

Opaque Boundary Tones in Jumjum

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Intro

Utterance-final Lowering

(p.151)

[dɛ́:n̩ ↓jén ʔôn] ‘cow of the man’

H-tone noun

[dɛ̀:n̩ %] ‘cow’

[jà:n̩ jén ʔôn] ‘bull of the man’

L-tone noun

[jà:n̩ %] ‘bull’

Iterative Utterance-final Lowering

(p.153)

[ʔìkè	pì:tì	mùk:ìní %]	'He is sowing maize'
ʔìkè	pí:t-í	múk:í-ní	
3SG	sow:AP-3SG	maize-PL	

[ʔìkè	mλ:ʝò	kùpkènè %]	'He opened for Määjo'
ʔìkè	mλ:ʝó	kúp-k-én-é	
3SG	Määjo	open-BEN-PST-3SG>3	

Utterance-initial Utterance-final Lowering

(p.153)

[lèŋ	ùlàŋ %]	‘The axe is black’
léŋ	úl-áŋ	
axe:SG	be:black-3SG	

[tòŋ	ùlàŋ %]	‘The spear is black’
tóŋ	úl-áŋ	
spear:SG	be:black-3SG	

Null Assumption

Final Lowering realizes a L boundary tone

The Across-the-Board Problem

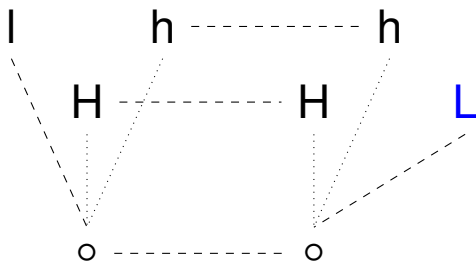
- ▶ **If lowering is due to a L-boundary tone:**
Why should it spread leftwards
if Jumjum doesn't have L-spreading elsewhere?

- ▶ **If lowering is due to deletion of a final fused H:**
How can we capture postlexical rule ordering?
(H-tone coalescence \rightsquigarrow H-deletion)

Proposal in this Talk

- ▶ The lowering boundary tone is a **subtonal** feature – a melody **L** in the feature geometry of Snider (1999) which ‘infects’ utterance-final H tones
- ▶ Opaque interaction of H-fusion and lowering is captured via simultaneous **infection** and coalescence in Containment Theory (Trommer and Zimmermann 2014)
- ▶ This also accounts for the opaque interaction of final lowering with other phrase-level processes

Proposal: Simultaneous Infection + Fusion

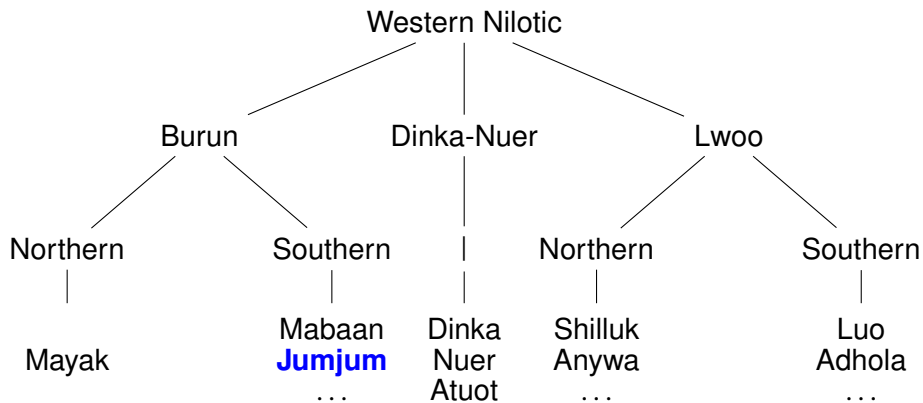


Jumjum

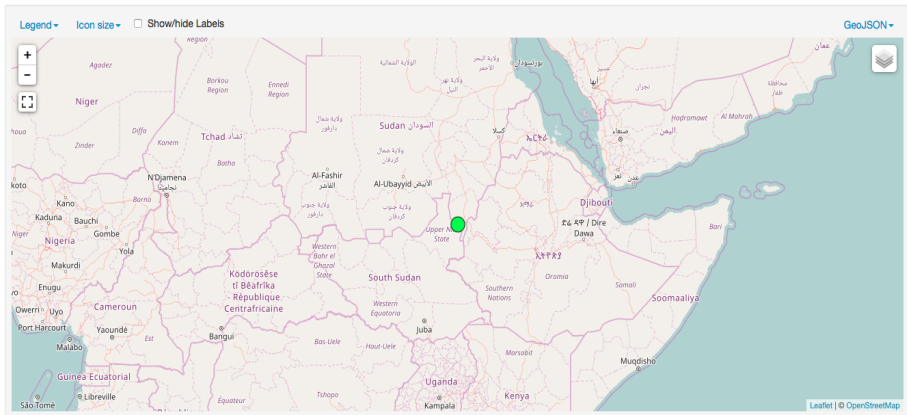
Jumjum

- ▶ Western Nilotic language of the Southern Burun branch spoken in the Blue Nile province of South Sudan
- ▶ Rich non-concatenative morphology, but also suffixation
- ▶ All data in this talk from the detailed paper by Andersen (2004)

Western Nilotic Languages



Jumjum



More Phrase-Level Processes

More Phrase-Level Processes

- ▶ H-Tone Spreading
- ▶ H-Tone Spreading + Final Lowering
- ▶ Falling Tone Simplification

H-Tone Spreading

(p.154)

[ʔìkè	kàttá	†dí:k	jà:kò]
ʔìkè	kàt-t-á	dì:k	já:-k-ó
3SG	steal-AP-PST-3	goat:PL	PRO-PL-1 PL
'He stole our goats'			

[ʔámí	†ká	gûŋ]
ʔám-í	kà	gûŋ
eat-PST3>3SG	PREP	dog:SG
'It has been eaten by the dog'		

H-Tone Spreading + Final Lowering

(p.155)

[ʔìkà	bí	tú⁺wû]	'I shall die'
ʔìkà	bí	túwù	
1SG	FUT	die-1SG	

[tí ⁺ ɲâl]	'sand'
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[tí ⁺ ɲál	jèk	ʔô:n]	'the man's sand'
tíɲàl	jè-k	ʔô:n	
sand	PRO-PL:AG	man:SG	

Fall Simplification

(p.156)

[kâŋ]

'hunger'

[káŋ

jèn

ʔô:n]

'the man's hunger'

kâŋ

jè-n

ʔô:n

hunger

PRO-SG:AG

man:SG

[ʔikô:n]

'we'

[ʔikó:n

+ʔámôŋ]

'We will eat'

ʔikô:n

ʔám-òŋ

1 PLEX

eat:AP-1 PLEX

Monosyllabic Nouns

(p.151)

	Underlying	Framed	Isolation		
/L/	/jà:n/	[jà:n jèn ʔôn]	[jà:n]	[L]	'bull'
/H/	/d̥é:ŋ/	[d̥é:ŋ ʔjén ʔôn]	[d̥è:ŋ]	[L]	'cow'
/HL/	/t̥ô:n/	[t̥ó:n jèn ʔôn]	[t̥ô:n]	[HL]	'cock'

Disyllabic Nouns

(p.151)

	Underlying	Framed	Isolation		
/LL/	/bè:lgà/	[bè:lgà jèk ʔôn]	[bè:lgà]	[LL]	'canes'
/HH/	/tùḍgù/	[tùḍgù †jék ʔôn]	[tùḍgù]	[LL]	'cocks'
/LH/	/ḍìŋ:á/	[ḍìŋ:á †jén ʔôn]	[ḍìŋ:à]	[LL]	'pestle'
/HL/	/wíllà/	[wí†lá jèn ʔôn]	[wí†lâ]	[HHL̂]	'guests'
/ĤLL/	/kû:rà/	[kú:rà jèn ʔôn]	[kú:rà]	[HL]	'ball'
/ĤLH/	/mêrká/	[mér†ká †jék ʔôn]	[mérkà]	[HL]	'children'

Opacity

Final Lowering Counterbleeds Fusion

(p.153)

[lɛ̃ŋ ʊ̀làn %] ‘The axe is black’
 léŋ ʊ̀l-án
 axe:SG be:black-3SG

[*lɛ̃ŋ ʊ̀làn %]

Underlying Final L-Tones don't spread

(p.153)

[ʔìkì	d̩̀l̩̀:m̩̀	l̩̀ǹ̩]	'You are looking at an axe'
ʔìkì	d̩̀l̩̀:m̩̀-á	l̩̀ǹ̩	
2SG	look:at:AP-2SG	axe	

[ʔìkì	d̩̀l̩̀:m̩̀á	k̩̀ǹ̩*	'You are looking at a bee'
ʔìkì	d̩̀l̩̀:m̩̀-á	k̩̀ǹ̩	
2SG	look:at:AP-2SG	bee	

*[ʔìkì	d̩̀l̩̀:m̩̀	k̩̀ǹ̩]
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("Non-derived Environment Blocking")

Fall Simplification Counterfeeds H-Spreading (p.156)

[ʔó:n bì:c:àn já:n tòrd̀̀è]
 ʔô:n bì:c:àn jâ:n tò-d̀̀-é
 man:SG rootSG:AG tree:SG pull-M-3SG>3
 ‘The man is pulling the tree’s root.’

*[ʔó:n †bí:c:àn já:n tòrd̀̀è]

Non-Iterativity of H-Tone Spreading

[ʔìkè	bùg g é	+ké	tí r +ké	wènòk]
ʔìkè	bùg-g-é	kè	tí r kè	wènòk
3SG	arm-PL-3SG	COM	leg-PL-3SG	swell-M:3

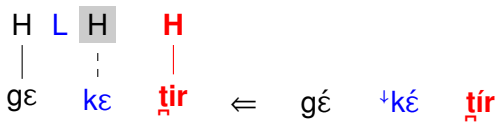
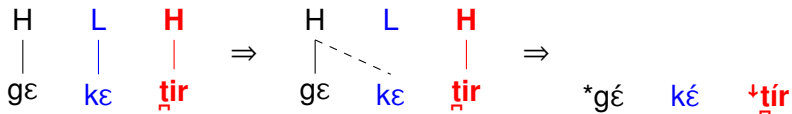
'His arms and legs swell'

[ʔáj	+bát tà	ʔà	ʔòtòn]
ʔáj	bàt:tà	ʔà	ʔót-ón
and	not	be:3	sleep-PTC

'But he is not sleeping'

*[ʔáj **+bát**+tá **+ʔá** **+ʔó**+tôn]

Downstep Displacement



Theoretical Assumptions

Theoretical Assumptions

- ▶ Autosegmental Containment & Generalized Markedness Constraints

(Trommer and Zimmermann 2014)

- ▶ Tonal Feature Geometry (Snider 1999)

- ▶ The Lateral Theory of Coalescence (Trommer 2016)

Containment & Generalized Markedness Constraints

- ▶ **Autosegmental Containment:** (extending Prince & Smolensky 1993)
Underlying material
is never literally deleted, but retained in the output,
(but may be marked as phonetically invisible).

- ▶ **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 (Trommer and Zimmermann 2014)

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

Axiom of Phonetic Visibility (Trommer and Zimmermann 2014)

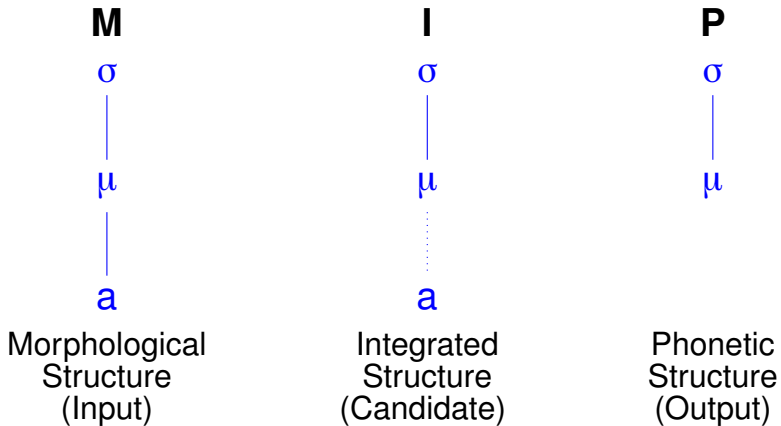
A phonological node is visible to phonetics

if and only if

it is dominated by the designated ancestor node of the structure

through an uninterrupted path of phonetic association lines

Deletion



Epenthesis

M

σ



μ

Morphological
Structure
(Input)

I

σ



μ



ϵ

Integrated
Structure
(Candidate)

P

σ



μ



ϵ

Phonetic
Structure
(Output)

Generalized Markedness (the Cloning Hypothesis)

Every markedness constraint exists in 2 incarnations:

The **general clone** refers to all structure in I

The **phonetic clone** refers only to structure in P

(cf. Cloning in Correspondence Theory, McCarthy & Prince 1995)

Generalized Markedness

OCP Assign * to every pair of adjacent H-tones in **P**

OCP Assign * to every pair of adjacent H-tones in **I**

	<u>OCP</u>	OCP
a. H L H mat wi ni		
b. H L H mat wi ni (Note: A dashed line connects the H above 'mat' to the L above 'wi'. A dotted line connects the L above 'wi' to the H above 'ni'. The L and H above 'wi' and 'ni' are blue.)	*	
c. H H / \ dep ke re	*	*

Central Consequence

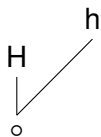
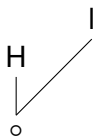
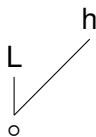
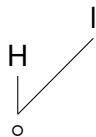
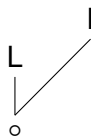
In contrast to Correspondence Theory

phonetically 'deleted' material can still have (opaque)

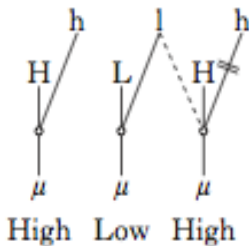
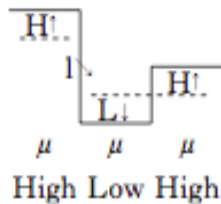
phonological effects in phonological surface representations

Tone in Register Tier Theory

(Snider 1999)

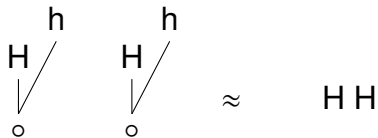
High**Mid₁****Mid₂****Low****Downstepped
High**

Representation of Downstep in Snider (1999)

*Downstepped High (automatic)*a. *structural representation*b. *phonetic representation*

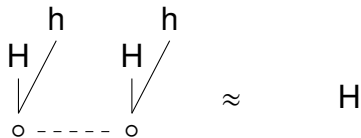
The Lateral Theory of Coalescence

(Trommer 2016)

Phonology**Phonetics**

≈

H H



≈

H

The Lateral Theory of Coalescence

(Trommer 2016)

Two laterally associated nodes are evaluated as identical

by phonological constraints on phonetic representations (**P**)

and by phonetic spellout

Analysis

Constraints on H-Spread and Downstep

- H▷ Assign * to every syllable intervening between the rightmost anchor of a H-tone and the closest right PWord edge in **I**

- *H:: Assign * to every epenthetic association line of a H-tone which is right-adjacent to another epenthetic association line of the same H-tone in **I**

- MAX I Assign * to every I register tone which is in **M** but not in **P**

Constraints on \textcircled{L} - Association and Coalescence

L
 \downarrow
 \circ

Assign * to every melody L
 which is not associated to a tonal root node in **I**

$\ast L_{\circ\{h,H\}}$

Assign * to every tonal root node which is associated to a L -melody node and a t the same time to a h -register or H -melody node in **P**

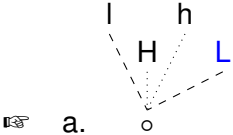
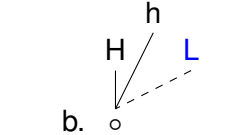
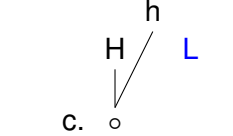
OCP_H

Assign * to every pair of adjacent H -melody, h -register, and \circ -nodes which form part of a H -tone (i.e. of a \circ associated to h and H) in **I**

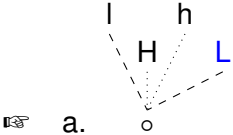
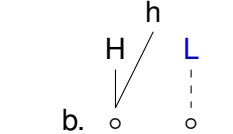
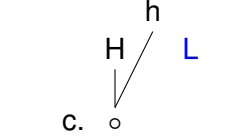
Constraints on Contour Tones

* $\hat{\sigma}$ Assign * to every HL contour which is PWord-final in **P**

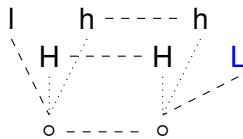
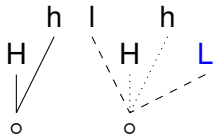
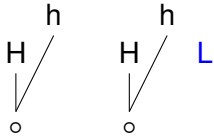
Simple Utterance-Final Lowering: dé:ŋ+L → dè:ŋ

Input: = c.	L ↓ ○	OCP _H	<u>*L_o{h,H}</u>	DEP ○	FAITH
 <p>a.</p>					****
 <p>b.</p>			*!*		*
 <p>c.</p>	*!				

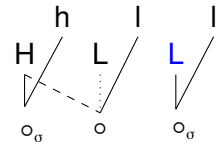
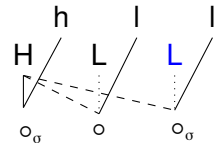
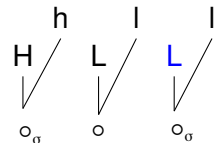
Simple Utterance-Final Lowering: dé:ŋ+L → dè:ŋ

Input: = c.	L ↓ ○	OCP _H	*L _o {h,H}	DEP ○	FAITH
 <p>a.</p>					****
 <p>b.</p>				*!	*
 <p>c.</p>	*!				

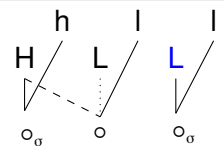
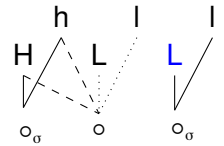
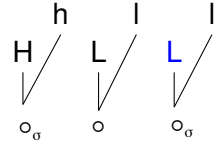
Iterative Utterance-Final Lowering: úlàn_H+L → ùlàn

Input: = c.	L ↓ ○	OCP _H	<u>*L_o{h,H}</u>	DEP ○	FAITH
<p>a. </p>					* ₇
<p>b. </p>		*!*			* ₄
<p>c. </p>	*!				

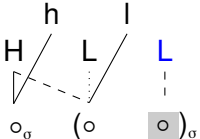
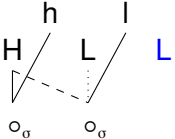
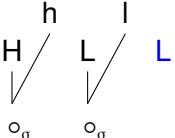
H-Spread \rightsquigarrow Downstep: wílà jèn \rightarrow wíl[↓]lá jèn

Input: = c.	*H::	*L _o {h,H}	H>	DEP \circ	FAITH
<p>a. </p>			*		**
<p>b. </p>	*!				****
<p>c. </p>			**!		

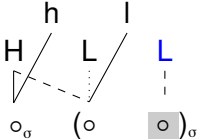
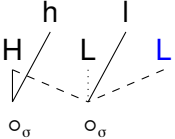
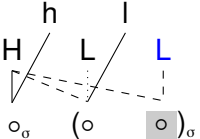
H-Spread \rightsquigarrow Downstep: wílà jèn \rightarrow wíl[↓]lá jèn

Input: = c.	*H::	*L _o {h,H}	H>	DEP \circ	FAITH
<p>a. </p>		*			**
<p>b. </p>			*		***!
<p>c. </p>			**!		

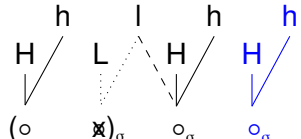
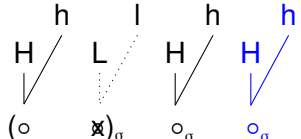
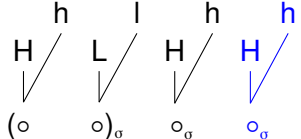
H-Spread + Boundary-L: wílà+L → wí[↓]là

Input: = c.	L ↓ ○	*H::	<u>*L_o{h,H}</u>	H▷	DEP ○	FAITH
 <p>a. o_{σ} (○ \square)$_{\sigma}$</p>					*	**
 <p>b. o_{σ} o_{σ}</p>	*!					*
 <p>c. o_{σ} o_{σ}</p>	*!			*		

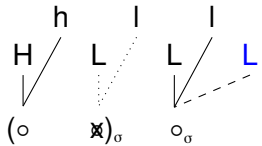
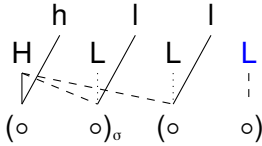
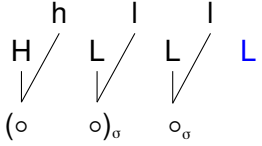
H-Spread + Boundary-L: wílà+L → wí[↓]là

Input: = \cup	L ↓ ○	*H::	<u>*L_o{h,H}</u>	H▷	DEP ○	FAITH
<p>a. </p>					*	***
<p>b. </p>			*!			***
<p>c. </p>		*!	*!			****

F-Simplification \leadsto Downstep: m \acute{e} rk \acute{a} +j \acute{e} k \rightarrow m \acute{e} r $^{\downarrow}$ k \acute{a} +j \acute{e} k

Input: = c.	MAX I	L ↓ ○	* $\hat{\sigma}$	H \triangleright	DEP ○	FAITH
<p>a. </p>				*		****
<p>b. </p>	*!					***
<p>c. </p>			*!	*	h	

Fall Simplification \nearrow H-Spreading: $k\hat{u}:r\grave{a}+L \rightarrow k\acute{u}:r\grave{a}$

Input: = c.	*H::	L ↓ ○	* $\hat{\sigma}$	H▷	DEP ○	FAITH
<p>a. </p>				*		**
<p>b. </p>	*!				*	***
<p>c. </p>		*!	*!	*		

Summary – Solved Problems

- ▶ **Downstep *before* not *after* target of H-spreading:**
Survival of register-l ← Feature Geometry

- ▶ **Boundary-L spreads, other Ls don't:**
L doesn't spread but infects fused H's ← Feature Geometry

- ▶ **Final Lowering counterbleeds Fusion:**
Generalized OCP fuses also lowered H's ← Containment

- ▶ **Non-Iterativity of H-Spreading & Fall Simplification counterfeeds H-Spreading:**
*H:: ← Containment

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Overview

Introduction

Utterance-final Lowering

Jumjum

More Phrase-Level Processes

Opacity

Theoretical Assumptions

Analysis

Summary