

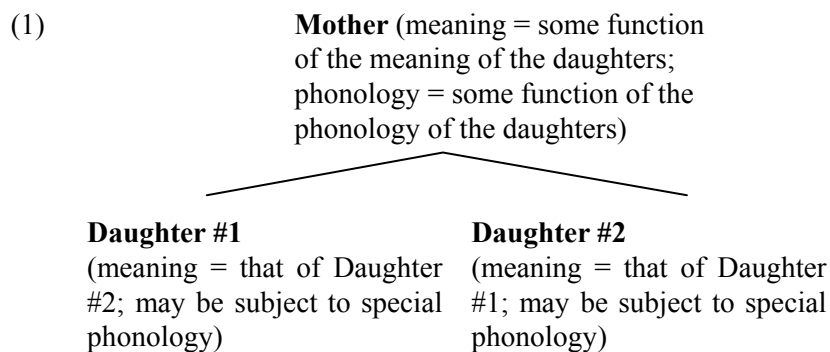
Morphological Doubling Theory: Evidence for morphological doubling in reduplication

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1. Introduction *

This paper introduces and motivates Morphological Doubling Theory by focusing on the morphological evidence for viewing reduplication as a morphological construction whose daughters are constrained to be morphosemantically identical.

In Morphological Doubling Theory, reduplication is viewed as the double (or multiple) occurrence of a morphological constituent meeting a particular morphosemantic description. Morphological Doubling Theory thus departs from previous theories in which the reduplicant is treated as an abstract morpheme, RED, whose substance is provided by phonological copying (e.g. Marantz 1982, Steriade 1988) or correspondence (e.g. McCarthy and Prince 1995). In Morphological Doubling Theory, reduplicant and base are both generated by the morphology as part of a construction which also embodies semantic and phonological generalizations about the output of reduplication:

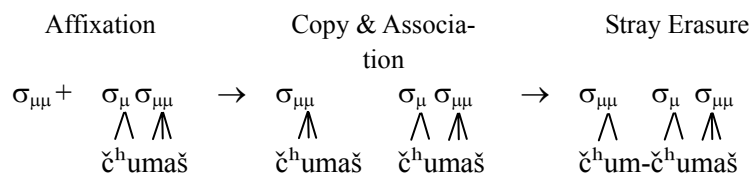


The same morphological structure is assigned to partial and to total reduplication, which differ solely in whether or not one of the daughters is phonologically truncated.

2. Phonological identity approaches

Previous approaches treat reduplication as phonological copying motivated by the need to segmentally flesh out a skeletal RED morpheme. The examples below, using the Chumash form for ‘islanders’ (Applegate 1976), illustrate preposed partial reduplication. Example (2) represents the derivational approach taken in the 1980’s (e.g. Marantz 1982, McCarthy and Prince 1999, Steriade 1988); RED, a skeletal bimoraic syllable, is fleshed out by copying the base segments and associating the copies by rule to RED. Any leftover segments are stray-erased. In (3), representing the more recent Base-Reduplication Correspondence Theory (BRCT) approach to reduplication in the Optimality Theory literature (e.g. McCarthy and Prince 1993, 1995), RED is a morpheme constrained, by RED= $\sigma_{\mu\mu}$, to instantiate a bimoraic syllable and, by FAITH_{BR}, to correspond segmentally to the material in the base. FAITH_{IO} » FAITH_{BR} prevents the base from truncating.

(2) Derivational approach: reduplication by copying



(3) Correspondence Theory: reduplication by correspondence

	RED, $\check{c}^h\text{uma}\check{s}$	FAITH _{IO}	RED = $\sigma_{\mu\mu}$	FAITH _{BR}
☞ a.	$\check{c}^h\text{um}-\check{c}^h\text{uma}\check{s}$			aš
b.	$\check{c}^h\text{uma}\check{s}-\check{c}^h\text{uma}\check{s}$		aš!	
c.	$\check{c}^h\text{um}-\check{c}^h\text{um}$	aš!		



For the remainder of this paper, phonological doubling theories will be represented by BRCT, as spelled out in McCarthy and Prince 1995.

3. Overall motivation for MDT

The argument for Morphological Doubling Theory (MDT), also articulated in Inkelas and Zoll (to appear) and Zoll 2002, is as follows:



- a) MDT is necessary: there are data that must be analyzed using MDT and which are inconsistent with BRCT.
- b) MDT is sufficient: there are no data that require BRCT for their analysis and which are inconsistent with MDT.
- c) MDT is more restrictive than BRCT, which overgenerates, predicting unattested types of reduplication patterns.

If these arguments hold up, Occam's razor supports choosing Morphological Doubling as the analysis of all cases of reduplication.

The present paper focuses on the first of these three arguments. The second is too lengthy to be attempted here, though see Inkelas and Zoll (to appear), Zoll 2002. The third argument appears briefly towards the end of the paper.



4. Comparison

The key assumption of MDT is that daughters in a reduplication construction are semantically identical. Phonological identity is not presupposed or required. As methods of generating reduplicated structures, MDT and BRCT differ in a number of important ways, summarized below:

- In MDT, the reduplicant is a potentially complex morphological constituent; in BRCT the reduplicant is monomorphemic
- In MDT, the meaning of a reduplication construction is a property of the mother node, i.e. of the construction as a whole; in BRCT, the reduplicant morpheme has its own fixed meaning
- In MDT, identity between base and reduplicant is semantic; in BRCT, it is phonological
- In MDT, the reduplicant and base are derived from phonologically independent inputs; in BRCT, a single phonological input generates both reduplicant and base

- In MDT, the reduplicant and base have phonologically independent outputs; in BRCT, reduplicant and base are linked on the surface by phonological correspondence

This paper will focus on the first three of these points in arguing for MDT.

5. The morphological argument for MDT

This paper argues on the basis of morphological evidence for the need to model reduplication as morphological doubling. The argument is structured as follows. First, as documented in §6, the existence of affix reduplication shows that reduplication can target morphological subconstituents of a word, regardless of phonological size, confirming that what is doubled in reduplication is a morphosemantically defined constituent. Second, as argued in §7, the existence of synonym and antonym constructions shows that grammatical constructions must be able to require semantic similarity (or dissimilarity) of their daughters. Any grammar that can generate nonreduplicative constructions with this ability already has, *we argue*, the ability to generate reduplicative constructions as well, identity being merely a special case of similarity. The argument that reduplication is morphological doubling is completed by the evidence, in §8, that morphological reduplication constructions exist in which base and reduplicant can be quite different phonologically, even to the point of containing different morphemes, as long as they are equivalent semantically; similar evidence from syntactic reduplication is provided in §9. The data discussed in these sections are incompatible with phonological copying approaches to reduplication.



6. Affix reduplication

Ordinary total or partial reduplication of the root or stem of a word, as in the Chumash example mentioned earlier, is generally compatible with both morphological doubling (MDT) and phonological copying approaches to reduplication. Affix reduplication provides a better test of their differences. We *present* here several cases in which what reduplicates is not the entire stem which is input to the reduplication process, nor any phonologically defined subpart of that stem, but instead a particular affix within that stem.



These data support the claim that reduplication is doubling of a morphological constituent, as in MDT.

In Amele (Papuan; Roberts 1987, 1991: 128–29), simultaneous action in verbs is marked by CV reduplication of the verb root (4a) or of an object suffix (-do) (4b), as shown below:

- | | | | | | |
|-----|----|-----------------|-------------------|---------------|---------------|
| (4) | a. | bi-bil-en | ‘as he sat’ | (bil-e-?) | ‘to sit’ |
| | | ḡba-ḡbatan-en | ‘as he split’ | (ḡbatan-e-?) | ‘to split’ |
| | b. | abul-do-do-n | ‘as he struggled’ | (abul-do-?) | ‘to struggle’ |
| | | mele-do-do-n | ‘as he examined’ | (mele-do-?) | ‘to examine’ |



In Dyrirbal (Dixon 1972: 242), nominals are pluralized by reduplicating either the root (5a) or a stem-forming suffix (5b). Root reduplication and affix reduplication have the same semantic effect (5c):

- | | | | |
|-----|----|-------------------------|--------------------------------|
| (5) | a. | midi-midi | ‘lots of little ones’ |
| | | gulgiṛi-gulgiṛi | ‘lots of prettily painted men’ |
| | b. | midi-baḍun-baḍun | ‘lots of very small ones’ |
| | | (bayi) yaṛa-gabun-gabun | ‘lots of other men/strangers’ |
| | c. | midi-midi-baḍun | ‘lots of very small ones’ |
| | | (bayi) yaṛa-yaṛa-gabun | ‘lots of other men/strangers’ |



If we assume that root + object marker, in Amele, and root + stem-forming suffix, in Dyrirbal, form a morphological constituent that we can call a ‘stem’, then the generalization is the same in both languages: reduplication doubles some morphological constituent *within the stem*, irrespective of phonological size or linear position. These cases are not easily described in a framework that attributes reduplication to a particular morpheme with a fixed meaning. The reduplicated elements in Amele and Dyrirbal don’t look like RED morphemes. They don’t have a common phonological shape within each language; in Amele their linear position isn’t even the same. Moreover, the meaning of these reduplication constructions is a property not of the stem-internal morpheme which happens to reduplicate in any given instance, but rather of the construction as a whole. In all of these respects affix reduplication is best described as morphological doubling.

Further evidence that reduplication is morphological constituent doubling, rather than arising from the use of a phonologically empty reduplicative morpheme with its own semantics, comes from triplication, the phenomenon whereby an element is repeated not just once but twice. In Mokilese



(Harrison 1973, 1976), verbs form their statives through suffixing CVX reduplication (e.g. *kadip* ‘to betray’, *kadipdip* ‘treacherous’; Harrison 1973: 424), and their progressives through prefixing CVC reduplication (e.g. *kapang* ‘to see’, *kapkapang* ‘watching’; Harrison 1973: 425). For monosyllabic verbs only, progressives reduplicate twice, resulting in triplication. Transcriptions are orthographic:

(6)	Denotative	Progressive	gloss
	kang	kang-kang-kang	‘eat’
	doau	doau-doau-doau	‘climb’
	soal	soal-soal-soal	‘black’
	daun	D ah-dah-daun	‘fill’
	jahk	J ah-jah-jahk	‘bend’



Harrison considers the possibility that triplication is an anti-homophony strategy aimed at keeping progressive and stative forms of monosyllabic forms distinct; however, he rejects this idea on the evidence that some verbs that undergo progressive triplication are inherently stative and lack a derived stative form. Thus triplication operates even when homophony is not an issue. As Harrison concludes, triplication appears to be a requirement of the progressive construction when the input is monosyllabic.

If reduplication is due to the presence of a meaningful morpheme RED, the double use of RED would be expected to correlate with a semantic change. By contrast, treating reduplication as a construction, with prespecified semantics, that simply requires one of its daughters to appear twice (or thrice) makes no such prediction. The existence of semantically vacuous triplication supports MDT.

7. Identity effects

A number of morphological constructions require semantic identity, semantic similarity or (in some cases) semantic dissimilarity between their daughters. These constructions are not normally called reduplicative (though see Singh 1982 on Hindi), since the daughters can in some cases differ semantically as well as, crucially, phonologically. However, as we argue, any theory with the ability to model these constructions already has the ability

to model reduplication, and does not need recourse to extra mechanisms like a RED morpheme or base-reduplication correspondence.

Khmer (Ourn and Haiman 2000: 485, 500–502) and Vietnamese (Ourn and Haiman 2000, Nguyen 1997: 67, 70) both exhibit what we may call ‘synonym compounding’ in which the two members of the compound are phonologically distinct, perhaps etymologically distinct synonyms (e.g. *peel-weeliə* ‘time’, from Sanskrit *peel* ‘time’ + Pali *weeliə* ‘time’; Ourn & Haiman, p. 485). The meaning of these constructions in Khmer can be lexicalized, as in the first two lines of (7a), but frequently are the same as the meaning of the individual parts.

(7) a. Khmer synonym compounds

cah-tum	‘old + mature’	‘village elder’
kee-mərdək	‘heritage + heritage’	‘legacy’
cəmnəj-ʔahaa(r)	‘food + food’	‘food’
ʔaar-kambəj	‘secret + secret’	‘secret’
cbah- prakat	‘exact + exact’	‘exact’

b. Vietnamese synonym compounds

mạnh-khoẻ	‘strong + strong’	‘well in health’
dơ bẩn	‘dirty + dirty’	‘filthy’
lười-biếng	‘lazy + lazy’	‘slothful’
tội-lỗi	‘offense + fault’	‘sin’
kêu-gọi	‘to call + to call’	‘to call upon, appeal’



Writing about a comparable construction in Hindi, Singh (1982) argues for a reduplication analysis in which a noun is repeated, but in different morphological forms. This is precisely the MDT view of such constructions.

If a reduplication construction can constrain its daughters to be morphosemantically identical, certainly other constructions could constrain daughters to be near-identical or even to have opposing feature values (antonyms). MDT can relate reduplication to these constructions; phonological copying theories cannot. The parallelism is clear in languages like Acehnese. As documented by Durie (1985: 39–44), Acehnese possesses total reduplication (a), partial reduplication (b), a synonym compounding (c) – as well as an antonym construction in which semantic opposites are juxtaposed (d). Constructions (a–c) have the semantics of emphasis; juxtaposition of opposites (d) has a meaning that covers the meanings of both parts:

- (8) a. Total reduplication
 tambô-tambô ‘drum-drum’
 ma-ma ‘mother-mother’
 tuleueng-tuleueng ‘bone-bone’
 jamee-jamee ‘guest-guest’
- b. Partial reduplication
 singöh-ngöh ‘sometime indefinite in the future’
 (cf. singöh ‘tomorrow’)
 bubê-bê ‘as big as’
 (cf. bubê ‘size’)
- c. Suppletive allomorph/synonym constructions:
 irang-irôt ‘zig-zag’
 (cf. irang, irôt ‘skew’)
 kreh=kroh ‘rustling dry sound’
 (cf. kreh, kroh ‘rustling dry sound’)
- d. Juxtaposition of opposites
 tuha-muda ‘old and young’
 bloe-publoe ‘buy and sell’
 uroe-malam ‘day and night’
 beungöh-seupôt ‘morning and evening’

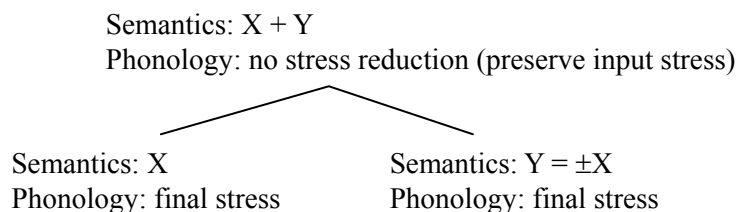
These four constructions are united not just by the semantic correspondence they exhibit between the sister constituents, but also by phonology: all four construction types exhibit stress on each constituent, thus two stresses overall.¹ From Durie (1985: 43–44):

- (9) ureuengñ -ureuengñ ‘people’ (literally: ‘person-person’)
 geunapñ -napñ ‘every single one’
 lakoeñ -binoeñ ‘men and women’

Normally, Acehnese allows just one, word-final stress per word.

In Acehnese it is possible to establish a meta-construction, as shown below, which unites the synonym, antonym and reduplication constructions under one umbrella. (On meta-constructions, see e.g. Stump 1998 and references therein, or, for a near-equivalent, Bochner 1993.)

(10) Meta-construction underlying the Acehnese constructs in (9):



Expressing the unity of the constructions in (9) is straightforward if reduplication is analyzed as morphological doubling; unity does not emerge, to the same extent, if reduplication is analyzed via a RED affix which phonologically copies the base.

8. Evidence that identity in reduplication is morphosemantic

We have seen thus far that morphological constructions can require a semantic parallelism (identity, near-identity or anonymity) of their daughters, and that reduplication in at least some cases must target morphological, rather than prosodic, constituents of the base (see also work by Downing, e.g. Downing 1999a/b, 2000 on morphological factors in reduplication). Together these findings predict the existence of reduplication constructions which require semantic identity between their morphological daughters, but which allow all other kinds of identity to vary. In a sense we have already seen evidence for this prediction, insofar as synonym compounding in Khmer, Vietnamese and Acehnese is related to reduplication. In this section we examine more dramatic cases in which the daughters in reduplication can differ phonologically and morphologically *as long as they mean the same thing*. There are two circumstances under which this can occur:

- Base and reduplicant contain different suppletive allomorphs of same morpheme
- Reduplicant contains morphemes that the base does not (possible, in MDT, only when the morphemes in question do not cause a semantic discrepancy between base and reduplicant).

We illustrate the first type of case with Sye (§8.1), and the second with Ndebele (§8.2).

8.1. Suppletive allomorphy

A pattern of intensifying stem reduplication in Sye (Erromangan; Crowley 1998) interacts with a pattern of suppletive stem allomorphy conditioned by morphological context. Most verb roots in Sye have two alternants, which for present purposes we may call Stem1 and Stem2. Stem2 forms appear in certain verb tenses and after echo subject markers; Stem1 forms appear elsewhere, and can be understood as the default stem type. We assume that each affix potentially selects for stem type. While historically the result of prefixal or left-edge phonological modifications, synchronically stem allomorphy appears to be suppletive in many if not all cases.

(11)	Stem1	Stem2	gloss
	evcah	ampcah	‘defecate’
	evinte	avinte	‘look after’
	evsor	amsor	‘wake up’
	ocep	agkep	‘fly’
	omol	amol	‘fall’
	oruc	anduc	‘bathe’
	ovoli	ampoli	‘turn it’
	ovyu-	avyu-	(causative prefix)
	vag	ampag	‘eat’

Intensifying reduplication doubles the verb root. As shown in (12), when a reduplicated root occurs with a prefix selecting for a Stem2 root, the first copy is Stem2, but the second remains in default Stem1 form:

(12) a. Reduplication of stem ‘fall’ in Stem1 context:

Stem1-Stem1 *omol-omol* ‘fall all over’

b. Reduplication of stem ‘fall’ in “modified” stem context:

Pfx-Stem2-Stem1 *cw-amol-omol* ‘they will fall all over’

Many interesting issues arise in constructions like that in (12b), which we will not be able to explore here. The example suffices to show that the reduplicants are not always phonological copies of their bases. What we are seeing in (12b) is semantic agreement between suppletive allomorphs: it is morphological doubling.

8.2. Empty morphs in reduplicant which are not in base

Like many Bantu languages, Ndebele (Hyman et al. to appear, Sibanda in preparation) possesses verb stem reduplication meaning ‘do here and there, a little bit’. The reduplicant, which precedes the verb stem, is limited to two syllables, as shown in (13a). Stem-final inflectional suffixes do not reduplicate; only the root plus any following derivational suffixes (what Downing has called the Derivational Stem) is subject to reduplication. As shown in (13b), some stems are disyllabic only by virtue of containing an inflectional suffix. In such cases, regardless of whether the inflectional suffix is subjective *-e*, perfective *-ile*, or default semantically empty *-a*, an [a] is provided as the second syllable of the reduplicant. We assume that this [a] can be equated with the semantically empty default suffix *-a* with which verbs must end when they do not end in a subjective or perfective suffix, and that the reduplicants in (13b) contain morphs not present in the ‘base’. In (13), reduplicated stems are shown in the infinitive; unreduplicated stems, with suffixes set off by hyphens, are shown to the right.

- (13) a. uku-nambi-nambitha ‘to taste’ /nambith-a/
 b. uku-lima-lima ‘to cultivate’ /lim-a/
 uku-lima-lime ‘to cultivate, subjunctive’ /lim-e/
 uku-lima-limi ‘to cultivate, negative’ /lim-i/
 uku-lima-limile ‘to cultivate, perfective’ /lim-ile/

If the verb stem is CV, where the V represents an inflectional suffix, even more radical discrepancies between reduplicant and base result. As shown in (14a), the reduplicant in such cases contains not only the empty morph *-a* but another semantically empty morph, [yi]. If, as shown in (14b), the stem has a consonantal root and any derivational suffixes, the reduplicant can freely choose among the derivational suffixes, empty *-a* or *-yi*, or any combination thereof that brings the reduplicant up to two syllables:

- (14) a. uku-dlayi-dla ‘to eat’ /dl-a/
 uku-mayi-ma ‘to stand’ /m-a/
 b. uku-dlea-dlela ‘to eat (applicative)’ /dl-el-a/
 uku-dleyi-dlela (ditto)
 uku-dlayi-dlela (ditto)

Like empty *-a*, *-yi* is used independently in the grammar; it is added (as a prefix) to roots in the imperative when they would otherwise be subminimal. Ndebele requires not only its reduplicants but also its verbs to be minimally disyllabic; imperatives consists of unprefixing stems, such that the imperative of a stem like *dl-a* ‘eat’ is rendered as *yi-dl-a* ‘eat!’.²

In conclusion, Ndebele permits reduplicants to contain not just one but even two semantically empty morphs not found in the following stem, which in BRCT would have to be the phonological base of reduplication. But Ndebele reduplicants are not phonological copies of the following stem; they are independently generated stems with the same meaning that bear the additional requirement of being truncated or augmented to two syllables.

Morphotactic discrepancies of the kind seen in Sye and Ndebele are serious problems for BRCT, either falsifying the theory outright or requiring serious departures from its essential architecture, in which base and reduplicant are generated from a single input (see e.g. Downing 2000, who draws on semantically related words in generating the reduplicant). The facts strongly support a morphological doubling account in which the only kind of forced identity is semantic. MDT is not only compatible with the data; it predicts effects like those in Sye and Ndebele to occur.

9. Parallel phenomena in syntax

In this section we explore a set of facts from syntax showing that constructions much like those in Sye and Ndebele are paralleled in syntax, where they have been called ‘syntactic reduplication’, but where a morpheme RED would be completely inappropriate.³ Here we discuss phrasal phenomena that are directly comparable to the morphological reduplication patterns in Sye and Ndebele.

9.1. Fongbe

What Lefebvre and Brousseau 2002 call syntactic doubling in Fongbe (Kwa) occurs in four syntactic constructions: temporal adverbials (a), causal adverbials (b), factives (c) and predicate clefts (d). In each case a verb is doubled, with the extra copy appearing initially in the verb phrase.

The fronted copy of the verb can be identical to the main verb, or, for some speakers, it can also occur truncated to its first syllable (Collins 1994, cited in Lefebvre and Brousseau 2002: 505):

- (15) a. **sísó ~ sí** Kókú **sísó** tlóló bó xǵsí ǵǵi Bàyí
tremble Koku **tremble** as.soon.as and fear get Bayi
 ‘As soon as Koku trembled, Bayi got frightened’
- b. **sísó ~ sí** Kókú **sísó** útú xésí ǵǵi Bàyí
tremble Koku **tremble** cause fear get Bayi
 ‘Because Koku trembled, Bayi got frightened’
- c. **sísó ~ sí** ǵé-è Bàyí **sísó** ǵ, vé nú mi
tremble OP-RES Bayi **tremble**, DEF bother for me
 ‘The fact that Bayi trembled bothered me’
- d. **sísó ~ sí** wé, Kókú **sísó**
tremble it.is Koku **tremble**
 ‘It is tremble that Koku did’

In Fongbe, the only difference between the main verb and its fronted copy is the optional truncation; both copies can be assumed to have phonologically and semantically identical inputs. In Lango, however, we find a doubling construction which more resembles Sye or Ndebele morphological doubling in that the two copies can differ morphotactically and phonologically; agreement is semantic only.

9.2. Lango

As described by (Noonan 1992: 175), Lango (Lwo, Western Nilotic) has an emphatic syntactic construction which repeats the verb. The first copy of the verb is inflected normally. The second copy, however, appears in what is called the gerund form; it “is given a high tone and preceded by à- and followed by -â...”:

- (16) a. **àbínô** **àbínâ** àwó’ró
 1SG.COME.PERF come.GER yesterday
 ‘I did come yesterday’
- b. **nákô** **òmýèlò** **àmýélâ**
 girl 3SG.dance.PERF dance.GER
 ‘the girl just danced’

- c. lóccə ònèkò gwòk ànékə òkkó
 man 3SG.kill.PERF dog kill.GER completely
 ‘the man killed the dog’

The gerund form of the verb semantically has a subset of the features of its inflected counterpart; the construction resembles Sye and Ndebele morphological reduplication in supplying morphotactically different, but semantically similar, copies of the doubled verb.

9.3. Chechen (and Ingush)

Chechen (North Caucasian) exhibits syntactic reduplication to satisfy the requirements of a second position clitic (Conathan and Good 2000; see also Peterson 1999 on Ingush). As shown in (17), chained clauses are marked by an enclitic particle *ʒa*, which immediately precedes the inflected, phrase-final, main verb. The enclitic must be preceded by another element in the same clause. Two types of constituent may occur before the verb (and enclitic particle) in the clause: an object (a), or a deictic proclitic or preverb (b). If neither of these elements is present in a chained clause, then the obligatory pre-clitic position is filled by reduplicating the verb (c):

- (17) a. Cickuo, [chʒaara =ʒa gina]_{VP}, ʒi buʒu
 cat.ERG [fish =& see.PP]_{VP} 3S.ABS B.eat.PRS
 ‘The cat, having seen a fish, eats it’
- b. Aħmad, [kiehkat jaaz =ʒa dina]_{VP}, zhejna dueshu
 Ahmad.ERG [letter write =& D.do.PP]_{VP} book D.read.PRS
 ‘Ahmad, having written a letter, reads a book’
- c. Aħmad, [ʒa =ʒa ʒiina]_{VP}, dʒa-vaghara
 Ahmad [stay.RED =& stay.PP]_{VP} DX.V.go.WP
 ‘Ahmad stayed (for a while) and left’

The Chechen reduplicant occurs in infinitive form, while the main verb is inflected. Because inflection sometimes requires use of a suppletive form of the root (cf. *lwo* vs. *Dala* for ‘give’), Chechen can exhibit Sye-like suppletive allomorphy differences between base and reduplicant.

It is a virtue of MDT that the kinds of structures it posits for morphological reduplication – a constituent containing two semantically identical morphemes – are, however they are generated, the same kinds of structures that are needed to describe syntactic reduplication. It is clear that what is

going on in (17c) is the use of two verbs with (almost) the same meaning; it would be absurd to say that what precedes the clause-chaining clitic is a reduplicative morpheme RED, which in any case is not a phonological copy of the main verb.

10. Where MDT draws the line: phonological duplication

We have emphasized that in MDT the defining property of reduplication is semantic, rather than phonological identity. There are, to be sure, phenomena that have been called reduplicative, in that a phonological element is doubled, but which are not amenable to a morphological doubling analysis, in part because the doubled element is something very small, like a single consonant or vowel, and in part because the doubling has a purely phonological purpose, rather than being associated with a change in meaning. For example, Hausa (Chadic) has numerous noun pluralization constructions, the most productive of which involves a suffix whose medial consonant is a copy of the final consonant of the noun stem (Newman 2000: 431–32):

(18) **Hausa** productive noun pluralization

bindigà:	bindig-o:gi:	‘gun’
fanni:	fann-o:ni:	‘category’
hùku:mà:	huku:m-o:mi:	‘governmental body’

In Spokane (e.g. Black 1996: 210 ff., Bates and Carlson 1998), the repetitive form of a verb is formed by infixing /e/ into an initial consonant cluster, if any (19a); for verbs beginning with only a single consonant, that consonant is doubled, with /e/ appearing between the two copies (19b):

(19) **Spokane** repetitive infixation

a.	/-e-, səl’-n’-t-ən’/	→ š-e-l’n’tén’
	/REP, chop-CTR-TR-1SGTRS/	‘I cut it up repeatedly’
b.	/-e-, nič’-n’-t-əx ^w /	→ n’-e-n’ič’n’tx ^w
	REP, cut-CTR-TR-2SGTRS	‘you kept cutting’

In both Hausa and Spokane, the duplication of the consonant is driven purely phonologically, by the need for a syllable onset. Autosegmental phonology would spread a consonant to the onset position; in Optimality The-

ory ONSET could compel the insertion of a consonant which agrees featurally with a nearby consonant. Walker (2000), Hansson (2001), Rose and Walker (2001) and Zuraw (2002) have developed theories of string-internal agreement which automate string-internal correspondence among segments, assuming they meet certain thresholds of similarity and locality; if FAITH_{IO} is ranked low, corresponding output segments can be made to become more (or less) similar along additional dimensions of similarity.⁴ (Although for lack of space we cannot work out the details here, the approach will favor copying (e.g., from (19b), *n-e-nič'n'təx*^w) over epenthesis of a default consonant (e.g. *B-e-nič'n'təx*^w) if correspondence and identity requirements are ranked higher than segmental unmarkedness.)

It might appear that we now have two methods for duplicating material: morphological reduplication, which we analyze in terms of doubling, and phonological duplication, which we analyze as phonological spreading or string-internal agreement. Hendricks 1999 and Gafos 1998 have both noted that theories with both morphological reduplication and phonological spreading are potentially redundant, insofar as both methods are applicable to the same data. Hendricks and Gafos propose to eliminate spreading in favor of morphological reduplication. However, this approach presupposes that there are data which could be analyzed in both ways. On the contrary, we argue, the phenomena for which morphological doubling is appropriate are very different from those for which phonological doubling is appropriate; both approaches should be retained, with no overlap. Below we list some criteria for determining when a copying effect is reduplication and when it is phonological duplication.

- (1) Phonological duplication serves a phonological purpose; morphological reduplication serves a morphological process (either by being a word-formation process itself or by enabling another word-formation process to take place; see e.g. the discussion in Inkelas and Zoll (to appear) of Nancowry, in which reduplication of monosyllabic roots is the means of satisfying a disyllabic stem condition imposed by a particular affix).
- (2) Phonological duplication involves a single phonological segment, as in Hausa or Spokane onset-driven consonant copying; morphological reduplication involves an entire morphological constituent (affix, root, stem, word), potentially truncated to a prosodic constituent (mora, syllable, foot)

- (3) Phonological duplication involves, by definition, phonological identity, while morphological reduplication involves semantic, not necessarily phonological, identity
- (4) Phonological duplication is local (a copied consonant is a copy of the closest consonant, for example), while morphological reduplication is not necessarily local. We have seen cases in syntactic reduplication in which the two copies are separated by other words; many parallel examples, in which base and reduplicant are separated, exist in morphology as well, e.g. Chukchee *nute-nut* ‘earth (absolutive singular)’ (Krause 1980), Umpila *maka* ‘die, go out’ → *maka-l-ma* ‘die, go out (progressive)’ (Harris and O’Grady 1976, Levin 1985).

10.1. Phonological correspondence and backcopying

Although phonological duplication is appropriate only for phonological, not morphological, duplication, in involving string-internal correspondence it formally resembles the BRCT approach to morphological reduplication. This fact causes BRCT and MDT to generate rather different predictions about the phonology of reduplication. We explore one of these here.

Unlike MDT, BRCT assumes that reduplicant and base are in bidirectional phonological correspondence, making it possible not only for the base to influence the reduplicant, but for the reduplicant to influence the base as well. The latter phenomenon, anticipated in Wilbur 1973, is termed ‘backcopying’ by McCarthy & Prince 1995. Backcopying in morphological reduplication is a phenomenon which MDT cannot describe, because there is no sense in which the reduplicant ever corresponds to the base. By contrast, however, we do assume string-internal correspondence in our analysis of phonological duplication. Thus, we make the following prediction:

- (20) backcopying should occur with phonological duplication (assimilation), but not directly as a result of morphological reduplication

Our surveys have not found backcopying to be a robust feature of morphological reduplication. Consider the following hypothetical example, based on a discussion in McCarthy & Prince (1995: 326), in which the effects of nasal place assimilation across the reduplicant-base boundary are reflected in the base:

- (21) Hypothetical backcopying junctural assimilation (RED = σ)
- a. RED-kama → kaŋ-kaŋa
 - b. RED-pana → pam-pama

Nasal place assimilation is one of the most common junctural phonological alternations; if backcopying is a real effect, we should expect to see cases like that in (21), but none, to our knowledge, have been documented.

McCarthy & Prince (1995) do offer a number of suggestive examples of other kinds which they characterize as involving backcopying; however, most of these have turned out on closer inspection to have a rather different character; see e.g. Inkelas and Zoll (to appear), Zoll 2002, Raimy 2000.

Backcopying thus does not appear to be a feature of morphological reduplication, supporting the MDT approach over the BRCT approach. But backcopying does appear to occur in the kind of examples that we independently classify as phonological duplication, supporting the prediction in (21). We illustrate with one example from Hausa participle formation (Newman 2000: 19). Like the plural formation construction discussed earlier, the participle formation construction involves a disyllabic suffix, *-aCCe:*, whose medial consonant is supplied through duplication of the final consonant of the stem (22a). The second syllable of the participial suffix has a front vowel, [e:]. Hausa palatalizes coronals before front vowels; a duplicated stem-final coronal will palatalize internal to the participial suffix. As noted in McCarthy 1986, Newman 2000: 417, this palatalization effect is occasionally extended to the stem-final consonant, resulting in the overapplication of palatalization (22c). Anticipation of palatalization is a backcopying effect:

- (22) Hausa participle formation: $XC_iV \rightarrow XC-aC_iC_ie:$
- a. dafà: dâf-affe: ‘cook/cooked’
tʃikà: tʃik-akke: ‘fill/full’
 - b. fasà: fâs-afʃe: ‘break/broken’
 - c. fasà: fâʃ-afʃe: ‘break/broken’ (sporadic)

Compare this actual case to a morphological reduplication process in Hausa that does not exhibit backcopying. As shown in (23), Hausa forms plural verbs through morphological reduplication; a verb is doubled and the first copy truncated to its initial CVC portion, which surfaces as a closed syllable. If the stem-initial vowel is long, it must shorten in the reduplicant,

since Hausa does not permit long vowels in closed syllables. Reduplicant-final noncoronal obstruents assimilate totally to the following consonant, producing a geminate consonant at the base-reduplicant juncture, as in (23a) (Newman 2000: 424–25). Gemination is also an option for reduplicant-final sonorants and coronal obstruents (23b); however, for these categories of segments, gemination is not obligatory. (23c–e) show the non-gemination options for reduplicant final sonorants and coronal obstruents (both variants are provided for ‘go out’). Reduplicant-final sonorants surface intact, modulo nasal place assimilation (23d) and glide vocalization (not shown); reduplicant-final coronal obstruents can also resist gemination (23e), though they do sonorize and rhotacize.

(23)	Plain stem	Reduplicated stem	Form with backcopying
a. ‘open mouth widely’ ‘step on’	wa:gè: ta:kà:	waw-wà:ge: tat-tàkà:	*waw-wàwe: *tat-tàta:
b. ‘oppress’ ‘go out’ ‘sell’	dannè: fitá: sayar	dad-dànnè: fif-fitá: sas-sayar	*dàd-dàdde: *fif-fifa: *sas-sasar
c. ‘chip off’	ɓalgàta:	ɓal-ɓalgàta:	—
d. ‘catch’	ka:mà:	kaŋ-kà:ma:	*ka:-kà:a:
e. ‘go out’ ‘kill’	fitá: kaʃè:	fɪfɪtá: kar-kaʃè:	*fɪr-fira: *kar-karè:

Neither gemination (23a–b), nor nasal place assimilation (23d), nor coronal sonorization (23e), nor closed syllable vowel shortening, attested in reduplicants throughout (23), is ever backcopied to the base, nor would we ever expect such an effect in Hausa or any other language.

The prediction in (20) thus appears accurate. The fact that backcopying occurs in phonological assimilation but not in morphological reduplication per se strongly supports not only the use of MDT for morphological reduplication but also our conclusion that phonological duplication and morphological reduplication are entirely different processes.

11. Conclusion

This paper has argued that semantic identity is what defines the two copies in reduplication constructions; phonological and morphotactic identity, while common correlates of semantic identity, are not required, and indeed we find variation along both phonological and morphotactic dimensions.

In modeling reduplication as morphological doubling, rather than phonological copying, MDT thus achieves greater descriptive adequacy than phonological copying theories, such as BRCT. At the same time MDT is more restrictive theoretically than BRCT in particular, which overgenerates by predicting unattested backcopying phenomena. By seeing reduplication as an essentially morphological process, MDT is better able to model the facts, as well as to relate reduplication to the other sister constructions that we have documented, both in morphology and in syntax.

Notes

- * Morphological Doubling Theory is the result of joint work with Cheryl Zoll; a co-authored, booklength presentation of the theory and results is currently underway. I am grateful to an anonymous reviewer for comments on an earlier draft of the paper.
- 1. Durie notes, however (p. 43), that “[f]or words of three syllables or more the emphatic semantic effect of doubling is achieved by simply reduplicating the initial syllable. The resulting construction has only a single word stress.”
- 2. One might be tempted to analyze either *a* or *yi* as phonologically epenthetic. However, such an approach would run into trouble with (a) the fact that *a* occurs verb-finally, when no other inflectional suffix is appropriate, to fill the final obligatory suffix position, *even when* the preceding morpheme is vowel-final and epenthesis could not be motivated (e.g. /bal-u-a/ → [balwa] ‘read-PASS-a’), (b) the fact that *yi* is a cross-linguistically marked syllable and not what one would expect as the result of epenthesis, and (c) the fact that *yi* appears either in its entirety or not at all; if *yi* were the result of phonological epenthesis of unmarked material we would also expect to find, in (14b), the following to be grammatical reduplicants: **dleli*, from /dl-el-/ and *i* epenthesis; or **dleya*, either from /dl-e/ and epenthesis of *a* and *y*, or from /dl-e-a/ and *y* epenthesis. These reduplicants are not possible.
- 3. For a discussion of reduplication of syntactic phrases, or, rather, the phonological phrases derived from syntactic structure, see Cole 1994.

4. While the mechanisms they use are fundamentally similar, Zuraw characterizes the resulting string-internal correspondence as reduplication, while Hansson, Rose and Walker characterize it as harmony (all three discuss primarily consonant harmony).

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