered, although to a lesser degree; in the CV-CV stem **ntsyóʉ** 'field' becomes **[ntsyōʉ].**

In tables 15 and 16, the four stem types are followed by a word with a L tone prefix, and in both tables, we again see only H tones on the STM prefix, indicating that the L tone subject agreement prefix has been deleted by the grammatical H tone.

Table 15: Recent past verb conjugations for L tone stems before a L tone prefix on the next word

Stem type	Recent past L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem + next prefix
CV **dzwa** *kill*	**Ndyé** <u>á-dzwi</u> **a-ntaali.** 3s.he 3s.REC-kill-PFV c2-snakes	[ndyé<u>ádzwi</u> a̱ntaali] 'He killed the snakes.'	**(H).L + L**
CVV/CV-V **luɔ** *teach*	**Bɨí** <u>lií-lu-eⁱ</u> **a-kéɨ́.** 1p.we 1p.REC.-teach-PFV c2-women	[bɨi<u>líílue</u>ⁱ a̱kēɨ] 'We taught the women.'	**(HH).LL + L**
CV-CV **fura** *pay for*	**Bɨí** <u>lií-fur-i</u> **li-kɔ́ɔ́lɔ.** 1p.we 1p.REC-pay.for-PFV c5-school	[bɨi<u>líífuri</u> likɔ̄ɔ̄lɔ] 'We paid for school.'	**(HH).LL + L**
CVV-CV **dzaara** *crush*	**Ndyé** <u>á-dzaar-i</u> **apfimbala.** 3s.he 3s.REC-crush-PFV c6.beetles	[ndyé<u>ádzaara</u>pfimbala] 'He crushed the beetles.'	**(H).LL + L**

In table 15 with lexical L tone verbs, only L tones are found on stems and the prefix of the next word. The CVV-CV example shows vowel hiatus between the stem FV and the prefix vowel, resulting in the deletion of the stem FV: ***ádzaari apfimbala*** is heard as ***[ádzaarapfimbala]***. Since both vowels carry L tone, there is no tone loss.

Table 16: Recent tense verb conjugations for H tone stems before a L tone prefix on the next word

Stem type	Recent past H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem + next prefix
CV ŋwâ *drink*	**Bɨí lií-ŋwí ˋ a-dzá.** 1p.we 1p.REC-drink.PFV c6-water	**[bɨi lííŋwáadza]** 'We drank water.'	**(HH).H + L**
CVV/CV-V twía *build*	**Ndyέ á-twí-i li-kɔɔ́lɔ.** 3s.he 3s.REC-build-PFV c5-school	**[ndyέátwíí likɔɔ̄lɔ]** 'He built the school.'	**(H).HH + L**
CV-CV sála *work*	**Bɨí lií-sál-i a-ntsyóʉ.** 1p.we 1p.REC-work-PFV c6-fields	**[bɨilíísáli antsyóʉ]** 'We worked the fields.'	**(HH).HL + L**
CVV-CV kyééle *await*	**Ndyέ á-kyéél-i a-kéí.** 3s.he 3s.REC-await-PFV c2-women	**[ndyέákyééli akēɨ]** 'He awaited the women.'	**(HH).HHL + L**

In table 16, the lexical H tone is in evidence on the stem-initial short or long vowel, with a L tone following on the next mora, which is sometimes the vowel of the prefix on the next word, assuming that tone melodies spread like in Kukuya. In the monomoraic example, the FV of ***ŋwí*** is elided, but the prefix vowel on the next word is lengthened to carry the H lexical tone of verb, followed by the floating L tone which combines with its own L tone: ***[bɨi lííŋwáadza]***. There is again evidence of final lowering: ***akéí*** 'women' in the final example of table 16 is realised as ***[akēɨ]***.

The data in tables 13-16 consistently shows only H tones on the STM prefix. Since after a first person subject the prefix underlyingly has a L subject agreement tone, the H tone must therefore be the grammatical tone marking the recent past. Not only do Kristensen & Kristensen (1987: 7) identify a H tone on the STM prefix of recent past verbs, but the grammatical H tone is also confirmed by taking a look at combined STM prefixes for the recent past in neighbouring Tyee (B73d). In 13, the sentence ***uyúghu ndé*** 'to listen to him' is conjugated for the recent past (with prefixes underlined):

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13.   (Tyee: my own data)

Mɛ <u>aá</u>.ngyúghu ndɛ.	'I listened to him.'
Wɛ <u>aá</u>.yúghu ndɛ.	'You (*sg*) listened to him.'
Ndɛ́ <u>áá</u>.yúghu ndɛ.	'He listened to him.'
Bihí <u>lií</u>.yúghu ndɛ.	'We listened to him.'
Bɛ́ <u>lií</u>.yúghu ndɛ.	'You (*pl*) listened to him.'
Bɔ́ <u>báá</u>.yúghu ndɛ.	'They listened to him.'

In these Tyee examples, the long vowel STM prefix shows the assumed subject agreement tone (L for first and second persons, and H for third persons) on the first mora, followed by the grammatical H tone marking the recent past on the second mora. I propose that the L tone marking subject agreement for first and second person subjects, which is still present in Tyee, has been deleted in Eboo.

In both Teke varieties, the H tone dominates as the grammatical tone for the recent past. In Eboo however, the STM prefix tones appear to be subject to the following rule:

14.   *Grammatical H tone deletes subject agreement L tones.*

Table 17 shows the recent past STM prefixes for each person and class, compared to the STM prefixes presented in table 11 which are unmarked for tense:

Table 17: Comparative zero tense and recent past STM prefixes for persons & noun classes, showing surface tones

	STM prefix for persons			STM prefix for noun classes			STM prefix for noun classes	
	Unmarked for tense	Recent past		Unmarked for tense	Recent past		Unmarked for tense	Recent past
1s	N-	í-	c1	ø-	á-	c7	í-	íí-
2s	ø-	á-	c2	á-	áá-	c8	í-	íí-
3a	ø-	á-	c3	ø-	á-	c9	ø-	í-
1p	li-	líí-	c4	í-	íí-	c10	ø-	í-
2p	li-	líí-	c5	lí-	líí-	c14	ú-	úú-
3p	á-	áá-	c6	á-	áá-			

In the recent past, H tone short vowels replace the nasal and zero prefixes attested for singular persons (and some nouns classes) when there is no tense marking. Furthermore, the L tone short vowel prefixes for first and second plural persons are replaced by H tones on a

lengthened vowel, and all the short H tone vowel prefixes with no tense marking become long H tone vowels in the recent past.

The fundamental frequency graphs in figure 5 confirm the length difference between prefix vowels which are unmarked for tense (consecutive conjugation) and those marked for the recent past. In figure 5a, the third person plural short vowel prefix with no tense marking lasts 0.079 seconds, whereas in 5b, the long vowel for the same person is nearly twice as long in the recent past: 0.149 seconds.

a. **Bwɔ́   á-sál-i   ku ntsyóʉ.**
   3p.they 3p.CON-work-PFV in   c5.field
   'They work in the field.'
   [bwɔ́ásálə́ ku ntsyóʉ]

b. **Bwɔ́   áá-sál-i   ku ntsyóʉ.**
   3p.they 3p.REC-work-PFV in   c5.field
   'They worked in the field.'
   [bwɔ́áásálə́ ku ntsyōʉ]

Length of prefix á- = 0.079 seconds

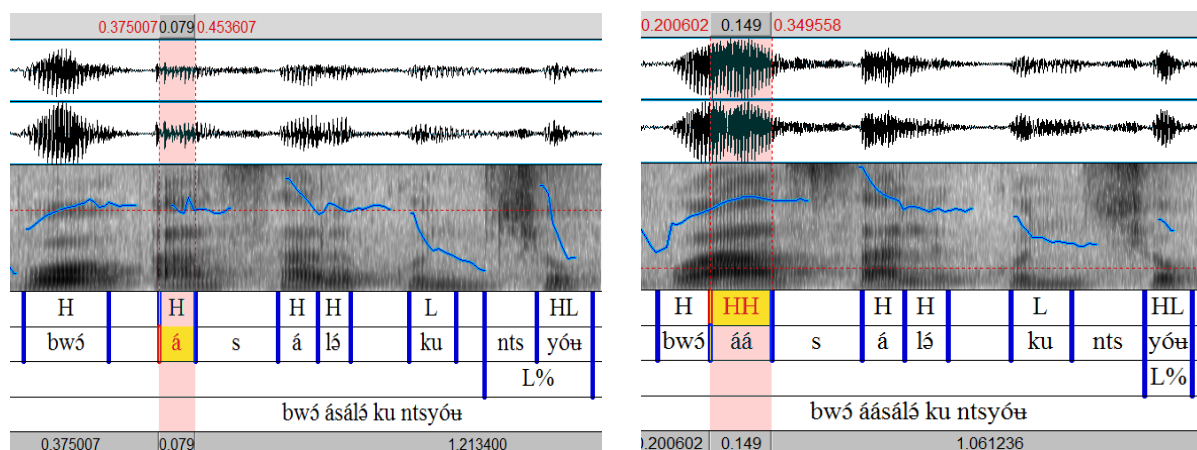**Length of prefix áá- = 0.149 seconds**

Fig. 5: Fundamental frequency graphs comparing a) short and b) long STM vowel prefixes

4.1.3 Summary of the recent past tense

Segmentally, the recent past has a high vowel showing perfective aspect as the stem FV (cf. 2.3.2), but this vowel may be weakened or deleted before a following stem or prefix, and is absent from stems with nasal vowels. When a prefix follows on the next word, there may be vowel coalescence, again causing the loss of the high vowel quality.

Grammatical tone is therefore the main marker for the recent past. The underlying subject agreement, grammatical and lexical tones attaching to the verb were presented in table 12 and are given again below for convenience. The difference between these underlying tones and the surface tone melodies can be accounted for by just one rule: *Grammatical H tone deletes subject agreement L tone.*

Table 18: Underlying subject agreement, grammatical & lexical tones on recent past tense verbs

STM prefix		ROOT	FV + prefix
Subject agreement	Grammatical tone	Lexical tone	Grammatical tone
1st/2nd persons: L 3rd persons: H	H	L/H	Floating L

Thus verbs in the recent past have a grammatical H tone on the STM prefix for all persons and classes (cf. table 17), and the stem-initial mora carries the contrastive lexical tones. There is a floating L tone on FVs, which only attaches if there is an available mora.

Table 19 shows surface melodies on stems with a first person subject *mɛ̨* 'I', when a word (with or without a prefix) follows in the utterance. I show data for both CVV and CV-V stems, which sometimes map differently. Unattached floating L tones are in brackets.

Table 19: Recent past surface tone melodies mapped to the four stem types (CV, CVV/CV-V, CV-CV and CVV-CV), when another word follows

Tone melody	Data examples for each stem type	Mapped tone before another word	Gloss
/L/	(Mɛ̨ í).bvi...	**L**	I fell... (REC)
	(Mɛ̨ í).swaa/lue...	**LL**	I washed/taught... (REC)
	(Mɛ̨ í).furi...	**L-L**	I paid for... (REC)
	(Mɛ̨ í).dzwaani...	**LL-L**	I fought... (REC)
/H(L)/	(Mɛ̨ í).ŋwí...	**H(L)**	I drank... (REC)
	(Mɛ̨ í).twíí/tsáo...	**HH(L)/HL**	I built/dispersed... (REC)
	(Mɛ̨ í).sáli...	**H-L**	I worked... (REC)
	(Mɛ̨ í).kyééli...	**HH-L**	I awaited... (REC)

The table shows the two different tone melodies attested for the recent past: /L/ tone on lexical L verbs and /HL/ on lexical H verbs where the L is floating (L). These tone melodies on stems and how they map onto the different stem types will be compared directly with Kukuya in section 6.

Only surface H and L tones are attested on verbs conjugated for the recent past, which is not the case for the general past and the future, as we shall see.

4.2   The general past

The general past tense in Eboo covers the vast period of time starting more than 24 hours ago, and extending back into the distant past.

4.2.1 The general past auxiliary

The frequently used past auxiliary is the same as that used for the recent past: **áli**. The following pitch graph (fig. 6) compares sentences without (left) and with (right) the auxiliary, and shows identical tones on the verb (which in this case has a lexical H tone: **usála** 'to work'), whether or not the auxiliary is present: **[asáli/asálə]**.

a. **Wɛ   a-sál-i.**
   2s.you 2s.PST.work.PFV
   'You worked'
   [wɛasáli]

b. **Wɛ   áli a-sál-i   ntsyóʉ**
   2s.you AUX 2s.PST-work-PFV c9.field
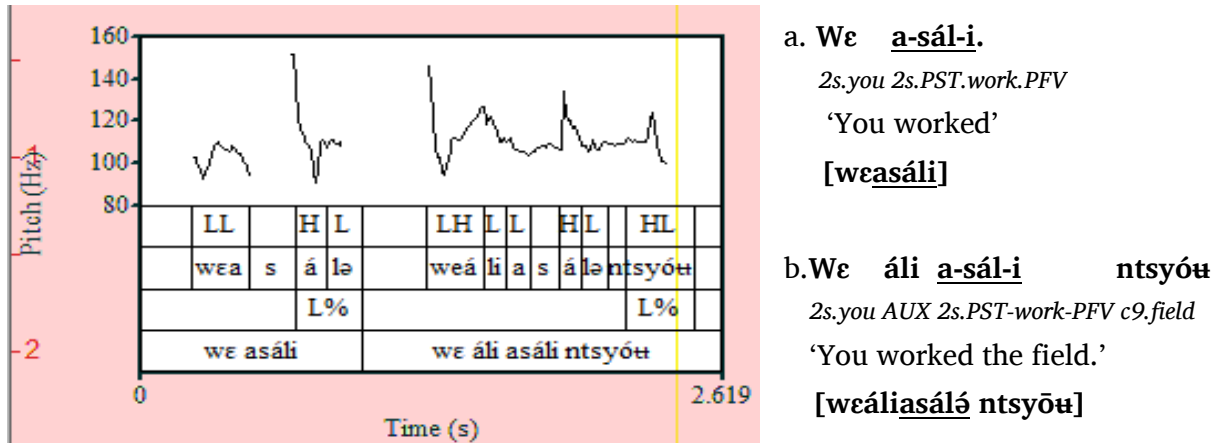   'You worked the field.'
   [wɛáliasálə́ ntsyōʉ]

*Fig. 6: Pitch curves comparing utterances with & without **áli**, with a second person subject*

Figure 7 shows similar sentences, with a third person rather than a second person subject, and the tones on the verb are again the same with or without the auxiliary: **[↓ásáli]**.

a. **Ndyɛ́ áli á-sál-i   ku uló.**
   3s.he AUX 3s.PST-work-PFV much
   'He worked a lot.'
   [ndyɛ́ ↓áli ásáli kuūlɔ]

b. **Ndyɛ́ á-sál-i   ku uló.**
   3s.he 3s.PST-work-PFV much
   'He worked a lot.'
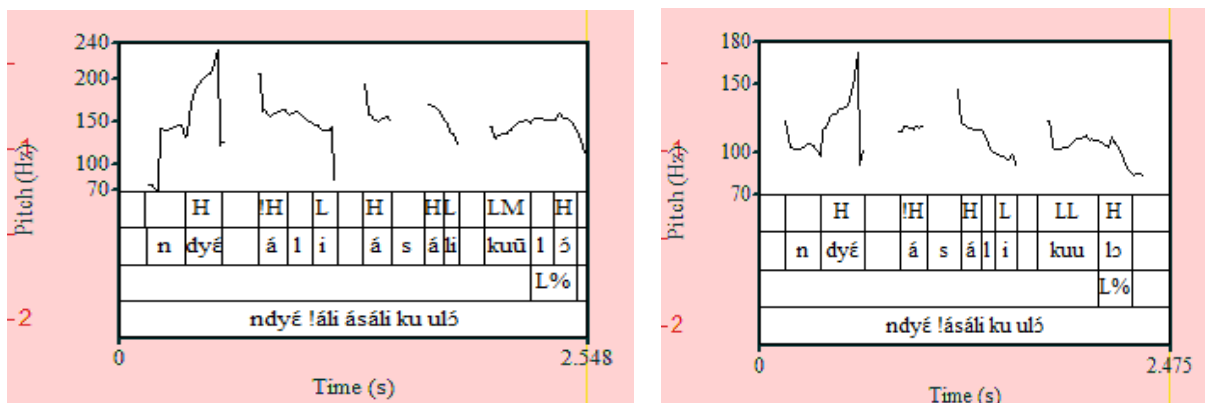   **[ndyɛ́ ↓ásáli kuulɔ]**

*Fig. 7: Pitch curves comparing utterances with & without **áli**, with a third person subject*

A striking difference between the second person and third person subjects is that the third person subject pronoun **ndyɛ́** 'he' in figures 7a (with **áli**) and 7b (without **áli**) is causing all H tones following the pronoun, including the H on the auxiliary, to be 'downstepped' (marked as ↓ in the data), since they are realised as M tones phonetically.

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Connell (2017: 133) describes downstep as "the lowering of a High tone following another High tone with the effect that a new ceiling is established for subsequent High tones within a specific domain." L tones maintain their usual level, as can be seen clearly in figure 7, and thus the pitch range is narrowed.

4.2.2 General past verb conjugations

I now examine in more detail verbs conjugated in the general past with the four different stem types. Table 20 shows how the underlying tones for the general past position themselves on conjugated verbs. Once again, subject agreement tone is L for first and second persons, and H for third person subjects. The general past is assumed to be marked by a grammatical L tone on the STM prefix, and a HL melody on the verb stem, for reasons which will become clear as we look at the data.

Table 20: Underlying subject agreement, grammatical & lexical tone on the general past verbs

STM prefix		ROOT	FV + prefix
Subject agreement	Grammatical tone	Lexical tone	Grammatical tone
1st/2nd persons: L 3rd persons: H	L	L/H	HL

The table indicates that first and second person prefixes conjugated in the general past have a L tone, whereas third person prefixes combine H agreement and L grammatical tone. The lexical tone on the root is followed by the HL grammatical tone melody on the stem.

Tables 21-24 give examples of the general past for lexical L and H tone stems, with each of the four stem structures, CV, CV-V, CV-CV and CVV-CV. Once again the first two tables show verbs with a following word without a prefix, and in tables 23 and 24, the word following the verb has a L tone prefix. The verbal subjects are again limited to **ndyɛ́** 'he' and **bií** 'we', and the assumed underlying tones presented in table 20 are shown on the transcription of the utterance in the second colomn. The third and fourth columns again show the phonetic realisation of the utterance and the surface tone melodies.

In table 21, when the subject is the first person pronoun, the STM prefix tone is L, as expected. However, when the subject is the third person pronoun **ndyɛ́** 'he', rather than the HL contour tone anticipated, the STM prefix tone is a downstepped H following the pronominal H tone, as seen in fig. 7. The downstepped H tones sometimes appears to be almost L tones, as Kristensen & Kristensen (1987: 7) assume them to be. However, careful analysis shows that real L tones are realised at a lower level than the downstepped H tones.

Table 21: General past verb conjugations for L tone stems before a word with a zero prefix

Stem type	General past L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **dzwa** *kill*	**Ndyɛ́ <u>ǎ-dzwǐ</u> ntaali.** 3s.he 3s-PST-kill-PFV c1.snake	**[ndyɛ́↓ádzwī ntaali]** 'He killed the snake.'	(↓H).M
CVV/CV-V **luɔ** *teach*	**Bɨ́ɨ́ <u>lii-lu-ô</u> baaná.** 1p.we 1p.PST-teach-PFV c2.children	**[bɨ́ɨ́ liiluō baana]** 'We taught the children.'	(LL).LM
CV-CV **fura** *pay for*	**Bɨ́ɨ́ <u>lii-fur-î</u> ntsyóʉ.** 1p.we 1p.PST-pay.for-PFV c9.field	**[bɨ́ɨ́ liifurī ntsyóʉ]** 'We paid for the field.'	(LL).LM
CVV-CV **dzaara** *crush*	**Ndyɛ́ <u>ǎ-dzaar-î</u> pfimbala.** 3s.he 3s-PST-crush-PFV c5.beetle	**[ndyɛ́↓ádzaarīpfimbala]** 'He crushed the beetle.'	(↓H).LLM

Downstep may be 'automatic' or 'non-automatic' (Connell 2017: 133). Automatic downstep occurs when there is a surface L tone between two H tones, which triggers the lowering of the second H tone, and sets a new, lower level for following H tones. However, non-automatic downstep is triggered by a floating L tone between the two Hs. I therefore suggest that in Eboo, there is a floating L tone before the prefix, causing downstep, and that this is the grammatical L tone marking the general past. For some reason, the L tone precedes rather than follows the subject agreement tone in this case.

Apart from downstepped prefixes, a particular characteristic of the general past is that, whether or not the prefix is downstepped, the FV of all the stems is realised with a M tone; e.g. ***[bɨ́ɨ́ liifurī…]***. No downstep has occurred following a first person subject, and therefore I surmise that the M tone on the FV is a grammatical HL contour realised simultaneously as a M tone. The FV M tone on verbs with third person subjects could be interpreted as either a downstepped H, or as the realisation of a HL contour on the FV. In the data I prefer to mark it with a M tone, to indicate that all the stem FVs are underlyingly HL: e.g. ***[ndyɛ́ ↓ádzaarī…]***.

The tone of the monomoraic stem is underlyingly a three-way contour: the lexical L tone plus the HL grammatical tone for the general past. Since it is realised as a M tone, like all the other FVs, ***[ndyɛ́↓ádzwī…]***, this stem provides the first instance we have seen of a lexical L tone which does not appear as such on the stem-initial (and in this case the only) mora. In fact, the lexical L tone appears to have been deleted, leaving the HL contour which is realised as M. On all the other stems, the lexical L tone appears as expected on the stem-initial mora.

Table 22: General past verb conjugations for H tone stems before a word with a zero prefix

Stem type	Recent past H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **ŋwâ** *drink*	**Bií** <u>lii-ŋwî</u> **mali.** 1p-we 1p-PST.drink-PFV c6.wine	**[bií** <u>liiŋwī</u> **mali]** 'We drank wine.'	(LL).M
CVV/CV-V **twía** *build*	**Ndyɛ́ ǎ-twí-i** **ndzwɔ́.** 3s.he 3s.PST-build-PFV c9-house	**[ndyɛ́↓átwīīndzwɔ]** 'He built the house.'	(↓H).MM
CV-CV **sála** *work*	**Bií** <u>lii-sál-i</u> **ntsyóʉ.** 1p.we 1p.PST-work-PFV c9-field	**[bií** <u>liisálᵊntsyóʉ</u>] 'We worked the field.'	(LL).H
CVV-CV **kyɛ́ɛ́lɛ** *await*	**Ndyɛ́** <u>ǎ-kyéél-i</u> **baána.** 3s.he 3s.PST-await-PFV c2.children	**[ndyɛ́↓ákyééli baana]** 'He awaited the children.'	(↓H).HHL

On the lexical H stems in table 22, H tones are again downstepped following the third person pronoun, and L tones are maintained on the STM prefix after the first person pronoun.

In the table, we see M, H and L tones surfacing stem finally in a seemingly irregular pattern, but a closer look reveals that the same pattern of lexical H tone merging with the grammatical HL melody to give /HL/, in fact produces the surface tones in each case.

Both the CV and CVV stems show a M tone representing the HL melody over a short or long vowel. The lexical H tone is underlyingly present as one of the constituents of the M tone. The CV-CV stem shows a FV which would normally carry a L tone after the H tone root vowel, but the FV is devoiced leaving just the H tone on the root vowel. In the CVV-CV stem, the FV is clearly L after the downstepped H tone on the long root vowel: *[ndyɛ́↓ákyééli...]*.

Thus all the surface tones on stems in tables 21 and 22 represent the underlying grammatical HL melody, which attaches after lexical L tones and merges with lexical H tones. The fact that HL is realised as M on FVs seems to confirm that the two tones together form the grammatical tone, and that the influence of the final L tone needs to remain in the surface realisation – unlike final L tones in the recent past which do not always attach.

Figure 8 shows pitch curves for the CV-CV example in table 21 and the CV example in table 22, both having the first person subject **bʉ́í** 'we', and having a M tone on the stem FV.

The pitch curves show that the pronoun and STM prefix are not pronounced exactly as LH + LL, but rather as MH + ML: **bʉ́í līī-.** However, it is perhaps normal in rapid, 'lazy' speech that the extremes of H and L be reached by a more limited rising tone followed by a falling tone, when there is no pause between the pronoun and STM prefix, and underlyingly, the
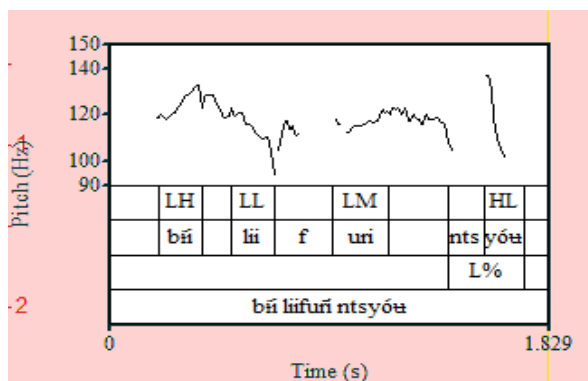
tones are still LH + LL. Of greater importance is that the pitch curve does not rise to a full H tone at the end of the stem, but is realised as M.

a. **Bií <u>lii-fur-î</u> ntsyóʉ.**
    1p.we 1p.PST-pay.for-PFV c9.field
    'We paid for the field.'
    [bíí<u>liifurī</u> ntsyóʉ]

b. **Bíí <u>lii-ŋwî</u> mali.**
    1p.we 1p-PST-drink.PFV c6.wine
    'We drank wine.'
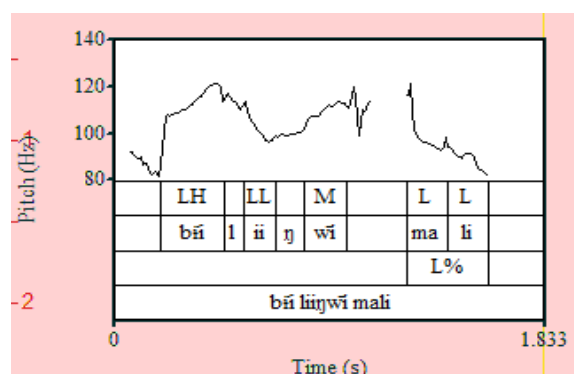   **[bíí<u>liiŋwī</u> mali]**

Fig.8: pitch curves for utterances with first person pronouns, showing M tone on the FV of the stem
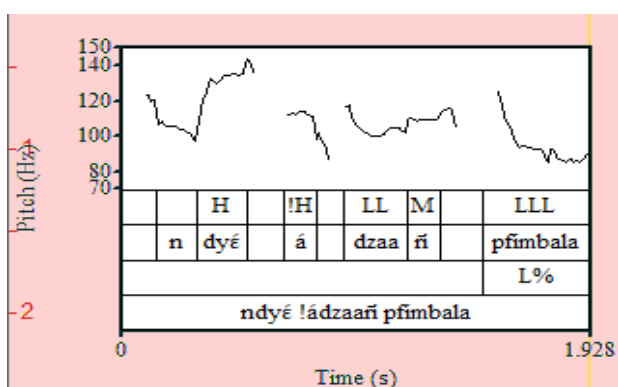
Figure 9 shows pitch curves for the CVV-CV stem in table 22 and the CVV stem in table 23, both with third person pronouns. The prefix carries a downstepped H, and the tone on the FV is M. Both of these tones are lower than the initial H tone on the pronoun.

a. **Ndyɛ́ <u>ǎ-dzaar-î</u> pfimbala.**
    3s.he 3s.PST-crush-PFV c5.beetle
    'He crushed the beettle.'
    [ndyɛ́ ↓ádzaarī pfimbala]

b. **Ndyɛ́ <u>ǎ-twí-i</u> ndzwɔ́.**
    3s.he 3s.PST-build-PFV c9.house
    'He built the house.'
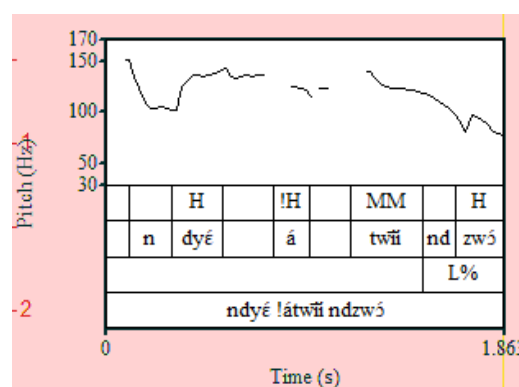   **[ndyɛ́ ↓átwīīndzwɔ]**

Fig. 9: pitch curves for utterances with third person pronouns, showing downstepped H tones.

When the verb is following by a word with a L tone prefix (table 23), the STM prefix again shows a downstepped H after the third person subject, and a L tone after the first person subject with no downstepped stem tones. The lexical tone appears as usual on the stem-initial

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mora, with the exception of the CV stem which has lost its lexical L tone, carrying instead a downstepped H tone: *[ndyɛ́ ↓ádzwí antaali]*.

Table 23: General past verb conjugations for L tone stems before a L prefix on the next word

| Stem type	General past L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem + next prefix
CV **dzwa** *kill*	**Ndyɛ́ ǎ-dzwǐ a-ntaali.** 3s.he 3s.PST-kill-PFV c2-snakes	**[ndyɛ́↓ádzwí antaali]** 'He killed the snakes.'	(↓H).H+L
CVV/CV-V **luɔ** *teach*	**Bɨ́ lii-lu-êⁱ a-kéɨ́.** 1p.we 1p.PST-teach-PFV c2-women	**[bɨ́liiluéⁱ akéɨ]** 'We taught the women.'	(LL).LH+L
CV-CV **fura** *pay for*	**Bɨ́ lii-fur-î li-kɔ́ɔlɔ.** 1p.we 1p.PST-pay.for-PFV c5-school	**[bɨ́liifurí likɔ́ɔ̄lɔ]** 'We paid for school.'	(LL).LH+L
CVV-CV **dzaara** *crush*	**Ndyɛ́ ǎ-dzaarî a-pfimbala.** 3s.he 3s.PST-crush-PFV c6.beetles	**[ndyɛ́↓ádzaaríapfimbala]** 'He crushed the beetles.'	(↓H).LLH+L

What is striking about table 23 is that the FVs on all the stems have a H tone, not M as in table 21, although when following a third person subject pronoun, this is a downstepped H. The lexical L tone on the root vowel (except on the CV stem where it is deleted), the H tone on the FV and the L tone on the next prefix, form a LHL melody over the stem and following prefix: lexical L + grammatical HL.

a. **Bɨ́ lii-lu-e a-kéɨ́.**
   1p.we 1p-PST-teach-PFV c2-women
   'We taught the women.'
   [bɨ́liilué akéɨ]
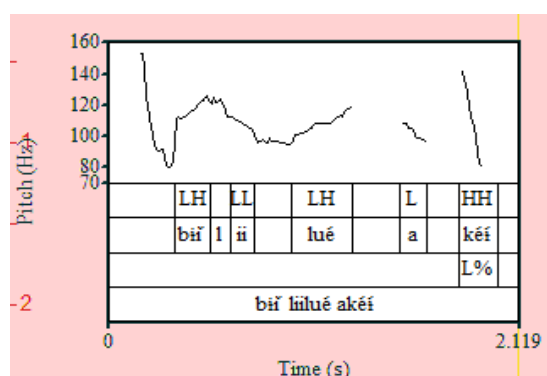
b. **Ndyɛ́ á-dzaar-i apfimbala.**
   3s.he 3s.PST-crush-PFV c6-beetles
   'He crushed the beetles.'
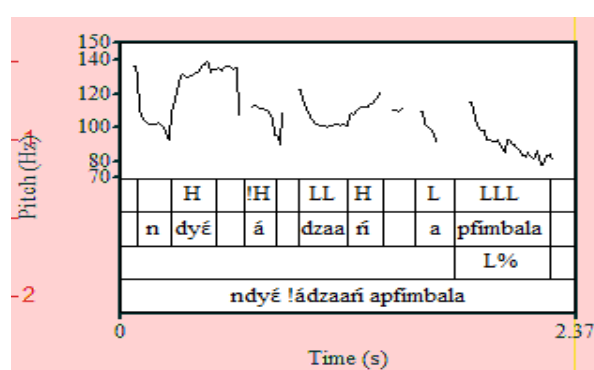   **[ndyɛ́↓ádzaarí apfimbala]**

Fig. 10: Pitch curves of utterances with a following prefix with first person and third person subjects.

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Figure 10 shows pitch curves for the CV-V and CVV-CV stems in table 23: 10a has a L first person STM prefix, and a LHL combined stem + prefix tone melody, and in 10b, the third person subject causes downstepped H tones, again with a LHL melody on stem + prefix.

Table 24: General past tense verb conjugations for H tone stems before a L prefix on the next word

Stem type	General past H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem + next prefix
CV **ŋwâ** *drink*	**Bɨɨ́ lii-ŋwî a-dzá.** 1p.we 1p.PST-drink.PFV c6.water	[bɨɨ́ <u>liiŋwáadza</u>] 'We drank water.'	(LL).H + L
CVV/CV-V **twía** *build*	**Ndyɛ́ ǎ-twí-i li-kɔ́ɔ́lɔ.** 3s.he 3s.PST-build-PFV c5-school	[ndyɛ́↓átwíí likɔ́ɔ̄lɔ] 'He built the school.'	(↓H).HH + L
CV-CV **sála** *work*	**Ndyɛ́ ǎ-sál-i a-ntsyó.** 3s.he 3s-PST.work.PFV c6.fields	[ndyɛ́↓ásáli antsyōo] 'We worked the fields'	(↓H).HL + L
CVV-CV **kyɛ́ɛ́lɛ** *await*	**Bɨɨ́ lii-kyéél-i a-kéɨ́.** 1p.we 1p-PST.await.PFV c2.women	[bɨɨ́ <u>liikyééli akéɨ́</u>] 'We awaited the women.'	(LL).HHL + L

In table 24, H tones on the verb are again downstepped after a third person subject, and first person STM prefixes are L toned. Stems show the lexical H on the first mora, which spreads to cover long vowels, and additional moras on the stem and/or next prefix carry L tone. The vowel of the CV stem coalesces with the vowel of the next prefix, but the lengthened prefix vowel carries both the H tone from the verb and its own L tone: *[...liiŋwáadza]*. We see the lexical H plus grammatical HL tones merging to form a /HL/ melody over the stem and the prefix on the next word.

Further evidence for the HL grammatical tone on stems in the general past is found in the following two pitch curves (fig.11) of recordings of verb paradigms made back in 2002. These graphs show a falling tone on the FV of the stem: ML or ↓HL.

a. **Bɨ́í lii-fur-i   ku ulɔ́.**

1p.we 1p.PST-pay-PFV much

'We paid a lot.'

[bɨ́í liifurî kuulɔ]

b. **A-kwɔ   áá-bwol-i   untsá ndzwɔ́.**

c6-bananas c6.PST-rot-PFV in   c9.house

'The bananas rotted in the house.'
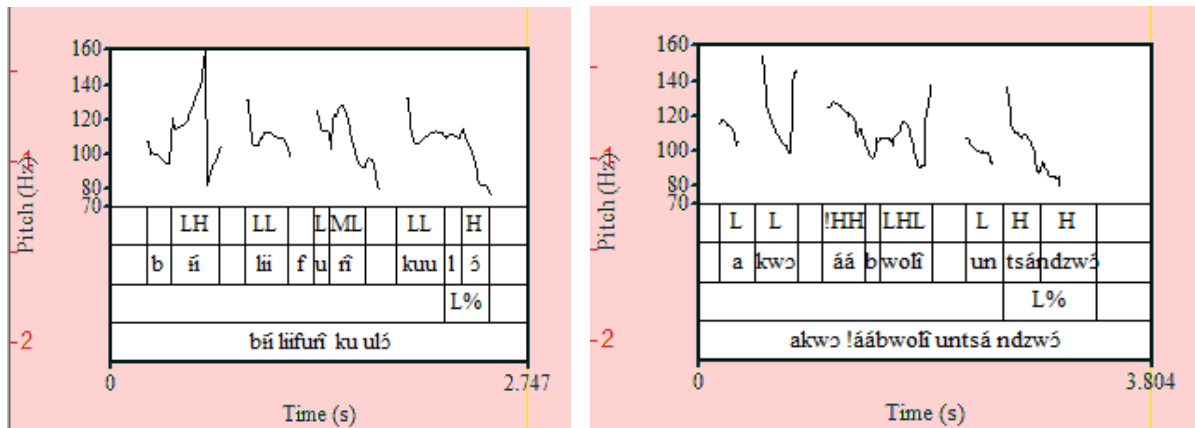
[akwɔ ↓áábwolî untsā ndzwɔ]

Fig, 11: Pitch curves from 2002, showing a falling tone on the stem FV before an oblique

Thus we can see that the M tone on FVs in more recent recordings really is underlyingly HL. When a L tone prefix follows, the L tone spreads to that prefix, leaving just the H (which may be downstepped), but if no prefix follows, the HL becomes a M tone. We can summarise this process with the following rule:

15. *HL contour tones are realised as M, or H if the L tone can move across to a following unstressed mora.*

Fig. 11b above raises an important question concerning downstepped H tones, which is beyond the scope of this study. In 11b, the subject is a class 6 noun, giving a H subject agreement tone on the verbal prefix. However, the noun in question has only L tones: *akwɔ* 'bananas', and thus the assumed floating L tone which triggers downstep does not occur between two H tones. It is not clear how downstep could be triggered in this case, and further research is required. However it *is* clear that the STM prefix vowels have been lowered, compared to previous H tones in the utterance (not visible on the pitch curve), which is still consistent with a grammatical L tone marking the tense.

Comparison of the general past STM prefixes of Eboo with the general past STM prefixes of Tyee also appears to confirm the posited L grammatical tone marking the general past in Eboo. In 16, the sentence *uyúghu ndé* 'to listen to him' is conjugated for the general past (with prefixes underlined). The Tyee prefixes again all have a long vowel, with the first mora carrying the subject agreement tone (L for first and second persons and H for third persons and noun classes), and the second mora carrying a grammatical L tone:

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16. (Teke-Tyee: my own data)

Me (áli) <u>aa</u>ngyúghu nde.	'I listened to him.'
We (áli) <u>aa</u>yúghū nde.	'You (*sg*) listened to him.'
Ndé (áli) <u>áa</u>yúghu nde.	'He listened to him.'
Bihí (áli) <u>lii</u>yúghu nde.	'We listened to him.'
Bé (áli) <u>lii</u>yúghu nde.	'You (*pl*) listened to him.'
Bó (áli) <u>bá</u>ayúghu nde.	'They listened to him.'

Thus we can write a rule for the general past in Eboo, following the rule given for the recent past *(Grammatical H tone deletes subject agreement L tone)*, as follows:

17. *Grammatical L tone lowers subject agreement H tone.*

Table 25 compares the STM prefixes for the general past and the recent past. The prefixes are segmentally identical, but the tones differ. Further investigation is needed to determine whether noun class prefixes have M or downstepped H tones.

Table 25: Comparative recent past and general past STM prefixes for persons & noun classes, showing surface tones

	STM prefix for persons			STM prefix for noun classes			STM prefix for noun classes	
	REC	**PST**		**REC**	**PST**		**REC**	**PST**
1s	í-	i-	c1	á-	ā-/↓á-	c7	íí-	ī̄-/↓íí-
2s	á-	a-	c2	áá-	āā-/↓áá-	c8	íí-	ī̄-/↓íí-
3a	á-	↓á-	c3	á-	ā-/↓á-	c9	í-	ī-/↓í-
1p	líí-	lii	c4	íí-	ī̄-/↓íí-	c10	í-	ī-/↓í-
2p	líí-	lii	c5	líí-	lī̄-/↓líí-	c14	úú-	ū̄-/↓úú-
3p	áá-	↓áá-	c6	á-	āā-/↓áá-			

Given our observation that the grammatical HL tone realised as M on monomoraic stems deletes lexical L tone, we can add the following rule:

18. *Grammatical HL tone on monomoraic stems deletes lexical L tone.*

4.2.3 Summary of the general past tense

As already observed, STM prefixes are segmentally identical for the recent and general past. The FV on general past stems is a high vowel showing perfective aspect (cf. 2.3.3), but this vowel may not appear for all the same reasons given for the recent past (cf. 4.1.3): devoicing,

deletion, vowel coalescence or nasalised vowels. Thus grammatical tone is the main tense marker for the general past.

The underlying tones (subject agreement, grammatical and lexical) on the verb were presented in table 20, which is reproduced below for convenience. There is a grammatical L tone on the prefix and a HL tone melody on stems.

Table 26: Summary of subject agreement, grammatical & lexical tone in the general past

STM prefix		ROOT	FV + prefix
Subject agreement	Grammatical tone	Lexical tone	Grammatical tone
1st/2nd persons: L 3rd persons: H	L	L/H	HL

The difference between underlying and surface tones in the general past tense can be accounted for by the following rules:

19. • *Grammatical L tone lowers subject agreement H tone.*
    • *Grammatical HL tone on monomoraic stems deletes lexical L tone.*
    • *HL contours are realised as M, or as H if the L tone can move across to a following unstressed mora.*

The lowering of subject agreement H tone takes the form of downstepped Hs following third person pronominal subjects, giving the prefix tones presented in table 25.

On stems, the grammatical HL melody is realised simultaneously as M tone, if only one mora is available, since contour tones on the same mora are avoided. If a L tone prefix on the next word receives the L tone from the stem, the H tone remains on the stem. The underlyingly three-way tone contrast on L tone CV stems is resolved by deleting the lexical L tone and realising the HL melody as M, or as H with the L tone moving across to a following prefix.

Table 27 shows the surface melodies of stems with a first person singular subject, when another word without a prefix follows in the utterance. Data examples are provided for both CVV and CV-V stems, which sometimes map differently. Any changes in tone melody on the stem if the next word has a L tone prefix, are given in brackets after the mapped tone with no following prefix.

There are two surface tone melodies attested on general past stems are thus /HL/ for lexical H verbs and /LHL/ for lexical L verbs. Final M tones on the stem are realised as H tones if there is a L tone prefix on the next word.

Table 27: General past surface tone melodies mapped to the four different stem types (CV, CVV/CV-V, CV-CV and CVV-CV), when another word follows with no prefix (or in brackets if with a prefix)

Tone melody	Data examples for each stem type	Mapped tone before another word		Gloss
/HL/	(Mɛ i).ŋwī...	M	(H)	I drank... (PST)
	(Mɛ i).twĭĭ/tsáo...	MM or HL		I built/dispersed... (PST)
	(Mɛ i).sáli...	H-L		I worked... (PST)
	(Mɛ i).kyééli...	HH-L		I waited... (PST)
/LHL/	(Mɛ i).dzwī...	M	(H)	I killed... (PST)
	(Mɛ i).swaā/luō...	LM	(LH)	I washed/taught... (PST)
	(Mɛ i).furā...	L-M	(L-H	I paid... (PST)
	(Mɛ i).dzwaanī...	LL-M	(LL-H)	I fought... (PST)

The surface realisations of recent and general past conjugations can be confusingly similar when there is a third person subject and a H tone verb. In the following two sentences (20), the only difference in surface tones is that the general past has a downstepped H tone on both the STM prefix and the root vowel. Even if the FVs were pronounced fully as –*i*, they would carry a L tone in both cases.

20. **Ndyɛ́ á.sáli ntsyōʉ.** [ndyɛ́ ásálə ntsyōʉ]   'He worked the field.' (REC)

    Ndyɛ́ ǎ.sáli ntsyōʉ. [ndyɛ́ ↓ásálə ntsyōʉ]   'He worked the field.' (PST)

Thus the general past tense has more complex tonal melodies than the recent past, with downstepped H tones as well as M tones appearing in surface realisations.

4.3   The future

The future tense covers the period starting from tomorrow or even today, excluding an action that is about to commence, and continues into the distant future.

4.3.1   The future auxiliary

The future is marked by an optional auxiliary *lí* (which has the variant *sá*) before the verb. The pitch curves in figure 12 show two sentences with a second person subject, with and without the auxiliary *lí*. In 12a, the auxiliary only manages a M tone between two Ls, but in both sentences, the STM prefix is L, and the tonal melody on the stem is LH: *afurá*. Thus the presence or absence of the auxiliary does not appear to affect the tones on the verb.

a. **Ukýá wɛ lí <u>a-fur-á</u> ku ulɔ́.**
tomorrow 2s.you AUX 2s.FUT-pay-FV much
'Tomorrow you will pay a lot.'
[ukýá wɛlīafurá kuulɔ]

b. **Ukýá wɛ <u>a-fur-á</u> ku ulɔ́.**
tomorow 2s.you 2s.FUT-pay-FV much
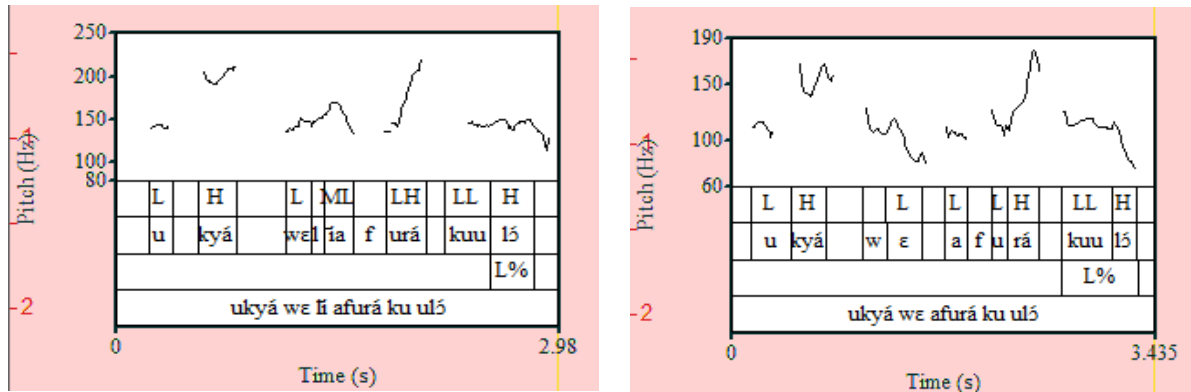'Tomorrow you will pay a lot.'
[ukýá wɛ afurá kuulɔ]

Fig 12: *Pitch curves showing utterances with & without the auxiliary* **lí,** *with a second person subject.*

Figure 13 shows the same utterance as in figure 12, but with a third person subject pronoun. In both 13a and 13b, the auxiliary and STM prefix are pronounced without a pause between them, giving a falling tone on the prefix. A H tone again follows the lexical L tone on the stem. Thus the tone pattern on the verb is the same, with or without the auxiliary **lí.**

a. **Ukýá bwɔ́ lí <u>áa-fur-á</u> ku ulɔ́.**
tomorrow 3p.they AUX 3p.FUT-pay-FV much
'Tomorrow they will pay a lot.'
[ukýá bwɔ̄líáāfurá kuulɔ]

b. **Ukýá bwɔ́ <u>áa-fur-á</u> ku ulɔ́.**
tomorrow 3p.they 3p.FUT-pay-FV much
'Tomorrow they will pay a lot.'
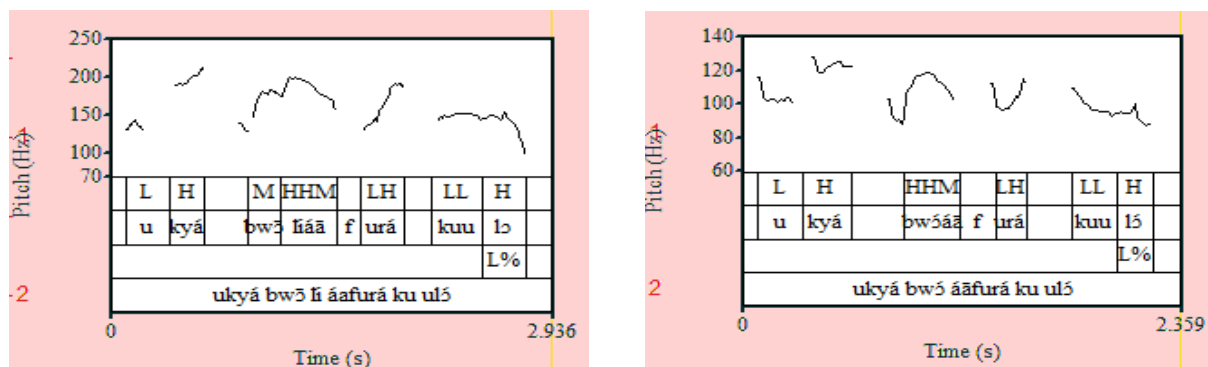**[ukýá bwɔ́áāfurá kuulɔ]**

Fig. 13: *Pitch curves showing utterances with & without the auxiliary* **lí,** *with a third person subject*

4.3.2 Future verbal conjugations

We now look in more detail at data for the future tense without the auxiliary **lí.** The future tense has the neutral FV /a/, /ɛ/ or /ɔ/, rather than the high perfective FV (PFV) we saw for the recent and general pasts.

Table 28 presents the assumed underlying tones on the verb. The subject agreement tones are unchanged, whatever the tense, and the future appears to be marked by a grammatical L tone on the STM prefix, and a H tone on the FV.

Table 28: Underlying subject agreement, grammatical & lexical tone in the future tense

STM prefix		ROOT	FV + prefix
Subject agreement	Grammatical tone	Lexical tone	Grammatical tone
1st/2nd persons: L 3rd persons: H	L	L/H	H

From table 28, we can expect to find a L tone on STM prefixes with a first or second person subject, as we saw in figure 12, and a HL tone melody with a third person subject, as in figure 13. The lexical tone on the root is followed by the grammatical H tone on the stem.

In the following tables (29-32), the data in the second column of each table shows the underlying tones, whereas the third and fourth columns show the phonetic realisation and surface tone melodies respectively.

Table 29: Future tense verb conjugations for L tone stems before a word with a zero prefix

Stem type	Future L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies (prefix).stem
CV **dzwa** *kill*	**Ndyé â.dzwá ntaali.** 3s.he 3s.FUT-kill-FV c1-snake	[ndyé ādzwá ntaali] 'He will kill the snake.'	(M).H
CVV/CV-V **luɔ** *teach*	**Bɨí lii.lu.ɔ́ baána.** 1p.we 1p.FUT-teach-FV c2.children	[bɨí liiluɔ́ baana] 'We will teach the children.'	(LL).LH
CV-CV **fura** *pay for*	**Bɨí lii.fur.á ntsyóʉ.** 1p.we 1p.FUT-pay-FV c9.field	[bɨí liifurá ntsyóʉ] 'We will pay for the field.'	(LL).LH
CVV-C **dzaara** *crush*	**Ndyé â-dzaar-á pfimbala.** 3s.he 3s.FUT-crush-FV c5.beetle	[ndyé ādzaará pfimbala] 'He will crush the beetle.'	(M).LLH

In table 29 with lexical L tone verbs, we see that the STM prefix for the future has the same phonetic realisation as for the general past. The L tone subject agreement on first person STM prefixes is maintained as L, while the H tone third person agreement tones are realised as M. Thus the grammatical L tone marking future tense appears to be lowering the H subject agreement tone, as we saw in the general past. However, there is no downstep of following H tones - only the prefix tone is lowered to M. I suggest that this M tone is underlyingly the

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H subject agreement tone and the grammatical L tone, pronounced simultaneously. When there is no pause between the subject pronoun and following prefix, the tone may be falling, rather than M, as in figure 13.

The lexical L tone on the stem is followed by a H tone on the FV. On the monomoraic stem, this lexical L tone has been deleted, in favour of the grammatical H tone.

When the lexical tone is H (table 31), the STM prefix shows the same pattern as for L tone verbs: L tone for first and second class subjects and M tone for third person subjects. The stem initial mora carries the lexical H tone, and the FV is again H.

Table 30: Future tense verb conjugations for H tone stems before a word with a zero prefix

Stem type	Future H tone verbs with assumed underlingly tones	Phonetic realisation and gloss	Surface tone melodies (prefix).stem
CV ŋwâ *drink*	**Bɨɨ́ lii-ŋwá mali.** 1p.we 1p.FUT-drink.FV c6.wine	**[bɨɨ́ liiŋwámali]** 'We will drink wine.'	(LL).H
CVV/CV-V twía *build*	**Ndyɛ́ â.twí.á ndzwɔ́.** 3s.he 3s.FUT-build-FV c9-house	**[ndyɛ́ ātwíándzwɔ]** 'He will build a house.'	(M).HH
CV-CV sála *work*	**Bɨɨ́ lii.sál.á ntsyóʉ.** 1p.we 1p.FUT-work-FV c9.field	**[bɨɨ́ liisálᵊntsyóʉ]** 'We will work the field.'	(LL).H
CVV-CV kyéélɛ *await*	**Ndyɛ́ â-kyéél-ɛ́ baána.** 3s.he 3s.FUT-await-FV c2.children	**[ndyɛ́ākyéélɛ́ baāna]** 'He will await the children.'	(M).HHH

On the CV-CV stem, the FV is devoiced to the extent that no clear tone can be heard; *[liisálᵊ]*, but the FV H tone is clearly seen on the CV-V and CVV-CV stems: *[ndyɛ́ ātwíá…]* and *[ndyɛ́ākyéélɛ́…]*. The fact that the tone on the FV is H even after a lexical H tone confirms that the grammatical tone is H, and not HL.

Figure 14 shows two pitch curves with lexical H tone verbs; 14a, has a H tone third person subject, and 14b has a L tone nominal subject. The tone of the STM prefix is realised as M in both cases, but the grammatical H tone on the FV retains its full height.

a. **Ndyɛ́ <u>â-twí-á</u>   ndzwɔ́.**
   3s.he   3s.FUT-build-FV   c9.house
   'He will build the house'
   [ndyɛ́ <u>ātwíá</u>ndzwɔ]
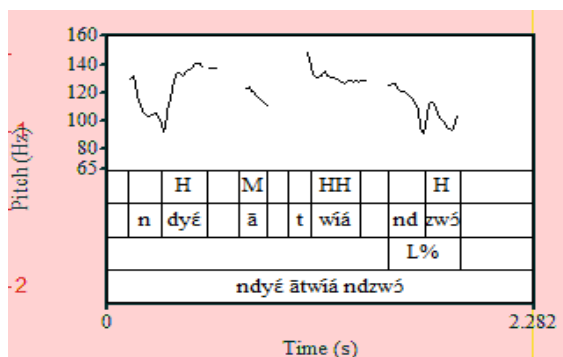
b. **Kwɔ   <u>líi-síílá</u>   kuntsá nkúru.**
   c5.banana   c5.FUT-remain-FV in   c9.basket
    'The banana will remain in the basket'
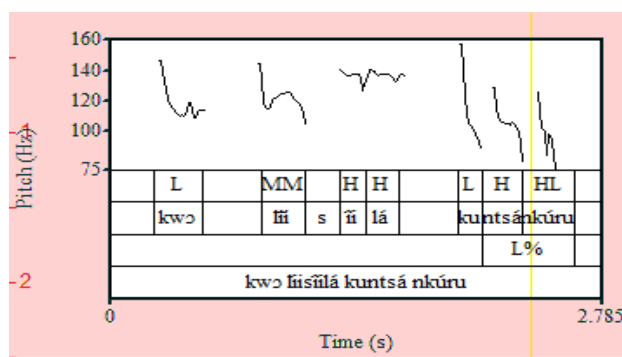   **[kwɔ <u>līīsíílá</u> kuntsankuru]**

Fig 14: Pitch curves showing third person and nominal future STM prefixes realised with M tones

Tables 31 and 32 show future stems followed by L tone prefixes on the next word. As expected, STM prefixes are L for first and second person subjects, and M for third person subjects. However, the important thing to note is that the L tone of the prefix on the next word is H after future tense stems, with no exceptions. This is the first conclusive evidence that the prefix on the next word is linked prosodically to the verbal stem, like in Kukuya (cf. the data in 1, section 2.2).

Table 31: Future tense verb conjugations for L tone stems before a L tone prefix on the next word

Stem type	Future L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies (prefix).stem + next prefix
CV **dzwa** *kill*	**Ndyɛ́ <u>â-dzwá</u> antaali.** *3s.he 3s.FUT-kill-FV c2.snakes*	**[ndyɛ́<u>ādzwá</u> ántaali]** 'He will kill the snakes.'	(M).H + H
CVV/CV-V **luɔ** *teach*	**Bɨí <u>lii-lu-ɔ́</u> a-kéɨ́.** *1p.we 1p.FUT-teach-FV c2-women*	**[bɨí <u>liiluɔ́</u> ákéɨ́]** 'We will teach the women.'	(LL).LH + H
CV-CV **fura** *pay for*	**Bɨí <u>lii-fur-á</u> li-kɔ́ɔ́lɔ.** *1p.we 1p.FUT-pay-FV c5-school*	**[bɨí <u>liifurá</u> líkɔ́ɔ̄lɔ]** 'We will pay for school.'	(LL).LH + H
CVV-C **dzaara** *crush*	**Ndyɛ́ <u>â-dzaar-á</u> a-pfimbala.** *3s.he 3s.FUT-crush-FV c6-beetles*	**[ndyɛ́ <u>ādzaará</u> ápfi- mbala]** 'He will crush the beetles.'	(M).LLH + H

In table 31, the lexical L tone CV stem again loses its L tone in favour of the grammatical H tone. On the other stems, the lexical L tone is followed by the grammatical H tone on the

FV and on the next prefix. This gives a LHH tone melody over the stem and next prefix, but the L tone does not spread to delink the stem final H as happens in Kukuya (cf. 1b, section 2.2). Since the H tone marks future tense, it perhaps needs to be realised on the verb itself.

Table 32: Future tense verb conjugations for H tone stems before a L tone prefix on the next word

Stem type	Future H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies (prefix).stem + next prefix
CV **ŋwâ** *drink*	**Bɨ́ɨ́ lii-ŋwá a-dzá.** 1p.we 1p.FUT-drink-FV c6.water	**[bɨ́ɨ́ liiŋwáádza]** 'We will drink water.'	(LL).H + H
CVV/CV-V **twía** *build*	**Ndyɛ́ â-twí-á li-kɔ́ɔlɔ.** 3s.he 3s.FUT-build-FV c5-school	**[ndyɛ́ātwíá líkɔ́ɔ̄lɔ]** 'He will build the school.'	(M).HH + H
CV-CV **sála** *work*	**Ndyɛ́ â-sál-á a-ntsyóʉ.** 3s.we 3s.FUT-work-FV c6-fields	**[ndyɛ́ āsáláántsyóʉ]** 'He will work the fields'	(M).HH + H
CVV-CV **kyɛ́ɛ́lɛ** *await*	**Bɨ́ɨ́ lii-kyɛ́ɛ́l-ɛ́ a-kéɨ́.** 1p.we 1p.FUT-await-FV c2.women	**[bɨ́ɨ́ liikyɛ́ɛ́lákéɨ]** 'We will await the women.'	(LL).HH + H

In table 32, with lexical H tone stems before a prefix in the next word, all the stem tones are again H, as well as the prefix tones of the next word. Thus the grammatical H tone on the stem has spread across to the following prefix, deleting the L tone of the prefix. The FV of the CVV-CV stem is elided, with no tone loss.

Table 33 summarises future STM prefixes for the future tense, compared to those for the recent and general pasts.

Table 33: Comparative recent past, general past & future prefixes for persons & noun classes, showing surface tones

	STM prefix for persons				STM prefix for noun classes				STM prefix for noun classes		
	REC	PST	FUT		REC	PST	FUT		REC	PST	FUT
1s	í-	i-	i-	c1	á-	ā-/↓á-	ā-	c7	íí-	ῑ̄-/↓íí-	ῑ̄-
2s	á-	a-	a-	c2	áá-	āā-/↓áá-	āā-	c8	íí-	ῑ̄-/↓íí-	ῑ̄-
3a	á-	↓á-	ā-	c3	á-	ā-/↓á-	ā-	c9	í-	ῑ-/↓í-	ῑ-
1p	líí-	lii	lii	c4	íí-	ῑ̄-/↓íí-	ῑ̄-	c10	í-	ῑ-/↓í-	ῑ-
2p	líí-	lii	lii	c5	líí-	līī-/↓líí-	līī-	c14	úú-	ūū-/↓úú-	ūū-
3p	áá-	↓áá-	āā-	c6	á-	āā-/↓áá-	āā-				

Segmentally, there is no difference between the prefixes for each tense, making the tonal differences even more pertinent for tense marking. Furthermore, as already noted, the general past and future STM prefix tones are phonetically the same, and thus these two tenses can only be distinguished by looking at the stems.

The future tense in Tyee is not formed in the same way as in Eboo, so no comparison of prefixes is possible, but the limited examples of conjugated verbs in Kukuya (Paulian 1975: 143) indicate that nominal prefixes have HL tones in both the general past and the future. Kristensen & Kristensen (1987) identify the third person prefix tone in Eboo as H for the future, but my acoustic analysis shows rather a M tone. The processus at work to produce the M tones are already covered by two of the rules identified for the general past (cf. 15 & 17):

21 a. *Grammatical L tone lowers subject agreement H tone;* and
    b. *HL contours are realised as M, or H if the L tone can move across to a following unstressed mora.*

In the future tense, HL tones are only attested on the STM prefix, and since the stressed stem-initial syllable follows, the L tone can never move across to a following unstressed mora. The contour tone is therefore realised as M tone, and the presence of M tones in the general past and future gives rise to a three-way distinction in surface realisations.

The fact that lexical L tone is lost on monomoraic stems in the future, can be expressed by adapting the rule given for the general past (*Grammatical HL tone on monomoraic stems deletes lexical L tone.),* as follows:

22.   *Grammatical H or HL tone on monomoraic stems deletes lexical L tone.*

The spreading of the grammatical H tone on the stem to the L tone prefix on the next word, can be expressed by the following rule:

23. *Stem-final grammatical H tone spreads to a L tone prefix on the next word, deleting the L tone.*

The deletion of the L tone of the prefix by the spreading H tone from the stem confirms that the prosodic domain covering the verb stems extends across to the following prefix, as in Kukuya (section 2.2). The lexical tone on the following stem then appears to block further H tone spreading.

4.3.3 Summary of the future tense

Considering first the segments, the neutral FV /a/, /ɔ/ or /ɛ/, contrasts with the high PFV in the recent and general pasts. However, the contrast is lost if the FV is nasalised, weakened or deleted, or subject to coalescence with a following vowel (cf. the CVV-CV stem in table 33), leaving tone alone to distinguish the tense.

Underlying tones for the future tense, presented in table 28, are reproduced below for convenience.

Table 34: Summary of subject agreement, grammatical & lexical tone in the future tense

STM prefix		ROOT	FV + prefix
Subject agreement Grammatical tone		Lexical tone	Grammatical tone
1st/2nd persons: L 3rd persons: H	L	L/H	H

A grammatical L tone marks the future tense on the STM prefix, as we saw for the general past. Unlike in the general past, there is no downstep of H tones, but H subject agreement tone combines with the grammatical L tone to form a HL melody, realised as M on prefixes (cf. table 34). Lexical contrast is maintained on the stem-initial mora, except for on monomoraic stems when lexical L tone is deleted by the grammatical H tone marking the future tense on stems. When a word with a L tone prefix follows the verb, the grammatical H tone on the stem spreads across to the prefix, deleting the L tone. This confirms that the grammatical tone on future stems is just H, compared to HL for the general past.

The difference in underlying and surface forms in the future tense can be summarised by the following rules:

24. • *Grammatical L tone lowers subject agreement H tone.*
    • *HL tones on STM prefixes are realised as M.*
    • *Grammatical H tone on monomoraic stems deletes lexical L tone.*
    • *Stem-final H tone marking future spreads to a L tone following prefix, deleting the L tone.*

Table 35 shows the surface melodies of verbal stems when another word follows in the utterance, regardless or not of whether it has a prefix. There are two different tone melodies attested: /H/ for lexical H verbs, and /LH/ for lexical L verbs.

Table 35: Future surface tone melodies mapped to the four stem types (CV, CVV/CV-V, CV-CV and CVV-CV), when another word follows

Tone melody	Data examples for each stem type	Mapped tone before another word	Gloss
/H/	(Mɛ i).ŋwá...	H	I will drink... (FUT)
	(Mɛ i).káá/twíá...	HH	I will grill/build... (FUT)
	(Mɛ i.)sálá...	H-H	I will work... (FUT)
	(Mɛ i).kyéélé...	HH-H	I will await... (FUT)
/LH/	(Mɛ i).bvá...	H	I will fall... (FUT)
	(Mɛ i).swaá/luɔ́...	LH	I will wash/teach... (FUT)
	(Mɛ i).furá...	L-H	I will pay... (FUT)
	(Mɛ i).dzwaaná...	LL-H	I will fight... (FUT)

There are no M or downstepped H tones on stems in the future tense, unlike the general past. In the sentences in 25 below, the M tone of the stem FV in the general past contrasts with the H tone on the FV in the future.

25. a. **Akwɔ áa.bwolî kuntsá ndzwɔ.**   [akwɔ **āābwolī kuntsā ndzwɔ**]
     'The bananas rotted in house.' (PST)

   b. **Akwɔ áa.bwɔlɔ́ kuntsá ndzwɔ.**   [akwɔ **āābwɔlɔ́ kuntsā ndzwɔ**]
     'The pineapple will rot in the house.' (FUT)

The verb in 25 has different FVs in the two sentences, but if the verb ends in a nasalised vowel such as **usɔ̨ɔ̨** 'to enter', there is no vowel change for perfective aspect (cf. 2.3.3), and the only difference is the tone on the FV: M for the general past and H for the future

26.   **Mɛ i.sɔ̨ɔ̂ kuntsá ndzwɔ́.** [mɛ **isɔ̨ɔ̄ kuntsā ndzwɔ**]   'I entered the house.' (PST)
     Mɛ i.sɔ̨ɔ́ kuntsá ndzwɔ́. [mɛ **isɔ̨ɔ́ kuntsā ndzwɔ**]   'I will enter the house.' (FUT)

The tone melodies on stems in table 35 will be compared with the tone melodies found in Kukuya in section 6. Firstly, however, I will summarise the grammatical tone, tone rules and tone melodies identified for the three tenses analysed.

4.4. General summary of tense marking, tone rules and tone melodies
Having presented the three tenses separately, I now conclude this section by comparing tense markers, tone rules and tone melodies across the board.

Firstly, all three tenses are marked segmentally in the STM prefix by an additional vowel compared to the prefix which is unmarked for tense. I suggest that the additional vowel simply indicates that there is tense marking, without indicating which tense.

The underlying grammatical tones distinguishing the three tenses are summarised in table 36.

Table 36: Summary of underlying grammatical tone marking recent past, general past & future

	Over the whole verb: prefix.stem
Recent past	H. floating L
General past	L.HL
Future	L.H

These three distinctive tone melodies operate over the verb to mark recent past, general past and future tenses. However, subject agreement tone and lexical tone are also marked on verbs.

Table 37 is a combination of tables 12, 20 and 28, showing how the three kinds of tone: subject agreement, grammatical and lexical, position underlyingly on verbs in the three tenses. The STM prefix combines subject agreement and grammatical tense, whereas the root shows lexical tone, and the FV (+following prefix) again shows grammatical tone.

Table 37: Summary of underlying subject agreement, grammatical & lexical tone for the three tenses

Tense	STM prefix		ROOT	FV (+prefix)
	Subject agreement	Grammatical tone	Lexical tone	Grammatical tone
Recent past	1st/2nd persons: L 3rd persons: H	H	L/H	Floating L
General past	1st/2nd persons: L 3rd persons: H	L	L/H	HL
Future	1st/2nd persons: L 3rd persons: H	L	L/H	H

On the STM prefix, when subject agreement and grammatical tones are identical, they simply merge to form a single prefix tone e.g. 3rd person H subject agreement tone meets with the grammatical H tone in the recent past to form a single H tone on the prefix. However, when contrasting tones met, either L tone deletes (recent past), or H tones are lowered or downstepped (general past), or a HL contour tone is formed which is then realised as M (future tense). The underlying and surface realisations are presented in table 38:

Table 38: Underlying tones and surface realisations on STM prefixes

Tense	Subject agreement tone	Grammatical tone	Resulting underlying prefix melodies	Surface realisation
Recent past	L	H	/LH/	H
	H		/H/	H
General past	L	L	/L/	L
	H		/(L)↓H/	M
Future tense	L	L	/L/	L
	H		/HL/	M

The following three rules account for these different processes occurring on the STM prefix when there are contrasting underlying vowels:

27. • *Grammatical H tone deletes subject agreement L tone.*
   • *Grammatical L tone lowers subject agreement H tone.*
   • *HL contours are realised as M tone.*

Turning now to the stem tones on the root and FV, there is again merging of identical lexical and grammatical tone, so that for example, H lexical tone combines with grammatical HL tone for the general past to become a /HL/ melody. However, when contrasting tones meet, with insufficient moras for each one to attach, either L tone deletes (general past and future), and/or a /LH/ contour tone is formed which is realised as M (general past). The mapping of the tonal melodies on stems depends on the number of moras available (cf. table 39). The most complexe melody, /LHL/, is only realised as such if the stem + following prefix provide three available moras.

Table 39: Underlying tones and surface realisations on stems (root + FV) + prefix on next word

Tense	Lexical tone	Grammatical tone	Resulting underlying stem melodies	Surface realisation on stem 1 mora	2 moras	3 moras	2 + prefix
Recent past	L	floating L	/L/	L	LL	LL-L	LL + L
	H		/H(L)/	H	HL	HH-L	HL + L
General past	L	HL	/LHL/	M	LM	LL-M	LH + L
	H		/HL/	M	HL	HH-L	HL + L
Future	L	H	/LH/	H	LH	LL-H	LH + H
	H		/H/	H	HH	HH-H	HH + H

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The stem-initial long vowels in trimoraic stems do not carry contrastive tones, but only two identical tones or one tone spreading over both. Therefore the first tone in the melody spreads over the long vowel: /LH/ maps as LLH, /HL/ as HHL, and /LHL/ as /LLM/.

On the other hand, two distinct vowels on the stem plus the prefix vowel of the next word, map contrastive tone melodies as /LHH/, /HLL/ and /LHL/ respectively. In this case it is the final tone which spreads to fill remaining moras.

I will return briefly to this discussion in section 6, but we can see from the above that tonal melodies do not map onto moras in exactly the same way as we saw in Kukuya, where the three permitted patterns are /LLH/, /HLL/ and /LHL/ (cf. table 2 in 2.2).

The following three rules account for the changes in the surface realisation of tones on the stem (+next prefix) in Eboo. I note that these processes to not apply to the recent past, which has the same underlying tones and surface realisations.

28. • *Grammatical H and HL tone on monomoraic stems deletes lexical L tone.*
    • *Grammatical H tone spreads to a L tone prefix on the next word, deleting the L tone.*
    • *HL contours on FVs are either realised as M, or as H if the L tone can move across to a following unstressed mora.*

From the rules given in 27 and 28, we can deduce the following:

29. • *Grammatical tone is more dominant than both subject agreement and lexical tone.*
    • *H tone is more dominant than L tone.*

Thus H grammatical tone deletes L subject agreement or lexical tone, but L grammatical tone can only lower H subject agreement or lexical tone.

Data showing the surface tones on stems for the three tenses when another word follows is presented in table 40, which summarises tables 19, 27 and 35, giving the tone melodies for each tense separately. The tone of following prefixes is not included in this table, but if a follow prefix is present, any change in how tone maps to the stem is show in brackets, after the mapping when the following word has no prefix.

The table shows that on CVV and CV-V stems, tone does not always map in the same way. For lexical L tone verbs, there is no difference in the mapping, but with lexical H tone verbs in the recent past and general past, CVV stems forming a long vowel do not allow contrastive tones, as we saw with the long vowels in CVV-CV stems, and thus the underlying /HL/ melody cannot be realised as such. In the recent past, the floating L does not attach, leaving only the H tone on the long vowel, whereas in the general past, H and L tone are realised simultaneously as a M tone.

Table 40: The five surface tone melodies of Eboo, mapped to the four different verbal stem types (CV, CVV/CV-V, CV-CV & CVV-CV) before another word (in brackets if different before a prefix).

Tone melody	Data examples for each stem type	Mapped tone before another word		Gloss
/L/	(Mɛ́ í).bvi...	L		I fell... (REC)
	(Mɛ́ í).swaa/lue...	LL		I washed/taught... (REC)
	(Mɛ́ í).furi...	L-L		I paid... (REC)
	(Mɛ́ í).dzwaani...	LL-L		I fought... (REC
/H/	(Mɛ i).ŋwá...	H		I will drink... (FUT)
	(Mɛ i).káá/twíá...	HH		I will pick/build... (FUT)
	(Mɛ i.)sálá...	H-H		I will work... (FUT)
	(Mɛ i).kyéélé...	HH-H		I will wait... (FUT)
LH/	(Mɛ i).bvǎ...	H		I will fall... (FUT)
	(Mɛ i).swaá/luɔ́...	LH		I will wash/teach... (FUT)
	(Mɛ i).furá...	L-H		I will pay... (FUT)
	(Mɛ i).dzwaaná...	LL-H		I will fight... (FUT)
/H(L)/	(Mɛ́ í).ŋwí...	H(L)		I drank... (REC)
	(Mɛ́ í).twíí/tsáoᵘ...	HH(L)/HL		I built/dispersed... (REC)
	(Mɛ́ í).sáli...	H-L		I worked... (REC)
	(Mɛ́ í).kyééli...	HH-L		I waited... (REC)
/HL/	(Mɛ i).ŋwī...	M	(H)	I drank... (PST)
	(Mɛ i).twīī/tsáoᵘ...	MM/HL		I built/dispersed... (PST)
	(Mɛ i).sáli...	H-L		I worked... (PST)
	(Mɛ i).kyééli...	HH-L		I waited... (PST)
/LHL/	(Mɛ i).dzwī...	M	(H)	I killed... (PST)
	(Mɛ i).swaā/luō...	LM	(LH)	I washed/taught... (PST)
	(Mɛ i).furī...	L-M	(L-H)	I paid... (PST)
	(Mɛ i).dzwaanī...	LL-M	(LL-H)	I fought... (PST)

Table 40 clearly shows that Eboo has the same five tone melodies on stems that we saw for Kukuya in section 2.2 : /L/, /H/, /LH/, /HL/ and /LHL/. Before comparing these tone melodies on stems with those in Kukuya, we must first address the question of intonation and examine how the boundary L% affects tone on verbs.

5. Intonation

In this section I discuss the impact of intonation on verbal phrases in Eboo, with particular reference to the phenomenon of final lowering and its effect on verbal stems utterance finally. The intonational process of downstep has already been noted in the general past. I consider briefly in this section the question of downdrift, which in fact appears to be absent, and show how lack of downdrift makes final lowering even more evident in the pitch curves.

5.1 Downdrift, boundary L tone and final lowering

Downdrift, which may also be referred to as declination, describes the progressive lowering of the pitch register during an utterance (Connell 2017: 133). It is often thought to mark declarative intonation, and is usually the result of alternating H and L tone sequences over the course of the utterance.

Rialland and Embanga Aborobongui (2017: 195-220) carried out a study of the interaction of intonation and tone in Embosi (C25), spoken to the north of the Teke area in Congo, and they provide evidence to show that Embosi displays no downdrift, even over long utterances with several H and L tone sequences. However, Embosi has a boundary L% at the end of each utterance, which is superimposed on the tone melodies, causing what is referred to as 'final lowering' of the tonal register.

From the pitch curves provided in this thesis, it seems that downdrift is also absent from Eboo declarative sentences, although there is clearly a lowering of H tones over the final two syllables which I attribute to a boundary L%. If we take a look at the longer utterances in section 4 for which pitch curves are given, both H and L tones generally maintain the same level until virtually the end of the utterance, apart from downstepped H tones. A good example of this is figure 3a, with a recent past utterance, reproduced below:
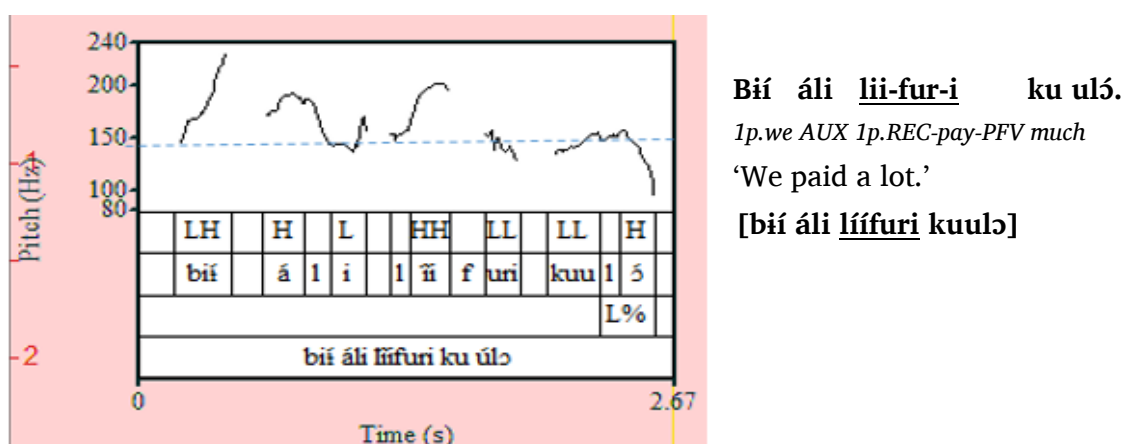

Bií áli lii-fur-i   ku ulɔ́.
1p.we AUX 1p.REC-pay-PFV much
'We paid a lot.'
[bɪí áli líífuri kuulɔ]

Fig. 15: *A pitch curve showing level H and L tones until the boundary L% causes final lowering (the dotted horizontal line shows L tones)*

Figure 15 shows progressive sequences of L and H tones, which maintain their level until the H tone on the final syllable of the utterance, which is reduced to L, falling even to extra L (L*).

In figure 16, the future utterance also contains sequences of L and H tones, with the M tone marking the future on just the verbal prefix. The H tone on the FV of the stem is at the same level as earlier H tones, whereas the two utterance final H tones are reduced to L and L* respectively, by the boundary L%.

Ukyá   kwɔ   lí   l̄ɪ̄-bwɔl-ɔ́   kuntsá ndzwɔ́

tomorrow c5.banana AUX   c5.FUT-rot-FV in   c9.house

'Tomorrow the banana will rot in the house'

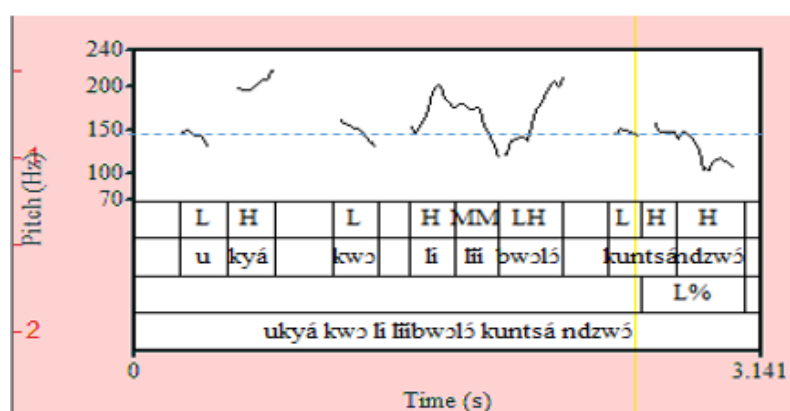**[ukyá kwɔ lí l̄ɪ̄bwɔlɔ́ kuntsandzwɔ]**

Fig. 16: A pitch curve showing level H and L tones until the boundary L% causes final lowering (the dotted horizontal line shows L tones)

Boundary tones are a common feature of, not only non-tonal, but also tonal languages (Downing & Rialland 2017: 5-6). In Embosi, the boundary tone is superimposed on the tone melody, causing lowering of the pitch at the end of the utterance. (Rialland & Embanga 2017:207-208). I suggest that this same process is occurring in Kukuya, causing final lowering of H tones (cf. table 4), and also in Eboo, as the pitch graphs in section 4 indicate.

5.2   Utterance final tone melodies in the light of final lowering

We now turn our attention to verbal stems in utterance final position, so see what effect final lowering has on the tone melodies identified thus far, and whether the changes are the same as those identified for Kukuya (cf. table 4).

Starting with lexical L tone verbs in the recent past, the expected L tones on both the root and the FV are observed for all the stem types, as the data in table 41 shows. There is apparently no final lowering, since there are no utterance final H tones to be lowered.

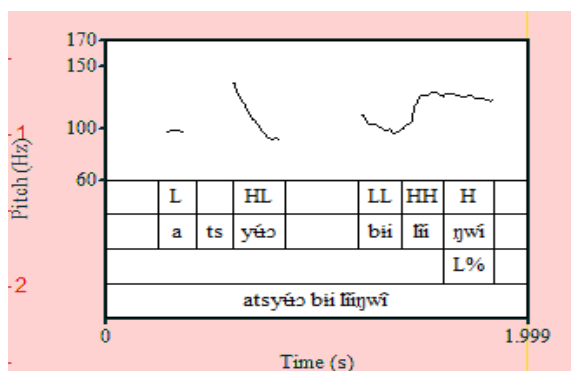*Table 41: Recent past verb conjugations for L tone stems utterance finally.*

Stem type	Recent past L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **bva** *fall*	**Ndyé á-bvi.** 3s.he 3s.REC-fall.PFV	**[ndyéábvi]** 'He fell.'	**(H).L**
CVV/CV-V **luɔ** *teach*	**Bɨí lii-lu-eⁱ.** 1p.we 1p.REC-teach-PFV	**[bɨilíílueⁱ]** 'We taught.'	**(HH).LL**
CV-CV **fura** *pay*	**Ndyé á-fur-i.** 3s.he 3s.REC-pay-PFV	**[ndyéáfuri]** 'He paid.'	**(H).LL**
CVV-CV **dzwaana** *fight*	**Bɨí lii-dzwaan-i.** 1p.we 1p.REC-fight-PFV	**[bɨi líídzwaani]** 'We fought.'	**(HH).LLL**

Lexical H tone verbs (table 42) with bimoraic or trimoraic stems also have a L tone FV on the stem, following the lexical H tone on the stem-initial mora. There is no evidence of final lowering, even on the monomoraic stem which maintains just a H tone. Given that we have identified a floating L tone following the lexical H tone, I posit that this floating tone prevents final lowering of the H tone.

Table 42: Recent past verb conjugations for H tone stems utterance finally

Stem type	Recent tense H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **ŋwá** *drink*	**Bɨí lii-ŋwí.˩** 1p.we 1p.REC-drink.PFV	**[bɨilííŋwí]** 'We drank.'	**(HH).H**
CVV/CV-V **twía** *build*	**Ndyé á-twí-i.** 3s.he 3s.REC-build-PFV	**[ndyéátwíi]** 'He built.'	**(H).HL**
CV-CV **sála** *work*	**Ndyé á-sáli.** 3s.he 3s.REC-work-PFV	**[ndyéásáli]** 'He worked.'	**(H).HL**
CVV-CV **kyéélɛ** *wait*	**Bɨí lii-kyéél-i.** 1p.we 1p.REC-wait-PFV	**[bɨilííkyééli]** 'We waited.'	**(HH).HHL**

Figure 17 shows the pitch graph for the H tone CV stem: *[bɨlííŋwí]*, confirming that the boundary L% does not cause lowering of the H tone on the FV.

Atsyúɔ bɨí   lii-ŋwí.`
Yesterday 1p.we 1p.REC-drink.PFV
'Yesterday we drank.'
[atsyúɔ bɨilííŋwí]

Fig. 17: Pitch curve showing a H tone vowel on the recent past CV stem, utterance finally

In the general past, we expect to find a HL melody following lexical tone on stems, with H tones downstepped after third person subjects. In table 43, lexical L tone stems have a HL contour on the FV, realised as M on all of the stem types.

Table 43: General past verb conjugations for L tone stems utterance finally

Stem type	General past L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **bva** *fall*	**Bɨí lii-bvɨ̌.** 1p.we 1p.PST-fall.PFV	**[bɨíliibvī]** 'We fell.'	(LL).M
CVV/CV-V **luɔ** *teach*	**Ndyέ ǎ-lu-ê.** 3s.he 3s.PST-teach.PFV	**[ndyέ↓áluē]** 'He taught.'	(↓H).LM
CV-CV **fura** *pay*	**Ndyέ ǎ-fur-î.** 3s.he 3s.PST-pay-PFV	**[ndyέ↓áfurī]** 'He paid.'	(↓H).LM
CVV-CV **dzwaana** *fight*	**Bɨí lii-dzwaan-î.** 1p.we 1p.PST-returned-PFV	**[bɨíliidzwaanī]** 'We fought.'	(LL).LLM

Once again, the FV M tones appear to be unaffected by the boundary L%. I assume that the L tone of the underlying HL melody producing the M tone prevents the boundary L% from taking effect.

Lexical H tone stems utterance finally (table 44) have the expected HL tone melody on stems, which is again realised as a M tone on the monomoraic stem, with no further final lowering. The CVV and CV-CV stems have a downstepped H tone on the root vowel, but there is no evidence that the boundary L% is causing the tone to be even lower. The root H tone on the long vowel in the CVV-CV also apprears to be unaffected, with the L tone FV following.

Table 44: General past verb conjugations for H tone stems utterance finally

Stem type	General past H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **ŋwá** *drink*	**Bɨí lii-ŋwî.** 1p.we 1p.PST-drink-PFV	**[bɨíliiŋwī]** 'We drank.'	(LL).M
CVV/CV-V **twía** *build*	**Ndyɛ́ ǎ-twí-i.** 3s.he 3s.PST-build-PFV	**[ndyɛ́↓átwīi]** 'We built.'	(↓H).HL
CV-CV **sála** *work*	**Ndyɛ́ ǎ-sál-i.** 3s.he 3s.PST-work-PFV	**[ndyɛ́↓ásālə]** 'We worked.'	(↓H).HL
CVV-CV **kyɛ́ɛ́lɛ** *wait*	**Bɨí lii-kyéél-i.** 1p.we 1p.PST-wait-PFV	**[bɨíliikyééli]** 'We waited.'	(LL).HHL

Figure 18 shows pitch curves for a) the L tone CV stem in table 43, and b) the H tone CV stem in table 44, which both have a M tone on their FV, reflecting their underlying /LHL/ and /HL/ tone melodies. The pitch curve in 18a is clearly not lowered at all, while the curve in 18b shows a M tone which only falls right at the end. Thus the boundary L% is having zero or very minimal effect.

a. **Bɨí   lii-bvî.**
     1p.we 1p.PST-fall.PFV
     'We fell.'
     [bɨílíibvī]
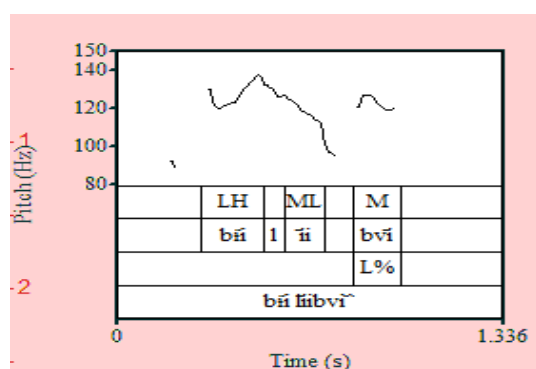
b. **Bɨí   lii-ŋwî.**
     1p.we 1p.PST-drink.PFV
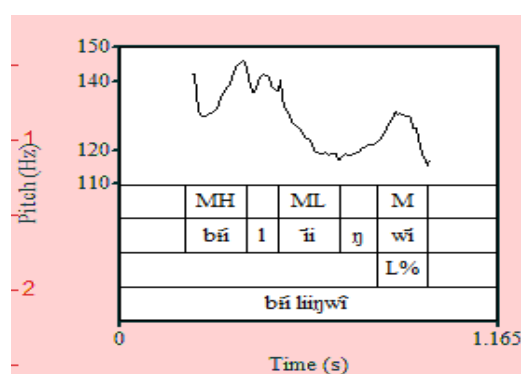   'We drank.'
     [bɨílíiŋwī]

Fig. 18: Pitch curves for general past lexical L and H tone CV stems, utterance finally

We look finally at future stems at the end of the utterance. In table 45, we can immediately see that all the H tones marking the future on the FV of the stem have been significantly lowered, since they are realised as L tones. I posit that the L tone on the CV stem is not the lexical L tone, but the lowered grammatical H tone: ***[…liibva]***. On the CVV stem,

the tone is LL, although in some recordings a slight final rise is heard. Even if the FV tones are not L*, as seen elsewhere as a result of the boundary L%, there is very clear evidence of final lowering on these stems.

Table 45: Future tense verb conjugations for L tone stems utterance finally.

Stem type	Future L tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV **bva** *fall*	**Bɨɨ́ lii-bvǎ.** 1p.we 1p.FUT-fall.FV	[bɨɨ́ liibva] 'We will fall.'	(LL).L
CVV/CV-V **luɔ** *teach*	**Ndyɛ́ â-lu-ɔ́.** 3s.he 3s.FUT-teach-FV	[ndyɛ́āluɔ] 'He will teach.'	(M).LL
CV-CV **fura** *pay*	**Ndyɛ́ â-fur-á.** 3s.he 3s.FUT-pay-FV	[ndyɛ́āfura] 'He will pay.'	(M).LL
CVV-CV **dzwaana** *fight*	**Bɨɨ́ lii-dzwaan-á.** 1p.we 1p.FUT-fight-FV	[bɨɨ́ liidzwaana] 'We will fight.'	(LL).LLL

The pitch curves in figure 19 show the L tone verbs from table 45 with a) CV-V and b) CV-CV stems; in both cases the FV tone is clearly L, although in 19b, the stem vowels are almost entirely devoiced. The boundary L% can be considered responsible for the final lowering of what is underlyingly the H tone future tense marker.

a. **Ukyá   mę̣ i-lu-ɔ́.**
Tomorrow 1s.I   1s.FUT-teach-FV
'Tomorrow I will teach.'
[ukyá mę̣iluɔ]

b. **Ukyá   ndyɛ́ â-fur-á.**
Tomorrow 3s.he   3s.FUT-pay-FV
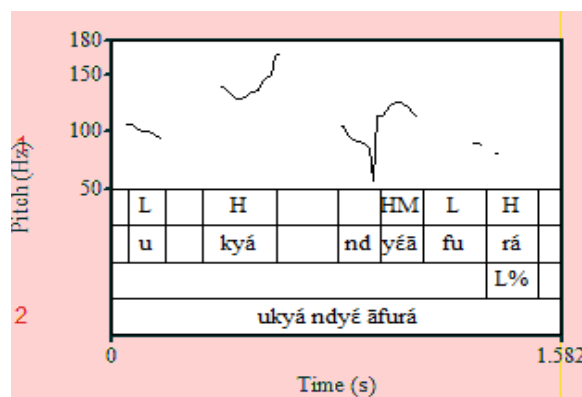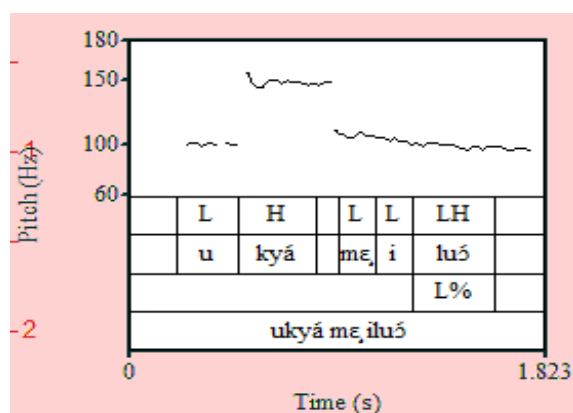'Tomorrow he will pay.'
[ukyá ndyɛ́āfura]

Fig. 19: Pitch curves for future tense L tone CV-V and CV-CV stems, utterance finally

Table 46: Future tense verb conjugations for H tone stems utterance finally

Stem type	Future H tone verbs with assumed underlying tones	Phonetic realisation and gloss	Surface tone melodies: (prefix).stem
CV ŋwá *drink*	**Ndyɛ́ â-ŋwá.** 3s-he 3s-FUT.drink-FV	**[ndyɛ́ ā̠ŋwa]** 'He will drink.'	(M).L
CVV/CV-V twía *build*	**Bií lii-twí-á.** 1p-we 1p-FUT.build.FV	**[bií liitwīa]** 'We will build.'	(LL).ML
CV-CV sála *work*	**Ndyɛ́ â-kín-á.** 3s-he 3s-FUT-danse.FV	**[ndyɛ́ ākína]** 'He will dance.'	(M).HL
CVV-CV kyéélɛ *wait*	**Bií lii-kyéél-ɛ́.** 1p-we 1p-FUT.wait.FV	**[bǐí liikyéēlɛ]** 'We will wait.'	(LL).HML

The same patterns can be observed in table 46, with even the combined lexical and grammatical H tone on the CV stem reduced to a L tone. On all the other stems, the normally H toned FV is L, and the penultimate vowel is sometimes also partially lowered to M by the boundary L% tone. Thus the CV-V stem is realised as *[...liitwīa]*, and on the CVV-CV stem, the long root vowel suffers partial lowering towards the end: *[...liikyéēlɛ]*.

Figure 20 shows the H tone verbs in table 46 with a) CV and b) CVV-CV stems. All trace of the combined lexical and grammatical H tone has been lost on the CV stem. In 20b, the lexical H tone on the long root vowel falls towards the end of the vowel, and the FV is virtually as low as the prefix tone.

a. **Bwɔ́ áa-ŋwá.**
   3p.they 3p.FUT-drink.FV
   'They will drink.'
   [bwɔ́āāŋwa]

b. **Bǐí lii-kyéél-ɛ́.**
   1p.we 1p.FUT-wait-FV
   'We will wait.'
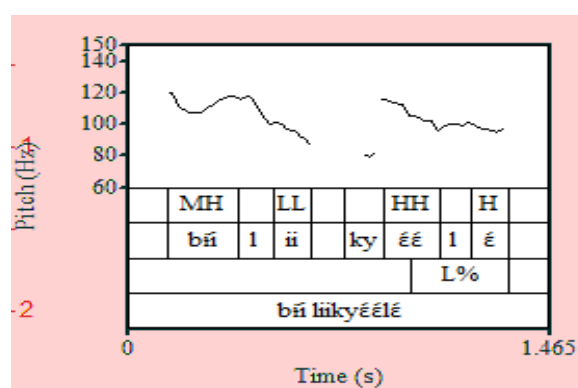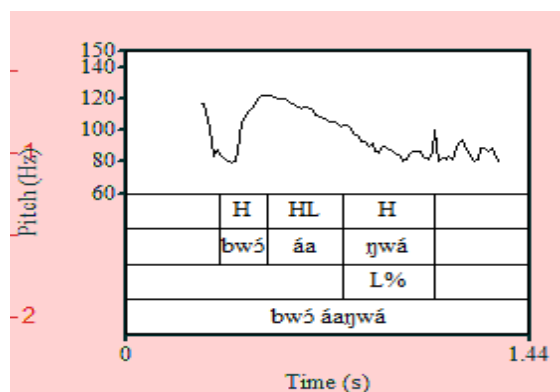   **[bǐíliikyéēlɛ]**

Fig. 20: Pitch curves for future tense H tone CV and CVV-CV stems, utterance finally

Interestingly, according to the perception of native speakers of Eboo, the H tone marking the future on the stem is still maintained utterance finally, but is just a little less H. Pitch curves however, mostly show it as a L tone, although I note that it is not L*, i.e. descending below the level of previous L tones, as is often the case with other H tones affected by final lowering. Thus the lowered H tones of the future tense, utterance finally, are still perceived as relatively H by native speakers, compared to other even more lowered FV tones.

Table 47 summarises the underlying and surface tones on utterance final CV stems for the three tenses. I noted earlier the prominence of both H tone and grammatical tone (cf. 27 in 4.4). However, these prominent tones give way before the boundary L% tone on monomoraic (and also multimoraic) future stems, and are reduced to L tones.

Table 47: Summary of underlying and surface tones on utterance final CV stems

Tense	Lexical tone	Grammatical tone	Resulting underlying tones	Surface tones on CV stems	Final lowering by the boundary L%?
Recent past	L H	Floating L	L H (+L)	L H (+L)	No
General past	L H	HL	LHL HL	M	No
Future	L H	H	LH H	L	Yes

I posit that both the underlying final L tone of the recent past (which is floating after a lexical H tone on a CV stem), and the underlying final L tone of the general past, block final lowering by the boundary L%. However, final lowering does occur when the H tone marking future stems is utterance final, since there is no L tone to block it. This same pattern is attested for all stems types, not just CV stems, since recent past and general past stems are all underlying L stem-finally, whereas future stems all end with a H tone.

In table 48, I present the tone melodies for utterance final future stems with a first person subject, as they map to the different stem types. Utterance final recent past and general past stems are unchanged in the way they map onto stems, whether or not a word follows in the utterance, and since these melodies are given in table 40, they are not reproduced here.

Table 48: The surface tone melodies of future stems, mapped to the four different verbal stem types (CV, CVV/CV-V, CV-CV and CVV-CV) when utterance final

Tone melody	Data examples for each stem type	Mapped tone utterance finally	Gloss
/H/	(Mɛ i).ŋwa.	L	I will drink. (FUT)
	(Mɛ i).lwɛ̄ɛ/twīa.	ML	I will initiate/build. (FUT)
	(Mɛ i.)sála.	H-L	I will work. (FUT)
	(Mɛ i).kyéɛ̄lɛ.	HM-L	I will wait. (FUT)
/LH/	(Mɛ i).bva.	L	I will fall. (FUT)
	(Mɛ i).sɔ̀ɔ̀/luɔ.	LL	I will enter/teach. (FUT)
	(Mɛ i).fura.	L-L	I will pay. (FUT)
	(Mɛ i).dzwaana.	LL-L	I will fight. (FUT)

Utterance finally, the FV tone may again be the only distinguishing feature between general past and future utterances, as the sentences in 30 demonstrate. The two sentences are identical apart from the FV M tone for the general past, and the FV L tone for the future.

30. **Bɨ́í <u>lii.sɔ̀ɔ̂</u>.**   [bɨ́í <u>liisɔ̄ɔ̄</u>]   'We entered.' (PST)

   Bɨ́í <u>lii.sɔ̀ɔ̂</u>.   [bɨ́í <u>liisɔ̀ɔ̀</u>]   'We will enter.' (FUT)

In the next section, I compare the utterance final tone melodies attested in Eboo with those attested in Kukuya.

6. Tone melodies and stress accent compared to Kukuya

Having completed the analysis of tense marking in Eboo, we now take a brief look back at Kukuya to see to what extent the tone melodies and stress accent are the same, and whether tone melodies on stems are mapped in the same way.

From the analysis of Eboo in sections 4 and 5, we have seen that lexical and grammatical tone combines on stems to form tone melodies which are like those presented for the Kukuya data in section 2.2. In table 49, I compare the tone melodies for Kukuya and Eboo side by side, since as already noted, the same five tone melodies are attested: /L/, /H/, /LH/, /HL/ and /LHL/. I find no occurrence of a /HLH/tone melody in the Eboo data.

Table 49 combines the data in tables 2 & 4 for Kukuya, and tables 37 & 45 for Eboo. I exclude the Kukuya stem structure CV-CV-CV which does not exist in Eboo. The table shows mapped tone both before a following stem and utterance finally. I do not compare stems before a prefix, since the context is not identical: in Kukuya the prefix has underlying H tone, and in Eboo an underlying L tone.

Contour tones (two or more contrastive tones on a single mora) are marked on the Kukuya melodies by a line above the tones linking them together (e.g. $\widehat{LH}$).

Table 49: The 5 surface tone melodies of Kukuya and Eboo, mapped to the four stem types of Eboo (CV, CVV/CV-V, CV-CV and CVV-CV) when the next word has a zero prefix and utterance finally

Tone melody	Kukuya mapped tone with following stem	Eboo mapped tone with following stem	Kukuya mapped tone utterance finally	Eboo mapped tone utterance finally	Comments
/L/	L LL L-L LL-L	L LL L-L LL-L	L LL L-L LL-L	L LL L-L LL-L	Identical mapping. No lowering by boundary L%.
/H/	H HH H-H HH-H	H HH H-H HH-H	M MM M-M MM-M	L HL H-L HH-L	Identical mapping when stem follows. Boundary L% lowers H to M in Kukuya and H to L or HL in Eboo.
/LH/	$\widehat{LH}$ LH L-H LL-H	H LH L-H LL-H	M LM L-M LL-M	L LL L-L LL-L	$\widehat{LH}$ contours in Eboo are realised as H. Boundary L% lowers LH to M or LM in Kukuya and H to L in Eboo.
/HL/	$\widehat{HL}$ HL H-L HL-L	H(L) or M HL H-L HH-L	H HL H-L HL-L	H(L) or M HL H-L HH-L	$\widehat{HL}$ contours in Eboo are realised M (or H + floating L). Boundary L% reduces $\widehat{HL}$ contours to H in Kukuya.
/LHL/	$\widehat{LHL}$ or M L$\widehat{HL}$ L-$\widehat{HL}$ LH-L	M LM L-M LL-M	$\widehat{LH}$ LH L-H LH-L	M LM L-M LL-M	Both $\widehat{LHL}$ & $\widehat{HL}$ contours in Eboo are realised as M. Boundary L% reduces $\widehat{LHL}$ & $\widehat{HL}$ contours to $\widehat{LH}$ & H in Kukuya.

Although the tone melodies map in very similar ways in Kukuya and Eboo, there are also some differences, as highlighted in the final column. The differences are found in two particular contexts, that of contour tones and that of final lowering.

Differences attested in the context of contour tones are as follows:

- As already stated, Eboo does not allow surface contour tones on FV vowels, whereas Kukuya *does* allows them. Thus in Eboo the L tone in underlying /LH/ contours is

deleted, and /HL/ contours are realised as either M, or H with a floating L tone realised on the following prefix.

- Similarly, Eboo does not allow contour tones on long vowels between consonants, whereas Kukuya *does* allow them. Table 50 compares the way in which Kukuya and Eboo map the three contrastive melodies onto CVV-CV stems. In Kukuya, the L tone spreads if there are more tones than moras, whereas in Eboo, the first tone spreads over the long vowel, and the remaining tone or tones are realised on the third mora.[10]

Table 50: Mapping of contrastive tone melodies onto CVV-CV stems in Kukuya and Eboo

Tone melody	Kukuya CVV-CV stems	Eboo CVV-CV stems
/LH/	LL-H	LL-H
/HL/	HL-L	HH-L
/LHL/	LH-L	LL-M

Differences attested in the context of final lowering are as follows:

- Final lowering of H tones occurs in both Kukuya and Eboo due to the boundary L%. However in Kukuya, FV H tones are reduced to M, wheras in Eboo they are reduced to L and penultimate H vowels may be reduced to M. Thus final lowering appears to be partial in Kukuya, but full in Eboo.
- In Kukuya, the final L tone of /HL/ and /LHL/ melodies appears to be lost utterance finally if there are insufficient moras, leaving the final tone as H. Since final H tones utterance finally in Eboo can only be realised as such if they are followed by a floating L tone, blocking lowering, I suggest that the 'missing' final L tone in Kukuya is also still present as a floating tone which blocks final lowering. This would be logical, since it forms part of the /HL/ and /LHL/ melodies.

We can summarise the above differences by saying that:

31. • *Eboo avoids contour tones on single moras – Kukuya does not.*
    • *Eboo avoids contrastive tones on long vowels between consonants – Kukuya does not.*
    • *Eboo undergoes full final lowering – Kukuya undergoes partial final lowering.*

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[10] As already mentioned, long vowels in H tone CVV stems in Eboo also avoid contrastive tones; thus /HL/ & /LHL melodies are realised as MM, or HH + a floating L tone which attaches to the following prefix.

Thus M tones in Kukuya appear when H tones are lowered by the boundary L% utterance finally, whereas M tones in Eboo always represent an underlying HL tone contour.

Although no direct comparison can be made between Kukuya stems followed by a H tone prefix on the next word and Eboo stems followed by a L tone prefix, we have seen that Eboo allows tone melodies to spread to following prefixes, just as Kukuya does.

An important claim made by Hyman (1987: 312) for Kukuya is that "there is no evidence that a prefix + stem ever constitutes a phonological domain." This study of three Eboo tenses suggests that in Eboo also, the prosodic domain in which tonal melodies operate does not allow spreading between a prefix and its own stem. Rather, the prosodic domain spreads between stressed syllables, starting at the stem-initial syllable and ending with the prefix of the following word.[11]

Having compared tone melodies, I now consider briefly the question of stress accent in Kukuya and Eboo. Hyman (2012: 353) considers that one of the 'optimal' characteristics of a stress accent is that there is some kind of audible, phonetic indication of its presence. In both Teke varieties, it is difficult to find phonetic evidence of increased intensity on the initial syllable. There is nothing in the Eboo pitch graphs to indicate that stem-initial consonants or vowels are more intense, have a higher pitch, or are phonetically any different from consonants and vowels in other syllables. However, the segmental asymmetries for Kukuya and Eboo, as described in 2.2 and 2.3.1, do provide convincing evidence that the stem-initial syllable is more dominant or robust than other syllables.

According to research in progress by Lionnet (2017), many languages in an area covering a large part of Northern Sub-Saharan African (particularly Niger-Congo languages) have what he refers to as 'Stem-initial prominence' (SIP). Lionnet provides evidence for SIP by showing that the full inventory of vowels and consonants is only found in stem-initial syllables. The other syllables are weakened and reduced, leading to shorter stems and an enhanced role for prosody. Lionnet quotes Kukuya as one such language, and it is clear that Eboo falls into the same category, with tone playing an enhanced role in tense marking.

Since phonetic evidence for stress is hard to find, it may therefore be appropriate to rename Paulian's stem-initial 'stress accent' in Kukuya, which is also attested in Eboo, as 'stem-initial prominence'. There is little doubt that the stem-initial syllable has greater status or weight than other syllables which are prone to weakening and segmental loss.

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[11] However, there appears to be at least one context in Eboo where Hyman's claim for Kukuya does not apply: in the hortative conjugation, marked by a H tone on the prefix, the H tone moves across to the following stem-initial vowel if there is a zero or nasal prefix.

7. Conclusion

This study has examined in detail three tenses in Eboo; the recent past, general past and future, and has identified the grammatical tones which mark each tense. Grammatical tones, realised on both the STM prefix and the stem FV, combine with subject agreement tones on prefixes and lexical tone on stems, to produce the surface tone melodies which characterise each tense. The underlying tonal patterns undergo processes such as L tone deletion, H tone lowering or downstep, and the emergence of M tones on FVs as the surface realisation of underlying HL contour tones.

The reference point for this study was neighbouring Kukuya, a closely related language which has been shown to have five tone melodies operating across stems, and even spreading to the prefix on the next word. This study of Eboo shows that the same five tone melodies attested in Kukuya are also present in Eboo, although they map slightly differently onto stems, and that they also spread to the prefix on the next word.

Thus a distinctive feature of both Kukuya and Eboo is that stems are linked prosodically to a following prefix, rather than to their own prefix. The stressed or prominent stem-initial syllables, which carry the lexical contrast on Eboo verbs, form the boundary lines between which tone melodies spread.

Eboo shares another prosodic feature with Kukuya. The lowering of H tones utterance finally suggests that an intonational process of final lowering occurs, triggered by a boundary L%. This process alters the surface realisation of grammatical tones marking the future tense in Eboo.

The tone melodies and prosodic features of Kukuya provide a helpful template for analysing tense marking in Eboo. However, since just three tenses were examined, further research is needed to determine whether other tenses, conjugations including pre-stem aspect markers, verbs in subordinate clauses and non-assertive utterances, etc., also 'fit' with the patterns of Kukuya. One thing is clear - prosody plays a major role in the verbal systems of both Kukuya and Eboo.

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Appendix: Metadata for Eboo recordings

Name	Year of recording	Age	Sex	Town/District	Eboo sub-variety
Joachim OBANI (A)	2002	28?	M	Ngo district	Eboo
Samson OBI (B)	2008	28	M	Djambala/Lekana	Nzikou
Célestin GUEBO	2012	53	M	Ngo district	Eboo
Oulgue MIENGUIE	2012	21	M	Ngo district	Eboo
Casimir AMPION	2012	70	M	Ngo district	Eboo
Estelle NTSIBA	2012	35	F	Djambala district	Nzikou
Samson OBI	2012	32	M	Djambala/Lekana	Nzikou
Anselme MOUNDZELE (C)	2016	43	M	Djambala/Ngo	Nzikou/Eboo

Verb paradigms were recorded in 2002, 2008 and 2016. The recordings made in 2012 with five different speakers were verbal phrases for tense and aspect in general. The data provided in this study is taken mainly from the verb paradigms, with speakers A, B and C above.

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