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# Linear Disorder in Bantu Reduplication

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## 1 Introduction

Many Bantu languages have a process of (partial) verb stem reduplication, with the meaning of doing the action of the verb here and there or from time to time.

- A common position for the reduplicative morpheme (RED, underlined) to occur is immediately preceding the morphological stem, as shown in (1a) and (2a).
- As shown in (1b) and (2b), in some languages RED is misaligned with **vowel-initial** stems, either exfixed, (1b), or infixed (2b):

(1) Hehe (Odden & Odden 1985)

(a) *C-initial stems*

| | | |
|---|---|---|
| kú-ceénga | kú-ceenga-ceénga | 'to build' |
| kú-teléka | kú-teleka-teléka | 'to cook for' |

(b) *V-initial stems – exfixing*

| | | |
|---|---|---|
| kw-íimbíla | kwíimbila-kw-iimbíla | 'to sing' |
| kw-áaka | kwáaka-kw-aáka | 'to burn' |

(2) Xhosa (Cassimjee 1998)

(a) *C-initial stems*

| | | |
|---|---|---|
| ukú-phátha | ukú-phathá-phatha | 'to touch' |
| ukú-sebénza | ukú-sebe-sebénza | 'to work' |

(b) *V-initial stems – infixing*

| | | |
|---|---|---|
| ukw-álátha | ukw-á-lathá-latha | 'to point at' |
| uk-óphúla | uk-ó-phulá-phula | 'to break' |

Indeed, as shown in (3),

- one can find both infixation and exfixation, as well as onset epenthesis, in the same language with vowel-initial stems,
    - depending on the length of the stem and the nature of the prefixes to the stem:

(3) Natal Zulu (Downing elicitation notes)

(a) *V-initial – exfixing*

| | | |
|---|---|---|
| s=ô:se | sosa-s-ô:se | 'roast it!' |

(b) *V-initial – infixing*

| | | |
|---|---|---|
| u-ya-s=ósela | u-ya-s=o-selá-sela | 'you are roasting for us' |

(c) *V-initial – Onset epenthesis*

| | | |
|---|---|---|
| úk=ó:sa | úk=ósá-*y*o:sa | 'to roast' |

Since RED is moving away from its usual pre-Stem position only with vowel-initial Stems, it is clear that prosodic well-formedness motivates the linear disorder of RED:

- infixation, exfixation (and epenthesis) are different strategies to avoid an ONSET violation across the RED-Stem boundary.

Bantu verbal reduplication provides, then, a fertile testing ground for two recent approaches within the OT framework to prosodic morpheme ordering critiqued in Yu (2007):

- In the phonological or morphological readjustment approach – or P >> M approach (McCarthy & Prince 1993, 1995, Łubowicz, in press; Horwood 2002, 2008),
    - the infixing position of RED is accounted for by proposing it is prefixed to the morphological stem, and forced inside vowel-initial stems to satisfy ONSET.
- In the Prosodic Subcategorization approach (Downing 1998a, b, 1999; McCarthy & Prince 1986; Inkelas & Zoll 2005; Yu 2007),
    - the infixing position of RED is accounted for by proposing that it is prefixed to a (morpho-) prosodic constituent, the Prosodic Stem, which must begin with an Onset.

I will argue in this talk that the Prosodic Subcategorization approach provides a better account for the range of misalignments one finds between RED and vowel-initial morphological stems in Bantu languages than the readjustment approach:

- In section 2, I present more data, illustrating the morpho-prosodic misalignment patterns one finds in reduplicating vowel-initial verb stems;
- In section 3, I develop a Prosodic Subcategorization analysis and show how it defines a factorial typology that accounts for the range of attested misalignments;
- In section 4, I discuss how the phonological/morphological readjustment approach would handle the data, and show why it would fail to provide a satisfactory account.

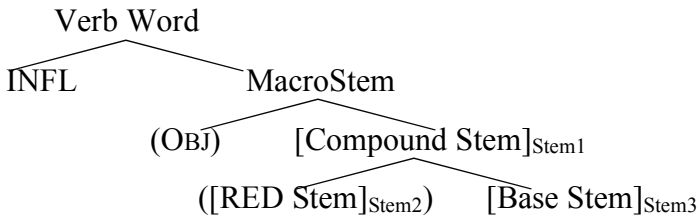
## 2 Patterns of disorder in Bantu verb stem reduplication

Canonical order for RED (in most Bantu languages) is immediately before the Verb stem.

As work like Downing (2000, 2003, 2006), Hyman, Inkelas & Sibanda (1999), Inkelas & Zoll (1999, 2000) and Myers & Carleton (1996) show,

- RED is a verb stem, forming a compound stem with the Base verb stem:

(4) Compound structure for reduplicated Bantu verb stems (Downing 2003)[1]




Why is RED a stem, not an affix?

- Minimal size is bisyllabic, like stems, not monosyllabic, like affixes;
- Fixed final /a/ in RED is default inflectional final vowel for verb stems;
- Patterns of tone in reduplicative complex best accounted for if complex is a compound.

RED is immediately adjacent to the Base morphological Stem if the Stem is C-initial in all the Bantu languages I know of.

[1] The RED is shown as preceding the Base here. In languages like Chichewa where RED is analyzed as following the Base, the reduplicative compound would have the structure shown in (4) with the relative positions of the RED and Base reversed.

However, if the Stem is V-initial,

- then a simple disyllabic or full copy RED adjacent to the Base morphological Stem would violate ONSET,
    - a constraint on word-medial syllables that is found in many Bantu languages:

(5) Pre-morphological V-initial Stem: RED violates ONSET

(a) *V-initial stems – NON-exfixing *KiHehe*

| | | |
|---|---|---|
| kw-íimbíla | *kw-íimbila-iimbíla | 'to sing' |
| kw-áaka | *kw-áaka-aáka | 'to burn' |

(b) *V-initial stems – NON-infixing *IsiXhosa*

| | | |
|---|---|---|
| ukw-álátha | *ukw-ala-alatha | 'to point at' |
| uk-óphúla | *uk-ophu-ophula | 'to break' |

We find a variety of strategies cross-Bantu to avoid an ONSET violation across the RED-Stem boundary:

- Epenthesis
- Infixation
- Exfixation

Epenthesis is illustrated with the Kikerewe data below; **note the epenthetic segment is not obligatorily copied**:

(6) Kikerewe verb reduplication (Odden 1996, 130-131)

(a) *C-initial stems* (full copy)

| | | |
|---|---|---|
| ku-lima | ku-lima-lima | 'to cultivate' |
| ku-biba | ku-bibá-biba | 'to plant' |
| ku-káláanga | ku-káláanga-kalaanga | 'to fry' |

(b) *V-initial stems - epenthesis in the Base stem*

| | | |
|---|---|---|
| kw-ááta | kw-ááta-*y*ata | 'to cut' |
| tw-aangílé | tw-aangile-*y*aangílé | 'we disagreed' |
| tw-ééndá | tw-eenda-*y*ééndá | 'we like' |

Exfixation and infixation were illustrated in (1b) and (2b), above, respectively.

A first desiderata of an OT analysis of RED infixation, then, is that it must define a factorial typology,

- showing that epenthesis, infixation and exfixation are alternative repair strategies in the V-initial context, because they are derivable by simple constraint re-ranking.
- NOTE: this is not just a Bantu-centric problem. As Downing (1998b) and Inkelas & Zoll (2005) show, different dialects of Chumash also have different repair strategies – epenthesis vs. exfixation – in the same vowel-initial stem context, for RED.

The infixation pattern is subject to a further condition in languages like IsiXhosa, Swati, Ndebele, Zulu (all Nguni Bantu) as well as in KiNande (Mutaka & Hyman 1990), namely,

- infixation is blocked in VCV stems.
- THAT IS, infixation is subject a minimality constraint: the residue Stem following the infixed RED must be at least bisyllabic.
    - NOTE, this is the usual minimality constraint on Bantu Stems.

As noted for Zulu, whether exfixation or epenthesis is chosen as the alternative strategy for VCV stems depends on the nature of any prefix to the Stem:

(7) Natal Zulu (Downing elicitation notes)

(a) *V-initial – infixing (or epenthesis) with VCVCV or longer*

| | | |
|---|---|---|
| u-ya=s-ósela | u-ya=s-o-selá-sela | 'you are roasting for us' |
| úkw=ábisa | úkw=á-bísá=bisa | 'to help share out' |
| | OR úkw=ábá-*y*ábisa | |

(b) *V-initial – VCV stem, exfixing possible with Object prefix*

| | | |
|---|---|---|
| s=ôse | sosa-s-ôse | 'roast it!' |
| si-ya=z-ába | si-ya=zabá-z-aba | 'we are sharing them' |

(c) *V-initial – VCV stem, epenthesis if prefix is outside the macro-stem*

| | | |
|---|---|---|
| úk=ó:sa | úk=ósá-*y*osa | 'to roast' |
| úkw=ába | úkw=abá-*y*aba | 'to distribute; share out' |

A similar set of patterns – with similar restrictions on exfixation vs. epenthesis – is found in closely related Ndebele (Sibanda 2004: 310ff).

In Kinande, the alternative to infixation found in longer V-initial stems (8c), is overcopy and coalescence in VCV stems (8d):

(8) Kinande verbal reduplication (Mutaka & Hyman 1990; Mutaka 1994; eri- is the infinitive prefix; the reduplicant is underlined)

| Stem | Reduplicated Form | Gloss |
|---|---|---|
| (a) *Consonant-initial* | | |
| eri=huma | eri=huma-huma | to beat |
| eri=humira | eri=huma-humira | to beat for |
| eri=humirana | eri=huma-humirana | to beat for each other |
| (b) *Monosyllabic* | | |
| eri=swa | eri=swa.swa-swa | to grind |
| erí=ta | erí=ta.ta.-ta | to bury |
| (c) *Vowel-initial, infixing* | | |
| ery=esera | ery=e-sera-sera | to play for |
| ery=óhera | ery=ó-hera-hera | to pick for |
| (d) *Vowel-initial, prefixing* | | |
| ery=esa | ery=e.se.s-e.sa | to play |
| ery=ôha | ery=ó.ho.h-o.ha | to pick |

A second desiderata of an OT analysis of RED infixation for these Bantu languages, then, is that it must also account for

- the effect of Base minimality: that is, the fact that epenthesis and exfixation are alternative repair strategies to infixation in VCV stems, under the same constraint ranking that optimizes infixation with longer V-initial stem.

In the next section, I present a Prosodic Subcategorization analysis of the position of RED in Bantu verb stem reduplication which:

- defines a factorial typology which matches the different repair strategies attested – epenthesis, exfixation and infixation;
- accounts for the effect of Base minimality on the choice of repair strategy.

## 3 Linear Disorder results from Prosodic Subcategorization

Elements of the Prosodic Subcategorization analysis:

- Shares with other OT approaches to morphological position the assumption that morpheme order can be defined through Generalized Alignment constraints (McCarthy & Prince 1993a, b; Yu 2007): e.g. ALIGN(RED, R; MSTEM, L).

- What is distinctive is that morpheme position can be defined *wrt* prosodic or morpho-prosodic constituents – stressed syllable, Foot, Prosodic Root, Prosodic Stem – as well as morphological constituents:

(9) **ALIGN(RED**, R; PSTEM, L).

- Subcategorization constituent also defines the phonological Base for reduplication.

Like other work on prosodic subcategorization (e.g., Booij & Lieber 1993), the analysis assumes that:

- morphemes that subcategorize for (morpho-)prosodic constituents are unordered in the input.

How are morpho-prosodic constituents defined? (See work like Inkelas 1989, Downing 1998a,b; 2006 for more detailed discussion)

- In default case, they are co-extensive with morphological constituent on which they are based:

(10) MSTEM ≈ PSTEM:
Align the L,R edges of every MStem with the L,R edges of a PStem

- They can be mismatched with the morphological constituent, to satisfy prosodic markedness constraints, like,

(11)
(a) ONSET: A syllable should not begin with a vowel/moraic element.
(b) ALIGNPSTEM (**STEM**): ALIGNL(PSTEM, σ)

Faithfulness constraints evaluate the (mis-)match between, e.g., MStem and PStem:

(12)
(a) DEP M-P: Every element of the PStem has a correspondent in the MStem.
(b) MAX M-P: Every element of the MStem has a correspondent in the PStem.

Mismatches motivated by the constraints in (11) incur violations of these constraints:

NOTE: both infixation and exfixation in this analysis involve prefixing RED to a prosodically well-formed PStem (indicated above with a square bracket '['):
- PStem is left-aligned with a syllable, and that syllable begins with an Onset.

- Infixation violates MAX M-P: =o-sela-[sela – initial vowel of MStem omitted from PStem and RED is prefixed to remainder;
- Exfixation violates DEP M-P: kwaambila-[kw-aambila – non-MStem material (prefix) is included in PStem and RED is prefixed to this complex.

The final type of repair for V-initial stems involves epenthesis, which violates:

(13) DEP I-O: Every element of the Output has a correspondent in the Input.

Epenthesis does not necessarily violate the Faithfulness constraints in (12), though it can violate STEM (11b):

kw-aata=*y*[aata – PStem = MStem, if epenthetic glide is not parsed in PStem
BUT PStem is not left-aligned with a syllable.

RECALL that the first desiderata of the analysis is to show how a factorial typology based on these constraints can account for
- Epenthesis
- Infixation
- Exfixation

as alternative strategies for avoiding Onset violation across RED-MStem boundary.

I now exemplify the analysis of each of these repair strategies in turn.

*Epenthesis* – Kikerewe: data repeated from (6), above.
- **note the epenthetic segment is not obligatorily copied**:

(6) Kikerewe verb reduplication (Odden 1996, 130-131)

(a) *C-initial stems* (full copy)

| | | |
|---|---|---|
| ku-lima | ku-lima-lima | 'to cultivate' |
| ku-biba | ku-bibá-biba | 'to plant' |
| ku-káláanga | ku-káláanga-kalaanga | 'to fry' |

(b) *V-initial stems - epenthesis in the Base stem*

| | | |
|---|---|---|
| kw-ááta | kw-ááta-*y*ata | 'to cut' |
| tw-aangílé | tw-aangile-*y*aangílé | 'we disagreed' |
| tw-ééndá | tw-eenda-*y*ééndá | 'we like' |

Tableau 1: Epenthesis - Kikerewe (square bracket = PStem edge)

| | ONSET | DEP M-P | MAX M-P | PSTEM/σ | DEP I-O | ALIGN RED |
|---|---|---|---|---|---|---|
| ☞a.ku-kúláanga-[kalaanga | | | | | | |
| b. ku-ká-láanga-[laanga | | | *! | | | |
| c. kukúláanga-[ku-kalaanga | | *! | | | | |
| ☞d. tw-aangile-*y*[aangílé | | | | * | * | * |
| e. tw-aangile.-[aangílé | *! | | | | | |
| f. twaangile-[tw-aangílé | | *! | | | | |
| g. tw-aangile-[*y*aangílé | | *! | | | * | |
| h. tw-aa-ngile-[ngílé | | | *! | | | |

Crucial constraint rankings: ONSET >> DEP I-O
DEP M-P, MAX M-P >> PSTEM/σ, ALIGNRED

As we can see, if both DEP M-P and MAX M-P are highly ranked, then MStem and PStem are optimally co-extensive. As a result, both infixation and exfixation – candidates b,c and f, h – are non-optimal.

In optimal epenthesis candidate d, MStem and PStem are co-extensive; thus this candidate satisfies the highest ranked constraints.

Since the MStem=PStem is the Base for reduplication, it is not surprising that the epenthetic segment is not copied: it is outside the Base for reduplication.

*Systematic exfixation* is optimal in languages like KiHehe, if DEP M-P is low-ranked.

(1) Hehe (Odden & Odden 1985)

(a) *C-initial stems*

| | | |
|---|---|---|
| kú-ceénga | kú-ceenga-ceénga | 'to build' |
| kú-teléka | kú-teleka-teléka | 'to cook for' |

(b) *V-initial stems – exfixing*

| | | |
|---|---|---|
| kw-íimbíla | kwíimbila-kw-iimbíla | 'to sing' |
| kw-áaka | kwáaka-kw-aáka | 'to burn' |

Tableau 2: Exfixation - KiHehe

| | ONSET | MAX M-P | PSTEM/σ | DEP I-O | ALIGN RED | DEP M-P |
|---|---|---|---|---|---|---|
| ☞a. kwíimbila-[kw-iimbíla | | | | | | * |
| b. kw-íimbila-[*y*iimbíla | | | | *! | | * |
| c. kw-íimbila-*y*[iimbíla | | | *! | * | * | |
| d. kw-íi-mbila-[mbíla | | *! | | | | |
| e. kw-íimbila.-[iimbíla | *! | | | | | |

Crucial re-ranking: for Exfixation to be optimal, DEP M-P must be low ranked.

*For infixation to be optimal*, the order of DEP M-P and MAX M-P must be reversed;
- that is, MAX M-P must be low-ranked.

Recall that with infixation, we find an additional twist in the analysis:
- Post-infix string is subject to minimality;
- This is not surprising if post-infix string is a prosodic constituent, PStem.

(14) Base Stem (PStem) MINimality:
The Base stem must be minimally disyllabic.

In the Nguni languages and KiNande, the RED Stem is both minimally and maximally disyllabic:

(15) RED STEM:
RED Stem is minimally and maximally disyllabic.

(See Downing 2006 for discussion of why disyllabic canonical prosodic shape of Bantu verb stems follows from bi-morphemic canonical morphemic structure.)

*Infixation alternating with Epenthesis in VCV stems* – this is found in Nguni languages like Zulu, Xhosa and Ndebele when the prefix is outside the macro-stem – is exemplified in the tableaux below:

Tableau 3: Infixation ~ Epenthesis – Xhosa (Downing 1998a, p. 17)

| | RED STEM | MIN | ONSET | **DEP M-P** | **PSTEM /σ** | DEP I-O | ALIGN RED | MAX M-P |
|---|---|---|---|---|---|---|---|---|
| ☞a. u-kw=a-**latha**-[latha | | | | | | | | * |
| b. u-kw=**ala**-*y*[alatha | | | | | *! | * | * | |
| c. u-**kwala**-[kw-alatha | | | | *! | | | | |
| d. u-kw=**ala.**-[alatha | | | *! | | | | | |
| ☞e. u-k=**oma**-*y*[oma | | | | | * | * | * | |
| f. u=**koma**-[k-oma | | | | *! | | | | |
| g. u-k=**oma**-[*y*oma | | | | *! | | * | | |
| h. u-k=**oma.**-[oma | | | *! | | | | | |
| i. u-k=o-**ma**-[ma | *! | * | | | | | | * |
| j. u-k=**o.m**-[oma | *! | | | | * | | | |
| k. u-k=o-**ma*yi***-[ma | | *! | | | | | | * |

We can see that epenthesis and infixation have in common that the PStem only contains elements from the MStem.

Simply adding Base and RED minimality constraints (14) and (15) high in the ranking optimizes the desired alternation.

For the prefixes that allow exfixation, we must propose a co-phonology where DEP M-P and PSTEM /σ have the reverse ranking from Tableau 3:

Tableau 4: Infixation ~ Epenthesis – Xhosa (Downing 1998a, p. 17)

| | RED STEM | MIN | ONSET | **PSTEM /σ** | **DEP M-P** | DEP I-O | ALIGN RED | MAX M-P |
|---|---|---|---|---|---|---|---|---|
| ☞a. u-kw=a-**latha**-[latha | | | | | | | | * |
| b. u-kw=**ala**-*y*[alatha | | | | *! | | * | * | |
| c. u-**kwala**-[kw-alatha | | | | | *! | | | |
| d. u-kw=**ala.**-[alatha | | | *! | | | | | |
| e. u-k=**oma**-*y*[oma | | | | *! | | * | *! | |
| ☞f. u=**koma**-[k-oma | | | | | * | | | |
| g. u-k=**oma**-[*y*oma | | | | | * | *! | | |
| h. u-k=**oma.**-[oma | | | *! | | | | | |
| i. u-k=o-**ma**-[ma | *! | * | | | | | | * |
| j. u-k=**o.m**-[oma | *! | | | * | | | | |
| k. u-k=o-**ma*yi***-[ma | | *! | | | | | | * |

Finally, for KiNande, we require a constraint that makes overcopy marked, and then rank it low enough that overcopy is an optimal strategy for satisfying RED minimality:

(15) INTEGrity: No more than one occurrence of a morpheme should occur in the output. (The assumption here is that overcopy instantiates two occurrences of the RED morpheme.)

Tableau 5: Infixation ~ Overcopy (KiNande, adapted, Downing 2000, pp 21-22)

| | REDSTEM | MIN | ONSET | DEP M-P | DEP I-O | PSTEM/σ | **INTEG** | ALIGN RED | MAX M-P |
|---|---|---|---|---|---|---|---|---|---|
| ☞a. e-ry=e-**sera**-[sera | | | | | | | | | * |
| b. e-ry=**ese**-*y*[esera | | | | | *! | * | | * | |
| c. e-**ryese**-[ry-esera | | | | *! | | | | | |
| d. e-ry =**ese.**-[esera | | | *! | | | | | | |
| e. e-ry =**esa**- *y*[esa | | | | | *! | * | | * | |
| f. e-ry =**esa**-[ *y*esa | | | | *! | * | | | | |
| g. e-ry =**esa.**-[esa | | | *! | | | | | | |
| h. e-ry =e-**sa**-[sa | *! | * | | | | | | | * |
| i. e-ry =**e.s**-[esa | *! | | | | | * | | | |
| j. e-ry =e-**sa***y*i-[sa | | *! | | | | | | | * |
| k. e=**ryesa**-[ry-esa | | | | *! | | | | | |
| ☞l. e-ry =**ese.s**-[esa | | | | | | * | * | | |

Crucial constraint rankings:
DEP I-O must be high enough ranked to make epenthesis non-optimal way to resolve hiatus.
INTEGRITY must be low enough ranked to make overcopy optimal way to satisfy minimality.

To sum up this section:

- The prosodic subcategorization approach defines a factorial typology that accounts for the range of variation we find in how the hiatus before V-initial stems is avoided:
    - all repairs satisfy high-ranked ONSET;
    - epenthesis allows MStem and PStem to be co-extensive;
    - infixation and exfixation involve mismatches between MStem and PStem AND simply re-ranking two constraints derives the different RED dis-orders.

- The prosodic subcategorization approach also explains why infixation into VCV stems is not possible:
    - violates a constraint on minimality – a common constraint on morpho-prosodic constituents.
- Adding minimality constraint to independently motivated infixation constraint grammar accounts for alternative repair chosen in VCV stems.

In the next section we will see how well the alternative approach – phonological or morphological readjustment – accounts for the same range of facts.

## 4 Attempting a Morphological/Phonological readjustment account

At first blush, the Phonological readjustment approach to infixation in Bantu verbal reduplication seems very simple:

- Default prefixal order of RED can be defined through Generalized Alignment constraint (McCarthy & Prince 1993a, b; Yu 2007):

(16) ALIGN(RED, R; MSTEM, L):
Align the right edge of RED with the left edge of the MStem.

HOWEVER, RED of vowel-initial stems would incur Onset violations with the Base if prefixed – see (5), above:

(11a) ONSET: A syllable should not begin with a vowel/moraic element.

Infixing is optimized by ranking ONSET (11a) above ALIGNRED (16):

This is the P >> M ranking which McCarthy & Prince (1993a,b) propose defines Prosodic Morphology.

Tableau 6 – Infixation into VCVCV stems in Xhosa

| ukw-RED-alatha | ONSET | ALIGNRED |
|---|---|---|
| ☞a. ukw-a**latha**latha | | * |
| b. ukw-**ala.**-alatha | *! | |

This looks so simple! Why prefer the Prosodic Subcategorization approach?

*Base minimality*:

- Infixation of RED in several Bantu languages is subject to a minimality condition on the Base, as it is blocked in VCV Stems.
- **There is no way** to express this condition in the P >> M account, as
    - the string following the infixed RED is not a constituent,
    - AND nothing ill-formed about KiNande Stem like: ery=esa → *ery=e**sa**sa

*Factorial typology:*

- How do we distinguish exfixation from infixation? (Epenthesis in this account, like in the Prosodic Subcategorization account, is optimized/penalized by DEP IO constraint.)

Tableau 6' – Infixation into VCVCV stems in Xhosa – OR exfixation??

| ukw-RED-alatha | ONSET | ALIGNRED |
|---|---|---|
| ☞a. ukw-a**latha**latha | | * |
| ☞b. u-**kwalatha**kwalatha | | * |
| c. ukw-**ala.**-alatha | *! | |

Both exfixation and infixation involve misalignment to satisfy Onset:

- What constraint might one satisfy that the other violates?
- McCarthy & Prince (1995) suggest a M/P Scope Concordance Condition (M/P SCC) *rules out exfixation as a possibility from GEN* – and Horwood (2008) takes up this proposal (with slight revision):

(17) M/P SCC (McCarthy & Prince 1995, p. 323, fig. (97))

If the M-scope of Morpheme B is a proper subset of the M-Scope of Morpheme A, then the P-Scope of Morpheme B must be a proper subset of the P-Scope of Morpheme A.

Downing (1998b) contains a detailed critique of the M/P SCC. One of the problems noted in this article is that the M/P SCC rules out some classic bracketing paradoxes:

(18) English 'unhappier'

A M-Scope of /-er/ = /un+happy/ P-Scope /-er/ = happy

B M-Scope of /un-/ = /happy/ P-Scope /un-/ = happy-er

That is, morphologically, the suffix /-er/ has M-Scope over /un+happy/: 'unhappier' means 'more unhappy'; while /un-/ only has scope over /happy/. However, phonologically, /-er/ has scope only over /happy/, as the suffix /-er/ may only be added to a base with two or fewer syllables. As a result, /un-/ is considered to have phonological scope over /un+happy/. (Downing 1998b, p. 107-108)

Horwood's (2008) revision of the M/P SCC is not more compelling:

- In particular one might object to the following statement (p. 13):

"The logic of this approach extends to any given level of prosodic structure, so that an affix which is syllabified as a given prosodically complete unit may dislocate to any position within a prosodic category of the next higher order."

- Problem: infixes (or exfixes) do NOT dislocate to any position within a prosodic category, as Yu (2007) demonstrates.
- Indeed, an advantage of the Prosodic Subcategorization account is to express what seems to be the correct cross-linguistic generalization:
    - affixes displace the minimal distance necessary to satisfy a prosodic constraint. (Recall that MAX M-P/DEP M-P evaluates this distance.)

*Consistency of Exponence* (Pyle 1972, McCarthy & Prince 1993a)

- Recent work on exfixation (McCarthy & Prince 1995) and infixation (Łubowicz 2005, Horwood 2002, 2008) has argued that infixation and exfixation lead to morphological fusion or readjustment:
    - The 'exfixed' RED is actually fused with the preceding prefix, and the prefix is copied into the Base;
    - Infixes also 'fuse' in the output with the 'host' morpheme.
- This violates the principle, accepted at least since Pyle (1972), that phonological processes cannot modify morpho-syntactic constituency.
- P >> M approach is more powerful than it appears: do we want a theory of prosodic morphology which allow phonology to not just condition the realization of morphemes but also change morphological affiliations: e.g., relabel an affix a root if it is infixed into a root?

## 5 Conclusion

To sum up,

- Bantu verb stem reduplication provides an ideal testing ground for theories of morpheme order/disorder, as one finds several strategies – including exfixation and infixation – to avoid Onset violations at the RED-Stem boundary.
- I have shown that the Prosodic Subcategorization approach to infix-/exfixation provides the most satisfactory account of the range of Bantu data:
    - can account for the minimality condition – P >> M approach cannot.
    - can define a factorial typology that accounts for all the data – P >> M approach cannot.
- Supports work like Yu (2007) which argues that Prosodic Subcategorization approach in general provides better account for infixation.

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