Towards reconstructing grammatical tone in the NW Bantu verb phrase

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1 Introduction

- There are about 500 Bantu languages, forming the largest sub-group of Niger-Congo

- Classification:

    - Niger-Congo > Benue-Congo > Bantu
    - the Bantu-internal classification is largely based on Guthrie's (1971) system with areal-geographic zones labeled by capital letters
    - each letter zone is subdivided into groups of decimals, e.g. A10, A20, A30, etc., which contain the individual languages

- Northwestern (NW) Bantu: all languages of zone A and B10, B20, and B30 (Grollemund et al., 2015)

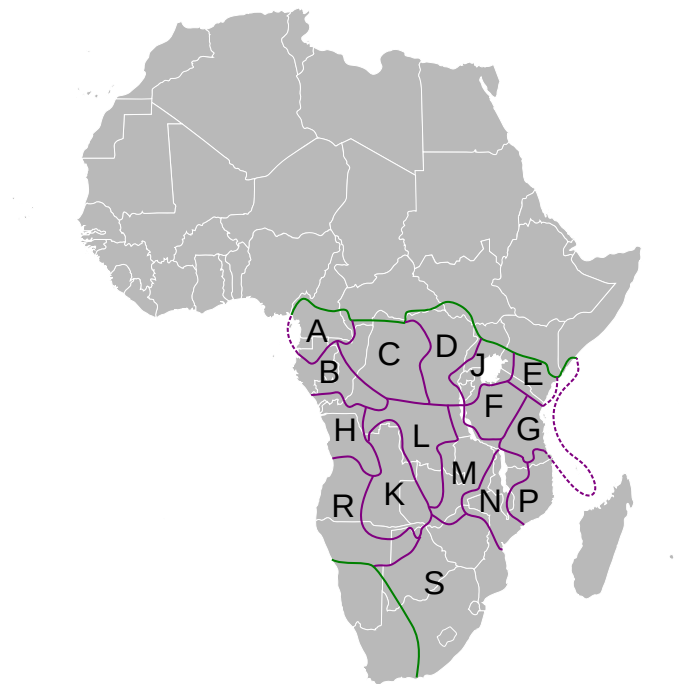- Savanna Bantu: all non-NW Bantu languages (Nurse, 2008)

Figure 1: Guthrie's Bantu zones (with Tervuren's J zone)

(based on https://commons.wikimedia.org/wiki/File:Locator_map_of_Cameroon_in_Africa.svg, CC-BY-SA Shosholoza)

- Bantu languages vary considerably with respect to tone systems

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- commonly two to three tone levels
- different types of tone languages, ranging from fully tonal languages (e.g. Kikuyu) to non-tonal languages (e.g. Swahili) and a "bewildering variety of intermediate types" (Clements and Goldsmith, 1984: 1)
- diversity of tonological operations and functions
- tone plays an important role in verbal inflection to encode subject agreement, tense, aspect, mood, and polarity (STAMP)

- Grammatical tone

  - GT has generally been subsumed under lexical tone as meaning-distinctive
  - Rolle (2018) shows that it is better viewed as a non-concatenative type of morphology
  - GT is only licensed in particular grammatical environments
  - GT is realized by tonal operations: tone spreading, shifting, addition, deletion, assimilation, or replacement
  - GT may or may not co-occur with a segmental morpheme: GT as co-exponent vs. sole exponent
  - Bantu GT systems constitute some of the most complex in Africa (Rolle, 2018: 37)

- Core assumptions about diachronic change of Bantu tone systems is towards the loss of tonal distinctiveness in favor of pitch-accent systems (Clements and Goldsmith, 1984; Ratliff, 2015) due to

  - increased morphological complexity of the inflected verb:
  - in Savanna Bantu, segmental morphemes often have a one-to-one mapping to functions
  - agglutinative morphology allows the stacking of several inflectional affixes
  - widespread phenomenon of tone spreading

The goals of this talk:

- The opposite is the case in NW Bantu: GT is indispensable due to

  - restrictions on the prosodic size of verb stems
  - the segmental erosion of grammatical markers

- Tone takes on a higher functional load in coding distinct grammatical categories.

  - GT occurs majoritarily as a co-exponent, together with a segmental morpheme, in the encoding of TAMP categories
  - Bantu A languages have a higher proportion of sole exponents (tonal or segmental)

2   Loci of grammatical tones in the verb phrase

- Historical work on Bantu languages has a long tradition (Greenberg, 1948; Meeussen, 1967)

  - reconstructions of Proto-Bantu (PB) mostly focus on segmental material, grammatical morphemes (Polak-Bynon, 1986; Voorhoeve, 1980), and lexical items (Bastin et al., 2002; Bostoen and Bastin, 2016; Fleisch, 2008; Riquier and Bostoen, 2008; Schadeberg, 2002)

- PB has two tonemes, H and L, which associate with vowels and syllabic nasals (Greenberg, 1948; Meeussen, 1967)

- The tonal reconstructions do not capture the nature of most synchronic grammatical tone systems

  - reconstructions lack common tonal operations (floating tones, tone spreading, attachment, shift, or deletion)
  - reconstructions do not address the role of grammatical tone

2.1 Tone and the inflected verb in Proto-Bantu

- basic SVO word order

- elaborate gender and agreement systems (typically seven to ten genders (Corbett, 2013))

- Meeussen (1967) reconstructs the inflected verb in PB as morphologically complex

(1) Havu JD52, DRC (Aramazani, 1985: 522)
    mù-è:-**cùl**-ań-é
    2PL-FUT2-wake-RECIP-FV
    'You (pl.) will wake each other.'

- Morphological positions are labeled as individual pre-stem and stem slots (Güldemann, 2022)

Table 1: The structure of inflected verbs in Bantu, based on Güldemann (2022: 388)

Pre-stem cluster				Stem			
(Pre-initial)	Initial	(Post-initial)$^+$	(Pre-radical)	Radical	(Pre-final)$^+$	Final	(Post-final)
	subject		object	verb	derivation		participant
TAMP		TAMP			TAMP	TAMP	P

Notes: (...) optional, + possibly more than one, T = tense, A = aspect, M = mood, P = polarity

- Each slot is reconstructed with a segmental and possibly a tonal representation
    - the radical is H or L
    - most derivational suffixes in PB are underlyingly toneless
    - tones of subject and object agreement markers depend on agreement class and morphological context

- Bantu inflected verbs are known for their tonal change and mobility
    - H tone spreading to the right and left
    - attachment of floating tones
    - tone insertion, deletion, and plateauing

- → The propensity of tones to spread seems to favor a trend towards losing tonal distinctiveness (Clements and Goldsmith, 1984; Ratliff, 2015).
    - several examples of languages which have lost their tonal contrast in various positions of the verb Hyman (2017) → tones are assigned by inflectional morphology
    - the tonal system may develop towards a reanalysis into an accentual system (Ratliff, 2015: 247)

- NW Bantu languages differ in several respects from the PB verb template
    - restrictions on the length of verbal stems (often a maximum of 3 syllables)
      → prosodic size constraints heavily limit the possibilities of adding segmental morphemes
      → this results in a higher functional load of grammatical tones in NW Bantu

– the relation between pre-stem material and the verb stem is much looser resulting in a more analytic type

(2) Basaá A43, Cameroon (Hyman, 2003: 277)
li≠wándá jêm **lí m≠ !ɓéná   jέ** bí≠jέk í !ndáp
friend   my SP PRS do.often eat food   in house
'My friend often eats food in the house.'

– The one-to-one mapping of a function to one segmental morpheme has become blurred in many NW languages.
→ tendency for segmental material encoding TAMP categories to become reduced or lost entirely

- NW Bantu languages have maintained two locations to mark TAMP categories: before and/or after the verb stem.

(3) Iyasa A33 (Brown, 2021: 113)
   a. pre-stem: *mú e-* future
      a-mú e-lapa
      1-FUT FUT-speak
      'S/he will speak.'
   b. stem-final: *-ndí* present
      a-lapá-ndí
      1-speak-PRS
      'S/he speaks.'
   c. pre-stem and stem-final: *H- ... -é* far past
      á-lapé
      1-speak-FV
      'S/he spoke (far past).'

- **There are three specific loci that are prone to host grammatical tone in NW Bantu:**

  – subject agreement morpheme (STAMP)

  – verb stem

  – immediate-after-verb elements

2.2 Grammatical tone in the Gyeli verb phrase

Gyeli constitutes an extreme case of segmental loss in the encoding of basic TAMP categories.

- GT is the sole exponent to encode seven grammatical categories forming a paradigm of core tense-mood distinctions.

- These have to be marked obligatorily.

- Features of the Gyeli phonological system:

  – phonemic tone contrasts: H, L, HL, LH, and toneless tone-bearing-units (TBUs)

  – verb stems maximally have three syllables

  – only the initial syllable in verbs is lexically specified for tone: H vs. L

  – second and third verb stem syllables are underlyingly toneless

(4)   a. mέ   gyέlὲ
         mε-H   gyέlε
         1SG-PRS jump
         'I jump.'

b. mὲ   gyέlέ
mɛ   gyέlɛ-H
1SG.PST1 jump-PST
'I jumped.'

Gyeli has three grammatical tones in the verb phrase.

1. Combination of the tone patterns on the STAMP marker and the verb stem

   – tone combinations on the STAMP marker and the verb stem instantiate seven affirmative tense-mood categories as a basic system in simple predicates

Basic distinction	TM category	STAMP	Verb stem		Gloss
NON-PST	PRES	**yá**	**kfùbàlà**		'We provoke each other. '
	INCH	**yàá**	**kfùbàlà**	L	'We start to provoke each other.'
	FUT	**yáà**	**kfùbàlà**		'We will provoke each other.'
PST	PST1	**yà**	**kfùbálá**	H	'We provoked each other (recently).'
	PST2	**yáà**	**kfùbálá**		'We provoked each other (a long time ago).'
other	IMP	**(yá)**	**kfùbálâ**	HL	'Let's provoke each other!'
	SBJV	**yá**	**kfùbáláà**		'May we provoke each other.'

Table 2: Tense-mood categories in Gyeli are encoded by tone only

2. Realis-marking H tone on the left of the verb stem

   – presence of the realis-marking H tone is conditioned by the specific tense-mood categories

   (5) a. mέ   **dé** mántúà   (with H tone: realis)
            mɛ-H   dè-H H-ma-ntúà
            1SG-PRS eat-R OBJ.LINK-ma6-mango
            'I eat mangoes.'
        b. mὲὲ   **dè** mántúà   (no H tone: irrealis)
            mὲὲ   dè H-ma-ntúà
            1SG.FUT eat OBJ.LINK-ma6-mango
            'I will eat mangoes.'

   – it is independent of the morphosyntactic material following the verb:
   – all parts-of-speech following the verb in the clause trigger the H tone to surface

   (6)
a.	mέ gyàgà	'I buy.'	
b.	mέ gyàgá bé-kwàndò	'I buy plantains.'	__N
c.	mέ gyàgá byô	'I buy them.'	__PRO
d.	mέ gyàgá ndáà	'I buy today.'	__ADV
e.	mέ gyàgá έ màkítí	'I buy at the market.'	__PREP
f.	mέ gyàgá nà kwànὲ	'I but and sell'	__CONJ
g.	mέ wúmbέ gyàgà	'I want to buy.'	__V
h.	mέ gyàg**à** nâ wέ déὲ	'I buy so that you eat.'	__COMP

   • Distribution of realis and irrealis categories in Table 3:

3. Object-marking H tone that is realized on the CV-prefix of a nominal object immediately after the verb
   (7)

   – the object-linking H tone is a distinct tone unrelated to the verb tone

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H tone presence	H tone absence
→ Realis	→ Irrealis
PRESENT	FUTURE
INCHOATIVE	IMPERATIVE
RECENT PAST	SUBJUNCTIVE
REMOTE PAST	

Table 3: Tense-mood categories in Gyeli

- the H tone on the object prefix is not the result of H tone spreading from the verb
- the object-linking H tone only attaches to argument nominal, not to obliques

(7) a. mɛ́   dé **má**ntúà
        mɛ-H   dè-H H-ma-ntúà
        1SG-PRS eat-R OBJ.LINK-ma6-mango
        'I eat mangoes.'

      b. mɛ̀ɛ̀   dè **má**ntúà
        mɛ̀ɛ̀   dè H-ma-ntúà
        1SG.FUT eat OBJ.LINK-ma6-mango
        'I will eat mangoes.'

      c. mɛ̀ pàlɛ́   dè [**mà**fú   málálɛ̀]OBL
        mɛ pàlɛ́   dè ma-fú   má-lálɛ̀
        1SG NEG.PST eat ma6-day 6-three
        'I haven't eaten in three days.'

- Each of these GTs in Gyeli has a clear grammatical function rather than constituting merely a phonological pattern.

3   Comparing grammatical tones in the verb phrase across northwestern Bantu

- Other NW Bantu languages have more segmental morphology and tone is only a co-exponent in the encoding of STAMP categories.
- Often, the contribution of tone to a grammatical function is less clear and, on the other extreme end of the spectrum, tone patterns are solely governed by phonological rules.
- NW Bantu languages exhibit grammatical tone in the expected three loci
- Yet, it is challenging to reconstruct the historical origins of these GTs
  - variation in terms of the specific conditions under which grammatical tone is realized on various targets
  - tonal systems of NW Bantu languages are vastly under-described

The sample of NW Bantu languages

- NW Bantu languages are spoken in Cameroon, Equatorial Guinea, and Gabon (+ Central African Republic and the Republic of the Congo)
- twelve languages in my sample, one from each subgroup (A10, A20, A30 [...] B10, B20, B30) in Table 4
- selected based on practical considerations of available and sufficiently extensive descriptions

- Languages in the sample were compared for (Table 5):

Figure 2: Map of the northwestern Bantu languagesby *Glottolog*, Glottocode: bant1295
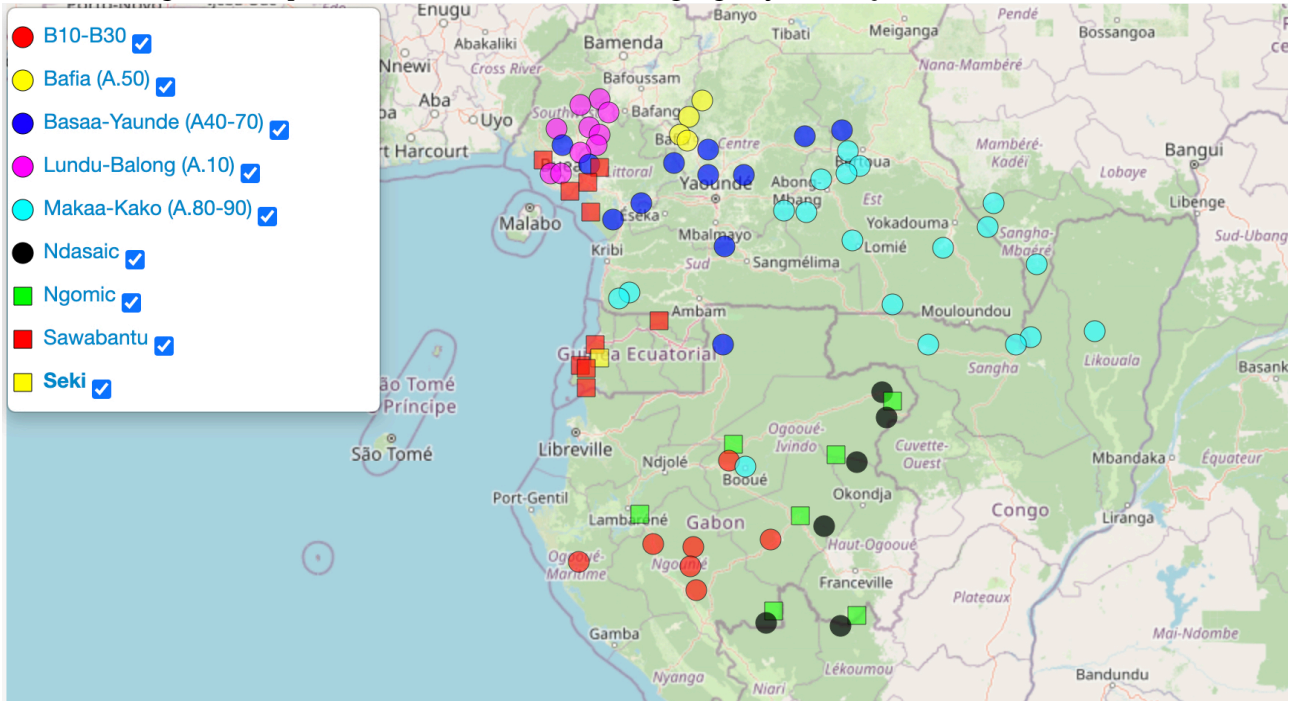
Language name	Bantu zone	ISO code	Data source
Balon	(A13)	bwt	Kouoh Mboundja (2004)
Bakweri	(A22)	bri	Hawkinson (1986)
Iyasa	(A33a)	yko	Brown (2021)
Basaa	(A43)	bas	Hyman (2003)
Bafia	(A53)	ksf	Guarisma (2000)
Nuasu	(A62A)	yav	Bébiné (2019)
Eton	(A71)	eto	Van de Velde (2008)
Gyeli	(A801)	gyi	Grimm (2021)
Kwakum	(A91)	kwu	Njantcho Kouagang (2018), Njantcho Kouagang and Van de Velde (2019)
Orungu	(B11b)	mye	Ambouroue (2007)
Ikota	(B25)	koq	Magnana Ekoukou (2015)
Pove	(B305)	buw	Mickala-Manfoumbi (1994)

Table 4: Sample of NW Bantu languages

– tone inventory

– maximal syllable length of verbs

– tonal distinctions on the verb radical

– GT on STAMP markers and verb stems

– GT conditioned by a phrase-medial position of the verb stem

– GT realized on immediate-after-verb elements

3.1   Dimensions of variation

Despite the many commonalities regarding the location of GT in the verb phrase and their functions of encoding TAMP categories and phrase-final/medial distinctions, there is a high level of variation in the details.

| Language | | Phonemic tone | Syllable max. | Verb radical | GT change | | Phrase-medial | GT on IAV |
Name	Zone	inventory	of verb stem	tone	STAMP	verb stem	GT change	
Balon	(A13)	H, L	3	L vs. H	yes	yes	yes	no
Bakweri	(A22)	H, L, !H	4	L vs. H	yes	yes	yes	no
Iyasa	(A33a)	H, L	4	L vs. H	yes	yes	yes	no
Basaa	(A43)	H, L	3	L vs. H	yes	yes	yes	yes
Bafia	(A53)	H, L, M	3	(L vs. H)	yes	yes	yes	yes
Nuasu	(A62A)	H, L, LH, ∅	4	L vs. H	yes	yes	no	no
Eton	(A71)	H, L, D	3	L vs. H	yes	yes	yes	yes
Gyeli	(A801)	H, L, HL, LH, ∅	3, mostly 2	L vs. H	yes	yes	yes	yes
Kwakum	(A91)	H, L, ∅	3, mostly 2	L vs. non-L	yes	yes	yes	no
Orungu	(B11b)	H, L, !H, HL, H!H	4	no contrast	yes	yes	no	no
Ikota	(B25)	H, L	4	L vs. H	yes	yes	no	no
Pove	(B305)	H, L, !H	3	L vs. H	yes	yes	yes	no

Table 5: Features of grammatical tone in NW Bantu verb phrases

- STAMP markers across NW Bantu synchronically have different underlying tones

  - toneless (Gyeli, Grimm 2021)

  - more similar to PB, e.g. 1SG, 2SG and classes 1 and 9 are L while the rest is H (Balon, Kouoh Mboundja 2004)

  - all speech-act-participants (first and second person in the singular and plural) and agreement class 1 are L, but not class 9, while the rest is H (Pove, Mickala-Manfoumbi 1994)

- GT patterns not only depend on a specific TAMP category but also on the agreement class of the subject.

  - all STAMP markers of all persons and agreement classes are H in all TAMP categories, except for agreement class 1, which is nearly always L

  - agreement class 1 STAMP marker surfaces H in the past irrealis
    → tone patterns are specific to individual TAMP categories, and each morphological verb slot is subject to change by GT

TAMP	AGR 1 's/he'		AGR 2 'they'	
PRS	è-kól-à	's/he buys'	ʋí-k!ól-à	'they buy'
	è-kól-íz-à	's/he sells'	ʋí-k!ól-íz-à	'they sell'
PST perfect/	à-kól-ì	's/he bought'	wá-kól-ì	'they bought'
resultative	à-kól-ì	's/he sold'	wá-kól-íz-ì	'they sold'
recent PST	à-kól-à	's/he bought'	wá-k!ól-à	'they bought'
	à-kól-íz-à	's/he sold'	wá-k!ól-íz-à	'they sold'
distant PST	à-ɣòl-í	's/he bought'	wá-ɣól-ì	'they bought'
	à-ɣòl-íz-í	's/he sold'	wá-ɣól-íz-ì	'they sold'
PST irrealis	á-ɣòl-è	'had s/he bought'	wá-ɣòl-è	'had they bought'
	á-ɣòl-ìz-è	'had s/he sold'	wá-ɣòl-ìz-è	'had they sold'
FUT	è-ɓé-k!ól-á	's/he will buy'	ʋí-ɓé-k!ól-á	'they will buy'
	è-ɓé-k!ól-íz-á	's/he will sell'	ʋí-ɓé-k!ól-íz-á	'they will sell'

Table 6: Tonal patterns in the Orungu verb inflection of *-kol-* 'buy'(Ambouroue, 2007)
Notes: The morphological template is STAMP-radical-(causative suffix *-íz-*)-final vowel. Agreement class 2 is representative of all classes other than AGR 1.

  - the radical in Orungu has no L vs. H contrast

  - basic TAMP categories are also encoded segmentally on the STAMP marker, a TAMP prefix, and the final vowel
    → the templatic tone structure in the Orungu verb inflection is thus rather different from Gyeli

- Variation in the underlying specification of tones in verb stems

  - a distinction of L vs. H on the radical

  - differences in tonal specifications of extension and final vowel suffixes (non-initial syllables)
    * toneless in Gyeli
    * L in Balon, but they differ depending on the number of syllables following the radical (Table 7)
    * Bakweri has a dissimilating tone on the final vowel: with H radicals, the final tone is L and, vice versa, with L radicals, the final vowel is H

    (8) Bakweri B22 (Hawkinson, 1986)
        a. H-toned radicals
           índ-à 'gossip'
           ók-à 'be sick'
           áv-à 'rotate, turn'

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Stem structure		H-toned radicals		L-toned radicals	
disyllabic	with final vowel	yúf-û	'ask'	yɔ̀l-ɔ̀	'laugh'
		kwál-ô	'scratch'	nùk-ɛ̀	'tremble'
		nún-û	'uproot'	nyàw-ò	'let'
	with extension	fɔ́l-îl	'calm sb.'	yàn-ìl	'forget'
		tél-îl	'open'	kɛ̀l-ìl	'attach'
		lók-ân	'drive'	kàk-àn	'promise'
		búl-âm	'observe'	bènd-âm	'perch'
trisyllabic		páŋ-ìnì	'scatter'	fèt-ìnì	'imitate'
		nyúŋgw-ɛ̀lɛ̀	'tip over'	bàk-ɛ̀lɛ̀	'accuse'
		ká-y-ìsɛ̀	'judge'	-	

Table 7: Tonal patterns of the Balon verb stem (Kouoh Mboundja, 2004: 232ff.)

b. L-toned radicals
   ìnd-á 'stay long'
   ɔ̀k-á 'play'
   àv-á 'sell'

∗ this pattern applies also to all non-initial syllables (unlike Balon)

(9) Bakweri B22 (Hawkinson, 1986)

a. H-toned radicals
   kɔ́k-ìsɛ̀ 'punish'
   ámb-ɛ̀lɛ̀ 'wait'
   kómb-ɛ̀nɛ̀ 'be near'

b. L-toned radicals
   làk-ísɛ́ 'forgive sb.'
   kòv-élɛ́ 'feed by hand'
   kàk-ɛ́nɛ́ 'promise'

- Location and direction of floating tone attachment

  – attachment before the stem and spread rightwards onto the stem OR

  – attachment on the right and spread leftwards

  – floating tones in Eton attach to both the left and the right of verb stems

  (10) Eton A71 (Van de Velde, 2008: 57-58)

  a. L-attachment to following syllable
     à-Ltɛ́ L-dí   → [àtɔ́ d!í]
     1-PRS INF-eat
     'She is eating.'

  b. L-attachment to preceding syllable
     mà-kód<Lg>ò   → [mà-kôdgò]
     1SG-leave<G.PST>
     'I left.'

  c. H-attachment to following syllable
     mà-H-k͡pὲlì   → [màk͡pɛ̂lì]
     1SG-PST-hurt.oneself
     'I hurt myself [in the past].'

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- Phrase-medial tone alternation "metatony"

  - phrase-final verbs surface L vs. phrase-medial verbs surface H
  - this alternation is conditioned by certain TAMP categories
  - "conjoint/disjoint distinction" in eastern and southern Bantu (Hyman, 2016), and "tone-case" in western Bantu (Kavari et al., 2012; Van der Wal, 2015)
  - grammatical functions of "metatony" differ
    * realis/irrealis distinction in Gyeli
    * coincides with past marking in Balon

      (11) Balon A13 (Kouoh Mboundja, 2004: 279)
        a. "disjoint" (phrase-final) form
           m̀ **bùmb-î**
           1SG grill-PST2
           'I grilled.'
        b. "conjoint" (phrase-medial) form
           m̀ **búmb** swî
           1SG grill fish
           'I grilled fish.'

    * "metatony" explained as a mere phonological pattern without a clear grammatical function (Abo A42, Hyman and Lionnet 2011)
    * conditions under which "metatony" occurs differ according to the TAMP categories that trigger "metatony"
    * all TAMP categories (except for the negative subjunctive) surface with a final H in Pove B305 (Mickala-Manfoumbi, 1994), due to the tonal specification of the final vowels: ǎ́ and ǐ́

      (12) Pove B305 (Mickala-Manfoumbi, 1994: 458)
        a. àsámápúm**à**dó
           à-sá-H-mà-púm-à-H-dó
           1-NEG-NEG-PST2-go.out-FV-FV-anymore
           'She did not go out anymore.'
        b. àsámápúm**á**dó   nà   mù-góle
           à-sá-H-mà-púm-à-H-dó   nà   mù-gólè
           1-NEG-NEG-PST2-go.out-FV-FV-anymore COM 1-milicien
           'She did not go out anymore with the milicien.'

  - Other factors that impact "metatony" concern the inflection status of the verb and sentence types.
    * In Iyasa A33, only the final syllable of infinitives takes a metatonic H tone (Brown, 2021: 47ff.), unless the infinitive occurs in a purpose clause.

- Grammatical tones on immediate-after-verb

  - Basaa A43
    * a H tone on an object noun prefix takes a H tone only if it is preceded by a metatonic H tone (Hyman, 2003: 280-281).
    * non-metatonic tenses with a verb-final H (past 3, future perfect, subjunctive and imperative) do not trigger a H on the object

  - Eton A71
    * "link" tone only occurs after infinitives
    * unlike in Gyeli, it does not seem to mark syntactic relations
    * the link tone does not get realized if another element appears between the verb and the object

(13) Eton A71 (Van de Velde, 2008: 206)

    a. àté kùl   **bí**kòb bí   tíd
       à-Ltɛ́ L-kùl   H   bì-kòb bí=tíd
       1-PRS INF-clean LT   8-skin 8.CON=animal
       'He cleans the skins.'

    b. àté kùl   vè **bì**kòb bí   tíd
       à-Ltɛ́ L-kùl   vè bì-kòb bí=tíd
       1-PRS INF-clean only 8-skin 8.CON=animal
       'He cleans only the skins.'

- GT may distinguish different sentence and clause types

  - tone is the sole exponent to encode the difference between the present in a main clause and in a relative clause in Ikota B25

  (14) Ikota (Magnana Ekoukou, 2015: 239)

    a. mwánà àdʒá   lɛ́tɛ̀
       child   eat.PRS rice
       'The child eats rice.'

    b. mwánà ádʒá   lɛ́tɛ̀
       child   eat.REL rice
       'the child that eats rice'

3.2 The distribution of segmental and tonal exponents in TAMP encoding

- There are three exponent types to encode grammatical categories in NW Bantu.

  - tonal sole exponent

  - tonal and segmental co-exponents

  - segmental sole exponent

- There has been little discussion of how tonal and segmental morphemes interact and distribute in single languages.

- "[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." (Rolle, 2018: 267)

Language		Tone only		Tone and segment		Segment only		Total TAMP categories
Balon	(A13)	3	(16.7 %)	14	(77.8 %)	1	(5.6 %)	18
Bakweri	(A22)	1	(7.1 %)	12	(85.7 %)	1	(7.1 %)	14
Iyasa	(A33)	1	(6,3 %)	4	(25 %)	**11**	(68,7 %)	16
Basaa	(A43)	**5**	(45.5 %)	4	(36.4 %)	2	(18.2 %)	11
Nuasu	(A62)	5	(22.7 %)	5	(22.7 %)	**12**	(54.5 %)	22
Eton	(A71)	4	(21 %)	9	(47.4 %)	6	(31.6 %)	19
Gyeli	(A801)	7	(36.8 %)	12	(63.2 %)	-		19
Kwakum	(A91)	-		13	(81.3 %)	3	(18.7 %)	16
Orungu	(B11)	-		19	(100 %)	-		19
Ikota	(B25)	-		18	(100 %)	-		18
Pove	(B305)	-		77	(100 %)	-		77

Table 8: The distribution of segmental and tonal exponents in encoding TAMP categories

- However, NW Bantu languages 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.

- While lexical tone seems to be similar across NW Bantu, the distribution of tonal and segmental exponents is more idiosyncratic and areally distributed.

  – GT and segmental co-exponents constitute the most common exponence type.
  – Bantu A languages have all three exponence types.
  – Bantu B languages only have the co-exponence type.

- There seems to be a relation between the number of exponent types a language has and the majority type.

  – If a language only has two exponents types, co-exponence is the main strategy.
  – If there is only one type, it is also co-exponence.
  – Only in languages with all three possible exponents types can sole exponence be the majority strategy.

- There are tendencies across languages for specific TAMP categories to be encoded by the same strategy.

  – Non-indicative categories such as the imperative (for singular addressees) and the subjunctive are prone to deviate from the main strategy.
  – Segment-only exponents have a tendency to encode past perfect(ive), negation categories, and also sometimes future, but never present.

Language	Tone only	Tone and segment	Segment only	Total
Balon	PRS, IMP SG, SBJV	all others	NEG FUT	18
Bakweri	IMP SG	all others	SBJV	14
Iyasa	near PST PRF	anterior, far PST PRF, NEG PRS, NEG non-PST	all others	16
Basaa	pluperfect, consecutive, FUT PRF, SBJV, IMP SG	PST1 PST2, PRS, FUT1	FUT2, NEG	11
Nuasu	PRF, situational, motional, SBJV, IMP SG	NEG FUT1, non-PST IRR, PST IRR, IMP PL, NEG IMP	all others	22
Eton	consecutive, SBJV, IMP SG, PST PRF 1	all others	PST PRF 2, relative imperfective, NEG *àá*, NEG *bé*, NEG *tè*	19
Gyeli	PRS, INCH, FUT, PST1, PST2, IMP SG, SBJV	all others	-	19
Kwakum	-	all others	PST1, PST3 PRF, PST4 PRF	16
Orungu	-	all	-	19
Ikota	-	all	-	18
Pove	-	all	-	77

Table 9: TAMP categories of minority exponent types

- Although, the main type of TAMP marking in Gyeli is by GT and segment co-exponence, the system in this language is still remarkable, since the GT-only categories constitute the basic system in the language that need to be obligatorily marked, while co-exponents include aspect and negation categories (Grimm, 2022).

4 Diachronic implications: Towards reconstructing grammatical tone in NW Bantu

- A conceivable path of historical development of GT in the verb phrase:
    - grammatical tones in the NW Bantu verb phrase mainly originate from tone-bearing segmental material in the pre-initial, post-initial and final verb slot
        * segmental material eroded
        * in parallel, the prosodic size of the verb was reduced to a maximum of three to four syllables
        * tones of the eroded material survived and attached to other TBUs (STAMP marker and verb stem)
- I am not aware of any literature describing actual instances of this scenario for the development of tone associated with TAMP markers.
- However, a well-known parallel case is the reduction of disyllabic verb stems to monosyllabic stems
    - monosyllabic stems host surviving tone and display contour tones in Nuasu (Bébiné, 2019: 56) or Eton (Van de Velde, 2008: 96)
    - floating H and L tones in Kwakum are explained historically by vowel loss and surviving tones by Njantcho Kouagang (2018: 55)
    - Balon has segmental (in addition to tonal) marking of the phrase-medial/final distinction, unlike all other languages in the sample → may give clue as to what a previous segment may have looked like
- In theory, it should be possible to reconstruct the origins of grammatical tone in the NW Bantu verb phrase
    - there are already crucial pieces in the existing reconstruction:
        * reconstruction of morphological verb template
        * loci of TAMP encoding
        * tonal specifications of verb radicals, extension suffixes, and the final vowel
    - complicating factor: grammatical tones depend on so many features of a language
        * underlying tone inventory
        * rules that govern a tone's mobility
            → significant variation as to how GT plays out in individual languages
            → the encoding of grammatical functions is majoritarily achieved by co-exponents: segmental markers are accompanied by seemingly random tonal co-phonologies
- Studying the development of tonal co-phonologies of segmental TAMP markers is thus more challenging.
    - behavior of tones that accompany segments seem to affect targets in idiosyncratic ways
    - tonal behavior may not only be influenced by the synchronic system of a language but by historic artifacts
    - individual grammatical morphemes in proto-forms possibly already came with their own tonal co-phonologies
- Solutions and next steps: compare closely related languages within the same subgroup
    - possibly lower levels of variation in the GT system may give an indication of directions of development
    - study phonological and grammatical systems at large, beyond merely the verb and TAMP system

* phonological basis of a language: distinctive tones and tone rules, TBU, syllable structure and structure of prosodic units
* grammatical level: cover TAMP categories as exhaustively as possible
* tonal behavior of nouns and noun phrases
* verbs need to be viewed within sentences (beyond simple subject plus verb constructions)
* different sentence types

- Current status of description of NW Bantu languages

  - lack a grammatical description entirely
  - existing descriptions do not sufficiently cover all areas in the grammar where GT plays a role
  - distinctive tones are still left out of some descriptions
  - even if surface tones are transcribed, which is not always the case, it is unclear which tones are phonemic
  - many descriptions lack a separate transcription line in the glossing that represents the underlying tone → interpretation of underlying tones and tonal processes opaque
  - some descriptions lack glossed examples entirely (only transcription and translation)
  - analyses are not sufficiently argued for and alternative analyses are not ruled out
  - most authors do not make their primary data accessible → impossible to verify the given analyses

  → the description of tonal systems is often incomplete and hard to compare

5 Conclusion

- Take-away points

  - first systematic analysis of GT in the verb phrase of NW Bantu languages
  - three dedicated loci for GT to attach to
    1. tonal melody of the STAMP marker and the adjacent verb stem
       (in all languages of the sample)
    2. right edge of the verb depending on the verb's position as phrase-final or phrase-medial
       (in most languages of the sample)
    3. GT immediately after the verb attaching to following parts of speech
       (in only a few languages of the sample)
  - Despite these commonalities, language specifics on how GT is realized and under which conditions varies substantially.
  - Three exponence types to encode TAMP categories: sole GT exponents, GT and segmental co-exponents, and sole segmental exponents
    * GT occurs majoritarily as a co-exponent, together with a segmental morpheme.
    * nearly all Bantu A languages allow for all three exponence types
    * Bantu B languages in the sample only have the co-exponence type
    * sole GT exponents often encode non-indicative categories
    * sole segmental exponents often encode past perfect and negation categories

- The broader picture

  - Advances in the understanding of GT and its historical dimensions will shed light on patterns in tone system changes that are characterized by a range of tonological operations.
  - It also provides insight into the interplay between tonal and segmental morphology in verb inflection.

6 Discussion points

- The concept of functional load
  - "The term *functional load* describes how much information a (co-)exponent contributes to the meaning." (Grimm, 2022)
  - in sole exponents, the form carries 100% of the information
  - information is often not equally distributed over co-exponents, but the segmental co-exponent seems to contribute more to the meaning
  - possible other ways to define a high functional load, e.g. by systematicity or paradigmaticity of tone (e.g. in San Juan Piñas Mixtec, GT in verb derivation have segmental allomorphs, which are conditioned tonally (Caballero, p.c.))

- The role of tonal melodies
  - how to distinguish tones originating from lost segments from tonal melodies

- Next steps: adding more details on the tonal and segmental morphology interplay, e.g.
  - where in the verb a GT attaches
  - what type of tone (H or L) and/or tonal operation
  - link the specific tonal properties to specific TAMP categories

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