

Three-level vowel length and phantom quantity in Shilluk



The Leverhulme Trust

Bert Remijsen
University of Edinburgh



Introduction

- Proto West Nilotic had a rich system of morphology, marked by vocalic suffixes (Andersen 1990).

*CVC

*CVC-V

*CVVC

*CVVC-V

- Several West Nilotic languages went on to lose final vowels.
- If nothing else happens, this would result in neutralisation...

Introduction

- But many things did.
- Neutralisation is avoided in morphological paradigms (Blevins & Wedel 2009).
- Typologically unusual / phonetically challenging patterns develop more easily if they have the effect of retaining morphological contrast (Blevins 2004).

Introduction

- In this presentation, I present a descriptive analysis of quantity phenomena which ensued in Shilluk, one of the daughter languages of Proto West Nilotic.
- They include:
 - Three-level vowel length
 - Overlength in roots
 - Floating quantity
 - Morphological shortening

Three-level vowel length

Three-level vowel length

- Compensatory lengthening in a language with a vowel length contrast yields three-level vowel length (cf. Hayes 1989):

*CVC > CVC

*CVC-V > CVVC

*CVVC > CVVC

*CVVC-V > CVVVC

Three-level vowel length

- Compensatory lengthening in a language with a vowel length contrast yields three-level vowel length (cf. Hayes 1989):

*CVC > CVC

*CVC-V > CVVC

*CVVC > CVVC

*CVVC-V > CVVVC

- This is the development described for Dinka (Andersen 1987, 1990).

Three-level vowel length

Table. Morphological vowel length (grade) in Dinka, illustrated by a minimal set example.

Morphological length (grade)

Short

ràaan ǎ-lèl 

person DECL.S-isolate:2s

‘You isolate someone.’

Long





ràaan ǎ-lèel 

person DECL.S-isolate:3s

‘He isolates someone.’





Three-level vowel length

Table. Lexical vowel length and morphological vowel length (grade) in Dinka, illustrated by a minimal set example.

		Morphological length (grade)	
		Short	Long
Lexical length	Short	ràaan ǎ-lèl  person DECL.S-isolate:2s 'You isolate someone.'	ràaan ǎ-lèel  person DECL.S-isolate:3s 'He isolates someone.'
	Long	ràaan ǎ-léel  person DECL.S-provoke:2s 'You provoke someone.'	ràaan ǎ-lèeel  person DECL.S-provoke:3s 'He provokes someone.'

Three-level vowel length

Table. Lexical vowel length and morphological vowel length (grade) in Dinka, illustrated by a minimal set example.

		Morphological length (grade)	
		Short	Long
Lexical length	Short	ràaan ǎ-lèl  person DECL.S-isolate:2s 'You isolate someone.'	ràaan ǎ-lèel  person DECL.S-isolate:3s 'He isolates someone.'
	Long	ràaan ǎ-léel  person DECL.S-provoke:2s 'You provoke someone.'	ràaan ǎ-lèeel  person DECL.S-provoke:3s 'He provokes someone.'

Three-level vowel length

- Analysed in Trommer (2014) using moraic affixes, which mirror the diachronic development.

Three-level vowel length

- Shifting the focus to Shilluk, the outcome of compensatory lengthening is slightly different:

*CVC > CVC

***CVC-V > CVVVC**







*CVVC > CVVC

*CVVC-V > CVVVC

- That is, lengthening of short roots is ‘overlengthening’ in Shilluk.







Three-level vowel length

- There are three patterns of quantity alternation in the inflectional morphology of verbs:

	PAST	PAST 2SG		
Fixed Short	á-ηόl	á-ηòl	'cut'	 
Short with Grade	á-cám	á-càaam	'eat'	 
Long with Grade	á-kέεl	á-kèεεl	'stab'	 







Three-level vowel length

- The same patterns of quantity alternation appear in noun morphology. Here with suffixless base forms:

	BASE	DEMONSTR.		
Fixed Short	ḍók	ḍóḥ	'mouth'	 
Short with Grade	káḥ	káaaḥ	'trumpet'	 
Long with Grade	gàḥt	gàḥḥḥ	'river bank'	 

Three-level vowel length in Shilluk

- ... and again with suffixed base forms, albeit in the opposite direction:

	BASE	DEMONSTR.		
Fixed Short	pîc-ò	pîŋ-ì	‘tethering pole’	 
Short with Grade	pâaal-ò	pâl-ì	‘knife’	 
Long with Grade	bòowɔ̄-ò	bòowɔ̄-ì	‘craftsman’	 

Putting the three-level vowel length analysis to the test
(Remijsen, Ayoker & Jørgensen, in press)

Three-level vowel length

- We selected 8 minimal sets (2 for each of 4 vowels).

	Short	Long	Overlong
/ɛ/	léŋ ‘beat:NOM’ kél ‘peel.w.teeth:NOM’	léɛŋ ‘throw:NOM’ kéɛl ‘separate:NOM’	léɛɛŋ ‘throw:NOM:PERT.P’ kéɛɛl ‘separate:NOM:PERT.P’
/a/	pál ‘dodge:NOM’ lám ‘pray:NOM’	páal ‘surgery.knife’ láam ‘prayer’	páaal ‘surgery.knife:PERT.P’ láaam ‘pray:NOM:PERT.P’
/ɔ/	kól ‘take.out:NOM’ ṭól ‘eat:NOM’	kóol ‘herd:NOM’ ṭóol ‘rope’	kóool ‘herd:NOM:PERT.P’ ṭóool ‘rope:PERT.P’
/u/	dúp ‘mess.up:NOM’ gít ‘stab:NOM’	dúup ‘rodent’ gíut ‘navel’	dúuup ‘rodent:PERT.P’ gíuut ‘navel:PERT.P’

Three-level vowel length

- Frames: utterance-medial between low tone targets

Short

dâa dúp kî kên

EXIST mess.up:NOM PREP place:DEM

‘There is messing up here.’



Long

dâa dúup kî kên

EXIST rodent PREP place:DEM

‘There is a rodent here.’



Overlong

dâa dúuup jîi

EXIST rodent:PERT.P people

‘There is a rodent of people.’



Three-level vowel length

- Data recorded with eight native speakers.

Three-level vowel length

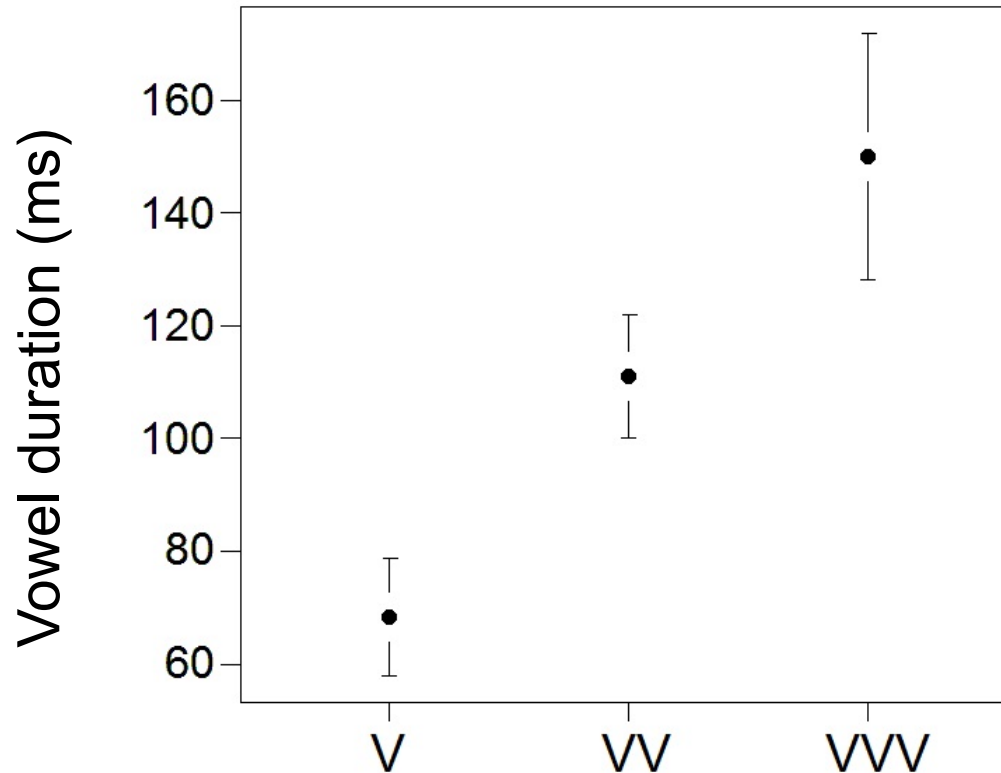


Figure. Means and standard deviation for vowel duration by Vowel length (V, VV, VVV), based on 8 minimal sets recorded with 8 speakers.

Three-level vowel length

- The level of vowel length is largely predictable based on vowel duration: correct classification result of 96% in Linear Discriminant Analysis (LDA).

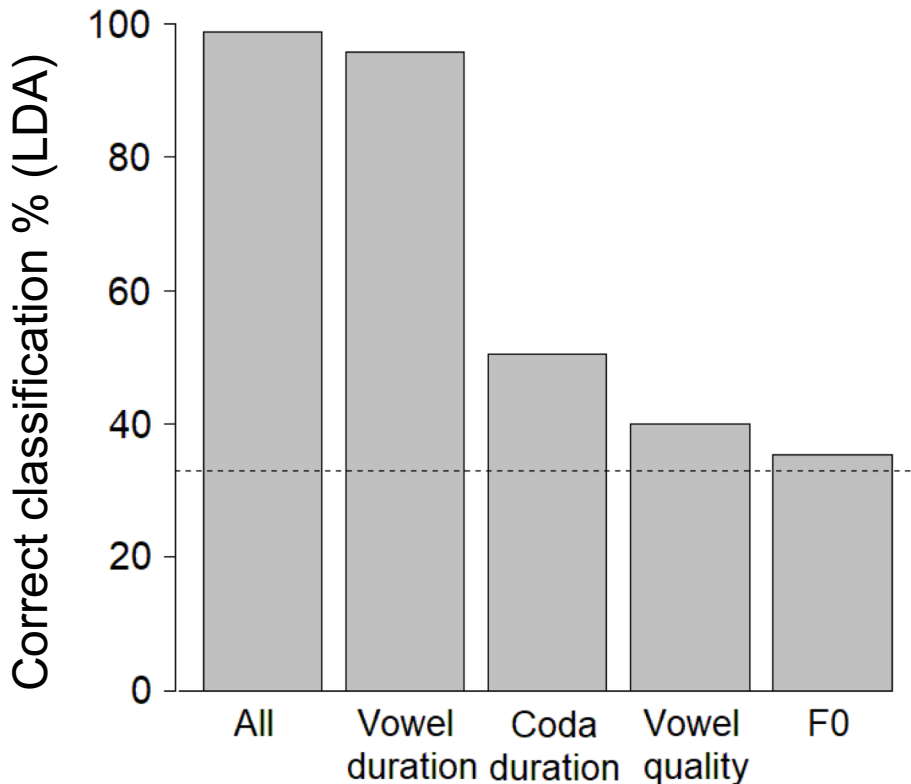


Figure. Percentage of items correctly classified for Vowel length in LDA on the basis of different measurements.

Overlength at the level of lexical roots

Overlength in lexical representations

- The great majority of Shilluk content words have a root with a short or a long vowel somewhere in their paradigm.

Overlength in lexical representations

- But there are some intransitive verbs that have an overlong stem vowel throughout.

PAST	IMPERF	INVERSION	
á-jûuuṭ	ú-jûuuṭ-ò	júuuṭ̄	‘finish’
á-dâââr	ú-dâââr-ò	dâââr̄	‘become tired’
á-tûuuḷ	ú-tûuuḷ-ò	tûuuḹ	‘come up’

- There is no evidence to support anything other than an overlong vowel at the lexical level for these roots.

Overlength in lexical representations

- Presumably these are historically derived from verbs with a short or a long root vowel.
- Synchronically, however, there is no evidence for which.
- Interesting departure from Dinka, where all content roots appear either with a short or a long stem vowel, which led Dimmendaal (1995) to postulate binary vowel length in the lexicon.
- Crucially, in Shilluk overlength cannot be limited in this way.

Floating quantity

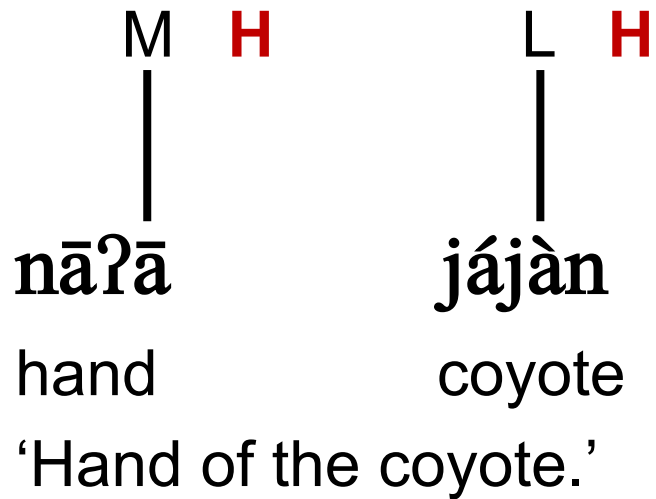
Floating quantity / floating tone in Mixtec (McKendry 2013)

Floating quantity / floating tone in Mixtec (McKendry 2013)

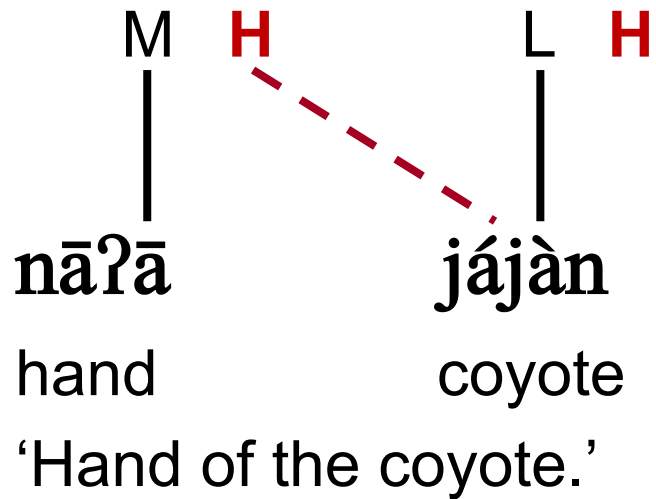
M H
|
nāʔā
hand
'Hand.'



Floating quantity / floating tone in Mixtec (McKendry 2013)



Floating quantity / floating tone in Mixtec (McKendry 2013)



Floating quantity / Rise-toned singulars

- There are suffixless and suffixed singular paradigms:

Inflection	Suffixless (‘warthog’)	Suffixed (‘neck’)
Base	kùl	mûn-ò
Pert., sg.	kùl	mûn-ì
Pert., pl.	kǔl	mûn-í
Construct state	kùl	mûn-ì
Demonstrative	kùl	mûn-ì

Floating quantity / Rise-toned singulars

- Rise-toned suffixless singulars are in between:

Inflection	Suffixless (‘warthog’)	Suffixed (‘neck’)	Rise-in-base (fishing spear)
Base	kùl	mûn-ò	běṭ
Pert., sg.	kùl	mûn-ì	bèṭ-ì
Pert., pl.	kǔl	mûn-í	bèṭ-í
Construct state	kùl	mûn-ì	bèṇ-ì
Demonstrative	kùl	mûn-ì	bèṇ-ì

Floating quantity / Rise-toned singulars

dâa kùl

EXIST warthog

‘There is a warthog.’



dâa kùl á-kjèl

EXIST warthog CARD-first

‘There is one warthog.’



dâa mûn-ò

EXIST neck

‘There is a neck.’



dâa mûn-ò á-kjèl

EXIST neck CARD-first

‘There is one neck.’



dâa bět

EXIST fishing.spear

‘There is a fishing spear.’



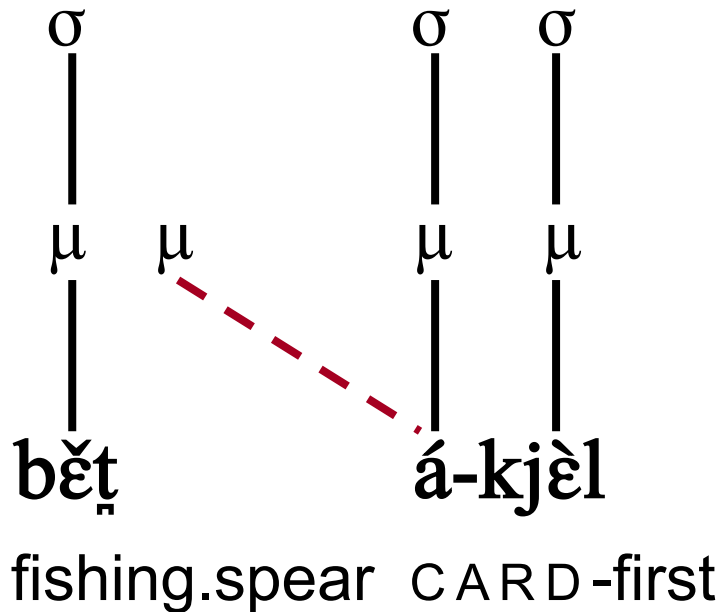
dâa bět á-kjèl

EXIST fishing.spear CARD-first

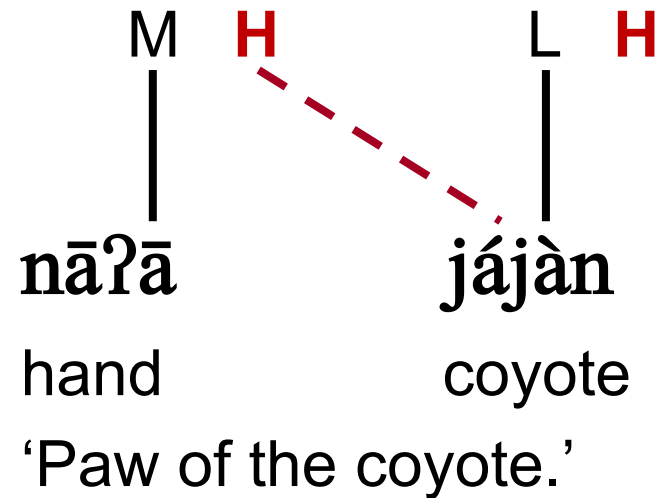
‘There is one fishing spear.’



Floating quantity / Rise-toned singulars



‘One fishing spear.’



‘Paw of the coyote.’

Floating quantity / plural marking

- Singular nouns that have floating quantity in the base form are rare: only the Rise-toned singulars do (18 nouns, >5% of suffixless singulars)
- The great majority of plural base forms do have floating quantity (>80% of suffixless plurals).

Floating quantity / plural marking

gìn bǎa kùl

DEM.S EXIST warthog

‘This is a warthog.’



kùl á-li̋t-à

warthog PAST-look-1S

‘I looked at the warthog.’



gìk bǎa tùl

DEM.P EXIST forehead:P

‘These are foreheads.’



tùl á-li̋t-à

forehead:P PAST-look-1S

‘I looked at the foreheads.’



Putting the floating quantity analysis the test

Floating quantity / putting it to the test

- Floating quantity is not predictable on number or tone.
- In a controlled study, we manipulated both of these factors:

Floating quantity / putting it to the test

		Number	
		Sg	Pl
Tone	Low	kùl 'warthog'	tùl 'foreheads'
		ṭìm 'forest'	pèl 'grinding stones'
		kàl 'compound'	ɲìm 'sesame'
		lòɲ 'cat'	lùl 'steep river banks'
		twèl 'section'	ṭòm 'lyres'
	High	tónɲ 'spear'	bjél 'grain'
		tjél 'elbow'	cínɲ 'hands'
		wónɲ 'grandmother'	rém 'blood'
		lín 'war'	ɲínɲ 'eyes'
		gúl 'joint'	jéɲ 'trees'

Floating quantity / putting it to the test

Number

	Sg	Pl
Tone	Low	
	kùl ‘warthog’	tùl ^μ ‘foreheads’
	ṭìm ‘forest’	pèl ^μ ‘grinding stones’
	kàl ‘compound’	ṇìm ^μ ‘sesame’
	lòṇ ‘cat’	lùl ^μ ‘steep river banks’
	twèl ‘section’	ṭòm ^μ ‘lyres’
	High	
	tónṅ ‘spear’	bjél ‘grain’
	tjél ‘elbow’	cínṅ ‘hands’
	wónṅ ‘grandmother’	rém ‘blood’
lín ‘war’	ṇínṅ ‘eyes’	
gúl ‘joint’	jénṅ ‘trees’	

Floating quantity / putting it to the test

- Other factors are kept constant:
 - Monosyllabic nouns
 - The coda is a liquid or a nasal (easy to segment accurately)
 - 8 speakers
 - Two repetitions
 - Context: utterance-initial in [target] **á**-lîŋ-à
- Measurement: duration of following /**á**-/.

Floating quantity / putting it to the test

- Mean durations of /á-/: 120ms if preceding noun has floating quantity; 85ms if preceding noun does not.

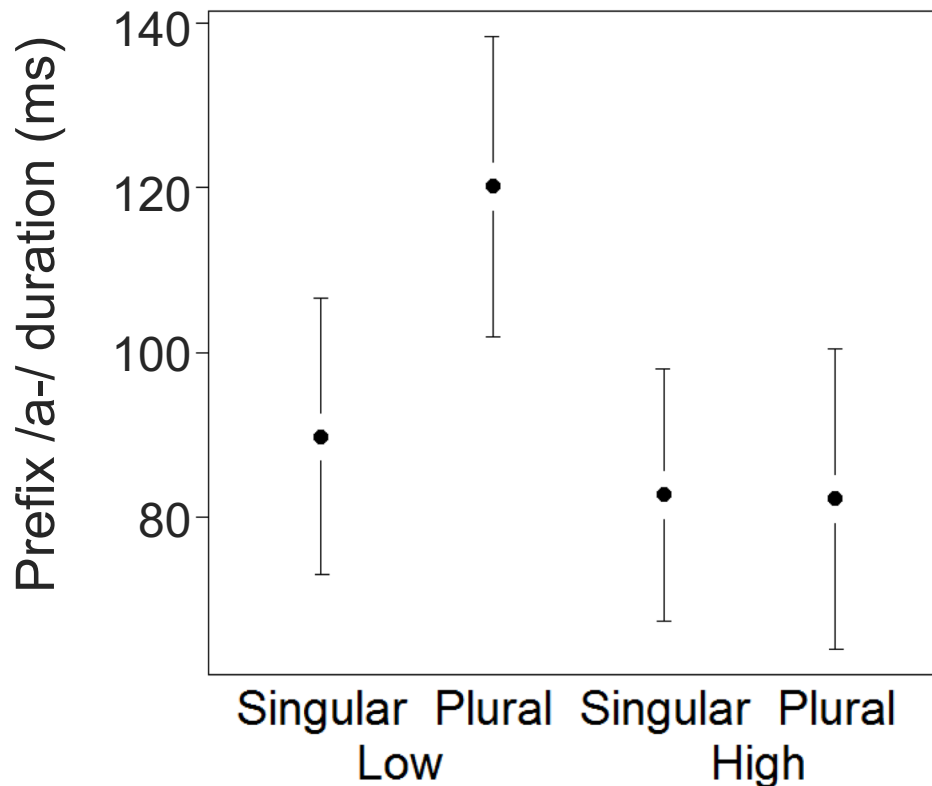


Figure. Means and standard deviations for the duration of the prefix /a-/ as function of Tone and Number.

Discussion of floating quantity

Discussion and conclusion / 1. Comparative-historical insight

- The closely-related Dinka language displays number-marking on the verb prefix (Andersen 1993:271-272).
- Example from Rek dialect cluster (Twic variety) of Dinka:

ràaan ǎ-lèl

person DECL.S-isolate:2s

‘You isolate a person.’



ròoor ǎa-lèl

men DECL.S-isolate:2s

‘You isolates men.’



Discussion and conclusion / 1. Comparative-historical insight

- In Shilluk, singular nouns with floating quantity in the base form are rare (>5% of suffixless singulars), whereas the great majority of plural base forms do have it (>80% of suffixless plurals).
- From there, analogy beckons. I postulate that Dinka had floating quantity, and that this developed into the marking of number on the verb prefix.
- This bucks the trend for affixal contrasts to develop leftward (Himmelman 2013).

Floating quantity / 2. Resolves apparent anomaly

- Phantom quantity reveals number marking in nouns which would otherwise be ambiguous as to which form is the morphologically the base.

Floating quantity / 2. Resolves apparent anomaly

- Problem – singular and plural are both ostensibly unmarked in pairs like these:

SINGULAR	PLURAL		SINGULAR	PLURAL	
			AR		
mîŋ	mìŋ	‘deaf person’	tûuŋ	tùŋ	‘horn’
pîl	pèl	‘grindstone’	kîc	kìc	‘orphan’
lûum	lùm	‘grass’	lôul	lùl	‘steep bank’

Floating quantity / 2. Resolves apparent anomaly

- Problem – sg and pl both ostensibly unmarked in pairs like these:

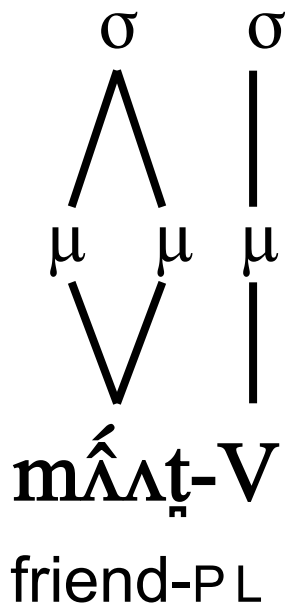
SINGULAR	PLURAL		SINGULAR	PLURAL	
mîŋ	mìŋ ^μ	‘deaf person’	tûŋ	tùŋ ^μ	‘horn’
pîl	pèl ^μ	‘grindstone’	kîc	kìc ^μ	‘orphan’
lûm	lùm ^μ	‘grass’	lôul	lùl ^μ	‘steep bank’

- Crucially, all of these have floating quantity in the plural.
→ We can maintain that all nouns are unmarked either in singular or in plural.

Floating quantity / 3. Insight into compensatory lengthening

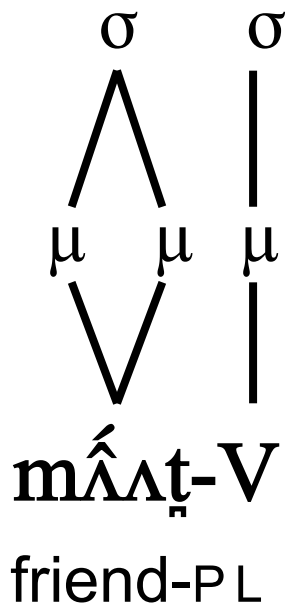
Floating quantity / 3. Insight into compensatory lengthening

Diachronic
origin

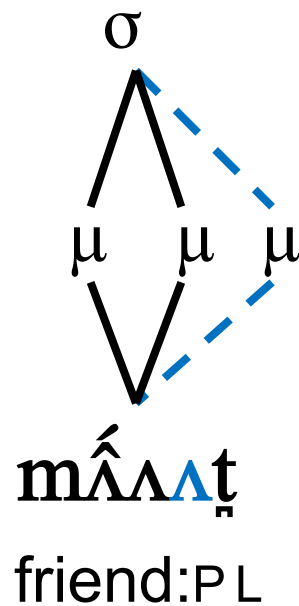


Floating quantity / 3. Insight into compensatory lengthening

Diachronic
origin

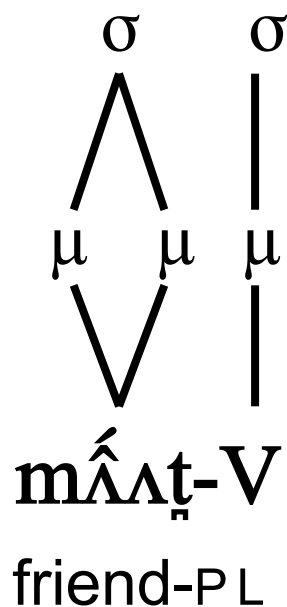


Compensatory
lengthening
only

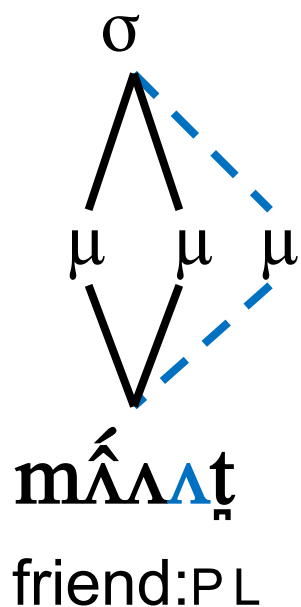


Floating quantity / 3. Insight into compensatory lengthening

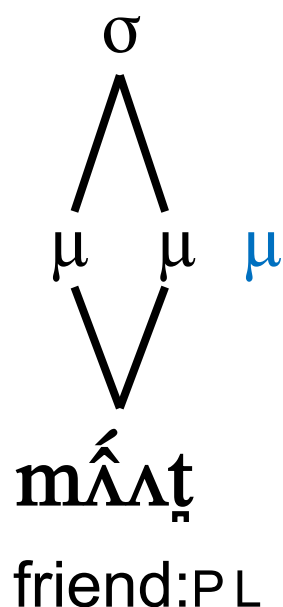
Diachronic origin



Compensatory lengthening only

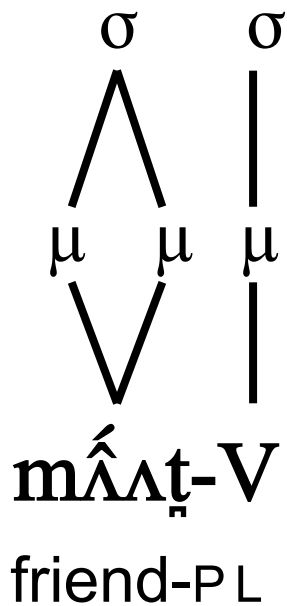


Floating quantity only

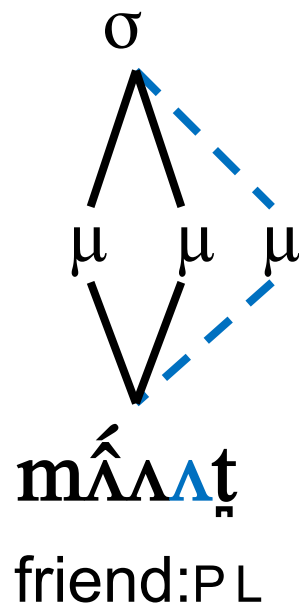


Floating quantity / 3. Insight into compensatory lengthening

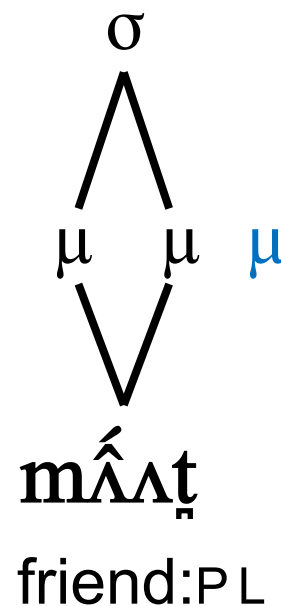
Diachronic origin



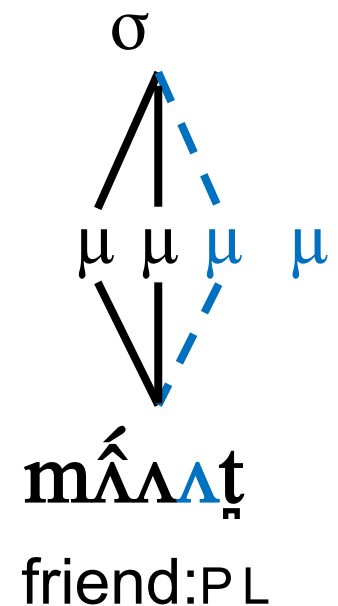
Compensatory lengthening only



Floating quantity only



The way things are



Floating quantity / 3. Insight into compensatory lengthening

- Floating quantity and overlength are not mutually exclusive.

m^hΛΛt á-lîîtt-à

friend PAST-look.at-1S

‘I looked at the friend.’

m^hΛΛΛt^μ á-lîîtt-à

friend:P PAST-look.at-1S

‘I looked at the friends.’

- Compensatory lengthening cannot be conceived of here as a quantity **transfer** from suffix to stem – contrary to Hayes (1989).
- Relevant to Trommer’s (2014) derivation of 3VL using moraic suffixes: compensatory lengthening is not the only way a stray mora can get spelled out.

Morphological shortening

Morphological shortening










- CVVC roots with a Low Fall and a high vowel have a short vowel in three derivations, incl. antipassive.

SUBJ VOICE PAST	ANTIPASS PAST	
á-bûuk	á-bûk	'cover w. powder'
á-mîîn	á-mîn	'pierce'
á-gûur	á-gûr	'grind'

- These verbs still appear with overlengthening inflectionally, yielding complete sets for 3VL.

Morphological shortening

- CVVC roots with a Low Fall and a high vowel have a short vowel in derivations such as antipassive.

SUBJ VOICE PAST	ANTIPASS PAST	PAST 2SG	
á-bûuk 	á-bûk 	á-bûuuk 	'cover w. powder'
á-mîin 	á-mîn 	á-mîim 	'pierce'
á-gûur 	á-gûr 	á-gûuur 	'grind'

- These verbs still appear with overlengthening inflectionally, yielding complete sets for 3VL.

Morphological shortening

- CVVC noun roots with a Low Fall and a high vowel may have a short vowel in the plural derivation.

SINGULAR	PLURAL		SINGULAR	PLURAL	
			AR		
mîŋ	mìŋ ^μ	‘deaf person’	tûŋ	tùŋ ^μ	‘horn’
pîl	pèl ^μ	‘grindstone’	kîc	kìc ^μ	‘orphan’
lûm	lùm ^μ	‘grass’	lôul	lùl ^μ	‘steep bank’

Morphological shortening

- Some CVVC noun roots with a Low Fall and a high vowel shorten the vowel in the plural derivation.

SINGULAR	PLURAL		SINGULAR	PLURAL	
mîŋ	mìŋ ^μ	‘deaf person’	tûŋ	tùŋ ^μ	‘horn’
pîl	pèl ^μ	‘grindstone’	kîc	kìc ^μ	‘orphan’
lûm	lùm ^μ	‘grass’	lôul	lùl ^μ	‘steep bank’

- Number marking goes both directions. However, from floating quantity, it is clear that the plurals are marked, i.e., it is CVVC~CVC, and not CVC~CVVC.

Morphological shortening

Alternation	Derivation	Inflection
CVVC~CVC	✓	
CVC~CVVVC	✓	✓
CVVC~CVVVC	✓	✓

CVC~CVVC:

- has a much lower functional load than CVC~CVVVC and CVVC~CVVVC.
- is quantity-decreasing process, whereas CVC~CVVVC and CVVC~CVVVC are increasing.

References

- Andersen, T. (1987). The Phonemic System of Agar Dinka. *Journal of African Languages and Linguistics* 9, 1-27
- Andersen, T. (1990). Vowel length in Western Nilotic languages. *Acta Linguistica Hafniensia* 22, 5-26.
- Andersen, T. (1991). Subject and topic in Dinka. *Studies in Language* 15(2), 265-294.
- Blevins, J. (2004). *Evolutionary Phonology: The Emergence of Sound Patterns*. Cambridge University Press.
- Blevins, J., & Wedel, A. (2009). Inhibited Sound Change: An Evolutionary Approach to Lexical Competition. *Diachronica* 26, 143-183.
- Dimmendaal, G.J. (2000) Number Marking and Noun Categorization in Nilo-Saharan Languages. *Anthropological Linguistics* 42(2), 214-261.
- Gilley (1992)
- Hayes, B. (1989). Compensatory Lengthening in Moraic Phonology. *Linguistic Inquiry* 20(2): 253-306.
- Remijsen, B., O.G. Ayoker & S. Jørgensen (in press). Three-level vowel length in Shilluk. Accepted for publication in *Phonology*.
- Trommer, J. (2014). Moraic prefixes and suffixes in Anywa. *Lingua* 140, 1-34.

Thank you to

I gratefully acknowledge the Leverhulme Trust, for funding this research through the project “A descriptive analysis of the Shilluk language” (RPG-2015-055).

Thank you to the people who recorded the sound examples: Inga McKendry for Mixtec, and Otto Gwado Ayoker for Shilluk.

I am very grateful to the organizers for giving me the opportunity to present this research at AMP 2018.

Thank you all for your attention!



Three-level vowel length in Dinka

Three-level vowel length in Dinka

Minimal set evidence:

Short (CVC)

ràaan ǎ-lèl

person DECL.S-
isolate:2s

‘You isolate a person.’



Long (CVVC)

ràaan ǎ-lèel

person DECL.S-
isolate:3s

‘He isolates a person.’



Overlong (CVVVC)

ràaan ǎ-lèeel

person DECL.S-
provoke:3s

‘He provokes a person.’



Three-level vowel length in Dinka

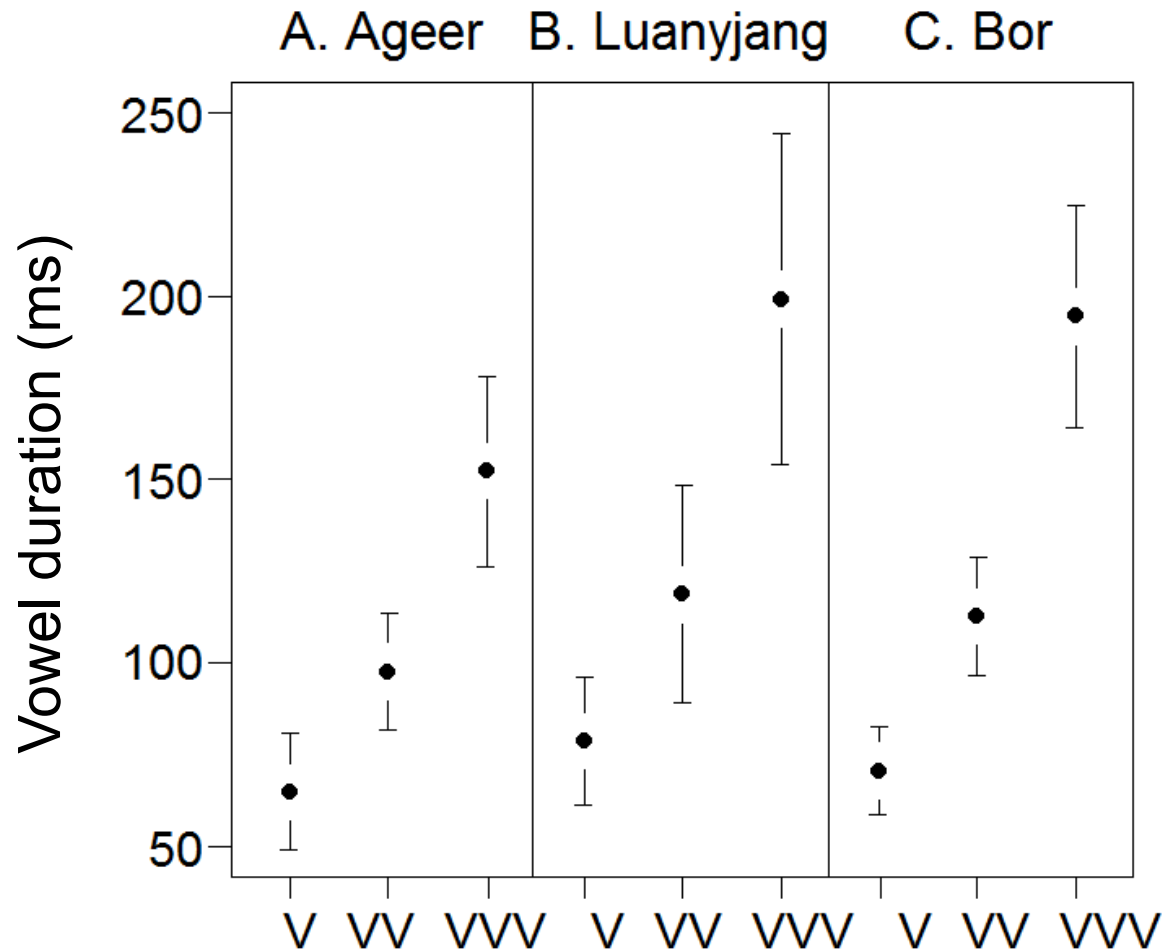


Figure. Mean and one standard deviation around it for vowel duration (ms) by vowel length (V, VV, VVV), in utterance-final context, in three dialects of Dinka (>8 speakers per dialect). Based on Remijsen & Gilley 2008, Remijsen, 2013, 2014⁶⁶