

ARTICLE

# Exponence and the functional load of grammatical tone in Gyeli

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## Abstract

Grammatical tone (GT) can be the sole exponent or a co-exponent of grammatical meaning (Hyman 2012; Rolle 2018), but there has been little discussion of how they distribute within a single language. In this article, I explore the relationship between tonal and segmental materials in Gyeli (Bantu A801, Cameroon), adopting a property-driven approach to phonological typology (Plank 2001; Hyman 2009). Gyeli has eight GTs in simple predicates, which serve as sole exponents of tense, aspect, mood and polarity distinctions and object-marking. When GT is a co-exponent accompanied by segmental material, for example, in auxiliary constructions, the information that the tonal component contributes to the meaning is insufficient to distinguish between grammatical categories: its functional load is weak. The decrease in functional load is correlated with an increase in length of a segmental co-exponent. This can be explained by the tonal cophonologies of segmental morphemes and their different GT dominance types.

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## 1. Introduction

Tonemes and tonological processes are known to encode the full range of grammatical meaning known to language (Rolle 2018: 33), just like segmental morphemes. They are, however, inherently different from segmental morphemes in that they require a host to be realised. The dependence of tonemes on segmental hosts raises a number of questions that have just begun to be explored in the literature. How much information does the tonal as opposed to the segmental morpheme contribute to the meaning? Tonemes can also impinge on lexical tone in competition with grammatical tones. How does grammatical tone (GT) interact with lexical meanings of tone hosts? Investigating the place of GT within a phonological and grammatical system, interacting with segmental morphology and lexical properties of tone hosts, contributes to our understanding of the interface between (tonal) phonology, grammar and lexical meaning. I address these questions for the northwestern Bantu (A.801) language Gyeli from a perspective of property-driven typology (Plank 2001; Hyman 2009). This approach seeks to classify the distribution of individual properties, such as units, categories, construction types and rules, instead of classifying languages.

Gyeli [gyi] is an endangered Bantu language spoken by 4,000–5,000 ‘Pygmy’ hunter-gatherers in southern Cameroon, who call themselves Bagyeli. The data for this article stem from fieldwork that I conducted in Cameroon over a total of 19 months between 2010 and 2017. The most extensive description of the language is provided in Grimm’s (2021) reference grammar, which is accompanied by a digital collection of natural text and elicitation recordings in Grimm et al. (2020).<sup>1</sup> The transcription system I use in this article was developed with the speech community, and relies substantially on notational conventions typically used for Bantu languages.<sup>2</sup>

In many ways, Gyeli is a typical Bantu language. Bantu languages exhibit some of the most complex GT systems in Africa (Rolle 2018: 37). Although they usually ‘only’ distinguish two to three tonal levels, they are highly diverse with respect to tonological operations and their functions, especially in the verbal domain, for example, with a recognised role of tonal inflection or ‘melodic Hs’ (Odden & Bickmore 2014; Odden & Marlo 2018). Tone plays an important role in the encoding of tense/aspect/mood (TAM) and polarity categories in various positions of the verb.

While tonal phenomena have been studied by Africanists for a long time, a focus on the typology of GT – a type of non-concatenative morphology in which a morpheme

<sup>1</sup>The language documentation project of the Bagyeli/Bakola was generously funded by the Volkswagen Foundation DoBeS projects #87014 and #84353.

<sup>2</sup>Representational conventions which deviate from the IPA include the following: *dj* = /dʒ/, *n* = /ŋ/ before velar obstruents, *nj* = /ndʒ/, *ny* = /ɲ/, *y* = /j/, ‘ = /ʔ/.

is expressed in part by tonal changes and operations (e.g. tone addition, deletion, replacement, spreading, shifting, assimilation and dissimilation; Rolle 2018) – is a more recent development. Whereas GT is only licensed in specific grammatical constructions, tonal languages also have tonal operations that are predictable from the phonological rules of a language. I refer to this as phonological tone (PT), which in Gyeli is restricted to high-tone spreading (HTS). Both operate against the backdrop of lexical tone, the underlying tones that are lexically specified for words and morphemes.

When comparing tone across languages, typologies of tone systems can be established from different angles: by phonological contrast, the functions of tone, or the underlying rules (Hyman 2001). There has been little discussion, however, of how tonal and segmental morphemes interact and distribute as exponents of grammatical features within a single language and across languages. In the absence of any studies on this question, Rolle (2018: 267) speculates that '[i]t is a straightforward and intuitive prediction that those languages with a high lexical role for tone would have less GT, and vice versa, but this hypothesis is yet to be tested'. Contrary to Rolle's (2018) prediction, Gyeli does have a high lexical role for tone in nouns, verbs and the majority of functional word classes while also having an important role for GT, which encodes diverse categories such as TAM and polarity.

In this article, I propose a different explanation and relate the amount of information GT contributes to grammatical meaning in Gyeli to the complexity of its exponence type (GT sole exponent, GT co-exponent with suprasegmental, segmental affix or auxiliary co-exponents). Following Miestamo (2006), Dahl (2004) and McWhorter (2001), I define complexity in information-theoretic terms, as a function of the length of the form encoding some category of information. In Gyeli, length can be seen on a scale from minimal, suprasegmental length such as tone (pitch) and lengthened vowels (duration) to segmental bound morphemes and finally free morphemes resulting in complex constructions such as complex predicates.<sup>3</sup> Segmental morphemes are often accompanied by tonal co-exponents, which add to the form length.

One factor that has been shown to increase complexity is violating transparency, that is, the clarity of the relation between meaning and form (Kusters 2003). A one-meaning-one-form relation is 'clear' on the transparency scale, whereas one-meaning-several-forms mappings are considered 'opaque'. 'Several forms' in this context refers to co-exponents, where information contributing to the meaning is distributed across co-exponents. The term *functional load* describes how much information a (co-)exponent contributes to the meaning. While providing precise measurements of how to calculate the functional load is beyond the scope of this article, it is intuitively clear that there are differences. Thus, in sole exponents, the form carries 100% of the information and is said to carry a high functional load. In co-exponents, information that contributes to the meaning is distributed over various signals, for example, a segmental affix and a tonal component. The important insight is that information is

<sup>3</sup>The distinction between bound and free morphemes does not relate to independence from other word forms, as suggested by one reviewer, but rather has to do with segmental length: bound morphemes in Gyeli are shorter in number of phonemes and number of syllables than free morphemes which serve as co-exponents of GTs.

often not equally distributed over co-exponents, but that more complex, segmental exponents usually carry the higher functional load. In turn, the relation between a tonal co-exponent and its meaning is more opaque and its functional load weak.

The decrease in functional load of GT correlates with an increase in length of a segmental co-exponent. GT sole exponents constitute the basic system used in Gyeli simple predicates to distinguish TAM categories and object-marking. In these cases, the one-to-one mapping of form to meaning is transparent, and GT has a high functional load, since tone alone carries the information to distinguish between categories. With an increase in complexity through addition of segmental material, the functional load of GT co-exponents becomes weaker and its meaning contribution more opaque. The reason for this is that the cue for the encoded grammatical category comes primarily from the segmental morpheme, whereas the GT co-exponent often takes an arbitrary pattern that deviates from the pattern of GT as sole exponent.

Tone impacts not only meaning contrasts across grammatical categories, but also lexical meaning. I offer an explanation for the interaction between GT and lexical tones couched in a dominance framework (Kiparsky & Halle 1977; Inkelas 1998; Rolle 2018), showing that GT is dominant and overwrites lexical tone in contexts of competition. The effect of sacrificing lexical tone is that the templatic structure of GT as sole exponent is maintained. With GT as co-exponent accompanying a segmental morpheme, however, no templatic structure is maintained. Instead, the surface tune is merely the result of idiosyncratic tonal cophonologies (Inkelas & Zoll 2007; Sande *et al.* 2020).

This article is structured as follows: In §2, I present the basic tonal patterns of nouns and verbs across inflectional paradigms. §3 shows the distribution of Gyeli GTs as sole and co-exponents of functional categories. In §4, I investigate the interaction between GT and lexical tones, including dominance effects and cophonological properties. §5 concludes the article with an outlook on Gyeli's place within the broader Bantu context.

## 2. Tonal surface patterns in Gyeli

In investigating GT systems, it is crucial to account for the overall grammatical system which GT operates in and is constrained by. Structurally, Gyeli is a head-initial language with an SVO(X) basic word order. The gender system features nine agreement classes that form six genders. Whereas Bantu languages are known for their overt marking of agreement class affiliation through noun prefixes, about 40% of Gyeli nouns do not take such prefixes (Grimm 2021: 297). Both noun and verb stems are restricted to a three-syllable limit. This constrains the possibilities for multiple verb extensions, such as causative, applicative or reciprocal, that are typical of eastern and southern Bantu languages.

Phonologically, Gyeli distinguishes level tones (H and L), contour tones (HL and LH) and toneless ( $\emptyset$ ) tone-bearing units (TBUs). Valued TBUs are lexically specified for H, L, HL or LH, whereas unvalued TBUs are underlyingly toneless (§3.1.1). I will first show that the syllable is the TBU in §2.1. I then outline the patterns of surface tones in nouns (§2.2) and verbs (§2.3).

## 2.1 The syllable is the TBU

Rising and falling tones are often analysed as sequences of level tones in Bantu, but they are true contour tones in Gyeli, as I analyse the syllable as the TBU (instead of the segment or mora). The language has light and heavy syllables, contrasted in the pairs in (1).<sup>4</sup> Light syllables have one mora; heavy syllables have two moras and contain either a long vowel, as in (1), or a diphthong. Both light and heavy syllables can host contour tones.

- (1) a. tsi ‘interdiction’  
       tsii ‘live, be well’  
       b. jǐ ‘bench’  
       jii ‘forest’  
       c. fū ‘fish’  
       fúú ‘rainy season’

The examples in (1) contribute some arguments in favour of an analysis with the syllable as TBU and true contour tones. First, if the TBU were the mora, short vowels would not be expected to allow contour tones. On the other hand, if the presence of contours on short vowels were accommodated by allowing individual morae to bear two tones, one would then expect bimoraic syllables to allow two contours, as in \*[fũũ]. These complex tone sequences, however, do not occur.<sup>5</sup> Evidence for the syllable as TBU comes from how grammatical H tones attach to verb forms with lexical long vowels. H attachment to a long L-toned verb such as *lèè* ‘uproot’ yields [léé], targeting the entire syllable, and not the mora, which would result in \*[lèé]. In contrast, in longer verbs, the H does not spread to the initial syllable, as *gyàga* ‘buy’ yields [gyàgá]. Thus, the all-H form in the long monosyllabic L verb *lèè* ‘uproot’ does not result from unbounded H spreading (nor systematic replacive H).

## 2.2 Tonal patterns in nouns

In this section, I will present the tonal patterns for nouns, noun prefixes and attributive constructions, which illustrate underlying tones and tonal operations in nouns. Gyeli nouns consist of a nominal stem and a noun class prefix, which in some agreement classes can be a Ø-prefix. Noun stems are fully specified for lexical tones, including both level and contour tones, as shown with the minimal pairs in (2) for prefixless nouns.

(2)	Level tones	Contour tones
	sínǵí ‘squirrel’	bâ ‘pit, stone’
	sǐnǵi ‘spirit’	bǎ ‘word’
	sínǵi ‘cat’	

<sup>4</sup>Only vowels serve as syllabic nuclei in Gyeli, whereas nasals are not syllabic and thus do not serve as TBUs, although nasal prefixes in many other Bantu languages are syllabic and host tones (Hyman 2003).

<sup>5</sup>The data in (1) are also consistent with a level sequence analysis if the TBU were the mora: a HL sequence assigned to a monomoraic word *fu* would be [fũ], and assigned to a bimoraic monosyllabic word *fuu* would be [fũũ]. The absence of complex tone sequences can be attributed to a ban on such sequences.

**Table 1.** *Distribution of level tones in noun stems.*

Tonal pattern	Frequency		Example	
$\sigma$	(119/224)	53.1%		
L	57	47.9%	ndè	‘bait’
H	62	52.1%	nká	‘line, row’
$\sigma\sigma$	(518/555)	93.3%		
L L	115	22.2%	ntòngè	‘hornet, wasp’
H H	148	28.6%	njímí	‘blind person’
L H	106	20.5%	vínó	‘finger’
H L	150	29.0%	djínò	‘name’
$\sigma\sigma\sigma$	(86/90)	95.6%		
L L L	26	29.1%	bèngvùdè	‘golden angwantibo’
H H H	14	17.4%	títímó	‘middle’
L H H	6	7.0%	ndzimózó	‘guard’
H L L	13	15.1%	mpí’idi	‘heat (from fire)’
L H L	10	11.6%	sisimù	‘shadow (of person)’
H L H	3	3.5%	nkúmbòlól	‘diarrhea’
L L H	5	5.8%	mìntùlí	‘mouse’
H H L	9	10.5%	dyúngúlè	‘chameleon’

Noun stems are mono-, di- or trisyllabic, with a preference for disyllabic stems (Grimm 2021: 92). Most of the 875 nominal lexemes in my database are specified exclusively for level tones, as shown in Table 1: 93.3% of disyllabic and 95.6% of trisyllabic noun stems have only level tones. All possible combinations of level tones are attested for every syllable count.

Contour tones are most frequent in monosyllabic stems, but are also found in di- and trisyllabic noun stems, where they can occur in any position except for the medial syllable of a trisyllabic stem, as shown in Table 2. LH is more restricted than HL. Comparing monosyllabic noun stems, the ratio of LH to HL is 20% to 80%.<sup>6</sup>

Noun prefixes consist of either a consonant (*N-*, *d-*, *j-*, *b-*, *bw-*) or a CV sequence (*ba-*, *mi-*, *le-*, *ma-*, *be-*; Grimm 2021: 296). Only the CV prefixes constitute TBUs. They surface as phonetically L when the noun occurs in isolation and there is no grammatical H tone, but I consider them to be phonologically toneless, as argued below. CV noun prefixes take a H tone in N + N attributive constructions, if the preceding attributive marker has a H tone, as shown in (3a).<sup>7</sup> Attributive markers are lexically specified for a H in agreement classes 2–8. In agreement classes 1 and 9, however, they are specified L, as in (3b). In these cases, the following noun prefix

<sup>6</sup>The numbers are based on a database of 875 nouns, 224 of which are monosyllabic. Of these 224 monosyllabic nouns stems, 105 have a contour tone.

<sup>7</sup>Another environment where a CV noun prefix hosts a H tone is with the ‘object-linking GT8’ (see §3.1.3).

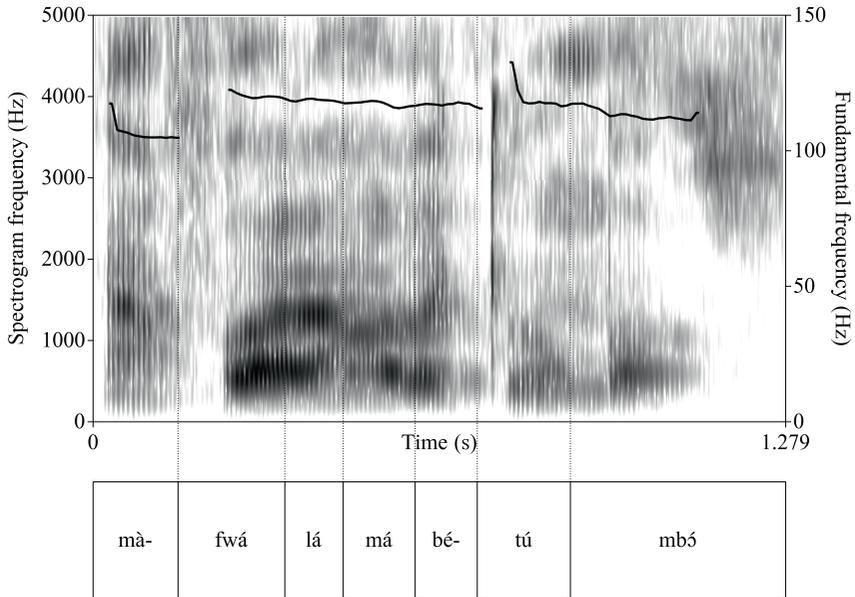
**Table 2.** Distribution of contour tones in noun stems.

Tonal pattern	Frequency		Example		
$\sigma$	(105/224)	46.9%			
HL	82	78.1%	sâ		‘thing’
LH	23	21.9%	mbwě		‘dog’
$\sigma\sigma$	(36/555)	6.5%			
Contour Level	12	33.3%			
HLH	4	33.3%	kândá		‘proverb’
HLL	6	50%	nkângà		‘weaver bird’
LHH	1	8.3%	ná-nkyàálé		‘termite mound’
LHL	1	8.3%	pùúli		‘hat’
Contour Contour	5	13.9%			
HLHL	4	80%	piipi		‘butterfly’
LHLH	1	20%	bùábùá		‘non-dry meat/fish’
Level Contour	19	52.8%			
L HL	13	68.4%	mèvâ		‘pride’
H HL	6	31.6%	nkándá		‘crack’
$\sigma\sigma\sigma$	(4/90)	4.4%			
Contour Level Level	1	25%			
HLH L	1	25%	tʃièsámè		‘circumcision’
Level Level Contour	3	75%			
H H HL	1	25%	le-yímbálí		‘entrance’
L H HL	1	25%	le-dèlé móò		‘mud wasp’
H L HL	1	25%	mwádèkâ		‘other side’

is L, too. If the noun prefix of the second constituent is not a TBU, no tonal changes occur on the possessor noun (3c).<sup>8</sup>

- (3) a. bà-só      **bá**    **bá-tí**  
           ba-só      bá    ba-tí  
           ba2-friend 2:ATT ba2-in.law  
           ‘the friends of the in-laws’

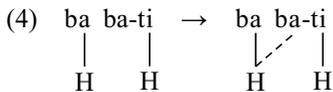
<sup>8</sup>The following abbreviations are used in this article: 1–9: agreement class 1–9; ∅: ∅ noun class; 1PL: first person plural; 2PL: second person plural; 1SG: first person singular; 2SG: second person singular; ADV: adverb; ANA: anaphoric marker; ATT: attributive marker; ba: *ba* noun class; be: *be* noun class; COM: comitative marker; COMP: complementiser; CONJ: conjunction; CONTR: contrastive marker; COP: copula; DEM: demonstrative; DIST: distal; F: phrase-final; FUT: future; GT: grammatical tone; H: high tone; HL: falling contour tone; HTS: high-tone spreading; IAV: immediate-after-verb; ID: identificational marker; IDEO: ideophone; IMP: imperative; INCH: inchoative; L: low tone; le: *le* noun class; LOC: locative; M: phrase-medial; ma: *ma* noun class; mi: *mi* noun class; N: noun; NEG: negation; NP: noun phrase; NPI: negative polarity item; OBJ: object; OBJ.LINK: object linking H tone; PL: verbal plural marker; pl.: plural; PN: proper name; POSS: possessor pronoun; PREP: preposition; PRO: pronoun; PROG: progressive; PROSP: prospective; PROX: proximal; PRS: present; PST: past (not specified for recent or remote past); PST1: recent past; PST2: remote past; PT: phonological tone; Q: question marker; R: realis mood; REL: relative clause; SBJV: subjunctive; SE: Sole exponent; SEQU: sequential marker; sg.: singular; STAMP: subject-tense-aspect-mood-polarity clitic; SUB: subordinate; TM: tense-mood; v: verb; VOC: vocative.



**Figure 1.** Pitch in HTS within the nominal domain

- b. só            wà    bà-tí  
 só            wà    ba-tí  
 Ø1.friend 1:ATT ba2-in.law  
 ‘the friend of the in-laws’
- c. bà-só        bá    m-ùdì  
 ba-só        bá    m-ùdì  
 ba2-friend 2:ATT N1-person  
 ‘the friends of the person’

The autosegmental representation of (3b) is given in (4).



Under the alternative where the noun prefix was specified L, one would either need to assume more complicated rules of featural change or L deletion, or expect to see downstep effects on a H stem. Unlike other languages of the area, however, Gyeli does not have downstep. The phrase in (5) will surface as all H except for the initial noun class prefix, as shown in Figure 1.<sup>9</sup>

- (5) ma-fwá lá má    be-túmbó  
 ma6.end 6:ATT be8-country  
 ‘borders’

<sup>9</sup>Many thanks to Florian Lionnet and Joyce McDonough for helping out with the Praat picture.

Tone attachment and spreading apply in different directions in nouns (as illustrated in (4)) and verbs (as shown in (11)). CV noun prefixes and the plural marker *nga* (§3.1) receive their tone specification from the left. In contrast, verb stems, vocative markers, demonstratives and adverbs receive GTs from the right (§3).

### 2.3 Tonal patterns in the VP

Hosts of GT in the VP in Gyeli include the verb stem and its preceding ‘STAMP’ clitic, which encodes combinations of subject agreement, tense, aspect, mood and polarity. The surface tones are determined by different TAM and polarity categories and the verb’s position as phrase-final or phrase-medial. In the following, I will outline the tonal patterns in simple and complex predicates.

Like nouns, verb stems are no longer than three syllables. Tonal lexical contrasts are only found in the stem-initial position, that is, the verb root, whereas the other syllables are the locus of GT distinctions.<sup>10</sup> In (6), the trisyllabic verbs are lexically specified for either L or H on the root (i.e. the stem-initial syllable), whereas tones on non-initial verb syllables are conditioned by specific tense-aspect-mood categories, instead of being predictable from the lexical tone of the first syllable.<sup>11</sup>

(6)	TAM	L tone verb <i>pàgàlā</i> ‘grow together’	H tone verb <i>págàlā</i> ‘dig together’
	non-finite	pàgàlā	págàlā
	finite PAST 1	pàgálá	págálá
	finite IMPERATIVE	pàgálá	págálá

The combinations of tonal patterns on the STAMP clitic and the verb instantiate seven TAM categories in simple predicates: present, inchoative, past 1 (recent), past 2 (remote), imperative and subjunctive. Tones on the verb are further subject to change in certain TAM categories, depending on whether the finite verb occurs phrase-finally or phrase-medially. Table 3 shows that, in the present and inchoative, the non-initial syllables of the verb are L in phrase-final position, indicated by the subscript F appended to the TAM category.<sup>12</sup> In contrast, they surface as H in phrase-medial position (marked by a subscript M). All other TAM categories only have one line, since their phrase-medial and phrase-final tone patterns are identical. I relate the different phrase-final and phrase-medial patterns to a realis/irrealis distinction, as discussed in §3.1.2.

<sup>10</sup>The term *root* (or *radical*) in Bantu studies refers to the stem-initial syllable, often of a CV(N)C shape in Proto-Bantu (Meeussen 1967). The root, together with any following material such as possible verb extensions and the final vowel, constitutes the ‘stem’. It has been observed that root tones and extension tones behave differently. Meeussen (1967) reconstructs most extension suffixes as L, whereas roots usually contrast H and L (Marlo & Odden 2019: 160).

<sup>11</sup>I mark the citation form of the verb in its underlying phonological form with toneless non-initial syllables. Arguments for toneless syllables are presented in §3.1.1

<sup>12</sup>The rightmost column of Table 3 (‘STAMP V’) uses the following notation: first tone = STAMP tone, X = initial syllable of verb, last tone = tonal suffix on verb. The lexical meanings of the verbs are as follows: *bà* ‘smoke sth.’, *bá* ‘marry’, *gyibɔ* ‘sharpen’, *gyibɔ* ‘call’, *pàgàlā* ‘grow together’, *págàlā* ‘dig together’.

**Table 3.** Tense–mood forms with L- and H-toned verb roots.

TAM	STAMP	$\sigma$		$\sigma\sigma$		$\sigma\sigma\sigma$		STAMP V	
		L	H	L	H	L	H		
	1PL	<i>bà</i>	<i>bá</i>	<i>gyìbɔ</i>	<i>gyíbɔ</i>	<i>pàgàlɑ</i>	<i>págálɑ</i>		
PRSF	yá	bà	bâ	gyìbò	gyíbò	pàgàlà	págàlà	H	XL
PRSM	yá	bá	bá	gyìbó	gyíbó	pàgálá	págálá	H	XH
INCHF	yàá	bà	bâ	gyìbò	gyíbò	pàgàlà	págàlà	LH	XL
INCHM	yàá	bá	bá	gyìbó	gyíbó	pàgálá	págálá	LH	XH
PST1F,M	yà	bá	bá	gyìbó	gyíbó	pàgálá	págálá	L	XH
PST2F,M	yàà	bá	bá	gyìbó	gyíbó	pàgálá	págálá	L	XH
FUTF,M	yàá	bà	bâ	gyìbò	gyíbò	pàgàlà	págàlà	H	XL
IMPF,M	(yá)	bâ	bâ	gyìbò	gyíbò	pàgálá	págálá	(H)	XHL
SBJVF,M	yá	bàá	bàá	gyìbòò	gyíbòò	pàgáláá	págáláá	H	XH.L

Tone is the only inflection marking on finite verbs and the only morphological difference between finite and non-finite verb forms. Finite verbs are tonally marked for the various TAM categories, for example, HL for imperative, or with the phrase-medial H (i.e. realis/irrealis). In contrast, non-finite forms are unmarked, and only carry the underlying tone of the verb on the initial syllable, with a default L surfacing on the underlyingly toneless non-initial syllables. Non-finite verb forms occur in complex predicate constructions with auxiliaries and modal verbs. They surface with final L tones, even in tense-mood categories that require the medial H tone (present, inchoative). As illustrated in (7), the H tone is realised on the finite modal verb in complex predicates, and the lexical verb is non-finite.<sup>13</sup>

- (7) a. mé gyàgá/jíwó mántúà  
 mɛ-H gyàgɑ-H/jíwɔ-H H ma-ntúà  
 1SG-PRS buy-R/steal-R OBJ.LINK ma6-mango  
 ‘I buy/steal mangoes.’
- b. mé wúmbé gyàgá/jíwò mántúà  
 mɛ-H wúmbɛ-H gyàgɑ/jíwɔ H ma-ntúà  
 1SG-PRS want-R buy/steal OBJ.LINK ma6-mango  
 ‘I want to buy/steal mangoes.’

### 3. Exponence types of GT in Gyeli

I use [Rolle’s \(2018\)](#) framework and terminology in analysing Gyeli GTs. The general idea for GT is that a specific grammatical context licences a specific tonal pattern on certain morphemes. The terms used are defined in (8).

<sup>13</sup>The object linking H tone realised on the nominal object prefix is discussed in §3.1.3.

## (8) Terminological definitions

- a. GRAMMATICAL TUNE: the unique tone sequence (or set of tone sequences) which covaries with the GT construction
- b. TRIGGER: the morpheme or construction which licenses the tonological operation
- c. HOST: the morpheme or morphemes on which the grammatical tune appears
- d. VALUATION WINDOW: the portion of the target-host which is evaluated with respect to whether its TBUs are valued or unvalued

In this section, I show that GT sole exponents in Gyeli have a high functional load, as defined in §1, and constitute the basic system for distinguishing TAM categories in simple predicates. The functional load of GT gradually weakens, however, with increasing complexity of a co-exponent, as shown in (9), where the top part represents the complexity of (co-)exponents on a scale from minimally to maximally segmental. The scale correlates with the tonal exponence type shown in the bottom part, following Hyman's (2012) 'three ways in which tone can be an exponent of a morpheme or morphological process' – or grammatical feature: tone as sole exponent, systematic co-exponent or arbitrary co-exponent.

- (9)  $\emptyset$  — lengthened vowel — segmental affix — auxiliary  
**minimally (supra-)segmental** **highly segmental**
- 
- high functional load of GT** **weak functional load of GT**  
 GT sole exponent — systematic co-exponent — arbitrary co-exponent

For example, present negation (§3.2.2) is expressed by a H that attaches to the verb root and a verbal suffix *-le*. If the tonal co-exponent were excluded, the negated clause would sound wrong to native speakers, but they would still understand the meaning. If, however, the negation suffix were excluded, the resulting form would not be distinct enough from other existing forms with other GTs, and the meaning of negation would be lost. Thus, the tonal co-exponent plays only a small – and by itself insufficient – role in distinguishing between grammatical categories, making this distinction opaque. In the following, I discuss each GT exponent type, elaborating on the data introduction given in §2.

### 3.1 GT as sole exponent

Gyeli has eight GT patterns where tone is the sole exponent of a grammatical category. They all occur in the VP, as illustrated in the second line in (10) with three GT patterns (GT1, GT7 and GT8), which will be described below.

- (10) mé gyágá bэфùmbí  
 [mε-H gyága]<sub>GT1</sub> [-H]<sub>GT7</sub> [H]<sub>GT8</sub> be-fùmbí  
 1SG-PRS buy-R OBJ.LINK be8-orange  
 'I buy oranges.'

**Table 4.** *GTs encoding tense in basic predicates (phrase-final).*

		STAMP tone	Verb tone	Basic distinction	Example		
GT1	PRS	-H			yá	kwále	‘we like’
GT2	INCH	-LH	∅	NON-PAST	yáá	kwále	‘we start to like’
GT3	FUT	-HL/∅			yáá/mæe	kwále	‘we/I will like’
GT4	PST1	∅			ya	kwále	‘we liked (recently)’
GT5	PST2	-HL	-H	PST	yáá	kwále	‘we liked (long ago)’
GT6a	IMP	(-H)	-HL	tenseless	(yá)	kwálê	‘let’s like!’
GT6b	SBJV	-H			yá	kwálêê	‘may we like’

Six GTs serve as tense encoding; they consist of tonal combinations on the STAMP clitic and the verb (§3.1.1). A floating H that attaches in phrase-medial position to the right of the verb in certain TAM categories correlates with realis marking (§3.1.2). Finally, another floating H surfaces on a toneless element immediately following the verb and marks the verb–object construction. I call this GT the ‘object-linking H tone’ (§3.1.3). In the following, I present more details on each GT, including information about tonal operations and possible alternative analyses.

### 3.1.1 Tense marking GTs

In Gyeli, tone is the (near) sole exponent to distinguish seven tense-mood categories, as shown in Table 4.<sup>14</sup> GT is assigned to the preverbal STAMP clitic and the non-initial verb stem syllables through attachment of floating tones to the right of both hosts (or, in the case of surface L, lack thereof). In verb stems that have three syllables, this also includes the phonological operation of HTS to the left onto the second stem syllable. A crucial point of this analysis is that I view both hosts – the STAMP clitic and non-initial verb syllables – as underlyingly toneless, as I will explain below. The combinations of tone patterns on the STAMP clitic and the verb stem for different syllable lengths are given in Table 3, distinguishing verb tones in phrase-final and phrase-medial position.

I argue that Gyeli has unvalued TBUs, which surface as L phonetically or receive their tonal specification from their grammatical environment. These include i) noun prefixes of a CV shape (e.g. *ba-kùsì* ‘parrots’, *le-nángá* ‘star’), as described in §2.2; ii) the preverbal clitic STAMP, which encodes subject agreement, tense, aspect, mood and polarity; iii) the present negation suffix *-le*; iv) the postverbal plural marker *nga*; and most importantly for GT in the VP, v) non-initial syllables of the verb stem (e.g. *bìyɔ* ‘hit’, *lúmele* ‘send’). With only a few functional morphemes that are tonally unvalued, Gyeli has a relatively high TONAL DENSITY (Gussenhoven 2004; Hyman 2009): the

<sup>14</sup>GT6b in Table 4 has a suprasegmental co-exponent in form of a lengthened verb-final vowel. Thus, this form belongs to the exponence category to be discussed in §3.2.1, but I include it here for the sake of presenting a complete paradigm.

**Table 5.** *Distribution of underlying tones in verb stems.*

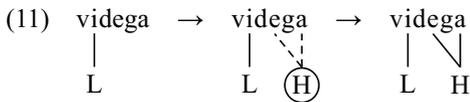
Tonal pattern	Frequency		Example	
$\sigma$	(88)			
L	39	44.3%	<i>kè</i>	‘go’
H [HL]	49	55.7%	<i>nyê</i>	‘see’
$\sigma\sigma$	(213)			
L $\emptyset$	92	45.2%	<i>sènge</i>	‘lower’
H $\emptyset$	121	56.8%	<i>gyibo</i>	‘call’
$\sigma\sigma\sigma$	(76)			
L $\emptyset$ $\emptyset$	26	34.2%	<i>kàsele</i>	‘light’
H $\emptyset$ $\emptyset$	50	65.8%	<i>djimese</i>	‘extinguish’

proportion of valued TBUs, that is, those that are underlyingly H, L, HL or LH, is high compared to unvalued ( $\emptyset$ ) TBUs. This is true for all lexical and functional parts of speech, such as nouns, adjectives, ideophones, adverbs, pronouns, demonstratives and adpositions, with the notable exception of verbs. As shown in Table 5, only stem-initial syllables are valued with lexical tones (as also shown in §2.3), amounting to 377 valued TBUs, whereas 365 TBUs of non-initial syllables are unvalued. Thus, verb stems exhibit a medium level of tonal density, while most verbal clitics (the STAMP marker) and verbal affixes (plural suffix, present negation suffix and all verb extension suffixes such as causative, applicative, passive or reciprocal) are unvalued.<sup>15</sup>

Non-initial verb syllables are best viewed as underlyingly toneless instead of L-toned. While there is ultimately no knockdown evidence for this analysis, I use the criterion of simplicity to justify my choice of treating non-initial verb syllables as toneless. Distributional asymmetry is one line of evidence for underspecification, although it is not sufficient by itself (Marlo & Odden 2019: 152). There is a clear asymmetry in Gyeli between noun stems, which allow nearly all possible tonal combinations (Table 1) as well as contour tones (Table 2), and verb stems, which allow lexical tonal contrasts only on their initial syllables (Table 5). Phonologically toneless TBUs, such as noun prefixes and non-initial verb syllables, predictably surface as L phonetically unless they receive another tone from some other source.

Another argument for proposing a ternary distinction between H, L, and  $\emptyset$  TBUs is that it is consistent with what is found in other languages in the area. For instance, Marlo & Odden (2019: 152) distinguish verb-stem-initial L from subsequent  $\emptyset$  in the closely related language Mokpwe (A22). The evidence they put forth is behaviour under HTS. In Mokpwe, word-final ‘melodic’ H tones spread to the left, up to but not including the root (stem-initial) syllable, just like in Gyeli. The best explanation for this limit on the spread is in both cases to posit roots that are specified L or H, while intervening TBUs are toneless. This is exemplified with H attachment in (11) for the trisyllabic Gyeli verb *videga* ‘turn’ (Grimm 2021: 110); in disyllabic stems, the H only attaches to the second TBU.

<sup>15</sup>Monosyllabic H verb stems are subject to a tone lowering rule, and so I represent them as [HL] in Table 5. This, however, is part of the phonological system and not part of the GT system.



Verbs with a H root maintain this H tone under H attachment so that the entire stem surfaces H, assuming that Obligatory Contour Principle (OCP) violations are silently resolved by tone fusion.

There are two alternative ways to analyse underlying non-initial verb tones in Gyeli, assuming in both that all syllables in verbs are valued, which I argue against. In the first alternative, all non-initial verb TBUs are specified with L tones. These are delinked and replaced under H attachment. Attached H tones spread to the left, with a phonological restriction against spreading to initial syllables. This, however, can be ruled out, since monosyllabic verbs show that root tones can be targeted: *kè* ‘go’ becomes *ké*. Another possibility in favour of underlying L tones could be that grammatical H tones do not target the right edge of the verb but second syllables, spreading rightwards instead. In this scenario, the (possible) non-initial L tones are delinked and replaced. Indeed, it is common in Bantu languages for GTs to target specific positions in the verb stem, such as the second mora or the penultimate syllable.<sup>16</sup> Positing second-syllable targets with rightwards spread, however, makes it harder to explain tonal changes on monosyllabic verbs.

A second hypothesis is that non-initial syllables receive their specification through tone spreading from the root syllable, that is, verbs with an initial H are specified all H and initial L verbs are specified all L. In this scenario, in L-toned verbs, H spreads leftwards and delinks all but the initial association of the L tone, maintaining the lexical contrast of the root.<sup>17</sup> This view, however, does not easily account for the tonal patterns found in simple predicates, failing to explain how all verbs, irrespective of their underlying specification with H or L, end up with the same tone patterns in different TAM categories. To make this alternative work, one would need to assume more rules than are necessary under my analysis. First, there is a need to explain how L-toned verbs surface as H in phrase-medial position and only in certain TAM categories, requiring the attachment of a H. In turn, one also needs to explain how H-toned verbs surface with L on non-initial syllables in phrase-final position, but again not in all TAM categories. This would require the attachment of a L, possibly a boundary L% tone, which I argue against in §3.1.2.

As for the STAMP clitic, it is difficult, if not impossible, to prove the underlying tone of this marker since it cannot appear outside of a grammatical context which serves as

<sup>16</sup>The choice of which TBU receives an (H) tone is part of the GT expression of inflectional categories and not necessarily dependent on being lexically unspecified. Furthermore, the case of Gyeli monosyllabic verbs proves that lexically specified tones are not generally exempt from tonal overwrite.

<sup>17</sup>This view has two advantages. First, possible OCP violation under H attachment is not an issue, since the verb is already entirely specified as H. The floating H simply does not attach and is left unrealised (or deleted). Second, it seems to offer a neat explanation for the tonal patterns found in present negation (Table 8), where H-toned verbs are realised as all H (*gyibó* ‘call’ → *gyibó-lé*) and L-toned verbs surface with H stem-initially, while second and third syllables are L (*vidègà* ‘turn’ → *vidègà-lè*). The only GT present is a H floating prefix, which is part of a circumfix /H-...-le/. The H and L on non-initial syllables are just the lexical tone spread from the initial syllable, before linking of the floating H prefix. The toneless suffix *-le* gets its tonal specification from the immediately preceding syllable (and not from the underlying tone of the verb, as clearly shown by the case of monosyllabic L-toned stems, which surface as H under negation with a H negation suffix).

trigger for a specific GT. In parallel to non-initial verb syllables, I view STAMP clitics as underlyingly toneless, with the segmental part contributing person agreement and the tonal exponent contributing TAMP marking.

Given that the STAMP marker and the verb are two separate words,<sup>18</sup> I analyse the floating tones as separate as well (rather than constituting a circumfix). Assuming two distinct floating tones is in line with the relative independence of the verb tone, showing functional divisions into non-past ( $\emptyset$ ), past (H) and tenseless (HL). Although verb and STAMP tone patterns work in parallel to arrive at the seven categories in the paradigm, the tonal form of one tonal host does not condition the tonal pattern of the other.

Whereas floating tones on verbs clearly attach to the right of the verb, as illustrated in (11), it seems difficult to linearise the segmental part of the STAMP morpheme and its floating tone. Since the STAMP morpheme is underlyingly toneless, no difference would be observable whether one postulated the tone to dock on the left or the right of the STAMP marker. Although there is no formal evidence for linearisation, I assume that the floating tone attaches to the right for historical reasons, and by analogy with other Bantu languages. In Bantu languages, TAM information usually follows subject agreement morphemes. Historically, Gyeli likely had segmental co-exponents for TAM marking between the subject agreement marker and the verb but lost the TAM segments. Closely related languages such as Kwasio, for instance, exhibit a mixture of segmental and tonal morphology between the subject marker and the verb (§5).

Some STAMP clitic forms are also lengthened. There is, however, a predictable relationship between lengthening and tone pattern, where a LH or HL pattern co-occurs with a long vowel. This could be analysed not as co-exponence *per se*, but as a phonotactic restriction, requiring that STAMP markers not have monomoraic contour tones. To accommodate the LH or HL tone pattern, the vowel is lengthened. In contrast, with the subjunctive, the lengthened vowel is an instance of co-exponence, a specific requirement for final vowel lengthening. As the imperative allows monomoraic contour tones, a phonotactic restriction for the verb can be ruled out. Thus, the subjunctive marking GT6b has a suprasegmental co-exponent (§3.2.1).

### 3.1.2 *Realis mood marking GT*

Every tense category also belongs inherently to a mood category, distinguishing realis from irrealis. This mood distinction is expressed through the presence (realis) or absence (irrealis) of GT7 that, unlike GT1–GT6b, only attaches to the right of the finite verb stem if the verb is in phrase-medial position. The present tense, for instance, belongs to the realis mood. As shown in (12) (Grimm 2021: 389), the verb surfaces as L in phrase-final position, as expected from the GT1 pattern. Phrase-medially, however, the verb stem takes the realis-marking GT7 and surfaces as H.

- |      |    |                     |                     |        |
|------|----|---------------------|---------------------|--------|
| (12) | a. | mé gyámbò           | ‘I cook.’           |        |
|      | b. | mé gyámbó bé-kwàndò | ‘I cook plantains.’ | ___N   |
|      | c. | mé gyámbó byô       | ‘I cook it.’        | ___PRO |

<sup>18</sup>Reasons for viewing the STAMP marker as independent from the verb include its assimilation and omission behaviour under certain conditions (Grimm 2021: 216) as well as speaker intuitions.

- d. mé gyámbó ndáá 'I cook today.' \_\_\_ADV  
 e. mé gyámbó é kisíní dé tù 'I cook in the kitchen.' \_\_\_PREP  
 f. mé gyámbó nà wómbèlè 'I cook and sweep.' \_\_\_CONJ

The presence of GT7 is solely conditioned by the tense category of the verb and not by the morphosyntactic material that follows the verb, since any phrase-internal material that follows the verb in realis tenses triggers the GT7 H to surface. Tense and mood categories are thus intrinsically connected, and so I generally refer to them as tense-mood categories. The distribution of tense-mood categories across realis and irrealis is shown in Table 6 (Grimm 2021: 387).

One may question the evidence for the realis-marking GT7, given that it is directly observable only in the present and the inchoative. The other two categories that surface as H phrase-medially, namely the recent and remote past, are also H phrase-finally through their tense-marking tones (GT4 and GT5). Alternatively, one could assume that there is no realis-marking tone, but that the phrase-medial H tones in the present and inchoative are part of the tense-marking patterns GT1 and GT2, which are lowered in phrase-final position. The surface contrast between H and non-H, however, clearly partitions the TAM categories into realis and irrealis. In my opinion, these semantic patterns should not be lightly dismissed as arbitrary phonological patterns. Since TAM categories are typically syncretic, it would not be unexpected if tense in the past forms was marked by the same H tone as mood.<sup>19</sup>

Additionally, I argue against L% boundary tones in Gyeli since they would not apply across TAM categories. On the one hand, the past tenses in phrase-final position are marked with a final H on the verbs, unlike all other TAM categories. On the other hand, in phrase-medial position, the future, imperative and subjunctive all end in L, whereas the other categories have a H tone.<sup>20</sup> This seems unexpected for a tone that marks prosodic domain edges. One could make this work by assuming that lowering only applies to the floating H tone that attaches to verbs in the present and inchoative,

**Table 6.** *Distribution of realis and irrealis categories.*

H tone present → Realis	H tone absent → Irrealis
PRESENT	FUTURE
INCHOATIVE	IMPERATIVE
RECENT PAST	SUBJUNCTIVE
REMOTE PAST	PRESENT NEGATION

<sup>19</sup>Even if one prefers the phonological explanation, this would not change the overall analysis opposing different exponence types; one would just end up with one less sole-exponent GT.

<sup>20</sup>While boundary tones are found in many Bantu languages, not all Bantu languages have them, as demonstrated for Bāsàá (A40; Makasso et al. 2017: 182), which is closely related to Gyeli. In addition to explaining the absence of boundary tones as an areal feature, the property of having no boundary tones could be related to the high complexity of the tone system, which allows only a minor role for intonation (Hyman & Monaka 2011; Downing & Rialland 2017).

taking medial forms as the default and final forms as special cases. It is simpler, however, to posit that final forms are the default and medial patterns those with added tonal morphology, since only one operation (floating H phrase-medially) is needed instead of two (floating H phrase-medially and lowering phrase-finally): a floating H attaches phrase-medially in certain TAM categories, whereas all instances of final L are the phonetic surface forms of underlyingly toneless TBUs. Gyeli has one exception where final lowering occurs, namely in monosyllabic H verbs, which are lowered to HL in non-finite and phrase-final forms. I view this as a case of alignment to imitate the surface pattern of non-initial syllables in the same grammatical contexts.<sup>21</sup>

### 3.1.3 Object-linking H tone

I analyse GT8 as a floating H, which immediately follows the lexical (finite or non-finite) verb and gets realised on the immediately following TBU whenever there is an *in-situ* object immediately after the verb. The host of GT8 is either a CV noun prefix on the object or an intervening verbal plural marker *nga*, both of which are underlyingly toneless. As I view the function of this GT to be to flag the presence of a syntactic object *in situ*, I gloss it as OBJ.LINK. GT8 can only surface when the object has an unvalued TBU, that is, a CV noun prefix, as in (13). Nouns with a C prefix or a  $\emptyset$  prefix do not undergo any tonal change, nor do pronominal objects.

- (13) a. mɛ̀ɛ gyám̀b̀ò bék̀wánd̀ò  
 mɛ̀ɛ gyám̀b̀ò H be-kwánd̀ò  
 1SG.FUT cook OBJ.LINK be8-plantain  
 ‘I will/might cook plantains.’
- b. gyám̀b̀ò bék̀wánd̀ò  
 gyám̀b̀ò-HL H be-kwánd̀ò  
 cook-IMP OBJ.LINK be8-plantain  
 ‘Cook (sg.) plantains!’
- c. mé wúmbé nâ wé gyám̀b̀óò bék̀wánd̀ò  
 mɛ-H wúmbɛ-H nâ wɛ-H gyám̀b̀óò H be-kwánd̀ò  
 1SG-PRS want-R COMP 2SG-PRS cook.SBJV OBJ.LINK be8-plantain  
 ‘I want you to cook plantains.’

The examples in (13) also show that the H on a postverbal object prefix does not stem from HTS, which it could be mistaken for in the many cases in which tense- and mood-marking GTs attach to the preceding verb stem. GT8 occurs in all tense, aspect, mood and polarity categories, including those that do not take a H tone on the preceding verb stem.

While Gyeli allows free ordering of the two objects in ditransitive constructions, only the object that is closest to the verb is marked by the object-linking GT, as shown in (14). This can be naturally explained by the GT’s location immediately after the lexical verb.

<sup>21</sup>The existence of alignment or edge effects in Gyeli are best seen in tense categories that are marked by a floating HL on the verb, such as the imperative (§§2.3 and 3.1). The HL is only realised on the final vowel, such as in the following L-toned verbs: *kám̀bálá* ‘defend!’ and *bìyò* ‘hit!’ In monosyllabic verbs, the lexical tone is replaced by the GT tune: *ké* ‘go!’

- (14) a. *mé vé bábwálè bèfùmbí béléálè*  
*mɛ-H vɛ̂-H H ba-bwálè be-fùmbí bé-láálè*  
 1SG-PRS give-R OBJ.LINK ba2-parent be8-orange 8-three  
 ‘I give the parents three oranges.’ S V O<sub>1</sub> O<sub>2</sub>
- b. *mé vé béfùmbí béléálè bàbwálè*  
*mɛ-H vɛ̂-H H be-fùmbí bé-láálè ba-bwálè*  
 1SG-PRS give-R OBJ.LINK be8-orange 8-three ba2-parent  
 ‘I give three oranges to the parents.’ S V O<sub>1</sub> O<sub>2</sub>

The functional distinction that GT8 makes can be neatly observed when comparing immediate-after-verb arguments to oblique NPs. Oblique NPs, as in (15), do not take the object-linking H tone.<sup>22</sup>

- (15) *mè pàlé kè dyô [màfú máláálè]<sub>OBL</sub>*  
*mɛ pàlé kè dyô ma-fú má-láálè*  
 1SG NEG.PST go sleep(v) ma6-day 6-three  
 ‘I haven’t slept in three days.’

The object-linking H tone occurs after the non-finite lexical verb in complex predicates, as in (16), since it is the non-finite verb that is transitive and carries this morphological marker, not the auxiliary. In contrast, tense- and mood-marking GTs only attach to finite verb forms.

- (16) *nkè nyi nzí sílè bédéwò*  
*nkè nyi nzí sílɛ H be-déwò*  
 Ø9.field 9 PROG.PST finish OBJ.LINK be8-food  
 ‘The field is running out of food.’

When the verbal plural marker *nga* used in imperative and hortative constructions intervenes between the verb and the object, GT8 is realised on the plural marker instead of the nominal object prefix. The clitic *nga* is underlyingly toneless and surfaces as L when the verb is phrase-final, as in (17a). If there is an object, however, as in (17b), the plural clitic ‘steals’ GT8 from its target, hosting the H tone, while the object prefix surfaces as L. These examples also show that the presence of an immediate-after-verb object is required for GT8 to surface: if the object is elided, as in (17a), GT8 does not attach.<sup>23</sup>

- (17) a. *yá gyàgâ ngà*  
*yá gyàgâ nga*  
 1PL-PRS buy.IMP PL  
 ‘Let’s buy!’
- b. *yá gyàgâ ngá bèkálàdè*  
*yá gyàgâ nga H be-kálàdè*  
 1PL-PRS buy.IMP PL OBJ.LINK be8-book  
 ‘Let’s buy books!’

<sup>22</sup>Modification of the IAV object NP does not affect the attachment of GT8. GT8 surfaces with bare nouns, as in (13), and in modified NPs, as in (14), opposing it to the modified adjunct in (15).

<sup>23</sup>This situation is similar to ‘non-extraction’ marking on transitive verbs attested in Hausa (Crysmann 2004, 2005) and in Laal (Lionnet 2013, 2022).

The verbal plural clitic *nga* receives its tone purely phonologically, either by insertion of a default L or by rightward HTS. Thus, in complex predicates such as in (18), *nga* receives its H tone from the preceding auxiliary, while GT8 surfaces on the object noun prefix.

- (18) yá tí **ngá** gyàgà **békálàdè**  
 ya-H tí nga gyàgà H be-kálàdè  
 1P-PRS NEG.R PL buy OBJ.LINK be8-book  
 ‘Let’s not buy books!’

### 3.2 *GT as co-exponent*

I distinguish three types of GTs as co-exponent of grammatical features in Gyeli, in an increasing order of complexity: i) the GT co-exponent co-occurs with the suprasegmental addition of vowel lengthening; ii) the GT co-exponent co-occurs with segmental morphemes; and iii) the GT co-exponent co-occurs with complex predicates that require auxiliaries. The first two types tend to constitute systematic co-exponents, while the tonal co-exponents of auxiliaries seem arbitrary.

#### 3.2.1 *GT co-exponent with vowel lengthening*

Suprasegmental co-exponence is minimally complex and involves vowel lengthening, that is, the addition of a mora. In simple verbal predicates, this type of co-exponence is restricted to the subjunctive (GT6a in Table 4). Verb stems in other tense-mood categories always end in a short vowel. In contrast, I do not consider the lengthened STAMP clitics in the inchoative, the future and the remote past as instances of co-exponence, since their occurrence can be explained as a phonotactic restriction in stamp morphs to accommodate HL and LH tones (§3.1.1).

Another case of GT co-exponence with vowel lengthening concerns demonstratives and certain adverbs, which use final vowel length in conjunction with a H tone to express deictic distance. As shown in Table 7 for all nine agreement classes, proximal demonstratives have a short vowel and a HL lexical tone.<sup>24</sup> The distal demonstrative

**Table 7.** *Gyeli demonstratives.*

Singular classes			Plural classes		
PROXIMAL	DISTAL		PROXIMAL	DISTAL	
1	nû	núú	2	bâ	báá
3	wô	wóó	4	mí	míí
5	lê	léé	6	mâ	máá
7	yî	yíí	8	bî	bíí
9	nyî	nyíí			

<sup>24</sup>One reviewer asked whether one might consider this tone to be grammatical rather than lexical. In accordance with Rolfe’s (2018) definition of GT as licensed by specific grammatical constructions, however, I exclude this possibility, since there is no environment in which the tone is not HL.

is derived from the proximal base form by adding a morpheme that consists of a lengthened vowel accompanied by a H GT co-exponent.

Similarly, the adverbs *wû* ‘there’ and *pè* ‘there’ can take a final H tone, together with final vowel lengthening, to mark distance. This is shown for the adverb *pè* in (19), with the unmarked form in (19a) and the distal form in (19b).

- (19) a.  $\acute{e}$  **pè** bà sílé bì lw<sup>ô</sup> mándáwò  $\acute{e}$  **pè**  
 $\acute{e}$  pè ba síle-H bì lw<sup>ô</sup> H ma-ndáwò  $\acute{e}$  pè  
 LOC there 2.PST1 finish-R 1PL.OBJ build OBJ.LINK ma6-house LOC there  
 ‘There, they have finished building us houses there.’
- b.  $\acute{e}$  **péé** mèè lw<sup>ô</sup> nyà ndáwò  
 $\acute{e}$  pé-é mèè lw<sup>ô</sup> nyà ndáwò  
 LOC there-DIST 1SG.FUT build real Ø9.house  
 ‘Over there [further away], I will build a real house.’

### 3.2.2 GT co-exponent with segmental morphemes

The next level of complexity involves bound segmental morphemes, which in the case of Gyeli are suffixes. Among the two suffixes that co-occur with GT, the vocative fits in with the tonal pattern and functionality of the deictic distance system with a predictable H signalling distance. The difference is, however, that the vocative has a dedicated segmental suffix *-o* and not only vowel lengthening, as used by demonstratives and some adverbs (§3.2.1). Vocative suffixes attach to proper names, as in (20), and to certain adverbs, as in (21). A L vocative suffix encodes proximity to the addressee, whereas a H vocative suffix encodes distance.

- (20) a. Minsêm-ò  
 ‘Minsem!’ (addressee is close to speaker)
- b. Minsêm-ó  
 ‘Minsem!’ (addressee is farther away from speaker)
- (21) mùdi kí tàtò wúò/wúó  
 m-ùdi kí tàtò wû-o/wû-o-H  
 N1-person NEG scream there-VOC/there-VOC-DIST  
 ‘Nobody scream there/far over there!’

There is another segmental co-exponent suffix, *-le*, which encodes present tense negation. As shown in Table 8, H-toned verbs surface as all H, including the negation suffix, regardless of the length of the stem. In contrast, L roots are realised with H on the initial syllable. In monosyllabic stems, the negation suffix is then also H, whereas di- and trisyllabic verbs are all L for non-initial syllables, including the negation suffix.

The accompanying GT pattern deviates from the basic affirmative present tense-mood pattern, as shown in (22). While the verb stem in the affirmative present surfaces as L phrase-finally but with a realis-marking H tone phrase-medially, as in (22a), present negation does not take the medial H tone, as in (22b). For this reason, I classify it as an irrealis category. This is consistent from a semantic perspective, given that it is typologically frequent for negation to correlate fully or partially with irrealis marking, although this does not apply systematically (cf. Elliott 2000).

**Table 8.** Tone patterns with the present tense negation suffix *-lɛ*.

Stem length	H roots		L roots	
$\sigma$	mé kwê	‘I fall’	mé njì	‘come’
	mɛ́ɛ kwé-lé	‘I don’t fall’	mɛ́ɛ njí-lé	‘I don’t come’
$\sigma\sigma$	mé gyíbò	‘I call’	mé biyò	‘I hit’
	mɛ́ɛ gyíbó-lé	‘I don’t call’	mɛ́ɛ bíyò-lè	‘I don’t hit’
$\sigma\sigma\sigma$	mé lóngàlà	‘I scream’	mé kàmbàlà	‘I defend’
	mɛ́ɛ lóngàlá-lé	‘I don’t scream’	mɛ́ɛ kàmbàlà-lè	‘I don’t defend’

- (22) a. **mé gyàgá** bédéwò  
 mɛ-H gyàga-H H be-déwò  
 1SG-PRS buy-R OBJ.LINK be8-food  
 ‘I buy food.’
- b. **mɛ́ɛ gyàgàlè** bédéwò  
 mɛ́ɛ gyàga-lɛ H be-déwò  
 1SG.PRS.NEG buy-NEG OBJ.LINK be8-food  
 ‘I don’t buy food.’

The negation pattern is an instance of systematic co-exponence, differing from its affirmative counterpart in two predictable ways. First, the STAMP clitic receives a LH floating tone in the first and second person singular and agreement class 1, while only the other subject agreement forms are identical to the H STAMP clitic of the affirmative present, as shown in (22).

Second, the present negation form on the verb consists of a H tone which attaches at the left edge of the verb stem and an underlyingly toneless negation suffix *-lɛ*, which receives its tone from the preceding syllable. Table 9 illustrates the analysis of the data presented in Table 8. The H tone displaces the lexical tone rightwards onto the second syllable of the stem. In H-toned roots, the lexical H shifts rightwards and then spreads rightwards, resulting in an all-H form. In L-toned roots, the lexical L shifts rightwards and spreads or is realised as L by default. If there is no second syllable of the verb to shift to, the lexical L is not realised, and the H of the tonal co-exponent spreads onto the negation suffix.

With the addition of the segmental negation suffix *-lɛ* and its tonal co-exponent, the patterns of tense-marking GT in the affirmative do not apply. The cue for the lexical contrast in monosyllabic verb stems is lost as all negated monosyllabic stems surface as all H, as shown in (23).

- (23) a. bwà ‘give birth’ → bwá-lé ‘to not give birth’  
 b. bwâ ‘swell’ → bwá-lé ‘to not swell’

**Table 9.** Present negation co-exponents H-...-lɛ.

Stem length	H roots		L roots	
$\sigma$	/H-HL-lɛ/	→ H-lé	/H-L-lɛ/	→ H-lé
	/H-kwê-lɛ/	→ kwé-lé 'fall'	/H-nji-lɛ/	→ nji-lé 'come'
$\sigma\sigma$	/H-H Ø-lɛ/	→ H H-lé	/H-L Ø-lɛ/	→ H L-lè
	/H-gyíbo-lɛ/	→ gyíbó-lé 'call'	/H-biyɔ-lɛ/	→ bíyò-lè 'hit'
$\sigma\sigma\sigma$	/H-H ØØ-lɛ/	→ H H H-lé	/H-L ØØ-lɛ/	→ H L L-lè
	/H-lóngala-lɛ/	→ lóngálá-lé 'scream'	/H-kàmbala-lɛ/	→ kàmbàlà-lè 'defend'

### 3.2.3 GT co-exponent with auxiliaries in complex predicates

The co-exponent type that is structurally most complex involves true auxiliaries in complex predicates.<sup>25</sup> In contrast to the other types of co-exponents, their tonal co-exponents are arbitrary, as each auxiliary has its own unpredictable tonal cophonology. The opposition of (24a) and (24b) shows that this is not a property of complex predicates *per se*, since modal semi-auxiliaries such as *kwáɛ* 'like' take the same tonal inflection patterns as simple predicates, for example, in the present tense with a H on the STAMP and a realis-marking H phrase-medially.

- (24) a. **á dé** mántúà  
a-H dè-H H ma-ntúà  
1-PRS eat-R OBJ.LINK ma6-mango  
'S/he eats mangoes.'
- b. **á kwálé** dè mántúà  
a-H kwáɛ-H dè H ma-ntúà  
1-PRS like-R eat OBJ.LINK ma6-mango  
'S/he likes to eat mangoes.'
- c. **à nzíí** dè mántúà  
a nzíí dè H ma-ntúà  
1 PROG.PRS eat OBJ.LINK ma6-mango  
'S/he is eating mangoes.'

True auxiliaries encode both aspect and negation. Just like modal (semi-auxiliary) verbs, they act as the inflected verb form, whereas the lexical verb is non-finite. They cannot, however, host tense-marking GT1–GT6a (§3.1.1), but instead display their own tone patterns, as in (24c), where the STAMP clitic surfaces with L instead of the expected H of the present tense.

<sup>25</sup>True auxiliaries in Gyeli are defined by inflectional restrictions to specific TAM categories and a general lack of lexical meaning. In this, they differ from modal semi-auxiliaries, which carry lexical meaning and can occur in all TAM categories.

While presenting the entire auxiliary system of Gyeli exceeds the scope of this article,<sup>26</sup> I choose several examples which illustrate that tonal co-exponence with auxiliaries is arbitrary and that the functional load of GT in these constructions is too weak to contribute enough information to distinguish between grammatical categories.

The arbitrary tonal patterns of auxiliaries heavily restrict most forms to a specific tense-mood category. For instance, the progressive has three segmental forms: *nzíí* for present progressive, *nzí* for recent and remote past, and *nzéé* for progressive in subordinate clauses (and none for the future). Each segmental marker determines the tonal pattern of the STAMP clitic, as I discuss below. In fact, the information that GT as sole exponent carries in simple predicates is entirely lost in auxiliary constructions, both with the STAMP clitic and verb stems.

Floating tones on STAMP clitics in auxiliary constructions do not contribute information to tense distinctions because of their lack of systematic oppositions. In addition to their differing patterns from simple predicates, some STAMP clitics show paradigm-internal variation, which seems to be parallel to simple predicate patterns. An example is the STAMP clitic pattern found with the future negation auxiliary *kálè* with a split between a long STAMP with a HL pattern for most subject agreement forms and a long L surface pattern for the first and second person singular and agreement class 1. The same pattern holds in the future marking of simple predicates (Table 4). This pattern identity across simple and complex predicates is, however, unpredictable. There are counterexamples, such as the prospective marker *múà*, which has a H STAMP clitic in most subject agreement classes, but L in first and second person singular and agreement class 1, as shown in (25). This paradigm-internal split does not cluster with any TAM category in simple predicates.

- (25) *mè/yá múà dè béfùmbí*  
*mè/yá múà dè H be-fùmbí*  
 1SG/1PL PROSP eat OBJ.LINK be8-orange  
 'I am/we are about to eat oranges.'

Tonal patterns on the segmental part of auxiliaries seem also unpredictable. Most of them end in a H tone, including all three progressive forms *nzíí*, *nzí*, *nzéé*, the retrospective marker *lɔ́*, the perfect marker *bwàá*, the past negation *sàlé/pálé* and the imperative and infinitival negator *tí*. Only the prospective marker *múà*, the future negation marker *kálè* and the subjunctive negation marker *dúù* surface with non-H tones. Since auxiliaries can never occur phrase-finally, it is impossible to test whether final H tones are lexically specified or a result of H attachment as proposed for the realis-marking GT7. For this reason, the contribution of GT to mood marking in auxiliary constructions is unclear. In fact, there is a fundamental question as to how much GT there is in these auxiliary constructions. One may argue that the tone on the auxiliary itself is lexical, and only the tone on the STAMP morpheme is grammatical. An argument for this is that the true auxiliaries are highly lexicalised forms likely derived from archaic verb forms and so maybe their tones have become lexicalised as well. An argument for viewing auxiliary tones as GTs, on the other hand, is their parallel

<sup>26</sup>The reader is referred to (Grimm 2021: 403) for an in-depth discussion of true auxiliaries and their forms.

structure with other (simple and complex) predicates, which all involve GTs on the STAMP morpheme and the finite verb form. I do not see any conclusive evidence for either option. I have shown in this section that, with increasing segmental complexity, the information that GT contributes to the meaning becomes less paradigmatic and its functional load weaker.

#### 4. Interaction with lexical tone

GT operates alongside PT and lexical tone. But what happens when GT and lexical tone are in competition? In this section, I explore the interaction between GT and lexical tone within a dominance framework (Kiparsky & Halle 1977; Inkelas 1998; Rolle 2018). I show that GT in Gyeli is dominant, but only ‘under duress’, that is, when there are not enough toneless syllables to host both lexical tone and GT. In this case, GT wins over lexical tone. Following Rolle (2018), dominance effects are understood as the interactions between the trigger, with its morphosyntactic properties, and the host, with its tonal value. Rolle (2018: 10) distinguishes dominant and non-dominant GT, and describes the tension between these two types as follows:

[W]ithin dominant GT all outputs have a uniform tone shape which has the advantage of providing a more consistent cue for the grammatical category of the trigger, but sacrifices the lexical contrast of the target. In contrast with non-dominant GT, outputs do not have a uniform form and thus maintain lexical contrast unambiguously, but at the cost of having a less delimited cue for the trigger.

The dominance type found in Gyeli is replacive-dominant (RD), as defined in (26).<sup>27</sup>

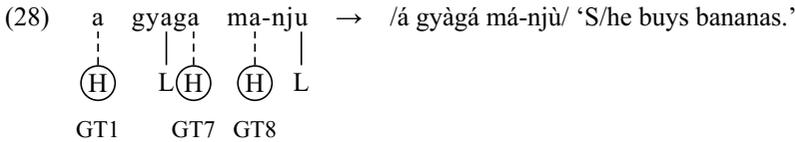
- (26) REPLACIVE-DOMINANT GT: ‘the automatic replacement of the underlying tone [...] within the valuation window of a target-host, revalued with a grammatical tune (whether via a floating tone, spreading from the sponsor, *etc.*)’ (Rolle 2018: 47–48)

Monosyllabic verbs provide the needed evidence that GT in Gyeli is, in fact, dominant ‘under duress’. In (27), the realis-marking GT7 is in conflict with the lexical L on the verb *dè* ‘eat’. The lexical tone is delinked and replaced by GT: GT wins out. This explains why underlying (lexical) tones of monosyllabic verbs go unrealised. If GT were non-dominant, then there would be no GT realisation in the monosyllabic forms, or it would combine and create a contour. It looks like Gyeli has a system that strives to keep both lexical and GT, and sacrifices lexical tone only when one of the two must go.

- (27) a de ma-nju → /á dé má-njù/ ‘S/he eats bananas.’
- |     |     |     |     |   |
|-----|-----|-----|-----|---|
|     |     |     |     |   |
| (H) | L   | (H) | (H) | L |
| GT1 | GT7 | GT8 |     |   |

<sup>27</sup>The term ‘replacive’ stems from Welmers (1973: 132) and was later used by Inkelas (1998: 139).

The longer verb forms provide no evidence for dominance or non-dominance, as there is no case of duress. All GTs in (28) are realised on underlyingly toneless syllables, maintaining the lexical tone on the verb. GT1 encodes present and is realised on the STAMP clitic for agreement class 1; GT7 expresses the realis category; and GT8 links to the object in the VP.



The phonological system – with its restrictions on syllable length, the status of the syllable as TBU and the distribution of valued and unvalued TBUs – constitutes the framework in which lexical tone and GT operate. Sole-exponent GTs (§3.1) generally target unvalued TBUs: STAMP clitics, toneless TBUs in non-initial verb syllables, and CV-noun prefixes. Thus, in (28), the lexical L tones of the verb stem *gyàga* ‘buy’ and the noun stem *-nju* ‘banana’ remain unaffected, while the GTs specify the unvalued TBUs. Longer verb forms can be seen as typical, since they constitute around 77% of all verbs (see Table 5). GT can easily exploit the unvalued TBUs in these longer forms to provide templatic cues for tense-mood category distinctions. Conflicts with lexical tone only arise in a minority of verbs, since monosyllabic verbs do not have unvalued TBUs. In these cases, the lexical contrast is sacrificed to rescue the templatic cues of GT patterns, as illustrated in (29), where GT results in a H surface form for both H(L) and L verb roots.

- (29) a. a-H **lâ**-H H be-kàsà → [á lá békàsà]  
 1-PRS count-R OBJ.LINK be8-bridge  
 ‘S/he counts the bridges.’
- b. a-H **lâ**-H H be-kàsà → [á lá békàsà]  
 1-PRS pass-R OBJ.LINK be8-bridge  
 ‘S/he passes the bridges.’

More segmentally complex triggers of GT are not merely segmental additions to the basic system of sole-exponent GT, but come with their own tonal cophonologies (Inkelas & Zoll 2007; Sande *et al.* 2020). The negation suffix *-lɛ*, for instance, is accompanied by a H GT co-exponent that has a different host position in the verb stem than the tense- and mood-marking sole-exponent GTs (§3.2.2). It is dominant, since it targets the first syllable, which is the location of lexical tone, again neutralising lexical contrasts in monosyllabic verbs (30).<sup>28</sup> It further triggers a different tone pattern of STAMP clitics in the first and second person singular and agreement class 1, whereas the other agreement classes exhibit a plain vowel with a H tone.

<sup>28</sup>This could be viewed as ‘dominance by accident’ by virtue of being a prefix: the GT co-exponent H must be realised on the lexical-tone-bearing syllable, creating the competition that is required for replaciveness in Gyeli. Interestingly, Gyeli prefers replaciveness over other potential solutions, such as spreading the lexical tone one syllable to the right, which would preserve it.

- (30) a. àá            H-**lâ**-le            H be-kàsà            → [àá lálé békàsà]  
 I.PRS.NEG NEG-COUNT-NEG OBJ.LINK be8-bridge  
 ‘S/he does not count the bridges.’
- b. àá            H-**lã**-le            H be-kàsà            → [àá lálé békàsà]  
 I.PRS.NEG NEG-PASS-NEG OBJ.LINK be8-bridge  
 ‘S/he does not pass the bridges.’

While there is likely no functional motivation for the difference of tunes from GT as sole exponents, the pattern can be explained by the observations that i) GT co-exponents and their properties (e.g. as a floating prefix) are lexically conditioned and encoded within the trigger (e.g. the present negation form) itself (Inkelas 1998; Rolle 2018) and ii) replaciveness is the general strategy in Gyeli for resolving competition between lexical and GTs, with GT winning out ‘under duress’. At the same time, phonological properties of the GT host pertaining to the availability of unvalued TBUs also determine whether the GT will yield the underlying lexical tones or not.

True auxiliaries come with idiosyncratic tonal patterns that target the STAMP clitic. Competition between GT and lexical tones in auxiliaries, however, cannot be observed, at least not synchronically. The reason for that is that these aspect and negation auxiliaries are associated with a specific tense-mood category (§3.2.3). They encode a grammatical function in a specific grammatical position, which does not allow for testing oppositions of underlying (lexical) tones. Lexical tones of the lexical verb in complex predicates are maintained, since lexical verbs occur in their non-finite forms, in which the lexical tone remains intact (§2.3).

## 5. Outlook: Gyeli’s place in the broader Bantu context

Eastern and southern Bantu languages are agglutinative and known for their rich verbal morphology with one-to-one mappings of form and meaning. In contrast, Gyeli as a typical northwestern Bantu language is heavily restricted in the addition of verbal morphemes due to its phonotactic limit of three syllables. Gyeli compensates for the restriction of segmental additions to the verb by a complex GT system, which fulfils many functions that other Bantu languages express via segmental morphemes. In turn, Gyeli needs the high functional load and transparency of GT in the absence of rich segmental morphology in verb inflection. It is likely that the loss of segmental morphemes and the formation of a GT system that relies heavily on GT as the sole exponent of a grammatical function are historically interrelated. Comparing the Gyeli system with closely related languages of the area, similar tonal ‘ingredients’ in the VP can be observed. These other languages, however, have more segmental morphology in their inflection paradigms, while tonal patterns seem idiosyncratically distributed over certain TAM categories, with a weak functional load in contrast to Gyeli sole-exponent GTs.

The closest relative, Kwasio (Bantu A81, [nmg]), for instance, has segmental morphemes between the STAMP marker and the verb for the recent and remote past tenses as well as for two future tense forms (Woungly 1971). While Kwasio exhibits similar patterns of tense-marking GTs on the STAMP marker and verb stem, these

patterns are less systematic, as the segmental morpheme seems to carry the bulk of the category encoding. GTs between the verb and a following object are particularly interesting in the languages of the area. Where Gyeli has slots for GT8 (realis marking) and GT9 (object marking), other languages seem to only have one GT slot. Hyman & Lionnet (2012) describe metatony in Abo (Bantu A42, [abb]), which is characterised by tonal alternations in certain conjugated verb forms. These tonal alternations in Abo constitute different phonological patterns that come with specific TAM categories, but do not map onto clear functions, unlike Gyeli. The same has been observed for Eton (Bantu A71, [eto]; Van de Velde 2008). Tonal alternations on the object, a potential equivalent to Gyeli's object-linking GT8, are described by Yukawa (1992) for Bulu (Bantu A74, [bum]). In Bulu, object tones must match the tone of the final TBU of the verb. Unlike Gyeli, however, this is restricted to certain TAM categories, and the meaning contribution of the GT alternation is rather opaque.

From a historical view, sole-exponent GTs with their high functional load may only have developed through the loss of segmental material in Gyeli, giving rise to a system that maximally exploits all tonal patterns for grammatical distinctions. The heavy reliance on GT as sole exponent of distinctions in the tense-paradigm, for instance, has been made possible and constrained by the overall phonological and grammatical system of the language. One key factor for this system to work is the distinction between valued root (i.e. stem-initial) syllables with lexical tones and non-initial toneless syllables. With a large majority of verbs containing unvalued TBUs, competition between lexical contrasts and faithfulness to GT templates does not typically occur. Monosyllabic roots, which lack unvalued TBUs, are an exception. In these cases, GT wins by overwriting lexical tone, maintaining the grammatical tune. In contrast, with segmental co-exponents, GT has a weak functional load and does not, by itself, seem to contribute to the meaning. It is rather an idiosyncratic cophonology of the segmental exponent, which sometimes idiosyncratically overwrites lexical tone, as in present negation.

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