

“Tonal exchange rules in Khoekhoe:  
The role of defective nodes and prosodic subcategorization”

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**1 PROPOSAL**

- (1) In Khoekhoe, causative morphology triggers an exchange rule:
  - It adds a mid tone (M) to a stem if it lacks one (e.g. L → LM)
  - It deletes a M if the stem already has one (e.g. LM → L)
- (2) Core of analysis:
  - A floating  $\textcircled{M}$  is associated to a defective tonal root node
  - This defective root node subcategorizes as outside the stem { }
  - Exchange *via representation* – An auxiliary process not required

**2 BACKGROUND ON EXCHANGE RULES**

- (3) Exchange rules (a.k.a. ‘toggling’, ‘reversals’, or simply ‘polarity’) (Anderson & Browne 1973, Baerman 2007, de Lacy 2012, Wunderlich 2012, *i.a.*)
- (4) Morphological patterns where in the exact same context
  - Input with segment or feature [-F] become [+F]
  - Input with segment or feature [+F] become [-F]
- (5) Itunyoso Triqui [tɾɔq] (DiCano, Martínez Cruz, Cruz Martínez, & Martínez Cruz 2020)

Adjective	Nominalized form	[Note: Tone omitted]
a. <b>ɲgo</b> ‘one’	→ <b>ɲgoh</b>	‘one (of them)’
<b>aʔngo</b> ‘none’	→ <b>aʔngoh</b>	‘none (of them)’
b. <b>ũʔũ?</b> ‘five’	→ <b>ũʔũh</b>	‘five (of them)’
<b>βatāʔ</b> ‘six’	→ <b>βatāh</b>	‘six (of them)’
c. <b>ββih</b> ‘two’	→ <b>ββi</b>	‘two (of them)’
<b>aneh</b> ‘half’	→ <b>ane</b>	‘half (of them)’ <i>etc.</i>

(6) Generalization for these morphological contexts (word-final ending):

- { $\emptyset, ?$ } → **h**
- {**h**} →  $\emptyset$

(7) Process-based approach: Antifaithfulness (Alderete 2001, DiCanto *et al.* 2020)

<b>ɲgo + NOM</b>	-MAX([SPREADGLOT])	IDENT([SPREADGLOT])
a. → [ɲgoh]		*
b. [ɲgo]	*!	
<b>ββih + NOM</b>		
a. [ββih]	*!	
b. → [ββi]		*

(8) Item-based approach: A suffix /-h/ (de Lacy 2020)

UR	/ɲgo/	/ngo + h/	/ββih/	/ββih + h/
Concatenation	<b>ɲgo</b>	<b>ngoh</b>	<b>ββih</b>	<b>ββihh</b>
Lengthening	<b>ɲgo:</b>	-	-	-
Epenthesis	-	-	-	<b>ββihh</b>
h-Deletion-1	-	-	-	<b>ββih</b>
Merger	-	-	-	<b>ββih</b>
h-Deletion-2	-	-	-	<b>ββi:</b>
Surface	<b>[ɲgo:]</b>	<b>[ngoh]</b>	<b>[ββih]</b>	<b>[ββi:]</b>

- (9) Generalized Nonlinear Affixation (GNLA) (Bermúdez-Otero 2012, *inter alia*)
  - “[GNLA] strives to derive all instances of *non-concatenative morphology without any additional assumptions simply from affixation of nonlinear phonological representations that are independently motivated*” (Zimmermann 2013:2)
- (10) Surprisingly, tone has played only a marginal role in the exchange rule literature, with few exceptions (e.g. Yue-Hashimoto 1986 for Chinese dialects)

**3 CORE KHOEKHOE DATA**

- (11) Khoekhoe [nɑq] (a.k.a. ‘Khoekhoegowab’, ‘Nama’, ‘Damara’ – Khoe-Kwadi family)
  - Largest “Khoisan” language, spoken primarily in Namibia
- (12) Tone system extensively documented and analyzed (Beach 1938, Hagman 1977, Haake 1999, 2008, Haacke & Eiseb 2002, Brugman 2009, Kusmer 2020)
- (13) Consensus on the tone system:
  - Involves four pitch heights, forming six primary melodies
  - Distributed across a bimoraic stem (“Khoisan” canonical shape)



(21) WFF adds an **M** (neutralizes pairs), while SFF exchanges an **M**

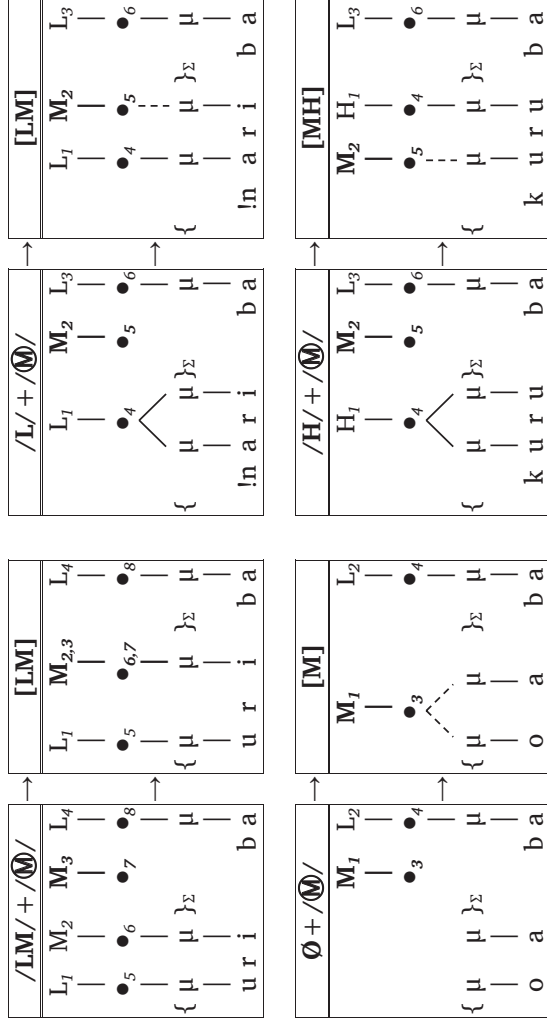
	Phonetics (SFF) (WFF)	Phonology (SFF) (WFF)	Phonetics (SFF) (WFF)	Phonology (SFF) (WFF)
a. /43/ →	24	/H/ →	M̄H	M̄H
/24/ →	43	/MH/ →	H	MH
b. /32/ →	22	∅ →	M̄	M̄
/22/ →	32	/M/ →	∅	M
c. /12/ →	13	/L/ →	L̄M̄	L̄M̄
/13/ →	12	/LM/ →	L	LM

(22) Phonological analysis provides a principled reason

- Why the melodies form the three pairs observed in both FF
- Why they neutralize in the direction observed for WFF

4.2 Part 2: *Weak Flip Flop as a floating M̄*

- (23) All tonemes are associated to a tonal root node (TRN, ●) (Snyder 1999)
- (24) Contexts which trigger Weak Flip Flop sponsor a floating M̄ which is pre-associated to a standard TRN (i.e. non-deficient)
  - Floating M—● coalesces with a **M** if one is present in stem { }<sub>Σ</sub>
  - M—● is added to stems without **M** (subject to contour tonotactics)



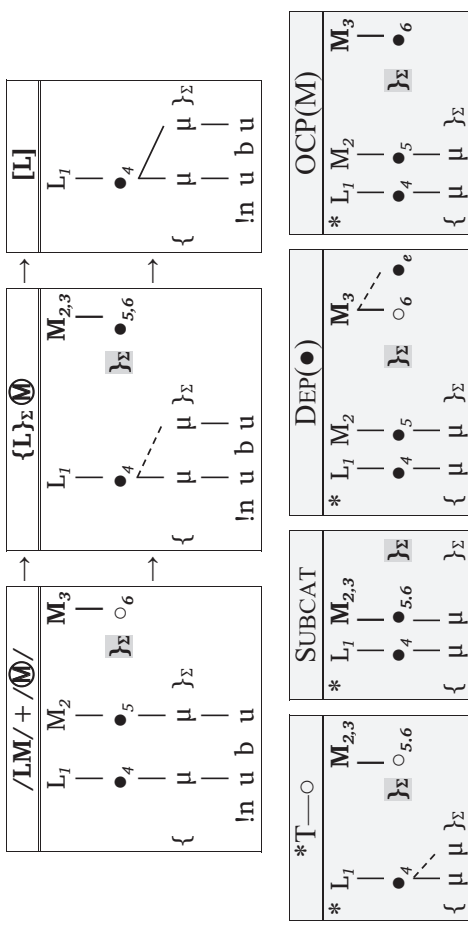
4.3 Part 3: *Strong Flip Flop as a subcategorizing defective M̄*

(25) In Strong Flip Flop with causative reduplication, a floating M̄ is associated to a deficient TRN (represented as ∅)

- Defective ∅ is qualitatively distinct from non-defective ●
  - Not simply under- or over-specified (cf. Bye & Svenonius 2012, Trommer 2015)
- (26) Defective node ∅ prosodically subcategorizes as being external to a prosodic stem, i.e. / { }<sub>Σ</sub> ∅/ (Inkelas 1990, Bennett et al. 2018; Downing & Kadenge 2020)

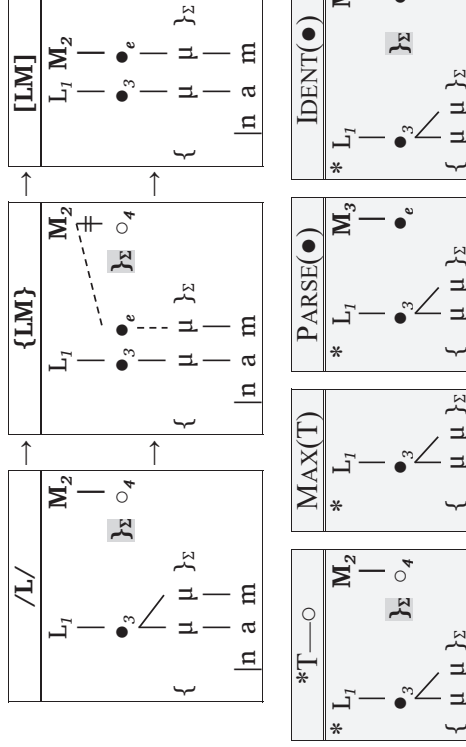
(27) Components of analysis for stems with **M**

- A toneme must associate to a non-defective TRN (i.e. ●)
- When a stem **M** is present, then M—∅ coalesces with it
- Unlike with WFF, coalescence occurs outside the stem to satisfy the prosodic subcategorization frame { }<sub>Σ</sub> of the defective ∅
- Resultant floating M—● is unincorporated, deletes at later cycle



(28) Components of analysis for stems without **M**

- A toneme must still associate to a non-defective TRN (i.e. ●)
- When stem **M** is absent, M—∅ has nothing to coalesce with
- An epenthetic ●<sub>e</sub> must be inserted to host **M**
- Unlike defective { }<sub>Σ</sub> ∅, ●<sub>e</sub> has no subcat — ∴ placed inside of { }<sub>Σ</sub>



(29) In related languages, Flip Flop cognates involve juncture morph **-ā-**

- Ts'ixa: **tyūn-ā-mā** 'buy for' (**-ma** < 'give') (Güldemann & Fehn 2017)
- Diachronic loss of morph is incomplete: **Tonal stability** (Yip 2002)

(30) Synchronically, potential interpretations of the defective  $\circ$  node:

- Value approaching zero *à la* Gradient Symbolic Representation (Smolensky & Goldrick 2016, Zimmermann 2019)
- Inherently phonetically uninterpretable *à la* Containment Theory (Prince & Smolensky 2004 [1993], Trommer 2022, *inter alia*)

(31) A special 'phantom' node *à la* Phantom Structure (Rolle & Lionnet 2020)

Independently, stem constituent  $\Sigma$  accounts for several phonotactic distributions in Khoekhoe and 'Khoisan' generally (Nakagawa *et al.* 2023)

**5 SUMMARY**

- (32) In Khoekhoe, causative morphology triggers an exchange rule:
- Adds M if stem lacks M ( $L \rightarrow LM$ ), deletes M otherwise ( $LM \rightarrow L$ )
- (33) Analysis:
- A floating  $\circ$  is associated to a defective tonal root node  $\circ$
- Defective root node subcategorizes as external to p-stem  $\{ \}$

- If stem has M, the floating  $\circ$  pulls it out of stem and coalesces
- If stem does not have M, non-defective node  $\bullet$  is epenthesised
- (34) Ramifications:
- Exchange rules can be accounted for by a unique representation – no specialized auxiliary process is required
- Extreme process morphology can be handled by representations, supporting Generalized Nonlinear Affixation (Bermúdez-Otero 2012, *i.a.*)
- (35) Next steps: Comparison of process- vs. item-based model
- Flip Flop blocked if the triggering context (e.g. a suffix) is not directly adjacent to stem, e.g. with  $\{\mu\mu\}$ -bases (Haacke 1999)

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