The University of Nairobi Journal of Language and Linguistics, Vol. 12 (2026), Special Issue on Nilo-Saharan Languages, 34-58

TONE MARKING ON BERIA VERBS

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Abstract

This paper gives a description of the tonal marking on verbal forms in the Wagi dialect of Beria. Beria is a Saharan language of the Nilo-Saharan phylum spoken in northwestern Darfur in Sudan and in northeastern Chad. Previous studies have reported the significant role played by tone in Beria. However, an in-depth analysis of tone is still pending. In this paper, we concentrate on verb forms and provide an up-to-date analysis of their tonal marking. The research is based on an extensive data collection of (non-)finite forms of more than 220 verbs. The verbal system of Beria is characterized by the existence of different lexical tone classes and grammatical tones. Grammatical tones distinguish categories such as number, TAM, and polarity. We describe lexical and grammatical tones and their interaction. The main objective of the paper is to present an analysis of the processes of tonal changes that derive surface realizations of finite verb forms. In this study, we provide evidence for three underlying level tones (L, M, and H) which typically form tonal contours on the surface. The three tones are not equally distributed. While L and M occur in all positions, the H tone is restricted, and we analyze it as having only a grammatical function. Moreover, L-tone-only forms are not attested on the surface, which, as we argue, is due to the Obligatory Contour Principle.

Keywords: Beria, Saharan, tone, verbal tone class, final morpheme

1. INTRODUCTION

The present paper describes the tonal marking of verbal forms in Beria.[1] Beria (*bērī-â*, lit. 'mouths of the *bērí*'), widely known by the exonym Zaghawa, is spoken by the Beri, who live in northwestern Darfur in Sudan and in northeastern Chad. The language has four dialects: Kube, Tuba, Wagi, and Dirong-Guruf. The paper focuses on the under-described Wagi dialect, which is mainly spoken in Sudan. Beria belongs to the small group of Saharan languages of the Nilo-Saharan phylum. It is the only surviving member of the eastern Saharan subgroup. The western subgroup comprises Kanuri, Kanembu, Teda, and Daza.

[1] This paper presents first results of a PhD project on the tone system of Beria by Omda Ibrahim Elnur, which was funded by the DAAD from 2019 to 2023. The research was also funded by a grant from Text+ and hosted by the Department of Linguistics, University of Cologne. We wish to express our special thanks to our consultants Adam Rahma Jamous, Mohyeldeen Adam Wadi, and Eltahir Suleiman Eesa Teeta for their patience in exhausting elicitation sessions during our collaboration in Sudan. For discussions of our tone analysis and for their comments on earlier versions of this paper, we are particularly grateful to Laura McPherson, as well as two anonymous reviewers.

Previous studies have reported the significant role played by tone in Beria, claiming that the tonal system of Beria is the most challenging aspect of its phonology (Wolfe 2001: 7; see also Fadoul Khidir 1984, Cyffer 1991, Jakobi and Crass 2004, Osman 2006, Abdalla 2010). Tonal distinctions are not only attested on the lexical level, but also on the grammatical level, where tone functions to mark a variety of categories, ranging from nominal number to tense-aspect, mood, polarity, etc., in the verbal domain. As stated by Cyffer (1991: 88), "the role of grammatical tone appears to be more important than in the other related languages". This challenge, however, was not taken up in previous research on Beria and an in-depth analysis of tone is still pending. In a first study which uses recorded data, Gayler, Omda Ibrahim Elnur, and Compes (2023) investigate tone in nominals.

In the present study, we concentrate on verb forms and provide an up-to-date analysis of their tonal marking. The research is based on a data collection of (non-)finite forms of more than 220 verbs, but for the present paper we confine our analysis to imperfective and perfective forms of the affirmative mood. The aim of the paper is to present an analysis of the tonal system of verbs. Underlying lexical and grammatical tones and tone patterns interact, leading to processes of tonal change that derive surface realizations of verb forms, as we will illustrate. Moreover, a few imperfective forms show variation in surface realizations, which we interpret in terms of a floating H tone. Finally, to account for some surface forms, we propose an analysis which relies on the well-known Obligatory Contour Principle (Leben 1980, Goldsmith 1976).

The outline of the paper is as follows: Section 2 gives a short overview of the general structure of Beria and the domains of grammatical tone. In Section 3, the methods and the theoretical background of our analysis are introduced. The main body of the paper in Sections 4-6 describes surface forms and their derivation: the verb system and the inventory of underlying tone patterns of lexical roots and grammatical morphemes (Section 4), the derivation of surface realizations in general (Section 5), and the derivation of the exceptional alternative realizations (Section 6). We discuss these facts in Section 7 and conclude in Section 8.

2. TYPOLOGICAL FEATURES AND DOMAINS OF GRAMMATICAL TONE

Linguistic research on Beria in general is still limited. Jakobi and Crass (2004) present a first grammar describing the Kube dialect.[2] Several articles (among others Jakobi 2006, 2011, Wolfe and Tajeldin Abdalla Adam 2018 on Kube; Compes 2021, 2024, Laureck 2024 on Wagi) as well as several unpublished theses at BA, MA, and PhD level (among others Wolfe 2001, Abdalla 2010) describe features of either the Wagi or the Kube dialect. The other two dialects – Tuba and Dirong-Guruf – are only

[2] In this paper, we use the term Beria when presenting general facts about the language, while we refer to Wagi, Kube etc. when talking about specific dialectal data and analyses.

mentioned in passing. We summarize the following typological features from this research: On the clause level, Beria is verb-final, with APV as its basic word order. It is a predominantly head-marking language, i.e., it has no case marking, but two sets of person indexes. Moreover, the inventory of verbal markers includes derivational morphemes and portmanteau morphemes for tense-aspect-mood (TAM), number, and polarity. The phonology exhibits a vowel harmony system with 7 phonemic and 9 phonetic vowels based on the feature Advanced Tongue Root [ATR], with minor harmonic effects of the features [round] and [back] (see Compes 2021). For consonants, Wagi shows an inventory of 16 phonemes (see Omda Ibrahim Elnur in prep). It has open as well as closed syllables with the following structures: V, VV, CV, CVV, VC, CVC, and CVVC (as in *ɔ̀* 'milk', *òì* 'hair', *bā̀* 'hand', *bāù* 'woman', *ɔ̀r* 'belly', *bū̀r* 'child', *tīèr* 'ax').[3] Generally, coda consonants are not restricted, but in word-final position, most coda consonants are sonorants (liquids, nasal, approximants), while voiceless plosives and fricatives are not frequent. Mono- or disyllabic roots prevail, trisyllabic roots are rare. However, due to the rich verbal morphology many multi-syllabic word forms exist.

Beria is a tone language and, for Wagi, three tone levels are attested: L, M, and H. On the surface, these three levels usually form tonal contours in two tone patterns (e.g., LM, LH, MH, ML), as well as some complex contours (e.g., LML and LHL). In addition, M-tone-only forms occur, while H-tone-only forms are highly restricted, and L-tone-only forms are not attested at all. Moreover, the three tones show a different positional distribution. L and M tones occur in all positions, while again the H tone is restricted. It does not generally appear as the initial tone of surface forms.[4]

The following examples illustrate the tonal contrast between two noun forms (both singular forms) in which the tone pattern either forms a contour on only one syllable (1a) or is distributed over two syllables (1b).

[3] Transcriptions throughout this paper are phonemic. To encode the ATR distinction in vowels, we use IPA symbols corresponding to different vowel heights instead of IPA symbols with diacritics. In our discussion of tonal marking (section 3), tone is presented according to the annotation scheme of Autosegmental Phonology. Only in the text, in examples (4), (6) and (7), and in Table 2 is the accent notation system of the Africanist tradition used (see Kutsch Lojenga 2018: 73).

[4] We present one exception to this rule in Section 6.2, where the H tone surfaces as the initial tone of alternative forms. These also comprise the H-tone-only forms. We will take up the H tone and discuss its special status in Section 7.1.

(1a)[5]	*ba*	*ba*	(1b)	*dɔrgʊ*	*korfu*
	/\	/\		| |	| |
	ML	MH		M L	M H
	‘paternal.uncle.sg’	‘hand.sg’		‘kidney.sg’	‘leaf.sg’

In the verbal domain, items also show contrastive tone patterns, as in the following set of imperative singular forms.

(2)	*bɪ*	*bɪ*	*bɪ*
	/\	/\	/\
	LM	ML	MH
	grow.IMP.sg	twist.IMP.sg	hold.IMP.sg
	‘grow’	‘twist, e.g., a rope’	‘hold’

The contrasting items in (1) and (2) are morphologically complex surface forms combining a root with a grammatical formative. The exact tonal pattern of the roots cannot be reconstructed from these forms only, as the surface forms also carry grammatical tone. However, the surface contrasts must clearly be attributed to the underlying lexical tone of the roots since the grammatical formative in each contrasting set is identical, i.e., singular for the nominal forms and imperative singular for the verbal forms.

Grammatical tone contributes to the expression of various categories. For example, most singular and plural forms of nouns are exclusively distinguished by tone, as in (3).

(3)	*bʊr*	*bʊr*
	|	/\
	M	ML
	child.SG	child.PL
	‘child’	‘children’

Table 1 summarizes the grammatical categories in which tonal marking is involved, either in combination with segments, or exclusively.

[5] Examples display four lines: (1) transcript, (2) either morphological analysis or tone pattern, (3) interlinear glosses, (4) Engl. translation. Abbreviations used in glossing: 1=1st person, 2=2nd person, 3=3rd person, Ø=zero morpheme, A=agent, AFF=affirmative, APPL=applicative, AUX=auxiliary, CAUS=causative, CVB=converb, EXCL=exclusive, HORT=hortative, IPFV=imperfective, INCL=inclusive, INTERR=interrogative, IMP=imperative, NEG=negative, P=patient, PVF=perfective, PL/pl=plural, SG/sg=singular, VAL=valence related prefix. The formalism of the association lines is stated in Table 3.

Table 1: Domains of grammatical tone

Domain	Grammatical category and function	
Nominals	Number	SG/ PL
Verbs	Number	Plurality
	TAM	IPFV, PFV, INTERR, IMP, etc.
	Polarity	AFF, NEG
	Clusivity	1PL EXCL/ INCL

In the verbal domain, which is the focus of the present paper, such tonal marking comprises number, TAM, and polarity, as well as clusivity, as illustrated in the following example, where a H tone on the final vowel[6] indicates the 1st person inclusive:

(4) a. *hĭrdɛ̀*
hɪr-d-ɛ
run-1PL.A-IPFV.sg
'We run (excl).'

b. *hìrdɛ́*
hɪr-d-ɛ
run-1PL.A-IPFV.pl
'We run (incl).'

Other verb forms which show a contrastive tonal pattern are given in the following table.

Table 2: Tonally contrastive verb forms

Tone pattern	Verb form	Gloss	Functional contrast	Grammatical category
ML	*kārɛ̀*	'he grinds'	A.sg	plurality
MH	*kārɛ́*	'they grind'	A.pl	
ML	*kīʃɛ̄rì*	'let him eat'	HORT	TAM
M^{R}H	*kīʃɛ̄rɪ̂*	'he ate'	PFV	
MM	*ʃɛ̄dū*	'we don't eat (incl)'	IPFV	TAM
MH	*ʃɛ̄dú*	'let us not eat (incl)'	HORT	

3. METHODOLOGY AND THEORETICAL BACKGROUND

The research we present is based on audio recordings of conjugated verb forms of over 220 verbs (19 hours). Data collection took place at yearly intervals from 2019

[6] This vowel is the segmental form of the final morpheme, which marks grammatical categories and hosts grammatical tone. For its distribution and function, see Section 4; for the glossing convention as X.sg or X.pl, see FN 13.

to 2021 in Omdurman, Sudan, with three male consultants, all speakers of Wagi (one of them supplied most of the data). The collected data constitutes the first audio-recorded corpus to serve as a basis for the phonology and tonology of Beria's verb system. To provide online access, it is intended to archive the corpus in the Language Archive Cologne (LAC, https://lac.uni-koeln.de/). Omda Ibrahim Elnur, who is a native speaker of Wagi, himself transcribed the verb forms with their surface tone patterns in ELAN, based on his native perception. The elicited verb forms cover a wide range of the paradigms of all four verb classes (see Jakobi 2011 and Compes 2021 on the verb class system of Beria), but the focus was laid on the comprehensive documentation of contrasts encoded by the final morpheme, i.e., TAM, polarity, and number (see Section 4 for details).

In this paper, we restrict our analysis to a subset of the corpus. For one, we concentrate on the classes I and II. As opposed to the productive classes III and IV, classes I and II consist of simplex roots which exhibit diverging root tone patterns (see Section 4).[7] These diverging root tone patterns are of special interest as they are the locus of the tonal changes and interactions with the tone of the final morpheme to be analyzed here. Secondly, we selected imperfective and perfective forms in the affirmative. The final morphemes, which code these TA forms, also show a variety of tonal patterns. Thus, the selected subset of verb forms — affirmative imperfective and perfective of classes I and II — is particularly suitable for the analysis of a great number of the tonal interactions attested in the corpus.

Our aim in this paper is descriptive, and we offer a phonological interpretation of the Wagi data which is as theory-independent as feasible. In our analysis, we applied fieldwork methodologies as presented in Hyman (2014) and Snider (2014, 2018). While doing so, we used Autosegmental Phonology (Goldsmith 1976, Gussenhoven 2004) with only some very basic theoretical assumptions. Its application has been proven useful in tone transcription, in the analysis of tone patterns and tonal processes, and in their phonological interpretation. As Hyman (2014: 545) puts it: "a classical autosegmental approach […] turns out to be both revealing and description-friendly." In this spirit, we use the approach not so much as a theoretical framework, but as a descriptive tool in the presentation of our results.

In the remainder of this section, we introduce those basic assumptions of Autosegmental Theory that underlie our analysis. Autosegmental Phonology treats tones as autonomous items which are linked to morphemes. Tonal specifications of morphemes are lexically determined and consist of sequences of one or more tones, called tone patterns or tonal melodies (Snider 2018: 13, Kutsch Lojenga 2018: 74; see Leben 1980 for the concept of tonal melody). The first objective of a tonal analysis is the reconstruction of these underlying tone patterns (Snider 2018: 29).

[7] In classes III and IV, the root is a segmentally reduced and highly suppletive auxiliary with a fixed tonal pattern which does not lend itself to such an analysis as proposed here. This auxiliary is combined with a content word (lexical morpheme) whose tone is lexically fixed and does not change.

Tone patterns and the segmental make-up of morphemes are two independent structures on an underlying level. In phonetic realizations these two underlying levels surface together. Each tone of a given tone pattern is associated to a tone bearing unit (TBU) which is part of the surface segmental structure of the corresponding morpheme. Languages differ in how they organize segmental structures in metrical units and, in general, a language is said to be either syllable- or mora-counting, and in turn, the TBU is the syllable or the mora. Likewise, the association of the sequences of tones to TBUs is language-specific and governed by tonal restrictions, rules, and processes which are the object of the tonal analysis. Thus, the second objective of a tonal analysis is "to discover and explain the different ways in which those patterns link to TBUs and are realized phonetically in the various contexts in which they are found" (Snider 2018: 29).

In autosegmental notations the two underlying structures are linearly registered on parallel tiers. The linking of individual tones on the tonal tier with a specific segment on the segmental tier (TBU) is indicated by association lines. Table 3 lists the common conventions in Autosegmental Phonology.

Table 3: Association lines in Autosegmental Phonology

Symbol	Meaning
|	One-to-one association
/\	Two-to-one association
\/	One-to-two association
` ` `	Right-to-left spread
´ ´ ´	Left-to-right spread
ǂ ≠	Delinking

Besides a one-to-one-association of tones and TBUs (see (3) in Section 2), both an association of more than one tone with one TBU (see (1) and (2) in Section 2) and an association of one tone with more than one TBU, as in (5), are possible.

(5)

tɛlɛ
\/
M
'daughter.SG'

Lines are also used to represent tonal processes as spreading to the right or spreading to the left (dashed lines). In some of these tonal processes, tones are delinked from an associated TBU. This delinking is represented by a crossed-out association line (see Hyman 2007, Kutsch Lojenga 2018 for identical representations).

Since Goldsmith (1976), the association of tones to TBUs has been discussed against the background of four Well-Formedness Conditions which were stated as

general principles in the derivation of surface realizations from underlying tone structures:

I. Every TBU must have a tone.
II. Every tone must be associated to some TBU.
III. Association proceeds one-to-one, left-to-right.
IV. Association lines must not cross.

Thus, for example, on the level of the phonetic realization or surface structure, every TBU has a tone (condition 1). On the underlying level, however, languages can have tonal properties which seem to contradict the well-formedness conditions (see Yip 2002): e.g., languages can have toneless morphemes (which contradicts condition 1) as well as floating tones (which contradicts condition 2). Condition (3) is the weakest condition, with plenty of counter-examples: For numerous languages (see Hyman and Ngunga 1994, Yip 2002), it has been shown that tonal processes of spreading do not proceed exclusively left-to-right. The most relevant condition, though, is condition 4. It is still valid after years of progress in tonal analysis, and it will never be violated. In our analysis of Beria verb forms, we will illustrate the derivation of tonal surface structures making use of the concepts of toneless morphemes, floating tones, and the processes of spreading and delinking. Thus, we move beyond conditions 1-3, but we stick to condition 4. Finally, we adduce evidence that the Obligatory Contour Principle (=OCP) might play a role in Beria. Cross-linguistically, there is a tendency for sequences of adjacent identical tones to be disallowed, which results in tonal changes in the derivation of surface patterns (see Leben 1980, Goldsmith 1976; for a short and concise discussion see Gussenhoven 2004). In our discussion in Section 7, we will come back to this principle.

4. TONE IN THE VERB SYSTEM

A common feature of Saharan languages is a rich verbal morphology (Cyffer 1991; for Wagi see Abdalla 2010, Compes 2021). Here, we concentrate on the role of tone in the verbal system. In Beria, grammatical categories are overtly marked by tone (in combination with segments) and different lexical tone classes interact with these grammatical tones.

4.1 Basic structure of the verb form

(6) shows a basic verb form in which the participants of the bivalent event are marked by person indexes of the first and second person.

(6) *lōgūgè*

lō-	gū	-g	-è
2P-	call	-1SG.A	-IPFV.sg

'I call you (sg)'

The final vowel in such a structure is called final morpheme (=FM). It is a portmanteau morpheme coding verbal categories such as number, TAM, and polarity. Person indexes and the FM are mandatory to form a finite verb form. Thus, the following template is the minimal structure of a transitive verb form.

P-root-A-FM

The following table shows further verbal slots, which are common to all dialects of Beria (see Compes 2021: 201, Abdalla 2010, Wolfe 2010, Jakobi and Crass 2004).

Table 4: Verbal template

1	2	3	4	5	6	7	8
P APPL	3.A.PFV IPFV VAL	CAUS	ROOT	CAUS	3.A.PFV	A	FM = TA Mood Polarity Plurality CVB

In the present context, two slots of this verbal template are relevant since they are tonally specified (see grey cells). The first is slot 4, with the verbal root, which has a specified lexical tone. The other slot of interest is slot 8, with the FM. The FM is the locus of a specified grammatical tone. Surface tones of verb forms result from the interaction of the underlying tone of the verbal root and that of the final morpheme (FM). All other slots are filled with toneless morphemes which, for their surface realizations, copy the tone from the root.

4.2 Underlying tone patterns of verbal roots

Verbal roots exhibit four underlying tone patterns: two level tone patterns and two rising tone patterns. Level tone roots are far more frequent. Rising roots are restricted in number, and so far, we have identified 43 verbs of this type.

I. L
II. M
III. LH
IV. MH

Before we look at how these tone patterns associate with syllable profiles of different lengths, we introduce the syllable structure and briefly discuss the question of whether the tone-bearing unit (TBU) is the syllable or the mora.

For Beria in general, Jakobi and Crass (2004: 21-25) postulate light ("légère", CV), heavy ("lourde", CVV or CVC), and extra heavy ("extra lourde", CVVC) syllables as defined by the number of moras: i.e., mono-, bi-, or trimoraic. This analysis includes the syllable structure of nouns which exhibit the closed CVC and the extra heavy CVVC syllable pattern (see example (3) and the list of nouns in Section 2). Verbal roots, however, have generally an open CV(V) syllable structure, and bimoraic syllables are not uncommon. Only a few verbs show a closed CVC syllable structure in some forms. For example, in the following verb forms the root consists of a closed syllable: *gɛ̀r-g-ɛ̀* 'I want it', *gīr-g-ɛ̀* 'I trap it'. By comparison with attested alternating forms, however, they are clearly identified as reduced forms of verbs with an open CVCV root structure (i.e., *gɛrɪ* 'want', *gɪrɪ* 'trap').[8]

This syllable structure must be related to the basic unit of tone assignment, which brings us to the question of whether the TBU is the syllable or the mora. For examples, can coda consonants which count as moras carry tone? Can two vowels in sequence carry different tones? These are still open questions which were not addressed in previous studies. At the current stage of research, we do not have evidence for consonants as TBUs. We do, however, have clear evidence that two vowels in sequence can bear two different tones. This indicates that the mora is the TBU in Beria, which would be consistent with crosslinguistic evidence. According to Kutsch Lojenga (2018: 76), "[in] most languages with light and heavy syllables, the mora is the tone-bearing unit".

In sum, since for the tone analysis of Beria we are still at an early stage of research, our procedure in this paper is to mark all vowels for tone in surface tone transcriptions. Hence, pretheoretically, we take the vowel to be the TBU (see Hyman 2014: 527 for similar considerations). Given this approach, the syllable and its weight are secondary to our tone analysis, as we count every vowel as one TBU. Moreover, our vowel-centered approach is even more valid in the analysis of verb forms, since verbal roots have only open syllabic profiles such as CV, CVV, CVCV, and CVCVV. While in principle we could talk of 'TBU profile' or 'vowel profile', for ease of reading we, however, stick to the traditional terms 'syllable profile' (and 'mono-', 'di-', and 'trisyllabic'), and with reference to the number of vowels speak of 'mono-', 'bi-', and 'trimoraic structures' in this paper.

Table 5 illustrates how the four root tone patterns above associate to segments in syllable profiles. As represented in the tone association tier, in disyllabic roots a

[8] Reduced forms are very common in Beria; in particular, syllables with liquids and high unrounded vowels /ɪ, i/ are prone to undergo reduction. In some forms, however, reduction is not evident: for *nɛ̄rʃī-g-ɛ̀* 'I soften it', no alternating form is attested, but the verbal root *nɛ̄rʃī* might be morphologically complex.

level root tone associates to both syllables. In addition, in rising roots the H tone docks on the final TBU. In the examples in Table 5, this is the second vowel of a rising diphthong and the single vowel of a CV profile.[9]

Table 5: Syllable profiles and tonal patterns of verbal roots

Syllable profile	CV	CVCV	VCVV[10]	CV
Segmental form	*bɪ-*	*tɪbɪ-*	*ʊfʊ̂ɪ-*	*bɪ-*
Tone association	|	\/	\/ |	/\
Root tone pattern	L	M	L H	M H
Gloss	'grow'	'stab'	'calm, e.g. a baby'	'hold'

The four tone patterns of verbal roots link to syllable profiles of different length, i.e., mono-, di-, or trisyllabic, with some restrictions. Level tone roots have mono- or disyllabic profiles only. Trisyllabic roots are very restricted and are attested in our data only for the group of rising roots: namely, the three verbs *ʃ̀gɪ̀rɪ̌* 'exchange', *ɔ̄fʊ̄rɪ́* 'pour', and *ɔ̀stɔ̀rɪ̌* 'fix'.[11] At the current stage of research, we assume that rising roots arose (historically) from morphologically complex forms and that the H tone is the residue of a suffix marking causativity or transitivity. Thus, the assumption is that the rising root tone pattern consists of the core root tone, i.e., L or M, and the residual grammatical H tone. Note that both the H tone, which will be further discussed in Section 7.1, and the existence of trisyllabic roots are arguments for the complex morphemic structure of rising roots.[12]

[9] Although we did not measure quantity, CV syllables in monosyllabic verb forms of rising roots are clearly longer than CV syllables of level tone roots. At the same time, the vowel is not as long as a geminated vowel, and in multi-syllabic verb forms of these roots the syllable profile of the root is CV.

[10] In Beria, all vowel-initial words are realized with an initial glottal stop which we do not analyze as an underlying phoneme. Thus, the surface syllable structure of this LH rising root is CVCVV.

[11] Generally, verbal roots can end in any vowel, but the high vowels /ɪ, i, ʊ, u/ prevail over the mid and low vowels /ɛ, ɔ, a/. Furthermore, rising roots are special as they never end in a mid or low vowel, but on the contrary, almost always in an unrounded high vowel /ɪ, i/ (see *ɔ̀fʊ̀ɪ́* and *bɪ̌* in Table 5). Only five rising roots with a rounded high vowel /ʊ, u/ are attested: *sʊ̄* 'grill', *kāʊ́* 'make kisra', *lāʊ́* 'learn', *kɔ̀bʊ́* ,churn', *tàʊ́* 'teach'.

[12] Similar to our account, Wolfe (2001: 65-66, 97-99) considers these roots as (historically) complex causative derivations. He analyzes their tonal melody slightly differently, i.e., as raising roots with a floating H tone.

4.3 The final morpheme (FM)

The other locus of a specified tone in finite verb forms is the FM. The FM is a portmanteau morpheme in which number, TAM, and polarity are overtly marked. The following table summarizes the segmental form (=SF) and the tonal form (=TF) of the FM in imperfective and perfective TAM categories in the affirmative. For illustration, the contrasting negative forms are also given.[13]

Table 6: Segmental and tonal form of the FM

Participant number	IPFV.AFF		PFV.AFF		IPFV.NEG/PFV.NEG	
	SF	TF	SF	TF	SF	TF
basic form	-E	L	-I	^{R}H	-O	M
marked form	-E	H	-u	^{L}LH	-u	M

In the table, we also specify the distinction for participant number or plurality marking, which for Wagi we analyze as the basic and the marked form of the FM. We briefly summarize this distinction (for details see Compes 2021): While the basic form is the default coding, the marked form occurs only under specific conditions. The occurrence of the marked form is dependent on the segmental form of the person indexes and on the referent number. The function of the marked form is to mark the plurality of participants only in the case that person indexes are segmentally syncretic for singular and plural, which are, therefore, underspecified for referent number. The 2nd person patient and the 3rd person agent indexes exhibit this syncretism. The 3rd person patient index is also syncretic for singular and plural, but 3rd person patient referents always remain underspecified for number. Moreover, the marked form distinguishes 1st person inclusive forms from 1st person exclusive forms (see (4) above).[14]

As seen in Table 6, the forms are distinguished segmentally and/or tonally. Four tonally contrastive patterns are attested. In the imperfective, the contrast between the basic and the marked forms is exclusively coded by a level tonal contrast of L vs. H tone. In the perfective, we observe the rising tonal patterns ^{R}H and ^{L}LH. The rising H of the basic form (=^{R}H) depends on the tone of the root. In level roots, the ^{R}H is realized as LH if the root tone is low. If the root tone is mid, the ^{R}H is realized as MH. The respective surface patterns are L-LH and M-MH.[15] In rising roots, the ^{R}H of the basic form is realized as a level H tone, giving LH-H and MH-H (merged to LH

[13] In Table 6, a capital letter represents affixes with two allomorphs, *-E =-e/-ɛ, -I =-i/-ɪ,* and *-O =-o/-ɔ*, which assimilate according to the ATR feature of the verbal root (=ATR vowel harmony). Other TAM distinctions are marked by the segmental forms *-II, -OO, -uu,* and *-aa*. Other tonal patterns are ML and HL.

[14] For ease of reading, we gloss the basic form of the FM as 'sg' and the marked form as 'pl'.

[15] This phenomenon could be interpreted as a peak delay, but this is not the case as there are contrasting words such as *ʃìrɛ́* 'they add it; L-H' vs. *ʃìlǐ* 'you (sg.) added it; L-LH'.

and MH). The marked form of the perfective shows a LH rising pattern with an additional L tone effect which we represent as ᴸLH in Table 6 (see Section 5.2 on the realization of this L tone effect).

5. SURFACE REALIZATIONS AND TONAL CHANGES

Surface tone realizations result from the interaction of the underlying tone of the verbal root and that of the FM in finite verb forms. In most cases, both underlying tone patterns appear unchanged in the same sequential order in surface forms, as in the following example, where the L tone root is followed by a FM carrying a H tone.

Table 7: Root (L) + IPFV.pl (H): surface pattern L-H

	Underlying form	Surface form	Gloss
segmental form	*gɪ -dɛ*	*gɪ -dɛ*	'we cut it/them (incl)'
tone association	| |	| |	
tones	L H	L H	

However, in some cases tonal changes are observed which take place in the verbal root, whereas no changes are attested in the FM. We discuss each of these tonal changes in detail in the course of the following sections.

5.1 LM allomorph of L tone roots

The first tonal change to be discussed concerns L tone roots. The interaction of L tone roots with the basic imperfective form of the FM results in an underlying L-L sequence. On the surface, however, the root is realized with an allomorphic LM tone pattern, as given in the following rule:

L → LM/__-L

We illustrate the tonal change with finite forms of the L tone verb *gì* 'cut'. Consider the following verb form, where the underlying form exhibits a L-L pattern, whereas the surface form exhibits a LM-L pattern.

Table 8: Root (L) + IPFV.sg (L): surface pattern LM-L

	Underlying form	Surface form	Gloss
segmental form	*gɪ -dɛ*	*gɪ -dɛ*	'we cut it/ them (excl)'
tone association	| |	/\ |	
tones	L L →	LM L	

The following two examples illustrate the behavior of toneless prefixes whose surface tone is determined by the tone of the root, and the effect on the overall tonal surface pattern. In the verb forms of Tables 9 and 10, one of the prefix slots is filled by the 2nd person patient prefix *lɛ-*. The prefix is underlyingly toneless and copies the tone of the hosting root. In our example in Table 9, the prefix *lɛ-* copies the L tone of the root *gì* 'cut'. Underlyingly, we have a L-H sequence without any tonal changes, resulting in the surface pattern L-H.[16]

Table 9: Toneless prefix + Root (L) + IPFV.pl (H): surface pattern L-H

	Underlying form	Surface form	Gloss
segmental form	*lɛ-gɪ -rɛ*	*lɛ-gɪ -rɛ*	'they cut you (sg)'[17]
tone association	| |	\ | |	
tones	L H	L H	

In contrast to Table 9, the verb form in Table 10 exhibits an underlying L-L sequence. In this case, the allomorphic rule given above applies and the root is realized with a LM tone pattern. In the course of the derivation of the surface pattern, the underlying L tone of the root delinks, making space for the M tone to dock on the root. Finally, the delinked L tone docks on the prefix to yield the surface LM-L pattern.

Table 10: Toneless prefix + Root (L) + IPFV.sg (L): surface pattern LM-L

	Underlying form	Surface form	Gloss
segmental form	*lɛ-gɪ -rɛ*	*lɛ-gɪ rɛ*	's/he cuts you (sg)'
tone association	| |	\≠ | |	
tones	L L	LM L	

If we compare the behavior of the LM allomorph in the verb form of Table 10 with that of Table 8, we note an important difference. In the latter case, both the L of the root and the M dock on the root forming a contour on a non-final TBU because it is the only one for the two tones to associate to. In the former case, however,

[16] We represent the LLH surface realization as L-H. In this paper the hyphen indicates boundaries between tone patterns, i.e., between those of the root and the FM. Prefixes (and also suffixes) copy the tone of the root and, thus, belong tonally to the root. We will comment on this LL sequence in Section 7.3.

[17] The patient prefix *lɛ-* is syncretic for singular and plural and, thus, underspecified for number. A number specification is marked by the FM either for the A or the P index or both. Therefore, this verb form has three alternative readings: 'they cut you (sg)', 'they cut you (pl)', and 'he cuts you (pl)' (see Compes 2021).

with the toneless prefix and the root, there is enough space for the L and the M tone to dock on one TBU each. This surface pattern circumvents a contour LM pattern on one single TBU, which would have otherwise appeared on the verbal root *gì* 'cut'. Thus, contour tones are possible on non-final TBUs, but they are avoided as long as there are enough TBUs.

5.2 Marked forms of the perfective

Another set of tonal changes arises in connection with the marked forms of the perfective. In these forms, the roots are realized with an additional final L tone, which seems to result from the spreading of the first tone of the LH pattern of the FM (represented as ᴸLH). In the following sections, we describe this L tone effect in two contexts, namely on M tone roots and on L tone roots.[18]

5.2.1 L tone effect on M tone roots

In marked forms of the perfective of M tone roots, a surface ML tone pattern is attested on the verbal root. This ML pattern contrasts with other forms of these roots, which exhibit the underlying M tone on the surface. Compare the following contrastive examples, which are segmentally identical but show a diverging tone on the verbal root, i.e., M vs. ML.

(7) *bɛ̄dū* 'we (*incl.*) do not insert them' vs. *bɛ̃̌dǔ* 'we (*incl.*) inserted them'

As this ML surface pattern is only attested before marked forms of the perfective, we assume that it is an effect of the LH contour of the FM. The first tone of this contour spreads leftward and docks on the verbal root. The resulting pattern is ML-LH, as shown in Table 11.

Table 11: Root (M) + PERF.pl (ᴸLH): surface pattern ML-LH

	Underlying form	Surface form	Gloss
segmental form	*bɛ -du*	*bɛ -du*	'we (incl) inserted them'
tone association	| /\	|`-.. /\	
tones	M LH	M LH	

If there are more TBUs, as in the case of prefixes, the M of the root delinks from the root and reassociates to the toneless prefix (see Table 12). Again, the spreading L docks on the root, which is the penultimate TBU, resulting in the surface pattern ML-LH.

[18] We showcase the tonal effect for level roots. Rising roots show the same behavior, yielding complex surface patterns as LHL-LH.

Table 12: Toneless prefix + Root (M) + PERF.pl (ᴸLH): surface pattern ML-LH

	Underlying form	Surface form	Gloss
segmental form	*kɪ*[19]*-bɛ -lu*	*kɪ -bɛ -lu*	'they inserted them'
tone association	| /\	\ ≠ ˋˋˋ/\	
tones	M LH	M LH	

In sum, in perfective forms of M tone roots a L tone spreading from the FM docks on the penultimate, which is always part of the verbal root, resulting in a ML root pattern. The LH pattern docks on the FM. No further tone changes are required to yield the surface ML-LH melody. The exact allocation of the ML pattern, however, depends on the number of TBUs of the verb, as follows:

- CV̋-CV̌
- CV̄CV̀-CV̌

5.2.2 L tone effect on L tone roots – complex derivation

Marked perfective forms of L tone roots require a more complex derivation. In such forms, the underlying pattern is L-ᴸLH. This pattern fulfils the conditions for the tonal allomorphy of L tone roots described above. These roots thus surface with the LM allomorph. In addition, the forms exhibit the L tone effect (=LM-ᴸLH). Depending on the number of the TBUs of the root, the surface realizations will show a different output.

The first case concerns monosyllabic roots with perfective forms of a CVCV profile. As seen in the first column of Table 13, the underlying L of the root and the L of the perfective are contiguous, i.e., L-L. As a consequence, the LM allomorph is selected (see the second column). In the resulting surface realization, however, additionally, the first tone of the LH contour of the FM spreads leftward to yield a complex LML contour (see the third column).

Thus, if the verb form has a CVCV profile (i.e., two TBUs), the penultimate hosts the LML pattern. The ultima hosts the LH tone of the FM. The surface tonal melody of the entire verb form is LML-LH.

Table 13: Root (L) + PERF.pl (ᴸLH): surface pattern LML-LH

	Underlying form	1. deriv.	Surface form	Gloss
segmental form	*gɪ -du*	*gɪ -du*	*gɪ -du*	'we cut it/them (incl)'
tone association	| /\	/\ /\	/\ˋˋˋ /\	
tones	L LH	LM LH	LM LH	

[19] This is the secondary perfective prefix *kV-* which occurs with 3rd person agents.

In verb forms with more TBUs, as with a toneless prefix and a CVCVCV profile (see Table 14), the L of the root delinks from the root and associates to this toneless prefix while the M of the LM allomorph docks on the root. Finally, the L tone effect of the perfective applies and the spreading L from the FM docks on the penultimate (i.e., the root) while the LH docks on the ultima. The surface tonal melody of the entire verb form is thus LML-LH.

Table 14: Toneless prefix + Root (L) + PERF.pl (ᴸLH): surface pattern LML-LH

	Underlying form	1. deriv.	Surface form	Gloss
segmental form	*kɪ-gɪ -lu*	*kɪ- gɪ -lu*	*kɪ- gɪ -lu*	'they cut it/them'
tone association	| /\	\ ≠ | /\	\ | ⋱ /\	
tones	L LH	L M LH	L M LH	

6. TONE CHANGES IN IMPERFECTIVE FORMS OF RISING ROOTS

In this section, we are going to discuss tone changes that are attested in basic imperfective forms of verbs with rising LH or MH root tone patterns. The tone changes are dependent on the speaker, although it is not yet clear whether the phenomenon is dialectal. The verb forms have variants in which the H of the rising root tone patterns shows an exceptional behavior in floating rightward and in one case even delinking the other root tone. We start with rising LH roots and then move to rising MH roots.

6.1 Tone changes in LH roots - progressive floating of H tone

In the underlying imperfective basic form of the rising root *ʃĭ* 'follow' (see Table 15), the H tone of the root either remains in situ (variant A) or it delinks from the root and floats rightward to dock on the FM, where it delinks the original L tone of the FM (variant B).

Table 15: Monosyllabic root (LH) + IPFV.sg (L): surface patterns LH-L and L-H

	Underlying form	Variant A	Variant B	Gloss
segmental form	*ʃĭ -ge*	*ʃĭ -ge*	*ʃĭ -ge*	'I follow it/them'
tone association	/\ |	/\ |	|ǂ/ǂ	
tones	LH L	LH L	LH L	

In the case of disyllabic LH roots (see *sèlí* 'make' in Table 16), the H tone of the root also either remains in situ (variant A) or it floats rightward, delinking the L of the FM (variant B). In the latter case, the L tone of the root distributes over the

whole root (variant B). With both mono- and disyllabic roots, variant B shows a rising LH pattern realized over the whole verb form.

Table 16: Disyllabic root (LH) + IPFV.sg (L): surface patterns LH-L and L-H

	Underlying form	Variant A	Variant B	Gloss
segmental form	*sɛlɪ -gɛ*	*sɛlɪ -gɛ*	*sɛlɪ -gɛ*	'I make it/them'
tone association	| | |	| | |	| /ǂ/ǂ	
tones	L H L	L H L	L H L	

6.2 Tone changes in MH roots - more variation

MH rising roots exhibit even more surface variations which are attributable to the behavior of the H tone of the root. As exemplified in Table 17, in monosyllabic MH roots, e.g., *bĭ* 'hold', there are three variants. In variant A, the verb form surfaces without any tonal changes directly derived from the underlying form. In variant B, the H of the MH rising root delinks from the root and floats rightward to dock on the FM, where it delinks the L of the FM. A rising MH tone pattern is realized over the whole verb form, similar to variant B of LH rising roots as described above. In variant C, the M of the MH verb root pattern delinks, whereas both the H of the root and the L of the suffix remain in situ. The final pattern is HL instead of the underlying MHL melody. This alternative surface form is the only tone pattern with an initial H tone in our corpus.[20]

Table 17: Monosyllabic root (MH) + IPFV.sg (L): surface patterns MH-L, M-H and H-L

	Underlying form	Var. A	Var. B	Var. C	Gloss
segmental form	*bɪ -gɛ*	*bɪ -gɛ*	*bɪ -gɛ*	*bɪ -gɛ*	'I hold it/them'
tone association	/\ |	/\ |	/ǂ/ ǂ	ǂ\ |	
tones	MH L	MH L	MH L	MH L	

In disyllabic forms (see *gīrí* 'loosen' in Table 18), where there are more TBUs for the MH sequence to dock on, the integrity of the rising MH contour is realized either over the two TBUs of the root (variant A, no tone changes) or over the whole verb

[20] On the surface, the marked forms of the imperfective of monosyllabic MH rising roots are also realized with a H tone as the initial tone. This, however, is a general phonetic effect in these MH rising roots, independent of speaker variation. In slow speech these forms are realized with a MH-H pattern. Moreover, the resulting surface H-H pattern is the only H-tone-only pattern attested in the verb forms analyzed.

form (variant B, floating H). In the latter case, the H tone floats rightward and delinks the L of the FM, and the M tone distributes over the root, similar to case B for the LH roots described above.

Table 18: Disyllabic root (MH) + IPFV.sg (L): surface patterns MH-L and M-H

	Underlying form	Variant A	Variant B	Gloss
segmental form	*gɪrɪ -gɛ*	*gɪrɪ -gɛ*	*gɪrɪ -gɛ*	'I loosen it/ them'
tone association	| | |	| | |	| /ǂ/ ǂ	
tones	M H L	M H L	M H L	

7. DISCUSSION – AN AUTOSEGMENTAL APPROACH TO BERIA

In the preceding presentation we used the framework of Autosegmental Phonology as a descriptive tool. In the following discussion, we summarize our findings in the light of some of the basic assumptions of Autosegmental Phonology as introduced in Section 3, namely the Well-Formedness Conditions and the OCP. In doing so, we draw attention to some particular characteristics of Beria's tone system. Finally, we relate our proposal to previous research.

7.1 How many tones?

Beria as analyzed in this study exhibits a three-tone system in which the underlying level tones (L, M, and H) typically form tonal contour melodies on the surface. As we already pointed out, these three tones are not equally distributed. L and M tones occur in all positions. L-tone-only forms, however, are not attested on the surface. This fact will be taken up in Section 7.4.

Moving to the H tone, its distribution is quite restricted, and we attribute a special status to this tone. Since as a general rule the H tone is excluded from the word-initial position, Beria has no H-tone-only forms underlyingly. Instead, the underlying occurrence of the H tone is at the right edge of the root or on the FM. In addition, the H tone shows a special active behavior. In Section 6, we showed that it can float right- and leftward and is able to delink other tones. Leftward-floating is what happens in one of the alternative forms of monosyllabic MH roots, where the H tone is realized as the initial tone; this represents the only surface exception to this positional restriction in the corpus. The H tone thus appears in marked positions, which conforms to the observation by Yip (2002: 83) that "[t]one (especially H tone) is often attracted to prominent positions (beginnings of things, edges, accented or stressed syllables), […]".

Furthermore, these prominent positions and features correlate with special functions which are all grammatical. This is the case for the FM. In the case of rising roots, we also assume it to be historically a grammatical marker. Ultimately, this

means that the H tone is – at least historically – excluded from functioning on the lexical level in verbal roots.

7.2 Tonal processes and the Well-formedness Conditions

In Sections 5 and 6, we described the interaction between the lexical tone of the root and that of the FM in deriving surface realizations and presented the following tonal phenomena and processes:

I. (Leftward) association of root tones to toneless morphemes (Tables 9, 10, and 12)
II. Floating H tone with tone delinking (Tables 15–18)
III. Allomorphy of L tone roots (Tables 8, 10, 13, and 14)
IV. L tone effect in marked forms of the perfective (Tables 11–14)

Relating these findings to the Well-Formedness Conditions, first (see I) we note that the mechanism of associating the root tone to prefixed person indexes and the secondary perfective prefix is regressive, i.e., leftward. Thus, the third well-formedness condition — "association proceeds left-to-right" — does not hold for Beria.

One outcome of the general condition of rightward association as formulated in the Well-Formedness Conditions is that contour tones are supposed to occur only at the right edge of surface structures. This edge-contouring effect is not confirmed in Beria, which also exhibits contours of two and even three tones on non-edge TBUs, i.e., on verbal roots. We find, for example, contouring on roots as the result of the allomorphy of L tone roots (see Table 8) and especially in connection with the L tone effect in perfectives (see Tables 11-14). If one wants to retain the rule of right-edge contouring for Beria, one would need to define the domain for contouring, i.e., the verbal root vs. the finite verb form. This would imply that there is some kind of tonal boundary between the root and the FM and that these morphemes somehow constitute tonally independent units where right-edge contouring can take place. It is, however, not clear how this could be accommodated with other phonological facts such as, for example, the word unity of verb forms.

Secondly (see II), the delinking of underlying tones as a consequence of the floating H tone is problematic for the second Well-Formedness Condition as the delinked tones are not associated with any TBU. All in all, our findings increase the number of counter-examples presented in the literature which call into question the usefulness of the Well-Formedness Conditions today.

7.3 Allomorphy or application of the OCP in Beria

Moving to the question of processes involving L tones (see III and IV), we presented two cases which are quite different. In the case of the L tone effect (see IV), the tone which docks on the verbal root seems to be part of the marked perfective

morpheme as it only occurs in this context. On the other hand, it docks not on the FM itself, but on the verbal root. In the case of more than one TBU, as is the case with a toneless prefix plus root (see Table 12), it even docks on a TBU of its own. The last case can hardly be interpreted as a lowering effect before the LH tone of the FM. Instead, this interesting behavior could be interpreted in terms of a floating tone. Currently, we do not have an explanation for it, but it might be sought in a yet unknown historical function of this L tone.

The other case concerns L tone roots (see III). In Section 5 we analyzed these roots as allomorphic, stating the following rule:

$$L \rightarrow LM / \_\_\text{-}L$$

L tone verbal roots are realized with a LM contour if they are followed by a L tone. This is the case in basic imperfective verb forms (see Tables 8 and 10), but also in marked perfective verb forms (see Tables 13 and 14). Moreover, this allomorph appears in absolute word-final position. Before H tones we find the lexical root tone L. The allomorphic rule in full is as follows:

$$L\text{-} \rightarrow \left\{ \begin{array}{l} LM\text{-} / \left\{ \begin{array}{l} \_\text{-}L \\ \_\# \end{array} \right\} \\ L\text{-} \text{ elsewhere} \end{array} \right\}$$

Looking at this rule, the question arises as to why we do not posit the LM pattern as the basic allomorph. Here, we propose that the phonological constraint known as Obligatory Contour Principle (OCP) triggers this allomorphy as a more general principle. If we assume an underlying L as root tone, we can explain the M tone as an insertion because of the OCP. In Beria, the OCP is more specific in that it disallows L-tone-only forms (i.e., a single word-final L or two adjacent Ls) in surface structures. The M tone insertion applies whenever the underlying input tone patterns yield a single L word form or L-L sequence. Without any tonal change in the derivation of the surface realization, the OCP in its characteristic form in Beria would be violated. The M insertion thus avoids such a tonal structure.

The main reason to assume the OCP as a very general principle is that in Beria, no L-tone-only form occurs at the surface level (compare the LM allomorph in word-final position).[21] There are, nevertheless, some exceptional cases where adjacent L tones are attested in surface structures. These occur within complex morpheme structures. In one case, they are the result of the association of a single L root tone to a toneless morpheme. In the context of the interaction between root and FM

[21] Thus, L tones as realized before H tones are the default and there is no need to explain this realization. However, the OCP cannot explain the occurrence of the LM allomorph before a M tone FM, which we find in some other verb forms. In these cases, we might need to analyze the M tone on the FM as a default tone which is not underlying, but is assigned to the surface form at a late stage of the derivation. This needs further research.

which we discuss in this paper, we hold that toneless prefixes (and also suffixes) belong tonally to the root, and that here the input to the OCP is a single L tone on both levels – underlying and surface – irrespective of whether or not the target tone associates to a single or several TBUs (as in prefix + root structures). Thus, although the surface TBUs of such verb forms (see Table 9) exhibit an LLH pattern, the adjacent Ls are the result of only one single L tone. This does not constitute an OCP violation in Beria.

Another, more problematic case results from the L tone effect in marked perfective forms (see Section 5.2.2). In these forms, two L tones are adjacent in the surface structure and seem to be adjacent in the underlying structure as well. One might argue that these belong to different morphemes or domains, i.e., to the root and the FM, and claim that the morpheme boundary allows for the adjacency. Already above, in connection with the complex tonal contours on verbal roots, we suggested that domains and/or morpheme boundaries might play a role in the tonal rules of Beria. There are other cases, however, where contiguous L tones also belong to roots and FMs (in basic imperfective forms), and in these cases, the OCP applies irrespective of the morpheme boundary. A solution might be sought in the level of representation at which the OCP applies. Adjacent L tones are disallowed if they are the result of the underlying input. Now, the docking of the L tone might be an effect not at the underlying input level, but on an intermediate level later in the derivation of the surface structure, i.e., after the derivation of the root tone as M in the case of M tone roots (see Tables 11 and 12), or, with the proposed application of the OCP, as LM in the case of L tone roots (see Tables 13 and 14). In future research it might be fruitful to follow up these hypotheses.

7.4 Previous research: two-tone or three-tone system?

The tone system of Beria has not yet been investigated in much detail, but there is a controversy in the literature on how many tones are posited. Fadoul Khidir (1984) proposes an analysis with an underlying three-tone contrast. This was called into question by Wolfe (2001: 84) and to a certain extent also by Jakobi and Crass (2004). In both studies, which present sketches of the Kube system in particular, the question of whether two or three tones must be assumed underlyingly is discussed. Jakobi and Crass (2004: 32-33) mainly describe three surface tones and develop a few hypotheses on the reduced number of two underlying tones. For verb forms (2004: 61-64), they assume invariable tone patterns on the verbal root with one exception of a tonal change on the root, which they analyze in terms of a polar tone. Wolfe (2001: 93-104) outlines an analysis in terms of *Register Tier Theory* (based on Snider 1999), arguing for an underlying two-tone system. Though he states that the formalism helps to provide insights into the system, at the same time he sees that problems still remain. He concludes that "a traditional two-tone model is insufficient to categorize the patterns in the verbal tone of Beria, yet the oppositions involved seem basically binary in nature" (2001: 105-106). A look at the other members of the small Saharan language group for which sources are available

reveals the following picture: Kanuri has a two-tone system (Hutchison 1981), and Dazaga has a tone system with two tones which – as analyzed by Walters (2016) – even shows restricted patterns comparable to a pitch-accent system.

Our analysis of Beria's tone system with three underlying level tones agrees with some of the proposals in previous sketches, but it does not conform to Wolfe's analysis, in particular. A point in question might be the status of the M tone. At the current stage of research, we assume that the M tone is an underlying tone. However, some verb forms not discussed in this paper suggest that there might be two M tones: an underlying one and a default one (see FN 21). Such an analysis would come closer to Wolfe's proposal of a basically binary opposition. It is left to future research to further pursue the open question of the status of the M tone.

8. CONCLUSION

In this paper, we presented an investigation of the tonal marking of verb forms in Beria. Four different lexical tone classes (L, M, LH, MH) interact with the tones of the FM which hosts the grammatical markings relevant for the analysis. We revealed some peculiarities of Beria's tone system in the verbal domain, confining our analysis to just two verbal categories: imperfective and perfective forms in the affirmative mood (see the allomorphy of L tone roots in Section 5.1, the L tone effect in marked forms of the perfective in Section 5.2, and the floating H tone in Section 6; see also the discussion in Sections 7.2 and 7.3). In the next step, our proposal must be assessed against the full range of verb forms in our corpus. Future research will also have to incorporate facts from the nominal domain to evaluate the number of underlying tones in Beria, to further specify the nature of the OCP proposed here, and, thus, to gain a closer understanding of the system in its entirety.

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