

# Reduplication as Morphological Doubling

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**Abstract:** The Correspondence Theory of reduplication (McCarthy & Prince 1995; henceforth BR Correspondence Theory) emerges from the assumption that the preservation of phonological identity between reduplicant and base constitutes the core problem of reduplication, motivated in particular by the unexpected overapplication and underapplication of alternations in reduplicative contexts (Wilbur 1973). However, phonological identity between the two copies in a reduplication construction is just one facet of a wide range of effects that comprise reduplication. This paper shows that the problem of reduplication looks very different when the focus is shifted away from the relatively small number of cases of phonological overapplication and underapplication to the larger class of cases where base and reduplicant diverge phonologically. We present evidence that demonstrates that the driving force in reduplication is identity at the morphosyntactic, not phonological level, and outline a theory of reduplication as morphological doubling that derives the full range of reduplication patterns.

## 1 INTRODUCTION

Previous approaches to reduplication have been phonological in character, treating reduplication as phonological copying of or correspondence to a “base” string (e.g. Wilbur 1973, Marantz 1982, Clements 1985, Kiparsky 1986, Mester 1986, Steriade 1988, McCarthy & Prince 1995). Phonological theories of reduplication make two essential assumptions. The first is that a reduplicant — RED — is a morpheme. The second is that its phonological content is derived from that of the base. The Correspondence Theory of reduplication makes a third assumption, which is that correspondence constraints not only generate the reduplicant from the base but also enforce a surface correspondence between the base and the reduplicant (BASE-REDUPLICANT, or BR, correspondence) (McCarthy & Prince 1995).

In this paper we sketch and defend a radically different approach, Morphological Doubling Theory.\* In this model, reduplication is purely morphological, and not the result of phonological copying. Reduplication is the situation in which a construction calls twice for the same morphosyntactic unit. What the construction doubles is not a phonological string per se, but rather a morphosyntactic feature bundle. Under this view, the reduplicant is not a morpheme; in fact, there is no intrinsic asymmetry between reduplicant and base, nor is there any phonological correspondence relation between them. For this reason we often refer to the constituents commonly known as RED and BASE as the two copies in the reduplication construction, terminology which is both more theory-neutral and also more reflective of our approach to reduplication. Morphological Doubling Theory is more descriptively adequate and at the same time more constrained in its predictions than existing phonological approaches. In this paper we compare Morphological Doubling Theory explicitly to BR Correspondence Theory (McCarthy & Prince 1995).

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## 2 THE NEED FOR A MORPHOLOGICAL THEORY OF REDUPLICATION

In phonological theories of reduplication, the essential relationship between reduplicant and base is one of phonological identity (although strict identity is sometimes obscured by phonological alternations). This paper presents cases which show that the primary relationship is instead one of morphosyntactic identity. When phonological identity occurs, it follows as a side effect of morphosyntactic identity; in some cases, it does not occur at all.

In Morphological Doubling Theory, reduplicant and base are related to one another in exactly one way: they are required to be in perfect morphosyntactic agreement. Evidence that this, rather than strictly phonological agreement, is the driving principle comes from cases in which the two copies in a reduplication construction diverge morphotactically or phonologically or both. Morphotactic divergence is the situation where the two copies clearly have distinct morphological composition, e.g. by containing different suppletive allomorphs of the same morpheme or by containing intersecting sets of morphemes. In this section we present snapshots of two such examples. In both, the two copies in the reduplication construction are identical only at the morphosyntactic level.

### 2.1 Sye

Sye presents the type of morphological divergence in which reduplicant and base contain different suppletive allomorphs of the same morpheme. The main points of Sye reduplication are the following:

- Most verb roots in Sye appear in two different shapes: basic and modified
- Reduplication in contexts that call for the basic root yields two copies of the basic root (a)
- Reduplication in contexts that call for the modified root give modified-basic (b)

In a collection of seemingly unrelated morphological environments (after future tense subject prefixes, after certain “discontinuously marked” tenses, and after echo subject markers; Crowley 1998:79), certain verb stems in Sye appear in a “modified” form which is phonologically similar to the unmarked form but ultimately not derivable from it.<sup>1</sup> Examples of basic and modified forms of some of the stems showing this alternation are given below:<sup>2</sup>

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<sup>1</sup> Since all modified stems begin with /a/, it would be plausible to treat /a/ as a (semantically empty) prefix that marks stems as [+ablaut]. However, the other phonological differences between basic and modified stems are more challenging to analyze. Crowley (1998:84) proposes a long list of phonological steps that convert basic stems into their modified counterparts. Several of these steps are unnatural, and in any case the rules have exceptions, in which case listing of at least some of the modified forms is inevitable. We make the (possibly simplifying) assumption that modified forms are listed in all cases.

<sup>2</sup> Forms are given in Sye practical orthography (Crowley 1998:37ff.); “c” = [ç], “g” = [ŋ].

(1)	Basic	Modified	gloss
	evcah	ampcah	‘defecate’
	evinte	avinte	‘look after’
	evsor	amsor	‘wake up’
	evtit	avtit	‘meet’
	ocep	agkep	‘fly’
	ochi	aghi	‘see it’
	omol	amol	‘fall’
	oruc	anduc	‘bathe’
	ovoli	ampoli	‘turn it’
	ovyu-	avyu-	(causative prefix)
	owi	awi	‘leave’
	pat	ampat	‘blocked’
	vag	ampag	‘eat’

Reduplication in Sye is total and has an intensifying meaning (thus *isut* ‘far away’, *isutisut* ‘very far away’ (Crowley 1998:34)). Of interest is the interaction between reduplication and stem modification. Reduplicated verb stems can occur in the morphological contexts in which a modified stem would be expected. When this occurs, a modified form appears – but only in the first half of the reduplication construction. That is, reduplicated stems in modification contexts consist of a modified stem followed by a basic stem. This is illustrated below for the stem meaning ‘fall’:

(2)	Stem in “basic” context:	omol
	Stem in “modified” context:	amol
	Reduplicated stem in “basic” context:	omolomol
	Reduplicated stem in “modified” context:	<b>amolomol</b>

e.g. cw-amol-omol  
 3pl.fut-fall<sub>mod</sub>-fall<sub>basic</sub>  
 ‘they will fall all over’

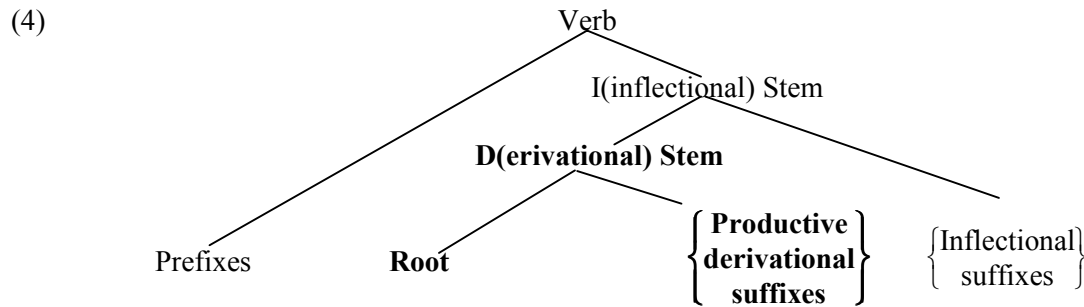
In summary, the ‘reduplicant’ in a Sye reduplicated verb cannot always be described as a phonological copy of the ‘base’, as phonological theories of reduplication would require. Rather, in at least some cases the reduplicant and base consist of different suppletive allomorphs of the same basic root morpheme.

## 2.2 Ndebele

Ndebele presents a different kind of divergent allomorphy in reduplication, where the reduplicant contains semantically empty morphemes not present in the base. As discussed in Hyman, Inkelas & Sibanda (1999), verb stem reduplication in Ndebele (Nguni (Bantu)) exhibits the following properties:

- (3) Properties of Ndebele verb stem reduplication
  - a. The reduplicant is disyllabic
  - b. The reduplicant has the internal morphological composition of a Dstem (Downing’s (1997 et seq.) term for the constituent containing root + derivational affixes but not inflectional affixes)
  - c. When a Dstem consisting of consonantal root plus suffix(es) is reduplicated, three different forms of the reduplicant occur in free variation, some containing semantically empty morphs not present in the base

Ndebele verbs have the standard internal structure of Bantu verbs. The Dstem constituent, an innovation by Downing (1997 et seq.) based on reduplication patterns in other Bantu languages, is adopted for Ndebele by Hyman et al.



Reduplication, which contributes the meaning ‘to do the action in little bits, here and there, perhaps not very well’, is limited to material in the Dstem and is sensitive to morphological structure. When the root is itself disyllabic or longer, the reduplicant consists of its initial two syllables. The outputs of reduplication in here and throughout are shown with final vowel in place, the standard citation form for verb stems:

- (5)
- |           |                  |                        |
|-----------|------------------|------------------------|
| nambith-a | nambi+nambith-a  | ‘taste’                |
| thembuz-a | thembu+thembuz-a | ‘go from wife to wife’ |

When the root is CVC (or smaller) the potential morphological complexity of the reduplicant emerges. Example (6) illustrates reduplication of stems based on CVC roots.

- (6)
- |    |                |                           |
|----|----------------|---------------------------|
| a. | lim-a+lim-a    | ‘cultivate’               |
|    | thum-a+thum-a  | ‘send’                    |
| b. | lim-a+lim-e    | (subjunctive <i>-e</i> )  |
|    | *lim-e+lim-e   |                           |
| c. | lim-a+lim-i    | (negative <i>-i</i> )     |
|    | *lim-i+lim-i   |                           |
| d. | lim-a+lim-ile  | (perfective <i>-ile</i> ) |
|    | *lim-i+lim-ile |                           |

In all four cases the reduplicant ends in the vowel *-a*. In (6a), the base also ends in *-a*, but in (6b-d) it does not. The reason for this discrepancy is that the final vowel in each base is an inflectional suffix, the so-called ‘Final Vowel’, and inflectional suffixes (which are outside the Dstem) never reduplicate. The *-a* that ends all the reduplicants in (6) is a default, semantically empty morph whose only function is to make the reduplicant disyllabic.

The option of fleshing out the second syllable of the reduplicant with default *-a* is available even when the stem contains Dstem suffixes whose vowels could serve the same purpose. In such cases, free variation is observed:

- (7)
- |    |           |                  |                    |                           |
|----|-----------|------------------|--------------------|---------------------------|
| a. | /lim-el-/ | lim-e+lim-el-a ~ | ‘cultivate for/at’ | (applicative <i>-el</i> ) |
|    |           | lim-a+lim-el-a   |                    |                           |
| b. | /lim-is-/ | lim-i+lim-is-a ~ | ‘make cultivate’   | (causative <i>-is</i> )   |
|    |           | lim-a+lim-is-a   |                    |                           |

The fact that these reduplicants contain morphemes not found in the base clearly shows that the reduplicant does not rely on the base as its source of phonological material.

The fullest spectrum of reduplication possibilities emerges in the reduplication of stems with consonantal roots, especially those containing extension suffixes. The following example illustrates the root /d-/ ‘eat’; the other consonantal roots (/m-/ ‘stand’, /lw-/ ‘fight’, /z-/ ‘come’) show exactly the same pattern.

- |     |    |          |   |                                |
|-----|----|----------|---|--------------------------------|
| (8) | a. | /dl-/    | dl-a-yi+dl-a  | ‘eat’                          |
|     | b. | /dl-el-/ | dl-el-a+dl-el-a<br>dl-e-yi+dl-el-a<br>dl-a-yi+dl-el-a | ‘eat for/at’ (applicative -el) |
|     | c. | /dl-is-/ | dl-is-a+dl-is-a<br>dl-i-yi+dl-is-a<br>dl-a-yi+dl-is-a | ‘make eat’ (causative -is-)    |

In (8a), the Dstem (*dl-*) is less than a syllable. This is sufficient for the base, on which no particular size conditions are imposed, but it is not sufficient for the reduplicant. Augmenting it with default *-a* adds only one syllable, not the needed two. It is thus necessary to appeal to yet another semantically empty morph in Ndebele, the affix *-yi*.<sup>3</sup>

Like *-a*, *-yi* is used independently of reduplication to satisfy a minimal size condition on words, which in Ndebele are required (like reduplicants) to be minimally disyllabic. This condition emerges only in the imperative, the only verbal construction in Ndebele *not* to involve prefixes. The imperative is illustrated in (9).

- |     |                        |           |                                      |
|-----|------------------------|-----------|--------------------------------------|
| (9) | Imperatives in Ndebele |           |                                      |
|     | a.                     | lim-a     | ‘cultivate-FV = cultivate!’          |
|     |                        | nambith-a | ‘taste-FV = taste!’invo              |
|     | b.                     | uku-dl-a  | ‘inf-eat-FV = to eat’                |
|     |                        | u-a-dl-a  | [wadla] ‘3sg-past-eat-FV = s/he ate’ |
|     |                        | ba-a-dl-a | [badla] ‘3pl-past-eat-FV = they ate’ |
|     | c.                     | yi-dl-a   | ‘yi-eat-FV = eat!’                   |
|     |                        | yi-m-a    | ‘yi-stand-FV = stand!’               |
|     |                        | yi-z-a    | ‘yi-come-FV = come!’                 |
|     |                        | yi-lw-a   | ‘yi-fight-FV = fight!’               |

In (9a), both forms, by virtue of disyllabic or longer stems, automatically satisfy the disyllabic word size condition. The forms in (9b) have monosyllabic stems, but achieve disyllabicity by virtue of their prefixes. Only the imperatives formed from consonantal roots in (9c) need augmentation to meet the disyllabic size condition. *yi-* is the augment of choice for subminimal words. As we saw in (8), it is one of several options available to augment subminimal reduplicants as well.

In summary, the reduplicant can differ phonologically from the base in Ndebele by virtue of containing semantically empty morphs which the base does not have. Reduplicants of this sort illustrate two important points. First, their obvious morphological complexity shows that reduplicants cannot universally be characterized as monomorphemic, as in theories where the reduplicant is represented as a single phonologically abstract morpheme RED. Second, the fact that the reduplicant can contain morphemes which are not present in the base clearly shows that the reduplicant is not dependent on the base for its phonological substance. Rather, the facts support the conclusion of Hyman et al. (1999) that bases and reduplicants are generated independently in the morphology.

<sup>3</sup> Under similar circumstances, Kinande shows double reduplication, e.g. *swa* ‘grind it’ → *swaswa-swa* ‘grind quickly!’ (Mutaka & Hyman 1990:112). This particular option is not available in Ndebele.

A full Morphological Doubling Theory analysis of Ndebele will not be presented in this paper, but is quite similar to that given in fuller detail for Kinande in section 4.1. See Hyman et al. (1999) for a complete analysis of Ndebele in a framework similar to that developed here.

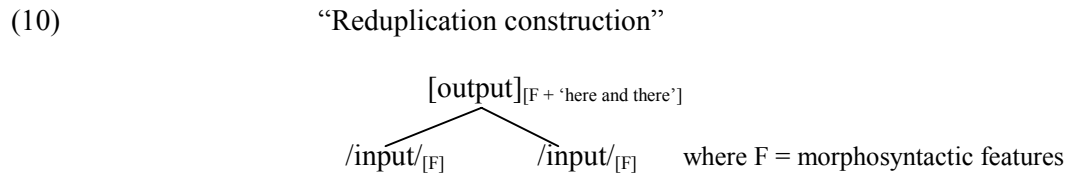
### 2.3 Summary

The Ndebele and Sye reduplication cases share the property that the base and reduplicant diverge phonologically, but nonetheless retain morphosyntactic agreement between the two copies. This generalization is the centerpiece of the morphological doubling theory that we develop in the next section. In the cases of reduplication that we discuss, the base and reduplicant agree in their morphosyntactic features. This observation motivates a theory of reduplication as copying or agreement of morphosyntactic features, rather than the copying or identity of phonological form, and correctly predicts morphotactic and phonological divergence in the reduplication of feature bundles where allomorphs exist.

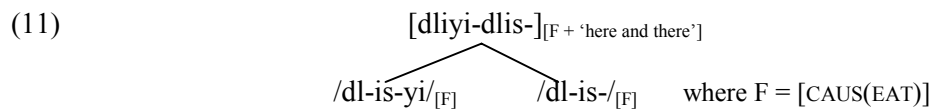
### 3 OVERVIEW OF MORPHOLOGICAL DOUBLING THEORY

The claim of Morphological Doubling Theory is that reduplication involves the concatenation of two stems meeting the same morphosyntactic description, with possible phonological modification of either or both constituents. Morphological Doubling Theory has roots in proposals by Hyman et al. (1999) and also resonates in some respects with Yip's (1995, 1998) REPEAT(Stem) constraint and with recent work by Downing (1997 et seq.) on morphological phenomena in Bantu reduplication.

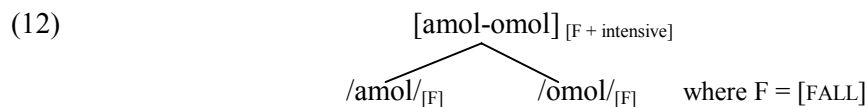
Morphological Doubling Theory assumes the same morphological structure for every case of reduplication. A reduplicated stem (or “reduplication construction”, to use a theory-neutral descriptive term) has two daughters which bear the same morphosyntactic features:



By requiring the two sisters to be identical only morphosyntactically, this structure permits other kinds of morphotactic and phonological deviation of the sort observed in Ndebele, Sye and cases to be discussed later in the paper. Example (11) illustrates one of the possible reduplications of the stem *dlisa* ‘cause to eat’ in Ndebele. Both the lefthand stem (‘reduplicant’) and the righthand stem (‘base’) have the same morphosyntactic description, i.e. CAUS(EAT). This morphosyntactic agreement is not disrupted by the fact that the reduplicant has an input morph which the base does not. This extra morph, *yi*, is semantically empty and does not affect the morphosyntactic description of the reduplicant.



The suppletive allomorphy in Sye reduplication is illustrated in (12). Here, both stems have the meaning of ‘fall’ and are thus morphosyntactically identical even though they differ in their phonology (and perhaps in their morphotactics, if the *a* of *amol* is a semantically empty prefix as suggested above).

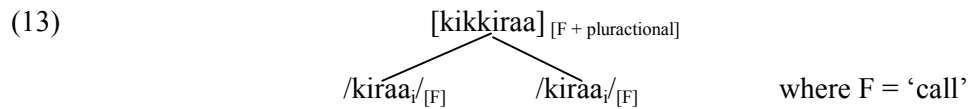


In summary, reduplication is double selection of a morphological constituent such as stem or root. There is no inherent morphological asymmetry between the daughters; there is no morpheme RED. The terms ‘base’ and ‘reduplicant’ in fact have no formal status, despite being descriptively handy in some cases.

### 3.1 The phonology of reduplication

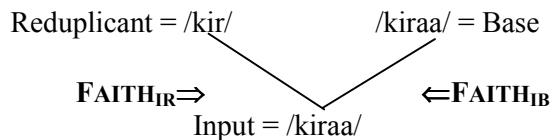
In the Ndebele and Sye examples, the phonological divergence between the two stems is due largely to the fact that the two daughters in the reduplication construction are autonomous. While they do share the same morphosyntactic features, they may be morphotactically and phonologically distinct. This source of morphological divergence is unique to Morphological Doubling Theory.

Like other theories of reduplication, however, Morphological Doubling Theory also provides for the possibility that the two parts of the reduplication construction will fare differently in the phonology even if their inputs are identical in every way. In the Hausa pluractional construction, for example, the first stem is reduced to its initial CVC string, while the second is maintained intact (Newman 1989):



In BR Correspondence Theory, according to which reduplicant and base share the same input, phonological divergence between base and reduplicant can be attributed to the differential ranking of Input-Base faithfulness (FAITH<sub>IB</sub>) and Base-Reduplicant faithfulness (FAITH<sub>BR</sub>) (or Input-Reduplicant faithfulness (FAITH<sub>IR</sub>)) with respect to some markedness constraint.<sup>4</sup> In Hausa, the relevant markedness constraint might be “Be a CVC syllable”, which is ranked below FAITH<sub>IB</sub> but above FAITH<sub>IR</sub> and FAITH<sub>BR</sub>:

(14) FAITH<sub>IB</sub> » “Be a CVC syllable” » FAITH<sub>IR</sub>, FAITH<sub>BR</sub>



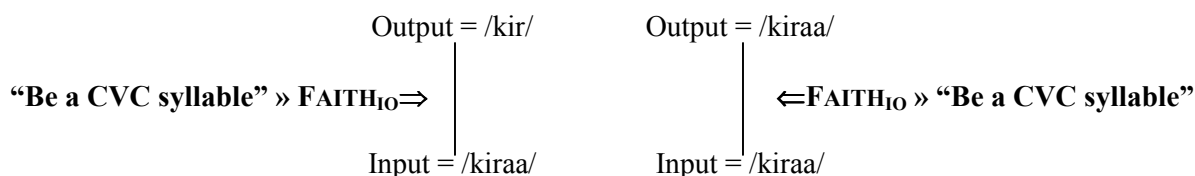
In Morphological Doubling Theory, the reduplicant and base have different inputs, so FAITH<sub>IB</sub> and FAITH<sub>IR</sub> correspond to simple FAITH<sub>IO</sub> constraints holding independently on the input-output mappings for reduplicant and base, respectively.

This “unpacking” of the constraint ranking in (14) is illustrated in (15). For the first stem (the ‘reduplicant’) in the Hausa construction in (13), the truncation constraint outranks FAITH<sub>IO</sub>, resulting in truncation of /kiraa/ to /kir/; for the second stem (the ‘base’), FAITH<sub>IO</sub> outranks truncation, resulting in a faithful output /kiraa/. Such morphologically specific constraint rankings (cophonologies, or their equivalents) are common in Optimality Theory work on the phonology-morphology interface.<sup>5</sup>

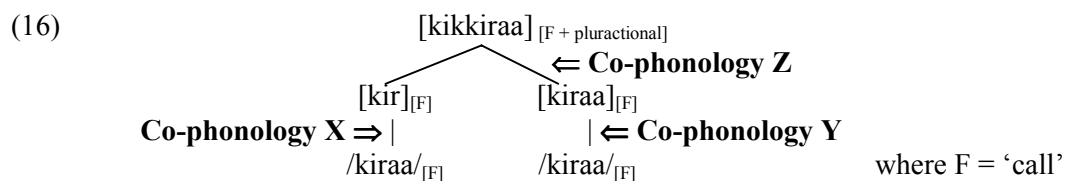
<sup>4</sup> The primary correspondent of RED is usually considered to be the BASE, rather than the input. Only the “Full Model” of BR Correspondence Theory (McCarthy & Prince 1995) includes FAITH<sub>IR</sub> at all, and in recent work Struijke (1998, 2000) has argued that it should be eliminated. Based in part on evidence introduced in section 5.1 which shows the necessity of FAITH<sub>IR</sub>, we assume the Full Model throughout this paper in our comparisons with BR Correspondence Theory.

<sup>5</sup> See e.g. Mester & Itô 1995; Orgun 1996, 1997; Inkelas, Orgun & Zoll 1997; Inkelas 1997, 1999 on cophonologies, Downing 1997 et seq. on morphologically specific output-output correspondence constraints, and Alderete 1999 on affix-specific correspondence relations. As the relation between the “packed” ranking in (14) and the “unpacked” rankings in (15) show, there is no difference in descriptive power between a single ranking with morphologically specific constraints and multiple, morphologically specific rankings of phonologically general constraints.

- (15) Cophonology of 1<sup>st</sup> stem: “Be a CVC syllable” » FAITH<sub>IO</sub>  
 Cophonology of 2<sup>nd</sup> stem: FAITH<sub>IO</sub> » “Be a CVC syllable”



The Hausa example shows the need for one further correspondence relation, or cophonology. In addition to separate cophonologies for the two stems, we also need a cophonology which concatenates those stems and handles any junctural or domain span effects applying to the reduplicated form as a whole. In Hausa, as it turns out, the pluractional construction is subject to a unique process of consonant assimilation that applies at no other morphological juncture in the language (Newman 1989:42).<sup>6</sup> This assimilation is accomplished by the cophonology which takes as input the outputs of the two stem cophonologies and produces as output a single, reduplicated stem.



Cophonology X = Truncation » FAITH<sub>IO</sub> » Geminatio  
 Cophonology Y = FAITH<sub>IO</sub> » Truncation, Geminatio  
 Cophonology Z = Geminatio » FAITH<sub>IO</sub> » Truncation

BR Correspondence Theory does not include the equivalent of a cophonology for the reduplicated string as a whole (although Struijke’s (1998, 2000) Broad Faithfulness comes close).

In summary, Morphological Doubling Theory differs from standard BR Correspondence Theory in five essential ways:

1. Morphological Doubling Theory holds that the two copies in reduplication are subject to morphosyntactic identity, not phonological identity
2. Morphological Doubling Theory posits separate, and potentially distinct, inputs for base and reduplicant, while BR Correspondence Theory posits a single, shared input for the two output strings
3. BR Correspondence Theory posits a RED morpheme, while in Morphological Doubling Theory the reduplicant is a potentially morphologically complex stem
4. Morphological Doubling Theory draws no fundamental asymmetry between base and reduplicant; neither is logically prior to the other. In the basic model of BR Correspondence Theory, the base and reduplicant have an asymmetrical relationship to the input.
5. Morphological Doubling Theory uses only FAITH<sub>IO</sub>, while BR Correspondence Theory uses FAITH<sub>BR</sub> and FAITH<sub>IO</sub> (and, in the Full Model, FAITH<sub>IR</sub> as well). Morphological Doubling Theory assumes no phonological correspondence between base and reduplicant.

<sup>6</sup> Geminatio does not result in other morphological environments in which similar consonant clusters arise, e.g. *gírkàa* ‘cook’ and *rìgá-r-kà* ‘gown-def-3sgf = her gown’, not *\*gírkàa*, *\*rìgákkà*.



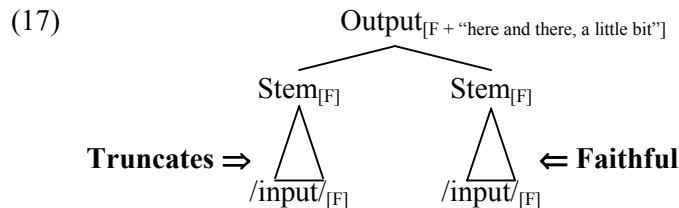
In the next two sections, we present morphological (§4) and phonological (§5) arguments in favor of Morphological Doubling Theory.

#### 4 MORPHOLOGICAL EVIDENCE FOR MD THEORY

This section presents the major morphological evidence for Morphological Doubling Theory, focusing on a case study of Kinande. Analyzed in section 4.1, Kinande manifests both types of morphological divergence exemplified in section 2. In Kinande, the base and reduplicant have different internal morphological (and thus phonological) structure, but agree in morphosyntactic features. Section 4.2 relates the analysis developed for Kinande (and by extension the other cases) to a better-known class of phenomena known in the recent literature as Melodic Overwriting (McCarthy & Prince 1986, Yip 1992, Alderete et al. 1999).

##### 4.1 Case study: Kinande

Kinande exhibits verb stem reduplication much like that of its fellow Bantu language Ndebele, seen in section 2.2. As sketched in (18), the construction takes two verb stems with identical morphosemantic descriptions as daughters. The first copy, or ‘reduplicant’, is truncated to two syllables (CVCV), while the second copy (‘base’) is faithful.<sup>7</sup>



Kinande verb stem reduplication exhibits several properties that motivate the innovations of Morphological Doubling Theory. These are:

- (18)
- a. The reduplicant is morphologically complex (as in Ndebele), *not* a single morpheme
  - b. The reduplicant has empty morphs that the base does not (as in Ndebele), and thus is *not* derivable phonologically from the base (or from the input to the base)
  - c. The reduplicant and base have different suppletive allomorphs of the same morpheme (as in Sye), further evidence the reduplicant is *not* derivable phonologically from the base (or from the input to the base)

The forms in (19) illustrate the most spectacular manifestations of these phenomena in Kinande. All of the data in this section are taken from Mutaka & Hyman (1990), on whose insightful and thorough analysis we rely heavily. In (19a), the reduplicant ends in a morph (the default stem-final suffix, or Final Vowel (FV), *-a*) which is not present in the stem. In (19b), the reduplicant and base have different suppletive allomorphs of the causative suffix:

- (19)
- |    |                              |   |  |  |
|----|------------------------------|---|--|--|
| a. | hum- <u>a</u>                | + | hum-ir-e                                 | ‘cultivate for (here and there, etc.)’ |
|    | cultivate-FV                 |   | cultivate-appl-FV <sub>subjunctive</sub> |  |
| b. | gend- <u>y</u> -a            | + | gend- <u>esy</u> -a                      | ‘make go (here and there, etc.)’       |
|    | go-caus <sub>short</sub> -FV |   | go-caus <sub>long</sub> -FV              |  |

<sup>7</sup> Kinande has also been discussed in recent work by Downing (see especially Downing 1997c, 1998, 1999, in press). As mentioned in section 4.1.7, the analysis presented here has many insights in common with Downing’s, despite important differences in the theoretical framework.

Below, we present a Morphological Doubling Theory analysis of Kinande which accounts for the morphotactic mismatches in (19). Before presenting the analysis in detail, we find it useful to give an overview of our account, since Kinande reduplication exhibits a couple of unusual properties. The first is the free variation between causative allomorphs in reduplicative and non-reduplicative contexts alike. Unlike many other cases of allomorphy found in the literature, there is no morphological blocking effect by the less productive causative, nor is there any phonological property that selects one allomorph or the other depending on phonological context. Following Kager 1996, we achieve variation between the two allomorphs as a result of the two competing constraints in (20), freely ranked in the sense of Anttila (1995).

(20) Free variation between allomorphs:

CAUSATIVE =/-y/            ‘[CAUSATIVE] is exponed by /-y/’  
 CAUSATIVE =/-Isy/        ‘[CAUSATIVE] is exponed by /-Isy/’

Second, as we will show in detail, the reduplication pattern in Kinande is clearly the result of morphosyntactic identity rather than phonological identity. The two copies in the reduplication construction are constrained to share the same morpho-syntactic features (in this case causative), but may expone those features with different allomorphs. The following analysis of Kinande reveals two different levels of morphosyntactic correspondence: input and output (21). The input condition is an inviolable property of the reduplication construction. The output condition, on the other hand, is a violable constraint that interacts with templatic and other considerations. The two copies strive to maintain morpho-syntactic identity at all levels, but as we will see a candidate may be optimal without satisfying the output constraint.

(21) Two levels of morphosyntactic identity:

- a. The two inputs to the reduplication construction must be morpho-syntactically identical
- b. Morphological constituents in the output must be morpho-syntactically identical.

X-AGREE: The two copies of Morphological Constituent X agree in morphosyntactic features

Finally, as in all cases of reduplication, there are constraints on the size and content of the truncated copy (“reduplicant”). The necessary constraints are described in (22) and will be formalized in the next section.

(22) Other constraints on the content of the truncated copy

OUTPUT=σσ                    ‘The truncated copy is bisyllabic’  
 CONTIGUITY:                ‘Contiguous elements in the truncated copy are contiguous in the input’  
 MORPHEME INTEGRITY: ‘A morpheme may not be truncated’

#### 4.1.1 The basics of Kinande reduplication truncation

We begin with an account of examples like that in (19), in which the reduplicant contains a morph present in the base. The morph in question is the semantically empty Final Vowel (FV) of Kinande. By default this morph ends all stems which lack a more semantically specified FV such as the subjunctive *-e*. As in Ndebele, this default morph shows up in reduplicants which would otherwise be phonologically subminimal. What is interesting about Kinande is that the default FV also shows up in reduplicants derived from inputs which exceed the disyllabic output condition on the reduplicant. This is due to two generalizations identified by Mutaka & Hyman (1990). The first is Morpheme Integrity, which prevents

affixes from being partially reduplicated. The second is Contiguity, which prevents the ‘skipping over’ of affixes in the reduplicant.

The effects of these constraints are illustrated more fully in (23), where affixes longer than V cannot fit into the reduplicants of stems derived from the CVC root *hum-* ‘cultivate’. Because of Contiguity, even the final vowel in the last form cannot be reduplicated. In all the cases in which affixes fail to reduplicate because of Morpheme Integrity or Contiguity, the default FV morph appears.

(23)	UR of base morphemes	gloss of base	reduplication	suboptimal alternatives
	/hum-a/	‘cultivate-FV’	huma-huma	
	/hum-e/	‘cultivate-subj’	hume-hume	
	/hum-ir-a/	‘cultivate-appl-FV’	huma-huma	* <i>humi-humira</i> violates Morpheme Integrity
	/hum-isy-a/	‘cultivate-caus-FV’	huma-huma	* <i>humi-humisya</i> violates Morpheme Integrity
	/hum-ir-e/	‘cultivate-appl-subj’	huma-humire	* <i>humi-humire</i> violates Morpheme Integrity, * <i>hume-humire</i> violates Contiguity

Example (24) provides Optimality-theoretic statements of Mutaka & Hyman’s (1990) constraints:

- (24) OUTPUT= $\sigma\sigma$ : The output is disyllabic [independent constraints on Kinande syllable structure ensure that it is vowel-final]
- MORPHEME INTEGRITY: Given two segments i and j which are tautomorphic in the input, if i has a surface correspondent in the output then j must as well
- CONTIGUITY: Given two segments i and j which are adjacent in the output, the input correspondent of i (if any) is adjacent to the input correspondent of j (if any)

The tableaux in (25-26) illustrate how these constraints, ranked above FAITH<sub>IO</sub> (represented here by MAX<sub>IO</sub>) in Cophonology X, generate the reduplicants of two the forms in (23).

(25)	Cophonology X	/hum-ir-e/	OUTPUT= $\sigma\sigma$	MORPHEME INTEGRITY	CONTIGUITY	MAX <sub>IO</sub>
	a.	humire	*!			
	b.	humi		*!		re
	c.	hume			*!	ir
	☞ d.	huma				ire

(26)	Cophonology X	/hum-ir-a <sub>i</sub> /	OUTPUT= $\sigma\sigma$	MORPHEME INTEGRITY	CONTIGUITY	MAX <sub>IO</sub>
	a.	humira	*!			
	b.	humi		*!		
	c.	huma <sub>i</sub>			*	ir
	☞ d.	huma				ira <sub>i</sub>

Note that by the same logic by which the input-final subjunctive *-e* fails to survive in the reduplicant in (25), the input-final *-a* fails to survive in (26). CONTIGUITY forces both reduplicants to end in the empty morph *-a*, which is assumed not to be present, or at least not to be linearly ordered with respect to the other morphs, in the input.

#### 4.1.2 Causative stems

With this background in hand, we now proceed to the Kinande phenomenon of greatest interest to Morphological Doubling Theory: the causative allomorphy in reduplication. The Kinande causative suffix has two allomorphs, a productive “Long” allomorph and an unproductive “Short” allomorph (Mutaka & Hyman 1990):

- (27) “Long” causative: -isy/esy (productive)  
 “Short” causative: -y (unproductive)

All roots can take the Long causative allomorph. Only a proper subset of roots can also take the Short allomorph. For roots of this latter type (28a), the two allomorphs are in free variation.

- (28) a. Roots that can take Short causative: free variation

<u>Plain stem</u>	<u>Causative stems</u>	
<i>gend-a</i>	<i>gend-esy-a</i> ~ <i>gend-y-a</i>	‘go’
<i>bul-a</i>	<i>bul-isy-a</i> ~ <i>bul-y-a</i>	‘ask’
<i>hek-a</i>	<i>hek-esy-a</i> ~ <i>hek-y-a</i>	‘carry’

- b. Roots that cannot take Short causative: no variation

<u>Plain stem</u>	<u>Causative stem</u>	
<i>hum-a</i>	<i>hum-isy-a</i> (* <i>hum-y-a</i> )	‘cultivate’

It is clear from the (28b) examples that the short causative seen in (28a) is not simply a phonological truncation of the Long causative; such an analysis would predict the Short causative to be possible whenever the Long causative is possible, but it is not. We assume, with Mutaka & Hyman (1990), that the Long and Short allomorphs of the causative are both listed lexically, with the Short allomorph specifying a list of those roots with which it may co-occur. Suppletive allomorphy of this sort has been discussed previously in Optimality Theory by Mester (1994), Kager (1996) and Dolbey (1996), among others. It is usually handled with a *tableau des tableaux* (term coined in Itô, Mester & Padgett 1995) which matches the possible inputs against all the possible outputs. The tableau des tableaux in (29) illustrates the derivation of two possible causative stems of *gend-*. (Note: this is the isolation cophonology, which happens to be identical to Cophonology Y in the verb stem reduplication construction.)

(29)

	CAUS(GEND)		FAITH <sub>IO</sub>
☞	/gend-esy-a/	gendesy-a	
		gendya	isy!
	/gend-y-a/	gendesy-a	y!
☞		gendya	

As the tableau shows, two of the input-output pairings tie as best, yielding both *gendesy-a* and *gendya* as possible causative stems of the root *gend-*.

The free variation exhibited by the Short and Long causative allomorphs in Kinande is unusual from the standpoint of both phonology and morphology. In many other cases where an irregular allomorph is in competition with a morphosyntactically identical regular, productive allomorph, the irregular one takes precedence. This phenomenon is termed “blocking” by Aronoff (1976) and has been a focus of morphological theorists (see e.g. Anderson 1992). Such blocking does not occur in Kinande. Free variation is of course attested in morphology, but typically between allomorphs that are equally morphologically productive but optimal along different *phonological* dimensions. In such cases, free ranking of the relevant phonological constraints can produce free variation in the output (as in Anttila’s

(1995) analysis of the Finnish genitive suffix). Kinande does not yield itself readily to this type of analysis either. It is hard to imagine the phonological constraint according to which /gend-esy-a/ would be more phonologically optimal than /gend-y-a/. Since \*STRUC (which minimizes phonological structure) prefers *gendya* (the output of /gend-y-a/) to *gendesya* (the output of /gend-esy-a/), the apparent expectation is that *gendya* should always prevail. Unless some phonological alternative is found, free variation is not the natural expectation.

To solve the problem of free variation in the Kinande causative, we adopt a proposal made for another language by Kager (1996:156) and postulate two morphological exponence constraints, each favoring one of the two lexical allomorphs of the causative. “Causative =/-y/” and “Causative =/-Isy/”, freely ranked in the sense of Anttila (1995), produce the desired variation.

(30)

	CAUS(GEND)		CAUSATIVE =/-y/”	CAUSATIVE =/-Isy/”
☞	/gend-esy-a/	gendesya	*	
☞	/gend-y-a/	gendya		*

The exponence constraints are output constraints, roughly comparable to rules in realizational morphology (see e.g. Anderson 1992). CAUSATIVE =/-y/ is violated by any form whose morphosyntactic description contains a CAUSATIVE element and whose phonological description does not contain material corresponding to the /-y/ allomorph of the causative morpheme.

#### 4.1.3 Reduplicated causative stems

Under reduplication, causative stems exhibit – with one notable exception – the same free variation occurring in plain (i.e. unreduplicated) causatives. Consider the following data:

(31) UR of base morphemes reduplication

/gend-esy-a/	genda-gendesya
	gendya-gendesya
/gend-y-a/	gendya-gendya
	*genda-gendya

For *gendesya* there are two possible reduplicants, *genda* and *gendya*. This follows from the same allomorph variation that yields two causative stems from *gend-*. Cophonology X, which truncates its input to two syllables, produces different reduplicant outputs according to whether its input happens to contain the Long or the Short causative, as shown in the constructions in (32).

(32)

Long + Long	Short + Long
[genda-gendesya]	[gendya-gendesya]
<b>X: Truncates</b> ⇒                          / gend-esy-a /    / gend-esy-a /	<b>X: (Truncates)</b> ⇒                          / gend-y-a /        / gend-esy-a /

The tableaux in (33-34) illustrate how Cophonology X derives the possible reduplicant outputs.<sup>8</sup> When the input contains the long causative (33) it must be reduced to two syllables. The optimal output (33a) satisfies the disyllabic template as well as Morpheme Integrity and Contiguity by deleting all the material in the causative morpheme and inserting default [a].

<sup>8</sup> Since we already know from section 4.1.2 that both inputs, /gend-esy-a/ and /gend-y-a/ are equally viable, we are not comparing them here in a tableau; (33) concentrates on the fate of the input /gend-esy-a/, and (34) on the fate of the input /gend-y-a/.

(33)	Cophonology X	/gend-esy-a <sub>i</sub> /	OUTPUT =σσ	MORPHEME INTEGRITY	CONTIG	DEP <sub>IO</sub>	MAX <sub>IO</sub>
	a.	genda				*a	isy
	b.	genda <sub>i</sub>			*!		isy
	c.	gendya		*!-esy-		*a	
	d.	gendya <sub>i</sub>		*!-esy-			
	e.	gendesya <sub>i</sub>	*!				

When the input to the reduplicant contains the short causative, however, as in (34), it does not exceed the template and no truncation is necessary. The optimal output here (34c) is the one most faithful to the input causative stem:

(34)	Cophonology X	/gend-y-a <sub>i</sub> /	OUTPUT =σσ	MORPHEME INTEGRITY	CONTIG	DEP <sub>IO</sub>	MAX <sub>IO</sub>
	a.	genda <sub>i</sub>			*!		y
	b.	genda				a!	ya
	c.	gendya <sub>i</sub>					
	d.	gendya				a!	a

Since Morphological Doubling Theory requires only that the two stems in a reduplication construction bear the same morphosyntactic features, we expect all possible causative reduplicative inputs to co-occur with all possible causative base inputs. This prediction is in general correct, as shown in (35). When a simple causative base contains the Long causative (35a,b), either *genda* (from the long causative) or *gendya* (from the short causative) is a possible reduplicant. Likewise, when the base contains the Short causative in addition to other derivational suffixes, such as the applicative *-ir*, either reduplicant can appear (35c-d).

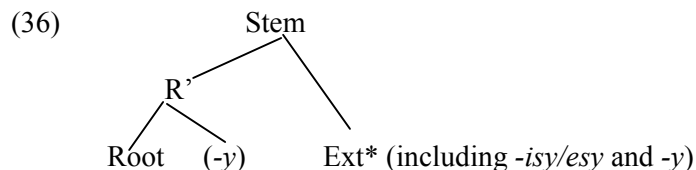
- (35) Long “base”
- a. gendya-gendesya
  - b. genda-gendesya
- Short extended “base”
- c. bulya-bulirya (Applicative *-ir*)
  - d. bula-bulirya
- Short “base”
- e. gendya-gendya
  - f. \*genda-gendya

Interestingly, however, the expectation of free variation in the reduplicant is *not* borne out when the base has in its input a Short causative and no other suffixes. As seen in (35e-f), when the base has a short causative (*gendya*) the reduplicant must as well. The output *\*genda-gendya*, from /gend-esy-a<sub>i</sub>/-/gend-y-a/ (35f), is ungrammatical. We return to this apparent anomaly in section 4.1.5.

#### 4.1.4 Extended causatives

The variability in reduplicants of extended causative stems follows straightforwardly from the fact that such stems have two different ways to expone causativity. The allomorphs differ not only phonologically but also morphologically. As Mutaka & Hyman (1990) observe, the Short causative, though linearly not

always adjacent to the root, behaves in some ways as if it were part of the root morphologically. This tension between linear position and morphological (or lexical) constituency can be captured by assigning the Short and Long causative to different hierarchical positions in the verb stem:



The Short causative *-y* has the option of attaching under the R' node, which is, as Hyman et al. (1999) propose for Ndebele, reserved for the root and unproductive suffixes. The analyst (and presumably the language learner) has a certain amount of freedom in positing a hierarchical structure for the extension suffixes because of the templatic nature of the Kinande verb stem (Hyman & Mchombo 1992, Hyman 2000a,b). Suffix order is not predictable from scope, and phonological considerations also come into play. For example, the Long causative suffix always immediately follows the root, while the Short causative always occurs at the end of the string of extension suffixes. We assume, with Orgun (1996), that this is a phonological fact, for two reasons. First, the *y* of the Long causative suffix is also always final, thus separated from the *-Is-* portion of the Long allomorph when any other extension suffixes are present. Second, the Passive suffix, also a glide (*-w*), patterns like the Short causative and is always ordered linearly last.

Returning to (36), then, the hypothesis is that the Short causative obligatorily attaches under R' when it surfaces adjacent to the root (i.e. when no other extension suffixes are present). When other extension suffixes are present, the Short causative is free to attach either under R' or under the Stem in the input. The Long causative, along with all the other extension suffixes, has only the Stem attachment option.

As a result of the different attachment possibilities for the two causative allomorphs, there are therefore three possible input strings for an extended causative. The table in (37) illustrates the possible inputs and corresponding outputs for reduplicants meaning APPL(CAUS(bul-)) 'ask for'.<sup>9</sup>

(37)

Meaning of reduplicant, base	Possible inputs	Predicted truncated output forms
APPL(CAUS(bul))	/bul-isy-ir-a/	bula-
	/bul-ir-y-a/	bula-
	/bul-y-ir-a/	bulya-
RECIP(APPL(CAUS(bul)))	/bul-isy-ir-an-a/	bula-
	/bul-ir-y-an-a/	bula-
	/bul-y-ir-an-a/	bulya-

The following tableau des tableaux illustrates the generation of multiple reduplicants for the applicativized causative of *bula*. Only the optimal output for each input is shown here:

(38)

	APPL(CAUS(bul))		CAUSATIVE =/-y/	CAUSATIVE =/-Isy/	FAITH <sub>IO</sub>
☞	/bul-isy-ir-a <sub>i</sub> /	bula-	*		isy, ir, a <sub>i</sub> , a
	/bul-ir-y-a <sub>i</sub> /	bula-		*	y, ir, a <sub>i</sub> , a!
☞	/bul-y-ir-a <sub>i</sub> /	bulya-		*	ir, a <sub>i</sub> , a

<sup>9</sup> We do not presently have data on how extended stems with the Long causative allomorph reduplicate, but an investigation is underway.

The unviolated truncation and CONTIGUITY constraints are suppressed in (38). The highest ranking violable constraints are the freely ranked allomorph preference constraints, resulting in equal viability for the (optimal outputs of) inputs /bul-isy-ir-a/ and /bul-y-ir-a/. (Inputs /bul-ir-y-a/ and /bul-y-ir-a/ tie on the allomorph preference constraints, but /bul-ir-y-a/ has a less optimal input-output pairing, as it is forced by CONTIGUITY into an extra FAITH<sub>io</sub> violation for the Short causative *y*.)

#### 4.1.5 Reduplicated unextended causative stems

The free variation observed in reduplicants of causative stems is suppressed in exactly one context: as seen earlier, the reduplicant of an unextended Short causative base – i.e. a stem with a Short causative and *no* other extension suffixes – must contain the Short causative. In just this instance, variation between the Short causative and (truncated) Long causative is impossible:

- (39) a. gendya-gendya (from /gend-y-a-/gend-y-a/)  
 b. \*genda-gendya (from /gend-esy-a-/gend-y-a/)

The apparent inconsistency between the lack of variation in (39) and the variation observed in extended causatives can easily be accounted for by making reference to the R' node. In addition to morphosyntactic identity of stems in the input to the reduplication construction, Kinande imposes the following constraint on the output of reduplication:

- (40) R'-AGREE: R' nodes must agree in morphosyntactic features

R'-Agree is not an inviolable condition on reduplication, in contrast to the definitional requirement of morphosyntactic identity between daughters. But, when ranked high, it does favor those reduplicant-base pairings in which both reduplicant and base have morphosyntactically identical R' nodes. Because it refers to both daughters in the reduplication construction, R'-AGREE belongs to Cophonology Z, which concatenates the outputs of the two daughter cophonologies. R'-AGREE assists in the selection between competing output forms generated by Cophonologies X and Y.

Consider now the simple reduplicated causatives from (41) from the perspective of whether their R' nodes match in morphosyntactic features. Strings representing R' nodes are shown in boldface:

(41)	Reduplicant and base inputs	outputs	Do R' nodes agree in MS features?
a.	/ <b>gend-y-a/</b> - / <b>gend-esy-a/</b>	<b>gendya-gendesya</b>	no (CAUS(GEND) vs. GEND)
b.	/ <b>gend-esy-a/</b> - / <b>gend-esy-a/</b>	<b>genda-gendesya</b>	yes (GEND)
c.	/ <b>gend-y-a/</b> - / <b>gend-y-a/</b>	<b>gendya-gendya</b>	yes (CAUS(GEND))
d.	/ <b>gend-esy-a/</b> - / <b>gend-y-a/</b>	* <b>genda-gendya</b>	no (GEND vs. CAUS(GEND))

Two of the reduplication constructions (41b,c) satisfy R'-AGREE and two (41a,d) do not. Of the latter, however, only one (41d) is actually ungrammatical.

In what respect might (41a) be optimal in comparison to (41d)? The answer is morphological exponence. Reduplicant candidates in which all phonological traces of the causative are lost to truncation, as in (41b) and (41d), violate *both* of the existing causative exponence constraints CAUS=y and CAUS=isy. Ranking these constraints freely with respect to R'-Agree thus generates an outcome in which (41a, b, c) are optimal on some ranking of the constraints, but (41d) always loses to another candidate:



(42) Choosing among possible reduplicants in Cophonology Z:

	CAUS(GEND)-CAUS(GEND)		R'-AGREE	CAUS= Y	CAUS= ISY
☞ a.	/gend-y-a/ - /gend-esy-a/	gendya-gendesya	*	*	*
☞ b.	/gend-esy-a/ - /gend-esy-a/	genda-gendesya		**	*
☞ c.	/gend-y-a/ - /gend-y-a/	gendya-gendya			**
d.	/gend-esy-a/ - /gend-y-a/	genda-gendya	*	*	**

Because candidate (42d), *genda-gendya*, has a superset of the violations of candidates (a) and (d), there is no ranking on which it can win. By contrast, each of (42a,b,c) wins under some ranking of the constraints in (42).<sup>10</sup>

In summary, Kinande exhibits free variation between suppletive allomorphs in both reduplicant and base stems, with no phonological identity requirements between the two. The only identity requirements are morphological. Both stems must agree in their morphosyntactic features, an inviolable and definitional constraint on reduplication. Further, a lower ranked and violable constraint pressures R' nodes to agree morphosyntactically as well. This constraint accounts for the absence of free variation in reduplicant causative allomorphy in unextended causative stems.

#### 4.1.6 Passive stems

The Morphological Doubling Theory analysis sketched above extends without modification to passive stems, whose behavior differs in interesting ways from that of seemingly parallel short causatives.

The passive suffix in Kinande is *-w*, the only other consonantal suffix besides the Short causative. Like the Short causative, it is the linearly last (rightmost) suffix in a stem containing it. One might expect on the basis of their phonological similarity that the two suffixes would behave similarly in reduplication. However, they do not, as Mutaka & Hyman (1990) observe. The Short passive can never appear in the reduplicant if the input contains other extension suffixes, such as the applicative *-ir* shown below (Mutaka & Hyman 1990):

- (43) hum-w-a            humwa-humwa        \*huma-humwa  
 hum-ir-w-a        huma-humirwa        \*humwa-humirwa     (cf. bulya-bulirya)  
 hum-ir-an-w-a     huma-humiranwa     \*humwa-humiranwa   (cf. bulya-buliranya)

The different behavior of passive and Short causative follows from the asymmetry in their morphology. Unlike the Short causative, which is unproductive and therefore may attach under the R' node, the passive is completely productive and resides under the Stem node. As a result, CONTIGUITY always prevents it from surfacing in case an extension suffix intervenes (in input) between it and the root:

(44) Generating a reduplicant meaning PASS(APPL(hum))

	/hum-ir-w-a/	OUTPUT=σσ	CONTIGUITY	FAITH <sub>IO</sub>
	humirwa	*!		
	humwa		*!(li, rw)	ir
☞	huma			irwa

When no other extension suffixes are present, stems containing the passive suffix behave just like those containing only root and Short causative.

<sup>10</sup> (42a) wins on the ranking R'-Agree » Caus=/-isy/ » others; (b) wins when CAUS=/-Isy/ » CAUS=/-y/ » R'-Agree; (c) wins when CAUS=/-Isy/ is lowest.

(45) Generating a reduplicant meaning PASS(hum)

	/hum-w-a/	OUTPUT= $\sigma\sigma$	CONTIGUITY	FAITH <sub>IO</sub>
☞	humwa			
	huma			w!a

Failure of the suffix to surface in the reduplicant represents a gratuitous and fatal violation of FAITH<sub>IO</sub>.

#### 4.1.7 Summary

Below is a review of the essential components of the analysis. The Morphological Doubling Theory account of Kinande relies on purely morphosyntactic correspondence between the daughters of the reduplication construction to capture the morphological and phonological parallelism between reduplicant and base. Beyond these agreement requirements, however, the reduplicant and base are morphologically and phonologically independent. This accounts for their noteworthy ability to take different suppletive allomorphs of the causative morpheme.

(46) Overview of Morphological Doubling Theory analysis of Kinande

a. The reduplication construction takes as inputs constituents with identical morphosyntactic features

b. Output constraints in Cophonology X determine the size and possible content of the truncated copy:

OUTPUT = $\sigma\sigma$ , MORPHEME INTEGRITY, CONTIG » DEP<sub>IO</sub>, MAX<sub>IO</sub>

c. Output constraints in Cophonology Z determine possible reduplicant-base output pairs:

CAUSATIVE =/-y/, CAUSATIVE =/-Isy/, R'-AGREE

The Morphological Doubling Theory analysis of Kinande derives the two constituents in a reduplication construction from independent causative stems based on the same root. This idea is related to the approach of Downing 1999, who also demonstrates that the reduplicant cannot be merely a phonological copy of the base. Her approach, which utilizes Output-Output correspondence in addition to FAITH<sub>BR</sub>, achieves morphotactic independence of the reduplicant from the base by allowing it to be in phonological correspondence with causative stems in other words as well as with the base. While Morphological Doubling Theory goes farther in granting RED complete phonological and morphotactic independence from the base, and embeds the proposal in a broader theory of reduplicant-base independence, we share with Downing the realization that BR correspondence is not sufficient to generate the reduplicant in Kinande. It remains to be seen whether phonological output-output correspondence is independently necessary in reduplication, or whether, as we claim, FAITH<sub>IO</sub> is sufficient.

## 4.2 Melodic Overwriting

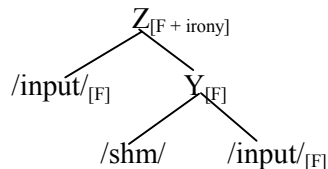
The cases of morphotactic discrepancy seen in sections 2 and 4.1 between the two copies in a reduplication construction are perhaps not widely known. However, the same structural phenomenon is amply manifested in the much better known class of cases dubbed Melodic Overwriting (Melodic Overwriting; see McCarthy & Prince 1986, Yip 1992, Alderete et al. 1999).

Melodic Overwriting resembles the Ndebele, Sye and Kinande cases in that one copy in the reduplication construction contains a morph that does not occur in the base. The principal difference between Melodic Overwriting and the other cases of divergent morphology in reduplication lies in the distribution of the divergent morph. In Sye, Kinande and Ndebele the divergent morph appears

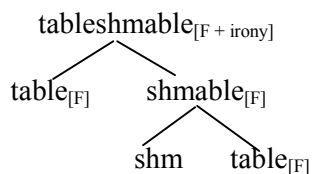
independently of reduplication. By contrast, in Melodic Overwriting, the extra morph is specific to the reduplication construction.

We illustrate a reduplication construction involving melodic overwriting with the canonical example of English-Yiddish *shm*, e.g. *theory-shmeory*. Alderete et al. 1999 characterize the fixed *shm*-sequence as a morpheme which successfully competes for position in the output with material which would otherwise reduplicate. Essentially the same Morphological Doubling Theory construction used above extends without modification to Melodic Overwriting.<sup>11</sup>

(47) “shm” construction of English (descriptive template):



(48) Actual example involving *table*



The fixed morpheme *shm* is like the default *-a* suffix of Ndebele and Kinande and the default *-yi* of Ndebele: it is semantically empty, so that its presence or absence does not affect the morphosyntactic feature makeup of the constituent containing it. Morphosyntactic agreement permits the two daughters in a reduplication construction to differ freely in regard to the number of empty morphs they contain.

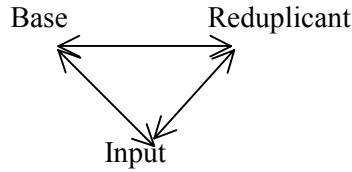
## 5 THE ROLE OF BR CORRESPONDENCE

Morphological Doubling Theory and BR Correspondence Theory differ in the number of types of correspondence relations they embody. In Morphological Doubling Theory all phonological correspondence is between input and output, while BR Correspondence Theory has input-output correspondence (FAITH<sub>IR</sub> and FAITH<sub>IB</sub>) as well as base-reduplicant correspondence (FAITH<sub>BR</sub>).<sup>12</sup> In both approaches the faithfulness relation controls the surface phonological content of the reduplicant. Because in BR Correspondence Theory the reduplicant corresponds to two strings (input and base) while in Morphological Doubling Theory it corresponds only to one (input), BR Correspondence Theory thus has two ways to control the phonology of the reduplicant. McCarthy & Prince argue for FAITH<sub>BR</sub> as the primary, or even only correspondence relation involving the reduplicant, for two reasons. First, they claim that FAITH<sub>BR</sub> is independently necessary to account for over- and underapplication. Second, they observe that adding FAITH<sub>IR</sub> to FAITH<sub>BR</sub> gives the theory excessive descriptive power, making FAITH<sub>IR</sub> a correspondence relation of last resort. McCarthy & Prince 1995 propose that FAITH<sub>IR</sub> is always ranked below FAITH<sub>IB</sub> and therefore has little effect.

<sup>11</sup> An alternative approach would be to analyze *shm* as a third daughter of the reduplication construction, which is grouped phonologically, but not morphologically, with the constituent to its right.

<sup>12</sup> McCarthy & Prince (1995) use the term FAITH<sub>IO</sub> for what we are calling FAITH<sub>IB</sub>, namely the faithfulness relation between the input and the base.

(49) McCarthy & Prince’s (1995:252) “Full Model”, with FAITH<sub>BR</sub>, FAITH<sub>IB</sub> and FAITH<sub>IR</sub>



This section argues for the opposite view of the relative importance of FAITH<sub>IR</sub> and FAITH<sub>BR</sub>. We show first that FAITH<sub>IR</sub> is necessary, even in BR Correspondence Theory, to account for cases of divergent modification not previously dealt with in CT. We then raise doubts as to the necessity of FAITH<sub>BR</sub> by showing that it does very little work in reduplication outside of the relatively trivial task of achieving copy. In sections 6 and 7 we demonstrate that many of the cases whose ostensible support for FAITH<sub>BR</sub> is the most dramatic are in fact better analyzed without it.

### 5.1 Divergent Modification

Divergent Modification is the phenomenon in which both base and reduplicant are subject to phonological modification, but in opposing directions. Such cases are expected in Morphological Doubling Theory, in which base and reduplicant are phonologically autonomous. They are more problematic for BR Correspondence Theory, because no combination of the available faithfulness relations – FAITH<sub>BR</sub>, FAITH<sub>IO</sub>, and FAITH<sub>IR</sub> – can describe them. Section 5.1.1 illustrates Divergent Modification with a case study of Tarok.

#### 5.1.1 Tarok

In Tarok (a Benue-Congo language of Nigeria), nominal reduplication expresses 3<sup>rd</sup> singular possession (Niepokuj 1991; Robinson 1976; Sibomana 1980, 1981; Longtau 1993). In reduplicated forms, as illustrated by the reduplicated polysyllabic nouns in (50), the tone of the second copy is neutralized to Mid.

(50) Polysyllabic roots

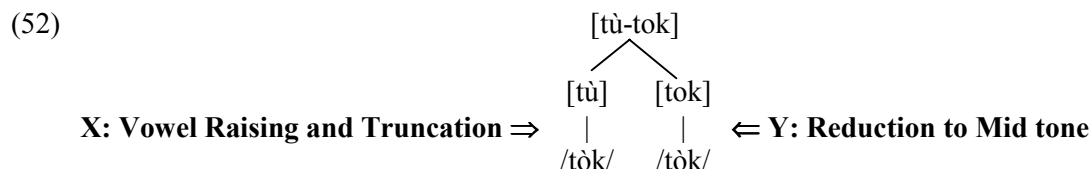
a-finì	a-finini	‘his/her yarn/	N10
a-gòrò	a-gòrò-goro	‘his/her cola-nut’	N10
ì-gisàr	ì-gisàrgisar	‘his/her broom’	N10
a-rìjìyá	a-rìjìyá-rìjiya	‘his/her spring’	N10
a-dànkáli	a-dànkáli-dankali	‘his/her potato’	N10

The interest of the Tarok facts lies in the divergent modification exhibited by the two copies of a monosyllabic base. Neither copy is faithful to the input, and each shows neutralization along a different dimension. As shown in (51), reduplication of monosyllables manifests tonal reduction in the second copy, and truncation and vowel neutralization in the first copy. In the first copy, the final consonant deletes and all vowels raise to [+high]. In the second copy, tone (which in Tarok can be High, Low or Mid) is neutralized to Mid.

(51) Monosyllabic roots

ĩ-ján	ĩ-jí-jan	‘his twin’	R206
a-sáŋ	a-sí-saŋ	‘his rope’	R203
ĩ-tòk	ĩ-tù-tok	‘his chair’	S203
ì-g <sup>v</sup> el	ì-gì-g <sup>v</sup> el	‘his/her chin’	N115

The diagram in (52) shows the Morphological Doubling Theory reduplication construction for Tarok monosyllables.<sup>13</sup> As usual, it selects two morphosyntactically identical daughters, each of which is subject to its own (distinct) cophonology:



The constraints in Cophonology X that must rank above FAITH<sub>IO</sub> to effect truncation and vowel raising are shown in (53).

- (53) Cophonology X
- Output=CV “Output is a light syllable”  
 \*V[-high] “Vowels must be [+high]”

Output=CV, mandates truncation to a light syllable. \*V[-high] neutralizes the height of the reduplicant vowel to the unmarked value, [+high]. Both effects are observed in *tù-tok* (54). Failure to truncate causes a fatal violation of the templatic constraint (54a-b), and failure to raise the vowel crucially violates the vowel markedness constraint (54c). The optimal outcome is a light syllable with a high vowel (54d).

(54)

<i>Cophonology X</i>	/tòk/	Output=CV	*V[-high]	FAITH <sub>IO</sub>
a.	tòk	*!	*	
b.	tùk	*!		*
c.	tò		*!	*
☞ d.	tù			**

In the second daughter in the reduplication construction, the only alternation is neutralization of tone to Mid. Cophonology Y thus ranks the tonal markedness constraints above tonal faithfulness:

(55)

<i>Cophonology Y</i>	/tòk/	*High, *Low	FAITH <sub>IO</sub>	*Mid
a.	tòk	*!		
☞ b.	tòk		*	*

### 5.1.2 BR correspondence account

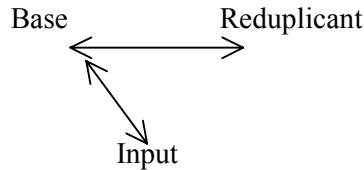
The first, though somewhat trivial, obstacle in comparing the Morphological Doubling Theory account of Tarok to a BR Correspondence Theory account is the impossibility of determining which copy is the reduplicant and which is the base. In Morphological Doubling Theory this ambiguity is not only unproblematic but actually expected, as the theory presupposes no built-in asymmetry between base and reduplicant. In BR Correspondence Theory, by contrast, the base-reduplicant distinction is unavoidable.

<sup>13</sup> Truncation and vowel raising do not occur in polysyllabic bases. Niepokuj (1991) takes this as evidence that monosyllabic and polysyllabic reduplication are different morphological constructions (prefixing and suffixing, respectively) but we demonstrate in other work (Inkelas & Zoll, in preparation) that a unified analysis of the two is in fact possible.

As it happens, whether the 1<sup>st</sup> or the 2<sup>nd</sup> copy is called the reduplicant has little effect on the fundamental problem that Tarok poses for BR Correspondence Theory. The difficulty is that along one dimension, the reduplicant is more faithful than the base to the input, while along another dimension, the base is more faithful than the reduplicant to the input. We will assume for sake of concreteness that the first copy is the reduplicant, but this decision could be reversed without affecting the argument.

The fact that both reduplicant and base are modified in Tarok reduplication is simply impossible to describe in the Basic Model of BR Correspondence Theory (McCarthy & Prince 1995:252), in which faithfulness relations hold only between input and base, and base and reduplicant, but *not* between input and reduplicant.

(56) The Basic Model:



In the Basic Model, neutralization in the reduplicant would be handled by the constraint ranking  $\text{FAITH}_{\text{IO}} \gg \text{Markedness} \gg \text{FAITH}_{\text{BR}}$ .<sup>14</sup> In the Tarok case, truncation and the neutralization of vowel height in the reduplicant require markedness (\*V[-high]) and a templatic constraint (e.g. RED = CV) to outrank  $\text{FAITH}_{\text{BR}}$ .  $\text{FAITH}_{\text{IO}}$  constraints protect the base from undergoing the neutralizations observed in the reduplicant. An illustration is provided in (57).

(57)  $\text{FAITH}_{\text{IO}} \gg *V[-\text{high}], \text{RED} = \text{CV} \gg \text{FAITH}_{\text{BR}}$

	RED-tòk	RED = CV	FAITH <sub>IO</sub> (V)	*V[-high]	FAITH <sub>BR</sub> (V)
a.	tòk-tok	*!			
b.	tò-tuk		*!	*	**
c.	tù-tuk		*!		*
d.	tò-tok			**!	*
e.	tù-tok			*	**

The problem for the Basic Model of BR Correspondence Theory presented by Tarok arises with tonal neutralization in the second copy, which the above analysis treats as the base. With respect to tone, the reduplicant is *more faithful* to the input than the base is. Accounting for this while maintaining that regular  $\text{FAITH}_{\text{IO}}$  is responsible for base faithfulness results in a ranking paradox. To see why, consider the following. First, we know independently that  $\text{FAITH}_{\text{IO}}$  must outrank the tonal markedness constraints (\*High, \*Low) since High, Low and Mid all occur in non-reduplicated forms.

(58)

	tòk	FAITH <sub>IO</sub> -Tone	*High, *Low
a.	tòk		*
b.	tok	*!	

Next, recall that in standard correspondence theory (McCarthy & Prince 1995),  $\text{FAITH}_{\text{IO}}$  is the same as  $\text{FAITH}_{\text{IB}}$ . Herein lies the divergent modification ranking paradox. The ranking required for nonreduplicated forms, namely  $\text{FAITH}_{\text{IO}}\text{-Tone} \gg$  tonal markedness constraints, incorrectly predicts

<sup>14</sup> This is, of course, the formula for the familiar TETU, or “The Emergence of the Unmarked”, effect (McCarthy & Prince 1994 et seq.); see discussion in 5.2.1.

preservation of the base tone in reduplication. Consider the candidates in (59). FAITH<sub>BR</sub>-Tone is shown low-ranked here, but this is immaterial; the fact is that no ranking of the constraints in (59) will correctly identify (59a) as the winner. Candidate (59d) violates a proper subset of the constraints violated by candidate (59a), so candidate (59a) can never win.

(59)

	RED-tòk	FAITH <sub>IO</sub> -Tone	*High, *Low	FAITH <sub>BR</sub> -Tone
( $\text{☞}$ ) a.	tù-tok	*!	*	*
b.	tu-tok	*!		
c.	tù-tòk		**!	
( $\text{☞}$ ) d.	tu-tòk		*	*

One solution that has been proposed to the neutralization of contrasts in the base is the Broad or Word-Faithfulness interpretation of FAITH<sub>IO</sub> offered by Struijke (1998, 2000). Struijke alters the Basic Model by reinterpreting FAITH<sub>IO</sub> as referring to the entire output (including BASE *and* RED), rather than just to the BASE.

(60) Broad IO Faith (Struijke 1998: 161):

Every element of the input has a correspondent in the output

While it works well for the Kwakwala and Lushootseed examples that Struijke discusses, Broad Faith does not solve the Tarok problem. Relativized to tone, Broad IO Faith requires that every input tone have some output correspondent. It is satisfied if the lexical tone appears in either the base or the reduplicant. Instead of incorrectly choosing the reduplicant-neutralizing *tu-tòk* (61b) over the actual winner *tù-tok* (61a), a Broad IO Faith analysis rates the two as equally good, incorrectly predicting free variation between them.

(61)

	RED-tòk	Broad IO Faith <sub>IO</sub> -Tone	*High, *Low	FAITH <sub>BR</sub> -Tone
( $\text{☞}$ ) a.	tù-tok		*	*
( $\text{☞}$ ) b.	tu-tòk		*	*

Broad IO Faith is therefore not sufficient to overcome the divergent modification ranking paradox presented by Tarok. BR Correspondence Theory must appeal to yet another type of faithfulness. The only other type of faithfulness constraint that Struijke's theory offers is FAITH<sub>ROOT</sub>, which serves to evaluate identity between the input and the base:

(62) FAITH<sub>ROOT</sub> (Struijke 1998:165):

Every element in the input root has a correspondent in the output root (i.e. the base in a reduplicated word)

FAITH<sub>ROOT</sub> achieves precisely the wrong effect in the Tarok case, however, since when added (anywhere) to the existing constraint ranking, FAITH<sub>ROOT</sub> favors the base-preserving *tu-tòk* (63b), not the form in which lexical tone is preserved only in the reduplicant (63a):

(63)

	RED-tòk	Broad IO Faith <sub>IO</sub> -Tone	*High, *Low	FAITH <sub>BR</sub> -Tone	FAITH <sub>ROOT</sub> -Tone
(☞) a.	tù-tok		*	*	*!
☛ b.	tu-tòk		*	*	

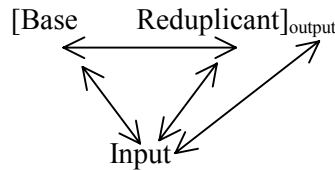
What the Tarok pattern requires is the addition of FAITH<sub>IR</sub> to the Basic Model *in addition to* the Broad IO Faithfulness proposed in Struijke (1998, 2000). Since tone is preferentially preserved on the reduplicant in Tarok, it must be the case that FAITH<sub>IR</sub>-Tone outranks FAITH<sub>ROOT</sub>-Tone, as shown in (64). Thus amended, the constraint hierarchy now correctly selects (64a) as the surface form:

(64)

	RED-tòk	Broad IO Faith <sub>IO</sub> -Tone	*High, *Low	FAITH <sub>IR</sub> -Tone	FAITH <sub>ROOT</sub> -Tone
☞ a.	tù- <u>tok</u>		*		*
b.	tu- <u>tòk</u>		*	*!	

Divergent modification in Tarok reduplication thus provides an important test case for the variety of possible correspondence models. Under standard assumptions, BR Correspondence Theory can describe Divergent Modification in Tarok only with an armamentarium of faithfulness constraints that exceeds any previous proposal. The pattern of neutralization effects in Tarok reduplication requires not only the Full Model of McCarthy & Prince (1995:252), but *also* the Broad IO Faithfulness that was intended to eliminate IR faithfulness. This “Extended Model” is shown in (65):

(65) “Extended model”:



Only when BR Correspondence Theory is equipped with the increased power of the Extended Model does it attain (with Morphological Doubling Theory) the ability to describe the Tarok facts. However, the Extended Model has much more descriptive power than Morphological Doubling Theory. The Extended Model has two types of Faithfulness that Morphological Doubling Theory definitionally lacks, namely Broad Faithfulness and FAITH<sub>BR</sub>.

(66)

	Extended model of CT	Morphological Doubling Theory
FAITH <sub>IB</sub>	✓	✓ (=FAITH <sub>IO</sub> in Cophonology <sub>X</sub> )
FAITH <sub>IR</sub>	✓	✓ (=FAITH <sub>IO</sub> in Cophonology <sub>Y</sub> )
FAITH <sub>BR</sub>	✓	
Broad IO Faith	✓	

A possible alternative to the Extended Model would be for BR Correspondence Theory to revert to the Full Model, with only FAITH<sub>IO</sub>, FAITH<sub>IR</sub>, and FAITH<sub>BR</sub>, but to allow FAITH<sub>IO</sub> to be re-ranked with respect to tonal markedness just in the case of reduplication. This analysis still requires FAITH<sub>IR</sub> in order to enforce the presence of lexical tone in the reduplicant, but no longer requires the Broad Correspondence relation.



(67) Morphologically restricted constraint rankings in BR Correspondence Theory:

- a. Non-reduplicative environments:  $\text{FAITH}_{\text{IO}} \gg *High, *Low$
- b. Reduplication:  $\text{FAITH}_{\text{IR}} \gg *High, *Low \gg \text{FAITH}_{\text{IO}}$

This is precisely the analysis of divergent modification offered above in Morphological Doubling Theory, where the morpheme-specific faithfulness constraints on reduplication are unpacked into the individual daughter cophonologies. These differ only in the ranking of input/output faithfulness relative to the relevant markedness constraints. The constraint hierarchy of the second daughter necessarily ranks \*High and \*Low above input-output faithfulness, while in both the cophonology of the first daughter as well as the cophonologies outside of the reduplication construction, faithfulness outranks tonal markedness.

(68) First daughter cophonology:  $\text{Output}=\text{CV}, *V[-high] \gg \text{FAITH}_{\text{IO}} \gg (*High, *Low, *Mid)$   
Second daughter cophonology:  $*High, *Low \gg \text{FAITH}_{\text{IO}} \gg *Mid, (\text{Output}=\text{CV}, *V[-high])$

## 5.2 The Role of $\text{FAITH}_{\text{BR}}$

Divergent modification requires that the two copies in a reduplication construction have independent faithfulness constraints, which in BR Correspondence Theory translates into a model which minimally contains both  $\text{FAITH}_{\text{IR}}$  and  $\text{FAITH}_{\text{IB/IO}}$  constraints. Since there is a great deal of duplication between  $\text{FAITH}_{\text{IR}}$  and  $\text{FAITH}_{\text{BR}}$ , it makes sense to reconsider the necessity of a correspondence relation between the two copies in reduplication.

In BR Correspondence Theory,  $\text{FAITH}_{\text{BR}}$  has two major functions. First, it provides phonological material to RED by specifying what to copy. Since any theory of reduplication has a way to do this, this function of  $\text{FAITH}_{\text{BR}}$  is theory-internal and does not constitute evidence for maintaining it. Second,  $\text{FAITH}_{\text{BR}}$  enforces identity between BASE and RED even under conditions where phonological divergence might be expected. This function of  $\text{FAITH}_{\text{BR}}$  allows BR Correspondence Theory to account for cases of apparent over- and underapplication that have eluded most previous theories, all of which lack such a relation.

Before looking more carefully at the data that appear to require a correspondence relationship between BASE and RED, it is important to situate these cases in the broader context of reduplicative phenomena. The number of cases for which  $\text{FAITH}_{\text{BR}}$  appears to be crucial is only a very small subset of the different patterns that are found. For most common reduplicative phenomena,  $\text{FAITH}_{\text{BR}}$  is outranked by markedness and faithfulness constraints (69), resulting in non-identity between BASE and RED. This phonological divergence takes a number of forms, ranging from the familiar (truncation of the reduplicant, neutralization of contrasts in the reduplicant, and dissimilation between base and reduplicant) to the less-familiar divergent modification discussed above.<sup>15</sup>

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<sup>15</sup> In addition, word-level alternations can have the incidental effect of differentiating base and reduplicant. These are handled by the mother node (Cophonology Z) in Morphological Doubling Theory.

- (69) a. “Emergence of the Unmarked” neutralization in reduplicant (McCarthy & Prince 1994; Alderete et al. 1999)  
 FAITH<sub>IO</sub> » Markedness » FAITH<sub>BR</sub>
- b. Truncation (McCarthy & Prince 1995)  
 RED = x » FAITH<sub>BR</sub>
- c. Normal Application (McCarthy & Prince 1995)  
 Markedness » FAITH<sub>BR</sub>, FAITH<sub>IO</sub>
- d. Melodic Overwriting (Yip 1992; Alderete et al. 1999)  
 MAX<sub>IO</sub> » FAITH<sub>BR</sub>
- e. Dissimilation: (Yip 1995, 1998; among others)  
 ANTI-FAITH<sub>BR</sub> » FAITH<sub>BR</sub>
- f. “Divergent Modification” (Inkelas & Zoll in preparation)

With respect to the kind of base-reduplicant divergence that results from either BASE or RED undergoing truncation, neutralization (TETU), melodic overwriting and/or dissimilation, or any of the other processes listed in (69), FAITH<sub>BR</sub> is irrelevant. In each of these cases, FAITH<sub>BR</sub> is subordinated to higher-ranking markedness and faithfulness constraints. The only function of FAITH<sub>BR</sub> is to ensure that as much of the material of the base as possible appears in RED. These phenomena have completely straightforward accounts in Morphological Doubling Theory, which lacks FAITH<sub>BR</sub>. All they require of a theory is independent faithfulness constraints for base and reduplicant. As section 5.2.1 illustrates, using TETU and dissimilation as examples, Morphological Doubling Theory can handle the phenomena in (69) using only IO faithfulness.

### 5.2.1 Reduplicant neutralization to the unmarked: TETU

“The Emergence of the Unmarked” (TETU) in reduplication is a common phenomenon whereby the reduplicant obeys a markedness constraint that is regularly violated elsewhere in the language. Tübatulabal aspectual reduplication provides a well-known example of TETU effects of the classic kind first documented in the seminal paper of McCarthy & Prince 1994. In their discussion of Tübatulabal, Alderete et al. (1999) unite the following two observations of Voegelin (1935): vowel hiatus is broken up by an epenthetic glottal stop, and a glottal stop appears as the initial consonant in reduplication. Alderete et al. (1999) propose that the glottal stop is the default consonant in Tübatulabal, and thus that the default onset in reduplication is a TETU effect.

- (70) Tübatulabal (Alderete et al. 1999:343, from Voegelin 1958)

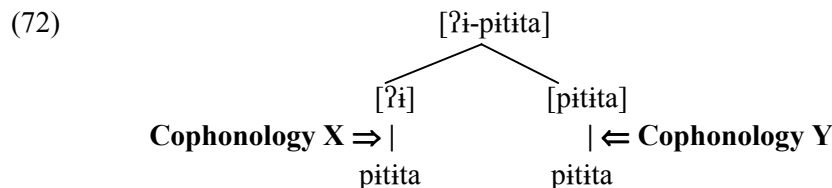
a.	pitita	ʔi-pitita	‘to turn over’
b.	ʃiʔiwi	ʔi-ʃiʔiwi	‘it looks different’
c.	ʔa:baʔiw	ʔa:-ʔabaʔiw	‘it is showing’

Alderete et al. (1999) attribute the reduction to /ʔ/ of the onset of the reduplicant to the constraint ranking in (71). The relative unmarkedness of /ʔ/ relative to the other consonants of Tübatulabal is obscured in most of the grammar, due to the ranking of FAITH-C<sub>IO</sub> above the ban against consonantal markedness. In reduplicants, however, the rankings are reversed, thanks to the low position in the constraint hierarchy of FAITH-C<sub>BR</sub>. As a result, the onset in the reduplicant neutralizes to the unmarked consonant, /ʔ/.

- (71) General TETU Ranking: FAITH<sub>IO</sub> » Phono-Constraint » FAITH<sub>BR</sub>  
 Tübatulabal: FAITH-C<sub>IO</sub> » \*PI/Dors, \*PI/Lab, \*PI/Cor » FAITH-C<sub>BR</sub> [and FAITH-C<sub>IR</sub>]

	ḫtta	FAITH-C <sub>IO</sub>	*PI/Dors, *PI/Lab, *PI/Cor	FAITH-C <sub>BR</sub>	FAITH-C <sub>IR</sub>
a.	pi-pitita		****!	**	**
b.	ʔi-pitita		***	***	***
c.	ʔi-ʔitita	*!	**	**	***

The correspondence relation between base and reduplicant is not crucial here. The important thing is just that the base and reduplicant have independent faithfulness constraints, with one ranked above the markedness constraint and one ranked below it. Any constraint ranking involving morpheme-specific constraints like these can be unpacked in Morphological Doubling Theory into morpheme-specific cophonologies, each of whose member constraints is itself general. The unpacking of the constraint ranking in (71) yields the necessary cophonologies for the Tübatulabal reduplication construction.



Cophonology X: \*PI/Dors, \*PI/Lab, \*PI/Cor » FAITH-C<sub>IO</sub>  
 Cophonology Y: FAITH-C<sub>IO</sub> » \*PI/Dors, \*PI/Lab, \*PI/Cor

(Cophonology X also truncates the first copy down to its first syllable).

Because it derives TETU effects using only FAITH<sub>IO</sub>, Morphological Doubling Theory predicts TETU to be a possible characteristic of *any* cophonology, not just cophonologies in reduplication constructions. Only if TETU turns out to be strictly a reduplication-specific effect could a case for FAITH<sub>BR</sub> as a crucial component of TETU be made. In fact, TETU is not limited to reduplication. It arises whenever markedness is ranked between faithfulness constraints that apply to non-identical domains. One common example of this is the emergence of the unmarked in contexts other than those which are subject to specific positional faithfulness constraints (see e.g. Beckman 1997, 1998; Casali 1997).

- (73) TETU  
 in reduplication FAITH<sub>IB</sub> » Markedness » FAITH<sub>IR</sub>  
 Elsewhere e.g., Positional FAITH<sub>IO</sub> » Markedness » FAITH<sub>IO</sub>

Consider, as an example, the well-known case of Turkish coda devoicing, illustrated in (74). Underlying obstruent voicing, which is marked, is preserved in the output when an obstruent occurs as the onset of a syllable, but lost when the obstruent syllabifies as a coda:

(74) Turkish coda-devoicing (Inkelas & Orgun 1995)

	Dative	Nominative	
/kanad/	kanad-a	kanat	‘wing’
/sanat/	sanat-a	sanat	‘art’

In this case the high-ranking Positional Faithfulness constraint IDENT-onset<sub>IO</sub> (75) demands that an onset be identical to its input correspondent, but is indifferent to elements in weak positions (Lombardi 1995; Beckman 1997, 1998). The unmarked voiceless obstruent emerges only when the obstruent is in coda position, since here the markedness constraint outranks the relevant faithfulness constraint.

(75) **IDENT-onset<sub>IO</sub>** ‘a syllable onset is identical to its input correspondent’

The tableau in (76) compares two candidates that differ only in the voicing of their final obstruent. The unsuccessful competitor in (76b) loses because high-ranking IDENT(ONSET) blocks onset devoicing. The optimal candidate (76a) therefore violates the lower ranking markedness constraint. When the same consonant is in coda position, however, as in (77), it is not protected by positional faithfulness, and the unmarked value for obstruent voicing emerges (77b).

(76)

	/kanad-a/	IDENTONSET <sub>IO</sub> (voice)	*VOICED OBSTRUENT	IDENT <sub>IO</sub> (voice)
☞ a.	kanad-a		*	
b.	kanat-a	*!		*

(77)

	/kanad/	IDENTONSET <sub>IO</sub> (voice)	*VOICED OBSTRUENT	IDENT <sub>IO</sub> (voice)
a.	kanad		*!	
☞ b.	kanat			*

This is clearly an instance of TETU occurring in a nonreduplicative context, so TETU effects cannot be limited to the BR relationship. Morphological Doubling Theory allows a unified account of all TETU effects as the relative ranking of different IO faithfulness constraints with respect to markedness.

(78) TETU outside of reduplication: Specific-FAITH<sub>IO</sub> » Markedness » General-FAITH<sub>IO</sub>

TETU in reduplication: FAITH<sub>IB</sub> » Markedness » FAITH<sub>IR</sub>

*Unpacked into the two reduplication cophologies:*

Reduplicant cophology: Markedness » FAITH<sub>IO</sub>

Base cophology: FAITH<sub>IO</sub> » Markedness

FAITH<sub>BR</sub> is not required to capture either reduplicative or nonreduplicative TETU effects.

### 5.2.2 Dissimilation

The last section illustrated the straightforward translation of FAITH<sub>BR</sub> into FAITH<sub>IO</sub> for handling TETU effects in reduplication. In those cases the difference between the two copies is a consequence of this ranking, but it is not uncommon to find cases of reduplication where it appears that the reduplicant is actually mandated by the grammar to be non-identical to the base along some dimension. Consider, for example, the case of melodic overwriting in (79). In Abkhaz (NW Caucasian), reduplicated nominal constructions meaning “X etc.”, *m-* replaces the onset of the second copy (or supplies an onset in case of vowel-initial stems) (Vaux 1998, Bruening 1997). When the base itself is *m-*initial, however, the reduplicant begins with *č’*.

(79) Dissimilation in Abkhaz reduplication (Vaux 1998)

- a. Second copy has [m] onset:
- |            |                              |             |
|------------|------------------------------|-------------|
| čá-k'      | čák'- <u>m</u> ák'           | 'horse'     |
| gázá-k'    | gázák'- <u>m</u> ázák'       | 'fool'      |
| pəstəh°-k' | pəstəh°k'- <u>m</u> əstəh°k' | 'fog, mist' |
- b. When base is [m]-initial, second copy begins with [č']:
- |          |                              |           |
|----------|------------------------------|-----------|
| mažá-k'  | mažák' <u>č'</u> ázák'       | 'secret'  |
| maát     | maát <u>č'</u> aát           | 'money'   |
| maš°ərk' | maš°ərk' - <u>č'</u> aš°ərk' | 'miracle' |

According to Alderete et al. (1997), the overwriting material in Melodic Overwriting constructions is a morpheme, whose obligatory appearance on the surface, even at the expense of BR identity, is due to the ranking FAITH<sub>IO</sub> » FAITH<sub>BR</sub>. Yip (1995, 1998) and Alderete et al. (1996) propose to derive dissimilatory Melodic Overwriting effects, as in Abkhaz, with anti-faithfulness constraints. ANTI<sub>FAITH</sub><sub>BR</sub> penalizes BASE-RED mappings in which BASE and RED are identical. In Abkhaz, ANTI<sub>FAITH</sub><sub>BR</sub> forces the choice of the marked allomorph /č'/ when the base begins with /m/ (80a). Otherwise, the less marked allomorph /m/ is chosen (80b).<sup>16</sup>

(80) Constraint ranking: ANTI<sub>FAITH</sub><sub>BR</sub> » FAITH<sub>BR</sub>, \*č' » \*m

a.	/maát, {m- ~ č'-, RED/	ANTI <sub>FAITH</sub> <sub>BR</sub>	*č'
	maát- <u>m</u> aát	*!	
☞	maát- <u>č'</u> aát		*

b.	/gázá-k', {m- ~ č'-, RED/	ANTI <sub>FAITH</sub> <sub>BR</sub>	*č'
☞	gázá-k'- <u>m</u> ázák'		
	gázá-k'- <u>č'</u> ázák'		*!

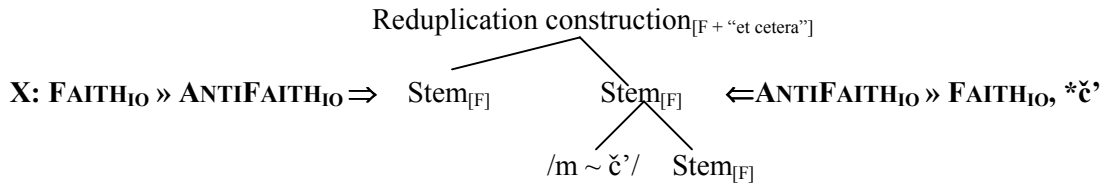
As this analysis utilizes a direct comparison between BASE and RED, it might appear that dissimilation in Melodic Overwriting requires BR correspondence. However, the same results would follow if FAITH<sub>BR</sub> were replaced in the above tableaux with FAITH<sub>IR</sub> – or if they were replaced, in Morphological Doubling Theory, with simple FAITH<sub>IO</sub> constraints.<sup>17</sup>

Consider the Morphological Doubling Theory construction for Abkhaz in (81):

<sup>16</sup> See Alderete 1999. Allomorphy in Optimality Theory has been discussed by, among others, Mester 1994, Hargus 1995, Kager 1996, Dolbey 1996, and Perlmutter 1998.

<sup>17</sup> A plausible alternative is that dissimilation does not depend on correspondence at all, since anti-identity effects are common outside of reduplication. Tang (2000), following Yip 1995 et. seq., discusses a number of strategies for identity avoidance in non-reduplicative contexts in Cantonese that include haplology, rephrasing and pause insertion.

(81) Melodic Overwriting in Abkhaz



This analysis, like that in (80), relies on antifaithfulness. Here, however, the antifaithfulness in question holds between input and output. Support for an IO analysis of dissimilatory reduplication comes from the fact that IO antifaithfulness is not restricted to reduplicative contexts, occurring as well in language disguises and in morphophonological toggles (on which see e.g. Weigel 1995). In Abkhaz, the cophonology of the second daughter ranks  $\text{ANTIFAITH}_{\text{IO}}$  higher than  $\text{FAITH}_{\text{IO}}$ , with the desired result that the /č'/ allomorph appears in the output only when the input and output would otherwise be identical (82b). In all other cases, the less marked allomorph m- is chosen (83a):

(82) Second daughter cophonology for input /maát/ 'money'

	/ {m- ~ č'-, maát/	$\text{ANTIFAITH}_{\text{IO}}$	*č'
a.	<u>m</u> aát	*!	
b.	<u>č'</u> aát		*

(83) Second daughter cophonology for input /gaʒá-k'/ 'fool'

	/ {m-, č'-}, gaʒá-k' /	$\text{ANTIFAITH}_{\text{IO}}$	*č'
a.	<u>m</u> aʒá-k'		
b.	<u>č'</u> aʒá-k'		*!

No BR correspondence is required in order to achieve the dissimilation.

### 5.2.3 Summary

The above analyses of TETU and dissimilation make clear that many of the most common reduplicative phenomena can be straightforwardly accounted for in a theory like Morphological Doubling Theory where the only possible correspondence relations are between inputs and outputs. The substitution of  $\text{FAITH}_{\text{IO}}$  for  $\text{FAITH}_{\text{BR}}$  simply exploits independently necessary hierarchies of faithfulness and markedness constraints that derive the same effects outside of the reduplicative context.

The comparisons drawn in section 5.2 between Morphological Doubling Theory and BR-Correspondence Theory are summarized below. From this table it appears that Morphological Doubling Theory, with fewer types of phonological correspondence relations, is more restrictive in its predictions.

(84)

Morphological Doubling Theory	BR-Correspondence Theory
Reduplication is a construction	RED is a morpheme
Morphosyntactic identity	Phonological identity
No asymmetry between base and reduplicant	BASE expected to be more faithful to input than RED is
Faithfulness constraints are all IO: Cophonology X → $\text{FAITH}_{\text{IR}}$ Cophonology Y → $\text{FAITH}_{\text{IB}}$	Faithfulness constraints include $\text{FAITH}_{\text{IR}}$ , $\text{FAITH}_{\text{IB}}$ , and $\text{FAITH}_{\text{BR}}$ , possibly also Broad-Faith and $\text{FAITH}_{\text{OO}}$

Section 6 begins to make the case that the greater restrictiveness of Morphological Doubling Theory is desirable. In Section 6, four cases appearing to require BR correspondence are examined in depth. For each it turns out that a deeper understanding of the morphology undermines the support for FAITH<sub>BR</sub>. This finding supports Morphological Doubling Theory, which lacks by definition the power of BR correspondence.

## 6 CASE STUDIES OF APPARENT BACKCOPYING

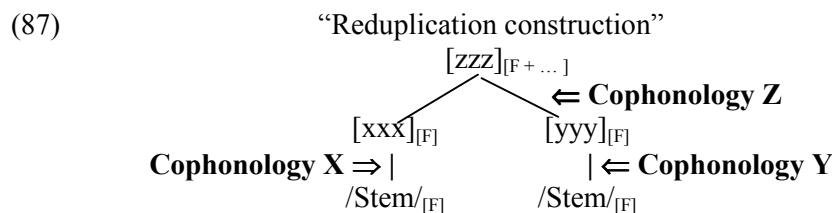
In Morphological Doubling Theory, phonological identity between the daughters in a reduplication construction is an emergent property occurring whenever the inputs to the construction are phonologically identical and are subjected to identical cophonologies. In contrast, BR Correspondence Theory elevates Wilbur’s (1973) Identity principle to a formal grammatical constraint family, BR faithfulness.

(85)		Source of phonological identity:
	Morphological Doubling Theory:	Two (nearly) identical inputs
	BR Correspondence Theory:	BR correspondence

BR correspondence establishes a symmetrical relationship between base and reduplicant. It thus predicts that an alternation affecting one copy can appear in the other. Any alternation in the reduplicant, even one that is conditioned at the BASE/RED juncture or at the juncture between RED and a prefix not contiguous with the BASE, can be copied back into the BASE. A famous example of this sort is the juncturally conditioned backcopying overapplication reported to occur in Tagalog (McCarthy & Prince 1995; see also Aronoff 1988, Bloomfield 1933, among others). In Tagalog, nasal fusion applies to nasal-consonant (NC) sequences across the boundary between prefix and stem (e.g. *mang-sayaw* → *manayaw* ‘to take up dancing as a profession’). Tagalog also has prefixing CV reduplication. When these occur in the same form, e.g. *ma-na-nayaw* ‘a professional dancer’, two applications of nasal fusion occur, even though only one would be conditioned under the assumption that the morphological structure is Pfx-RED-Stem. McCarthy & Prince’s (1995) analysis is that nasal fusion applies at the Pfx-RED juncture and is backcopied to the stem under the imperative of BR identity:

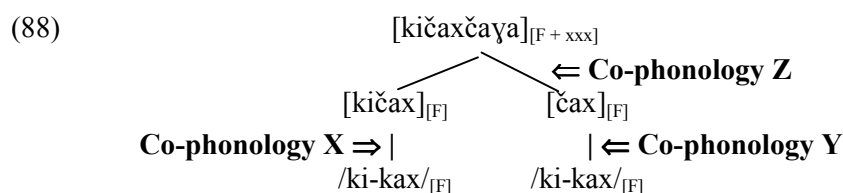
- (86) Input = /mang-RED-sayaw/ ‘a professional dancer’
- \* mang-sa-sayaw      *No nasal fusion at mang-RED boundary*
  - \* ma-na-sayaw      *Nasal fusion applies at B-R boundary, but B-R identity violated*
  - ☞ ma-na-nayaw      *Nasal fusion applies; B-R identity maintained by backcopying*

Morphological Doubling Theory and BR Correspondence Theory differ starkly in their predictions regarding over- and underapplication. Because cophonologies operate independently of one another in Morphological Doubling Theory, juncturally conditioned alternations in one constituent cannot be replicated in the other. As seen in the Morphological Doubling Theory schema below, there is no way for the output of Cophonology X to influence the output of Cophonology Y.<sup>18</sup>



<sup>18</sup> The mother Cophonology, Z, can of course cause junctural effects between the two daughters, but no backcopying is possible, as there is no BR correspondence.

The only types of apparent over- and underapplication possible in Morphological Doubling Theory are internally conditioned over- and underapplication effects of the non-backcopying sort. Underapplication in Morphological Doubling Theory is simply the (expected) nonapplication of an alternation outside of its domain. Formally, this translates to the absence in a reduplication cophonology of an alternation which applies in some other morphological domain in the language. Apparent overapplication, on the other hand, is a cyclic effect (as in Kiparsky 1997), and occurs in Morphological Doubling Theory whenever the *inputs* to reduplication already reflect the alternation that appears in each copy. Example (88) illustrates a case of “overapplication” in Dakota (Shaw 1985, Mester 1986, Kiparsky 1986). In *ki-čax-čay-a* ‘he made it for them quickly’ (Kaisse & Shaw 1985, from Shaw 1980), post-/i/ velar palatalization applies in both copies, even though the conditioning /i/ is absent in the output of the second copy.



The context for palatalization is present in the input to both daughters, and both Cophonologies X and Y perform palatalization. The alternation is rendered opaque in Cophonology Y due to the accompanying truncation. Although traditionally classified as an overapplication effect, Dakota palatalization is actually a case of (albeit opaque) normal application in Morphological Doubling Theory.

The chart in (89) shows the six types of over- and underapplication that BR Correspondence Theory predicts possible. Shaded cells are ones which Morphological Doubling Theory predicts to be impossible. In support of BR Correspondence Theory, McCarthy & Prince (1995) provide apparent instantiations of many of the shaded cells in the chart.<sup>19</sup> These cases would appear to be a problem for Morphological Doubling Theory (as well as for other cyclic theories of reduplication, like that of Kiparsky 1997).

(89)

	Base affects Red	Red affects Base
Internally conditioned	Axininca Campa	Klamath
Juncturely conditioned (internal juncture)		Malay
Juncturely conditioned (external juncture)		Tagalog Chumash Javanese h-deletion Javanese nasal prefixation Southern Paiute

The following sections present reanalyses of four of these cases. Two of these four cases involve apparent backcopying underapplication (Southern Paiute, Klamath) and two apparent backcopying overapplication (Tagalog, Chumash). Closer study of the morphology is the consistent factor in the reanalyses. In all four cases, it turns out that the backcopying analyses rely on incorrect assumptions

<sup>19</sup> In cases of total reduplication it is usually not clear which is the base and which is the reduplicant, making it difficult to place the cases in the “BASE affects RED” column or the “RED affects BASE” column. This is true of Malay and Javanese in this chart. McCarthy & Prince (1995) are careful to provide analyses based on both assumptions; the juncturally conditioned cases are apparent counterexamples for Morphological Doubling Theory either way.



about the morphological structure of the reduplication construction. Once these assumptions are rectified, the illusion of backcopying disappears.<sup>20</sup>

### 6.1 Southern Paiute $w \rightarrow \eta^w$ alternations

Southern Paiute has been considered an example of the sort of backcopying underapplication that requires a correspondence relation between the base and reduplicant (McCarthy & Prince 1995). However, the case has been effectively dismissed by Raimy (1999) (and, independently, by Gurevich (2000)) as the result of morphological misanalysis.

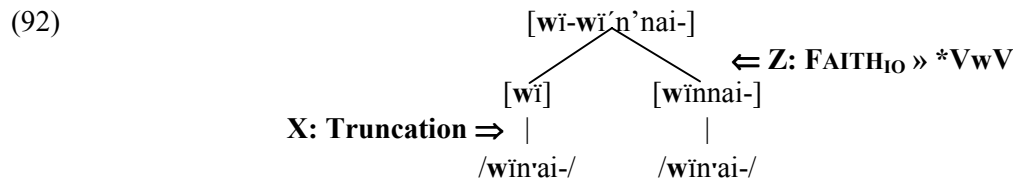
The phenomenon in question is the alternation between /w/ and / $\eta^w$ / illustrated in (90), where an underlying /w/ appears as / $\eta^w$ / intervocalically (McCarthy & Prince 1995:350, Sapir 1930:49-50):

- (90) a. wa'ą̃jɪ t̃i'-' $\eta^w$ a'ą̃jɪ- 'to shout/to give a good shout' S49, MP350  
 b. waiʒa- nʒa'vi-' $\eta^w$ aiʒa-pɪ 'to have a council/council (of chiefs)' S49, MP350

In reduplication, however, an intervocalic /w/ at the RED/BASE juncture does *not* become / $\eta^w$ /. In the forms in (91), cited from Sapir (1930:49-50, 260, 262), prefixation of a CV reduplicant places the BASE-initial /w/ in intervocalic position – but the /w/ does not emerge as / $\eta^w$ / in the output:

- (91) a. wayi- wa-wa x'ip̃iʒa' 'several enter/all entered' S49, MP350  
 b. w̃in'ai- w̃i-w̃i'n'nai- 'to throw/several throw down' S50, MP350  
 c. w̃iñi w̃i-w̃in'ñi'q'u- 'to stand/to stand (iterative)' MP350  
 d. w̃i'ʔi' w̃i-w̃i'ʔi' 'dances/dances repeatedly' S260  
 e. w̃in'i- w̃i-w̃in'i- 'to stand, be standing/to stand up' S262

In Morphological Doubling Theory, failure of /w/ to nasalize corresponds to ranking FAITH<sub>IO</sub> above \*VwV, a constraint violated by a labiovelar glide between two vowels, in the mother node of the reduplication construction (Cophonology Z).<sup>21</sup> Although the intervocalic /w/ that may appear in reduplication does violate the markedness constraint, the underlying form is preserved in order to satisfy the higher ranking FAITH<sub>IO</sub>.



The form in (93) would appear to invalidate the claim that glide nasalization fails to apply at the reduplicant-base juncture. It is cited by McCarthy & Prince (1995:350-51) as an example of the junctural application of nasalization – and its *backcopying* from RED to BASE.

<sup>20</sup> The Tagalog, Chumash and Klamath cases presented below are abridged versions of lengthier studies that have been presented elsewhere (Tagalog and Klamath, by Inkelas (2000) and Zoll (2000), respectively) or are being prepared by the present authors for a longer study of Morphological Doubling Theory.

<sup>21</sup> Raimy (1999) proposes to derive the absence of the alternation in reduplication from the strict cycle condition, asserting that the juncture between reduplicant and base does not count as a derived environment. In Morphological Doubling Theory this translates to the assertion that \*VwV outranks FAITH<sub>IO</sub> only in affixation constructions. (See Inkelas & Orgun 1995, 1998 and Inkelas (in press) for discussion of similar generalizations in other languages.)

(93) w̥ini- ya-ŋ<sup>w</sup>i'ŋ<sup>w</sup>iniɰa' 'to stand/while standing and holding'

According to the BR Correspondence Theory account of McCarthy & Prince, the reason that the reduplicated form in (93) undergoes nasalization, while those forms in (91) do not, is that in the form in (93) *both* the RED-initial and the BASE-initial labiovelar glides are intervocalic. As a consequence, changing both to /ŋ<sup>w</sup>/ preserves base-reduplicant identity, which would be violated if the same alternation were to apply to the single intervocalic /w/ in the forms in (91). The claim, therefore, is that in Southern Paiute the ranking FAITH<sub>BR</sub> » \*VwV results in backcopying overapplication.

(94) Southern Paiute appears to require BR faithfulness:

- (118b) /w̥i-w̥i'n'nai/ \*w̥i-ŋ<sup>w</sup>i'n'nai w → ŋ<sup>w</sup>V\_V blocked by FAITH<sub>BR</sub> since initial w cannot alternate
- (120) /ya-w̥i-w̥ini-/ ya-ŋ<sup>w</sup>i-ŋ<sup>w</sup>ini- w → ŋ<sup>w</sup>V\_V allowed since both copies are intervocalic

If it were true that the alternation could apply in reduplication, but was subject to identity between reduplicant and base, then these data would indeed constitute an important argument for the need for BR Faithfulness. However, as Gurevich (2000) and Raimy (1999) show, the back-copying account is based on a misanalysis of the one form provided by Sapir in which it appears that the alternation has taken place under reduplication. In fact, the form [ya-ŋ<sup>w</sup>i-ŋ<sup>w</sup>iniɰa'] does not contain *any* reduplicated material. As Gurevich and Raimy independently point out, the word is instead a compound of two verbs, 'to carry' and 'to stand', which coincidentally happen to have some identical segments:

(95)	<i>surface form</i>	[yaŋ <sup>w</sup> i'ŋ <sup>w</sup> iniɰa']	'while standing and holding'
	<i>Actual morphological analysis</i>	yaŋ <sup>w</sup> i-ŋ <sup>w</sup> ini-ɰa'	'to carry' + 'to stand'
	<i>cf. "Backcopying" misanalysis</i>	ya-ŋ <sup>w</sup> i-ŋ <sup>w</sup> ini-	'Pfx-RED-root'

There is no evidence that the /w/ → /ŋ<sup>w</sup>/ alternation ever applies in reduplication. Therefore Southern Paiute cannot be used to motivate the need for BR correspondence in general or backcopying in particular.

## 6.2 Klamath

This section examines another prominent case of ostensible back-copying — the non-application of vowel reduction in intensive prefixing reduplication in Klamath (Penutian) — and demonstrates that vowel reduction failure in the intensive *cannot* be derived from BR-faithfulness. Rather, intensive prefixation is actually a process of stem formation not subject to the same constraints as regular prefixation. This reanalysis eliminates Klamath as support for BR correspondence and makes the more general point that morphological investigation must precede any attempt to attribute a non-application of a phonological alternation to back-copying underapplication.

The verb in Klamath consists of a number of prefix classes, a root, and a variety of suffixes:

(96) Overview of Klamath verb: (Barker 1964; Delancey 1991; Delancey 1999)

DISTRIBUTIVE	CAUSATIVE, REFLEXIVE- RECIPROCAL	CAUSATIVE, TRANSITIVE	CLASSIFIERS	INTENSIVE	ROOT	SUFFIXES
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Klamath prefixes trigger a well-known process of vowel reduction and syncope. Both reduplicative and non-reduplicative prefixes trigger vowel reduction in the following syllable (Barker 1963; Barker 1964).<sup>22</sup> If the second syllable is closed, its vowel reduces to schwa (97a-c). In what would otherwise be an open syllable, the vowel deletes (97d-f).

(97) Vowel reduction in prefixed forms (C' indicates glottalization)

<b>qlin</b>	'choke'	<b>qli-qlən</b>	'DISTRIBUTIVE-choke'	D321
<b>domna</b>	'hears, obeys, understands'	<b>so-dəmna</b>	'hear each other'	D121
<b>čonwa</b>	'vomits'	<b>hos-čənwa</b>	'cause to vomit'	D166
<b>paga</b>	'barks'	<b>pa-pga</b>	'DISTRIBUTIVE-bark'	D296
<b>wp'eq'a</b>	'hits in the face with a long instrument'	<b>ʔi-pq'a</b>	'puts plural objects on the face'	D308
<b>qaba:ta</b>	'sets something heavy up against'	<b>has-qba:ta</b>	'causes s.o. to put a heavy or pronged object up against'	D310

As shown in (98), Barker (1964) considers intensive reduplication, which is full reduplication of the root, to be a prefix. Unlike the other Klamath prefixes, however, it does not trigger vowel reduction.<sup>23</sup>

(98)	/Liw' / <sup>24</sup>	'shiver (from fatigue, hunger)'	Liw-Liw'-a	*Liw-Lw'-a	'shivers from fatigue, hunger'	D229
	/Wič/	'be stiff'	Wič-Wič-l'i	*Wič-Wəč-l'i	'stiff'	D458

McCarthy & Prince (1995) argue that the failure of vowel reduction in the reduplicating intensive stem is an instance of backcopying underapplication, requiring BR correspondence. The analysis is illustrated by the tableau in (99). The constraint called REDUCE represents whatever it is that motivates vowel reduction. In the intensive form shown here, reduction in the base alone (99a) is blocked, because it would render the BASE and RED non-identical. A possible way to maintain identity would be to reduce both copies, but this fatally violates the high-ranking positional faithfulness constraint (99b) that protects the initial syllable from reduction.<sup>25</sup> The optimal solution is to reduce neither (99c). If this is the right analysis, then it is the failure of reduction in the base is due to the impossibility of reducing the reduplicant, which can only be stated with some notion of BR faithfulness.

(99) Backcopying analysis (McCarthy & Prince 1995)

	/RED-Wič-l'i/	FAITH-Initial-Syllable	FAITH <sub>BR</sub>	REDUCE
	Wəč-Wəč-l'i	*		
	Wič-Wəč-l'i		*	*
☞	Wič-Wič-l'i			**

<sup>22</sup> Klamath vowel reduction has been discussed extensively in the linguistics literature. See e.g. Kisseberth 1972; Kean 1973, 1975; White 1973; Thomas 1975; Feinstein & Vago 1981; Clements & Keyser 1983).

<sup>23</sup> In fact, it is ambiguous between prefixing and suffixing since it is full reduplication and no other prefixes intervene between it and the root.

<sup>24</sup> /M, N, L, W, Y/ are voiceless sonorants (Barker 1963:13)

<sup>25</sup> McCarthy & Prince (1995:348) don't specify the type of faithfulness involved; if both prefixes and reduplicants are subject to word-initial faithfulness to the input vowel, then both FAITH<sub>IO</sub>-Initial Syllable and FAITH<sub>IR</sub>-Initial Syllable would appear necessary.

This analysis has two major drawbacks, however. First, it arbitrarily relates the failure of reduction to the need for identity in reduplication, despite the fact that reduction failure is also observed in some nonreduplicative contexts – and despite the fact that reduction does apply in some reduplicative contexts.

A more complete description of the contexts in which reduction applies reveals the broader generalization that Reduction/Deletion never applies root-internally or to suffixes (White 1973; Thomas 1975). These are both contexts where BR identity is not at stake:

(100) Reduction/Deletion is not triggered root internally (data from White 1973)

c'aw'ig-a	'is crazy, goes crazy'	*c'awga
m'otc'oc'o:y-a	'smiles, grins'	*m'otcc'o:ya
nkililk'-a	'is dusty'	*nkilalk'a
p'iling-a	'secretes a sweet sap'	*pilanga
q'ambolw'-a	'it buds'	*q'ambəlw'a
sdaqbong-s	'a leech'	*sdaqbəngs
tonip	'five'	*tonəp
t'op'e-s	'mud'	*t'opəs

(101) Reduction/Deletion is not triggered in suffixes (root is underlined):

<u>bo:s</u> -dgi-di:l-a <sup>26</sup>	<u>bo:s</u> - <b>dgi</b> -di:l-a	'turns black underneath'	G141
	* <u>bo:s</u> - <b>dg</b> -di:l-a		
se- <u>tpek</u> -bli-bg-a	se- <u>tpek</u> - <b>bli</b> -pg-a	'reaches back of oneself'	G155
	*se- <u>tpek</u> - <b>blə</b> -pg-a		

In addition to the failure of reduction outside of reduplication, there are also contexts where reduction and reduplication go hand in hand. Klamath has another reduplicative affix, the Distributive, which (unlike the Intensive) does trigger Reduction/Deletion. McCarthy & Prince (1995) distinguish the Distributive pattern from the Intensive pattern by ranking FAITH<sub>BR</sub> for the Distributive reduplicant below REDUCE. The fact that the Intensive fails to trigger reduction is an arbitrary consequence of constraint re-ranking.

(102) Reduction/Deletion is not triggered by the INTENSIVE reduplicant (a-b):

a. gic-tgi	'becomes tight'	gic- <u>gic</u> -li	'tight' (int)
b. k'at'-sga	'tooth falls out'	k'at- <u>k'at</u> '-a	'teeth chatter' (int)

Reduction/Deletion *is* triggered by the DISTRIBUTIVE reduplicant (c-d):

c. qlin	'choke'	qli- <u>qlən</u>	'DISTRIBUTIVE-choke'
d. pag-a	'barks'	pa- <u>pg</u> -a	'DISTRIBUTIVE-bark'

These facts call for a reconsideration of the backcopying analysis of intensive reduplication, since the presence or absence of Reduction/Deletion is not generally a function of identity considerations in Klamath.

<sup>26</sup> The *i* in *-dgi* is not due to reduplication. cf. *bemtgi* 'is confused' from /bem'-dgi/ (Barker 1964: 141).

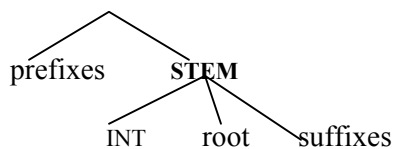
Of even greater concern for the backcopying analysis is an incorrect prediction that it generates. Recall that on the backcopying analysis of simple reduplicated stems, Reduction/Deletion is blocked in the reduplicant because it is word-initial and in the BASE because of BR identity (103). The backcopying analysis therefore predicts, that when RED is *not* word-initial, and thus not protected by positional faithfulness, reduction *will* occur in both RED and BASE (McCarthy & Prince (1995:349)). However, as illustrated by the actual form in (103), when an intensive is prefixed, it is only the syllable immediately following the prefix that reduces.<sup>27</sup>

(103) A prefixed reduplicated stem: only one application of reduction

/Wič/	‘be stiff’	
Wič-Wič-l’i	‘stiff’	D458
Wi- <u>Wəč</u> -Wičl’i	‘d. stiff’	G121
cf. * Wi-Wəč-Wəč-l’i	prediction of backcopying analysis	

In summary, while the intensive does not trigger reduction in the same way as other prefixes, its failure to trigger the process does not seem to be the result of BR identity. We propose, building on Barker 1964 and White 1973, that the apparently special behavior of the intensive morpheme is due to the fact that it is not a stem-external “prefix”, but rather a stem-*internal* morpheme.<sup>28</sup>

(104) Simplified structure of the verb:



Crucially, Reduction/Deletion is triggered only by prefixes, and not by Stem-internal morphemes. Under this analysis, since the stem is not a domain in which Reduction/Deletion applies at all, the absence of Reduction/Deletion in the Intensive simply reflects normal non-application of a phonological process.

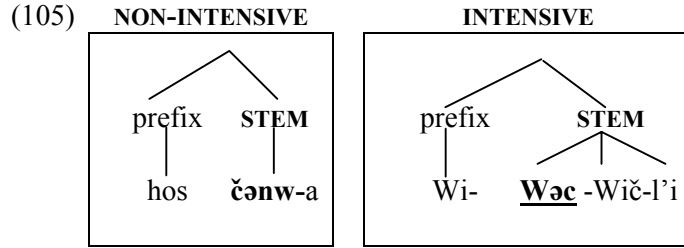
The proposed solution encounters none of the problems of the back-copying analysis. Most importantly, the analysis is descriptively adequate. It predicts that in prefixed intensives only the first

<sup>27</sup> There are some reduplicated forms where both copies appear to be reduced upon prefixation, including the one (below, a) cited by McCarthy & Prince (1995:349) in support of backcopying. However, further investigation suggests that backcopying is not what is occurring. An exhaustive search of Barker 1964 reveals that there are no examples that show the expected alternation with an unprefixed counterpart that has a full, unreduced vowel in the second copy. As the examples below illustrate, either the unprefixed form shows a regular Reduction/Deletion pattern targeting the second syllable (a), or there is no unprefixed form given (b). The predicted alternation between a reduced prefixed form and an unreduced plain form is unattested.

a.	/čiq’/	‘shake out, beat out, comb’	čiq-čq’a	‘shakes (as a house in the wind)’	D76
			sw’i-čəq-čq’-a	‘shakes the head (as a horse)’	
			sni-čəq-čq’-a	‘shakes something (as a rattle)’	
b.	/k’ač’/	<i>the only form is</i>	tga-k’əč-kč’-a	‘stands from earth to sky (said of a character in a myth)’	D197

<sup>28</sup> The intensive “morph” might even follow the root, since it is full reduplication and no other prefixes intervene between it and the root. In this case it would be even less surprising that it did not behave like the prefixes.

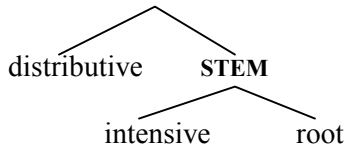
copy will be targeted, since in normal application only the syllable immediately following the stem-external prefix is expected to reduce:



Second, the proposed solution provides a unitary explanation for the failure of Reduction/Deletion in intensives as well as roots and suffixes where identity is not at stake. The intensive, the root and the suffixes are all part of the same morphological constituent (Stem), and constitute a unified domain for phonological generalizations.

Finally, the proposed morphological analysis explains why only the Intensive fails to trigger Reduction/Deletion. The Intensive is adjacent to the root and thus can be part of the same morphological constituent headed by the root. The distant Distributive, which does trigger reduction/deletion, cannot share the phonology of the stem without also including the Intensive.

(106) The [DISTRIBUTIVE + root] cannot form a constituent that excludes the INTENSIVE.



In summary, Klamath is a case of *normal non-application* of Reduction/Deletion stem-internally, not backcopying underapplication. The proposed morphological analysis yields a unified account of the contexts in which reduction/deletion does and does not apply, provides a principled motivation for the difference between the two kinds of reduplication in Klamath, and most importantly correctly accounts for the behavior of prefixed intensive verbs. Klamath therefore does not motivate the base reduplicant correspondence relation that is central to BR Correspondence Theory.

### 6.3 Tagalog nasal fusion

McCarthy & Prince (1995) argue that Tagalog shows the backcopying overapplication of nasal fusion alluded to briefly above. Nasal fusion is conditioned by certain prefixes ending in the velar nasal (“ng” in standard orthography), and results in the following alternations:

(107) Nasal fusion in Tagalog:

/ŋ/ + /p,k,t,s/ → /m,ng,n,n/  
 /ŋ/ + /b, ?/ → /m, ŋ/ (optional)

The following examples from Bloomfield 1933 (108a), Schachter & Otnes 1972 and English 1986 (108b) illustrate the application of nasal fusion in simple prefixed forms and its apparent overapplication in prefixed reduplicated forms:

- |       |    |                         |                         |    |               |                            |
|-------|----|-------------------------|-------------------------|----|---------------|----------------------------|
| (108) | a. | putul                   | 'cut (n.)               | b. | ibig          | 'love'                     |
|       |    | pa-mutul < /pang-putul/ | 'that used for cutting' |    | mang-ibig     | 'to court, to be a suitor' |
|       |    | pa-mu-mutul             | 'a cutting in quantity' |    | ma-ngi-ngibig | 'beau, suitor'             |

The BR-Correspondence Theory analysis of nasal fusion overapplication as backcopying rests on the following morphological analysis of prefixed reduplicated forms (McCarthy & Prince 1995:60):

- (109) Prefixing analysis: /Pfx-RED-Stem/

On this analysis, nasal fusion applies at the external juncture between prefix and reduplicant, such that the *only* account of its application in the base (=Stem) is backcopying, necessarily mediated through BR correspondence. The input and candidates below illustrate the logic of the analysis:

- (110) Sample input: /mang-RED-saway/  
 \* mang-sa-sayaw    *No nasal fusion at mang-RED boundary*  
 \* ma-na-sayaw    *Nasal fusion applies at B-R boundary, but B-R identity is violated*  
 ☞ ma-na-nayang    *Nasal fusion applies; B-R identity maintained by backcopying*

There is, however, an alternative approach to the Tagalog facts which rests on a different assumption about the internal structure of prefixed reduplicated stems. As suggested by such researchers as Aronoff (1988), Booij & Lieber (1993), Carrier-Duncan (1984), Lathroum (1991), Cole (1994), and French (1988), it is equally possible to view the reduplicant as an infix – in which case the backcopying argument disappears.<sup>29</sup>

- (111) Infixing analysis: /RED-Pfx-Stem/

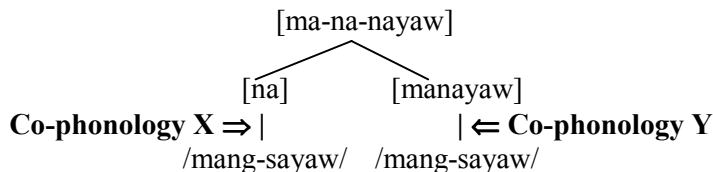
On this account, nasal fusion would apply in the normal manner at the Pfx-Stem boundary – and would thus be present in the input to infixing CV reduplication.

- (112) mang-sayaw → manayang → ma-na-nayang  
*Prefixation                      Nasal Fusion                      Reduplication*

☞ *Nasal fusion doubling is ordinary reduplication, not (backcopying) overapplication.*

On a Morphological Doubling Theory account, the Infixation analysis operates on prefixed stems. Thus each stem in the reduplication construction contains the environment for nasal fusion:

- (113) Infixation analysis, in Morphological Doubling Theory



*Cophonologies X, Y: NC<sub>i</sub> in the input corresponds to N<sub>i</sub> in the output (oversimplified)*

<sup>29</sup> In an Morphological Doubling Theory analysis, there is of course no morpheme RED; the abbreviation “RED” in (111) should be interpreted only to mean that reduplication (however implemented) applies to the output of prefixation, despite being phonologically infixal to the right of the prefix.

The details of accomplishing infixing reduplication are complicated and we will not go into them here.<sup>30</sup> What is important is that, just as in the Dakota example discussed above, on this analysis the doubling of nasal fusion is simply two independent normal applications of the same alternation. What makes this case noteworthy is not overapplication per se but opacity: like Dakota palatalization, Tagalog nasal fusion applies whenever there is a triggering sequence *in the input*.

We now have two competing analyses, one (the Prefixing analysis) which assumes backcopying and one (the Infixing analysis) which does not. Previous discussions have simply assumed one analysis or the other without providing morphological arguments. The question before us now is whether independent analysis can be found within Tagalog to deciding between these competing hypothesis.

### 6.3.1 Morphological arguments for Infixation

We contend that there are strong morphological and phonological arguments favoring the Infixation hypothesis over the Prefixation hypothesis – that is, favoring the claim that reduplication operates on the output of prefixation. The first morphological argument involves an asymmetry between reduplication and prefixation. If prefixation operates on a reduplicated stem, then we expect the reduplicated stem to exist on its own. Conversely, if reduplication operates on a prefixed stem, then we expect the prefixed stem to exist on its own. The facts are consistent with the latter expectation. As illustrated in (114), there are a number of prefixed reduplicated stems for which there is an unreduplicated counterpart but not an unprefixated counterpart. Examples are taken from Schachter & Otones 1972) and English (1986):

(114)

	<i>Reduplicated mang- Stem</i>	<i>mang- Stem</i>	<i>Plain stem</i>
a.	ma- <u>ma</u> -mayan 'resident of a city or town'	ma-mayan 'live or reside in a town'	mayan 'town'
b.	ma- <u>ngi</u> -ngibig 'beau, suitor'	ma-ngibig 'to court, to be a suitor'	ngibig 'love, fondness, affection'
c.	ma- <u>na</u> -nahi 'one who sews; tailor, seamstress...'	ma-nahi 'to engage in sewing'	nahi 'sew'
d.	ma- <u>na</u> -nayaw 'a professional dancer'	ma-nayaw 'to take up dancing as a profession'	nayaw 'dance(n.)'
e.	man- <u>da</u> -rambong 'looter, plunderer, pillager'	man-dambong 'to loot, plunder'	dambong 'loot, plunder (n.)'
	ma- <u>nga</u> -ngalakal 'trader, merchant, businessman'	ma-ngalakal 'to engage in trading or commerce'	ngalakal 'merchandise, commodity'

Since the prefixed stem exists independently but the reduplicated stem does not, it is logical to assume (in the absence of evidence to the contrary) that reduplication operates on prefixed stems.

The second morphological argument is semantic. When one looks at the semantics of the bare stem, the prefixed stem and the reduplicated prefixed stem, as in (114), it appears that the agentive meaning of the reduplicated prefixed stem is predictable from the meaning of the prefixed stem, while the meaning of the prefixed stem is not always predictable from the meaning of the bare root. This suggests that the reduplicated prefixed stems are derived from the prefixed stems, as the Infixation account predicts. If they were instead derived by *mang*-prefixation from reduplicated stems, their semantic closeness to the plain prefixed stems would be unexpected.

<sup>30</sup> There are a variety of proposals in the literature as to what exactly the reduplicant is infixing to in Tagalog. Aronoff (1988) proposes the morphological head, Booij & Lieber (1993) the minimal prosodic word, and Cole (1994) the prosodic word corresponding to the morphological stem.



### 6.3.2 Phonological arguments for Infixation account

The phonological evidence also supports the Infixation account over the Prefixation account. As shown in (115), some stems with disyllabic prefixes show variation in the location of the reduplicant, which occurs either between the prefix and stem or between the two syllables of the prefix. From Schachter & Otanes 1972:<sup>31</sup>

(115)	Basic form	Contemplated aspect	
		Stem reduplication	Second syllable reduplication
	/ika-takbo/	→ ika-ta-takbo	i-ka-katakbo
		‘will cause to run’	
	/ipag-linis/	→ ipag-li-linis	i-pa-paglinis
		‘will clean for’	

The appearance of reduplication in the middle of the prefix is completely unexpected on the Prefixation account, but makes much more sense on the Infixation account. If reduplication is already analyzed as an infix in the majority of cases in which the prefix is monosyllabic, it is hardly surprising that the description of the infixation site is ambiguous between “after the first morpheme (=prefix)” and “after the first syllable”. In (115) both possibilities are instantiated.

In summary, the claim that Tagalog exhibits backcopying presupposes a morphological analysis which turns out to be incorrect. Once it is recognized that reduplication is actually infixing, the doubling of nasal fusion exhibited in prefixed reduplicated stems becomes a simple case of normal application of the same alternation. Nasal fusion is conditioned independently (albeit opaquely) in both stem and reduplicant.

### 6.4 Chumash

McCarthy & Prince (1995:60) cite the following (Ineseño) Chumash forms, from Applegate (1976), as examples of backcopying. What is striking about these forms is that a prefix-final consonant which becomes the onset of the reduplicant is apparently copied back onto the base:

(116)	Plain	Reduplicated		
	s-ikuk	<u>s</u> iksikuk	‘he is chopping, hacking’	A76:279
	s-iš-expeč	si <u>š</u> exšexpeč	‘they two are singing’	A76:279
	k-ʔaniš	<u>k</u> ʔankʔaniš	‘my paternal uncles’	A76:279

The backcopying pattern emerges only when the stem is vowel-initial and the preceding prefix is consonant-final. Otherwise, as in the following examples of reduplicated consonant-initial stems, ordinary CVC stem reduplication results (Applegate 1972):

(117)	Plain	Reduplicated		
	s-cʔimutelew	scʔ <u>i</u> mcʔimutelew	‘he nibbles at it’	A72:384
	s-kitwon	sk <u>i</u> tkitwon	‘it is coming out’	A72:386
	s-wati-lokʔin-š	šwati <u>l</u> oklokʔič	‘it falls apart’	A72:387

In accordance with Applegate’s (1972, 1976) description of Chumash CVC reduplication as stem reduplication, McCarthy & Prince (1995) assume the following morphological analysis of the reduplicated forms in (116) and (117). We term this the “Prefixation” analysis in order to contrast it with another possible approach, presented later:

<sup>31</sup> In other cases, e.g. *magpa-kain* → *magpapakain*, 2<sup>nd</sup> syllable reduplication is the *only* option.

(118) Prefixation analysis: /Pfx-RED-Stem/

On the Prefixation account, the doubling of the prefix-final consonant in (119) is a case of backcopying. The consonant syllabifies as (or fuses with) the onset of the reduplicant syllable, and is backcopied to the following base (= stem).<sup>32</sup> To aid in interpretation, RED is double-underlined.

(119) Sample input: /s-iš-RED-expeč/

- \* s-i.š-e.x-ex.peč      ONSET satisfied, but RED and BASE begin with different segments
- \* s-iš.-ex.-ex.peč      ONSET violated, though BR identity maintained
- ☞ s-i.š-ex.-šex.peč      ONSET satisfied *and* BR identity maintained

This analysis, like McCarthy & Prince's (1995) analysis of Tagalog, represents the kind of overapplication of an external junctural effect that Morphological Doubling Theory cannot describe.

There is, however, an alternative morphological analysis available for Chumash reduplicated stems which does not require backcopying or for that matter any overapplication of junctural effects. This analysis rests on the assumption that Chumash reduplication is (like that in Tagalog) infixing:

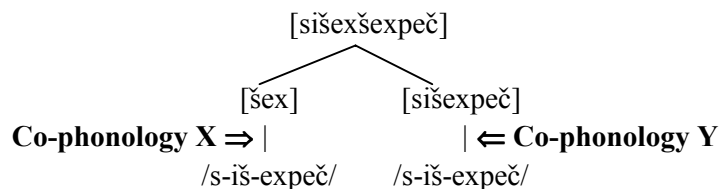
(120) Infixation analysis: /RED-Pfx-Stem/

On this account, reduplication operates on the output of prefixation, so that the reduplicating prefix-final consonants seen above are actually already present, and adjacent to the following stem, in the input to reduplication. Thus prefix resyllabification or fusion is a junctural alternation *internal* to the input to reduplication. Any doubling of such junctural alternations would be the result of reduplication operating on the result of normal application of phonology, rather than overapplication of the kind requiring BR correspondence.

(121) s-iš-expeč                  si.šex.peč                  si.šex.šex.peč  
*Prefixation*    →    *Resyllabification/fusion*    →    *Reduplication*

The example below illustrates an implementation of the Infixation analysis in Morphological Doubling Theory. The inputs to the two stems in the reduplication construction are both prefixed. Each stem thus contains (in its input) the context for the resyllabification/fusion alternation, even though truncation of the first copy renders this context opaque. The mother node cophonology infixes the truncated copy:

(122) Infixation analysis, in Morphological Doubling Theory



*Cophonologies X, Y: prefix-final consonant syllabifies as onset of following syllable*

<sup>32</sup> Note that this analysis requires a prefix-final consonant to be interpreted as part of the morph RED, rather than part of the morph to which it belongs in the input, which is potentially conceptually problematic.

There are now two different morphological hypotheses available for Chumash reduplication. It is either strictly prefixing, in which case backcopying is entailed, or it is infixing, in which case the phonological doubling effects are simply normal application.

The next section assembles morphological arguments from Chumash that distinguish the two hypotheses. The conclusion is that the infixation hypothesis is strongly supported over the prefixation hypothesis. The Infixation account of CVC reduplication is not just a last resort for those theories of reduplication that reject backcopying; it is, in fact, the best analysis of Chumash on *any* approach to reduplication.

#### 6.4.1 Morphology of reduplication

The most thorough accessible description of Ineseño Chumash is Applegate's (1972) Ph.D. dissertation (based primarily on the field notes of J. P. Harrington), in which he discusses six types of reduplication in Chumash. Of these only the most well-known, CVC prefixing reduplication, is discussed here. The dissertation is the best source of information about the morphological structure of complex words. However, most theoretical discussions of Chumash rely on Applegate's short (1976) paper on reduplication, in which morpheme breaks are not given. Such discussions are thus not informed by the morphological evidence to be presented here.

Chumash verbal morphology is heavily prefixing (there are also a small number of suffixes, both derivational and inflectional). Verb prefixes fall into three main classes: inner, outer, personal, with inner prefixes occurring closest to the root and outer prefixes, farthest away. The following is a rough description of the Chumash verb.

(123) Outer prefixes – Personal prefixes – Inner prefixes – [root – suffixes]<sub>Stem</sub>

Only personal prefixes and Inner prefixes interact at all with reduplication. Personal prefixes mark subject person and number (and are identical to possessive markers on nouns). Inner prefixes serve a wide range of functions, including the derivational as well as the inflectional; see Applegate 1972:301 ff.

##### 6.4.1.1 Reduplication as infixing or prefixing?

Although Applegate (1976) describes CVC reduplication as stem reduplication, which is how McCarthy & Prince characterize it, Applegate (1972) carefully documents the involvement of Inner prefixes in CVC reduplication as well:

(124) “With the exception of a few prefixes which regularly shift reduplication to the following morpheme...CVC reduplication falls on the first CVC sequence following person-number markers.” (Applegate 1972:386)

One example in which an Inner prefix is included in the reduplicant is given below, in which the causative *su-* is part of the string of which the initial CVC is reduplicated.<sup>33</sup>

(125)  $k=$  $su-$  $[p\text{še}ʔ]$      $k\text{šup}\text{šup}\text{še}ʔ$     ‘I’m putting out (a fire)’    76.282

Forms like this clearly show that the simple Prefixation picture in (118) cannot be right, since some of the inner prefixes are themselves within the domain of reduplication. To determine the correct morphological analysis of prefixed reduplicated words, it is necessary to understand more fully the behavior of Inner prefixes under reduplication. Applegate (1972) is very helpful in this regard. In his

<sup>33</sup> Applegate doesn't normally provide morpheme glosses, and given the amount of homophony in the system it is risky to try to infer them. In this particular example, *k-* is a 1<sup>st</sup> person singular personal prefix, *su-* is a causative prefix, and *pšeʔ* is a root meaning ‘to be extinguished’.

comprehensive inventory of verbal affixes, Applegate classifies each Inner prefix according to whether or not it can reduplicate.<sup>34</sup> Reduplicatable Inner prefixes (let us call them “Inner<sub>R</sub>”) far outnumber nonreduplicatable (“Inner<sub>N</sub>”) prefixes.

The examples in (126) illustrate the different behaviors of these two types of Inner prefix. In the unreduplicated forms given below, Inner<sub>R</sub> prefixes are double-underlined and Inner<sub>N</sub> prefixes are single-underlined. Reduplicants are bold-faced. (To aid in parsing these forms, Personal prefixes are set off from Inner prefixes with an “=” symbol, and Stems are enclosed in square brackets.) In each case, reduplication, shown by boldface, targets the string beginning with the leftmost Inner<sub>R</sub> prefix, and otherwise the Stem. If this string is vowel-initial, reduplication always takes an immediately preceding consonant as well (as illustrated in the last example in (126a)):

(126) Reduplication targets string beginning with first Inner<sub>R</sub> prefix, else stem

a. Inner<sub>R</sub> prefix-Stem:

<u>ʔal</u> -[aqša+Vn+ʔ]	<b>ʔal</b> ʔalaqšanʔ	‘the dead’	72.210
k= <u>su</u> -[pšeʔ]	<b>kšup</b> šupšeʔ	‘I’m putting out (a fire)’	76.282
k= <u>su</u> -[towič]	<b>kšut</b> šutowič	‘I’m doing it fast’	76.282
ma-iy-al= <u>aqi</u> -[mow+Vn]	mayala <b>laq</b> laqimowowon	‘the fancy ones’	72.387

b. Inner<sub>N</sub> prefix-Stem

s= <u>uti</u> -[lip’in]	sutil <b>lip</b> lip’in	‘the ground is uneven’	72.390
s= <u>wati</u> -[k’ot]	šwatik’ <b>otk</b> ’ot	‘...is broken to pieces’	72.384
s= <u>pili</u> -[paq’]	spil <b>ipa</b> paq’	‘a travelling company splits up (each going his own way)’	72.389
s= <u>ni</u> -[wiy]	šni <b>wiy</b> wiy	‘he is cutting notches on it’	72.384
s-am= <u>ti</u> -[lok’in]	smit <b>lok</b> lok’in	‘they cut it off’	72.387

c. Inner<sub>N</sub> prefix + Inner<sub>R</sub> prefix + Stem

k= <u>sili</u> - <u>pil</u> -[wayan]	ksil <b>ipiw</b> piwayan	‘I want to swing’	72.387
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d. Inner<sub>R</sub> prefix + Inner<sub>N</sub> prefix + Stem

k= <u>xul</u> - <u>ni</u> -[yiw]	<b>kxun</b> xuniyiw	‘I am looking all over for it’	72.384
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Interestingly, even when an Inner<sub>N</sub> prefix intervenes between an Inner<sub>R</sub> prefix and the Stem, reduplication still targets the string beginning with the leftmost Inner<sub>R</sub> prefix – even if that means reduplicating part of the following Inner<sub>N</sub> prefix. This is illustrated in (126d), where fusion between the Inner<sub>R</sub> prefix *pil*- and the (otherwise) nonreduplicating Inner<sub>N</sub> prefix *ni*- results in the reduplication of the initial /n/ of the Inner<sub>N</sub> prefix.

#### 6.4.2 Modeling the split among Inner prefixes

There are two possible accounts for the varying location of reduplication relative to the inner prefixes in the Chumash verb. On the Linear Ordering account, Inner<sub>R</sub> prefixes are linearly ordered closer to the Stem than Inner<sub>N</sub> prefixes, and reduplication is ordered in between the two prefix classes:

<sup>34</sup> For only a minority of cases is supporting evidence given in the dissertation. However, there are examples to back up all of the crucial arguments made here.

(127) Linear Ordering hypothesis: RED attaches between Inner<sub>R</sub> and Inner<sub>N</sub> prefixes

*Outer prefixes – Personal prefixes – Inner<sub>N</sub> prefixes – Reduplication – Inner<sub>R</sub> prefixes – Stem*

The apparent overapplication in Chumash depends on the supposition that the Inner<sub>N</sub> prefixes, whose final consonants are nevertheless sometimes incorporated into the reduplicant, are outside the scope of reduplication. Therefore, the prefixation approach of McCarthy & Prince 1995 assumes something along the lines of this Linear Ordering hypothesis.

The other way to differentiate Inner<sub>R</sub> prefixes from Inner<sub>N</sub> prefixes is not in terms of affix order, but rather depends on possible prosodic affiliation. On this account, Inner<sub>R</sub> prefixes differ from Inner<sub>N</sub> prefixes in that the former, but not the latter, become part of a Prosodic stem, which consists minimally of the material in the morphological stem. To use common terminology, Inner<sub>R</sub> prefixes are “cohering” and Inner<sub>N</sub> prefixes are “noncohering”.

(128) Prosodic Hypothesis: Inner<sub>R</sub> prefixes “cohere” with the prosodic stem; Inner<sub>N</sub> prefixes do not.

*Outer prefixes – Reduplication – Personal prefixes – Inner prefixes – (Morphological) Stem*

On this account, all the phonological material that can potentially reduplicate – including the final consonants of the personal prefixes – are inside the morphological scope of reduplication, and the question of what actually ends up reduplicating is a purely prosodic one.

The prosodic hypothesis clearly correlates with the Infixation approach to reduplication: morphologically the reduplicant can attach outside of all the material that ever potentially reduplicates. The reduplicant is infixed phonologically to, and constitutes the first CVC of, the prosodic stem.

### 6.4.3 Deciding between Prefixation and Infixation hypotheses

The Prefixation hypothesis, with Linear Ordering as its account of the split between Inner<sub>R</sub> and Inner<sub>N</sub> prefixes, makes strikingly different morphological predictions than the Infixation hypothesis, which draws a purely prosodic distinction between Inner<sub>R</sub> and Inner<sub>N</sub> prefixes. Fortunately, enough information about Chumash morphology is available to be able to test the predictions against the data. As it turns out, the evidence strongly favors the Infixation hypothesis.

The first area in which the two hypotheses diverge is in predicting the relative order of Inner<sub>R</sub> and Inner<sub>N</sub> prefixes. By definition, the Prefixation hypothesis requires that all Inner<sub>R</sub> prefixes be ordered after (closer to the stem than) all Inner<sub>N</sub> prefixes. The Infixation hypothesis makes no such prediction, as it makes no claims about the relative ordering of Inner<sub>R</sub> and Inner<sub>N</sub> prefixes.

The second dimension of difference is semantic. Since the Prefixation hypothesis situates reduplication outside of Inner<sub>R</sub> prefixes but inside Inner<sub>N</sub> prefixes, the expectation is that Inner<sub>R</sub> prefixes, but not Inner<sub>N</sub> prefixes, will be inside the semantic scope of reduplication. By contrast, the Infixation hypothesis situates reduplication outside *all* Inner prefixes, predicting them all to be within the semantic scope of reduplication.

These predictions are summarized schematically below:

	Affix ordering	Semantic scope
Prefixation/ Linear Ordering	predicts fixed partial ordering of inner prefixes	Some inner prefixes in, others outside semantic scope of reduplication
Infixation/ Prosodic	makes no predictions about relative ordering of inner prefixes	All inner prefixes inside semantic scope of reduplication

### 6.4.3.1 Evidence from affix ordering

Applegate (1972) devotes over 60 pages to the Inner prefixes alone, dividing them into a number of rough position classes which correlate (imperfectly) with syntactic function and semantic transparency. Although there are not as many clear examples containing both Inner<sub>R</sub> and Inner<sub>N</sub> prefixes as one would like, the forms that do exist give the clear impression that there is no fixed linear ordering between these two prefix classes.

Many of these examples involve the ubiquitous and highly productive Inner<sub>R</sub> prefix *su-*, which appears in many of the complex verbs cited by Applegate. The status of *su-* as an Inner<sub>R</sub> prefix, illustrated earlier in (125) and (126), is documented again in (130):

(130) Causative *su-* reduplicates:

a.	k= <u>su</u> -[pšeʔ]	kš <u>up</u> šupšeʔ	‘I’m putting out (a fire)’	76.282
b.	k= <u>su</u> -[towič]	kš <u>ut</u> šutowič	‘I’m doing it fast’	76.282

In the examples below, *su-* is shown preceding other prefixes which according to Applegate’s classification are Inner<sub>N</sub> prefixes.<sup>35</sup>

(131) a.	/maq- <u>su</u> -ni-[apay]/	[maqsunapay]	‘to raise a line or rope; to string a bow’	72:379
	/wi- <u>su</u> -ni-[apay]/	[wisunapay]	‘[sea] to cast ashore’	72:383
b.	/k= <u>su</u> - <u>wati</u> -[lok’in]/	[ksuwatilo’k’in]	‘I cut it in passing (I’ll be back for it later)’	72:368
c.	/s <u>u</u> - <u>ti</u> -[wiy]/	[sutiwiy]	‘to sing a charm, spell’	72:324
	/s <u>u</u> - <u>waš</u> - <u>ti</u> -aq-[pey]/	[šuwēšteqpey]	‘to mend, fix’	72:383
d.	/maq- <u>su</u> - <u>al</u> -ʔal-[apay]/	[maqsal’alapy]	‘to pull up on a garment (e.g. a belt)’ (‘to be up, above’)	72:348

The proof that *ni-* (131a), *wati-* (131b), *ti-* (131c), and *al-* (131d) are Inner<sub>N</sub> prefixes is given in (132). Each of them “shifts” reduplication to the right, the defining property of Inner<sub>N</sub> prefixes:

(132) a.	k= <u>ni</u> -[č’eq]	knič’eqč’eq	‘I’m tearing it up’	76.282
	<u>ni</u> -[p <sup>h</sup> at]	nip <sup>h</sup> atp <sup>h</sup> at	‘to break to pieces’	72.390
b.	s= <u>ni</u> -[wiy]	šniwiywiy	‘he is cutting notches on it’ ‘he is notching it’	72.384 76.282
	/s= <u>wati</u> -[k’ot]/	swatik’otk’ot aksukuy’		72:384
c.	/s= <u>wati</u> -[lok’in-š]/	šwatiloklok’ič	‘it falls apart’	72:388
	/s-am= <u>ti</u> -[lok’in]/	smtiloklok’in	‘they cut it off’	72:387
d.	/ma-iy- <u>al</u> - <u>aqi</u> -[mow-Vn]/	mayalaq <sup>36</sup> laqimowowon	‘the fancy ones’	72:387

The inescapable conclusion is that *su-*, clearly an Inner<sub>R</sub> prefix, can linearly precede at least four different Inner<sub>N</sub> prefixes. This is contrary to the predictions of the Prefixation account, and therefore supports the Infixation account of reduplication.<sup>37</sup>

<sup>35</sup> There is some homophony among the prefixes. Lack of underlining in an Inner prefix indicates our uncertainty as to its identity and therefore its classification as Inner<sub>R</sub> and Inner<sub>N</sub>.

<sup>36</sup> This particular form shows final VC reduplication (*mowon* → *mowo-wo-n*) in addition to CVC prefixing reduplication. The initial *ma-* is an outer prefix.

<sup>37</sup> In an affix ordering chart on p. 380, Applegate states that *ni-* precedes *su-*, a claim apparently borne out by such examples as

*su-* is not the only Inner<sub>R</sub> prefix with which one can make this point. Consider, for instance, the example below. Here, the prefix *ni-*, whose Inner<sub>N</sub> status is documented in (132a), is preceded by the prefix *xul-*. Its Inner<sub>R</sub> status is proved by the fact that it reduplicates in this very form:<sup>38</sup>

(133) /k=xul-ni-[yiw]/      **kxunxuniyiw**      ‘I am looking all over for it’      72:384

In conclusion, the Prefixation account predicts that Inner<sub>N</sub> prefixes should be ordered linearly before Inner<sub>R</sub> prefixes. While this is often true, it is also often *not* true, as the examples in (131) and (133) indicate. Only the Infixation account is consistent with the morphological evidence from affix ordering.

#### 6.4.3.2 Evidence from semantic scope

We turn next to the question of the semantic scope of reduplication. Applegate (1972:383-84) describes the semantic function of verb reduplication as follows:

(134) “Syntactically reduplicated verbs, unless they are used in some idiomatic sense, have a repetitive, distributive, intensive, or continuative force; it is often not directly reflected in the gloss.”

Illustrative examples are given below:<sup>39</sup>

(135)	<u>Plain</u>	<u>Reduplicated</u>	
a. /s= <u>tal</u> -[memen]/	štelmemen ‘he touches it’	šteltelmemen ‘he [is] groping around’	1972:384
b. /s= <u>wati</u> -[k’ot]/	[swatik’ot (haspu)] ‘(my arm) is broken’	swatik’otk’ot (aksukuy’) ‘(my stone jar) is broken to pieces’	1972:384
c. /[p’ow]/	p’ow ‘to bend, be bent’	<b>p’owp’ow</b> ‘to zigzag’	1972:390
d. / <u>ni</u> -[p <sup>h</sup> at]/	nip <sup>h</sup> at ‘to take apart’	<b>nip<sup>h</sup>atp<sup>h</sup>at</b> ‘to break to pieces’	1972:390
e. /( <u>s</u> )= <u>uti</u> -[lip’in]/	utilip’in ‘to cave in’	sutilip <sup>l</sup> ip’in ‘the ground is uneven’	1972:390

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/ <u>ni</u> - <u>su</u> -wal-tun/	[nisuwatun]	‘to put something over something else’	72:332
/ <u>ni</u> - <u>su</u> -tap/		‘to put into; to stuff (e.g. a doll)’	72:332

It is not clear what to make of the fact that *ni-* and *su-* can apparently occur in either order. Several possibilities come to mind (e.g. different orderings with different meanings, two different *su-* prefixes, or two different *ni-* prefixes (Chumash has other cases of homophonous prefixes), but it is impossible to decide among these on the basis of the available data. A similar discrepancy involves *su-* and *wati-*, which are shown below in the opposite relative order from what is exhibited in (131).

/wati-su-[axsil-š]/      [watišaxšilš]      ‘to go fishing every now and then’      72:383

<sup>38</sup> Applegate does not gloss the individual morphemes in (133). Elsewhere (e.g. pp. 353, 379) he glosses *xul-* as a reduplicating prefix meaning ‘of, with heat’ with possible metaphorical extensions to anger. Neither meaning appears to be implicated in this example, however.

<sup>39</sup> The surface form of ‘my arm is broken’ is constructed from Applegate’s underlying representation, but there is no reason to doubt it.

It appears from these examples that the linear position of the reduplicant is *not* correlating with semantic scope. In particular, Inner<sub>N</sub> prefixes, which are outside the *phonological* scope of reduplication appear to be within the *semantic* scope of reduplication. Consider the Inner<sub>N</sub> prefix *wati-* in (135b). Although it is not reduplicated phonologically, it appears to be within the scope of reduplication. According to Applegate *wati-* means ‘apart, of disintegration’, which is transparent in the unreduplicated word *swatik’ot* ‘is broken’. Judging by the meaning of the reduplicated verb with *wati-*, i.e. *swatik’otk’ot*, reduplication is acting semantically on the prefixed verb. ‘is broken to pieces’ is the expected result of applying a distributive suffix to a form meaning ‘is broken’. This is exactly as the Infixation account would predict. By contrast, the Prefixation account would predict *wati-* to attach after reduplication, and therefore to be outside its semantic scope.

To take one more case, consider the inceptive Inner<sub>N</sub> prefix *uti-* in (135e). In the unreduplicated verb *utilip’in* ‘to cave in’, the inceptive meaning of *uti-* is clear. Yet its meaning is obscured in the reduplicated form of this verb, suggesting that reduplication is the outermost process. If, as on the Prefixation account, *uti-* prefixation followed reduplication, we would expect the output to have transparent inceptive semantics, yet it does not. Both of these cases support the Infixation hypothesis.

Of the two arguments for infixation, the semantic argument is the weaker, in part because so little information is available. If a clear case can be made that a given Inner<sub>N</sub> prefix cannot be inside the scope of reduplication, the support for the Infixation account over the Prefixation account would of course be weakened. However, it is still the case that all of the affix ordering and semantic facts we have come across so far – and documented here – favor the Infixation account; these facts will always be problematic for the Prefixation account that backcopying analyses must presuppose.

### 6.4.3.3 Summary

Morphological evidence strongly supports a structure for prefixed reduplicated Chumash verbs in which the reduplicant is morphologically outermost, positioned internally by phonological means (which we have not yet seen). This is consistent with Applegate’s (1972:278) characterization of CVC reduplication as “a very low-level process which applies to the output of the main block of phonological rules.” We assume that reduplication is a morphological construction, not a phonological rule – i.e. that it adds a morphological layer to the word – but agree with the late ordering proposal.

The consequence of this conclusion is that backcopying is no longer a viable, much less a necessary, analysis of Chumash reduplication. Backcopying depends on the assumption that the prefix whose final consonant is doubled is not linearly adjacent to the BASE string in the input. This assumption is what makes the copying of the prefix-final consonant unexpected. But we have shown that in fact the prefix-final consonant is adjacent to the target of reduplication in the input. Its doubling is the result of normal application of syllabification and fusion phonology. Consonant doubling is not backcopying. There is no need for BR correspondence in Chumash.

## 7 CONCLUSION

The main elements of Morphological Doubling Theory are summarized below.

1. *Reduplication is a construction which calls for morphosyntactically identical daughters.* This claim is motivated by constructions in which base and reduplicant contain different morphs but are nonetheless in perfect morphosyntactic agreement (section 4).
2. *There is no morpheme RED.* A reduplicant is not a phonologically underspecified morpheme. This claim has been made independently by others, e.g. Yip (1995); Raimy & Idsardi (1997); Raimy (1999), for other reasons. What motivates us in making this claim is evidence (explored in section 4) that reduplicants can be morphologically complex.



3. *Phonological RED-BASE similarity is epiphenomenal.* The grammar does *not* enforce phonological identity. There is no phonological copying operation to supply the reduplicant with material identical to that of the base; there is no phonological base-reduplicant correspondence. Phonological similarity between reduplicant and base simply follows, when it occurs, from morphosyntactic identity requirements and similar cophologies.

Morphological Doubling Theory, which permits base and reduplicant to differ morphotactically, is more descriptively adequate than theories of reduplication in which the reduplicant is solely dependent for its content on the output (or input) of the base. On the other hand, because phonological correspondence in MDT is restricted to input-output faithfulness, it is more constrained than both the Full and Extended models of reduplication that have been proposed in Correspondence Theory.

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