

# Licensed Harmony in Lango

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P-TREND  
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## 1 Iterativity

- As part of the vowel harmony system in Lango (Nilotic; Uganda), [+ATR] spreads from suffixes to root-final syllables (Woock & Noonan 1979, Noonan 1992, Smolensky 2006):

- (1)
- |    |              |           |              |
|----|--------------|-----------|--------------|
| a. | /bòŋó + ní/  | → bòŋóní  | ‘your dress’ |
| b. | /còŋò + ní/  | → còŋòní  | ‘your beer’  |
| c. | /àmók + ní/  | → àmúkí   | ‘your shoe’  |
| d. | /dàktàl + ê/ | → dàktàlê | ‘doctors’    |
| e. | /mòtòkà + ê/ | → mòtòkàè | ‘cars’       |

- Cf. Kinande, e.g., where [ $\pm$ ATR] spreads regressively from roots to the beginning of the word (*a* is transparent; Archangeli & Pulleyblank 1994, Cole & Kisseberth 1994):

- (2)
- |    |                  |              |                     |
|----|------------------|--------------|---------------------|
| a. | /tU-ka-kI-lim-a/ | → tukakilima | ‘we exterminate it’ |
|    | /tU-ka-kI-huk-a/ | → tukakihuka | ‘we cook it’        |
| b. | /tU-ka-kI-lim-a/ | → tɔkakilima | ‘we cultivate it’   |
|    | /E-rI-hum-a/     | → ɛrɪhuma    | ‘to beat’           |

- The Lango data look like a noniterative version of Kinande’s harmony.
- Many rule-based theories (e.g. Jensen & Strong-Jensen 1976, Archangeli & Pulleyblank 1994): By turning an iterativity parameter off, analyses for whole-word processes can be used for shorter processes.

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(3) 
$$\begin{array}{c} V \dots V \\ \swarrow \quad \downarrow \\ [+ATR] \end{array} \quad \text{Iterativity Parameter: } \left\{ \begin{array}{l} \text{ON (Kinande)} \\ \text{OFF (Lango)} \end{array} \right\}$$

- But Lango presents two difficulties for Optimality Theory (OT; Prince & Smolensky 1993[2004]):
  - I. “Sour grapes”: Typical constraints driving whole-word processes are unsuited for less comprehensive processes (Padgett 1995, McCarthy 2003, 2004):
    - AGREE (Lombardi 1999, Baković 2000)
    - ALIGN (McCarthy & Prince 1993, Kirchner 1993, Cole & Kisseberth 1995, Pulleyblank 1996)
    - SPREAD (Padgett 1997, Walker 2000), etc.
  - OT requires wholly different analyses for Lango and Kinande: the similarities are lost.
  - II. If Lango’s is truly noniterative—i.e. spreading [+ATR] leftward by exactly one vowel—OT can’t account for it.

(4) *Noniterative spreading:*

- a. /bòŋó + ní/ → bònóní
- b. /bòŋó + ní/ → bònóní (hypothetical)

- The markedness constraint driving harmony must see the input to determine which output form is correct, but only faithfulness constraints have access to the input.

⇒ What does it mean to be noniterative? Is it a problem that OT can’t formalize the notion of doing a process exactly once?

- The OT approach is correct: there are no purely noniterative phenomena (Kaplan 2006).
- Lango: (1) is best analyzed as a product of Positional Licensing (Steriade 1994a,b, Zoll 1998a,b, Itô & Mester 1999, Crosswhite 2000), not standard harmony drivers.
- cf. Walker (2004): The harmonizing feature in Tदानca Spanish is attracted to stress.
- Structure of talk:
  - Harmony in Lango & a Positional Licensing analysis
  - Alternatives: Positional Faithfulness, LOCAL
  - Fast speech in Lango: more support for Licensing
  - Predictions of Licensing
  - Other cases of apparent noniterativity

## 2 ATR Harmony in Lango

- [+ATR] vowels: *i, e, u, o, ə*                      Their [-ATR] correspondents: *ɪ, ɛ, ʊ, ɔ, a*

- ATR spreads from roots to suffixes (prefixes don't harmonize):

- (5) *Harmony with /-Ca/ '1sg inalienable'*
- a. /òpúk + Ćá/ → òpúkkó 'my cat' (cf. *dèkká* 'my stew')
- b. /píḡ + Ćá/ → píggó 'my juice' (cf. *òttá* 'my house')

- (6) *Harmony with /-Co/ 'infinitive'*
- a. /lwək + Co/ → lwəkkɔ 'to wash' (cf. *riḡḡo* 'to run')
- b. /lʊb + Co/ → lʊbbɔ 'to follow' (cf. *ketto* 'to put')

- Certain phonotactic conditions block harmony (see Appendix and Smolensky 2006):

- (7) a. /twòl + ná/ → twòllá 'my snake'
- b. /dèk + ẃú/ → dèkwú 'your (pl) stew'
- c. /lɪm + Co/ → lɪmmo 'to visit'
- d. /gwèn + ná/ → gwènná 'my chicken'

- [+ATR] can spread regressively:

- (8) *Harmony with /-ni/ '2sg possessive,' /-ẃú/ '2pl possessive'*
- a. /kóm + ní/ → kòmí 'your chair'
- b. /dèk + ní/ → dèkkí 'your stew'
- c. /ɲìḡ + ẃú/ → ɲìḡwú 'your (pl) name'

- But [+ATR] only targets the root-final vowel:

- (9) a. /bòḡ + ní/ → bòḡóní 'your dress' (\**bòḡóní*)
- b. /còḡ + ní/ → còḡòní 'your beer' (\**còḡòní*)
- c. /àmúk + ní/ → àmúkkí 'your shoe' (\**àmúkkí*)
- d. /dàktàl + ê/ → dàktàlê 'doctors' (\**dàktàlê*)
- e. /mòtòkà + ê/ → mòtòkê 'cars' (\**mòtòkê*)

- Noniterativity is epiphenomenal: It results from a Positional Licensing constraint that interacts with Faithfulness constraints to produce harmony that does minimal violence to the input.
- Root-affix harmony creates disharmonic stems (9). Whatever drives assimilation can't encourage generic harmony.


### 3 Positional Licensing

- Smolensky (2006) accounts for the direction and possibility of harmony, but not the noniterativity.
- Harmony is driven by AGREE (10).

(10) AGREE( $[\pm\text{ATR}]$ ): Vowels in adjacent syllables must have the same value for  $[\pm\text{ATR}]$ . (Smolensky 2006)

- Six other constraints block harmony and derive progressive/regressive harmony as appropriate; see Appendix.
  - In Tableaux below, PROGRESSIVE HARMONY and REGRESSIVE HARMONY stand in for these constraints.
- AGREE, etc., can't account for (9):

(11)

	/bòŋó + ní/	AGREE	IDENT( $[\pm\text{ATR}]$ )
(  )	a. bònóní	*!	*
(  )	b. bònóní		**
	c. bònóní	*!	

- No iterativity parameters in the OT constraints and no obvious way to modify AGREE.
- Despite similarities, typical harmony and Lango have fundamentally different motivations.
- The iterativity parameter common among rule-based theories is misguided.
- After assimilation, the suffix vowel shares its ATR feature with some root segment.

⇒ Roots are “prominent positions which license more contrasts than other non-prominent positions” (Urbanczyk 2006:194; see also Steriade 1995, Beckman 1999).

(12) LICENSE-[ATR]:  $[\pm\text{ATR}]$  features must be linked to root segments. (cf. Zoll 1998b, Crosswhite 2000; see also Walker 2004)

- I.e., a contrast based on  $[\pm\text{ATR}]$  is only permitted in roots.
- Spreading in either direction can be sufficient.

(13)

/bòŋó + ní/	REGHARM	LIC-[ATR]	IDENT([±ATR])
a. b̀òŋóní		*!	
☞ b. b̀òŋóní			*
c. b̀òŋóní			**!
d. b̀òŋóní	*!		*

- A noniterative rule works just as well for this form.
- Polysyllabic suffixes:
  - Noniterative rule: Only first suffix vowel should harmonize.
  - Licensing: All suffix vowels must harmonize in order to be licensed.

- (14)
- |    |               |            |                        |
|----|---------------|------------|------------------------|
| a. | /cèg + éré/   | → cègéré   | ‘to be closed’         |
| b. | /cul + méré/  | → cullere  | ‘penis (3sg alien)’    |
| c. | /kùl + méré/  | → kùlléré  | ‘wart hog (3sg alien)’ |
| d. | /gwôk + méré/ | → gwôkkéré | ‘dog (3sg alien)’      |

- This is consistent with Licensing, but not a noniterative rule.
- Also: harmony isn’t foot-bound. (Plus, stress is roughly root initial.)

(15)

/cèg + éré/	PROGHARM	LIC-[ATR]	IDENT([±ATR])
a. c̀ègéré		*!(*)	
b. c̀ègéré		*!	*
☞ c. c̀ègéré			**
d. c̀ègéré	*!		*

- “Harmony” in Lango isn’t simply noniterative spreading. It’s spreading with a purpose, and the Licensing requirement is typically met after one “iteration” of spreading.

## 4 Alternatives

- Positional Faithfulness (Beckman 1999) can block assimilation of initial Vs:

- (16) IDENT[ATR]-[σ: Corresponding segments in root-initial syllables have identical values for [±ATR].



## 5 Fast Speech

- Assimilation in fast speech provides more evidence for Positional Licensing.
- [+ATR] may optionally extend into the root-penultimate syllable:

- (20)
- |    |                       |                   |
|----|-----------------------|-------------------|
| a. | b̀̀̀̀́-ńí ~ b̀̀̀̀́-ńí | ‘your (sg) dress’ |
| b. | b̀̀̀̀́-wú ~ b̀̀̀̀́-wú | ‘your (pl) dress’ |
| c. | p̀̀̀̀́-ńí ~ p̀̀̀̀́-ńí | ‘your (sg) knife’ |
| d. | p̀̀̀̀́-wú ~ p̀̀̀̀́-wú | ‘your (pl) knife’ |

- Key observation: “Extra” spreading targets stressed vowels (Noonan 1992; stress is roughly root-initial).
- Perhaps this is attraction to stress (cf. Walker 2004).
- The second (typically unstressed) vowel of a disyllabic stem is optionally deleted under suffixation (Noonan 1992:71):

- (21) b̀̀̀̀́-ńá ~ b̀̀̀̀́ńá ‘my dress’

- These second vowels may be less prominent and worse licensors than the first (stressed) vowels, especially under fast speech.
- cf. (22a), with stress on medial o: no fast-speech form like (22b) is available because “normal” harmony already reaches the stressed vowel.

- (22)
- |    |           |                          |
|----|-----------|--------------------------|
| a. | ìc̀̀k-kí  | ‘your (sg) sweet potato’ |
| b. | *ìc̀̀k-kí |                          |

- (23) imposes stricter licensing requirements under fast speech. It is no longer enough to spread to the root. [+ATR] must spread to the stressed syllable.

- (23) LICENSE-[ATR]/Stress (fast speech): In fast speech, [±ATR] features must be linked to stressed vowels.

(24)

/b̀̀̀̀́ + ńí/	REGHARM	LIC-[ATR]	LIC (fast)	IDENT
a. 'b̀̀̀̀́-ńí		*!		
b. 'b̀̀̀̀́-ńí			*!	*
☞ c. 'b̀̀̀̀́-ńí				**
d. 'b̀̀̀̀́-ńí	*!			*

- The facts are different, but the motivation is the same: ATR features must be licensed.
- More extensive harmony is needed to reach the stressed syllable.

## 6 Two Predictions of the Licensing Account

A. Lango should have “noniterative” spreading from prefixes, to:

(25) /ĩ + lùb̀/ → \*ĩ-lùb̀ ‘you followed’      *actual output:* ì-lùb̀

- But prefixes don’t harmonize at all.
- High-ranking Alignment can block spreading across a root’s left boundary.
- This is roughly what happens in Chamorro (see below).
- In fact, we should find “edge in” harmony:

(26) /i + m̀t̀k̀ + ê/ → i-m̀t̀k̀-ê (*hypothetical*)

- This looks like a combination of Chamorro and Lango.
- With prefixes inert, these patterns are unattested.

B. There should be no mirror image of Lango in which ATR spreads once from roots to suffixes. e.g.:

(27) /boŋo-nitɛ/ → boŋo-nitɛ

- If less-than-complete spreading is the result of attraction to prominence, spreading to be licensed on an affix shouldn’t be possible: affixes are not prominent.
- Under both Licensing and AGREE, etc.: spreading to affixes should be total.
  - Licensing: Anything less leaves unlicensed features (see (14)).
  - AGREE: Standard harmony constraints require complete spreading.
- As in Kinande, if a harmonizing feature spreads from roots to an affix, it should (be able to) spread to *all* affix vowels.



## 7 Other Cases of Noniterativity

- If Lango’s assimilation isn’t noniterative, what is?

### 7.1 Chamorro Umlaut

- [-back] spreads from “certain particles and affixes” (Chung 1983:44) onto the vowel in the next syllable if the target vowel is stressed (Topping 1968, Chung 1983):

(28)	a.	nána	‘mother’	i nána	‘the mother’
	b.	kátta	‘letter’	ni kátta	‘letter’
	c.	húŋuk	‘to hear’	in-híŋuk	‘we (excl.) heard’
	d.	púgas	‘uncooked rice’	mí-pìgas	‘abounding in uncooked rice’ <sup>1</sup>
	e.	sóŋsuŋ	‘village’	i séŋsuŋ	‘the village’

- This is just attraction to stress, as in Tudanca Spanish (Walker 2004). Positional Licensing is relevant here, too.

### 7.2 Foot-Constrained Phenomena

- Many phenomena can be analyzed as complete assimilation within a foot (McCormick 1981, Flemming 1994): German umlaut, Chamorro umlaut, Tudanca Spanish metaphony
- In Tudanca Spanish, [-ATR] spreads leftward (capitalization = [-ATR]):

(29)	<i>Metaphony in Tudanca Spanish</i>				
	a.	pÍntU	‘male calf’	cf. pÍnta	‘female calf’
	b.	sÉkU	‘dry (masc.)’	séka	‘dry (fem.)’
	c.	θÚrdU	‘left-handed (masc. sg.)’	θúrdos	‘left-handed (masc. pl.)’
	d.	ÓhU	‘eye (sg.)’	óhos	‘eye (pl.)’
	e.	sekÁIU	‘to dry him’	sekálo	‘to dry it (mass)’
	f.	ahambrÁU	‘hungry (masc.)’	ahambráa	‘hungry (fem.)’

- This looks noniterative, but if it’s spreading within a foot (Flemming 1994), it can be iterative, and just one vowel will be targeted.
- This could also be attraction to prominence (Walker 2004).

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<sup>1</sup>Umlaut only optionally targets secondarily stressed segments, so this form has an alternative: *mí-pùgas*.

### 7.3 Nati

- Sanskrit: retroflexion spreads from  $\varsigma$  or  $r$  rightward to  $n$  (Gafos 1999).

- (30)
- |    |            |            |
|----|------------|------------|
| a. | pūr-ṇā     | ‘fill’     |
| b. | vṛk-ṇa     | ‘cut up’   |
| c. | bṛahmaṇ-ya | ‘devotion’ |
| d. | kṛp-a-māṇa | ‘lament’   |
| e. | kṣubh-āṇa  | ‘quake’    |
| f. | cakṣ-āṇa   | ‘see’      |

- Just the first  $n$  is targeted: *varṇanānām*, \**varṇaṇāṇām* ‘descriptions (gen. pl.)’
- But retroflexion can’t spread from  $\eta$  anyway, so the conditions aren’t met for further spreading (Kiparsky 1985:113).
- Perhaps retroflexion must be licensed by  $\eta$ , so the motivation for spreading is satisfied after the first  $\eta$  is reached.

### 7.4 Tone

- Tone spread/shift by one syllable is very common.
- Rimi: tones appear one syllable to the right of their underlying hosts (Myers 1997:875):

- (31)
- |    |                |  |    |                        |
|----|----------------|--|----|------------------------|
| a. | ra-mú-ntu      |  | c. | mu-tem-í               |
|    | 5/gen-1-person |  |    | 1-cut-nominalizer      |
|    | ‘of a person’  |  |    | ‘chief’                |
| b. | cf. mu-ntu     |  | d. | cf. u-huvi-ì           |
|    | 1-person       |  |    | 14-believe-nominalizer |
|    | ‘person’       |  |    | ‘belief’               |

- Myers (1997) uses LOCAL (see (18), (19)): Noniterative shift is derived through adjacency requirements.

## 8 Conclusion

- Lango [ $\pm$ ATR] harmony holds between root-final and suffix vowels.
- A standard harmony rule turned noniterative seems appealing.
- A Licensing account within OT is superior.

- On close inspection, assimilation in Lango and typical harmony have distinct motivations.
- AGREE, ALIGN, etc., may drive standard cases of harmony, but a separate analysis is required for Lango.
- (Non)iterativity is epiphenomenal: different motivations, different analyses—not two sides of the same coin, as an iterativity parameter suggests. Our analyses need not mention (non)iterativity.
- Other apparently noniterative phenomena may have other driving or limiting factors such as attraction to prominence.

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## Appendix

Summary of Constraints in Smolensky (2006); see original for formalizations.

$\left. \begin{array}{l} \mathbb{C}_1 : \text{No [+ATR] spread from [-hi] source in closed } \sigma. \\ \mathbb{C}_2 : \text{No regressive [+ATR] spread from a [-hi] source.} \\ \mathbb{C}_3 : \text{No regressive [+ATR] spread from a [-front] V} \\ \quad \text{onto a [-hi] V in a closed } \sigma. \end{array} \right\} \text{regulate [+ATR] spread}$

$\left. \begin{array}{l} \mathbb{C}_X : \text{No regressive [-ATR] spread.} \\ \mathbb{C}_Y : \text{No [-ATR] spread from a [+fr] vowel.} \\ \mathbb{C}_Z : *[-\text{ATR}, +\text{hi}] \end{array} \right\} \text{regulate [-ATR] spread}$

- Ranking:  $\mathbb{C}_1, \mathbb{C}_2, \mathbb{C}_3, \mathbb{C}_X, \mathbb{C}_Y, \mathbb{C}_Z \gg \text{AGREE}$
- ◊ [+ATR]-spreading candidates win if they don't violate  $\mathbb{C}_1, \mathbb{C}_2, \mathbb{C}_3$ .
- ◊ [-ATR]-spreading candidates win if they don't violate  $\mathbb{C}_X, \mathbb{C}_Y, \mathbb{C}_Z$ .
- ◊ Harmony is blocked if no harmonic candidate survives these constraints.
- Example Tableaux:

(32) *[+ATR] Spreading*

/pí + wú 'for you'/'	$\mathbb{C}_1$	$\mathbb{C}_2$	$\mathbb{C}_3$	$\mathbb{C}_X$	$\mathbb{C}_Y$	$\mathbb{C}_Z$	AGREE	IDENT([±ATR])
a. píwú							*!	
☞ b. píwú								*
c. píwó						*!	*!*	*

(33) *[-ATR] Spreading*

/lwək + Co 'to wash'/'	$\mathbb{C}_1$	$\mathbb{C}_2$	$\mathbb{C}_3$	$\mathbb{C}_X$	$\mathbb{C}_Y$	$\mathbb{C}_Z$	AGREE	IDENT([±ATR])
a. lwəkko							*!	
b. lwokko		*!	*!					*
☞ c. lwəkko								*

(34) *No Spreading*

/dèk + wú 'your (pl) stew'/'	$\mathbb{C}_1$	$\mathbb{C}_2$	$\mathbb{C}_3$	$\mathbb{C}_X$	$\mathbb{C}_Y$	$\mathbb{C}_Z$	AGREE	IDENT([±ATR])
☞ a. dèkwú							*	
b. dèkwú			*!					*
c. dèkwó						*!	*!	*