

We analyze the realization of the imperative suffix vowel by spreading of the underlying [\pm ATR] feature of the root vowel as in the perfective (1 - 3), but with an additional assimilatory process raising the underlying [+low] suffix vowel to [-low] when preceded by a vowel that is underlyingly [-low, +ATR]. We view this as an instance of parasitic harmony (Cole and Trigo 1988) which applies in (4a - d). The unexpected realization of [+ATR] on the stem vowels as clearly seen in (4f - g) is analyzed as the docking of a floating [+ATR] feature that comes with the imperative suffix.

We continue to illustrate the effects of the abstract underlying vowel analysis with examples of suffix-controlled [+ATR] harmony in the infinitive (5) and [-ATR] in the medio-passive (6). The same roots as above are now shown in the infinitive in (5). The final vowel¹ of the infinitival suffix is specified for [+ATR]. The [+ATR] value of the infinitive suffix spreads in a feature-changing manner onto the root. This is most clearly seen in examples (5f - g) as the root vowel(s) in these stems are underlyingly [-ATR], seen among the roots in the right columns of (1 - 3). The [+LO] root vowels in (5e) and (5j) surface with the feature [-ATR] because of feature co-occurrence constraint * [+LO, +ATR].

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|-----|----|--------------|----|-------------|
| (5) | a. | [nój-ílòŋ] | f. | [dòg-ílòŋ] |
| | b. | [nèmbíl-lòŋ] | g. | [kédʒ-ílòŋ] |
| | c. | [bí-ílòŋ] | h. | [gí-ílòŋ] |
| | d. | [súg-ílòŋ] | i. | [dʒúg-ílòŋ] |
| | e. | [bàr-lòŋ] | j. | [pág-ílòŋ] |

In (6), we contend that the final vowel of mediopassive suffix is specified as [-ATR]. This also spreads in a feature-changing manner onto the root. This is most clearly seen in (6a - b) as the root vowels are underlyingly [+ATR]. [+HI] root vowels (6h - i) and [+LO] root vowels (6e, j) continue to surface [+ATR] and [-ATR] respectively because of the feature co-occurrence constraints * [+HI, -ATR], * [+LO, +ATR].²

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|-----|----|-------------|-------------|----|------------|-----------|
| (6) | a. | [nòj-íjé] | sleep | f. | [dòg-íjé] | leave |
| | b. | [pòr-íjé] | escape | g. | [kédʒ-íjé] | cut |
| | c. | [gìbír-íjé] | put on wrap | h. | [ír-íjé] | forget |
| | d. | [ìn-íjé] | go | i. | [dʒùg-íjé] | recognize |
| | e. | [jàmb-íjé] | cover | j. | [dàg-íjé] | lock |

These two data sets (5 - 6) illustrate that, unlike the imperfective and imperative suffixes which are underlyingly unspecified for the feature [\pm ATR], suffixes which are underlyingly specified spread their value onto the root. Additionally, both roots and suffixes have the ability to spread both values of the [\pm ATR] feature, as witnessed in the first columns of (1 - 4) and (5) for [+ATR] spread and in the second columns of (1 - 4) and (6) for [-ATR] spread.

¹The initial vowel [i] of the suffix may be epenthetic since it mainly seems to occur to prevent a consonant cluster of rising sonority; but this needs further research.

²Certain examples show exceptions to [-ATR] spread: [nèmbíl-íjé] ‘beg’, [dàm-íjé] ‘be spoken’.

To illustrate further the aforementioned described processes, the imperfective [3rd person] plural forms, italicized in (7a, b), surface with [-ATR] vowels. The first suffix in (7) marks the imperfective, the second one marks person. The other forms in (7) surface with [+ATR] vowels, (ignoring vowels that are [+low]). The imperfective [3rd person] plural suffix (italicized forms) is claimed to be underlyingly [-ATR] while the other person suffixes are underlyingly [+ATR]. The alternation in the first vowel of the imperfective suffix between a~o/ɔ is similar to the alternation with the imperative suffix in (4) in that the alternation is dependent on underlying vowel of root. If the root vowel is [-ATR] (7a), then the imperfective vowel surfaces [-a]. If root vowel is underlyingly [+ATR] (7b) then it surfaces as [o], but as [ɔ] when the person suffix is specified as [-ATR] (italicized form 7b).

(7) a.	Slaughter: /sem/ [-ATR]	1 st sg	sém-ándz-òm	1 st pl	sém-ándz-ójì
		2 nd sg	sém-ándz-òò	2 nd pl	sém-ándz-è
		3 rd sg	sém-ándz-ò	3 rd pl	<i>sém-ándz-éè</i>
b.	Heal: /dʒon/ [+ATR]	1 st sg	dʒón-óndz-òm	1 st pl	dʒón-óndz-ójì
		2 nd sg	dʒón-óndz-òò	2 nd pl	dʒón-óndz-è
		3 rd sg	dʒón-óndz-ò	3 rd pl	<i>dʒón-óndz-éè</i>

The underlyingly [-ATR] vowel of root in (7a) spreads its value to the imperfective suffix, which, like the imperative suffix, is underlyingly specified [+low, +back], but unspecified for [ATR], causing it to surface as [-ATR] variant, [a]. The underlyingly [+ATR] vowel of root in (7b) spreads its [+ATR] value to the imperfective suffix; the suffix subsequently undergoes raising to [o], purportedly by the same rule that raises /-a/ to [o], as seen in imperative data (4a - d). The person suffixes in (7) are indicated as having underlying [+ATR] values except for the [3rd person plural]. Next, because the imperfective plural (all except [3rd person]) suffix is specified being [+ATR], it spreads this feature right to left in a feature changing manner, causing all (non-low) vowels in (7) to surface [+ATR]. The imperfective suffix [3rd person] plural, italicized in (7), is underlyingly specified as being [-ATR]. This feature spreads from right to left, in feature changing manner, causing all vowels in this form to become [-ATR]. Therefore, the imperfective [3rd person] plural is like the infinitive and mediopassive as representing another case of suffix-controlled [-ATR] harmony.

To summarize, we have presented two types of vowel harmony processes among verb stems in the language: root-controlled [\pm ATR] harmony as shown in the perfective aspect in (1 - 3) and the imperative mood in (4), and suffix-controlled [\pm ATR] harmony as seen in the infinitive in (5) and mediopassive in (6). Both roots and suffixes may spread both the values [\pm ATR] in a feature changing way. A floating feature accompanies the imperative in (4) and spreads onto roots. The linked [+ATR] feature in the infinitive in (5) and the [-ATR] in the mediopassive in (6) spread from these suffixes onto roots. Finally, the imperfective [3rd plural] forms in (7) illustrate that both root controlled and suffix controlled harmony may occur in the same stem, the latter in a feature changing way. Since the features [+ATR] and [-ATR] can spread when there is both root-controlled and suffix-controlled harmony, neither [+ATR] nor [-ATR] can act as an unspecified default feature. Thus, we maintain that, by an analysis of the Bondu harmony patterns, all vowels in Bondu verb roots contrast underlyingly for the feature [\pm ATR]. The verb roots on the righthand column in (1 - 5) consistently behave as if they are underlyingly [-ATR] and those in the lefthand column in (1 - 5) consistently behave as being [+ATR]. The [\pm ATR] contrast is neutralized among low and high vowels. High vowels surface as [+ATR], and low vowels surface as [-ATR]. The most straightforward analysis is the abstract one where root-initial vowels are specified for either [+ATR] or [-ATR] underlyingly.

An analysis that posits a root-based floating [\pm ATR] feature would be especially problematic given the imperative data in (4) where the suffix comes with a floating [+ATR] feature that is realized on the root. Our analysis is consistent with Wolf's (2008) observation that floating features are typically not realized on the morphemes that sponsor them. Also, the raising rule of [-a] to [-o] in the imperative (and imperfective) is sensitive to the underlying features of the root-initial vowel. This would be awkward to express in a root-based floating feature analysis.

While many [ATR] vowel systems have more surface vowels than underlying ones, it is argued that, if viewed abstractly, Bondu displays the opposite. We thus contend that the abstract vowel representation is most consistent with the different patterns of harmony witnessed in Bondu, and almost certainly preserves the diachrony of the system, that is, an earlier stage of Bondu maintained a surface 10 vowel contrast, where surface vowels were the same as underlying vowels. It probably also displayed root-controlled harmony, but also had suffixes that were dominant. Casali (2008) shows data to support the generalization that languages possessing seven underlying vowels with a [\pm ATR] contrast in the mid vowels employ [-ATR] spreading while those with nine underlying vowels show a preference for [+ATR] dominance. In Bondu, there is not evidence to support dominance of either [+ATR] or [-ATR] spreading. Rather, affixes which are specified for the feature [ATR] have dominance over roots. The analysis also supports Finley's (2009) observation that there is a distinction between phonological and morphological [ATR] spreading. In the case of Bondu, both are witnessed, with a complex interaction. We leave the details of this matter for future research. Bondu displays both [+ATR] and [-ATR] dominant harmony and this is consistent with the abstract feature analysis.

Archangeli, D. and D. Pulleyblank (1994) *Grounded Phonology*. MIT Press: Cambridge, MA.

Casali, R. F. (2008). *Language and Linguistics Compass*, 2(3), 496 - 549.

Cole, Jennifer, & Loren Trigo (1988). Parasitic Harmony. In Smith & Hulst (Eds.), *Features, Segmental Structure and Harmony Processes (Part II)* (pp. 19- 38): Published by Walter de Gruyter.

Finley, S. (2009). Morphemic Harmony as Featural Correspondence. *Lingua* 119, 478-501.

Heath, J. (2010). A Grammar of Najamba: Eastern Dialect of Najamba-Kindige-Bondu language Dogon language family, Mali. Unpublished grammatical sketch.

Wolf, M. (2007). For an Autosegmental Theory of Mutation. In L. Bateman, M. O'Keefe, E. Reilly & A. Werle (Eds.), *University of Massachusetts Occasional Papers in Linguistics 32: Papers in Optimality Theory III* (Vol. 32 pp. 315-404). Amherst: GLSA.