

Luo Voicing Polarity as Opaque Licensing Intervention

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Workshop on Phonological Voicing Variation
September 11 & 12, 2008

Luo Voicing Polarity: Basic Pattern

Voiceless → **Voiced**

	singular		plural	
[-voiced]	a. arip	'milky way'	arib-e	[+voiced]

Voiced → **Voiceless**

	singular		plural	
[+voiced]	b. cogo	'bone'	cok-e	[-voiced]

Luo Voicing Polarity: More Data

[-voice] → [+voice]

	sg	pl		
a.	bat	bed-e	‘arm’	(Okoth-Okombo, 1982:30)
b.	luθ	luð-e	‘walking stick’	(Okoth-Okombo, 1982:30)
c.	eri:p	eri:b-e	‘milky way’	(p. 128)
d.	guok	guog-i	‘dog’	(Okoth-Okombo, 1982:30)

[+voice] → [-voice]

	sg	pl		
a.	ki:dí	kí:t-ê	‘stone’	(p. 128)
b.	ɔkê:bɛ	oké:p-ê	‘tin can’	(p. 127)
c.	cogo	cok-e	‘bone’	(Okoth-Okombo, 1982:30)

Distinctivity-Based Analyses

Alderete (2001): \neg IDENT[voice]

Base	Derivative	\neg IDENT[voice]	IDENT[voice]
a./arip/	☞ i. arib-e	*	*
	ii. arip-e		
b./cogo/	☞ i. cok-e	*	*
	ii. cog-e		

(Similar: de Lacy, 1999,2008; Kurisu, 2001; Wolf, 2005)

Basic Claims

- ▶ Voicing Polarity is phonological devoicing
- ▶ Devoicing is triggered by lack of licensing
- ▶ Licensing is blocked by intervention of deleted segments

LUO (Dholuo; Okoth-Okombo,1984; Tucker,1994; Heusing,2004)

- ▶ Nilosaharan language of the Western Nilotic branch
- ▶ Spoken by more than 3 million speakers around Lake Victoria (Kenya,Uganda, Tanzania)
- ▶ Tone language with complex morphophonology
- ▶ All data in this talk are from Tucker (1994) unless otherwise noticed

Important Phonological Facts

- ▶ Roots are either (C)V.CV, (C)VC , or (C)V.CVC, e.g. **bet**, and **ari**, but not ***be** or ***ber.te**
- ▶ **Basically:** CVC or CV.CV
- ▶ Word-final obstruents in bare roots are always voiceless e.g. **bet**, but not ***bed**

Outline

A Closer Look at the Data

- V-final Roots

- C-final Roots

A Phonological Analysis

- The Framework: Containment Theory

- Basic Analysis

- Exceptions

More Luo Polarity

- Plurals in -ni

- Possession Forms

- Manner Alternations

Conclusions

A Closer Look at the Data

		singular	plural
V-final Root	a.	[+voice]	[-voice]
	b.	[-voice]	[-voice]
	c.	[-voice]	[+voice]
	d.	[+voice]	[+voice]
C-final Root	e.	[-voice]	[+voice]
	f.	[-voice]	[-voice]
	g.	[+voice]	[+voice]
	h.	[+voice]	[-voice]

Under a distinctivity-based analysis,
 a.,c.,e. and h. should be productive
 while **b.,d., f.** and **g.** should be unattested

a. V-final [+vc] → [-vc]

	sg	pl		
a.	ki:dí	kí:t-ê	'stone'	(p. 128)
b.	ɔkê:bɛ	oké:p-ê	'tin can'	(p. 127)
c.	cogo	cok-e	'bone'	(Okoth-Okombo, 1982:30)

- ▶ Well-documented
- ▶ **Correctly predicted by distinctivity accounts**

c. V-final [-vc] → [+vc]

	sg	pl		
a.	agɔ:kɔ	agóg-g-ê	'chest'	(p. 491)
b.	koti	kod-e	'coat'	(English; Okoth-Okombo, 1982:54)
c.	ongeti	onged-e	'blanket'	(English; Okoth-Okombo, 1982:54)

- ▶ a. is the only example of this type in Tucker's grammar and has a second plural variant without voicing (agók-ê, p.491)
- ▶ b. and c. are loanwords cited in Okoth-Okombo (1982)
- ▶ **incorrectly predicted to be productive by distinctivity accounts**

d. V-final [+vc] → [+vc]

ɲudi (sg.) ɲud-e (pl.) 'neck of meat'

- ▶ Only this single example
- ▶ **Correctly excluded by distinctivity accounts**

b. V-final [-vc] → [-vc]

	sg	pl		
a.	cu:pɛ	cú:p-ê	'bottle'	(Swahili; p. 130)
b.	ɔθî:θɔ	ɔθî:θ-ê:	'small thing'	(p. 130)
c.	osi:kí	osí:k-ê	'stump'	(p. 130)
d.	ɔkô:cɔ	ɔkô:c-ê	'neck rest of sisal trunk'	(p. 130)

▶ Well-documented

▶ **Incorrectly excluded by distinctivity accounts**

e. C-Final [-vc] → [+vc]

	sg	pl		
a.	bat	bed-e	'arm'	(Okoth-Okombo, 1982:30)
b.	luθ	luð-e	'walking stick'	(Okoth-Okombo, 1982:30)
c.	eri:p	eri:b-e	'milky way'	(p. 128)
d.	guok	guog-i	'dog'	(Okoth-Okombo, 1982:30)

▶ Well-documented

▶ **Correctly predicted by distinctivity accounts**

h. C-Final [+vc] → [-vc]

	singular		plural	
[+voiced]	*bad		*bet-e	[-voiced]

- ▶ Non-existent (due to restrictions on voicing)
- ▶ **Incorrectly predicted by distinctivity accounts**

g. C-Final [+vc] → [+vc]

	singular		plural	
[+voiced]	*ba d		*be d -e	[-voiced]

- ▶ Non-existent (due to restrictions on voicing)
- ▶ **Correctly excluded by distinctivity accounts**

f. C-Final [-vc] → [-vc]

a. i:p (sg.)	i:p-e (pl.)	'tail'	
b. lep (sg.)	lep-e (pl.)	'tongue'	
c. la:k	lé:k-e	'tooth'	(p. 130)
d. bǎ:θ	bé:θ-ê/bé:θ-ê	'side'	(p. 130)

- ▶ Well-documented
- ▶ **Incorrectly excluded by distinctivity accounts**

Voicing patterns in Luo

		singular	plural	
V-final Root	a.	[+voice]	[-voice]	well-attested
	b.	[-voice]	[-voice]	
	c.	[-voice]	[+voice]	marginal
	d.	[+voice]	[+voice]	
C-final Root	e.	[-voice]	[+voice]	well-attested
	f.	[-voice]	[-voice]	
	g.	[+voice]	[+voice]	not attested
	h.	[+voice]	[-voice]	

Predictions of distinctivity accounts are largely wrong

Containment Theory in General

- ▶ Underlying phonological material which is not pronounced is not deleted in the phonology
- ▶ Instead, it is marked as phonetically inert and (mostly) disregarded by the phonetics
- ▶ **History:**
 - ▶ Original version of OT in Prince & Smolensky (1993)
 - ▶ Abandoned with the advent of Correspondence Theory (McCarthy & Prince, 1994, 1995)
 - ▶ Resurrected in a modified way (“Coloured Containment”) in recent work by van Oostendorp and Revithiadou

The Version of Containment Theory Used Here

- ▶ A variant of Coloured Containment which is closer to the original model
- ▶ Standard Autosegmental Representations instead of Turbidity Theory (Goldrick, 2000)
- ▶ Deletion and epenthesis are interpreted as invisibility at the interfaces:
 - ▶ Deletion = invisibility at the phonetic interface
 - ▶ Epenthesis = invisibility at the morphological interface

Typology of Phonological Visibility

		morphologically visible	
		+	-
phonetically visible	+	realized underl. material	epenthetic material
	-	unrealized underl. material	

Wellformedness Conditions on Phonetic Visibility

- ▶ Phonological objects are either morphologically or phonetically visible (or both)
- ▶ Phonetically visible links connect only phonetically visible structure
- ▶ Phonetic structure must be phonetically linked to higher phonetic structure (if there is any)

Representation of Epenthesis and Deletion

Underlying /bete/
Surfacing [bete]

b e t e

Underlying /bet/
Surfacing [bete]

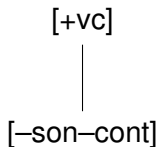
b e t e

Underlying /betep/
Surfacing [bete]

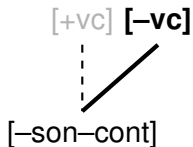
b e t e p

Representation of Featural Changes

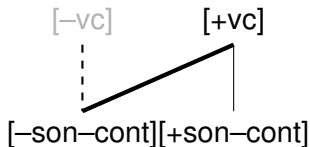
Underlying /t/
Surfacing [t]



Underlying /d/
Surfacing [t]



Underlying /tn/
Surfacing [dn]



Faithfulness Constraints on Voicing

ID [+vc]: Every segment which is morphologically associated with [+vc] is phonetically associated with [+vc]

ID [-vc]: Every segment which is morphologically associated with [-vc] is phonetically associated with [-vc]

Licensing Voiced Obstruents (Lombardi,1994,1995;Steriade,1997)

LICENSING CONSTRAINT:

A [+vc] obstruent should be phonetically visible through a phonetically right-adjacent sonorant in the same voicing span.

Constraints on Autosegmental Skipping

NoSKIPPING-VISIBLE:

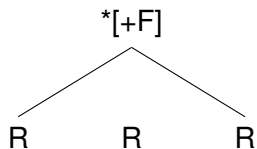
Phonetically visible association spans
should not skip phonetically visible root nodes

NoSKIPPING:

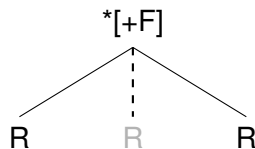
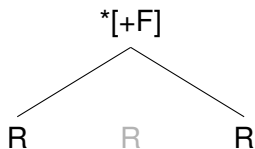
Phonetically visible association spans
should not skip root nodes

Relevant Skipping Configurations

violates NOSKIPPING-VIS
and NOSKIPPING



violate only
NOSKIPPING




Blocking of Place Assimilation in Hellendoorn Dutch

(van Oostendorp, 2004:2-3)


		Underlying	Surface
a.	'to work'	wɛrk-n	wɛrk _ɨ ŋ
b.	'we worked'	wɛrk-t-n	wɛrk _ɨ ŋ
c.	'to hope'	hop-n	hop _ɨ m
d.	'we hoped'	hop-t-n	hop _ɨ m

NO-SKIPPING at Work in Hellendorn Dutch

Input: wɛrk-n, 'to work'

	NOSKIP	SHAREPLACE
a. wɛrk-n		*!
 b. wɛr(k-ŋ)		

Input: wɛrk-t-n, 'we worked'

	NOSKIP	SHAREPLACE
 a. wɛrkt-n		*
b. wɛr(kt-ŋ)	*!	

Basic Analysis

- ▶ All roots which don't alternate are underlyingly voiceless
All roots which alternate are underlyingly voiced
- ▶ Underlyingly voiced roots are devoiced
in the singular if C-final, and in the plural if V-final
- ▶ Singular devoicing =
unlicensed voicing in word-final position

- Plural devoicing =
unlicensed voicing by an intervening deleted segment

Underlyingly Voiced C-final Root

Input: erib, 'milky way'

	ID [-vc]	NO SKIP	LIC	ID [+vc]
☞ a. erip				*
b. erib			*!	
c. er(ib)			*!	

Input: erib-e, 'milky way (pl.)'

	ID [-vc]	NO SKIP	LIC	ID [+vc]
☞ a. eri(b-e)				
b. erip-e				*!
c. erib-e			*!	

Underlyingly Voiced V-final Root

Input: kidi, 'stone'

	ID [-vc]	NOSKIP	LIC	ID [+vc]
☞ ki(di)				
kidi			*!	
kiti				*!

Input: kidi-e, 'stone (pl.)'

	ID [-vc]	NOSKIP	LIC	ID [+vc]
a. ki(di-e)		*!		
b. ki(d)-e			*!	
☞ c. kiti-e				*

Underlyingly Voiceless C-final Root

Input: ip, 'tail'

	ID [-vc]	NOSKIP	LIC	ID [+vc]
☞ ip				
ib	*!		*	

Input: ip-e, 'tail (pl.)'

	ID [-vc]	NOSKIP	LIC	ID [+vc]
☞ ip-e				
i(b-e)	*!			
ib-e	*!		*	

Underlyingly Voiceless V-final Root

Input: osiki, 'stump'

	ID [-vc]	NO SKIP	LIC	ID [+vc]
☞ osiki				
osigi	*!		*	
osi(gi)	*!			

Input: osiki-e, 'stump (pl.)'

	ID [-vc]	NO SKIP	LIC	ID [+vc]
☞ osiki-e				
osigie	*!		*	
osi(gie)	*!	*		

Marginal/Exceptional Patterns

		singular	plural	
V-final Root	a.	[+voice]	[-voice]	well-attested
	b.	[-voice]	[-voice]	
	c.	[-voice]	[+voice]	marginal
	d.	[+voice]	[+voice]	
C-final Root	e.	[-voice]	[+voice]	well-attested
	f.	[-voice]	[-voice]	
	g.	[+voice]	[+voice]	not attested
	h.	[+voice]	[-voice]	

Analysis: Exceptional cases are due to root suppletion

Non-alternating Voiced Obstruent

ŋu:di (sg.) ŋu:d-e (pl.) ‘neck of meat’

ŋudi-e, ‘necks of meat (pl.)’

	ID [-vc]	NO SKIP	LIC	ID [+vc]
☛ a. ŋu(di-e)		*!		
☞ b. ŋuti-e				*
c. ŋudi-e			*!	

Suppletive stem allomorphs


sg	pl		
a. ǎ́:kɔ	mó:n	‘woman’	(p. 126)
b. dá:lâ	mie:r	‘village’	(p. 126)
c. ǎ́a:ŋ	ǎ́o:k	‘cow’	(p. 126)
d. ǎ́á:kɔ	ŋi:r-i	‘girl’	(p. 126)
e. lɛ:l	líét-ê	‘anthill, grave’	(p. 129)
f. we:r	we:nd-e	‘song’	(p. 129)

Non-alternating Voicing as Suppletive Stem Allomorphy

necks ↔ η ud / _____ Plural

necks ↔ η udi

Input: η ud-e, 'necks of meat (pl.)'

	ID [-vc]	NoSKIP	LIC	ID [+vc]
 η u(d-e)				
η ut-e				*!
η ud-e			*!	

Vowel-final Roots with [-vc] → [+vc] Alternation

	sg	pl		
a.	agɔ:kɔ	agóg-ê	'chest'	(p. 491)
b.	koti	kod-e	'coat'	(Okoth-Okombo, 1982:54)
c.	ongeti	onged-e	'blanket'	(Okoth-Okombo, 1982:54)

Inverse-alternating Roots as Suppletive Allomorphy

coat ↔ kod /_____Plural

coat ↔ kot

Inverse-alternating Roots as Suppletive Allomorphy

Input: koti, 'coat'

	ID [-vc]	NO SKIP	LIC	ID [+vc]
ko(di)	*!			
kodi	*!		*	
☞ koti				

Input: kod-e, 'coats (pl.)'

	ID [-vc]	NO SKIP	LIC	ID [+vc]
☞ ko(d-e)				
kote				*!
kod-e			*!	

What do we learn from Loanwords?

- ▶ **Ernestus and Baayen (2003):** Dutch speakers experimentally confronted with non-words ending in a voiceless obstruent often reanalyze these as ending underlyingly in the corresponding voiced obstruent based on the lexical frequency of similar words in the language.
- ▶ **Nevins and Vaux (2006):** Similar results for Turkish
- ▶ Luo also has final devoicing, and regularly patterning loanwords, hence it is difficult to draw any conclusions from the behaviour of loanwords

Regularly patterning loanwords

	sg	pl		
a.	cak	cag-ε	'chalk'	(English; Okoth-Okombo, 1982:54)
b.	buk	bug-e	'book'	(English; Okoth-Okombo, 1982:54)

Plurals in -ni

	sg	pl		
a.	gɔ:gó	gɔ:g-nɪ	“lump of clay”	(p. 126)
b.	pé:dô	pɛ:d-nɪ	“thorny Rambler”	(p. 127)
c.	aba:já	ɛbe:ʃ-nɪ	“large spear”	(p. 127)
d.	oké:bé	oke:b-nî	“rich man”	(p. 127)
e.	pó:kô	po:k-nɪ	“gourd”	(p. 127)
f.	ŋgé:tó	ŋge:t-nɪ	“clog”	(p. 127)
g.	fú:kó	fu:k-nɪ	“mole”	(p. 126)
g.	kúé:sí	kue:s-nɪ	“pipe”	(p. 126)

Insufficiency of LICENSING and NO-SKIP

Input: gɔgɔ-ni, 'lump of clay (pl.)'

	NoSKIP	LC	ID [+vc]
☛ a. gɔ(gɔ-n)ɪ	*!		
☞ b. gɔkɔ-nɪ			*
c. gɔgɔ-nɪ		*!	

Constraint on Stop-Nasal Voicing

(TN): Stops and phonetically right-adjacent nasals should be linked to the same voicing feature.

Voicing of Prenasal Stops in Tangale

(Kidda, 1993; Kenstowicz, 1994)

	'N'	'the N'	'my N'	
a.	bugat	bugat-i	bugad-no	'window'
b.	aduk	aduk-i	adug-no	'load'
c.	tugat	tugad-i	tugad-no	'berry'
d.	kuluk	kulug-i	kulug-no	'harp'

Plural in -ni – Underlyingly Voiced Stop

Input: gɔgɔ-ni, ‘lump of clay (pl.)’

	ID [-vc]	(TN)	NO SKIP	LC	ID [+vc]
☞ a. gɔ(gɔ-n)ɪ			*		
b. gɔgɔ-nɪ		*!		*	
c. gɔkɔ-nɪ		*!		*	*

Input: gɔgɔ, ‘lump of clay’

	ID [-vc]	(TN)	NO SKIP	LC	ID [+vc]
☞ g(ɔgɔ)					
gɔgɔ				*!	
gɔkɔ					*!

Plural in -ni – Underlyingly Voiceless Stop

Input: pəkɔ, ‘gourd’

	ID [-vc]	(TN)	NO SKIP	LC	ID [+vc]
☞ pəkɔ					*
p(ɔgɔ)	*!				
pɔgɔ	*!			*	

Input: pəkɔ-ni, ‘gourd’

	ID [-vc]	(TN)	NO SKIP	LC	ID [+vc]
☞ pəkɔ-nɪ		*			
pɔgɔ-nɪ	*!	*		*	
pɔ(gɔ-n)ɪ	*!		*		

Nominal Possession Forms

Bare Root	ki: d i		'a stone'
	stone		
Possession Form	kit	gô t	'a stone from a hill'
	stone	hill	

Bare Root	o: t		'a nest'
	nest		
Possession Form	o d	winyó	'a bird's nest'
	nest	bird	

Problem: Word-final [+voiced] obstruent

Pronominal Possession Forms

o:t , 'house'

	sg	pl
1	o:d-á 'my house'	o:d-wá 'our house'
2	o:d-í 'your (sg.) house'	o:d-ú 'your (pl.) house'
3	o:d-e 'his house'	o:d-gí 'their house'

ki:di, 'stone'

	sg	pl
1	ki:t-á 'my stone'	ki:t-wá 'our stone'
2	ki:t-í 'your (sg.) stone'	ki:t-ú 'your (pl.) stone'
3	ki:t-e 'his stone'	ki:t-gí 'their stone'

Analysis of Nominal Possession Forms

- ▶ At the word-level nominal possession forms have the same morphology as pronominal possession forms which is truncated at the phrase level
- ▶ “Polarity” is phonologically transparent at the word level and opaque at the phrase level

Derivation of Nominal Possession Forms

Root	Affixation	Pron.Poss.	Truncation	Nom.Poss.
o:t	→	o:d-e	→	od
ki:di	→	ki:t-e	→	kit
		Voicing Alternations		

instead of

Root	Truncation + Polarity	Nom.Poss.
o:t	→	od
ki:di	→	kit

Evidence for the 2-Step Derivation

Root	Plural	Pron. Poss	Nom.Poss.	
í:p	i:p-e	í:w-ê	íw	'tail'
mo	mó:dh-î	mór-ê	mór	'oil,fat'
rawe:ra	rawé:r-ê	rawe:cé	rawec	'boy'

- Irregular stem changes of Nom.Poss.
always follow stem change of Pron.Poss.

Apparent Manner Polarity

	sg	pl		
a.	bɛ:wo	bé:p-ê	'plank'	(Swahili, p. 127)
b.	lǎ:w	lé:p-ê	'cloth'	(p. 128)
c.	lé:p	le:w-e	'tongue'	(p. 128)

The General Picture

- ▶ The lé:p → le:w-e case is exceptional
- ▶ All other cases of manner alternations involve consistent stopping of sonorants

Regular Manner Alternations in C-final Nouns

	sg	pl		
a.	i:m	i:mb-e	'ram'	(p. 129)
b.	tê:n	te:nd-e	'neck rest'	(p. 129)
c.	pí:n	pi:nɟ-ε	'country'	(p. 129)
d.	wa:ŋ	wé:ŋg-ê	'eye'	(p. 129)
e.	bu:l	bu:nd-e	'drum'	(p. 129)
f.	bʊ:r	bʊ:c-ε	'ulcer'	(p. 128)
g.	ɔ:r	ó:c-ê	'brother-in-law'	(p. 128)

Regular Manner Alternations in V-final Nouns

	sg	pl		
a.	ja:mɔ	jé:mb-ê	'wind'	(p. 129)
b.	pi:nɔ	pí:nd-ê	'wasp'	(p. 129)
c.	ɲi:ɲɔ	ɲí:ɲɟ-ê	'iron'	(p. 129)
d.	lɔ:ɲɔ	lɔ́:ɲg-ê	'hernia'	(p. 129)
e.	hɯ:la	hú:nd-ê	'wax'	(p. 129)
f.	ga:ra	gé:c-ê	'leg bell'	(p. 128)
g.	gɛ:ri	gé:c-ê	'vehicle'	(p. 128)

Summary

- ▶ Voicing polarity in Luo is purely phonological
(contra Alderete, 2001; Kurisu, 2001; Wolf, 2005, etc.)

- ▶ Voicing polarity in Luo is triggered
by a single phonological condition
(contra Pulleyblank, 2006; Trommer, 2006; Bye, 2006)

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