Tone (Non-) Transfer in Bantu Verbal Reduplication

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Abstract

A long-standing problem in analyzing Bantu verbal reduplication is to account for why tone does not usually transfer along with the segmental content of the Base. Even though most current theories of reduplication predict the reduplicant's tone (and other prosodic information) should be faithful to the Base, in fact, this is found in only one Bantu language, Chichewa. In other Bantu languages, either tone is realized only on the Base, or the reduplicant (RED) forms a single domain of tone realization with the Base. In this paper, I propose that tone realization in the RED+Base complex falls out if the complex is a compound verb stem. Then tone realization in the complex can be seen to be parallel to accent realization in compounds in other languages. I show this analysis improves on previous ones as it correctly predicts a three-way, rather than two-way, pattern of variation in realizing tone in reduplicated forms. The analysis thus confirms work showing that both morphological and phonological factors determine the realization of reduplicative morphemes.

1. Introduction

The defining hallmark of the process of reduplication is that the Base and the reduplicated portion of the word should have identical pronunciations (Wilbur 1973). Most current theories of reduplication (Steriade 1988; McCarthy & Prince 1995; Inkelas & Zoll 1999, 2000) require prosodic information - including tone - to correspond as faithfully as segmental information from the Base. As a result, these theories predict that, in the unmarked case, reduplicants (REDs) and corresponding Bases should have identical tone patterns.

However, in Bantu languages (a family with 500+ members where tone is contrastive and verbal reduplication productive in most members of the family), we find, surprisingly, that the tone of the Base verb stem and its RED are identical in only one language, Chichewa. In the other Bantu languages for which documentation is available, either the stem tone is realized only on the Base or it is distributed over the entire RED+Base complex.

In this paper, I argue that these patterns of stem tone realization in reduplicated verb stems fall out if the RED+Base complex is a compound stem. To show this, I first present a brief survey of tone and reduplication in Bantu languages. Then I show the range of variation found in how tone is realized in reduplicated forms matches the range of variation found in accent realization in compounds. As a result, I argue tone realization is explained by the different possibilities for assigning stem tone to the constituents of a compound stem. Finally, I compare this approach to previous analyses and show they do not correctly predict the attested range of variation.

2. Reduplication as stem compounding in Bantu languages

2.1. Variation in tone copy

Most work on tone transfer in Bantu reduplication (Myers & Carleton 1996, Mutaka & Hyman 1990, Walsh 1992, etc.) has focussed on two possibilities: either tone is identical in the RED and Base, or High tones are realized on only one half of the complex. Actually, there are three patterns, discussed in turn below.

2.1.1 Variant 1

In the first variant, tone is identical in the RED and Base. Examples of this variant are found in the Kinande noun data in (1) and the Chichewa verb data in (2):

(1) Kinande nominal reduplication (M&H 1990, fig (2)) ; '[' is the Stem edge

Unreduplicated	Gloss	'a real X'
oku-gulu	leg	oku-[gulu-gulu
omu-góngò	back	omu-[góngo-góngò
o.kú-boko	arm	okú-[bokó-boko
o.mu-longò	village	o.mu-[longo-longò
o.mu-síkaa	girl	o.mu-[síka-síkaa

(2) Chichewa verbal reduplication (Myers & Carleton 1996, fig (25)); '[' is Stem edge

	Unreduplicated X	Gloss
(a)	tambalal-á	stretch out your legs!
b)	phikits-á	really cook
(c)	ndí-ma=[sangaláts-a	I please (habitual)
(d)	ti=[sangalats-é	let's please

	'do X repeatedly'
(a')	tambalalá-tambalalá
(b')	phikitsá-phikitsá
(c')	ndí-ma=[sangalátsa-sangalátsa
(d')	ti=[sangalatsé-sangalatsé

(3) Chichewa nominal reduplication (Myers &Carleton 1996, figs (41-43))

Unreduplicated	Gloss	'a real X'
chímanga	maize	chímanga-mánga
munthu	person	munthu-múnthu
masaná	afternoon	masaná-saná
máwa	tomorrow	máwa-mawá

This variant is the one predicted in current theories, which define unmarked reduplication as total identity between the RED and its Base for both prosody and segments (Steriade 1988; McCarthy & Prince 1995; Inkelas & Zoll 1999, 2000). Surprisingly, then, tonal identity appears to be rare in Bantu languages, especially in verbal reduplication. In fact, according to Hyman & Mtenje (1999), Chichewa is the only Bantu language where it is found. More common are two other variants: either the tone of the entire reduplicative complex is identical to the tone of the unreduplicated Base stem (Variant 2) or only one half of the complex (typically the Base stem) has a High tone (Variant 3).

2.1.2. Variant 2

The second variant in tone realization is illustrated below by data from Kikerewe, Kinande, and Shona. Odden (1996b) shows that in Kikerewe, for example, if a High tone is realized on the first (two) syllables of the unreduplicated stem, as in (4c,d), the High tone is also realized on the first (two) syllables of the reduplicative complex (4c',d'). However, if the stem High tone is realized on the final two syllables in the unreduplicated verb, as in the perfective forms in (4e,f), the High tone is also realized on the final two syllables of the reduplicative complex (4e',f').

(4) Kikerewe verbal reduplication (Odden 1996b) ; '[' is the Stem edge

	Unreduplicated X	Gloss
(a)	ku-[lima	to cultivate
(b)	ku-[bala	to count
(c)	ku-[bíba	to plant
(d)	ku-[kálánga	to fry
(e)	m-[baz-ílé	I counted (yesterday)
(f)	m-[bib-ílé	I planted (yesterday)

	X carelessly, here and there
(a')	ku-[lima-lima
(b')	ku-[bala-bala
(c')	ku-[bíbá-biba
(d')	ku-[káláanga-kalaanga
(e')	m-[bazile-bazílé
(f')	m-[bibile-bibílé

In KiNande, up to two High tones can be contributed by a verb stem: the lexical stem tone and a grammatical tone found in verb forms like the perfective. The data in (5) shows the four possible combinations of these two tones in unreduplicated and reduplicated verbs. (Reduplication adds the meaning of doing the action quickly or here and there.) Mutaka & Hyman (1990) show that when there is neither a lexical or grammatical High tone, as in (5a), there are, unsurprisingly, no High tones in either form. When there is a lexical High tone, as in (5b), it is realized on the pre-stem vowel in both forms (assuming the RED counts as the left edge of the stem). When there is only a grammatical High tone, as in (5c), there is a High tone on the pre-stem vowel and the stem-initial syllable in both forms. And when there is both a lexical High tone and a grammatical High tone, as in (5d), there is a High tone on the pre-stem vowel, the antepenult and penult vowels in both forms.

(5) KiNande verbal reduplication (Mutaka & Hyman 1990, p. 102); ; '[' is the Stem edge

(a) ø + ø
eri=[hum-a to beat eri=[huma-huma

(b) H + ø
erí=[tum-a to send erí=[tum-tuma

(c) ø + H
mó-tw-a-mú=[húm-irè we beat him
mó-tw-a-mú=[húma-humirè

(d) H + H
mó-tw-a-mú=[túm-írè we sent him
mó-tw-a-mú=[tuma-túmírè

The Shona partial reduplication pattern in (6) also illustrates a verb form which contributes a grammatical High tone as well as, potentially, a lexical High tone. As Odden (1994) shows, in toneless verbs, the grammatical High tone is realized on the second and third syllables of unreduplicated stems (6a,b). The data in (6a', b') shows that reduplicated toneless verb complexes of the same length have the same tone pattern. As shown in (6c,d), when the stem has a lexical High tone, the grammatical High tone is realized on the stem-final syllable, and the lexical High tone on the first two-three syllables of the stem.[1] Data in (6c', d') shows that reduplicated High-toned verb complexes of the same length have the same tone pattern. (In (6), only stems are given, with the tone pattern they would have following the INFL string, handáká- 'I didn't X'.)

(6) Shona verbal reduplication, partial (Odden 1994, p 270)

(a) ø + H stem, 4 syllables
-bikísíra 'I didn't make cook for'

(a') Reduplicated ø + H stem, 4 syllables
-biká-bíka 'I didn't repeatedly cook'
(cf. -biká 'I didn't cook')

(b) ø + H stem, 5 syllables
-bikísírana
'I didn't make cook for each other'

(b') Reduplicated ø + H stem, 5 syllables
-biká-bíkisa
'I didn't make cook repeatedly'
(cf. -bikísa 'I didn't make cook')

(c) H + H stem, 4 syllables
-tóréserá 'I didn't make take for'

(c') Reduplicated H + H stem, 4 syllables
-tórá-torá 'I didn't take frequently'
(cf. -tóra 'I didn't take')

(d) H + H stem, 5 syllables
-tóréseraná
'I didn't make take for each other'

(d') Reduplicated H + H stem, 5 syllables
-tórá-tóresá 'I didn't make take frequently'
(cf. -tóresá 'I didn't make take')

Other examples of Variant 2 can be found in: Haya (Hyman & Byarushengo 1984), Kimatuumbi (Odden 1996a), Kinyamwezi (Maganga & Schadeberg 1992), Lomongo (Lovins 1971), and Runyankore (Poletto 1998).

2.1.3 Variant 3

In the third variant, the tone of the corresponding unreduplicated form is realized only on one half of the reduplicated complex, instead of being distributed over the entire RED+Base complex, as in Variant 2. For example, Odden & Odden (1985, 1996) show that in KiHehe, a High tone occurs on the stem-initial mora in certain verb forms (7a,b,c,d). In the corresponding reduplicated forms (7a', b', c', d'), the High tone is realized on the initial mora of the second half of the RED+Base complex. The first half is ignored for tone realization. (As Odden & Odden (1985) and McCarthy & Prince (1995) argue, the second half is plausibly the Base stem.)

[1] See, too, Downing (1996) and Hewitt (1992) for discussion of this tone pattern and Myers (1987) for discussion of another Shona reduplication pattern.

(7) KiHehe verbal reduplication (Odden & Odden 1985, 1996)

	Unreduplicated	Gloss
(a)	si-tu=[dóongoleesa	we won't roll
(b)	si-tu=[fúlugala	we won't be tired
(c)	si-tu=[déeña	we won't cut
(d)	si-tu=[fúuwa	we won't believe

	X a bit
(a')	si-tu=[dongolesa-dóongoleesa
(b')	si-tu=[fulugala-fúlugala
(c')	si-tu=[deña-déeña
(d')	si-tu=[fuwa-fúuwa

Shona also has a pattern of total reduplication for the verb form illustrated in (6), above. However, as Odden (1984 shows), in the reduplicated forms (8a', b', c', d'), High tones are only realized on the first half of the RED+Base complex in this pattern. The second half is ignored for tone realization. (As above, only stems are given, with the tone pattern they have following, handáká- 'I didn't X'.)

(8) Shona verbal reduplication, total (Odden 1984, fig (35))

	Unreduplicated X	Gloss
(a)	-bikísa	I didn't make cook
(b)	-bikísíra	I didn't make cook for
(c)	- tóresá	I didn't make take
(d)	-tóréserá	I didn't make take for

	X frequently
(a')	-bikísa-bikisa
(b')	-bikísíra-bikisira
(c')	-tóresá-toresa
(d')	-tóréserá-toresera

Other examples of Variant 3 can be found in: Ndebele (Hyman, Inkelas & Sibanda 1999; Downing, in press), Swati (Downing 1994), Xhosa (Cassimjee 1994), and Yao (Myers & Carleton 1996).

2.2 Variation in the prosodic parse of compounds

In this section, I will show that the range of variation in tone realization in reduplicated Bantu verb forms is entirely parallel to the variation in the realization of stress or pitch-accent found in compounds cross-linguistically. Indeed we find the same three patterns.[2]

2.2.1 Variant 1

In the first variant, stress and/or pitch-accent is assigned and realized on each member of the compound (cf. section 2.1.1, above). For example, in Malayalam co-compounds, Mohanan (1982) shows that each lexical morpheme in the compound is assigned main stress, and each half is a separate domain for realization of the LH intonation melody:

(9) Malayalam co-compounds (Inkelas 1989, Mohanan 1982); intonational LH melody is given below the compound

(a) [[[ácchan] [ámma]]maare] 'parents'
L H L H
father mother pl.

(b) [[[yáksa] [kínnara][gándharwan]] maare]
L H L H L H
Yaksha Kinnara Gandharwan pl.
'Yaksha, Kinnara, Gandharwa'

Similarly, in Italian, each member of a compound receives main stress:

(10) Italian compounds (Nespor & Vogel 1986, p. 130)

(a)	tósta páne	'bread toaster'
(b)	pélle róssa	'redskin'
(c)	cápo pópolo	'chief'
(d)	diváno létto	'sofa bed'

In Dakota syntactic compounds, Chambers & Shaw (1980) and Shaw (1985) show that each member of a compound has a significant degree of stress (though, as in English, the first member of the compound is more prominent). Comparison of (11c) with (11d) shows that in non-compounds with the same number of syllables, only one syllable (generally the second syllable of a word) is stressed:

[2] In section 2.2, accent marks on vowels indicate stress or accent, not tone as in the other sections.

(11) Dakota syntactic compounds (Chambers & Shaw (1980); Shaw 1985)
(a) hã´ wakhã` 'holy night'
(night holy)
(b) hayá-pi waʃtè-ʃte 'Sunday-best clothes'
(wear good)
(c) máza skà 'money'
(metal bright)
(d) witʃá-ya-kte 'you kill them'
(them-you-kill)

2.2.2. Variant 2

In the second variant, stress or pitch-accent is realized over the entire compound as a single unit (cf. section 2.1.2, above). For example, Malayalam has another form of compounding, shown in (12). In contrast to the co-compounding pattern illustrated in (9), in sub-compounds the entire compound has a single main stress. And the entire compound is a single domain for realization of the LH intonation melody (the main stress syllable realizes the L tone of the melody, and all heavy syllables have H tone):

(12) Malayalam sub-compounds (Inkelas 1989; Mohanan 1982)
(a) [[[táaraà] [kaàntan] maare]
L H H H
Tara husband pl.
'Tara's husbands'

(b) [[máta] [widweèsam]]
L H H
religion hatred
'hatred of religion'

Dakota also has a second form of compounding, shown in (13). In contrast to the syntactic compounds in (11), in lexical compounds, as in simplex words, only a single syllable (generally the second one in the complex) has main stress. As a result, the syllable stressed in the compound need not be identical to the syllable stressed in members of the compound when they occur as independent words.

(13) Dakota lexical compounds (Mohanan 1982; Shaw 1985)
(a) hã wákhã 'northern lights'
(night holy)
(b) mas tʃ˜íʃka 'metal spoon'
(metal spoon)
(c) mni skúya 'salt'
(water sweet)

Similarly, in Greek compounds, only a single syllable has main stress, assigned within a three-syllable window counting from the right edge of the compound, as shown in (14). As a result, in Greek as in Dakota lexical compounds the stressed syllable in a compound need not be identical to the syllable stressed in members of the compound when they occur as independent words.

(14) Greek (Nespor & Vogel 1986, pp 112-113)
(a) kuklóspito 'doll's house'
(cf. kúkla 'doll'; spíti 'house')
(b) asprómavros 'black and white'
(cf. áspros 'white'; mávros 'black')
(c) nixtopúli 'night bird'
(cf. níxta 'night'; pulí 'bird')
(d) ksilókola 'wood glue'
(cf. ksílos 'wood'; kóla 'glue')

2.2.3 Variant 3

In the third variant, stress or pitch-accent is realized on only one half of the compound (cf. section 2.1.3, above). For example, Amha (1996) shows that in Wolaitta, an Omotic language spoken in south-central Ethiopia, nouns have accent on either the penult or the final syllable. Numerous minimal pairs show that accent placement is unpredictable: e.g., zaré 'lizard' vs. záre 'relative'. In compounds, as shown in (14), only the first member of the compound has an accent. Note that the accent falls on the same syllable as when the word occurs in isolation, typically on a syllable that is outside the two-syllable window at the right edge where accent is usually assigned to nouns:

(14) Wolaitta nominal compounds (Amha 1996, p 133, fig. (49))
(a) hayttá tukke
'spicy coffee made from coffee leaves'
(cf. hayttá 'leaf'; tukké 'coffee')
(b) haattá harge 'algae'
(cf. haattá 'water'; hargé 'illness')
(c) goóʃʃa giya
'a special market day in the 2d week of September'
(cf. goóʃʃa 'crazy'; giyá 'market')
(d) yeehó keetta 'mourning house'
(cf. yeehó 'mourning'; keettá 'house')

Other examples of this variant are found in Somali (Hyman 1981) and Japanese (McCawley 1978; Tsujimura 1996).

2.3. How the compound analysis explains variation in tonal transfer

As we see, tone realization in Bantu reduplicated verb stems is entirely parallel to accent realization in compounds cross-linguistically. I propose this parallel can be straightforwardly accounted for if the RED+Base complex is itself a compound, with the structure shown in (15a):

(15a) Compound structure for reduplicated Bantu verb stems[3]

$$[\text{Compound Verb Stem}]_{\text{Stem1}}$$
$$\diagup\ \diagdown$$
$$[\text{RED Stem}]_{\text{Stem2}} \quad [\text{Base Stem}]_{\text{Stem3}}$$

This compound stem is a subconstituent of the verb word, as shown in (15b):

(15b) Verb word (see, e.g., Myers 1987, Downing 2000)

Verb Word
5
INFL (Compound) Stem

It is actually not surprising to propose the RED+Base verb stem complex is a compound. As argued by work like Inkelas & Zoll (1999, 2000), Kiparsky (1986), Niepokuj (1991), reduplication in many languages can be considered a form of self-compounding at the stem level, where the RED matches the Base morphologically as well as phonologically. Further, as Downing (1999, 2000, etc.) argues, there is a body of independent evidence in a number of Bantu languages motivating the RED as a verb stem. It is most plausible, then, for the RED+Base complex to be a compound, since generally only compounds contain more than one lexical morpheme like a stem.

If we assume the compound structure in (15a) for the RED+Base complex, then the variation in tone realization can be accounted for by defining different stems within the compound as the relevant domain for stem tone association for a particular language:

- Both Stem2 and Stem3 = Variant 1
- Stem1 (Compound Stem) = Variant 2

OR

- Stem 3 (Base Stem) = Variant 3

As a result, the three variants in tone realization fall out from exploiting the fact that the RED+Base complex is simultaneously a single (compound) stem and the two stems contained in the compound, giving stem tone realization a choice of three stem domains.

3. Alternatives to compounding as an explanation for lack of tonal transfer

In this section I discuss several alternatives to the compounding analysis which are found in the previous literature on tone transfer. I will show that none of the alternatives correctly predicts the full range of tone realization in Bantu verbal reduplication described here.

3.1 Contrasting morphological or prosodic status of reduplicants

Myers & Carleton (1996) discuss tone and reduplication in Chichewa, where tone identity is found, and in Yao, where High tone is only realized on the Base. To account for the contrast between these languages, they propose that tone identity is found if REDs are compound stems. If REDs are affixes, in contrast, the tone of the RED is not identical to the tone of the Base. This proposal stands in obvious contrast to the compounding analysis,

[3] The RED is shown as preceding the Base here. It is analyzed as following it in some languages (e.g., Chichewa, Yao (Myers & Carleton 1996), perhaps Shona). In those languages the reduplicative compound would have the structure shown in (15a) with the relative positions of the RED and Base reversed.

which proposes that reduplicated verb stems are compound stems in all Bantu languages.

There are, however, numerous problems with the claim that REDs are affixes in the languages where the RED tone is not identical to that of the Base. First, reduplicants phonologically resemble stems in all Bantu languages. In the case of total reduplication, the reduplicant is identical to its base stem, by definition (so clearly meets Inkelas & Zoll's (1999, 2000) definition of reduplication as self-compounding). Further, the size of the reduplicant is minimally bisyllabic in most Bantu languages. Stems are also typically minimally bisyllabic, while affixes generally contain at most a single vowel. As Urbanczyk (1996, to appear) argues, cross-linguistically affix-like REDs are monosyllabic, while longer REDs are root or stem-like. It would be very unusual for multi-syllabic REDs to be classified as affixes rather than stems. Finally, as Downing (1999, 2000) argues in detail, the fixed final /a/ in the verbal reduplicant of many Bantu languages (see, e.g., the KiNande data in ((5)) is best explained by proposing the reduplicant is a verb stem. As a result, it is not plausible to propose that RED is an affix rather than a stem to explain lack of tone identity, especially in languages where we find total reduplication.

Hyman & Mtenje (1999) develop an alternative explanation for why tone is transferred in Chichewa but not in most other Bantu verbal reduplication systems. They propose that tone identity is found if REDs are separate Prosodic Words from the Base. If REDs are in the same Prosodic Word with the Base, however, the tone of the RED is not identical. This proposal follows from work like that of Nespor & Vogel (1986) which argues that each member of a compound is assigned stress independently if each member is parsed into a distinct Prosodic Word. The proposal is thus similar to the compounding analysis in proposing that when tonal transfer is found, each half of the RED+Base complex must be an independent tonal domain.

A problem for the proposal that Prosodic Word status of the RED correlates with tonal transfer is presented by Kikerewe. As Odden (1996b) shows, the Kikerewe reduplicant is arguably a Prosodic Word. (It is also arguably a morphological Stem (Downing 1999).) The evidence comes from a process of word-final shortening illustrated in the data in (16). As shown in (16a), vowels are normally long following consonant-glide sequences. However, word-final vowels are not long following these sequences, as shown in (16b). The data in (16c) shows that Prosodic Word is the context requiring short vowels, as stem-final vowels are long before enclitics. As shown in (16d), RED-final vowels are also short following consonant-glide sequences. One might propose that this is due to a requirement that vowel length in the RED match that in the Base, but the data in (16e), especially the final example, shows that there is no general length identity requirement holding between RED and Base vowels. As a result, the best explanation for the RED-final short vowels in (16d) is that RED is a Prosodic Word, so that short in this context follows from a more general process.

(16) Prosodic Word-final vowel shortening in Kikerewe (Odden 1996b, p. 132)
(a) Long vowels follow Consonant-Glide
ku-mwaana 'to shave each other'
ku-balisyaanya 'to cause ea. other to count'
(b) Word-final vowels always short
ku-mwa 'to shave'
ku-balisya 'to cause to count'
(c) No shortening with enclitics
ku-balwa 'to be counted'
ku-balwáá-hó 'to be counted there'
ku-gelezya 'to sprinkle'
ku-gelezyáá-kí? 'to sprinkle what?'
ku-básya 'to catch'
ku-bá!syáá-gá? 'to catch who?'
(d) RED-final vowels also short
ku-balwa-balwa
'to be counted here and there'
ku-gelezya-gelezya
'to sprinkle here and there'
ku-básyá-basya
'to catch here and there'
(e) Vowel length mismatches in RED, Base (RED means 'to do X here and there, quickly')
ku-gwa 'to fall' ku-gwaa-gwa
ku-sya 'to grind' ku-syaa-sya
ku-balwáá-hó 'to be counted there'
ku-balwa-balwáá-hó

If the RED is a distinct Prosodic Word from the Base, it should have the same tone as the Base. However, as the data in (4), above, show, in Kikerewe the entire RED+Base

complex is the domain for tone realization (i.e., it follows the Variant 2 pattern). These Kikerewe data show there is no consistent correlation between the reduplicant's status as a Prosodic Word and tone identity in the RED and Base.

3.2. Differences in input tone association

Other analyses of tonal transfer seek to find a correlation between the phonological representation of the Base tone and tone realization in the RED. Mutaka & Hyman (1990) show that in Kinande, tone is transferred in nominal reduplication (17a) but not in verbal reduplication (17b; see also (5), above).

(17) Kinande reduplication (Mutaka & Hyman 1990)

(a) Nominal reduplication (M&H 1990, fig (2))

Unreduplicated	Gloss	'a real X'
oku-gulu	leg	oku-[gulu-gulu
omu-góngò	back	omu-[góngo-góngò
o.kú-boko	arm	okú-[bokó-boko
o.mu-longò	village	o.mu-[longo-longò
o.mu-síkaa	girl	o.mu-[síka-síkaa

(b) Verbal reduplication (M&H 1990, fig (26-28))

	Unreduplicated X	Gloss
(i)	eri=hum-a	to beat
(ii)	erí=tum-a	to send
(iii)	eri=gend-a	to leave
(iv)	erí=twal-a	to bring
(v)	erí=bang-a	to jump about

	'to do X quickly, here and there'
(i')	eri=huma-huma
(ii')	erí=tuma-tuma (*erí=tumá-tuma)
(iii')	eri=genda-genda
(iv')	erí=twala-twala
(v')	erí=banga-banguka

They propose this difference falls out from the different input tonal associations required for nouns and verbs. In verb stems, tone is only contrastive on the root-initial syllable. Since output tone realization is predictable for verbs, tones need not be linked in the input. In nouns, though, every syllable contrasts for tone. Since output noun tone realization is not predictable, tones do need to be linked in the input for nouns. The contrast in tonal transfer in nouns vs. verbs would then follow if only linked input tones must be realized in the RED .

As Myers & Carleton (1996) argue, comparing Kinande with Chichewa provides a counterexample to the proposal that input tone linking correlates with tone realization in the RED. In Chichewa, too, verb tone is arguably unlinked in the input as its output realization is entirely predictable. Noun tone is contrastive on every syllable, as in Chichewa, so noun tones must be linked in the input. Yet, as shown in (18; repeated from (2), above) and (19; repeated from (3)), tone is transferred in verbal reduplication in Chichewa, but not in nominal reduplication. (In nominal reduplication, in fact, a High tone is realized on all nouns, even if the unreduplicated form is toneless.)

(19) Chichewa verbal reduplication (Myers & Carleton 1996, fig (25)); '[' is Stem edge

	Unreduplicated X	Gloss
(a)	tambalal-á	stretch out your legs!
b)	phikits-á	really cook
(c)	ndí-ma=[sangaláts-a	I please (habitual)
(d)	ti=[sangalats-é	let's please

	'do X repeatedly'
(a')	tambalalá-tambalalá
(b')	phikitsá-phikitsá
(c')	ndí-ma=[sangalátsa-sangalátsa
(d')	ti=[sangalatsé-sangalatsé

(20) Chichewa nominal reduplication (Myers &Carleton 1996, figs (41-43))

Unreduplicated	Gloss	'a real X'
chímanga	maize	chímanga-mánga
munthu	person	munthu-múnthu
masaná	afternoon	masaná-saná
máwa	tomorrow	máwa-mawá

These Chichewa data show there is no consistent correlation between input tone association and tone realization in the RED.

The contrast between KiNande and Chichewa is also not predicted by Walsh's (1992) proposal that tone realization in the RED correlates with the level of representation to which tone is linked. This proposal assumes that tone is prosodically linked (to mora or syllable) in some languages but segmentally linked in others. The interaction of tone with other segmental features like [voice] for example, would provide evidence for segmental linking, while evidence for prosodic

linking would come from prosodic conditioning on the output realization. This proposal further assumes that segmental material of the Base obligatorily transfers in reduplication, but prosodic Base material only optionally transfers. As a result, segmental tone is predicted to always be realized in the RED while prosodic tone need not be.

As Myers & Carleton (1996) argue, though, Chichewa output tone association is prosodically conditioned, yet tone is realized in the RED. There is no contrast in tone representation available, then, to explain why tone transfers in Chichewa but not in KiNande. Further, consonant segmentism conditions output tone realization in many Southern Bantu languages, like Ndebele and Xhosa (see, e.g., Doke (1954), Cassimjee & Kisseberth (1992) for discussion), yet tone does not transfer in these languages, as noted in section 2.1.3, above.[4] As a result, prosodic vs. segmental association of tone does not reliably correlate with tone realization in the RED.

3.3. The Emergence of the Unmarked (TETU)

Recent work within Optimality Theory (Alderete et al. (1999); Akinlabi (1997) proposes that non-identity between RED and Base should in general result from the Emergence of the Unmarked: marked segmentism in the Base can correspond to unmarked segmentism in the RED. In the case of tone, when the tone of the Base and RED are not identical, that should be because RED has the unmarked tone. (Low tone is the unmarked tone in Bantu languages.) This is precisely what we find in the Variety 3 languages. However, this approach cannot account for the tone patterns of reduplicated verbs in Variety 2 languages discussed in 2.1.2, above. In these languages, the RED tone is not identical to that of the Base, but the RED can have the marked tone because the RED+Base complex is a single domain for tone association. This pattern cannot be straightforwardly accounted for in the TETU approach.

3.4. Common problem for all alternatives

All of the proposals discussed in this section face the problem that they predict only a two-way contrast in tone identity: either the Base tone and RED tone are identical, or the RED has no (High) tone associated with it. However, as we have seen, there is, in fact, a three-way contrast in the possibilities for tone realization in reduplicated forms. If the tone of the RED is not identical to the Base tone pattern, that can be either because the Base tone pattern is realized over the entire RED+Base complex as a unit, or because the Base tone pattern is realized on just one half of the complex. However, the three-way contrast is predicted in the compounding analysis. The RED+Base complex consists of three stems, each of which is a candidate for stem tone association.

4. Conclusion

I have argued that tonal (non-)transfer in Bantu verbal reduplication is best explained if we propose that the complex is a compound. Then tone realization in the RED+Base complex is parallel to accent realization in compounds in other languages. This result contributes to our understanding of the role of morphology in determining the realization of reduplicative morphemes. Morphologically, the RED+Base complex is a compound. This gives stem tone the choice of three stems (RED stem, Base stem, compound stem) as its domain of realization, correctly predicting the three-way pattern of variation in tone realization found in Bantu verbal reduplication. This analysis improves on previous ones, as it allows this three-way pattern of variation in tone association to follow from the cross-linguistic properties of compounds. The analysis thus confirms work like Downing (1999, 2000), Inkelas & Zoll (1999, 2000) and Urbanczyk (1996, to appear) arguing that both morphological and phonological factors determine the realization of reduplicative morphemes.

A disappointing result of the analysis presented here is that there seems to be no correlation between tonal transfer and independent facts about the tone or morphology of a language. This is like compounding, where one cannot always predict from independent factors about the language where the compound will be a single domain for stress assignment or whether each member will be stressed independently (compare, for example, Italian and Greek).

[4] See Akinlabi (1997) for discussion of other cases which are problematic for Walsh's (1992) proposal.

However, it may well be that no factors correlating with tonal transfer have been found because too little is known as yet about tone and reduplication in Bantu languages. One must second Myers & Carleton (1996, fn. 22) when they note that a theory of tone and reduplication can only be thoughtfully developed and thoroughly tested if complete paradigms are available on grammatical tone in reduplicated and non-reduplicated forms for a number of verb tenses in a number of languages. This data is unavailable for most Bantu languages. It is hoped that when more descriptive work is done, a better understanding of the factors that correlate with tonal transfer in reduplication can be achieved.

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