

Bondu Vowel Harmony¹
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39th Colloquium on African Languages and Linguistics
August 24th to 26st, 2009
Leiden University, The Netherlands

1. Introduction

- This study examines [ATR] vowel harmony in two dialects of the Dogon language Bondu [bòndú] : Kindige [kindigé] and Najamba [nàdzàmbá].
- Two types of vowel harmony processes are examined in the language: phonologically driven, root-controlled [\pm ATR] dominance, and morphologically triggered, affix driven, [+ATR] spreading.
- All vowels in Bondu verb roots underlyingly contrast for the feature [\pm ATR], though this contrast is neutralized among roots containing low and high vowels. High vowels surface as [+ATR], and low vowels surface as [-ATR].
- The proposed ten-vowel system of the language is represented as /i i e e a a o o u u/.²

2. Perfective Aspect

- The perfective aspect 3rd singular suffix alternates between [e] ~ [ε].
- As Harrison (2003) discusses in his analysis of vowel harmony in the Turkic language, Tuvan, vowels whose feature values are predictable by a process of harmonization must remain underspecified.
- Following the theories of Archiphonemic Underspecification (Inkelas 1995) and Underspecification Theory (Steriade 1995) the perfective suffix is specified as being [-HI, -LO, -BK] but unspecified for [\pm ATR], and is thus represented as /-E/.

¹ This research was funded through National Science Foundation grant BCS-0537435, "Dogon languages of Mali" of which Jeffrey Heath is the Principle Investigator. I am indebted to the patient consultants who provided the data for this research, Hama and Issa Sangalbah, and to Jeffrey Heath and Stuart Davis for their comments on this presentation.

² [+ATR] vowels as [i u e o a] and the [-ATR] vowels are represented as [ɪ ʊ ε ɔ a].

2.1 Full contrast of [ATR] specification: Normal Application of [\pm ATR] Spreading

- Verb roots with mid vowels display a surface [\pm ATR] contrast.
- As shown in the examples in (1a – d), the [+ATR] variant of the perfective suffix follows a root which contains a [-HI, -LO], [+ATR] vowel, whereas the examples in (1e – h) illustrate that the [ATR] allomorph follows a root which contains a [-HI, -LO], [-ATR] vowel.

(1) Roots with Mid Vowels

	Stem	Gloss	Suffix Alternation	Stem	Gloss	
a)	nòj-è	sleep	e ~ ε	e)	dḡg-è	leave
b)	tònd-è	curve (v.)	e ~ ε	f)	jḡb-è	run
c)	kònd-è	do well	e ~ ε	g)	mḡmb-è	assemble/come together
d)	nḡmbil-è	beg	e ~ ε	h)	kḡdḡ-è	cut

- Following an autosegmental analysis (Goldsmith 1976), each verb root has a floating feature [\pm ATR] specification which is transparently spread to the suffix.

2.2 Opaque Outputs: Apparent over-application of [-ATR] Spreading

- Verb roots with high vowels do not display a surface [\pm ATR] contrast.
- The forms in (2a – d) illustrate examples with [+HI], [+ATR] in the roots. The perfective suffix variant agrees in its [ATR] value.
- The words in (2e – h) have no [+HI], [-ATR] vowels in the root yet the perfective suffix appears as being [-ATR], thus in disagreement with its root in [ATR] value.

(2) Roots with High Vowels

	Stem	Gloss	Suffix Alternation	Stem	Gloss	
a)	in-è	go	e ~ ε	e)	ir-è	forget
b)	bij-è	lie down	e ~ ε	f)	gij-è	dance
c)	sug-è	go down	e ~ ε	g)	dḡug-è	recognize
d)	tumbil-è	cut off, trim	e ~ ε	h)	tḡgudḡ-è	scrub

- Roots in the second column, (2e – h) have underlying [-ATR] vowels in the verb roots, and this feature is spread to the perfective suffix.
- The generalization that [+HI], [-ATR] vowels are banned in phonetic form is based on typologically and articulatorily grounded generalizations (Archangeli & Pulleyblank 1994).

2.3 Account of Opaque Outputs: Over-application of [+ATR] Spreading

- Verb roots with low vowels also do not display a surface [\pm ATR] contrast.
- Based on phonetic (Kenstowicz, in press) and typological (Archangeli & Pulleyblank 1994) evidence, the accepted generalization is that the unmarked specification for /a/ is [-ATR]. Therefore, the [+LO] root vowels in the examples in (3) are assumed to display a surface [-ATR] specification.
- Compare the forms in (3a – d), with those in (3e – h), both sets of which have low vowels in the roots. Note that though none of the low vowels in these roots surface as [+ATR], the perfective suffix is realized with the value [+ATR] in the examples (3a – d), illustrating that these are cases of apparent over-application of [+ATR] spreading.

(3) Roots with Low vowels

	Stem	Gloss	Suffix Alternation	Stem	Gloss
a)	bàr-è	help	e ~ ε	e) bààr-è	instruct
b)	dàm-è	speak	e ~ ε	f) dàg-è	allow
c)	gìnàg-è	break	e ~ ε	g) pàg-è	tie
d)	dàmàg-è	denigrate	e ~ ε	h) wàṅ-è	hate

- Roots in the first column, (3a – d) have underlying [+ATR] vowels in the verb roots, and this feature is spread to the perfective suffix.
- The contrast between /a/ and /a/ is neutralized in surface forms.

3. Summary of Perfective Stems

- All vowels in Bondu verbs do have [\pm ATR] counterparts underlyingly.
- The contrast among [+HI] vowels and [-LO] vowels is neutralized in surface forms yielding opaque outputs.
- High vowels surfacing as [+ATR] and the low vowels surfacing as [-ATR] is phonetically grounded (Archangeli & Pulleyblank 1994).
- The 3rd person singular perfective suffix provides evidence for its root's underlying form though the suffix is specified as being [-HI, -LO] but underspecified for the feature [\pm ATR].
- Typologically, languages with root-controlled [ATR] systems, otherwise known as 'symmetric harmony languages' (Aoki 1968), are very common among Niger-Congo languages (Casali 2008).

4. Imperative Mood

- The 2nd person singular imperative suffix alternates between the vowels [o ~ a].
- All the vowels in the verb root surface as [+ATR], regardless of their underlying [\pm ATR] value.

4.1 Roots with Mid and High Vowels

- The examples in (4a – d) and (5a – d) illustrate that [-o] suffixes to roots which have underlyingly [+ATR] mid and high vowels, respectively, while [-a] suffixes to roots which have underlyingly [-ATR] mid vowels in (4e – h) and high vowels in (5e – h).

(4) Roots with mid vowels

	Stem	Gloss	Suffix Alternation	Stem	Gloss
a)	nój-ó	sleep	o ~ a	e) dóg-á	leave, let go
b)	tónd-ó	curve (v.)	o ~ a	f) jób-á	run
c)	kónd-ó	do well	o ~ a	g) mómb-á	assemble, come together
d)	némbíl-ó	beg	o ~ a	h) kédz-á	cut

(5) Roots with high vowels

	Stem	Gloss	Suffix Alternation	Stem	Gloss
a)	ín-ó	go	o ~ a	e) ír-á	forget
b)	bíj-ó	lie down	o ~ a	f) gíj-á	dance
c)	súg-ó	go down	o ~ a	g) dʒúg-á	recognize
d)	túmbíl-ó	cut off, trim	o ~ a	h) túgúdʒ-á	scrub

- The imperative suffix is segmentally underlyingly a [+LO] vowel unspecified for the feature [ATR] and can be represented as /-A/.
- Since the co-occurrence restrictions ban [+ATR], [+LO] vowels from surfacing, the [\pm ATR] value of the root spreads to the imperative suffix, giving the allomorphs [o] ~ [a].
- A floating feature suffix suffix [+ATR] spreads throughout the entire stem.

4.2 Roots with Low Vowels

- Roots with low vowels illustrate that the [-a] [-ATR] variant of the imperative suffix is attached to roots with low vowels independent of the underlying [\pm ATR] value of the root-vowel(s).
- Recall that the roots in (6a – d) have underlying [+ATR] vowels while those in (6e – h) have underlying [-ATR] vowels, illustrating underapplication of [+ATR] spreading in (6a – d).

(6) Roots with low vowels³

Stem	Gloss	Suffix Alternation	Stem	Gloss
a) b̄ár-á	help	—	e) b̄áár-á	instruct
b) d̄ám-á	speak	—	f) d̄ág-á	allow
c) ḡínág-á	break	—	g) p̄ág-á	tie
d) d̄ámág-á	denigrate	—	h) w̄ájñ-á	hate

- The process of apparent [ATR] harmony found among verbs in the imperative is in fact a process of raising or parasitic harmony (Cole & Trigo 1988), whereas a root with [-LO] vowels spreads its height feature to the imperative suffix.

4.3 Summary of Imperative Suffix

- The imperative suffix is underspecified for the feature [\pm ATR] but is specified as being [+LO].
- A root spreads its height feature to the imperative suffix:
Roots with [+ATR]/[-HI] vowels cause the suffix to be raised to [o].
Roots with [-ATR]/[-LO] vowels do not raise the suffix.
- A floating feature suffix [+ATR] causes imperative stem vowels to become [+ATR].

5. Conclusions

- The opacity found among verb stems in the Dogon language of Bondu presents problems for currently phonological theoretical models such as OT (1993/2004), or more recent attempts to handle this issue (McCarthy 2007).
- It can be proposed that Bondu historically displayed a full contrast between [\pm ATR] vowels at the surface level.
- A floating feature suffix [+ATR] causes imperative stem vowels to become [+ATR].
- For further research: What is the correct representation of the root in Bondu? (hint – ask me about about monosyllabic roots!)

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³ The surface [ATR] representations of the low vowels in (6) are yet to be decisively determined as preliminary measurements of F1 and F2 values for the imperative suffix show that roots with underlyingly [-ATR] values take a variant of [a] which is slightly lower than those with [+ATR] vowels in the roots, suggesting there may be two surface variants of the perfective suffix.

Appendix

Perfective Stem	Imperative Stem	Root [+ATR]	Gloss
[inè]	[ínó]	/in/	go
[ibè]	[íbó]	/ib/	catch
[kilè]	[kíló]	/kil/	fence
[bijè]	[bìjó]	/bij/	lie down
[sùgè]	[súgó]	/sug/	go down
[tùmbilè]	[túmbíló]	/tumbil/	cut off, trim
[nèmbilè]	[némbíló]	/nembil/	beg
[nòjè]	[nójó]	/noj/	sleep
[tòndè]	[tóndó]	/tond/	curve
[kòndè]	[kóndó]	/kond/	do well
[irè]	[írá]	/ir/	forget
[gìjè]	[gìjá]	/gij/	dance
[dʒùgè]	[dʒúgá]	/dʒug/	recognize
[kùnè]	[kúná]	/kun/	fatten
[tùgùdʒè]	[tùgùdʒá]	/tugudʒ/	scrub
[bèlè]	[bélá]	/bel/	pick fruit
[sèmè]	[sé má]	/sem/	slaughter
[tègè]	[té gá]	/teg/	fall (rain)
[kèdʒè]	[ké dʒá]	/kedʒ/	cut
[dògè]	[dó gá]	/dog/	leave
[jòbè]	[jó bá]	/job/	run
[mòm b è]	[mó m bá]	/momb/	assemble/come together
[dàgè]	[dá gá]	/dag/	allow, licit
[pàgè]	[pá gá]	/pag/	tie
[wàpè]	[wá p á]	/wap/	hate (v.)
[bàà r è]	[bá á r á]	/baar/	instruct
[gìnàgè]	[gíná g á]	/ginag/	break
[bà r è]	[bá r á]	/bar/	help
[dàmè]	[dám á]	/dam/	speak
[kànè]	[kán á]	/kan/	do
[wàdʒè]	[wádʒ á]	/wadʒ/	remain
[dàmàgè]	[dámá g á]	/damag/	denigrate