

THE TONE OF KABIYE VERBAL EXTENSIONS

David Roberts
Independent Researcher
rbrdvd@gmail.com

Abstract

This paper investigates the extent to which the tones of Kabiye verbal extensions are predictable from the surface tone patterns of the root to which they are attached, and/or those of any corresponding underived roots. Following Snider (2018), the analysis counts relative frequencies of phonotactic patterns to identify complex stems, and compares known complex stems with those that are suspect. This process reveals two kinds of stem-final [LABIAL] and [DORSAL] consonants: those that elide in the imperative which are analyzed as forming part of the underived roots, and those that do not elide which are considered to be extensions. As for stem-final [CORONAL] consonants, which are much more numerous, the same diagnostic is not available because no elision process is attested. Nevertheless, most of those in this set are best analyzed as having extensions with causative, intensive, transitive, diminutive and reversive values. As for the tonal tier, the most convincing hypothesis is that imperatives of underived verbs have two surface tone patterns (H, L) each of which fan out into three surface tone patterns (H, L, HL) when one, two or three extensions are added. The extensions themselves have one of three underlying tone patterns /-H, -L, -Ø/, with the unspecified tone being necessary to resolve an adjacency issue.

Keywords: African languages, Mabia (Gur) languages, Kabiye, tone, verbal extensions.

1. Introduction

Verbal extensions are verb-to-verb derivational suffixes that are affixed directly to the root, and whose function is to increase or decrease valency, reorient the action, or introduce aspectual nuances (Creissels forthcoming; Hyman 2007). This paper investigates them in Kabiye, seeking to answer the following bipartite research question: *Are the tones of verbal extensions predictable from the surface tone patterns of their own root tones and/or those of any corresponding underived roots?* It is based on a study of 767 verbs which were extracted from the dictionary (CLNK 1999) and checked with two L1 informants from the canton of Lama.

Kabiye (ISO kbp) is an Eastern Gurunsi Mabia (Gur) language spoken by an estimated 1.2 million speakers in and around the town of Kara in the north of Togo, and also in the centre and south of the country. It has SVO word order, ten noun classes as well as ATR and rounding vowel harmony. Kabiye has 18 consonants /p, f, t, ɬ, s, tʃ, k, kp, d, z, l, y, w, h, m, n, ɲ, ŋ/ and nine vowels /i, ɪ, u, ʊ, e, ɛ, o, ɔ, a/. Vowel length is contrastive. In addition, five long back unrounded vowels [ɯɯ, ʉʉ, ɤɤ, ʌʌ, ɑɑ]² occur at morpheme boundaries (cf. Lébikaza 1999: 43-44, 49-56).

Kabiye has two underlying level tones, high (H, [´]) and low (L, [˘]) and automatic downstep (Lébikaza 1999: 184-190). Disyllabic nouns exploit the full range of possible tone patterns (H, L, HL, LH), whereas underived imperatives – the unmarked form of the verb that comes closest to revealing the underlying forms of the root (Roberts under review) – exploit only two (H, L) and derived imperatives only three (H, L, HL). The tone-bearing unit is the mora (Lébikaza 1999: 170, 267). All vowels are tone bearing, as are nasals in pre-consonantal and word final position. Contour tones do not occur on single TBUs (tone bearing units).

The article is structured as follows. A survey of previous research narrows the lens from Mabia (Section 2.1) to Kabiye (Section 2.2). After explaining the methodology adopted (Section 3), three scenarios for identifying Kabiye verbal

¹ This paper transcribes the palatal approximant as /y/ following the Africanist tradition.

² These vowels are represented orthographically as <iy, iy, ey, ey, ay> respectively.

extensions are illustrated (Section 4), and this lays the groundwork for an analysis of their tonal morphology. Verbs are catalogued according to the place of articulation of their final stem consonant: [LABIAL] (Section 5.1), [DORSAL] (Section 5.2) or [CORONAL] (Section 5.3). To explain the tonal alternations, two hypotheses are examined and rejected, while a third – that the underlying tone patterns of the extensions are /H, L, Ø/ – is upheld (Section 6). The article concludes with a summary of the findings (Section 7).

2. Previous research

2.1 Mabilia

Among the many Niger-Congo languages that have verbal extensions (Voeltz 1977) the two families with the most elaborate and transparent systems are Bantu (Meeussen 1967; Schadeberg 2003) and Atlantic (Doneux 1975). As for Mabilia, situated geographically between these two, verbal extensions are also widespread (Williamson and Blench 2000: 26), but many of them are fossilized and obscure, as is the case with other families in this middle area, such as Adamawa-Ubangi (Boyd 1989), Ijoid (Blench 2015), Bantoid (Harro 1988; Hyman 2018), and even certain NW Bantu languages (Hedinger 1990; Orwig 1988; Paulian 1998).

Most Mabilia grammars contain sections on verbal extensions, and although many are purely descriptive, they are welcome sources of data in sparsely documented languages, e.g. Kusaal (Eddyshaw 2018: 271-277), Dagaare (Bodomo 1993: 90-91; Kropp Dakubu 2005: 34-35), Gourmantché (Chantoux et al. 1968: 86, 101-102), Yom (Bio 1993: 72-73), Byali (Sambiéni 2005: 58), Waama (Peter 1990: 268, 276-285) and Baatonum (Grossenbacher 1974: 45-48; Horn 1998: 60).

Among those works that are more analytical, two broad approaches can be detected. Some researchers exercise a degree of caution, wary of claiming too much ground. Adouna (2009: 198) considers that the second syllables of Konkomba disyllabic forms are almost never derivational, as L1 speakers do not readily identify semantic links between them and any corresponding monosyllabic forms. Bakpa (2014: 177), guided by the conservative principle of morphological irreducibility, finds nine syllable structures for underived Gangam roots. Kleinewillinghöfer (2000: 97-98) judges that a significant number of Kusuntu second consonants are not extensions because the corresponding underived form is either lost or unknown to his informants. Canu (1976: 180-184) and Nicole (1983: 174-204) treat extensions in Mooré and Nawdm respectively, but both authors limit their findings to comparisons between existing forms. For Ulrich (1999: 113), an s-final Lama verb can be identified as a causative *only* by finding a corresponding form that has a related meaning. He does question whether C₄ might always be a suffix, but hesitates as long as corresponding underived verbs are lacking.

Others take a more liberal approach, segmenting stems into root and suffix on purely formal grounds (Hedinger 1990: 231). They justify this approach on the grounds that, just because longer forms are not synchronically decomposable, it does not mean that they are not complex, either diachronically or when compared with another related language. Treating functional and fossilized verb extensions together has the double advantage of accounting for parallel segmental and tonal behavior while avoiding an unwieldy inventory of disparate verb root structures. Elders (2007: 189-190) considers it legitimate to identify Kulango extensions by formal equivalence in the absence of other criteria. Manessy (1975: 32-33) makes the bold claim that all Oti-Volta CVC and CVCC forms are complex and are made up of one or two extensions. According to Kantchoa (2005: 162, 169), only CV and CVV are underived roots in Moba. Tchagbalé (1998: 141) concludes that most Tem verbs are derived, as does Neukom for Nateni (1995: 42-43) and for Mbelime trisyllabic forms (2004: 114). It is this second, more liberal, approach that will be adopted in the following analysis of Kabiye.

So what are the formal characteristics that enable the researcher to identify unproductive, fossilized extensions? In language after language, tight phonotactic

constraints are attested. Typically, non-initial consonants are highly restricted in comparison to initial ones, as in Senoufo (Manessy 1996: 4, 8),³ Kɔnni (Cahill 2000: 35), Konkomba (Adouna 2009: 195), Moba (Kantchoa 2005: 161), Tem (Tchagbalé 2000: 172), Lama (Ulrich 1999: 114, 117), and Kusuntu (Kleinewillinghöfer 2000: 97).

Similarly, the V₁ slot usually exploits the entire inventory, whereas non-initial vowels are restricted and predictable. They may be copies of root vowels as in Senoufo (Manessy 1996: 4), Tem (Tchagbalé 1998: 132), and Kusuntu (Kleinewillinghöfer 2000: 97-98);⁴ close front as in Kulango (Elders 2007: 190), Dagbani (Hyman and Olawsky 2004: 2), Kɔnni (Cahill 2000: 34-35) and Konkomba (Adouna 2009: 195); a schwa as in Lama (Ulrich 1999: 113-116); or completely absent as in Mbelime, which has geminate medial consonants (Melick 2012: 49-50), and as in Moba (Kantchoa 2005: 151) and Nawdm (Nicole 1983: 174-204), which attest CVC, CVCC and CVCCC stems in which each coda C can be analyzed as a tone-bearing morpheme.⁵ Thus, Mabilia extensions are often reducible to single underlying consonant phonemes (Tchagbalé 2000: 172).

Similar restrictions apply to vowel length, which is typically contrastive in Mabilia, but in certain languages long vowels may only occur in initial syllables, and trisyllabic stems never contain long vowels, as in Kɔnni (Cahill 2000: 31), Konkomba (Adouna 2009: 195), and Mbelime (Neukom 2004: 97). All these consonant and vowel constraints suggest the presence of extensions and will be exemplified in the following analysis of Kabiye.

Turning to tone systems, Mabilia extensions are often analyzed as being underlyingly toneless, taking their tones from the surrounding elements, as in Senoufo (Manessy 1996: 4), Moba (Kantchoa 2005: 163-165), Mbelime (Rietkerk 2000: 143), Ncam (Cox 1998: 93-107), Lama (Ulrich 1999: 117) and Kusuntu (Kleinewillinghöfer 2000: 97). This concurs with Hyman (2016: 5-6) who considers that extensions were toneless in proto-Bantu and often in other Niger-Congo families. The following analysis of Kabiye will evoke under-specification for only some extensions.

As for the underlying tones of underived verb roots, those with three-height systems are generally analyzed as having a ternary /H, M, L/ contrast on underived verb roots. These include Mbelime (Melick 2012: 66), Konkomba (Adouna 2009: 41-42), and Byali (Sambiéni 2005: 58). Two-height systems, on the other hand, can be grouped into four types with regard to their root tones:

1. A ternary /H, □, HL/ contrast as in Dagaare (Anttila and Bodomo 2001: 7);
2. A binary /H, L/ contrast as in Lama (Ulrich 1999: 117);
3. A privative /H, □/ contrast as in Dagbani (Hyman and Olawsky 2004: 13);
4. Total underspecification /□/, as in Kulango (Elders 2007: 3) and Kɔnni (Cahill 2000: 35).

The most closely related of these languages to Kabiye is Lama, and it is indeed scenario (2) that will be exemplified in the analysis that follows. It also matches Hyman's (2016: 7) proposition for proto-Niger-Congo.

As a postscript to this literature overview, it is worth noting two more points. Firstly, a few studies – Mooré (Canu 1976: 180-184), Nawdm (Nicole 1983: 202-204) and Lama (Ulrich 1999: 117) – include frequency counts as will be espoused in the following analysis. Secondly, causatives tend to be among the most frequent verb extensions in Niger-Congo, the most productive within a given language, and consequently the best understood. Eastern Gurunsi is no exception, as illustrated by

³ The position of Senoufo in the Gur family is widely contested, but it is included in this overview because Manessy's article appears in the Gur Papers series.

⁴ The respective authors do not discuss whether this process is associated with any wider vowel harmony systems in these languages.

⁵ In fact consonantal coda sequences in Moba and Nawdm are articulated with an epenthetic schwa, but this is not a phoneme as it is in Lama.

Tem (Tchagbalé 2000: 177), Lama (Ulrich 1999: 112), Kusuntu (Kleinewillinghöfer 2000: 98), and the Kabiye analysis that follows.

2.2 Kabiye

Turning the focus of our attention to the Kabiye literature, Kassan (1996: 71) admits that it is not easy to exactly define the semantic content of extensions, and this is amply illustrated by the diversity of interpretations among previous researchers, all of whom were writing in French (Table 1).⁶

Table 1: Previous research on Kabiye extensions

	Delord (1976: 115-121)	Lébiakaza (1999: 281-284)	Kassan (1996: 71-73, 76-77)
/-s, -z/	Causative, restrictive	Causative, iterative	Causative
/-t/	Restrictive	Iterative, intensive, abstraite	Intensive
/-d/	Frequentative (précisée/dépréciée)	Diminutive	Intensive, répétition, prolongement
/-l/	Consecutive	Iterative, durative	-
/-y/	Frequentative (précisée/dépréciée)	Iterative, intensive, abstraite ⁷	Intensive
/-k/	Progressive ⁸	Iterative, durative	Précision ⁹

Previous research also reveals a lack of agreement about the morphological profile of the extensions. They all group them into semantic pairs and triplets, and are unanimous about the existence of a “causative” /-s, -z/ pair. But beyond this, Delord (1976: 118) groups “frequentative” /-d, -y/, while Kassan (1996: 72) groups “intensive” /-t, -d, -l/ and Lébiakaza (1999: 281) groups “iterative” /-t, -y, -l, -k/. Furthermore, no previous researcher mentions the /-d/ verbal extension which will be exemplified in the following analysis (Section 5.3.5).

Previous tone analyses present just as confusing a picture. According to Lébiakaza (1999: 281), extensions are underlyingly unspecified and surface with a polar tone. For Delord (1976: 118-119) the tone associated with /-s, -z/ is either a copy of the root tone or a polar tone depending on the meaning, while the tones of /-y, -l/ simply “vary”. Kassan (1996: 72), on the other hand, considers that /-s, -z, -t/ take a L tone, and it is only /-y/ that is subject to polarity. As for Roberts (2002: 4), he briefly acknowledges the existence of extensions, but claims that extended verbs do not need separate treatment from underived verbs. By mixing mono-, di- and trimorphemic forms, he misses crucial insights that could have been gained by keeping them apart as in the analysis that follows.

⁶ The instrumental/comitative extension /-na/, which all previous researchers mention, is beyond the scope of the present study because it is structurally and inflectionally unique.

⁷ The section heading in Lébiakaza (1999: 282) states /-l, -t/ but all the examples are of /-y, -t/; presumably this is a typographical error.

⁸ Here, Delord (1976: 120) is incorrectly alluding to the TAM suffix /-kI/ which is not a verbal extension.

⁹ The French “une précision” is often translated in English merely as “a detail, a piece of information”.

3. Methodology

The lack of agreement among previous researchers is not entirely surprising, because extensions present challenges for the analyst at three levels: elicitation, form and meaning.

ELICITATION: Obtaining verb extension data requires an in-depth knowledge of the language (Hyman 2007: 151) and L1 speakers often do not recognize their existence (Blench 2015: 60). They cannot be elicited in isolation and, being small, they are likely to form false cross-linguistic cognates (Hyman 2007: 151). As Snider (2018: 16) warns, “The source of [such] complexity can be very obscure and is often buried deep in the history of the language.”

FORM: Underived roots may end with the same segment as that of a verbal extension and identification may be blurred by morphophonemic processes (Hedinger 1990: 232; Paulian 1998: 377). A given segment may be a contrastive morpheme in one context and an allomorph in another, but examples may not be sufficiently numerous to be decisive. Cases of contrast in identical environments with other extensions may be few and far between.

MEANING: The semantic values of extensions are usually only identifiable in a minority of cases, because no underived root is available for comparison (Blench 2015: 63; Harro 1988: 253; Paulian 1998: 382-383). Any one extension may have several semantic values, and one semantic value may be represented by several suffixes (Hedinger 1990: 227; Hyman 2007: 157; Kantchoa 2005: 163-165); Meanings may converge so that the extended form is practically synonymous with the underived root (Harro 1988: 253).

To navigate through such an apparent minefield, the researcher can do no better than to adopt the methodology proposed by Snider (2018: 34-35). The author defines a complex stem as one that consists of a root plus one or more derivational affixes, and warns against mixing simple and complex stems since each morpheme has its own tone pattern. He emphasizes that sometimes only one of the constituent elements in a complex stem is identifiable (as in English “cranberry”), and that in many cases no morphological evidence is available; indeed few L1 speakers even realize that they are complex.

Snider proposes two strategies for dealing with such cases. First, he underlines that insights can be gained by counting relative frequencies of phonotactic patterns to identify morpheme complexity, because stem patterns with the lower lexical frequencies are those that are more likely to be complex and vice versa. Second, he suggests studying the phonological interactions that take place between different elements of known complex stems and comparing their outputs with the surface forms of morphologically suspect stems.¹⁰

In the analysis that follows, examples are only included when both informants agreed on the semantic link.

4. Identifying verbal extensions

When Kabiye verbal extensions are catalogued according to their morphological and semantic relationships, there are three scenarios (cf. Hyman 2007: 153; 2018: 176). First, in 9% of two- and three-mora roots, the meaning of a single extension is identifiable by a comparison with a corresponding underived verb (Table 2), and that of a double extension by comparison with a corresponding singly extended verb (Table 3).

¹⁰ Snider’s third recommendation, to undertake comparative research in related languages, is beyond the scope of this paper but would be a fruitful avenue for future research.

Table 2: Singly extended verbs and their underived counterparts

	Underived		1 extension	
Causative:	lìì-Ø	<i>come out!</i>	lí-zí	<i>cause to come out!</i>
Diminutive:	kàà-Ø	<i>bar!</i>	ká-dí	<i>lock!</i>
Reversive:	yòò-Ø	<i>quarrel!</i>	yó-sì	<i>reconcile!</i>
Synonym:	tʃáá-Ø	<i>give back!</i>	tʃé-lí	<i>give back!</i>

Table 3: Doubly extended verbs and their singly extended counterparts

1 extension			2 extensions	
lò-lì-Ø	<i>give birth!</i>	Transitive:	lò-lò-sì	<i>deliver (baby)</i>
sè-lì-Ø	<i>tremble!</i>	Intensive:	sè-lì-tì	<i>get carried away!</i>
kpá-lí-Ø	<i>clap (hands)</i>	Diminutive	kpá-lí-sì	<i>click (tongue)</i>

These data illustrate a common tendency: extensions may have more than one semantic value, and semantic values may be expressed by more than one extension. There are even a few cases of apparent synonyms. The analysis must therefore avoid lumping all occurrences of a given extension together solely on the basis of its phonological profile; its semantic value also needs to be taken into account.

Second, in 4% of two- and three-mora roots, the semantic value of the extension is obscure, be it in the relationship between a singly extended verb and its underived counterpart (Table 4) or between a doubly extended verb and its singly extended counterpart (Table 5). Here we are treading on thinner ice, because of course it is possible that the roots are merely homophones. The decision to classify them as extensions is guided by the formal criteria evoked in Section 2.1, and reinforced by the fact that both informants consider them to be derivations with semantic links.

Table 4: Unusual semantic links between singly extended verbs and their underived counterparts

Underived		1 extension	
tòò-Ø	<i>sleep!</i>	tò-zì	<i>dream!</i>
kpi-Ø	<i>catch by surprise!</i>	kpi-yì	<i>fold, roll!</i>
hú-Ø	<i>strike down!</i>	hù-lì	<i>pour!</i>

Table 5: Unusual semantic links between doubly extended verbs and their singly extended counterparts

1 extension		2 extensions	
tʃè-yì-Ø	<i>try hard!</i>	tʃè-yì-sì	<i>reinforce!</i>
tʃò-lì-Ø	<i>tidy up!</i>	tʃò-lò-tì	<i>straighten up!</i>
há-dí-Ø	<i>scatter!</i>	há-dí-yì	<i>move back!</i>

Third, 7% of two- and three-mora roots participate in minimal pairs, and in one case a triplet, that help identify the extensions, but there is no obvious corresponding underived verb (Table 6).

Table 6: Minimal pairs and triplets with identifiable verb extension but no identifiable underived verb

1 extension		1 extension		1 extension	
tí-tì	<i>pack down!</i>	tí-zì	<i>plaster!</i>	-	-
pó-dì	<i>unroll!</i>	pó-sì	<i>spread, unpack!</i>	-	-
kè-zì	<i>move (s.th.)!</i>	kè-lì	<i>clear (s.th.)!</i>	kè-sì	<i>put aside!</i>

The corpus contains only one clear case of an underived verb spawning singly and doubly extended verbs (Table 7).¹¹

Table 7: Underived root spawning single and double extension verbs

Underived root	hù-Ø-Ø	<i>strike down (human)!</i>
1 extension	hù-lì-Ø	<i>pour (liquid)!</i>
2 extensions	hù-lù-sì	<i>pour a small quantity (liquid)!</i>

Taking all these types together, then, 20% of two- and three-mora verbs in my corpus have semantically identifiable extensions.¹² In the remainder, a full 80%, morphological extensions are identifiable by their form alone, their semantic values being unclear and no corresponding underived verbs being identifiable.

Two further preliminary observations will help to lay the groundwork. First, the segmental minimal pairs in Table 8 provide evidence of the need to treat all the extensions separately until clear proof of allomorphy is forthcoming.

Table 8: Segmentally contrastive extended verbs

/-t ~ - d/	hé-tí	<i>slow down!</i>	hé-dí	<i>scar, castrate!</i>
/-t ~ - l/	mé-tì	<i>slip away!</i>	mé-lí	<i>hide (oneself)!</i>
/-t ~ - y/	lí-tí	<i>skin (animal)!</i>	lí-yì	<i>rip slightly!</i>
/-t ~ - n/	hé-tí	<i>slow down!</i>	hé-nì	<i>lie down!</i>
/-d ~ - l/	hó-lí	<i>set free!</i>	hó-dì	<i>wash negligently!</i>
/-d ~ - y/	tǐí-dí	<i>scratch (pimple)!</i>	tǐí-yí	<i>rip!</i>
/-d ~ - n/	hé-dí	<i>scar, castrate!</i>	hé-nì	<i>lie down!</i>
/-ǵ ~ - t/	ká-dí	<i>lock!</i>	ká-tí	<i>dare!</i>
/-ǵ ~ - d/	pá-dì	<i>pick (fruit)!</i>	pá-dí	<i>hurry!</i>
/-s ~ - z/	kè-sì	<i>put aside!</i>	kè-zì	<i>move (something)</i>

Second, two kinds of tonal contrast are attested. In the first set, tone alone signals the difference between each pair both of which have extensions but no semantic link. The corpus contains fourteen pairs representing all three possible combinations of tone patterns (Table 9) and one triplet (Table 10).

¹¹ cf. [hù-zì-Ø] *spit!* and [hù-tì-Ø] *pour out in one go!*

¹² cf. Kassan (1996: 35) in whose corpus “a few disyllabic roots and a third of trisyllabic roots are derived” (my translation from the French).

Table 9: Tonal minimal pairs with no semantic link

H	pí-sí	return!	L	pì-sì	become!
	té-zí	cross over!		tè-zì	complete!
	hú-yí	hurry!		hù-yì	dig!
H	ǰá-lí	complain!	HL	ǰá-lì	wash (dishes)!
	té-kí ¹³	give piece of dumpling!		té-kì	reshoot (plant)!
	ká-tí	dare!		ká-tì	meet!
	lé-dí	reimburse!		lé-dì	be twilight!
	ká-dí	lock!		ká-dì	follow through!
	ná-zí	rumble (thunder)!		ná-zì	punish!
L	yì-lì ¹⁴	prepare (sauce)!	HL	yí-lì	deceive!
	mà-zì ¹⁵	break, destroy!		má-zì ¹⁶	cause to cross over!
	lè-sì ¹⁷	perceive!		lé-sì	lose!
	tò-zì	sort!		tó-zì	remember!
	tǰè-tì	rush, flow!		tǰé-tì	tell lie!

Table 10: Tonal minimal triplet with no semantic link

H	kpé-zí	pull out, pull up!	L	kpè-zì	deny!	HL	kpé-zì	threaten!
---	--------	--------------------	---	--------	-------	----	--------	-----------

The second set is much smaller. It contains two pairs in which tone alone signals a semantic difference normally assumed by a verbal extension (Table 11).

Table 11: Tonally contrastive extended verbs with semantic link

Causative	H	tú-zí	push!	HL	tú-zì	cause to fall by pushing!
Reversive	L	tǰà-nì	become leprous!	HL	tǰá-nì	beautify!

The existence of such tonal minimal pairs is an early indication that the tone of the extension is not immediately predictable from the tone of the root, and points to the need to look elsewhere to explain the underlying tone patterns.

Finally, one of the strongest arguments in favor treating C_2 and C_3 as extensions in Kabiye is that if di- and trimoraic forms were underived roots, we would expect them to be capable of carrying the same extensions as those that are incontrovertibly monomorphemic, and that this potential would be widely exploited. But this is not the case: Forms with a C_3 that duplicates a C_2 (e.g. [ǰá-lì] wash → * [ǰá-lì-lì] wash intensively) or a C_4 that duplicates a C_3 (e.g. [wélésí] listen → * [wélésí-sí] cause to listen) are never attested.

5. Tonal morphology

The observant reader will have noticed by now that all the examples of identifiable extensions cited so far share a phonological feature: their consonants are all [CORONAL]. Accordingly, it will be helpful to divide the ensuing analysis into

¹³ Dialect variant: [tá-á] give piece of maize dumpling!

¹⁴ Dialect variant: [hì-lì] prepare (sauce)!

¹⁵ Corresponding underived verb: [má-Ø] build!

¹⁶ Corresponding underived verb: [màà-Ø] jump!

¹⁷ Dialect variant: [lò-sì] perceive!

three parts according to the place of articulation of the C₂ or C₃, beginning with [LABIAL] and [DORSAL] verbs and leaving the main [CORONAL] set till last.

5.1 Labial verbs

Many of the verbs ending with the [LABIAL] root structure /CVp, CVm-, CVw-/¹⁸ are among the most frequent in natural contexts. The C₂, which is present in the perfective elides in the imperative, resulting in a CV form (Table 12). Since the segments /p, m, w/ in C₂ position show no sign of having any intrinsic meaning, they are analyzed as forming part of roots many of which contribute to the basic lexical stock. The imperative tone patterns are either H or L; the third possible pattern, HL, is absent. Granted, Kabiye does have a general constraint against contour tones on single moras, but there is no reason why the HL pattern shouldn't appear on the CVV forms exemplified on the bottom row of Table 12, especially since these are by far the most numerous of the four types.

Table 12: Monomorphemic [LABIAL] imperatives

		RT-IMP	RT-PRF		Count
CVp-	L	là-Ø	làb-á	<i>do</i>	30
CVm-	L	ṭò-Ø	ṭòm-á	<i>walk</i>	37
CVw-	H	ná-Ø	nàw-á	<i>see</i>	35
CVw-	L	lì-Ø ¹⁹	lìw-á	<i>go out</i>	58
				Total	160

Admittedly, analyzing verbs with /p, m, w/ in C₂ position as being underived roots on the semantic grounds that these consonants have no readily identifiable meaning is inconclusive evidence, because it is also true of so many other consonants in the same position. But stronger evidence comes from a comparison with the imperatives of eight /CVp, CVm-/ verbs which do not undergo elision, suggesting that their underlying morphological structure differs from those in Table 12. In Table 13, notice that the meanings are more complex (i.e. they do not describe the most basic physical actions, infants and L2 learners do not acquire them first, and they are infrequent in natural contexts), that V₁ and V₂ in trimoraic forms are always identical,²⁰ and that this time the HL pattern is present. All these considerations suggest that these examples are di- and trimorphemic imperatives in which the segments /p, m/ are extensions even though their meaning is no longer identifiable.

Table 13: Di- and trimorphemic [LABIAL] imperatives

/CV-p/	HL	só-bì-Ø	<i>crouch!</i>
/CV-m/	HL	lí-mì-Ø	<i>deepen!</i>
/CVCV-m/	H	kó-ló-mí ²¹	<i>be twisted!</i>
	H	sá-lá-mí	<i>go to and fro!</i>
	L	hò-lò-mì	<i>be white!</i>
	L	pì-lì-mì	<i>roll about!</i>
	L	sò-lò-mì	<i>beg for!</i>
	L	yò-lò-mì	<i>become blind!</i>

¹⁸ The other [LABIAL] consonants /f, kp/ are unattested in root final position.

¹⁹ In L tone CVw- imperatives, when the /w/ elides, it leaves its trace in a lengthened vowel. A similar process occurs in CVk- imperatives when the /k/ elides (see Section 5.2). These can be considered as two manifestations of the same [DORSAL] process, given that /w/ is [DORSAL] as well as being [LABIAL].

²⁰ If this were merely a product of the vowel harmony system, it would not necessarily generate an exact copy of the root vowel.

²¹ This verb is semantically related to [kó-tí] *bend!*

5.2 Dorsal verbs

A similar pattern emerges in verbs with the underlying [DORSAL] root structure /CVk-/,²² some of which are quite frequent in natural contexts. This time, when the underlying C₂, which is present in the imperfective past (IPA), elides in the imperative, it leaves its [DORSAL] trace in a long back vowel, resulting in a CVV form. All three possible imperative tone patterns – H, L and HL – are attested (Table 14).

Table 14: Monomorphemic [DORSAL] imperatives

		RT-IMP	RT-IPA		Count
/CVk-/	H	kpáá-Ø	kpàká-à	take	16
		sýý-Ø	sèká-à	lift	
	L	tʃàà-Ø	tʃàkà-á	sit	23
		nòò-Ø	nòkà-á	carry on back	
	HL	kpýý-Ø	kpýýà-à ²³	pardon	2
		tálà-Ø	tálà-à ²⁴	reshoot (plant)	
				Total	41

The simple, concrete actions of the H and L verbs suggest that they form part of the basic, underived lexical stock, but the two HL verbs require closer investigation. The following considerations point to their /k/ segments being fossilized extensions:

1. The HL tone pattern was not attested on basic verbs in the [LABIAL] set;
2. There many fewer examples of HL than of H and L verbs;
3. The meanings are more complex (according to the definition given in Section 5.1) than those of H and L verbs.

Even more strikingly, the imperatives of a handful of apparently CVk verbs never undergo elision, suggesting that they do not share the same underlying morphological structure as the H and L verbs in Table 14. In Table 15, note that V₁ and V₂ are identical in the only example containing three vowels ([kpè-lè-kì] *learn!*), which is not necessarily the case with all trimoraic verbs just because of vowel harmony, and that the HL tone pattern is not only present, it is by far the most frequent. These considerations suggest that the segment /-k/ in these verbs (and its voiced counterpart [-g] following a nasal)²⁵ are fossilized extensions.

Table 15: Di- and trimorphemic [DORSAL] imperatives

H	/CV-n-k/ ²⁶	má-ŋ-gí ²⁷	bend out of shape!	1
L	/CV-k/	hò-kì	attach!	1
	/CV-n-k/	wò-ŋ-gì	laugh!	6
	/CV-l-k/	kpè-lè-kì	learn!	1
HL	/CV-k/	lé-kì	plunge!	2
	/CV-n-k/	ʃá-ŋ-gì	wait!	20
			Total	31

²² The other [DORSAL] consonant, /kp/, is unattested in C₂ position.

²³ The dorsal consonant is realized in the Kidjang dialect: [kpè-kà-à] *pardon!*

²⁴ The dorsal consonant is realized in the Kidjang dialect: [tè-kà-à] *reshoot (plant)!*

²⁵ In the standard orthography, words with this structure are spelled with no letter <g>, but the voiced plosive is always present in the pronunciation, e.g. <wong> [wongì] *laugh!*

²⁶ For a justification of the underlying structure as /CV-n-k/ rather than /CVN-k/ in this and the following examples, see Section 5.3.7.

²⁷ The verb [mángí] (dialect variant [méngí]) *deform (something)!* is probably derived from [móní] *be deformed!* in spite of the vowel change.

In one further case, a semantic link is identifiable between the single and double extension verbs, and once more the V₁ and V₂ are identical, this time providing solid proof that the segment /-k/ can indeed be an extension²⁸ (Table 16).

Table 16: Double /-k/ extended verbs

	1 extension			2 extensions	
L	kpì-yì-Ø	<i>fold, roll up!</i>	L	kpì-yì-kì	<i>grasp!</i>

Moreover, extension verbs that are derived from underlyingly /CVk-/ verbs divide into two sets: those with short and those with long vowels (Table 17). It is likely that in the first set only the root C₂ elides, whereas in the second set both the root C₂ and an intermediate fossilized /-k/ extension elide. Note too, that the V₁ and V₂ in the second set are identical as usual.

Table 17: CVk underived verbs with corresponding single and double extensions

	Underived			1 extension	
/CVk-/	tʃáá-Ø	<i>give back!</i>	/CVk-l/	tʃé-lí	<i>give back!</i>
	máá-Ø	<i>avoid (obstacle)!</i>	/CVk-l/	mé-tì³⁰	<i>slip away!</i>
	kàà-Ø	<i>bar!</i>	/CVk-d/	ká-dí	<i>lock!</i>
	Underived			2 extensions	
/CVk-/	nùù-Ø	<i>moisten!</i>	/CVk-k-d/	nù-ù-dì	<i>refresh, cool down!</i>
	tʃóó-Ø	<i>be cloudy!</i>	/CVk-k-d/	tʃó-ù-dì	<i>cloud!</i>
	tʃàà-Ø	<i>sit !</i>	/CVk-k-z/	tʃá-á-zì	<i>cause to sit!</i>

The consequence of this analysis is that verbs in the first series must always be listed as having single extensions₃₁, while those in the second series must always be listed as having double extensions.

5.3 Coronal verbs

The [LABIAL] and [DORSAL] verbs have been presented first because many of them make up the basic lexical stock and are analyzed as having no extension. Verbs ending with the [CORONAL] stem structure /t, d, ɖ, s, z, l, y, n/,³² on the other hand, are much more numerous and the meanings of their extensions are sometimes easier to identify, so they are at the heart of the quest to identify underlying tone patterns. The following inventory demonstrates that most [CORONAL] verbs with unidentifiable underived counterparts are best analyzed as dimorphemic stems composed of a monomorphemic root and a verbal extension. Proof is threefold: (i) their meanings are often complex; (ii) the V₁ and V₂ of trimoraic forms is usually

²⁸ According to my assistants, the semantic link between **[kpì-yì-kì]** *grasp!* and **[kpì-yì-Ø]** *fold, roll up!* is that to grasp something is to fold one's fingers over it. They also readily accept a semantic link between **[kpì-Ø]** *catch by surprise!* and **[kpì-yì-kì]** *grasp!*, but hesitate over **[kpì-Ø]** *catch by surprise!* and **[kpì-yì-Ø]** *fold, roll up!*

²⁹ In all the underived verbs in Table 17, the final /k/ of the root is realized in the imperfective past, e.g. **[tʃáká-á]** *sit*. However this consonant is never realized in the derived forms.

³⁰ cf. **[mé-lí]** *hide (oneself)!* However, there is an unusual short/long dialect alternation in a third related extension verb, **[mé-sí ~ méé-sí]** *hide (something)!*

³¹ In one further pair, **[tɔ]** *vomit!* and **[tɔɔ]** *eat!*, it may seem tempting to posit an extension with a reversive value, but it is most unlikely that a verb as basic as *eat!* would literally mean *un-vomit!*

³² The other [CORONAL] consonants, /tʃ, ɲ/, are unattested in stem final position.

identical;³³ and (iii) their tone patterns match those of [CORONAL] verbs that have identifiable extensions, including, this time, the HL tone pattern.

Stem-final [CORONAL] consonants are much more numerous than [LABIAL] and [DORSAL] ones, but the elision diagnostic that served us well in Sections 5.1 and 5.2 is not available here because no such [CORONAL] elision process is attested. It is highly likely that at least some are underived, especially because [CORONAL] is the least marked place feature cross-linguistically. Evaluated purely on the grounds of semantic simplicity and frequency in natural contexts, some likely candidates are listed in Table 17. We can draw no firm conclusions, but in any case such verbs form only a small proportion of the dataset, and crucially there are no semantically simple verbs among those with HL tone patterns, suggesting that verbs with this tone pattern are always derived.

Table 17: Likely candidates for underived roots ending in a [CORONAL] consonant

H		L	
sétí	cut!	ɲìnì	look for!
pédí	sell!	kàlì	count!
kúlí	open!	tàlì	arrive!
tólí	fall!	hèyì	say!
wílí	cry!	yòdòdì	speak!

The following purely descriptive sections present each of the extensions in turn (Sections 5.3.1 – 5.3.7). Such a repetitive approach may seem tedious, but it is necessary in order to draw together the various strands into a summary (Section 5.4), which, in turn, prepares the way for the tone analysis itself (Section 6).

5.3.1 /-s/ extension

The primary semantic value of the /-s/ extension is causative, but it occasionally has transitive, intensive, reversive, diminutive, synonymic, or unclear values. It is voiced in C₂ position following CVm, CVw or CVk roots,³⁴ and in C₃ position following a nasal /n/. This conditioning is illustrated in Table 19.

Table 19: Examples of causative or synonymic /-s/ conditioning

C ₂	/p __ /	lè-Ø	lose (o.s.)!	lé-sì	lose (s.th.)!	2
	/m __ /	tè-Ø	finish!	tè-zì	complete !	3
	/w __ /	ɲòd-Ø	drink!	ɲò-zì	cause to drink!	12
	/k __ /	tòd-Ø	eat	tòd-zì	cause to eat!	4
C ₃	/n __ /	hò-lò-mì	be white!	hò-lò-ñ-zì	whiten!	1
	elsewhere	lò-lì-Ø	give birth!	lò-lò-sì	deliver (baby) !	5

³³ Out of 60 CVCVCV verbs in the dictionary, 44 (73%) are spelled with V₁ = V₂, while in the remaining cases, V₂ = V₃ (i.e. /ɪ ~ i/). However, my informants pronounce, or accept as a dialect variant, 57 (95%) of these verbs as V₁ = V₂, and in the remaining three, the C₂ is /y/, which doubtless conditions the pronunciation of V₂ as /ɪ ~ i/. When the C₂ is /m/, V₂ may elide, e.g. [tàmàsì ~ tàm̀sì] *join, tie!*, and in some cases this elision is obligatory e.g. [ɲám̀sì] *sneeze!*

³⁴ The corpus contains three exceptions to these conditioning rules, but none of the meanings are causative.

The corpus contains one segmental minimal pair contrasting /-s, -z/, suggesting that these may originate in two underived verbs with different segmental structures, although this is unverifiable (Table 20).

Table 20: Segmental minimal pair contrasting /-s, -z/

1 extension		1 extension		Count
kè-sì	<i>put aside!</i>	kè-zì	<i>move (s.th)!</i>	1

Tables 21 and 22 show the tone patterns for singly and doubly extended verbs respectively, with examples of all possible meanings.

Table 21: Singly extended verbs with /-s/ verbal extension

		Underived			1 extension		Count
Causative	H	kpá-Ø	<i>go up!</i>	HL	kpá-zì	<i>cause to go up!</i>	1
	L	lì-Ø	<i>go out!</i>	H	lí-zí	<i>cause to go out!</i>	2
		tì-Ø	<i>go down!</i>	L	tì-sì	<i>cause to go down!</i>	7
		yòò-Ø	<i>quarrel</i>	HL	yó-zì	<i>cause to quarrel!</i>	1
Transitive	H	má-Ø	<i>avoid (obstacle)!</i>	H	mé-sí	<i>hide s.th.</i>	1
	L	hù-Ø	<i>become weak!</i>	L	hù-zì	<i>weaken s.o.</i>	3
		lè-Ø	<i>get lost!</i>	HL	lé-sì	<i>lose s.th.</i>	1
Intensive	L	kpè-Ø	<i>get out!</i>	H	kpé-zí	<i>pull out!</i>	1
		sù-Ø	<i>go in!</i>	L	sù-zì	<i>push right in!</i>	2
Reversive	H	má-Ø	<i>build!</i>	L	mà-zì	<i>break down!</i>	1
	L	yòò-Ø	<i>quarrel!</i>	HL	yó-sì	<i>reconcile!</i>	2
Diminutive	L	t̃ò-Ø	<i>take hold suddenly!</i>	H	t̃ó-zí	<i>take a small part!</i>	1
Synonym	H	tú-Ø	<i>put!</i>	HL	tú-zì	<i>put!</i>	1
Unclear	L	tò-Ø	<i>sleep!</i>	L	tò-zì	<i>dream!</i>	5
Unknown	-	-	-	H	pí-sí	<i>return!</i>	7
	-	-	-	L	jà-sì	<i>bite!</i>	65
	-	-	-	HL	té-zì	<i>extinguish!</i>	35
						TOTAL	136

Table 22: Doubly extended verbs with /-s/ verbal extension

		1 extension			2 extensions		Count
Causative	H	wá-lí-Ø	<i>enlarge!</i>	H	wá-lí-sí	<i>cause to enlarge!</i>	1
		tó-lí-Ø	<i>open!</i>	HL	tó-lí-sì	<i>reveal!</i>	1

Transitive	H	má-lí-Ø	<i>place o.s!</i>	HL	má-lá-sì	<i>place s.th. against!</i>	1
	L	yò-lò-mì	<i>be blind</i>	L	yò-lò-sì	<i>blind s.o!</i>	5
Intensive	H	tó-lí-Ø	<i>lose o.s!</i>	HL	tó-lí-sì	<i>lose o.s. without realizing!</i>	1
Diminutive	H	kpá-lí-Ø	<i>clap hands !</i>	HL	kpá-lí-sì	<i>click tongue!</i>	1
	L	hù-lì-Ø	<i>pour!</i>	L	hù-lù-sì	<i>pour small quantity!</i>	1
Unclear	H	tó-lí-Ø	<i>open!</i>	HL	tó-ló-sì	<i>reveal!</i>	2
	L	ṭʃè-yì-Ø	<i>try hard!</i>	L	ṭʃè-yì-sì	<i>reinforce!</i>	2
Unknown	-	-	-	H	ṭʃú-lú-sí	<i>deepen!</i>	5
	-	-	-	L	ɲè-yè-sì	<i>accelerate!</i>	11
	-	-	-	HL	ɲí-lí-sì	<i>shine!</i>	10
					TOTAL		41

5.3.2 /-l/ extension

The primary semantic value of the /-l/ extension may be intensive, but in two cases the meanings are synonymous and in one case the semantic link is unclear. The /-l/ extension has no known allomorphs. Tables 23 and 24 show the tone patterns for singly and doubly extended verbs respectively, with examples of all possible meanings.

Table 23: Singly extended verbs with /-l/ verbal extension

		Underived			1 extension		Count
Intensive	H	má-lí-Ø	<i>avoid (obstacle)!</i>	H	mé-lí	<i>hide (o.s)!</i>	1
Synonym	H	ṭʃá-lí-Ø	<i>give back!</i>	H	ṭʃé-lí	<i>give back!</i>	1
Unclear	H	hú-Ø	<i>strike down (human)!</i>	L	hù-lì	<i>pour (liquid)!</i>	1
Unknown	-	-	-	H	tó-lí-Ø	<i>open!</i>	27
	-	-	-	L	lò-lì	<i>give birth!</i>	30
				HL	yó-lì	<i>melt!</i>	28
					TOTAL		88

Table 24: Doubly extended verbs with /-l/ verbal extension

		1 extension			2 extensions		Count
Synonym	H	ḥɣ̣-ɣ̣-Ø	<i>feel nauseous!</i>	H	ḥɣ̣-ɣ̣-lí	<i>feel nauseous!</i>	1
Unknown	-	-	-	H	ṭʃé-dé-lí	<i>divide up!</i>	7
				L	ɲà-mà-lì	<i>cease!</i>	1
	-	-	-	HL	hé-ŋ-gé-lì	<i>lean!</i>	10
					TOTAL		19

5.3.3 /-y/ extension

The semantic value of the /-y/ extension is intensive or transitive. It has no known allomorphs. Tables 25 and 26 show the tone patterns for singly and doubly extended verbs respectively, with examples of all possible meanings.

Table 25: Singly extended verbs with /-y/ verbal extension

		Underived			1 extension		Count
Intensive	L	tʃi-Ø	<i>scratch!</i>	H	tʃi-yí	<i>rip!</i>	2
		li-Ø	<i>come out!</i>	HL	lí-yì	<i>take out (vein)!</i>	1
Transitive	L	tù-Ø	<i>slide!</i>	H	tú-yí	<i>push s.th!</i>	1
Unknown		-	-	H	pé-yí	<i>rival!</i>	14
		-	-	L	ɲè-yì	<i>sew!</i>	20
		-	-	HL	fí-yì	<i>grumble!</i>	33
						TOTAL	71

Table 26: Doubly extended verbs with /-y/ verbal extension

		1 extension			2 extensions		Count
Intensive	H	há-dí-Ø	<i>spread out!</i>	HL	há-dí-yì	<i>draw back!</i>	1
Unknown		-	-	L	kpà-dì-yì	<i>get old!</i>	2
				HL	nú-kú-yì	<i>twist o.s.</i>	6
						TOTAL	9

5.3.4 /-t/ extension

The primary semantic value of the /-t/ extension is intensive, though one case is a synonym and in two further cases the semantic link is unclear. This extension has no known allomorphs. Tables 27 and 28 show the tone patterns for singly and doubly extended verbs respectively, with examples of all possible meanings.

Table 27: Singly extended verbs with /-t/ verbal extension

		Underived			1 extension		Count
Intensive	H	hú-Ø	<i>strike down!</i>	L	hù-tì	<i>pour all at once!</i>	1
		má-Ø	<i>avoid (obstacle)!</i>	HL	mé-tì	<i>slip away!</i>	1
	L	hò-Ø	<i>beat!</i>	L	hò-tì	<i>throw to ground violently!</i>	1
		kpì-Ø ³⁵	<i>darn!</i>	HL	kpí-tì	<i>grip, pinch!</i>	1

³⁵ Lama dialect: [kpà-Ø] *darn!*

Unclear	L	hèè-Ø	cool down!	H	hé-tí	slow down!	1
Unknown		-	-	H	yó-tí	wander!	14
		-	-	L	ɲɔ-tì	come near!	15
				HL	pé-tì	intercept!	17
					TOTAL		51

Table 28: Doubly extended verbs with /-t/ verbal extension

		1 extension			2 extensions		Count
Intensive	L	sè-lì-Ø	tremble!	L	sè-lì-tì	get carried away! ³⁶	1
Synonym	L	tʃɔ-lì-Ø	tidy up!	L	tʃɔ-lɔ-tì	tidy up!	1
Unclear	L	hèè-Ø	be cold!	H	hé-tí	slow down!	1
Unknown		-	-	L	mì-lì-tì	interlace!	8
		-	-	HL	yí-ɖí-tì	itch!	2
					TOTAL		13

5.3.5 /-d/ extension

The semantic value of the /-d/ extension is intensive or transitive. It has no known allomorphs. Tables 29 and 30 show the tone patterns for singly and doubly extended verbs³⁷ respectively, with examples of all possible meanings.

Table 29: Singly extended verbs with /-d/ verbal extension

		Underived			1 extension		Count
Intensive	H	lú-Ø	beat!	H	lú-dí	beat with instrument!	2
	L	tʃí-Ø	scratch slightly!	H	tʃí-dí	scratch!	3
Unknown		-	-	H	ké-dí	tell (story)!	21
				L	hòò-dì	kill in large numbers!	5
		-	-	HL	mí-dì	whisper!	25
					TOTAL		56

Table 30: Doubly extended verbs with /-d/ verbal extension

		1 extension				2 extension s	Count
Intensive	H	ɲú-ú-Ø	press! ³⁸	H	ɲú-ú-dí	compress! ³⁹	1
Transitive	H	tʃó-ú-Ø	be cloudy!	HL	tʃó-ú-dì	cloud s.th.!	1
	L	ɲú-ú-Ø	be	H	ɲú-ú-dí	refresh,	1

³⁶ The semantic link between these two verbs is the notion of not being in control of one's emotions.

³⁷ The three doubly extended verbs with known underived counterparts in Table 30 are all analyzed as having the underlying structure /CVk-k-d/ (See Section 5.2, Table 17).

³⁸ e.g. finger on a button.

³⁹ e.g. clothes into a suitcase.

			<i>humid!</i>			<i>cool down!</i>	
Unknown ⁴⁰				H	pá-yí-ń-dí	<i>thrash about!</i>	1
				L	kè-lè-ń-dì	<i>go from left to right!</i>	1
				HL	ṭṣó-ló-ń-dì	<i>hurry!</i>	2
						TOTAL	7

5.3.6 /-t/ extension

The primary semantic value of the /-t/ extension is diminutive, but one example has an intensive value. The voiceless retroflex phoneme /t/ is always pronounced voiced [d] in medial position, but as a morpheme it has no allomorphs.⁴¹ Tables 31 and 32 show the tone patterns for singly and doubly extended verbs respectively, with examples of all possible meanings.

Table 31: Singly extended verbs with /-t/ verbal extension

		Underived			1 extension		Count
Diminutive	L	kàà-Ø	<i>bar</i>	H	ká-dí	<i>lock!</i>	1
		tè-Ø	<i>finish!</i>	HL	té-dì	<i>lack!</i>	3
Intensive	L	sò-Ø ⁴²	<i>prick!</i>	H	só-dí	<i>insert (to fill a hole)!</i>	1
Unknown		-	-	H	kó-dí	<i>cling to!</i>	3
		-	-	L	kè-dì	<i>cut!</i>	2
		-	-	HL	ná-dì	<i>drag!</i>	15
						TOTAL	25

Table 32: Doubly extended verb with /-t/ verbal extension

	1 extension		2 extensions		Count
Unknown	-	HL	ṭṣé-bé-dì	<i>entertain, relax!</i>	1
				TOTAL	1

5.3.7 /-n/ extension

Of the ten verbs with an alveolar nasal C₂, only one shows evidence of that consonant being a verbal extension, because it has a semantic link with two other extension verbs, and the underived verb for all three is known (Table 33).

Table 33: Singly extended verbs with /-n, -z, -t/ extensions

	Underived			1 extension	
L	hèè-Ø	<i>cool down!</i>	HL	hé-nì	<i>lie down!</i>
			L	hè-zì	<i>cause to cool down, rest!</i>
			H	hé-tí	<i>slow down!</i>

⁴⁰ It does not go unnoticed that all four verbs in this category have the same CV-C-n-C structure. For a justification of this analysis rather than CV-CVN-C see Section 5.3.7.

⁴¹ The only hint of allomorphy occurs in the dialect variants [ṭṣébé-dì ~ ṭṣébé-lì] *entertain, relax!* (Table 32).

⁴² The underived verb may be [sò-Ø] *plant!* which has the underlying structure CVw.

The suffix /-n/ may be an allomorph of one of the other alveolar extensions, but this cannot be proven with such limited data. Table 34 shows singly extended verbs with /-n/ verbal extensions.

Table 34: Singly extended verbs with /-n/ verbal extension

Underived		1 extension		Count
-	L	kò-nì	<i>wipe!</i> ⁴³	5
-	HL	pí-nì	<i>last!</i>	5
			TOTAL	10

The analysis must also justify its treatment of pre-consonantal nasals as extensions. The nasal /m/ in [**hò-lò-mì**] *be white!* has already been analyzed as an extension on the grounds that the /m/ does not undergo the usual root final elision common to CVm roots (see Section 5.1, Table 13). Therefore, the same segment must also be an extension in the corresponding form [**hò-lò-n-zì**] *whiten!* The verbs in Table 35 are analyzed in the same way by analogy, even though no corresponding underived forms are identifiable. These are the only example of verbs with three extensions in the corpus.

Table 35: Triply extended verbs with C₃ /-n/

H	CV-y-n-d	pa-yí-ń-dí	<i>thrash about!</i>	1
L	CV-l-n-d	kè-lè-ń-dì	<i>go from left to right!</i>	1
HL	CV-l-n-d	tʃó-ló-ń-dì	<i>hurry!</i>	2
HL	CV-n-k-l	hé-ń-gé-lì	<i>lean!</i>	10
			TOTAL	14

Similarly, it is likely that the forms in Table 36 have an /-n/ extension, the only other alternative being to add CVN to the existing CV and CVV root structures just for the sake of these few verbs.

Table 36: Doubly extended verbs with C₂ /-n/

H	/CV-n-k/	má-ń-gí	<i>bend out of shape!</i>	1
L	/CV-n-k/	wò-ń-gì	<i>laugh!</i>	6
HL	/CV-n-k/	tá-ń-gì	<i>wait!</i>	20
			TOTAL	27

5.3.8 Summary

Table 37 summarizes the attested word-level surface tone patterns on singly extended verbs that have a CORONAL C₂ and an identifiable corresponding underived verb. Their tone patterns present at best a fragmented picture because of the scarcity of the data. All we can state for sure is that all underived verbs are /H, L/, and that singly derived verbs attest all three tone patterns /H/, L, HL/, though not with any obvious pattern.

⁴³ More specifically: “Wipe the remaining sauce off one’s plate with the curved underside of the right index finger, then lick it!”

Table 37: Word-level surface tone patterns on singly extended verbs with identifiable corresponding underived verbs

	Underived verb:	H			L			TOTAL
	Derived verb:	H	L	HL	H	L	HL	
/-s/	Causative			1	2	7	1	11
/-s/	Transitive	1				3	1	5
/-s/	Unclear					5		5
/-d/	Intensive	2			3			5
/-t/	Diminutive				1		3	4
/-s/	Intensive				1	2		3
/-s/	Reversive		1				2	3
/-t/	Intensive		1	1		1		3
/-y/	Intensive				2		1	3
/-s/	Diminutive				1			1
/-s/	Synonym			1				1
/-t-	Unclear		1					1
/-l/	Intensive	1						1
/-l/	Unclear		1					1
/-t/	Intensive				1			1
/-y/	Transitive				1			1
	TOTAL	4	4	3	12	18	8	49

Table 38 summarizes the attested word-level surface tone patterns on doubly extended verbs with a CORONAL C₃ and an identifiable corresponding singly extended verbs. Here, there are even fewer examples, but a clear pattern can be detected: singly derived verbs are/H, L/ (HL is unattested again), and, with one exception, doubly extended verbs take their tone patterns from the corresponding singly extended verb. Nevertheless, one would hesitate to draw hasty conclusions on the basis of such a small sub-set of data.

Table 38: Word-level surface tone patterns on doubly extended verbs with an identifiable corresponding singly extended verb

	Single extended verb:	H			L			TOTAL
	Doubly extended verb:	H	L	HL	H	L	HL	
/-s/	Transitive			1		5		6
/-s/	Unclear			2		2		4
/-s/	Causative	1				1		2
/-s/	Diminutive			1		1		2
/-d/	Transitive			1		1		2
/-s/	Intensive			1				1
/-d/	Intensive	1						1
/-t/	Intensive					1		1

/-t/	Synonym	1						1
/-t/	Unclear				1			1
/-l/	Synonym	1						1
/-y/	Intensive			1				1
	TOTAL	4	0	7	1	11	0	23

Table 39 summarizes the attested word-level surface tone patterns on singly and doubly extended verbs with no identifiable corresponding underived verbs. This time, the C₂ or C₃ may be [LABIAL], [CORONAL] or [DORSAL] and a much clearer pattern emerges. Four of the extended verbs with the most examples /-s, -l, y, -d/, exploit all three possible tone patterns /H, L, HL/ on singly and doubly extended verbs, and the five extended verbs with the most examples /-s, -l, -y, -d, -t/ do so on singly extended verbs. The further up the table, the higher the frequencies and the fewer the gaps. This strongly suggests that with a larger corpus the remaining gaps would be filled.

Table 39: Word-level surface tone patterns on extended verbs with no identifiable corresponding underived verb

	1 extension			2 extensions			TOTAL
	H	L	HL	H	L	HL	
/-s/	7	65	35	5	11	10	133
/-l/	27	30	28	7	1	10	103
/-y/	14	20	33	2	2	6	77
/-t/	14	15	17		8	2	56
/-d/	21	5	25	1	1	2	55
/-k/		1	1	1	7	20	30
/-t̥/	3	2	15			1	21
/-n/		5	5				10
/-m/			1	2		4	7
/-p/			1				1
TOTAL	86	143	161	18	30	55	493

The overall picture that emerges, then, is that underived verbs have two imperative tone patterns (H, L) each of which fan out into three possible surface tone patterns (H, L, HL) when a single or double extension is added (Table 40).

Table 40: Surface tone patterns of underived verbs and their singly and doubly extended counterparts

Underived	1 extension	2 extensions
H	H-H	HH-H
	L-L	LL-L
	H-L	HH-L
L	H-H	HH-H
	L-L	LL-L
	H-L	HH-L

But even this table only shows the relationships between surface level tone patterns. The next and final stage of the analysis is to determine their underlying forms.

6. Tone analysis

On the one hand, the aim is to establish whether the morpheme-level tones of extensions are predictable from the surface form of the roots to which they are attached. This is problematic because verb roots with H surface patterns take H or L extensions. On the other hand, we want to know whether the word-level tone patterns of extended forms are predictable from those of their corresponding underived forms. This presents a challenge because the two underived verb tones, H and L, both spawn H, L and HL extension verbs.

Both investigations also need to take into account the phenomenon of polarity⁴⁴ in the wider verb phrase (Roberts under review). In Table 41, the underlyingly toneless perfective /-a/ and imperfective past /-a/ TAM suffixes are added to single extension verbs. In [H-H] and [L-L] imperatives, the TAM suffixes surface with a polar tone that is sensitive to the rightmost TBU of the root. But in [H-L] imperatives, the TAM suffix does not have the expected surface H tone. The latter is therefore analyzed as being underlyingly /H-Ø/, so that when the TAM suffix is added, it is adjacent on the tonal tier to the H root tone and can surface with a polar L tone.

Table 41: Polar tone in the perfective and imperfective past

Underlying word pattern	Surface stem pattern	Surface TAM pattern					
/H/	[L-H-]	[-L]	è-	tʃè	-lá	-à	he ~ she gave back
/L/	[L-L-]	[-H]	è-	hà	-zà	-á	he ~ she swept
/HØ/	[H-L-]	[-L]	è-	té	-qà	-à	he ~ she lacked
			SP3/1	RT	EXT	PER	
/H/	[L-H-]	[-L]	è-	tʃè	-lá	-à	he ~ she was giving back
/L/	[L-L-]	[-H]	è-	hà	-zà	-á	he ~ she was sweeping
/HØ/	[H-L-]	[-L]	è-	té	-qà	-à	he ~ she was lacking
			SP3/1	RT	EXT	IPA	

The need to prepare the environment in which TAM polarity can occur is of paramount importance when seeking to identify the underlying tones of the extensions, and will be termed the Adjacency Requirement (cf. Odden 1994).

Adjacency Requirement: *The verbal extension of HL extended verbs must be toneless at the point when the toneless TAM suffix to its right is added, so that*

⁴⁴ A reviewer has questioned why the analysis opts for polarity rather than dissimilation at this point. For a defense of this choice in the wider Kabiye verb phrase, see Roberts (under review). Another reviewer has suggested that the data could be accounted for in terms of a HLH avoidance strategy. But if this were the case, it would be the only context in the entire language where this tone pattern is avoided by means of a strategy other than postlexical plateauing. See Roberts (2016: 137-138); under review) for further information.

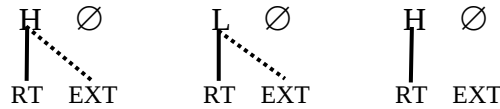
the latter is adjacent to the H of the root tone on the tonal tier and can thus surface as L by a rule of polarity.

We will investigate three hypotheses all of which are guided (and limited) by the Adjacency Requirement. The first posits that all extensions are unspecified for tone/ $\emptyset$ / (Section 6.1); the second posits a binary contrast /-H, - $\emptyset$ / (Section 6.2); the third posits a ternary contrast /-H, -L, - $\emptyset$ / (Section 6.3).

6.1 Hypothesis 1: Extensions are toneless /- $\emptyset$ /

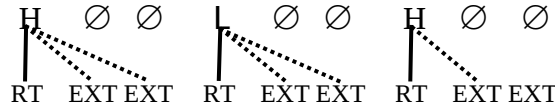
The first and perhaps the most obvious hypothesis is that the extensions are toneless, leaving only two underlying patterns on single extension stems, /H- $\emptyset$ / and /L- $\emptyset$ /. The extensions in [H-H] and [L-L] single extension verbs receive their tones from the root tone spreading rightwards on to them, but something blocks that spreading in the case of surface [H-L] verbs (Figure 1).

Figure 1: Tonal associations on single extension verbs if all extensions are toneless



Similarly, the extensions in [H-H-H] and [L-L-L] double extension verbs receive their tones from the root tone spreading rightwards on to them, but this time, in the case of [H-H-L] verbs, the H tone spreads to the first toneless extension and not the second (Figure 2).

Figure 2: Tonal associations on double extension verbs if all extensions are toneless



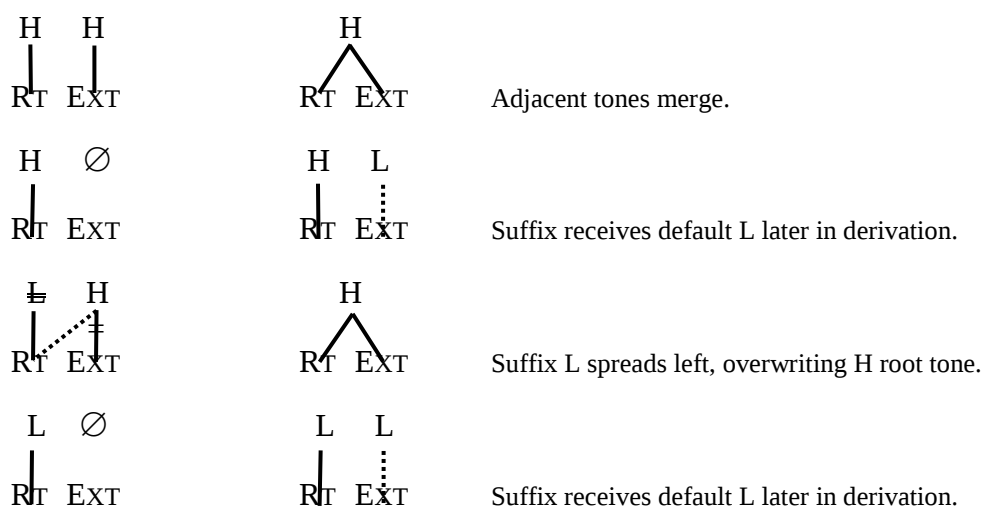
The advantages of this hypothesis are threefold: it is widely attested in Mabia (see Section 2.1); all extensions have the same underlying tone, and the Adjacency Requirement is satisfied. However, it also has three major weaknesses: it does not explain what blocks the H spread in single extension [H-L] verbs; neither does it explain why, in double extension [H-H-L] verbs the first extension receives a tone through H spreading but the second does not. It might be possible to find work-around solutions for these two issues, but more worryingly, this hypothesis comes nowhere near accounting for how extended verb root tones are derived from underived verb root tones unless it is merely by replacing one set of tone patterns with the other. This hypothesis is therefore rejected.

6.2 Hypothesis 2: Extensions are /-H, - $\emptyset$ /

The second hypothesis is that the extensions are either H or toneless, generating four underlying patterns on single extension verbs, /H-H/, /H- $\emptyset$ /, /L-H/ and /L- $\emptyset$ /.⁴⁵ This adequately account for the following patterns (Figure 3).

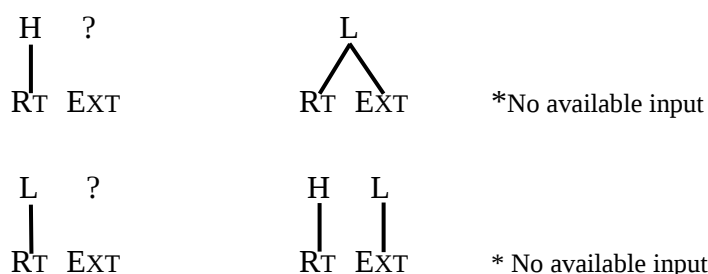
⁴⁵ The presence of leftward spreading overwriting tones in the second and third hypotheses should not raise eyebrows, as they have been shown to occur in five of the ten noun classes (Roberts 2016).

Figure 3: Tonal associations on single extension verbs if extensions are /-H, -Ø/



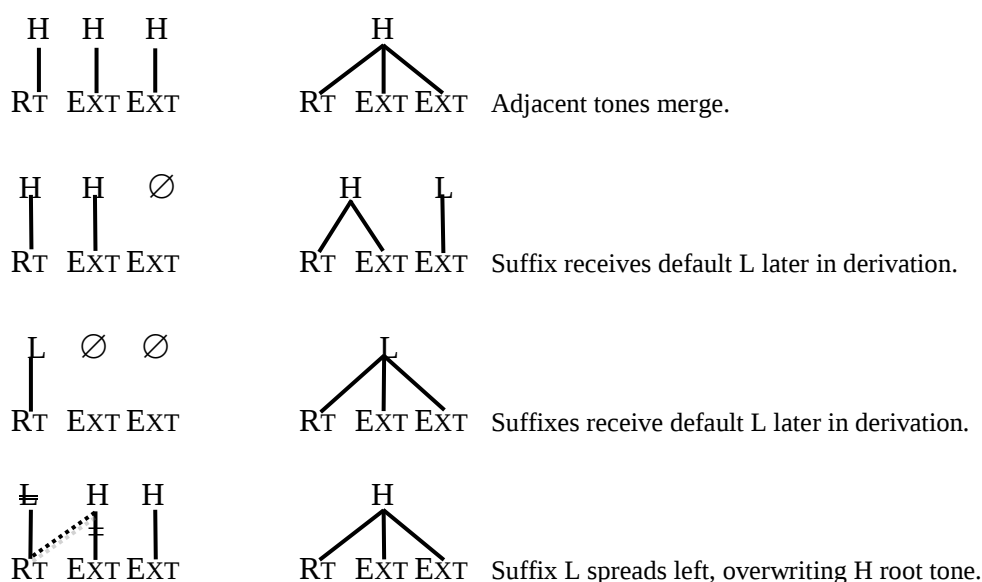
However, this hypothesis cannot explain how H roots can spawn L-L extension verbs, or how L roots can spawn H-L extension verbs (Figure 4).

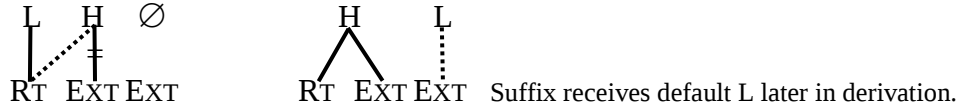
Figure 4: Single extension verbs unaccounted for by hypothesis 2



Turning to double extension stems, the 2nd hypothesis adequately accounts for the derivations of the following forms (Figure 5).

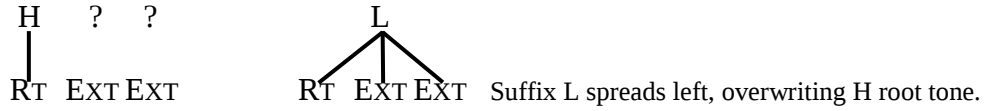
Figure 5: Tonal associations on double extension verbs if extensions are /-H, -Ø/





But this hypothesis fails to account for how H roots can spawn L-L-L extension verbs (Figure 6). This hypothesis is therefore rejected.

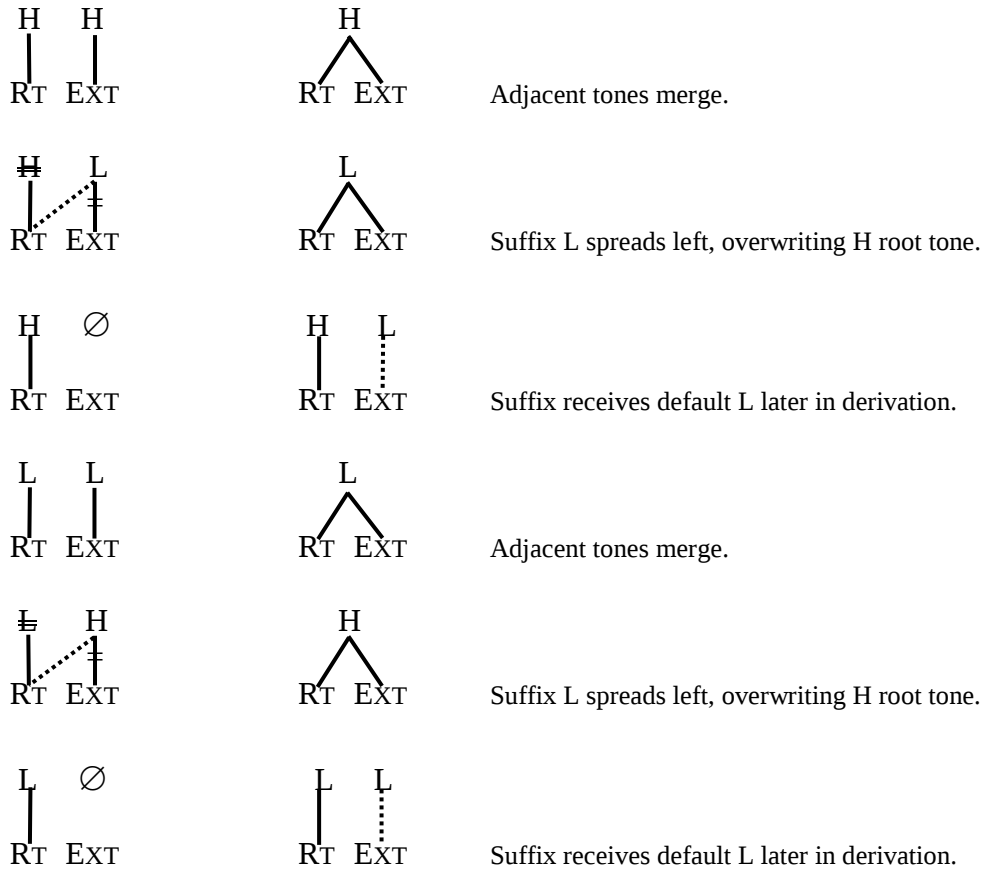
Figure 6: Double extension verb unaccounted for by hypothesis 2



6.3 Hypothesis 3: Extensions are /-H, -L, -Ø/

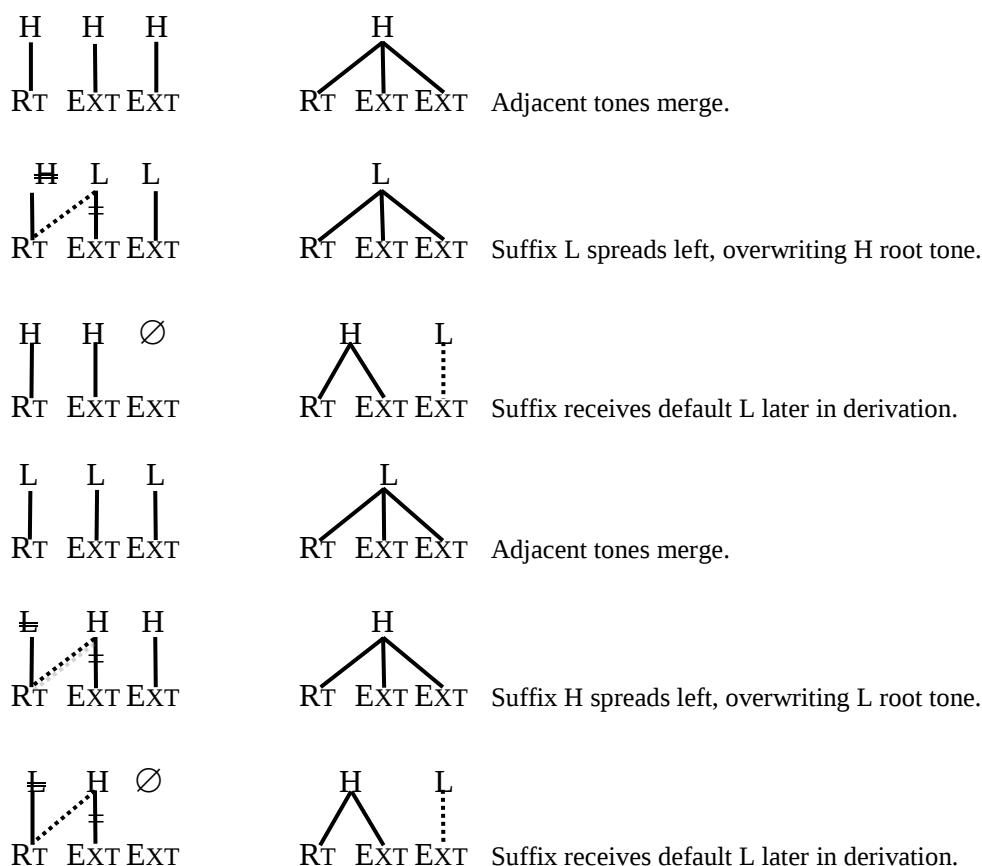
The third hypothesis is that the underived verb root tones /H, L/ are transformed into the corresponding extended verb stem tones by means of an underlying ternary contrast in the extensions /-H, -L, -Ø/ according to the following pattern on single extension verbs (Figure 7).

Figure 7: Tonal associations on single extension verbs if extension tones are /-H, -L, -Ø/



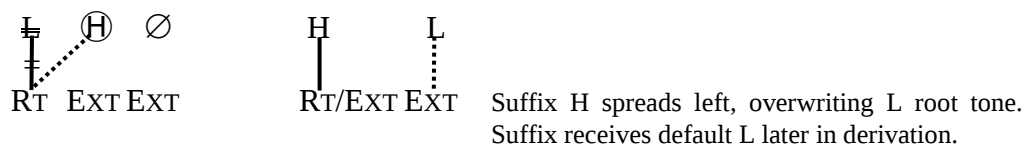
A similar analysis can be applied to double extension verbs (Figure 8).

Figure 8: Tonal associations on double extension verbs if extensions are /-H, -L, -Ø/



This analysis has two weaknesses. First, it does not account for 15 L underived verbs that transform into HL single extension verbs and which are unsemantically related. Could it be that these have a floating (H)tone – a phenomenon that is attested elsewhere in the language (Roberts under review) – between the root and the extension, which is the trace of an intermediate extension the segments of which have elided (Figure 9)?

Figure 9: Tonal associations on single /H-Ø/ extension verbs with L underived roots



Secondly, if a ternary contrast exists on the second extension, in principle it could also occur on the first (setting aside the extremely limited number of examples with three extensions). Yet none of the derivations in Figures 7 to 9 contains a toneless first extension, and since the Adjacency Requirement dictates that the second must be toneless, only six of the eighteen possible patterns are actually attested.

In spite of these drawbacks, the advantages of this hypothesis are fourfold: It explains how extended verb roots tone patterns are derived from those of underived verb roots. It also provides an integrated account of single and double extension verbs. The fact that L is the output in five of the twelve derivations helps explain why L tone verbs (377) are so much more frequent in the corpus than H verbs (190) and HL verbs (200). Finally, it fulfills the Adjacency Requirement. This hypothesis therefore fares best of the three examined.

7. Conclusion

This study has shown that Kabiye verbs benefit from being classified according to the place of articulation of the C₂ or C₃. Most [LABIAL] and [DORSAL] verbs are considered to be underived verbs many of which form the basic lexical stock. Most [CORONAL] verbs, on the other hand, are analyzed as having extensions, though many are fossilized. This is justified on five grounds: the tone patterns of functioning and fossilized suffixes exactly match; the V₂ of dimoraic forms and the V₂ and V₃ of trimoraic forms are predictable; the meanings are often complex; the HL pattern never occurs on underived roots; and the analysis of verb roots matches closely related Lama (Ulrich 1999: 117) and proto-Niger-Congo (Hyman 2016: 7).

To summarize the tonal morphology, underived verb imperatives have two surface tone patterns (H, L) each of which fan out into three surface tone patterns (H, L, HL) when one or two extensions are added. The extensions are analyzed as having one of three underlying tone patterns /-H, -L, -Ø/. The H and L suffix tones merge with identical root tones and overwrite dissimilar ones. As for the toneless suffix, it remains toneless so that the TAM suffix to its right can be adjacent on the tonal tier to the H root on its left and to surface as L by a rule of polarity. Following this, the toneless verbal extension receives a default L tone.

Some readers may find the tone analysis lacking because even the most convincing of the three hypotheses leaves an awkward set of outstanding items and because the tones of the various extensions are apparently not consistent. The latter point seems relatively easy to justify: Since a single extension can express more than one meaning, and a single meaning can be conveyed by more than one extension, why should it be surprising to find a single extension-plus-meaning articulated with more than one tone? The only other obvious alternative is that when verbs receive extensions the newly derived forms are assigned one of three new tone patterns (H, L, HØ) that simply overwrite the two existing tone patterns (H, L) of corresponding non-derived roots. Such a transformation may seem capricious but it retains a certain appeal given that the three hypotheses investigated all fall short of satisfactorily accounting for the data.

This leads us, in conclusion, to embrace an important principle. Given that the source of verbal extensions is often “obscure and ... buried deep in the history of the language”, to use Snider’s (2018) phrase, researchers should not necessarily expect to be able to neatly tie up all the loose ends. The best analyses will be realistic and not claim too much ground. They will examine all reasonable hypotheses, choose the one which best accounts for the most data, and readily acknowledging any shortcomings. Snider’s methodology provides an excellent framework for such an approach, in particular his twin recommendations to pay careful attention to frequency counts and to compare the outputs of identifiable complex stems with those that are suspect.

Abbreviations

	consonant
EXT	extension
H	high tone
IMP	imperative
IPA	imperfective past
L	low tone
M	mid tone
N	nasal
PER	perfective
RT	root
SP	subject pronoun
TAM	tense, aspect, mood

TBU	tone bearing unit
V	vowel

References

- Adouna, G. (2009) *Description phonologique et grammaticale du konkomba : langue gur du Togo et du Ghana – parler de Nawaré*. Thèse de doctorat, Université de Rennes et Université de Lomé, Rennes et Lomé.
- Anttila, A. and A. Bodomo (2001) "Tone and Morphology in Dagaare". Paper presented at the *Department of Linguistics seminar*, University of Hong Kong.
- Bakpa, M. (2014) *Etude du ngbem, parler gangam de Koumongou*. Berlin: Lit Verlag.
- Bio, J. A. (1993) *Esquisse grammaticale du yom*. Mémoire de maîtrise, Université du Bénin, Lomé.
- Blench, R. (2015) "Izoñ verbal extensions". *Studies in African Linguistics*. 44(2): 59-73.
- Bodomo, A. (1993) *The structure of Dagaare*. Stanford, CA: Center for the study of language and information.
- Boyd, R. (1989) "Adamawa-Ubangi". In J. Bendor-Samuel (ed.) *The Niger-Congo languages*, 178-216. Lanham: University Press of America.
- Cahill, M. (2000) "The phonology of Kɔnni verbs". *Cahiers voltaïques / Gur Papers*. 5: 31-38.
- Canu, G. (1976) *La langue mò:rē*. Paris: Société d'Études Linguistiques et Anthropologiques de France.
- Chantoux, A., A. Gontier and A. Prost (1968) *Grammaire gourmantché*. Dakar: Institut Fondamental d'Afrique Noire, Université de Dakar.
- CLNK (1999) *Tɔm kpou kabiyɛ-fransu (Dictionnaire kabiyè-français)*. Lomé: Ministère de l'Éducation Nationale et de la Recherche, Comité de Langue Nationale Kabiyè et SIL-Togo.
- Cox, M. (1998) *Description grammaticale du ncàm, langue gourma du Togo et du Ghana*. Thèse de doctorat, École Pratique des Hautes Études, Paris.
- Creissels, D. (forthcoming) "Morphology in Niger-Congo languages". In *The Oxford encyclopedia of morphology*. Oxford: Oxford University Press.
- Delord, J. (1976) *Le kabiyè*. Lomé: Institut national de la recherche scientifique.
- Doneux, J. L. (1975) "Hypothèse pour la comparative des langues atlantiques". *Africana Linguistica*. 6: 41-129.
- Eddyshaw, D. (2018) *A grammar of Agolle Kusaal*: Place and publisher unknown.
- Elders, S. (2007) "Complex verb morphology in Kulango (Gur) Dissimilarities with Bantu". *SOAS Working Papers in Linguistics*. 15: 187-200.
- Grossenbacher, J.-P. (1974) *Abrégé de grammaire bariba à l'usage de ceux qui enseignent la langue bariba*. Parakou: Coopération Suisse Technique, IPRAS Presses du Bourgou.
- Harro, G. (1988) "Les extensions verbales en yemba (bamiléké-dschang)". In D. Barreteau & R. Hedinger (eds), *Description systématique des langues nationales*, 239-269. Paris et Yaoundé: ORSTOM (Institut Français de Recherche Scientifique pour le Développement en Coopération) et l'Agence de Coopération Culturelle et Technique.
- Hedinger, R. (1990) "Verbal extensions in Akɔɔse, their form, meaning and valency changes". *Afrika und Übersee*. 75: 227-251.
- Horn, U. (1998) "A propos de la morphologie verbale du Baatonum". *Gur papers / Cahiers voltaïques*. 3: 55-62.
- Hyman, L. (2007) "Niger-Congo verb extensions: Overview and discussion". In D. Payne & J. Peña (eds), *Selected proceedings of the 37th Annual Conference on African Linguistics*, 149-163. Somerville, MA: Cascadilla Proceedings Project.
- Hyman, L. (2016) "On reconstructing tone in proto-Niger-Congo". Paper presented at the *2nd International Conference Towards Proto-Niger-Congo: Comparison and Reconstruction*, Paris, 1-3 September 2016.
- Hyman, L. (2018) "Common Bantoid verb extensions". In J. Watters (ed.) *East Benue-Congo: Nouns, pronouns and verbs*, 173-198: Language Science Press.
- Hyman, L. and K. J. Olawsky (2004) "Dagbani Verb Tonology". Place and publisher unknown.
- Kantchoa, L. (2005) *Description de la langue moba : Approche synchronique*. Thèse de doctorat, Université de Lomé, Lomé.
- Kassan, B. B. (1996) *Système verbal et énonciation en kabiyè*. Thèse de doctorat, Université de la Sorbonne Nouvelle, Paris III, Paris.
- Kleinewillinghöfer, U. (2000) "The verb in Kusuntu". *Cahiers voltaïques / Gur Papers*. 5: 95-101.
- Kropp Dakubu, M. (2005) *Dagaare grammar: Collected language notes no. 26*. Legon: Institute of African Studies.
- Lébikaza, K. z. (1999) *Grammaire kabiyè: une analyse systématique - phonologie, tonologie et morphosyntaxe*. Cologne: Rüdiger Köppe.
- Manessy, G. (1975) *Les langues oti-volta : classification généalogique d'un group de langues voltaïques (volume 15)*. Paris: SELAF.
- Manessy, G. (1996) "Structure morphologique des bases nominales et verbales en proto-sénoufo". *Cahiers voltaïques / Gur Papers*. 1: 3-23.
- Meeussen, A. E. (1967) "Bantu grammatical reconstructions". *Africana Linguistica*. 3: 79-121.

- Melick, C. (2012) *Tone in the Mbelime verb system*. Dallas, TX: SIL International. https://www.sil.org/system/files/rapdata/12/24/18/122418536905309022538246076268750821795/e_Book_47_Melick_ToneinMbelimeVerbSystem_FINAL.pdf (accessed 3 September 2018).
- Neukom, L. (1995) *Description grammaticale du naténi (Bénin): système verbal, classification nominale, phrases complexes, textes*. Arbeiten des Seminars für Allgemeine Sprachwissenschaft, 14. Zurich: University of Zurich.
- Neukom, L. (2004) *Esquisse grammaticale du mbèlimè, langue voltaïque du Bénin*. Arbeiten des Seminars für Allgemeine Sprachwissenschaft 18. Zürich: Universität Zürich.
- Nicole, J. (1983) *Morphologie du nominal et du verbal en nawdm (langue gur du Togo)*. Thèse de doctorat du 3e cycle, Institut de Linguistique et Phonétique Générales et Appliquées, Université de la Sorbonne nouvelle, Paris III, Paris.
- Odden, D. (1994) "Adjacency patterns in phonology". *Language*. 70(2): 289-330.
- Orwig, C. (1988) "Les extensions verbales en ngunu". In D. Barreteau & R. Hedinger (eds), *Description systématique des langues nationales*, 283-314. Paris et Yaoundé: ORSTOM (Institut Français de Recherche Scientifique pour le Développement en Coopération) et l'Agence de Coopération Culturelle et Technique.
- Paulian, C. (1998) "La dérivation verbale dans une langue bantu atypique : le cas du küküa". In R. Kabore & S. Platiel (eds), *Fait des langues : Les langues d'Afrique subsaharienne*, 377-390. Paris: Ophrys.
- Peter, U. (1990) *Description systématique du Waama. Volume 2 : Grammaire*. Thèse de doctorat, Université Paris Descartes (Paris V), Paris.
- Rietkerk, D. (2000) "Tone on Mbelime verbs". *Cahiers voltaïques / Gur Papers*. 5: 141-147.
- Roberts, D. (2002) *Les classes tonales du verbe en kabiye*. Mémoire de maîtrise, Institut de linguistique et phonétique générales et appliquées, Université de la Sorbonne nouvelle, Paris III, Paris.
- Roberts, D. (2016) "Word tone and tonal overwriting in Kabiye nouns". *Journal of African Languages and Linguistics*. 37(1): 131-160.
- Roberts, D. (under review) "Low tone spread, polarity and underspecification in the Kabiye verb phrase". *Studies in African Linguistics*.
- Sambiéni, K. (2005) *Une étude du système verbal du parler biali de Matéri*. Mémoire de maîtrise, Université d'Abomey-Calavi, Cotonou.
- Schadeberg, T. C. (2003) "Derivation". In D. Nurse & G. Philippson (eds), *The Bantu languages*, 71-89. London & New York: Routledge.
- Snider, K. (2018) *Tone analysis for field linguists*. Dallas TX: SIL International.
- Tchagbalé, Z. (1998) "Le verbe en tem". *Gur papers / Cahiers voltaïques*. 3: 129-142.
- Tchagbalé, Z. (2000) "L'infinitif tem, statut et structure". *Cahiers voltaïques / Gur Papers*. 5: 169-180.
- Ulrich, C. H. (1999) "Verb root structure in Lama". *Gur papers / Cahiers voltaïques*. 4: 111-124.
- Voeltz, E. (1977) *Proto Niger-Congo extensions*. PhD dissertation, University of California, Los Angeles, Los Angeles.
- Williamson, K. and R. Blench (2000) "Niger-Congo". In B. Heine & D. Nurse (eds), *African languages: an introduction*. Cambridge: Cambridge University Press.