

# Syllable-counting Tone Allomorphy in Bari

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# The $1\sigma$ -Syndrome in Bari Tone Morphology

Monosyllabic bases differ idiosyncratically

from polysyllabic bases

in tone presence, quality & alignment

## Same Tone – Different Alignment

	H			LHL		
1 $\sigma$	pé	→	pé-jà 'shoot'	ré	→	rè-jâ 'sweep'
> 1 $\sigma$	bóró	→	bóró-jâ 'smear'	kàbûr	→	kàbûr-jà 'agitate'

# Antipassive Tone

## Same Tone – Different Alignment

	H	LHL																					
$1 \sigma$	<table><tr><td>H</td><td>-L</td></tr><tr><td> </td><td> </td></tr><tr><td>pe</td><td>ja</td></tr></table>	H	-L			pe	ja	<table><tr><td>L</td><td>H</td><td>L</td><td>L</td></tr><tr><td> </td><td></td><td> </td><td> </td></tr><tr><td>re</td><td></td><td></td><td>ja</td></tr></table>	L	H	L	L					re			ja			
H	-L																						
pe	ja																						
L	H	L	L																				
re			ja																				
$> 1 \sigma$	<table><tr><td>H</td><td></td><td>-L</td></tr><tr><td> </td><td></td><td> </td></tr><tr><td>bo</td><td>ro</td><td>ja</td></tr></table>	H		-L				bo	ro	ja	<table><tr><td>L</td><td>H</td><td>L</td><td>L</td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td>ka</td><td>bur</td><td>ja</td><td></td></tr></table>	L	H	L	L					ka	bur	ja	
H		-L																					
bo	ro	ja																					
L	H	L	L																				
ka	bur	ja																					

The  $1\sigma$ -Syndrome

$\approx$

Syllable-counting tonal allomorphy

# Claim I

Allomorphs of tonal Morphemes

exhibit syllable-counting allomorphy

which must be captured by morphological selection

(Bye 2008, Embick 2010, Paster 2006, 2009, 2015)

# Claim II

Tonal Allomorphs of Morphemes

may select the strata on which they apply

Stem Level → **early** allomorphs

Word Level → **late** allomorphs

# Antipassive Tone

Antipassive ↔ (**Early**) -L /  $\sigma$  —

Antipassive ↔ (**Late**) -L /  $\sigma\sigma \dots$  —



# More general Claims

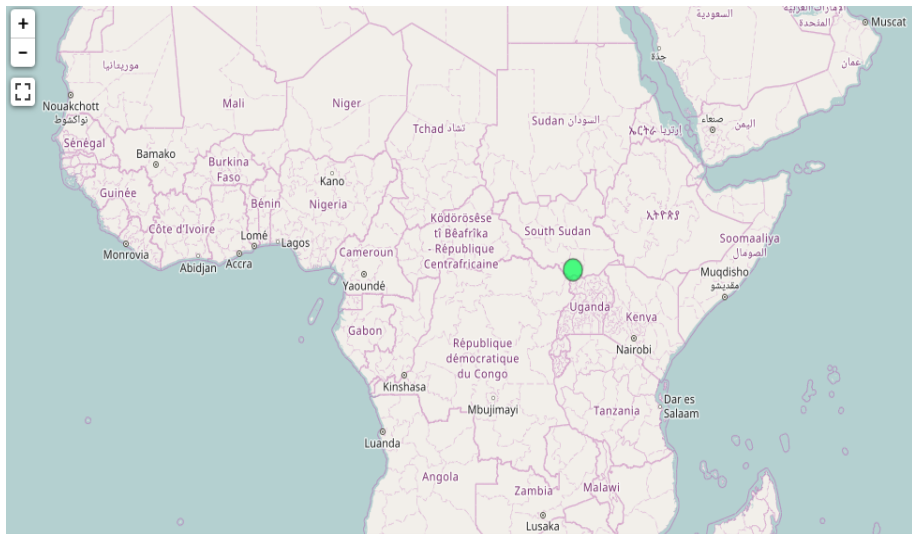
- ▶ **Tonal Independence Hypothesis:** Tonal exponents may be independent morphologically (in selection and stratal affiliation) from corresponding segmental exponents
  
- ▶ **Allomorphic Independence Hypothesis:** Phonologically conditioned allomorphs may be independent morphologically (in selection and stratal affiliation) from their coallomorphs

Bari

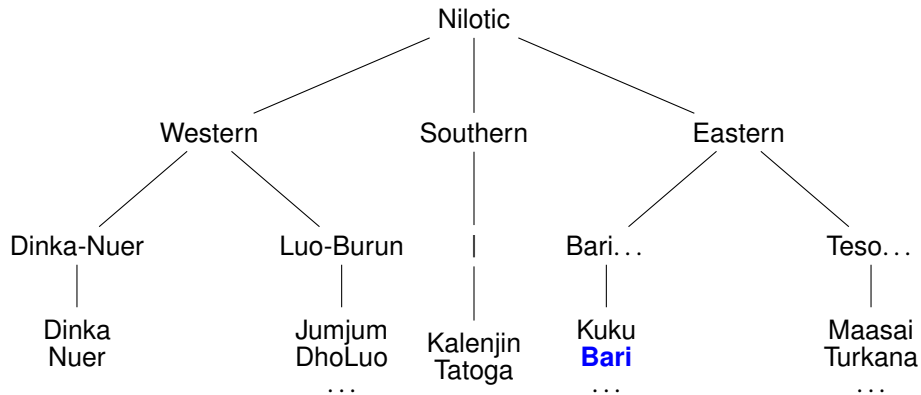
# Bari (Owen 1908, Spagnolo 1933, Yokwe 1986)

- ▶ **Eastern Nilotic** language spoken in parts of Southern Sudan, Northwest Uganda & the Democratic Republic of Congo
- ▶ **Polysynthetic**, mainly suffixing, grammatical verb tone and complex phrasal tonology
- ▶ **H**(igh), **L**(ow) tones and word-final **F**(alling) (HL) tones
- ▶ All data discussed in this talk from the comprehensive tonal grammar of Yokwe (1986)

## Bari



# Nilotic Languages



# Bari Verbs

- ▶ 2 lexical tone melodies: **H** and **LHL**
- ▶ Inflection for:
  - tense/aspect/mood (non-past/habitual/imperative),
  - valency ((anti-)passive, benefactive, causative, instrumental)
  - direction (ventive/itive)
- ▶ Non-tonal expression by **suffixes** (prefixes & reduplication)
- ▶ Additional tone (or tonal overwriting)

## Instrumental Tone

(Yokwe 1986:59)

	<b>H</b>			<b>LHL</b>		
<b>1</b> $\sigma$	pé	→	pé-fî 'shoot'	ŋí	→	ŋì-fî 'raise'
<b>&gt; 1</b> $\sigma$	bújúd	→	bújúd-dî 'sharpen'	sàpûk	→	sàpúg-gì 'overturn'

# Instrumental Tone

	H	LHL
<b>1</b> $\sigma$	<p>H    -L pe    -ji</p>	<p>L   H   L   -L ŋi            -ji</p>
<b>&gt; 1</b> $\sigma$	<p>H                    -L bu    jud    -di</p>	<p>L            H   L   -L sa    pug    -gi</p>



# Instrumental Tone

Instrumental ↔ (Late) -L

# Theoretical Assumptions

# Theoretical Assumptions

- ▶ **Autosegmental Containment:** (extending Prince & Smolensky 1993)  
Underlying material  
is never literally deleted, but retained in the output,  
(but may be marked as phonetically invisible).
- ▶ **Stratal OT:** Root-Level Stem-Level, and Word-Level Evaluations  
feed each other serially. Different levels have potentially different  
optimality-theoretic constraint rankings
- ▶ **Constraint Cloning:** (cf. Cloning in Correspondence Theory, McCarthy & Prince 1995)  
All markedness constraints are assumed to exist in two versions,  
one referring only to phonetically visible material,  
and one to all material in a given structure.

# Representation of Association Lines (Zimmermann & Trommer 2011)

Morphological association lines		Epenthetic association lines
phonetically visible:	phonetically invisible:	phonetically visible:
X   Y	X ⋮ Y	X ⋮ Y

# Allomorphy by Prosodic Subcategorization (Paster 2006, 2015)

- ▶ Affixes can be **morphologically** specified for the prosodic shape of the base to which they attach
- ▶ Subcategorization is **arbitrary**  
(and hence potentially non-optimizing)
- ▶ Subcategorization targets the **input** not the output of affixation  
(the base, not the resulting derived form) → potential for opacity

# Basic Analysis

# Basic Analysis

## Tone allomorphs ...

- ▶ ... select monosyllabic or longer bases
- ▶ ... specify phonological content (H vs. L)
- ▶ ... select affiliation to Stem-Level (**dominant**)  
or Word-Level phonology (**recessive**)

# Additional Assumptions

- ▶ All segmental affixes are **early** (stem-level)
- ▶ Lexical tone melodies are underlyingly **not** associated to roots



# The Morphology-Phonology Interface

Three Steps:

1. Selection
2. Stem-Level Morphophonology
  - Stem-Level Affixation
  - Stem-Level Phonology
3. Word-Level Morphophonology
  - Word-Level Affixation
  - Word-Level Phonology

## Passive Tone

(Yokwe 1986:62,63)

## Different Tones – Different Alignment

	H			LHL			
<b>1</b> $\sigma$	lók	→	lók-â	'entrap'	mók	mòk-â	'catch'
<b>&gt; 1</b> $\sigma$	bújút	→	bújút-á	'sharpen'	sàpûk dìlìlì	sàpúk-á dìlìlì-já	'turn over' 'winnow'

## Bari Passive Tone Allomorphy

(Yokwe 1986:62,63)

## Different Tones – Different Alignment

	H	LHL
1 $\sigma$		
> 1 $\sigma$		

# Passive Tone Allomorphs

Passive ↔ (Late) **-L** /  $\sigma$  —

Passive ↔ (Early) **-H** /  $\sigma\sigma\dots$  —

Passive Stem-Level Allomorph (Base  $> 1\sigma$ )

Root Level	L	H	L	
+ Selection	di	li	li	
<hr/>				
Stem-Level Affixation	L	H	L	H
	di	li	li	ja
Stem-Level Phonology	L	H	L	H
	 di	 li	 li	 ja
<hr/>				
Word-Level	L	H	L	H
	 di	 li	 li	 ja

# Passive Word-Level Allomorph (Base = $1\sigma$ )

Root Level  
+  
Selection

H  
lo k

---

Stem-Level Affixation

H  
lo ka

Stem-Level Phonology

H  
lo ka

---

Word-Level Affixation

H L  
lo ka

Word-Level Phonology

H L  
lo ka

# Passive **Dominant** Stem-Level Allomorph (Base > 1 $\sigma$ )

Root Level	L	H	L
+			
Selection	sa	pu	k

---

Stem-Level Affixation	L	H	L	<b>H</b>
	sa	pu	ka	

Stem-Level Phonology	L	H	L	<b>H</b>
	sa	pu	ka	

---

Word-Level	L	H	L	<b>H</b>
	sa	pu	ka	

# Markedness and Faithfulness Constraints

- \*R      Assign \* to every syllable with a phonetic rising tone
  
- \*F      Assign \* to every syllable with a phonetic falling tone
  
- MAX |    Assign \* to every association line  
          which is in the input, but not in the output
  
- DEP |    Assign \* to every association line  
          which is in the output, but not in the input



# Constraints on Tone Association

$H \rightarrow \sigma$  Assign \* to every H-tone  
which is not associated to a syllable

$[\tau \rightarrow \sigma$  Assign \* to every PWord-initial tone  
which is not associated to a syllable

$L \rightarrow \sigma$  Assign \* to every L-tone  
which is not associated to a syllable

# Constraint on Morphophonological Alignment


CONTIGUITY  $\tau$

Assign \* to every  $\sigma$  associated to a tone of color  $\kappa'$  intervening between two syllables associated to tones of morphological color  $\kappa$  (where  $\kappa \neq \kappa'$ )

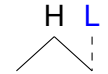
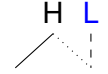
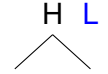
## Passive Polysyllabic Base (Stem Level)

Input: = c.				<u>*R</u>	H → σ	[τ → σ	L → σ	<u>*F</u>	DEP
		L	H	L	H				
☞	a.	di	li	li	ja				****
		L	H	L	H				
	b.	di	li	li	ja	*!			*****
		L	H	L	H				
	c.	di	li	li	ja	*!*	*	**	

Passive Polysyllabic Base: **Dominance** (Stem Level)

Input: = e.	<u>*R</u>	H → σ	[τ → σ	L → σ	<u>*F</u>	DEP
 a.    L    H    L    H                / sa   pu   ka				*		***
b.    L    H    L    H                \ sa   pu   ka	*!					****
c.    L    H    L    H /    \    / sa   pu   ka			*!	*		***
d.    L    H    L    H             sa   pu   ka		*!				***
e.    L    H    L    H             sa   pu   ka		*!*	*	**		

# Passive Monosyllabic Base: **Recessiveness** (Word Level)

Input: = c.	<u>*R</u>	MAX	L → $\sigma$	<u>*F</u>	DEP
 <p>a. lo ka</p>				*	*
 <p>b. lo ka</p>		*!			*
 <p>c. lo ka</p>			*!		

# Extensions

## Antipassive Tone

(Yokwe 1986:42,43,45,46)

## Same Tone – Different Alignment

	H			LHL				
1 $\sigma$	pé	→	pé-j <sup>à</sup>	'shoot'	ré	→	rè-jâ	'sweep'
> 1 $\sigma$	bóró	→	bóró-j <sup>â</sup>	'smear'	kàbûr	→	kàbûr-jà	'agitate'

# Antipassive Tone

## Same Tone – Different Alignment

	H	LHL
$1 \sigma$	H      -L          pe    ja	L   H   L   L       \   / re     ja
$> 1 \sigma$	H                      -L                          bo                    ro                    ja	L                      H                      L                      L                                                                        ka                    bur                    ja

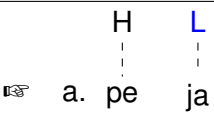
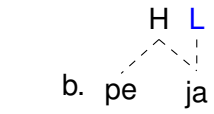
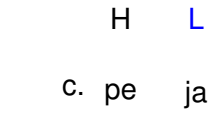


# Antipassive Tone


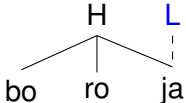
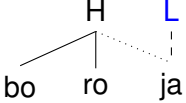
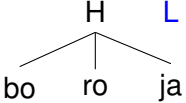
Antipassive ↔ (**Early**) -L /  $\sigma$  —

Antipassive ↔ (**Late**) -L /  $\sigma\sigma \dots$  —

## Antipassive Monosyllabic Base (Stem Level)

Input: = e.	* <u>R</u>	H → σ	[τ → σ	L → σ	* <u>F</u>	DEP
 a. pe ja						**
 b. pe ja					*!	***
 c. pe ja		*!	*	*		

## Antipassive Polysyllabic Base (Word Level)

Input: = c.	<u>*R</u>	MAX	L → $\sigma$	<u>*F</u>	DEP
 a. 				*	*
b. 		*!			*
c. 			*!		

## Ventive Tone

(Yokwe 1986:48-50)

## Tonal Affix vs. No Affix

	H	LHL
<b>1</b> $\sigma$	dép → dép- <b>ún</b> 'hold'	mó → mò- <b>kún</b> 'catch'
<b>&gt; 1</b> $\sigma$	bújút → bújút- <b>ún</b> 'sharpen'	sàpûk → sàpûk- <b>ùn</b> 'overturn'

# Ventive Tone

## Tonal Affix vs. No Affix

	H	LHL
1 $\sigma$	H    H        dep   un	L   H   L   H     \   /     mok   un
> 1 $\sigma$	H /   \   \   \   \ bu   jut   un	L   H   L     \   /   \   \ sa   puk   un

(cf. L-deletion with trisyllabic passive roots)

# Ventive Tone

Benefactive ↔ (Early) **-H** /  $\sigma$  —

(Benefactive ↔ **Ø** /  $\sigma\sigma\dots$  —)

## Ventive Monosyllabic Base (Stem Level)

Input: = e.	* <u>R</u>	H → σ	[τ → σ	L → σ	* <u>F</u>	DEP
<p>a. mo kun</p>				*		***
<p>b. mo kun</p>			*!	**		**
<p>c. mo kun</p>		*!				***
<p>d. mo kun</p>	*!	*!				***
<p>e. mo kun</p>		*!*	*	**		

## Benefactive Tone

(Yokwe 1986:24-25)

## Syllable Counting vs. Mora Counting

	H			LHL				
1 $\sigma$	ló	→	ló- <b>kín</b>	'spread'	mó	→	mò- <b>kín</b>	'smell'
> 1 $\sigma$	búdú	→	búdú-kín	'hasten'	tòkû	→	tòkú-kìn	'preach'

**But:** sùt → sùt-ákin 'bet'



## Benefactive Tone

(Yokwe 1986:24-25)

	H				LHL			
1 $\mu$	l $\acute{o}$	→	l $\acute{o}$ -k $\acute{i}n$	'spread'	m $\acute{o}$	→	m $\grave{o}$ -k $\acute{i}n$	'smell'
> 1 $\mu$	d $\acute{e}r$	→	d $\acute{e}r$ - $\acute{a}k\acute{i}n$	'cook'	s $\acute{u}t$	→	s $\grave{u}t$ - $\acute{a}k\acute{i}n$	'bet'
	b $\acute{u}d\acute{u}$	→	b $\acute{u}d\acute{u}$ -k $\acute{i}n$	'hasten'	t $\grave{o}k\acute{u}$	→	t $\acute{o}k\acute{u}$ -k $\acute{i}n$	'preach'

# Benefactive Tone

Benefactive ↔ (Early) **-H** /  $\mu$  —

Benefactive ↔  $\emptyset$  /  $\mu\mu\dots$  —

## Imperative Tone

(Yokwe 1986:81-82)

## Tone Addition vs. Overwriting

	H			LHL				
<b>1</b> $\sigma$	dér	→	dèr-é	'cook'	mók	→	mòk-ê	'catch'
<b>&gt; 1</b> $\sigma$	bújút	→	bùjùt-ê	'sharpen'	sàpûk	→	sàpùk-ê	'overturn'

# Imperative Tone

## Tone Addition vs. Overwriting

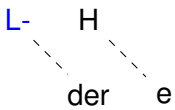
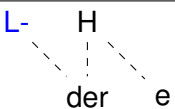
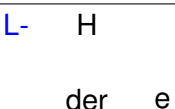
	H	LHL
$1 \sigma$	<p>L- H der e</p>	<p>L- L H L mok e</p>
$> 1 \sigma$	<p>L- H -L bu yut e</p>	<p>L- L H L -L sa puk e</p>

# Imperative Tone

Imperative ↔ (Early) **L-** / σ —

Imperative ↔ (Early) **L-** **-L** / σσ... —

## Imperative Monosyllabic

Input: = c.	* <u>R</u>	H → σ	[τ → σ	L → σ	* <u>F</u>	DEP
 a.						**
 b.	*!					***
 c.		*!	*	*		

## Imperative Polysyllabic

Input: = d.	* <u>R</u>	CONT	H → $\sigma$	[ $\tau$ → $\sigma$	L → $\sigma$	* <u>F</u>	DEP
<p>a. bo ro ne</p>						*	****
<p>b. bo ro ne</p>		*!					***
<p>c. bo ro ne</p>	*!						****
<p>d. bo ro ne</p>			*!	*	**		

## Default Tone

(Yokwe 1986:24-25)

	H				LHL			
<b>1</b> $\sigma$	ló	←	ló-kín	'spread'	<b>mó</b>	←	mò-kín	'smell'
> <b>1</b> $\sigma$	búdú	←	búdú-kín	'hasten'	tòkû	←	tòkú-kìn	'preach'



# Verbal Default Tone

## Tonal Affix vs. No Tonal Affix


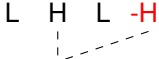
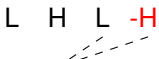

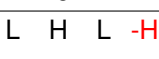
	H	LHL
$1 \sigma$		
$> 1 \sigma$		

# Verbal Default Tone

v ↔ (Early) **-H** / σ —

(v ↔ ∅ / σσ... —)

## Default Suffix - Monosyllabic LHL root

Input:e	* <u>R</u>	MAX	H → σ	[τ → σ	τ → σ	* <u>F</u>	DEP	NOGAP
a. 	*!*					*	****	
b. 				*	**		**	*
c. 	*!		*	*	**		****	
d. 			*!	*	**	*	***	
e. 			*!*	*	****	*	***	

# Tonal Allomorphy

	$1 \sigma$	$> 1 \sigma$
<b>Passive</b>	Recessive -L	Dominant -H
<b>Antipassive</b>	Dominant -L	Recessive -L
<b>Ventive</b>	Dominant -H	∅
<b>Benefactive</b>	Dominant -H	∅
<b>Default</b>	Dominant -H	∅
<b>Imperative</b>	Dominant L-	Dominant L- -L
<b>Instrumental</b>	Recessive L	
<b>Causative</b>	Dominant L- -L	

(for  $\mu s$ )

# Arguments for the Selection Analysis

1. Tone in affixed forms differs idiosyncratically from identical tone melodies in unaffixed forms (e.g. **mò-kín** 'smell-Benefactive' vs. **tòkû** 'preach', both monosyllabic and with underlying LHL tone).
2. Both quality (H vs. L) and dominance values of affixal tones might be restricted to  $1\sigma$  or to longer forms.
3. Patterns as the Antipassive are unnatural since under standard assumptions on tone mapping recessiveness (i.e. final contour tones) are expected to occur preferentially in shorter, not in longer forms.

# Summary

- ▶  $1\sigma$ -syndrome  $\approx$  **Syllable-counting tone allomorphy**
- ▶ Tone allomorphy in Bari is **arbitrary** – must be captured by affix-specific selection
- ▶ Morphological **Independence** of tonal and segmental affixes for strata and selection
- ▶ covers a wide range of apparently heterogeneous patterns in the language

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# Overview

Intro

Claims

Bari

Theoretical Assumptions

Basic Analysis

Extensions

Antipassive

Ventive

Benefactive

Imperative

Verbal Default Tone