

Mutual counterfeeding in Bari as two separate counterfeeding interactions

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Overview

- A supposed mutual counterfeeding interaction in Bari (Eastern Nilotic; Yokwe 1987) can be reinterpreted into two separate counterfeeding interactions
- Bari interactions can be generated by theories that can handle simple counterfeeding but not mutual counterfeeding:
 - Serial rule based phonology
 - OT with Local Constraint Conjunction
- Bari interactions are not an argument in favour of theories that can generate mutual counterfeeding

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Mutual counterfeeding

- **Mutual counterfeeding** (Wolf 2011) involves two rules that each can create the environment of the other rule, but neither applies to the output of the other rule.
- Ordering paradox in serial theories: Neither rule feeds the other, while simultaneous application can generate mutual counterfeeding (Chomsky & Halle 1968: fn. 5)

Hypothetical example (Wolf 2011: 89)

- Schwa-syncope (1a) deletes /ə/ except if it would create a cluster of more than two consonants.
- H-deletion (1b) deletes /h/ before consonants, glides or word-finally.

(1) a. **Schwa-syncope**

/ə/ → ∅ / {V,#} (C)_(C){V,#}

b. **H-deletion**

/h/ → ∅ / _{[-voc],#}

- Schwa-syncope and H-deletion can feed each other:

(2) **Feeding and counterfeeding interactions**

a.

UR	/ehtəmu/	/ahəpi/
ə-syn	–	ahpi
H-del	etəmu	api
SR	[etəmu]	[api]

b.

UR	/ehtəmu/	/ahəpi/
H-del	etəmu	–
ə-syn	etmu	ahpi
SR	[etmu]	[ahpi]

Hypothetical example (Wolf 2011: 89)

- Suppose that both rules apply simultaneously, we would get mutual counterfeeding:
 - H-deletion applies and creates the input for schwa-syncope, which underapplies ((3a))
 - Schwa-syncope applies and creates the input for h-deletion, which does not apply (3b)
- (3) a. **H-deletion counterfeeds Schwa-syncope**
/ehtəmu/ → [etəmu]
- b. **Schwa-syncope counterfeeds H-deletion**
/ahəpi/ → [ahpi]

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H-Dissimilation

- Word-initial high tones dissimilate to low tones after a word-final high tone (Yokwe 1987: 207;224):

(4) **H#HL** → **H#LL**:

dók + kópò → dók kòpò 'fetched the cup'

H-Spreading & Feeding

- Word-final high tones can spread to a following noun with an initial low tone (Yokwe 1987: 209-210):

- (5) a. **H#LL → H#HL:**
 bék + ràbà → bék rábà 'fixed the platform'
- b. **H#LH → H#HH:**
 tór + bòngó → tór bóngó 'tied the dress'
- c. **H#LF → H#HF:**
 mát + wìnî → mát wínî 'drank the medicine'

- Dissimilation can feed spreading (Yokwe 1987: 206):

- (6) **H#HH → H#LL → H#HL:**
 dép + kéré → dép kèrè → dép kéré 'held the gourd'

Mutual counterfeeding

- H-spreading counterfeeds H-Dissimilation:

(7) **H#LH → H#HH:**

tór + bòngó → tór bòngó * → tór bòngò 'tied the dress'

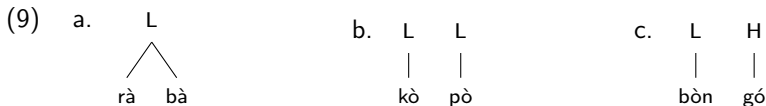
- H-Dissimilation counterfeeds H-Spreading:

(8) **H#HL → H#LL:**

dók + kópò → dók kòpò * → dók kópò 'fetched the cup'

Observation

- In /LL/ (5a) and /HH/ → /LL/ (6), L is multiply linked to two syllables (9a)
- In /HL/ → /LL/ sequences, there are two distinct Ls (9b)
- In /LH/ (5b) and /LF/ (5c), there is a distinct L followed by an H (9c)



- Spreading applies to /LL/ only if the sequence consists of one multiply associated L

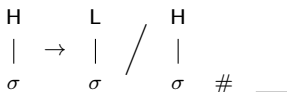
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Dissimilation

- Dissimilation changes an High tone to a low tone after a word-final high tone:

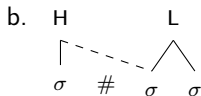
(10) Dissimilation:



Spreading and falling tones

- Spreading would create a falling tone but there is a general restriction against falling tones on non-final syllables in Bari (Yokwe 1987: 209):

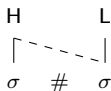
(11) a. bék + ràbà → * bék râbà 'fixed the platform'



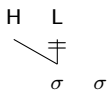
Spreading and falling tones

- What looks like spreading involves actually two operations: Linking H and de-linking L

(12) High Tone Spread (Yokwe 1987: 210):



(13) Contour Simplification (Yokwe 1987: 210):



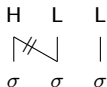
Retraction

- Splitting “H-spreading” into two rules allows us to order a additional rule in between
- According to the earlier observation: Spreading to a TBU that was (not multiply) linked to an underlying H is not allowed:

(14) **H#HL** → **H#LL** *→ **H#HL**:
 dók + kópò → dók kòpò *→ dók kópò ‘fetched the cup’

- In some environments, H is de-linked from a HL contour syllable (instead of L as with Contour Simplification)
- Retraction (cf. Bresnan & Kanerva 1989) reverses the effect of spreading (similar to *]HH in Trommer 2017)

(15) **Retraction:**



H#HH → H#HL

(16) dép + kéré → dép kèrè → dép kéré 'held the gourd'

(17)

UR	<div> <div>H</div> <div> <div>σ</div> <div>#</div> <div> <div>H</div> <div> <div>σ</div> <div>σ</div> </div> </div> </div> </div>
Dissimilation	<div> <div>H</div> <div> <div>σ</div> <div>#</div> <div> <div>L</div> <div> <div>σ</div> <div>σ</div> </div> </div> </div> </div>
High tone spread	<div> <div>H</div> <div> <div>σ</div> <div>#</div> <div> <div>L</div> <div> <div>σ</div> <div>σ</div> </div> </div> </div> </div>
Retraction	—
Contour Simplification	<div> <div>H</div> <div> <div>σ</div> <div>#</div> <div> <div>L</div> <div> <div>σ</div> <div>σ</div> </div> </div> </div> </div>

feeds

feeds

H#LH → H#HH

(18) tór + bòngó → tór bòngó *→ tór bòngò 'tied the dress'

(19)

UR	<table><tr><td>H</td><td></td><td>L</td><td>H</td></tr><tr><td> </td><td></td><td> </td><td> </td></tr><tr><td>σ</td><td>#</td><td>σ</td><td>σ</td></tr></table>	H		L	H					σ	#	σ	σ
H		L	H										
σ	#	σ	σ										
Dissimilation	—												
High tone spread	<table><tr><td>H</td><td></td><td>L</td><td>H</td></tr><tr><td>└─┐</td><td></td><td> </td><td> </td></tr><tr><td>σ</td><td>#</td><td>σ</td><td>σ</td></tr></table>	H		L	H	└─┐				σ	#	σ	σ
H		L	H										
└─┐													
σ	#	σ	σ										
Retraction	—												
Contour Simplification	<table><tr><td>H</td><td></td><td></td><td>H</td></tr><tr><td>└─┐</td><td></td><td></td><td> </td></tr><tr><td>σ</td><td>#</td><td>σ</td><td>σ</td></tr></table>	H			H	└─┐				σ	#	σ	σ
H			H										
└─┐													
σ	#	σ	σ										

feeds

counterfeeds

feeds

counterfeeds

H#HL → H#LL

(20) dók + kópò → dók kòpò *→ dók kópò 'fetched the cup'

(21)

UR	H		H	L
	σ	#	σ	σ
Dissimilation	H		L	L
	σ	#	σ	σ
High tone spread	H		L	L
	└──┐			
	σ	#	σ	σ
Retraction	H		L	L
	σ	#	σ	σ
Contour Simplification		—		

feeds
feeds
bleeds
counterfeeds

Summary of the Analysis

- Re-interpretation of mutual counterfeeding is successful:
 1. The possibility of multiply linked tones can differentiate between contexts (This differentiates Bari from the Wolf 2011 example)
 2. Spreading can be split into two operations: Linking and de-linking a tone
- More derivation steps are not necessarily needed for a reanalysis → OT-LCC can also deal with Bari interactions (see appendix)

Conclusion

- Bari interactions can be reinterpreted as two separate cases of counterfeeding
- Serial rule based phonology can derive the data
- Bari interactions should be amenable to other theories that can derive counterfeeding but not mutual counterfeeding, e.g. OT-Containment (Trommer 2017), OT-LCC (appendix)
- Bari interactions cannot be accounted for by simultaneous rule application

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Monosyllabic nouns

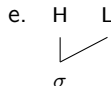
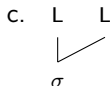
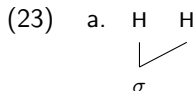
- Yokwe (1987: 223) observes that on the surface there appear to be three different types of monosyllabic nouns: H, L and HL
- However, with regard to their behaviour in post-verbal environment there are five different patterns:

(22) **Post-verbal Monosyllabic nouns (Yokwe 1987: 224–226)**

- a. **H#H₁ → H#L**
ryák + túr → ryák tùr ‘robbed the village’
- b. **H#H₂ → H#F**
mát + lé → mát lê ‘drank the milk’
- c. **H#L₁ → H#L**
lók + mòk → lók mòk ‘trapped the antbear’
- d. **H#L₂ → H#F**
mét + dàk → mét dâk ‘saw the pipe’
- e. **H#F → H#L**
rík + têng → rík tèng ‘chased the herd’

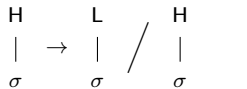
Monosyllabic nouns: towards an analysis

- **Idea:** The difference between H_1 or L_1 and H_2 or L_2 is that H_1 and L_1 have two underlying tones of the same kind (HH and LL, respectively)



- Assumption: Dissimilation does not make reference to word boundaries:

(24) Dissimilation (reformulation):



$$H\#H_1 \rightarrow H\#L$$

(25) ryák + túr → ryák tùr ‘robbed the village’

(26)

UR	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">H H └─┘ σ</div> </div>
Dissimilation	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">L L └─┘ σ</div> </div>
High tone spread	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H └─┘ σ</div> <div>#</div> <div style="text-align: center;">L L └─┘ σ</div> </div>
Retraction	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">L L └─┘ σ</div> </div>
Contour Simplification	—

$$H\#H_2 \rightarrow H\#F$$

(27) mát + lé → mát lê ‘drank the milk’




(28)

UR	
	$\begin{array}{ccccc} H & & H \\ & & \\ \sigma & \# & \sigma \end{array}$
Dissimilation	$\begin{array}{ccccc} H & & L \\ & & \\ \sigma & \# & \sigma \end{array}$
High tone spread	$\begin{array}{ccccc} H & & L \\ \lceil & \text{---} & \\ \sigma & \# & \sigma \end{array}$
Retraction	—
Contour	—
Simplification	

$$H\#L_1 \rightarrow H\#L$$

(29) lók + mòk → lók mòk 'trapped the antbear'

(30)

UR	
	
Dissimilation	—
High tone spread	
Retraction	
Contour Simplification	—

H#L₂ → H#F

(31) mét + dàk → mét dâk 'saw the pipe'

(32)

UR	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">H σ</div> </div>
Dissimilation	—
High tone spread	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H └──┐ σ</div> <div>#</div> <div style="text-align: center;">L └──┐ σ</div> </div>
Retraction	—
Contour	—
Simplification	

H#F → H#L

(33) rík + têng → rík têng 'chased the herd'

(34)

UR	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">H L ↘ σ</div> </div>
Dissimilation	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">L L ↘ σ</div> </div>
High tone spread	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H └───┐ σ</div> <div>#</div> <div style="text-align: center;">L L └───┘ σ</div> </div>
Retraction	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">H σ</div> <div>#</div> <div style="text-align: center;">L L ↘ σ</div> </div>
Contour Simplification	—

Hypothetical language (Wolf 2011)

- Schwa-syncope (35a) deletes /ə/ except if it would create a cluster of more than two consonants
- H-deletion (35b) deletes /h/ before consonants, glides or word-finally.

(35) a. **Schwa-syncope**
 $/ə/ \rightarrow \emptyset / \{V, \#\}(C)_ (C)\{V, \#\}$

b. **H-deletion**
 $/h/ \rightarrow \emptyset / _ \{[-voc], \#\}$

(36) a. **H-deletion counterfeeds Schwa-syncope**
 $/ehtəmu/ \rightarrow [etəmu]$

b. **Schwa-syncope counterfeeds H-deletion**
 $/ahəpi/ \rightarrow [ahpi]$

Containment


- Constraints (adopted from Wolf 2011):
 - $[*hC]_P$:
Assigns a violation for every sequence of h followed by a consonant in P
 - $PARSE(h)$:
Assigns a violation for every underlying h not realized in P
 - $[*ə]_P$:
Assigns a violation for every ə in P
 - $[*CCC]_P$:
Assigns a violation for every sequence of three consonants in P
 - $PARSE(ə)$:
Assigns a violation for every underlying ə not realized in P

Containment

- OT with Containment (Prince & Smolensky 1993) cannot derive the hypothetical case of mutual counterfeeding, because there is no unambiguous ranking:

Containment

/ahəpi/ → [ahpi]

/ahəpi/	[*CCC] _P	[*ə] _P	PARSE(h)	[*hC] _P	PARSE(ə)
a. ahəpi		*!		*	
 b. ah<ə>pi				*	*
c. a<h><ə>pi			*!		*
d. a<h>əpi		*!	*!		



Rankings:

PARSE(h) ≫ [*hC]_P

[*ə]_P ≫ [*hC]_P, PARSE(ə)

Containment

/ehtəmu/ → [etəmu]

/ehtəmu/	[*CCC] _P	[*ə] _P	PARSE(h)	[*hC] _P	PARSE(ə)
 a. ehtəmu		*		*	
b. e<h>təmu		*!	*!		
 c. e<h>t<ə>mu			*		*
d. eht<ə>mu	*!			*	*

This ranking does not derive at the correct output.


Re-Ranking:

PARSE(ə) ≫ [*ə]_P

[*hC]_P ≫ [*ə]_P, PARSE(h)

Containment

/ehtəmu/ → [etəmu]

/ehtəmu/	[*CCC] _P	[*hC] _P	PARSE(ə)	[*ə] _P	PARSE(h)
a. ehtəmu		*!		*	
 b. e<h>təmu				*	*
c. e<h>t<ə>mu			*!		*
d. eht<ə>mu	*!	*	*		

Hypothetical language (Chomsky & Halle 1968)

- Rules α and β can feed each other
- The derivations in (38) create an ordering paradox in Serial rule based phonology (\rightarrow mutual counterfeeding)

(37) a. Rule α : $B \rightarrow X / _ Y$


b. Rule β : $A \rightarrow Y / _ X$

(38) a. $/ABY/ \rightarrow [AXY]$


b. $/BAX/ \rightarrow [BYX]$

Containment

(39)


/ABY/	$[\ast BY]_P$	PARSE(A)	$[\ast AX]_P$	PARSE(B)
a. ABY	*!			
 b. AX^BY			*	*
c. Y^AX^BY		*!		*

(40)

/BAX/	$[\ast BY]_P$	PARSE(A)	$[\ast AX]_P$	PARSE(B)
 a. BAX			*	
b. BY^AX	*!	*!		
c. X^BY^AY		*!		*!

Constraints

- Spread(H): H tones should span a prosodic word boundary
- *F: F tones should not be associated with a non-final TBU
- OCP(H): H tones should not be adjacent
- DEP(|)
- MAX(H)
- MAX(L)
- IDENT(H)
- (IDENT(H) & MAX(L))_{σσ}: Violations on two adjacent TBUs
- (DEP(|) & MAX(H))_σ: Violations on the same TBU

	<div><div><div>H</div><div> </div><div>σ</div></div><div>#</div><div><div><div>H</div><div>∧</div></div><div>σ</div><div>σ</div></div></div>	(IDENT(H) & MAX(L)) _{σσ}	(DEP(I) & MAX(H)) _σ	Spread(H) *F	OCP(H)	DEP(I)	MAX(H)	MAX(L)	IDENT(H)
a.	<div><div><div>H</div><div> </div><div>σ</div></div><div>#</div><div><div><div>H</div><div>∧</div></div><div>σ</div><div>σ</div></div></div>			*!	*				
b.	<div><div><div>H</div><div> </div><div>σ</div></div><div>#</div><div><div><div>L</div><div>∧</div></div><div>σ</div><div>σ</div></div></div>			*!					*
c.	<div><div><div>H</div><div>└───┐</div><div>σ</div><div>#</div><div>σ</div></div><div><div><div>L</div><div>└──┐</div><div>σ</div><div>σ</div></div></div></div>			*!		*			*
 d.	<div><div><div>H</div><div>└──┐</div><div>σ</div><div>#</div><div>σ</div></div><div><div><div>L</div><div> </div><div>σ</div></div></div></div>					*			*

H#LH → H#HH

	<div style="display: flex; justify-content: space-around;"> <div>H σ</div> <div>L σ</div> <div>H σ</div> </div>	<div style="display: flex; justify-content: space-around;"> <div>(IDENT(H) & MAX(L))_{σσ}</div> <div>(DEP() & MAX(H))_σ</div> </div>	Spread(H) *F	OCP(H)	DEP()	MAX(H)	MAX(L)	IDENT(H)
l:	<div style="display: flex; justify-content: space-around;"> <div>H σ</div> <div>#</div> <div>L σ</div> <div>H σ</div> </div>							
a.	<div style="display: flex; justify-content: space-around;"> <div>H σ</div> <div>#</div> <div>L σ</div> <div>H σ</div> </div>		*!					
b.	<div style="display: flex; justify-content: space-around;"> <div>H └───┐ σ # σ</div> <div>L σ</div> <div>H σ</div> </div>			*!	*			
c.	<div style="display: flex; justify-content: space-around;"> <div>H └───┐ σ # σ</div> <div>H σ</div> </div>				*	*	*	
d.	<div style="display: flex; justify-content: space-around;"> <div>H └───┐ σ # σ</div> <div>L σ</div> </div>	*!				*	*	*

H#HL → H#LL

	H		H	L	(IDENT(H) & MAX(L)) _{σσ}	(DEP(l) & MAX(H)) _σ	Spread(H) *F	OCP(H) *!	DEP(l)	MAX(H)	MAX(L)	IDENT(H)
l:	σ	#	σ	σ								
a.	σ	#	σ	σ			*	*!				
b.	σ	#	σ	σ			*					*
c.	σ	#	σ	σ				*	*!			*
d.	σ	#	σ	σ		*!			*	*		