

**SWATI AND KIKUYU REDUPLICATION:
EVIDENCE AGAINST EXHAUSTIVE COPY***

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This paper addresses the central question of deriving shape-invariance of partial reduplication in two competing models of reduplication: *Selective Copy* [McCarthy and Prince 1986, 1988, and 1990] and *Exhaustive Copy* [Steriade 1988]. I show that the core difference lies in the fact that whereas Selective Copy favors prosodic templates, Exhaustive Copy selects parameters defined in terms of prosodic units. This distinction is examined against Swati diminutive reduplication which shows the base-independent vowel *a*. Crucially, to insert *a* requires access to segmentally unspecified prosodic units. Under Selective Copy, prosodic templates provide exactly the structures for defining insertion. In contrast, Exhaustive Copy cannot provide an internally consistent mechanism to express *a* insertion, with its reliance on parameters. This incapability reveals a larger problem confronting Exhaustive Copy: how to account for reduplication involving base expansion rather than base reduction. Unless a mechanism is found, Exhaustive Copy, with its parameter approach, is unable to explain base-expansion cases in reduplication.

0. Introduction

Two intriguing properties of reduplicative affixes are first, that they are invariant in shape and second, that their segmental makeup is dependent upon the base to which they are attached. Previous autosegmental explanations of shape-

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invariance and base-dependent melody adopt two mechanisms: (i) a skeletal template to account for the consistency in weight and (ii) a copying mechanism that transfers base segmental content into a reduplicative template [Marantz 1982, Broselow and McCarthy 1984, Levin 1985]. These accounts have since come under attack for a number of reasons. One major criticism concerns the unconstrained nature of templates; in principle, any string of skeletal slots can be licensed as a template under these earlier accounts [Clements 1985, McCarthy and Prince 1986, 1988, Steriade 1988].

To cope with this problem, McCarthy and Prince [1986, 1988] show that reduplicative affixes are best defined by prosodic templates: (i) core syllables (σ_c), (ii) light syllables (σ_μ), (iii) heavy syllables ($\sigma_{\mu\mu}$), (iv) syllables (σ), (v) bimoraic feet ($F_{\mu\mu}$), (vi) iambic feet ($F_{\mu\mu\mu}$), (vii) disyllabic feet ($F_{\sigma\sigma}$), and (viii) prosodic words. An immediate consequence of imposing prosodic constituency on reduplicative templates is that it severely reduces the number of templates predicted in natural languages. McCarthy and Prince [1986, 1988] exploit a copying mechanism as well. Copying takes two forms: (i) an entire sequence of base segmental melody can be targeted for copying; or (ii) a portion of it can be targeted for copying as long as that portion is prosodically defined or "circumscribed" [McCarthy and Prince 1990]. In either case, copying is *selective* in that it excludes suprasegmental structures. Hence, I will refer to this model as *Selective Copy*.

In contrast, Steriade [1988] advocates a parametric approach to reduplication. Under her proposal, shape-invariance results from an interplay of weight and syllable markedness parameters. Among the weight parameters are (i) light syllables, (ii) monosyllabic feet, (iii) bimoraic feet, and (iv) disyllabic feet. These weight parameters differ from prosodic templates posited by Selective Copy. They are not templates that possess independent prosodic structures. Yet formally, weight parameters are stated in terms of prosodic units that specify which prosodic constituent is targeted as the reduplicant.¹ This conception of weight parameters forces a different copying apparatus. Copying must be *exhaustive*: it must target both the segmental melody and the prosodic structure of the base. This is critical; without the prosodic structures of the base, weight parameters cannot determine which unit of the copied base is to be retained as the reduplicant. In what follows, I refer to this model as *Exhaustive Copy*.

This contrast demonstrates two radical differences between Selective Copy and Exhaustive Copy: (i) templates vs. parameters and (ii) selective vs. exhaustive copying. These differences impose an additional contrast in expressing the insertion of base-independent melody. Whereas insertion can make reference to the prosodic units of a template with Selective Copy, it cannot rely on parameters

¹ *Reduplicants* are short for reduplicative affixes. They refer to melodies that make up a reduplicative affix [Spring 1989].

with Exhaustive Copy. Insertion can and must be defined by the existing prosodic structure of the copied base.

This distinction becomes significant in examining diminutive reduplication in Swati. A critical property of Swati reduplication is that a base-independent² vowel *a* surfaces in a reduplicant only when a base cannot supply sufficient melody for a foot-sized reduplicant: *lingi-lingis* ‘resemble a little’ vs. *goba-gob* ‘bend a little’. The question addressed here is whether or not these two proposals can express *a* insertion. I demonstrate that *a* insertion cannot be formally stated by Exhaustive Copy. Crucial to the argument is that an insufficient base is lacking not only in segmental melody but also in the prosodic constituency essential for defining the locus of insertion.

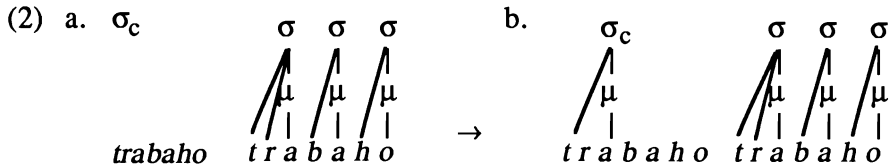
Motivation for an insertion treatment takes two steps. First, internal evidence from passive formations suggests that *l* functions as the default vowel—not *a* in Swati. Second, *a* behaves in Kikuyu³ like an archetypical instance of “prespecification” in that it overrides any vowel in the base. Considering that Kikuyu and Swati are both members of the Bantu family and that diminutive reduplication is a common property of Bantu morphology [Meinhof 1932], there is an advantage in treating Swati *a* on a par with Kikuyu *a* since the former cannot be filled in by default.

The layout of this paper is as follows: Section 1 contrasts the two models of reduplication through examples from Tagalog. Section 2 applies Selective Copy to an account of Swati and Kikuyu reduplication. In particular, I demonstrate that Swati *a* requires an insertion treatment. Section 3 spells out the argument against Exhaustive Copy from Swati *a*. I demonstrate that a fundamental flaw with Exhaustive Copy lies in its inability to deal with cases of reduplication which require base expansion, rather than base reduction. Section 4 concludes with further consideration of the templatic vs. parametric opposition for a unified theory of morphology.

²A base-independent melody refers to (i) a melody of the reduplicant that overrides a corresponding segment in the base, e.g. *cara-carek* ‘pop a little’ in Kikuyu or (ii) a melody that cannot be supplied by a base too small for the reduplicant, e.g. *goba-gob* ‘bend a little’ in Swati. In either case, they are independent of the base from which a reduplicant is derived. As a term, *base-independent* is purely descriptive; it does not carry any theoretical connotation. In this regard, *base-independent* is to be distinguished from *prespecification*, which carries both a theoretical and descriptive sense. Theoretically, prespecification refers to prelinking to a template. Descriptively, *prespecification* is equivalent to (i). Occasionally, I have to refer to prespecification in its descriptive sense. In such cases, “prespecification” is quoted to distinguish it from prespecification in its theoretical sense, which is not in quotation.

³ Swati is a Bantu language, which is spoken in some areas of South Africa and Mozambique. Kikuyu is a Bantu language spoken in Kenya. Diminutive reduplications presented here are not limited to Swati and Kikuyu. Reduplications with similar semantic and phonological properties are abundant in the languages of the Bantu family [Meinhof 1932]. For instance, Kinande is another case with similar reduplications analysed in detail by Mutaka and Hyman [1990].

McCarthy and Prince [1986] posit a core syllable template σ_c to derive the reduplicant. A derivation for *ka-ta-trabaho* is illustrated in two steps. The diagram in (2a) shows that a σ_c template is prefixed and the entire segmental melody is copied to the left of the base. The diagram in (2b) is the result of the left-to-right mapping.



Two points need to be emphasized. First, *t* alone saturates the onset of σ_c , given the definition of core syllables. Second, copying selects only the segmental information. The empirical effect is that a single template not only derives the base-dependent melody but also functions to eliminate the non-initial onset consonant *r* in the reduplicant.

1.2. Exhaustive Copy. In direct contrast with prosodic templates, parameters of weight and syllabic markedness constitute an important component of the formal machinery required by Exhaustive Copy. These parameters serve as instructions which are executed by satisfaction procedures. An illustration of parameters and satisfaction procedures is shown below:

(3) **Exhaustive Copy** [Steriade 1988]

a. **Weight Parameters:**

- whether copy is monosyllabic or polysyllabic
- if monosyllabic, whether light or heavy

b. **Parameters of syllabic markedness:**

- are complex onsets permissible

...

c. **Satisfaction Procedures:**

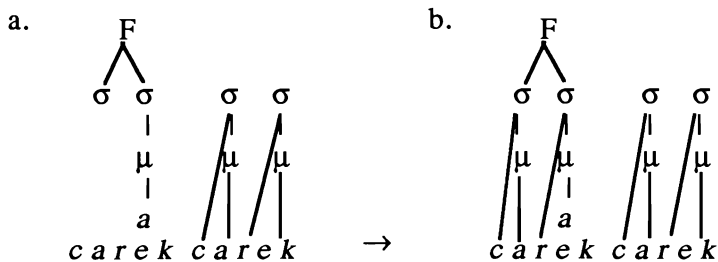
- monosyllabic template: eliminate all but the first/last syllable
- no complex onsets: eliminate all but initial segment in onset

Note that weight parameters are defined in terms of prosodic constituents such as syllables. Consequently, for a weight parameter to be executed by satisfaction procedures, there must be prosodic constituents in the copied base.

1.3. Base-independent melody. An important fact about base-independent melody is that it appears at a specific prosodic position of the reduplicant. If prespecification is invoked as the mechanism, a template with prosodic structures is needed. If insertion is invoked, there must be prosodic constituency to define the locus of insertion. Under Selective Copy, reduplicative templates possess prosodic structures; therefore, prelinking to or insertion into a prosodic template are possible from a theoretical point of view. But with Exhaustive Copy, there is one and only one option; insertion must be defined by the prosodic constituency of the copied base.

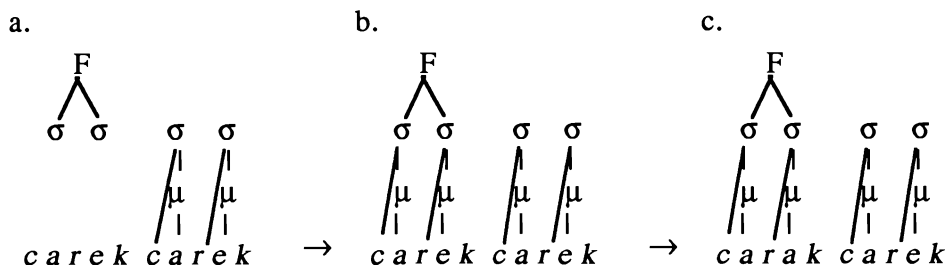
As an illustration, let's consider how these two models treat the base-independent vowel *a* in *cara-carek* 'pop a little' in Kikuyu. One option with Selective Copy is to posit a template with a prelinked *a*, as shown in (6a). Left-to-right mapping stops when the template is saturated by *car* together with the prelinked melody, as shown in (6b):

(6) Prespecification



A second option with Selective Copy is through insertion. The locus of insertion can be defined as the nucleus position of the second syllable in the template. The diagram in (7c) shows the effect of the insertion:

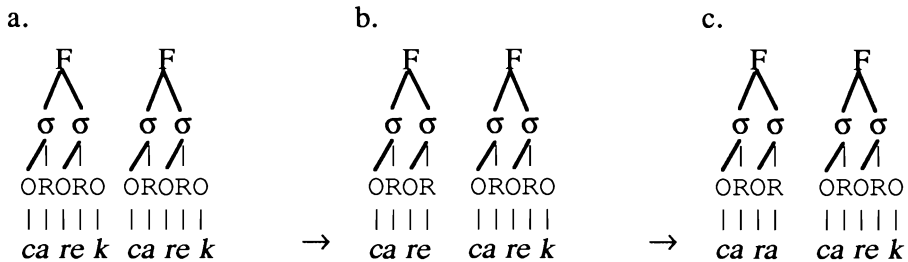
(7) Insertion



Note that insertion into a template is possible because templates come with prosodic constituency under Selective Copy.

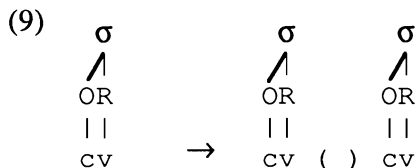
But prespecification is not possible with Exhaustive Copy. Insertion into a template is impossible as well because weight parameters are not templates with prosodic structures. However, as Steriade [1988] has argued, insertion can be defined by the prosodic constituency of the *copied base*. In this case, *a* insertion can be stated as “insert *a* into the nucleus position of the second syllable in the copied base”. In (8a) we see a full copy of the base. Diagram (8b) shows the result of executing a disyllabic foot parameter. Insertion into the copied base is illustrated in (8c).

(8) Insertion into the copied base



It must be pointed out here that templates supply the prosodic structure in (6) and (7), but the base supplies the prosodic structure in (8).

The templatic vs. parametric difference matters in a language where the base is smaller in weight than the reduplicant. Imagine a language which possesses a foot-sized reduplication that is derived from a CV syllable (CVCa-CV). Further, *a* is base-independent. Under Selective Copy, this *a* can be derived via prespecification (6) or insertion into a template (7). However, insertion into the copied base is the only option with Exhaustive Copy. By being smaller than a foot, the copied base lacks the exact prosodic structure needed to define the locus of insertion as shown by the parentheses:



An exhaustive copy of a CV syllable yields only another CV syllable. If the base-independent melody must be defined on the basis of the copied base, then there is

no prosodic structure upon which the insertion can be defined. I argue that Swati reduplication presents such an instance of reduplication. Consequently, it provides evidence against Exhaustive Copy.

2. For Selective Copy

Two crucial properties of Selective Copy are its prosodic templates and selective copying apparatus. These properties provide an appealing account of Swati reduplication. In particular, it is argued that (i) the Swati reduplicative affix manipulates a foot-sized template and (ii) the base-independent *a* is to be treated on a par with archetypical cases of “prespecification”. Evidence for (i) stems from the C and CVC roots which inevitably surface with a foot reduplicant. With regard to (ii) independent evidence in Swati demonstrates that *l* is the default segment, not *a*. Further evidence for (ii) comes from the base-independent *a* in diminutive reduplication of Kikuyu.

Kikuyu reduplication is important as a comparison with Swati. Like Swati, Kikuyu manipulates a foot-sized reduplicant as a marker of diminutives. Moreover, the base-independent melody *a* is present in both languages. Kikuyu *a* is in every respect a typical case of “prespecification” in that it overrides any existing melody in the base. This fact, together with evidence for a default *i* in Swati, supports an unified account of the Kikuyu and Swati base-independent melodies, namely, via insertion. I discuss Swati reduplication in §2.1 before moving on to an analysis of Kikuyu reduplication in §2.2. Section 2.3 establishes insertion as the mechanism of stating base-independent melody to the exclusion of prespecification.

2.1. Swati reduplication.⁶ One significant aspect of diminutive reduplication concerns the base-independent vowel *a* in Swati. In particular, we will see that this vowel surfaces only where the base fails to supply sufficient melody, and it is not limited to a given position in the reduplicant. These two properties of Swati *a* are directly opposed to Kikuyu *a* considered in §2.2. First, Kikuyu *a* is present whether the base can or cannot provide the required melody. Second, Kikuyu *a* is constrained to a specific location of the template. These differences might suggest that Swati *a* is a default vowel while Kikuyu *a* is an instance of “prespecification” in the sense of McCarthy and Prince [1986] and Steriade [1988]. In §2.1.2, I provide an independent argument against a default *a* in Swati. The analysis of the Swati reduplication is presented in §2.1.1.

⁶ Swati reduplication data are taken from Ziervogel and Mabuza [1976]. I follow their orthographic system in this paper. Note that all sequences of adjacent consonants are to be treated as a single segment.

2.1.1. Analysis. First, consider how CVCVC verbs reduplicate in Swati. As shown in (10), the leftmost CVCV sequence is copied and prefixed to the base:⁷

(10) CVCVC Verbs: CVCVC → CVCV-CVCVC

- | | | | | | |
|----|---------------|------------|---|---------------------|---------------------|
| a. | <i>lingis</i> | ‘resemble’ | → | <i>lingi-lingis</i> | ‘resemble a little’ |
| b. | <i>khulum</i> | ‘talk’ | → | <i>khulu-khulum</i> | ‘talk a little’ |

Note that no base-independent melody is present in the reduplicative affixes of (10). Examination of CVC verbs shows a somewhat distinct pattern in (11). In particular, the reduplicant surfaces with a full copy of the base together with the base-independent vowel *a*.

(11) CVC Verbs: CVC → CVCa-CVC

- | | | | | | |
|----|-------------|--------|---|-------------------|-----------------|
| a. | <i>gob</i> | ‘bend’ | → | <i>goba-gob</i> | ‘bend a little’ |
| b. | <i>dlal</i> | ‘play’ | → | <i>dlala-dlal</i> | ‘play a little’ |

This same *a* is observed in VC verbs as well. What distinguishes CVC from VC roots is the presence of *y* in the latter.

(12) VC Verbs: VC → VCa-yVC

- | | | | | | |
|----|------------|---------|---|------------------|------------------|
| a. | <i>os</i> | ‘roast’ | → | <i>osa-yos</i> | ‘roast a little’ |
| b. | <i>ent</i> | ‘do’ | → | <i>enta-yent</i> | ‘do a little’ |

A further property of *a* is revealed by C verbs in (13) where *a* appears right after the root consonant in the first syllable of the reduplicative affix. In addition, *yi* is filled in to make up the second syllable:

(13) C Verbs: C → Cayi-C

- | | | | | | |
|----|-----------|--------|---|-----------------|-----------------|
| a. | <i>n</i> | ‘rain’ | → | <i>nayi-n</i> | ‘rain a little’ |
| b. | <i>dl</i> | ‘eat’ | → | <i>dlayi-dl</i> | ‘eat a little’ |

⁷Reduplication data presented in (10) through (13) involve C, VC, CVC, CVCVC roots. According to Ziervogel and Mabuza [1976], CV and CVCV roots are not attested in Swati. VCVC roots are attested. However, the initial vowel of VCVC roots is “latent”; that is, it is not present at the time when reduplication takes place. Thus, VCVC roots behave in all respects like CVC roots.

To summarize, *a* is filled in only when the base fails to supply sufficient segmental melody: *lingi-lingis* vs. *goba-gob* or *osa-yos*, and *a* is not fixed to any specific location in the reduplicant: *goba-gob* or *osa-yos* vs. *nayi-n*.

Apart from the base-independent *a*, a recurring pattern of the reduplicative affix from (10) to (13) is that it is invariantly disyllabic. This shape-invariant property of Swati reduplication is quite robust, because three additional segments can be epenthesized to meet the disyllabic requirement. I take this to indicate that Swati diminutive reduplication manipulates a disyllabic template. Further evidence for disyllabicity will be shown in §2.1.2.

One additional aspect of Swati reduplication that calls for explanation is the presence of *y* in both (12) and (13). I argue below that *y* epenthesis is conditioned by a phonotactic constraint banning vowel clusters in Swati. Evidence for this constraint comes from vowel elision present in both compounding and *-ana* suffixation. In verb-noun compounding, we see the elision of the second vowel when a vowel-final verb is combined with a vowel-initial noun, as shown in (14):

(14) Verb-Noun Compounding

- | | | | | | | |
|----|----------------|---|-----------------|---|--------------------------|---------|
| a. | <i>cosha</i> | + | <i>indvodza</i> | → | <i>ema-cosha-ndvodza</i> | ‘ashes’ |
| b. | <i>phandza</i> | + | <i>ematala</i> | → | <i>im-phandza-matala</i> | ‘fowl’ |

With regard to *-ana*, a diminutive suffix of nouns, we see the deletion of the first vowel when *-ana* is suffixed to a noun that ends with a vowel:

(15) *-ana* Suffixation

- | | | | | |
|----|----------------|-------------|-------------------|-------------|
| a. | <i>lilawu</i> | <i>-ana</i> | <i>lilaw-ana</i> | ‘boys’ hut’ |
| b. | <i>ligwayi</i> | <i>-ana</i> | <i>ligway-ana</i> | ‘tobacco’ |

Taking (14) and (15) together, we see that two points are evident. First, Swati does not tolerate vowel clusters. Second, *a* remains after vowel elision in cases where two vowels come in contact, one of which is *a*.⁸

These facts suggest one plausible explanation for *y* epenthesis. In (12) and (13), vowel clusters made up of *a* and some other vowel would result without *y* epenthesis. According to (14) and (15) vowel elision would be a natural means to resolve vowel clusters. However, deletion is not desirable for reduplication. In the case of *VCa-VC* in (12), to delete the second vowel would result in *VCa-C*. Even though this representation does not violate the disyllabic constraint on the reduplicant, its surface result would not be distinguishable from a simple *C*

⁸Russell Schuh [p.c.] suggests that the Sonority Hierarchy can explain why *a* surfaces in vowel deletion. More sonorous than any other vowel, *a* is expected to be preserved in vowel deletion. Further investigation of Swati indicates that the data are consistent with this observation.

reduplication in (13). With regard to *Cayi-C* in (13), the elision of the second vowel would render the reduplicative prefix smaller than the required disyllabic foot. Thus *y* is called for in reduplication to resolve a constraint violation that cannot be handled by elision.

A preliminary account of Swati reduplication is provided on the basis of Selective Copy in (16):

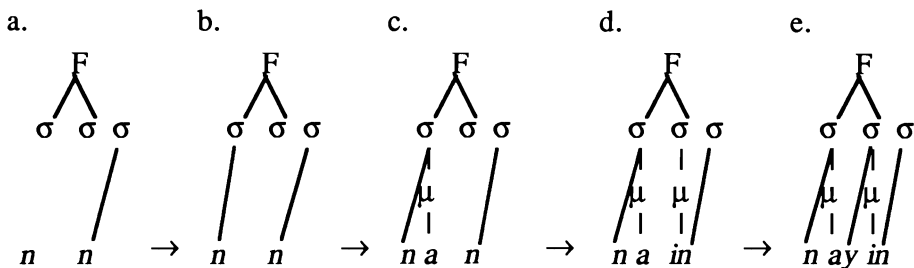
- (16) a. Prefix a disyllabic template.
- b. Copy the base melody.
- c. Map the base melody from left to right.
- d. Insert *a* in an empty position of the template from left to right.
- e. Insert *i* in an empty position of the template.
- f. Insert *y* between two adjacent vowels.
- g. Erase stray segments.

Of importance here is that *a* insertion is conditioned by an unfilled template. This is possible because a given prosodic template licenses a particular sequence of segmental melody.

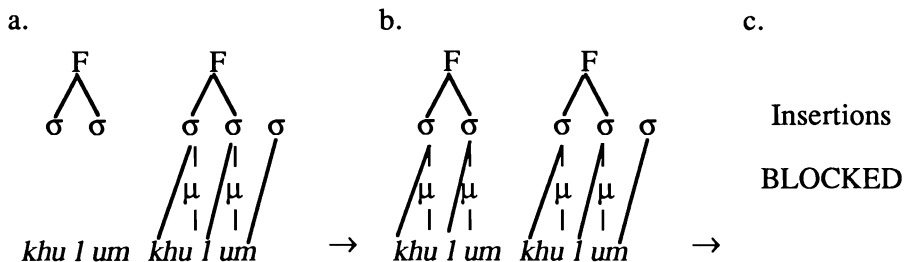
A yet unmotivated aspect of (16) is that *a*, *i*, and *y* are all stated through insertion. As §2.1.2 will show, there is a default segment in Swati, represented as [+high, -low, -back]. This default segment, which I represent as *I*, has two surface realizations. *I* shows up as *i* when functioning as the syllable nucleus. *I* appears as *y* when it serves as the onset. As suggested by Russell Schuh [p.c.], one appealing consequence of deriving both *i* and *y* from *I* (that is, [+high, -low, -back]) is that it explains why *y* appears as the onset, rather than *w* or glottal stop.

This proposal has two implications for (16). First, *i* and *y* insertions need not be stated as a rule. Their appearances can be viewed as an automatic consequence of filling in [+high, -low, -back] that is left unspecified in underlying representation. Second, *a* ought to be expressed via either insertion or prespecification. For the moment, I assume insertion to be the mechanism for deriving *a*, *i*, and *y* in the reduplicant.

Consider now a step-by-step derivation of a C verb. In (17a) a foot template is prefixed, together with a copy of the base. Mapping in (17b) scans leftwards and incorporates the only base consonant into the template. Diagrams (17c) and (17d) show the result of *a* and *i* insertion. Since *a* and *i* create a vowel sequence, *y* is epenthesized in (17e):

(17) *nayi-n* “rain a little”

In contrast with (17), consider another derivation of a CVCVC verb. We see in (18b) that the initial CVCV sequence is mapped into the foot template. Rules (16d) through (16f) are either blocked because the template is already saturated or inapplicable when there is no conditioning environment for *y* epenthesis. Since no coda consonant is allowed in a syllable, *m* is erased through (16g).

(18) *khulu-khulum* ‘talk a little’

This account of the base-independent melodies relies on an important component of Selective Copy: prosodic templates. By definition, a template is a prosodic architecture unspecified for segmental melodies. This makes it possible to refer to an unspecified prosodic position in the template. As demonstrated by the contrast between CVCVC and CVC/CVC roots, access to an unfilled prosodic position is crucial in defining the locus of insertion.

2.1.2. For the default *I*. The above examination of Swati reduplication has identified two properties of the base-independent *a*. First, its appearance is conditioned by an unfilled template. Second, it is not restricted to a single position in the reduplicant. Donca Steriade [p.c.] suggests that these two attributes may lead to the conclusion that *a* is a default vowel in that it is devoid of featural content in underlying representation and its features are filled in via

redundancy rules. It turns out, however, that Swati passive conjugations suggest that *I* is the default segment, not *a*. Crucially, *I* must function as the syllable nucleus, thus appearing as *i* in passive conjugations.

Formation of *simple passive* takes one of the two suffixes *w* and *iw*. I argue that *w* is the underlying form and *i* surfaces only when the passive verb is less than two syllables. Motivation for a disyllabic constraint on passive formation comes also from *passive perfect* conjugations in Swati. Two results will emerge from this discussion. First, *I* is the default segment, surfacing as *i* in passive formations. Second, the disyllabic constraint imposed on reduplicative affixes is evidenced independently in passive formation.

Simple passive can be formed by attaching either one of the two suffixes: *w* and *iw*. When the passive suffix is attached to a CVC or longer root, only *w* is added, appearing between the root and the final vowel (FV).

(19)	<u>Root</u>	<u>Root + FV</u>	<u>Simp. Pass.</u>	<u>Gloss</u>
a.	<i>val</i>	<i>val-a</i>	<i>val-<u>w</u>-a</i>	'close'
b.	<i>esus</i>	<i>esus-a</i>	<i>esus-<u>w</u>-a</i>	'take away'
c.	<i>jikijel</i>	<i>jikijel-a</i>	<i>jikijel-<u>w</u>-a</i>	'throw'

Note in (19) that surface forms of simple passive are always two or more syllables.

In contrast, a verb consisting of a single consonant is passivized by suffixing not *w* but *iw*, as shown below:

(20)	<u>Root</u>	<u>Root + FV</u>	<u>Simp. Pass.</u>	<u>Gloss</u>
a.	<i>dl</i>	<i>dl-a</i>	<i>dl-<u>iw</u>-a</i>	'eat'
b.	<i>ph</i>	<i>ph-a</i>	<i>ph-<u>iw</u>-a</i>	'give'

I argue that this variant *iw* is derived from an underlying *w*; *i* is filled in when a simple passive verb is less than disyllabic. This sensitivity to disyllabicity is not only present in the formation of simple passive but also perfect passive.

First, consider how perfect verbs are conjugated. A CVC or longer root can take either a long perfect suffix *ile* or a short perfect suffix *e*.

(21)	<u>Root</u>	<u>Long Perf.</u>	<u>Short Perf.</u>	<u>Gloss</u>
a.	<i>lahl</i>	<i>lahl-<u>ile</u></i>	<i>lahl-<u>e</u></i>	'throw away'
b.	<i>lahlek</i>	<i>lahlek-<u>ile</u></i>	<i>lahlek-<u>e</u></i>	'lose'

Similarly, a C verb can take a long perfect or a short perfect suffix:

(22)	<u>Root</u>	<u>Long Perf.</u>	<u>Short Perf.</u>	<u>Gloss</u>
a.	<i>dl</i>	<i>dl-<u>ile</u></i>	<i>dl-<u>e</u></i>	'eat'
b.	<i>ph</i>	<i>ph-<u>ile</u></i>	<i>ph-<u>e</u></i>	'give'

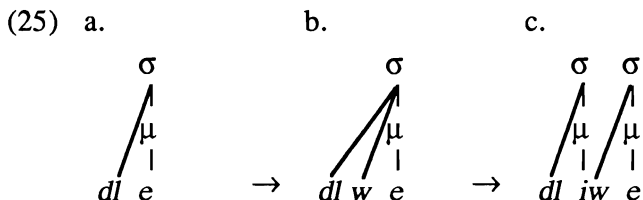
With CVC or longer roots, a long perfect can be rendered passive by substituting *w* for *l* in *ile* with *w*; a short perfect can be passivized by inserting *w* before the perfect suffix *e*:

(23)	<u>Root</u>	<u>Long Perf. Pass.</u>	<u>Short Perf. Pass.</u>	<u>Gloss</u>
a.	<i>lahl</i>	<i>lahl-<u>iwe</u></i>	<i>lahl-<u>w-e</u></i>	'throw away'
b.	<i>lahlek</i>	<i>lahlek-<u>iwe</u></i>	<i>lahlek-<u>w-e</u></i>	'lose'

But with respect to a C verb, Ziervogel and Mabuza [1976:83] note that it can have a long perfect passive, but not a short perfect passive.

(24)	<u>Root</u>	<u>Long Perf. Pass.</u>	<u>Short Perf. Pass.</u>	<u>Gloss</u>
a.	<i>dl</i>	<i>dl-<u>iwe</u></i>	* <i>dl-<u>w-e</u></i>	'eat'
b.	<i>ph</i>	<i>ph-<u>iwe</u></i>	* <i>ph-<u>w-e</u></i>	'give'

The explanation for the attested *lahl-w-e* versus the unattested **dl-w-e* lies in the disyllabic constraint on passive formations, regardless of whether it is a simple passive or perfect passive. With respect to a CVC or larger root, suffixing *w* alone produces a disyllabic form, *lahl-e* → *lahl-w-e*. Yet attaching *w* to a C verb is insufficient to create a disyllabic short perfect passive since *w* can be syllabified as the onset with *dl* (25b). Consequently, *l* is needed to maximize the base to meet the disyllabic requirement on passive formation. As shown in (25c), *l* can appear only as *i* in order to create a surface disyllabic form.



Note that as a result, the distinction between a long perfect passive and a short perfect passive is completely neutralized on the surface. This account provides a straightforward explanation for Ziervogel and Mabuza's [1976:83] observation regarding the absence of short perfect passives. Short perfect passives can be formed, but due to the disyllabic constraint, the form of the short perfect passive is rendered indistinguishable from the long perfect passive by the default insertion of *I*.

This unified account of simple and perfect passives hinges on two crucial points. First, *I* is the default segment, not *a*. Second, formations of passive, simple or perfect passive, must make reference to disyllabicity. Thus, the passive conjugations constitute independent evidence for positing a disyllabic reduplicative template and treating *I*, not *a*, as the default segment.

With *I* established as the default segment, we can simplify the analysis in (16). As shown in (26), *i* and *y* insertions need not be stated as a rule. Following Archangeli [1984], Archangeli and Pulleyblank [1989], and Abaglo and Archangeli [1989], a default segment is one that is not specified and its feature content is specified via redundancy rules.

- (26) a. Prefix a disyllabic template.
 b. Copy the base melody.
 c. Map the base melody from left to right.
 d. Insert *a* in an empty position of the template from left to right.
 f. Erase stray segments.

In Swati reduplication, *i* and *y* appear only when a template is not saturated. In the case of a CVCVC root, the disyllabic template can be satisfied with the copied base melody. With regard to a CVC or VC root, mapping of the base melody and *a* insertion fill up the template. Only a C root verb cannot meet the disyllabic constraint only with the base melody and *a*. Consequently, *i* and *y* surface only if the root possesses a single consonant.

What is Swati *a* if it is not a default melody? This is where Kikuyu base-independent melody becomes relevant. To be shown next, Kikuyu *a* reveals the major trait of "prespecification". As Kikuyu and Swati are related and both possess a disyllabic diminutive reduplication, it is natural to assume that Swati *a* is a case of "prespecification" on a par with Kikuyu *a*.

2.2. Kikuyu reduplication.⁹ Two important properties of Kikuyu diminutive reduplication will become evident from this section. First, there is independent

⁹ Reduplication data in Kikuyu come from Barlow [1960], Sharp [1960], and Benson [1964]. My consultations with Peter Mwangi, a native speaker of Kikuyu, confirm the data discussed in this paper.

evidence from verb and noun morphology that motivates a disyllabic template. In addition, Kikuyu base-independent *a* is a typical case of “prespecification”. In this section, I assume that Kikuyu *a* is inserted, postponing my motivation for insertion and against prespecification to §2.3.

Consider the following examples of reduplication from Kikuyu. In (27-28), we observe a copy of either an initial CVC or VC sequence from the base. However, in both cases, the base-independent vowel *a* emerges together with (C)VC sequences as part of the reduplicant.

(27) CVC... → CVC*a*-CVC...

a.	CVC	<i>rɔr</i>	‘see’	<u><i>rɔra</i></u> - <i>rɔr</i>	‘see a little’
b.	CVCVC	<i>carek</i>	‘pop’	<u><i>cara</i></u> - <i>carek</i>	‘pop a little’
c.	CVCVCVC	<i>hoŋgotok</i>	‘wander’	<u><i>hoŋga</i></u> - <i>hoŋgotok</i>	‘wander a little’

(28) VC... → VC*a*-VC...

a.	VC	<i>aⁿd</i>	‘set aside’	<u><i>aⁿda</i></u> - <i>aⁿd</i>	‘set aside a little’
b.	VCVC	<i>iθor</i>	‘yield’	<u><i>iθa</i></u> - <i>iθor</i>	‘yield a little’
c.	VCVCVC	<i>aθimor</i>	‘sneeze’	<u><i>aθa</i></u> - <i>aθimor</i>	‘sneeze a little’

With regard to the base-independent *a*, it is evident from the contrast between (27a) and (27b, c) and between (28a) and (28b, c) that *a* can surface in a vacant position or override a corresponding segment in the base. Moreover, *a* consistently appears as the second syllable nucleus of the reduplicant.

An analysis of Kikuyu reduplication based on Selective Copy is presented in (29).

- (29) a. Prefix a disyllabic template.
 b. Copy the base melody.
 c. Map the base melody from left to right.
 d. Insert *a* into the second syllable of the template.
 e. Erase stray segments.

Note that a disyllabic template is posited for Kikuyu. Notice also that *a* insertion makes reference to the prosodic constituent of the disyllabic template. Two derivations illustrate the analysis in (29).

Consider the derivation in (30) first. Diagram (30a) shows that a foot-sized template and a copy of base melody have been attached to the left of the base. Diagram (30b) presents the result of mapping, which associates the first four

(32) Reduplication of Monosyllabic Verbs

a.	<i>he</i>	‘give’	<u><i>hεε.a-hεε.a</i></u>	‘give a little’
	<i>ne</i>	‘hand over’	<u><i>nεε.a-nεε.a</i></u>	‘hand over a little’
	<i>tε</i>	‘discard’	<u><i>tεε.a-tεε.a</i></u>	‘discard’
b.	<i>rea</i>	‘eat’	<u><i>ree.a-ree.a</i></u>	‘eat a little’
	<i>hoa</i>	‘dry up’	<u><i>hoo.a-hoo.a</i></u>	‘dry up a little’
	<i>kua</i>	‘die’	<u><i>kuu.a-kuu.a</i></u>	‘die a little’

A detailed analysis of (32) is beyond the scope of the paper, but see Peng [1990] for such an analysis.

This account of reduplication calls for two important mechanisms: (i) a disyllabic template and (ii) *a* insertion. Evidence from monosyllabic verbs shows that Kikuyu diminutive reduplication manipulates a disyllabic template. Furthermore, the data reveal two properties of the base-independent *a*: (i) *a* appears in any position, empty or occupied, and (ii) *a* is limited to the second syllable of the template. These two properties together establish Kikuyu *a* as a case of “prespecification”.

As pointed out earlier, Kikuyu and Swati are related in that both are Bantu languages. Moreover, their patterns of reduplication are similar in that (i) they both require a foot-sized template and (ii) they both fulfill the diminutive function. As shown in §2.1.2, the default segment is *I*, not *a* in Swati. As Kikuyu *a* behaves in every respect as a “prespecified” vowel, I conclude that Swati *a* is a case of “prespecification”.

Once the base independent *a* has been established as a “prespecified” vowel, the question to be addressed next is whether or not it can be formally expressed as prelinking to a template. I argue for insertion and against prespecification in the following section.

2.3. Against prespecification. Under Selective Copy, two logically plausible mechanisms are available for formalizing the base-independent melody: (i) insertion and (ii) prespecification. I have assumed insertion in my analyses of Kikuyu and Swati *a*’s. It is therefore important to determine whether or not prespecification can be invoked to explain the presence of the base-independent segment since my argument against Exhaustive Copy hinges on inserting *a*. I argue below that Swati base-independent segment defies a prespecification account. Moreover, evidence from other languages suggests that prespecification is ineffective as a means of expressing the base-independent phenomenon in reduplication [McCarthy and Prince 1986, 1988]. Furthermore, insertion has

been shown to be independently required in other phonological processes [Steriade 1988].

It should be emphasized that my arguments against Exhaustive Copy do not hinge on whether there is compelling evidence against prespecification in Kikuyu. Swati *a*-insertion alone constitutes the crux of the argument against Exhaustive Copy. In the preceding section, the data from passive formations exclude the possibility of treating *a* as a default vowel. This section further eliminates prespecification as the mechanism for deriving the base-independent segment.

Reduplication data from Swati in (33) are of importance to the argument against prespecification. As marked by the down arrow, the base-independent vowel *a* shifts in location in the reduplicant:

(33) CVC/VC vs. C Roots

↓		↓	
a. <u>goba</u> -gob	‘bend a little’	vs.	<u>nayi</u> -n ‘rain a little’
↓		↓	
b. <u>osa</u> -yos	‘roast a little’	vs.	<u>dlayi</u> -dl ‘eat a little’

Recall that *a* does not appear when the base can supply sufficient melody, as in linqi-lingis ‘resemble a little’.

This behavior of the base-independent segment provides a compelling argument against prespecification. If prelinking were invoked, we would be forced to posit three templates: one with *a* prespecified to the second syllable for CVC or VC roots and another one with *a* prelinked to the first syllable for C roots. In addition, to explain the reduplication of CVCVC roots requires yet a third template with no prelinked melody. There are two problems with such an analysis. First, it complicates the analysis of Swati reduplication. Moreover, positing three templates loses the generalization that diminutive reduplication is a single morphological process.

Further consideration of base-independent phenomena from other languages argues against prespecification. McCarthy and Prince [1986] discusses a number of cases of reduplication involving base-independent melody. One case is Kolami word reduplication which shows the base-independent melodies *gʔgii*:

(34) Kolami Word Reduplication

a. <i>pal</i>	<i>pal-gil</i>	‘tooth’
b. <i>iir</i>	<i>iir-giir</i>	‘water’
c. <i>kota</i>	<i>kota-gita</i>	‘bring it’
d. <i>maasur</i>	<i>maasur-giisur</i>	‘men’

Prespecification is impossible for Kolami reduplication. In order for a base-independent melody to be prespecified, the template must be able to specify its internal prosodic structure, to which a base-independent melody is prelinked. But words differ in their sizes and internal prosodic constituencies. Thus, there is a suprasegmental structure corresponding to each word. A phonological word template cannot spell out the prosodic units for each word without being infinitely long. Consequently, prespecification is not an option.

In addition to evidence against prespecification, there is independent evidence for insertion adopted here. Citing the treatment of ablaut in the English strong verbs, Steriade [1988] points out that the analysis of *sing vs. sang* provided by Halle and Mohanan [1985] requires the insertion of [+low] into the matrix of the root vowel. Such insertions, she claims, are formally identical to the insertion of base-independent melody adopted here.

Evident from this discussion, prespecification is inadequate to explain base-independent melodies in reduplication. Swati *a* is of particular significance in that it cannot be formalized without unnecessary proliferation of templates. This result further suggests that *a* insertion is motivated in Swati.

To summarize, this analysis of Swati reduplication supports prosodic templates advocated by Selective Copy. In particular, the base-independent melody must make reference to a segmentally unspecified template in order to distinguish CVCVC from ones that cannot supply sufficient melodies. By definition, a template is an “unfurnished building”; thus it allows a straightforward definition of *a* insertion.

Motivation propelling an insertion treatment takes two steps. First, as evidenced by simple and perfect passive formations, *I* is filled in as a default segment, excluding *a* in that capacity in Swati. Kikuyu *a* further establishes Swati *a* as an instance of base-independent melody. Second, once it is shown that *a* is a base-independent vowel, Selective Copy in principle allows two options: (i) insertion and (ii) prespecification. Data from Swati and further consideration of base-independent facts favor an insertion analysis.

3. Against Exhaustive Copy

A crucial property of Swati base-independent *a* is that its appearance is conditioned by a segmentally insufficient base. But significantly, such a base is deficient in another way, viz. its prosodic constituency is not sufficient. Under Exhaustive Copy, insertion *must access an existing prosodic structure of the copied base*; yet, this structure is not present in an insufficient base. Section 3.1 addresses this point in detail. Section 3.2 attempts to salvage Exhaustive Copy by retaining its basic premises while incorporating an additional assumption. Section 3.3 further considers whether or not a parameter can generate prosodic units which a base fails to supply. The conclusion is that Exhaustive Copy fails to provide a principled mechanism to express the base-independent melody in Swati.

3.1. Exhaustive Copy. Two properties that differentiate Exhaustive Copy and Selective Copy are (i) parameters of weight and syllabic markedness and (ii) exhaustive copying. As pointed out in §1.2, parameters are stated in terms of prosodic units, which function as instructions governing how matching procedures are executed. This characteristic of Exhaustive Copy drives a specific copying mechanism. It must copy the segmental melody and prosodic constituency of the base. A matching procedure like, "Eliminate all but the first syllable," cannot be carried out unless the base identifies the syllable boundaries.

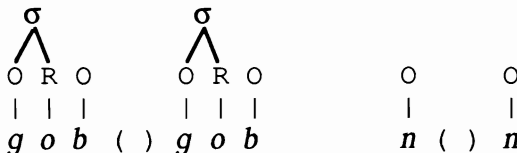
A further consequence of this model is that base-independent melodies must be inserted. Moreover, insertion must refer to an existing prosodic constituency. Steriade [1988:78] explains:

Prespecified reduplication results from the insertion of segments or features into the copied base. The locus of insertion is an existing syllable ... Unlike the segments affixed by concatenation, the segments introduced by insertion cannot generate a new syllable. They must find their place in an existing syllable.

Under Exhaustive Copy, insertion into an existing structure is not just a logical option, but a necessity driven by parameters devoid of prosodic constituency. A further point bears repeating here as well. Steriade claims that insertion cannot produce new prosodic structures. Two consequences follow from this statement: (i) a copied base must possess the structure for defining insertion or (ii) parameters must be able to create prosodic structures which a base cannot supply.

This reliance upon (i) (that is, the prosodic constituency of the copied base) is problematic. Consider the results of exhaustive copying for CVC and C roots in (35). My notation follows that of Steriade [1988], who assumes that syllables are composed of onsets (O) and rhymes (R). The location of *a* insertion is highlighted with parentheses.

(35) a. goba-gob 'bend a little' b. navi-n 'rain a little'

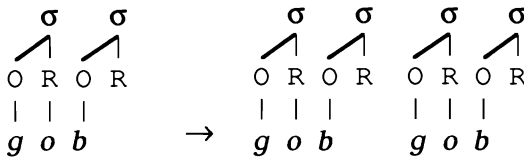


It should be apparent that an insufficient base lacks certain prosodic structures as well as melodic content. Regarding CVC roots, this entails that no syllable can be constructed on *b* alone. Roots containing a single consonant exacerbate this problem; they are devoid of syllabic structures entirely. In order to define *a* insertion, reference to syllabic units is critical. Yet it is exactly in those which

lack prosodic constituency that access to such units is essential. This paradox is a logical consequence of a model which relies on parameters. It cannot be resolved unless melodyless prosodic structures are posited in the base. This option is considered in the next section.

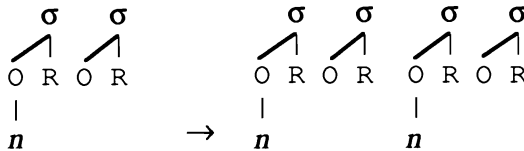
3.2. An alternative. It is noted that *a* insertion requires reference to the base prosodic units. But these units are not available in roots with insufficient melodies. One logical possibility is to augment the base with prosodic structures that are left unspecified for featural matrices, as shown for a CVC base:

(36) *goba-gob* ‘bend a little’



A base with a single consonant then requires the representation in (37):

(37) *nayi-n* ‘rain a little’



Even though such representations as (36) and (37) make it possible to state insertion, they are problematic. Proliferation of unfilled prosodic structures is highly unconstrained; there is no principle determining whether a specific base should or should not posit empty prosodic constituency. Furthermore, these segmentally unspecified prosodic structures are a stipulation. Their existence should predict that Swati morphology and/or phonology can and do make reference to or use of these prosodic units. Yet there is no evidence besides reduplication that suggests that these prosodic units are necessary.

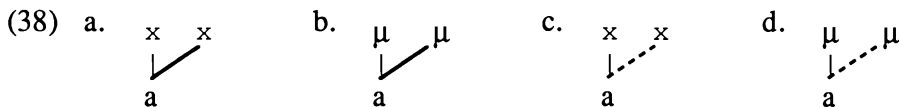
3.3. Summary. This discussion points to a fundamental flaw inherent in a model of reduplication that relies on reducing excessive materials to derive shape-invariance. An important flip side of reduction is base expansion, a point not elaborated in Steriade [1988]. This problem is pointed out by Mutaka and

Hyman [1990] in their analysis of Kinande reduplication, which requires a foot-sized reduplicant from a monosyllabic stem.

Steriade [1988:82] does mention certain instances of base expansion. One such case is Mokilese where the reduplicative affix requires a heavy monosyllable. In the case of a light syllable word, Steriade explains,

When the stem is monosyllabic and light (e.g. *pa* 'weave'), it is lengthened: *paa-pa*. The same lengthening procedure is used in polysyllabic stems like *di.ar* 'find', where the first and second syllables stand in hiatus: *dii-di.ar*.

But what is not spelled out is how lengthening takes place. Under a skeletal or moraic approach, vowel length is represented as either (38a) or (38b). Thus, lengthening usually results from mapping vocalic features into a skeletal or moraic position, as shown in (38c) or (38d):



With regard to *pa*, the copied base does not supply the second skeletal or moraic position for lengthening. This problem is a parallel case to Swati *a*. A question for Exhaustive Copy is what mechanism is responsible for creating an extra position. There are two options. First, a lengthened vowel projects an extra skeletal or moraic position *independently* of weight parameters. This option is problematic; it cannot explain why not every vowel projects such a position.

The other option is that weight parameters can insert prosodic structures. Unless a specific weight parameter is satisfied, it can generate prosodic units for such operations as lengthening and insertion. Even though a logical possibility, it must be considered in relation to the definition of parameters. Recall that a critical property that marks Exhaustive Copy as a competing model of reduplication rather than a notational variant is that it ascribes a central role to parameters. By definition, parameters are not templates; they are distinct in that they do not possess prosodic structures, even though they are stated in terms of prosodic units. Allowing parameters to create prosodic constituency essentially removes this distinction between parameters and templates. How can parameters which insert prosodic constituency be distinguished from templates which come with it?

The conclusion emerging from this discussion is clear. Exhaustive Copy cannot offer an internally consistent analysis of *a* insertion in Swati and base expansion cases in general. As demonstrated in §3.2, Exhaustive Copy must stipulate empty prosodic structure to account for the insertion of Swati *a*. Or it must allow weight parameters to create prosodic constituency, which renders parameters a notational variant of templates.

4. Conclusion

This paper addresses the central question of deriving shape-invariance in two competing models of reduplication: Selective Copy and Exhaustive Copy. A central difference is shown to be templates vs. parameters. Contingent on this opposition are two additional distinctions in copying and insertion. These distinctions are examined against Swati diminutive reduplication, which reveals the base-independent melody *a*. Crucially, *a* insertion requires access to segmentally unspecified prosodic units. Under Selective Copy, templates provide exactly the right structures for defining insertion. In contrast, there is no internally consistent mechanism to express *a* insertion within Exhaustive Copy.

In addition to reduplication, the templatic vs. parametric difference has further repercussions for other types of morphological phenomena. Specifically, two types of cases are in support of the templatic approach and against the parametric approach. One type of case involves base expansion, exemplified in Arabic Broken Plurals [McCarthy and Prince 1990] and Japanese hypocoristics [Ishihara 1990]. The other type of case concerns the Semitic and Yawelmani roots [McCarthy 1979, 1981; Hammond 1988; McCarthy and Prince 1990; Archangeli 1983, 1991]. A critical property of this second type is that they require the separation of melody from the prosodic constituency.

All these cases including the base-independent phenomena in reduplication point to a need for prosodic structures which are not filled with segmental material—a critical property of templates. Exhaustive Copy, with its reliance on parameters, is inadequate in this regard.

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