

# Morphophonological Tone Polarity and Phonological Opacity

Jochen Trommer  
jtrommer@uni-leipzig.de

Department of Linguistics  
University of Leipzig

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## Morphophonological Polarity

A tone in a morphologically derived form  
is systematically different  
from an underlying tone of the base form

# Syntagmatic Polarity

“In some languages, certain affixes have tones that are fully predictable from the tone of the foot to which they attach, but instead of receiving their tone by spreading in the usual way they show a tone that is the opposite of the neighbouring tone. Words that end in L take H affixes, and words that end in H take L affixes. This is termed ‘polarity’” (Yip, 2002:159)

Stem	Affix
L	H

Stem	Affix
H	L


(see also Pulleyblank 1986 on Margi, Kenstowicz et al. on Mooré, Antilla & Bodomo 2001 on Dagaare, Trommer 2005 on Kanuri)


## Syntagmatic Polarity in Kɔnni (Cahill 2004:14)

Root	Plural	Stem Tone	Suffix Tone	
tàn	tàn-á	L	H	'stone(s)'
bì:s	bì:s-á	L	H	'breast(s)'
sí	sí-à	H	L	'fish(es)'
zùnzú	zùnzú-à	H	L	'maggot(s)'

# Syntagmatic Polarity and the OCP (Leben 1973, Myers 1997)

OBLIGATORY CONTOUR PRINCIPLE: Avoid identical tones linked to adjacent syllables

	OCP	
 Stem   Affix     L   H		
Stem   Affix     L   L	*!	



	OCP	
Stem   Affix     H   H	*!	
 Stem   Affix     H   L		

## Paradigmatic Polarity in Kɔnni' (unattested)

Singular	Plural	Sg. Tone	Pl. Tone	
tà <sub>n</sub>	tá <sub>n</sub>	L	H	'stone(s)'
bì:s	bí:s	L	H	'breast(s)'
sí	sì	H	L	'fish(es)'
zùnzú	zúnzù	H	L	'maggot(s)'

# Paradigmatic Polarity in Antifaithfulness (Alderete 2001, 2008)

$\neg$ IDENT[Tone]: At least one pair of corresponding syllables does not agree in the feature [Tone]

Base		Derivative	$\neg$ IDENT[TONE]	IDENT[Tone]
a./tàn/		i. tán	*	
		ii. tòn		*
b./sí/		i. sì	*	
		ii. sí		*

# Theoretical Significance of Paradigmatic Polarity

- In approaches where morphophonology is about paradigmatic distinctness (Kurisu 2001, Alderete 1999, 2001, 2008), paradigmatic polarity should be **common**
- In restrictive versions of a SPE-approach (morphophonology = affixation + phonology) (Bye & Svenonius 2012, Bermúdez-Otero 2012, Anderson & Browne 1973, Moreton 2004) paradigmatic polarity should be **impossible**
- Alderete (2008): Kɔnni' is unattested due to learnability problems, but there are approximative equivalents



## Central Question of this Talk

Does morphophonological polarity require morpheme-specific constraints?

## Plan for this Talk

- **Syntagmatic Tone Polarity:** Reevaluate the claim by Cahill (2004) that Kɔnni is governed by a morphophonological constraint requiring tonal distinctinctness
- **Paradigmatic Tone Polarity:** Reevaluate a case which is close to Kɔnni' on the surface: Dioula d'Odienné (Braconnier 1982, Hyman 2011)

## Major Claim of this Talk

Paradigmatic polarity

=

OPC-effects + Opacity

# Theoretical Assumptions (Trommer 2011)

- **Stratal OT:** (Bermúdez-Otero 2012)  
Root-Level Stem-Level, and Word-Level Evaluations feed each other serially. Different levels have potentially different optimality-theoretic constraint rankings
- **Colored Containment:** (van Oostendorp 2006)  
Underlying material (i.e. nodes and association lines) is never literally deleted, but retained in the output, and marked as phonetically invisible.
- **Doubling:** (cf. Doubling 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.

# Könni

# Tone and Inflection in Kɔnni

- Most affixes bear constant H-tone  
(esp. singular -ŋ and the reduplicative def.pl)
- The plural suffix -a/-e of noun class 1 bears polar tone wrt the preceding stem tone
- Many stems bear floating H or L tones

# H-Tone Suffixes in Kɔnni (Cahill 2004)

## Noun

Class	Sg.	Sg.Def.	Pl.	Pl.Def.	
1	bì:s-íŋ	bì:s-ìrí	bì:s-á	bì:s-á-há	'breast'
2	gbă:-ŋ	gbà:-kú	gbà:-tí	gbà:-tí-tí	'courtyard'
3	nánjú-ŋ	nánjú-ká	nánjú-sí	nánjú-sí-sí	'fly'
4	nǎ-ŋ	nò m-bú	nò n-tí	nò n-tí-tí	'meat'

# Tone Polarity in Kɔnni (Cahill 2004:14)

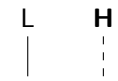
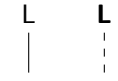
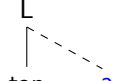

Root	Plural	Stem Tone	Suffix Tone	
tàn	tàn-á	L	H	'stone(s)'
bì:s	bì:s-á	L	H	'breast(s)'
sí	sí-à	H	L	'fish(es)'
zùnzú	zùnzú-à	H	L	'maggot(s)'



# A morphophonological $\alpha$ -Constraint for Kɔnni (Cahill 2004:4)

POLAR: ... the last tone of the plural is  
opposite in value to the  
immediately preceding tone

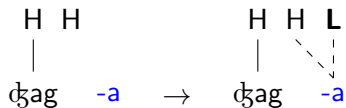
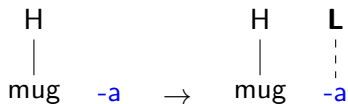
# Plural Affixation: Simple Polarity

Input: = d.	POLAR	DEP H	DEP L
 a. tan -a		*	
 b. tan -a	*!		*
 c. tan -a	*!		
 d. tan -a	*!		

# Plural + Definite Affixation: Polarity + Plateau

Input: = d.	POLAR	*H-Spread	DEP H	DEP L
a. $\begin{array}{c} \text{L} \\   \\ \text{tan} \end{array}$ $\begin{array}{c} \text{H} \\ \vdots \\ \text{-a} \end{array}$ $\begin{array}{c} \text{H} \\   \\ \text{-ha} \end{array}$			*	
b. $\begin{array}{c} \text{L} \\   \\ \text{tan} \end{array}$ $\begin{array}{c} \text{H} \\ \vdots \\ \text{-a} \end{array}$ $\begin{array}{c} \text{H} \\   \\ \text{-ha} \end{array}$		*		
c. $\begin{array}{c} \text{L} \\   \\ \text{tan} \end{array}$ $\begin{array}{c} \text{L} \\ \vdots \\ \text{-a} \end{array}$ $\begin{array}{c} \text{H} \\   \\ \text{-ha} \end{array}$	*!			*
d. $\begin{array}{c} \text{L} \\   \\ \text{tan} \end{array}$ $\begin{array}{c} \text{H} \\ \vdots \\ \text{-a} \end{array}$ $\begin{array}{c} \text{H} \\   \\ \text{-ha} \end{array}$	*!			

# Pure H-Stems vs. H + Floating-H Stems (Cahill 2004:7)



# Floating-H Stem (Cahill 2004:16)

Input: = d.	MAX H	POLAR	*CONTOUR	DEP L
<p>a. ɕag -a</p>			*	*
<p>b. ɕag -a</p>		*!		
<p>c. ɕag -a</p>	*!			*
<p>d. ɕag -a</p>	*!	*		

# Cahill's Arguments against an OCP-driven Analysis

The OCP is at odds with ...

- L H H In definite plural forms
- with H HL in floating-H stems

## Important Side Argument

- POLAR is **not** a construction-specific version of the OCP in the sense of Cophonology or Indexed-Constraint Approaches (Inkelas & Zoll 2005, Pater 2006, 2009)
- For any version of the OCP an output without a contour should harmonically bound one with it:  
H H  $\gg$  HHL ( $\rightarrow$  no contour tone formation)
- Cahill shows that a parallel OCP-analysis cannot be saved by indexing the OCP for this very reason

## Reanalysis: Polarity = OCP-effects + Opacity

- Polar plural affixes are attached at the Stem Level, definite plural affixes at the Word Level
- At the Stem Level the OCP is high-ranked, at the Word Level the OCP is low-ranked
- The Stem Level doesn't integrate floating features, the Word Level does integrate them
- No OCP-effects for Word-Level affixes and underlyingly floating features



# Reanalysis – Constraints

$\tau$   
 $\uparrow$  Assign \* to every syllable which is not associated to a tone  
 $\sigma$

$\tau$   
 $\downarrow$  Assign \* to every tone which is not associated to a syllable  
 $\sigma$

OCP Assign \* to every pair of identical tones which are phonetically associated to adjacent syllable edges

DEP | Assign \* to every morphological tone-syllable pair which is not associated morphologically, but phonetically

DEP  $\tau$  Assign \* to every tone which is phonetic, but not morphological

# Anti-Tautomorphemicity Constraint (van Oostendorp 2007)

ALTERNATION: Assign \* to every phonetic association line  
between tautomorphemic nodes

(undominated - never violated in Kɔnni)

## Plural (Definite): Stem Level

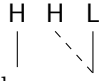


Input: = d.	$\tau$ $\uparrow$ $\sigma$	DEP	OCP	DEP $\tau$	$\tau$ $\downarrow$ $\sigma$
<p style="text-align: center;">L      H</p> <p style="text-align: center;">        </p> <p>a. tan -a</p>				*	
<p style="text-align: center;">L      L</p> <p style="text-align: center;">        </p> <p>b. tan -a</p>			*!		
<p style="text-align: center;">L</p> <p style="text-align: center;">       -</p> <p>c. tan -a</p>			*!		
<p style="text-align: center;">L</p> <p style="text-align: center;"> </p> <p>d. tan -a</p>	*!				



# Floating-H Stem: Stem Level

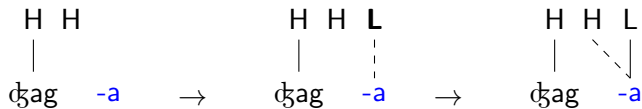
Input: = d.	$\tau$ $\uparrow$ $\sigma$	DEP	OCP	DEP $\tau$	$\tau$ $\downarrow$ $\sigma$
a. $\begin{array}{c} \text{H} \quad \text{H} \quad \text{L} \\   \quad \quad   \\ \text{ɕag} \quad -\text{a} \end{array}$				*	
b. $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad \quad   \\ \text{ɕag} \quad -\text{a} \end{array}$			*!	*	
c. $\begin{array}{c} \text{H} \quad \text{H} \\   \quad \quad   \\ \text{ɕag} \quad -\text{a} \end{array}$			*!	*	
d. $\begin{array}{c} \text{H} \quad \text{H} \\   \\ \text{ɕag} \quad -\text{a} \end{array}$	*!				*

# Floating-H Stem: Word Level

Input: = c.	$\tau$ $\uparrow$ $\sigma$	$\tau$ $\downarrow$ $\sigma$	DEP $\tau$	DEP	OCP
 <p>a. <math>\text{ɔʒag} \text{-a}</math></p>				*	*
 <p>b. <math>\text{ɔʒag} \text{-a}</math></p>			*!	**	
 <p>c. <math>\text{ɔʒag} \text{-a}</math></p>		*!			

# Crucial Counterbleeding Opacity in Kɔnni

The OCP triggers insertion of a L-tone although this does not surface in a position that would avoid an OCP-violation



## Kɔ̀nni and Antifaithfulness

- Polarity in Kɔ̀nni couldn't be derived by Output-Output  $\neg$ IDENT[Tone] because polarity applies in a segment that is only present in the plural form (the vowel of the affix)
- An analysis of Polarity in Kɔ̀nni might be built around  $\neg$ DEP[Tone], but this would require additional (OCP- or POLAR-like) mechanisms to ensure that the inserted tone exhibits polarity



# Dioula d'Odienné

## Definiteness in Dioula d'Odienné (Braconnier 1982, Hyman 2011)

is marked by:

- a H-tone on the last  $\sigma$  of the noun
- Insertion of a L-tone between a stem-H and the affix-H on the last  $\sigma$
- Spreading of the first tone of the second  $\sigma$  to the first  $\sigma$  if the stem-medial consonant is transparent

This leads to paradigmatic polarity on the first stem- $\sigma$

## Dioula d'Odienné L-Tone Roots (Braconnier 1982, Hyman 2011)

	indef.	def.	
<b>Opaque L</b>	sèbè	sèbé	'paper'
	fòdá	fòdá	'season'
	b̀rìsá	b̀rìsá	'bush'
<b>Transparent L</b>	tùrù	túrú	'oil'
	bègì	bégí	'white cotton cloth'
	kùnà	kúná	'leprosy'

## Dioula d'Odienné H-Tone Roots (Braconnier 1982, Hyman 2011)

	<b>indef.</b>	<b>def.</b>	
<b>Opaque H</b>	bésé	bésě	'machete'
	dáfé	dáfě	'horse'
	bákán	bákǎn	'belt/wrist protector'
<b>Transparent H</b>	<b>mú</b> ú	<b>mù</b> ú	'knife'
	jégí	jègí	'hope'
	télú	tèlú	'tree'

# Analysis in Stratal OT

**Stem Level:** Suffixation and association of H to  $\sigma_2$

Insertion of L on  $\sigma_2$   
to avoid a OCP violation (\*HH)

**Word Level:** Shifting of the first tone of  $\sigma_2$  to  $\sigma_1$   
across a transparent C

## Additional Constraints on Contour Tones

- \* $_{L\underline{\sigma}H}$  Assign \* to every syllable which is associated phonetically to the tone contour L H
  
- \* $[_{L\underline{\sigma}H}$  Assign \* to every syllable which is associated phonetically to the tone contour L H in non-final position
  
- \* $[_{HLH}$  Assign \* to every syllable which is associated to the tone contour H L H

# Additional Constraints on Tone Spreading

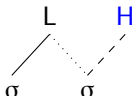

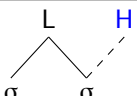
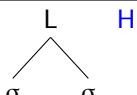
$\tau$   
 $\downarrow$   
 $[\sigma$

Assign \* to every tone which is not associated to the initial syllable of a Prosodic Word

$*[\sigma \text{ b } \sigma]$


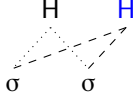
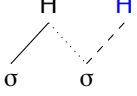
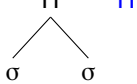
Assign \* to every tone which is associated to two syllables across an opaque consonant

## Stem Level: L-Root



Input: = d.	$\tau$ ↓ $\sigma$	OCP	MAX $\tau$	* $[\underline{L}\underline{\sigma}_H]$	* $[\underline{L}\underline{\sigma}_H]$	FAITH
 <p>a. <math>\sigma</math>   <math>\sigma</math></p>						**
 <p>b. <math>\sigma</math>   <math>\sigma</math></p>			*!			****
 <p>c. <math>\sigma</math>   <math>\sigma</math></p>				*!	*!	*
 <p>d. <math>\sigma</math>   <math>\sigma</math></p>	*!					



## Stem Level: H-Root

Input: = d.	$\tau$ ↓ $\sigma$	OCP	MAX $\tau$	$*[\underline{L}\underline{\sigma}_H]$   $*\underline{L}\underline{\sigma}_H$	FAITH
 <p>a. <math>\sigma</math>   <math>\sigma</math></p>				*	***
 <p>b. <math>\sigma</math>   <math>\sigma</math></p>			*!		***
 <p>c. <math>\sigma</math>   <math>\sigma</math></p>		*!			**
 <p>d. <math>\sigma</math>   <math>\sigma</math></p>	*!				

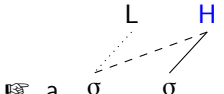
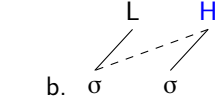
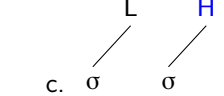
## Stem Level: H-Root

Input: =	$\tau$ ↓ $\sigma$	OCP	MAX $\tau$	* $[\underline{L}\underline{\sigma}_H]$	* $[\underline{L}\underline{\sigma}_H]$	FAITH
<p>a. </p>					*	***
<p>b. </p>				*!	*	***

## Word-Level: Opaque L- Root

Input: = c.	$*[\sigma \text{ b } \sigma]_{\tau}$	$*[L\sigma_H]$	$\tau$ ↓ [ $\sigma$ ]	MAX $\tau$	FAITH
a.	*!			*	**
b.	*!	*			*
c.			*		


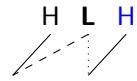
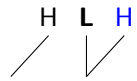
## Word Level: Transparent L-Root

Input: = c.	* $[\sigma \text{ b } \sigma]_{\tau}$	* $[\text{L}\sigma_{\text{H}}]$	$\tau$ ↓ [ $\sigma$ ]	MAX $\tau$	FAITH
 <p>a. <math>\sigma</math>      <math>\sigma</math></p>				*	**
 <p>b. <math>\sigma</math>      <math>\sigma</math></p>		*!			*
 <p>c. <math>\sigma</math>      <math>\sigma</math></p>			*!		

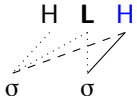

## Word-Level: Opaque H-Root

Input: = c.	* $[\sigma \text{ b } \sigma]_{\tau}$	* $[\text{L}\underline{\sigma}\text{H}]$	$\tau$ ↓ [ $\sigma$	MAX $\tau$	FAITH
<p>a. <math>\sigma</math> <b>b</b> <math>\sigma</math></p>	*!		*	*	**
<p>b. <math>\sigma</math> <b>b</b> <math>\sigma</math></p>	*!	*	*		*
<p>c. <math>\sigma</math> <b>b</b> <math>\sigma</math></p>			**		

## Word Level: Transparent H-Root

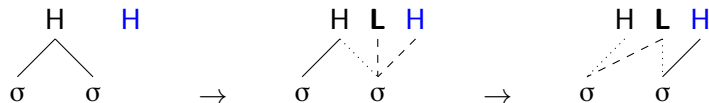
Input: = c.	* $[\sigma \text{ b } \sigma]_{\tau}$   * $[\underline{L}\sigma_H$	$\tau$ ↓ [ $\sigma$	MAX $\tau$	FAITH
 <p>a. <math>\sigma</math>   <math>\sigma</math></p>		*	*	***
 <p>b. <math>\sigma</math>   <math>\sigma</math></p>	*!		*	**
 <p>c. <math>\sigma</math>   <math>\sigma</math></p>		**!		

## Word Level: Transparent H-Root

Input: = b.	* <sub>[HLH]</sub>	* <sub>[σ b σ]<sub>τ</sub></sub>	* <sub>[Lσ<sub>H</sub>]</sub>	τ ↓ [σ	MAX τ	FAITH
 <p>a. σ      σ</p>	*!				**	*****
 <p>b. σ      σ</p>				*	*	***

# Crucial Counterbleeding Opacity in Dioula

The OCP triggers insertion of a L-tone  
to separate two adjacent H-tones,  
but the first of these H-tones doesn't surface





# Dioula and Antifaithfulness

An Antifaithfulness analysis . . .

- is at odds with the multiple changes in Dioula definiteness marking
- cannot account for the blocking of polarity on  $\sigma_1$  through opaque consonants

# Are there true cases of morphophonological polarity?

- Many alleged cases of polarity are based on insufficient empirical sources (de Lacy 2012)
- Voicing polarity in Dholuo is an epiphenomenon of final devoicing interacting with other processes (Pulleyblank 2006, Bye 2006, Baerman 2007)
- Vowel length polarity in Anywa and Pări is a side effect of  $\mu$ -affixation (Trommer & Zimmermann 2014)
- None of the cases of tone polarity discussed in the Africanist literature is obviously paradigmatic (see Trommer 2011 possible counterexamples from Dinka and Anywa)
- Phonosyntactic tone circles in Chinese (Alderete 2008)?

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