To appear in J. Trommer (ed.), *The Morphology and Phonology of Exponence: the State of the Art.* Oxford: Oxford University Press

Reduplication

1 Overview

Reduplication is the doubling of some part of a morphological constituent (root, stem, word) for some morphological purpose.[1] Total reduplication reduplicates the entire constituent, as with plural formation in Indonesian (Western Malayo-Polynesian, Sundic; Cohn 1989:185): *kərá* 'monkey' → *kərá-kərá* 'monkeys'. Partial reduplication duplicates some phonologically characterizable subpart, e.g. a maximal syllable, as in plural formation in Agta (Western Malayo-Polynesian, Northern Phillipines; Marantz 1982:439): *takki* 'leg' → *tak-takki* 'legs'.[2]

Reduplication has long been a topic of intense interest for morphological and phonological theory alike. From the morphological perspective, reduplication poses a challenge for item-based theories of morphology because of its process-like phonological character (see e.g. Anderson 1992:59). From the phonological perspective, reduplication, along with other prosodic morphology like truncation and infixation, has trained a bright light on phonological representations, providing evidence outside phonology proper for constituents like the mora, syllable and foot (see e.g. McCarthy & Prince 1986, 1996). More recently, reduplication has been plumbed as a source of evidence for syntagmatic

[1] This chapter benefitted very much from the commentary of Laura Downing and Jochen Trommer, to whom I am extremely grateful.

[2] Most language classifications (genus and sometimes also subfamily) are taken from the World Atlas of Linguistic Structures (Haspelmath et al. 2005), available online at http://wals.info. Bantu languages are classified, following the practice in the literature, with their Guthrie number, accompanied by their name of the country in which they are primarily spoken.

correspondence relationships among segments (e.g. McCarthy & Prince 1995, 1999; Zuraw 2002).

2 Functions of reduplication

Morphological reduplication is associated with a wide range of syntactic and semantic functions; for cross-linguistic surveys, see Moravcsik 1978, Kiyomi 1993, Regier 1994, and Niepokuj 1997. Reduplication is often semantically iconic, expressing meanings that seem impressionistically related to its duplicative nature. Pluralization (as in Indonesian), emphasis, and frequency/repetition are among the most frequent meanings of reduplication cross-linguistically (Kiyomi 1993) and, according to Bakker and Parkvall (2005), are the meanings most commonly found associated with reduplication in creoles.

More broadly, however, reduplication can be associated with quite a wide range of derivational and inflectional meanings, some of them not clearly iconic at all. These include changes in category. For example, reduplication converts verbs to nouns in Banoni (Oceanic): *resi* 'grate coconut' → *re-resi* 'coconut grater', *sogu* 'to husk coconut' → *so-sogu* 'coconut-husking stick'; Lynch & Ross 2002:442, Lincoln 1976:164). In Ulithian (Oceanic; Lynch 2002:799), reduplication converts nouns to verbs: *sifu* 'grass skirt' → *sif-sifu* 'wear a grass skirt'; *yaŋi* 'wind' → *yaŋi-yaŋi* 'blow'.

Beyond changing part of speech, reduplication can carry out other functions typically categorized as derivational. In Nadrogā, reduplication is used 'to form intransitives of patient-oriented verbs', thus *vuli* '[to be] turned over' → *vuli-vuli* 'turn over' (Geraghty 2002:841). In Siroi, reduplication of the verb plus class marker connotes pretence, e.g. *[malmbi-k-et-malmbi-k-et-ng-ate]* '[cry-k-1SG.PRES]-[cry-k-1SG.PRES]-ng-3SG.PRES = he is pretending to cry' (Wells 1979:36). Reduplication can even mark inflectional categories not related to plurality. In

Tarok, for example, (Benue-Congo, Platoid), noun reduplication expresses third person singular possession: *a-[fini]* 'yarn' → *a-[fini-fini]* 'his/her yarn', *a-[dànkali]* 'potato' → *a-[dànkali-dànkali] ~ a-[dànkali-kali]* 'his/her potato' (Niepokuj 1997:23, citing Robinson 1976, Sibomana 1980, 1981).

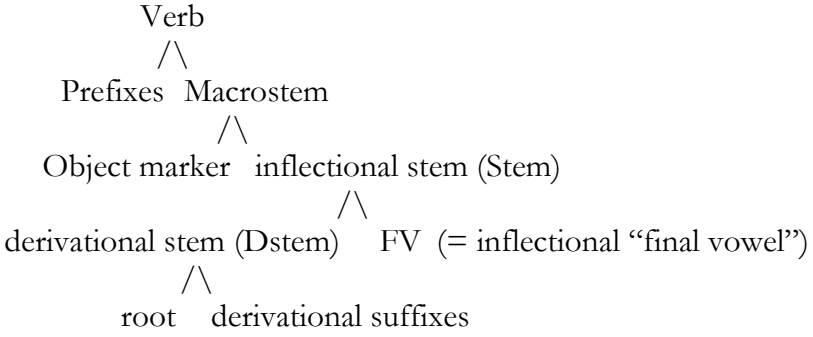
In sum, reduplication is associated, cross-linguistically, with a fairly large subset of the derivational and inflectional semantic and syntactic operations that morphology can perform. Reduplication is by no means always iconic, in any naïve sense of that word; it is not limited to encoding pluralization, distributivity, intensity, and so on. However, not every morphological function is equally likely to be encoded through reduplication. Operations like applicativization, negation, and case marking are just some of the functions that seem rarely, if ever, to be reduplicative in form.

In highly syntactic theories of morphology like Distributed Morphology (Halle & Marantz 1993), the independence of reduplicative form from any fixed exponential category is captured by making reduplication a morphophonological readjustment operation that is triggered by certain morphemes (potentially null) after they are inserted into terminal nodes in the abstract structure (e.g. Raimy 2000a,b; Frampton 2009). Vocabulary items are associated with meaning; reduplication itself is not. In the highly lexicalist, construction-based approach of Morphological Doubling theory (Inkelas & Zoll 2005), the form and function of reduplication are similarly dissociated; the exponence function of a reduplication construction is, like that of any other construction, a property of the construction as a whole, not derivable from its form, whether reduplicative or otherwise (on construction morphology, see e.g. Booij 2010).

3 What, morphologically, does reduplication copy?

Reduplication can target the entire word, the root, or any subconstituent in between. An example of this kind of variation is provided by the large family of Bantu languages, in which verb reduplication is widespread. The schema in (1), based on work by Downing (e.g. 1997, 1998a,b, 1999ab, 2000, 2006), Hyman (e.g. 2008), and others, shows an internal analysis of the verb which has been motivated in many Bantu languages, including the ones that will be illustrated below. Verb reduplication can target the whole verb, the macro-stem (stem plus preceding object marker), the inflectional stem ('Stem'), or the derivational stem ('Dstem).

(1)



In a study of the natural history of Bantu reduplication, Hyman (2008) identifies examples of reduplication at each of the levels in (1). The semantics of the constructions Hyman surveys are similar, indicating a common historical source. Ciyao (P.21; Ngunga 2001) manifests full Stem reduplication, including derivational suffixes (2)a) and the final inflectional suffix (2)b). By contrast, Ndebele (S.44; Sibanda 2004) reduplicates only the Dstem, excluding any suffix in the FV position (2)c-d). In Kinyarwanda (N.61; Kimenyi 2002), only the root is reduplicable, as shown in (2)e-f). Verb stems are shown, in all

examples in (2), without inflectional or infinitival prefixes, as these do not undergo reduplication:[3]

(2) *Full stem reduplication (all suffixes)* [Ciyao]

a. telec-el-a → telec-el-a + telec-el-a
'cook-APPL-FV' 'cook for someone frequently'

b. dim-ile → dim-ile + dim-ile
'cultivate-PERF' 'cultivated many times'

Dstem reduplication (no inflectional suffixes) [Ndebele]

c. lim-el-a → lim-e + lim-el-a
'cultivate-APPL-FV' 'cultivate for/at a little, here and there'

d. lim-e → lim-a + lim-e (*lim-e + lim-e)
'cultivate-SUBJ' 'cultivate a little, here and there (subjunctive)'

Root reduplication (no suffixes) [Kinyarwanda]

e. rim-w-a → rim-aa + rim-w-a (*rim-w-a + rim-w-a)
'cultivate-PASS-FV' 'be cultivated several times'

f. rim-ir-a → rim-aa + rim-ir-a (*rim-i + rim-ir-a)
'cultivate-APPL-FV' 'cultivate for/at, here and there'

Reduplicants in all three of these languages, among others, are similar in another way: they must be minimally disyllabic. As will be discussed further (for Ndebele) in section 4.2.1,

[3] Bantu languages are cited with their Guthrie classification number, roughly reflecting geographical zone, following the practice in Hyman 2008 and other specialized works on Bantu languages.

this requirement compels the use of a semantically empty dummy suffix (*-a* or *-aa*) which fleshes out the otherwise subminimal Ndebele and Kinyarwanda reduplicants in (2)d-f).

3.1 Root privilege

The examples discussed above from Hiaki, Ciyao, Ndebele and Kinyarwanda are typical in that, no matter what the specific morphological and phonological conditions on reduplication may be, reduplication ends up copying at least a portion of the morphological root. This is probably no accident. As observed by Hyman (2008) and Hyman et al. (2009), partial reduplication tends cross-linguistically to occur on the opposite edge from the side of the root at which most affixation takes place in the language. Thus, while affixation tends cross-linguistically to be suffixing (e.g. Dryer 2008), reduplication tends to be prefixing (Rubino 2008). In the majority of Bantu languages, partial verb stem reduplication is almost exclusively prefixing, while stems themselves are otherwise internally exclusively suffixing, with the result that the copied material always includes some or all of the root.

Sometimes, however, even what looks like straight root reduplication will pull in segments from a neighboring affix. This typically occurs under two conditions: pressures of minimality, and pressures of syllable well-formedness.

In Kinande (J. 42; Mutaka & Hyman 1990:77-80, Downing 2000, Hyman 2008), noun reduplication normally targets only the root, not the noun class prefix: *kʊ-gʊlʊ* 'leg' → *kʊ-gʊlʊ + gʊlʊ* 'a real leg', not *kʊ-gʊlʊ + kʊ-gʊlʊ. But if a noun root is smaller than two syllables, the prefix is compelled to copy as well: *ri-bwɛ* 'snake' → *ri-bwɛ + ri-bwɛ* 'a real snake', not **ri-bwɛ-bwɛ*. In Emerillon (Tupi-Guarani), for example, disyllabic 'repeated action' reduplication targets the root, but will pull in material from prefixes as needed to flesh

out the reduplicant. Thus *o-ʤika-ŋ* '3-kill-PL' and *o-eta* '3-cut' reduplicate as *o-ʤika-ʤika-ŋ* and *o-eta-eta,* respectively. But in forms with a monosyllabic root, like *o-ʔal-oŋ* '3-**fall**-PL' OR *a-lo-**wag*** '1sg-CAUS.COM-go', reduplication pulls in the prefix: *oʔa-o-ʔal-oŋ, a-lowa-lo-wag* (Rose 2005:353-359).

3.2 Affix reduplication

Root privilege aside, reduplication is known, if rarely, to target individual affixes. For example, iterative aspect is expressed in Amele (Trans New Guinea, Madang; Roberts 1987:252-254, 1991:130-131) by reduplicating the object marker (3a). In verbs lacking object markers, the root is reduplicated instead (3b):

(3)	a.	hawa-du-du	'ignore-3s-3s' (iterative)	[Amele]
		gobil-du-du	'stir-3s-3s = stir and stir it'	
		guduc-du-du	'run-3s-3s' (iterative)	
	b.	qu-qu	'hit' (iterative)	
		ji-ji	'eat' (iterative)	
		budu-budu-eʔ	'to thud repeatedly'	
		g͡batan-g͡batan-eʔ	'split-inf' (iterative)	

The reason that the second *du* in the forms in (3a) isn't anlayzed as a fixed suffix (*-du*) or as a CV reduplicant is, of course, the variable size of the roots which reduplicate when the object marker is absent. Affix reduplication is easiest to diagnose in cases like this where it alternates with the reduplication of other stem elements.

The reduplication of the rightmost stem-internal morpheme in Amele is structurally similar to stem-internal pluralizing reduplication in noun-noun compounds in Pima (Uto-Aztecan, Tepiman). Either member, or both, can be reduplicated to effect pluralization, with no apparent difference in the meaning. According to Haugen 2009, citing Munro and Riggle 2004, speakers exhibit free variation according to whether the first member, the second member or both reduplicate. Reduplicants are underlined:

(4) a. ’ònk-’ús ’<u>ò</u>-’onk-’ús ~ ’ònk-’<u>ú</u>-’us ~ ’<u>ò</u>-’onk-’<u>ú</u>-’us [Pima]
salt-tree
‘tamarack’ ‘tamaracks’

b. bàn-nód:adag <u>bà</u>-ban-nód:adag ~ bàn-<u>no</u>nd:adag ~ <u>bà</u>-ban-<u>no</u>nd:adag
coyote-plant.type
‘peyote’ ‘peyote (pl.)’

These examples, taken together with Amele, show that morphological subconstituents can be the direct target of reduplication processes whose contribution to the syntax and semantics of the word are seemingly unrelated to the meaning of the actual morpheme whose phonological material is reduplicated.

4 The morphologcal status of reduplication

Many modular theories of morphology, including A-morphous morphology (Anderson 1992) and Distributed Morphology (Halle and Marantz 1993), segregate affixation, compounding, and morphophonology in different components of the grammar. In such theories,

reduplication would lay claim to all three components. Reduplication sometimes resembles affixation (see e.g. Marantz 1982), at other times morphophonology, and at other times compounding in its form and integration with other morphological processes. These different faces of reduplication have motivated two basic theoretical models: phonological copying (Marantz 1982; McCarthy & Prince 1986, 1995; Steriade 1988; Raimy 2000a,b) and morphological doubling (Singh 2005, Inkelas & Zoll 2005). Phonological copying theories typically treat reduplication as the affixation of a segmentally null morpheme which must be fleshed out through the process of phonological copying of segments from the base of affixation. Morphological Doubling theory, by contrast, treats reduplication as the insertion of two identical or semantically equivalent morphological constituents.

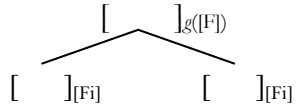
Both types of approach are descriptively rich enough that each has been fruitfully extended to virtually all types of reduplication. However, the two approaches do make different predictions in some key areas. In this section we focus on the morphology of reduplication, which will allow us to draw attention to some phenomena for which Morphological Doubling theory provides a natural account. In section 5, which focuses on the phonology of reduplication, we will focus on phenomena for which phonological copying theories are particularly suited.

4.1 Morphological Doubling Theory

In Morphological Doubling Theory (Inkelas & Zoll 2005), reduplication is modeled by a construction which calls for two semantically and syntactically equivalent subconstituents. In (5)a), the daughter nodes bear the same features, thus are synonymous. The meaning of the construction as a whole is some function of the meaning of the daughters; as was discussed in section 2, that function could be any of the functions associated cross-linguistically with

reduplication. Morphological Doubling Theory is couched within the general framework of Construction Grammar (Booij 2010).

(5) A morphological doubling schema in Morphological Doubling Theory (Inkelas & Zoll 2005)



Because the equivalence between the daughters in (5) is defined over the features that the daughters independently expone ([F_i]), morphological doubling can result in the exact same morphological (sub)constituents being used twice ((6)a), yielding total reduplication, as in Warlpiri pluralizing total reduplication. If one of the two daughters in the doubling construction is associated with special phonology, the result can be partial reduplication.

(6) Total reduplication construction in Indonesian, in Morphological Doubling Theory

Our focus here is not on how Morphological Doubling Theory handles phonology but on morphological arguments for doubling. Inkelas & Zoll provide two basic arguments in favor of Morphological Doubling Theory, vs. a theory in which reduplication is a phonological copying process effect triggered by the insertion of an abstract 'reduplication' morpheme.

One argument is the existence of effects, illustrated below with data from Sye (section 4.2) and Hindi, in which the two copies in a reduplication construction are different suppletive allomorphs of the same morpheme. The second argument, illustrated with Ndebele (sections 4.2.1, 4.3.1), involves reduplicants which are morphologically complex, constructed independently of the base that they are synonymous with.

4.2 Different bases: Synonym reduplication

In Sye (Oceanic; Crowley 1998, 2002), most verb roots have two different forms, termed here Stem1 and Stem2. Specific affixation constructions call for one or the other stem type. When a reduplicated base occurs in a context normally requiring Stem 2, both stems are used, one as the 'reduplicant' and the other as the 'base'. For this reason, Inkelas & Zoll cite Sye as a case showing the morphological and phonological independence between the two copies in reduplication. Examples of lexemes with two distinct stem allomorphs are given in (7a), and reduplication using two different allomorphs is illustrated in (7) (Crowley 1998:79, 84; 2002:704:):

(7) a.

Stem	Stem2	gloss
arinova	narinova	'provoke'
omol	amol	'fall'

[Sye]

b. cw-**amol-omol**

3.FUT-**fall$_2$-fall$_1$**

'they will fall all over'

Inkelas & Zoll argue that this is a case of morphological doubling, in which the two copies are synonymous but not identical. It is important for the argument that the allomorphy is suppletive. This is not obvious in (7b), where the allomorphs differ in just one vowel. Indeed, many Stem1-Stem2 pairs differ only minimally, e.g. *aruwo* ~ *naruwo* 'sing', *owi* ~ *nowi* 'plant' (Crowley 1998:81). In other cases, however, the relationship is opaque enough to motivate treating the allomorphy as suppletive. Examples *ovoli* ~ *aompoli* 'turn it', *velom* ~ *ampelom (*singular imperative only)/*elom* 'come'. Crowley likens such pairs to 'strong verb alternations in Germanic languages' (Crowley 1998:82)[4].

The Morphological Doubling analysis developed by Inkelas & Zoll is given below. The details of how stem selection works are less important here than the simple concept that the two copies in reduplication need only to be synonymous to be licensed by the reduplication construction:

(8) Suppletive allomorphy in Sye reduplication

[4] Building on the correspondences between stem alternants elucidated by Crowley (1982:81-84), Frampton (2009) argues in favor of deriving the allomorphy using a combination of an *an-* prefix, which has two suppletive allomorphs of its own, and a number of lexically conditioned readjustment rules. The question of when to recognize allomorphy as suppletive and when to attribute it to phonology is notoriously difficult. The approach taken here is to treat allomorphy as suppletive unless the alternations that would derive it generalize beyond the morphemes in question; by that criterion, this allomorphy counts as suppletive.

Inkelas and Zoll (2005) draw a connection between Sye (and Chechen, which they also discuss), on one hand, and synonym compounding constructions of the sort discussed by Singh (1982), on the other hand. For example, a construction in Modern Hindi (Indic) pairs synonymous adjectives, the first of native origin and the second of Perso-Arabic origin, to give an overall meaning of '[noun] et cetera'. Data are from Singh 2005:271:

(9)	a.	tan	badan	tan-badan	[Hindi]
		'body' [+native]	'body' [-native]	'body, etc.'	
	b.	vivaah	shaadi	vivaah-shaadi	
		'marriage' [+native]	'marriage' [-native]	'marriage, etc.'	

Inkelas & Zoll (2005), building on earlier proposals by Singh (2005), advocate a morphological doubling analysis of synonym compounding:

(10) Synonym compounding in Hindi

Singh (2005) and Inkelas & Zoll (2005) observe that once reduplication and synonym constructions are connected under one morphological analysis of synonym compounding, it also becomes possible in the same formal model to relate both to compounding

constructions requiring different degrees of semantic similarity across daughters, including part-whole and even antonym constructions. In Acehnese, for example, Durie (1985:40-44) documents a construction which juxtaposes words of opposite meaning to yield a word whose meaning encompasses both:

(11)	tuha-muda	'old and young'	[Acehnese]
	bloe-publoe	'buy and sell'	
	uroe-malam	'day and night'	
	beungöh-seupôt	'morning and evening'	

Insofar as these constructions resemble, in their behavior, total reduplication or synonym compounding, extending the schemas in (5) to them is a useful ability.

4.2.1 Morphologically complex reduplicants

A different type of morphological independence between the two copies in reduplication is demonstrated by reduplicants which are morphologically complex, composed of elements not all of which are found in the apparent base of reduplication. One way in which this can happen is when reduplicants contain semantically empty 'filler' morphs. These have been the focus of several studies of Bantu reduplication by Downing (1998a,b, 1999ab, 2000, 2006) and Hyman (Mutaka & Hyman 1990; Hyman & Mtenje 1999; Hyman, Inkelas & Sibanda 2009), among others. The phenomenon in question is illustrated by the data in (12) from Ndebele (S.44, Zimbabwe; Sibanda 2004, Hyman, Inkelas & Sibanda 2009). As discussed

earlier in section 3 (see example (2)), the locus of verbal reduplication in Ndebele is the derivational stem, which consists of the root and derivational suffixes, but excludes the obligatory final inflectional suffix. Reduplicants are disyllabic and prefixed, as shown in (12). When the verb root itself is two syllables or longer, as in (12)a), the reduplicant copies the first two open syllables of the stem. If the verb root is monosyllabic but combines with derivational suffixes such as applicative *-el* or causative *-is*, reduplication copies material from both, as in (12)b). But reduplication cannot copy inflectional suffixes. When the derivational stem (root plus derivational suffixes) is only monosyllabic, as in (12)c), the reduplicant recruits semantically empty *-a* to flesh out its obligatory disyllabic shape.[5] The suffix *-a* occurs on verb stems when one of the more contentful inflectional endings (e.g. subjunctive *-e* or perfective *-ile*) is absent; it is the default filler of the obligatory inflectional suffix position. Because it has no meaning of its own, it is recruitable to flesh out subminimal reduplicants even of verb stems that end in one of the other inflectional suffixes.

(12)

		stem	reduplicated stem	[Ndebele]
a.	'INF-taste-FV'	(uku-)nambith-a	(uku-)nambi+nambith-a	
	'INF-appear-FV'	(uku-)bonakel-a	(uku-)bona+bonakel-a	
b.	'INF-cultivate-APPL-FV'	(uku-)lim-el-a	(uku-)lim-e+lim-el-a	
	'INF-cultivate-CAUS-fv'	(uku-)lim-is-a	(uku-)lim-i+lim-is-a	

[5] Hyman, Inkelas & Sibanda 2009 discuss a second empty morph, yi, which is used to augment reduplicants of stems formed from consonantal roots such as /dl-/ 'eat'. When reduplicated, stems like [dl-e] 'eat-subjunctive' or [dl-ile] 'eat-perfective' recruit both -a and yi to the cause of reduplicant disyllabism, thus dl-a-yi-+dl-e or dl-a-yi+dl-ile. The facts in (12)b are more complex than reported here; see Hyman et al. 2009. Note also that all of the forms in (12) are provided in the infinitive, prefixed with uku-. However, the infinitive prefix is outside the scope of reduplication and can be ignored; for this reason it is parenthesized in the data in (12).

c.	'INF-cultivate-FV'	(uku-)lim-a	(uku-)lim-a+lim-a
	'INF-cultivate-SUBJ'	(uku-)lim-e	(uku-)lim-**a**+lim-e
	'INF-cultivate-PERF'	(uku-)lim-ile	(uku-)lim-**a**+lim-ile
	'INF-send SUBJ'	(uku-)thum-e	(uku-)thum-**a**+thum-e
	'INF-send-PERF'	(uku-)thum-ile	(uku-)thum-**a**+thum-ile

Downing (2006) characterizes the morphologically complex reduplicants of Ndebele and several other Bantu languages as 'canonical stems'. The canonical verb stem in Bantu ends in the final vowel *a* and is minimally disyllabic; this is exactly the shape the reduplicant assumes when, because of various constraints on reduplication, it cannot copy the verb stem exactly. The ability of the reduplicant to assume the canonical morphological structure of verb stems even when that structure is not found in the apparent base of reduplication illustrates the potential morphological independence of reduplicant and base.

4.3 Phrasal reduplication

Several studies have also documented reduplication at the phrasal level (see e.g. Fitzpatrick-Cole 1994, Lidz 2001), and it seems clear that while reduplication may be primarily a word-internal phenomenon, it is equally possible for it to apply to syntactic structures. This is expected in a constructional approach such as Morphological Doubling theory; Construction Grammar in general is known for its lack of modularity between morphology and syntax.

For example, Emeneau (1955) reports that 'echo' reduplication in Kolami (section 4.3.1) can apply not only to words but also to phrases: *me'kel to'tev* 'goat not' → *me'kel to'tev* -

giˑkel toˑtev 'There are no goats at all' (Emeneau 1955:102). Lidz (2001) cites similar findings from Kannada (Southern Dravidian):

(13) a. nannu **[baagil-annu much-id-e] [giigilannu muchide]** [Kannada]
I-NOM [**door-ACC close-PST-1S] [ECHO-REDUPLICANT]**
anta heeLa-beeDa
that say-PROH
'Don't say that I closed the door or did related activities.'

b. pustav-annu [**meejin-a meele] [giijina meele]** nooD-id-e
book-ACC [**table-GEN on] [ECHO-REDUPLICANT]** see-PST-1S
'I saw the book on the table and in related places'

Another case of syntactically reduplication in Chechen is discussed in section 4.2.

4.3.1 Echo reduplication and other types of morphologically fixed segmentism

'Echo'-reduplication, as seen above in Kannada, a type of reduplication in which the beginning of the second copy is replaced by a fixed substring. In Kolami and Kannada, above, the string *gi* replaces the initial CV of the second copy, preserving vowel length. Familiar English examples include the ironic or pejorative Yiddish-derived *fancy-schmancy, resolutions-schmesolutions*, in which the fixed substring [ʃm] stands in as the onset of the copy, replacing any existing initial consonant(s).

Alderete (et al.) analyze the fixed material in echo reduplication as an affix which merges with the reduplicant into a constituent whose prosodic shape is determined by the

reduplication construction; in most examples cited, this shape is determined by the base, since most examples involve total reduplication. The affix — *shm-* in English, *gi-* in Kolami — often supplements segmental material that would otherwise be expected to be copied, giving rise to the term 'Melodic Overwriting' for the replacive affix found in echo reduplication (e.g. Yip 1992, McCarthy & Prince 1996). In possessing an affix that the base lacks, echo reduplication instantiates the expectation, in Morphological Doubling theory, that the two copies in reduplication may be morphologically distinct in their makeup, as long as they are synonyms. In Morphological Doubling theory, the affix in echo reduplication is treated as semantically empty, and the meaning of the construction is assigned to the constrution as a whole.

Echo reduplication is often subject to the requirement that the fixed substring not be identical to the substring that the copy would otherwise begin with. Yip (1992, 1998), invoking an anti-homophony constraint, relates this pattern to the dissimilation often required in poetic rhyme. Thus, for example, in Hindi the 'et cetera' echo construction uses a replacive *v-: narendra* 'Narendra' (proper name) → *narendra-varendra* 'undesirables like Narendra' (Singh 2005:266), *tras* 'grief' → *tras-vras* 'grief and the like' (Nevins 2005:280). However, for stems that are already *v*-initial, *š* is used instead: *vakil* 'lawyer' → *vakil-šakil* 'lawyers and the like' (Nevins 2005:280).

Reduplication with Melodic Overwriting, including echo reduplication, is much more common in total reduplication than it is in partial reduplication. The latter is, however, attested in a number of languages in the Micro-Altaic group (including Turkic, Mongolic and Tungusic; see e.g.), as well as in various dialects of Armenian (Vaux 1998). The process in question intensifies adjectives and is marked by a preposed reduplicative syllable whose onset and nucleus are copied from the base but whose coda consonant is drawn from a small fixed

set of consonants. Data from Oroqen (Tungusic) are shown in (14). In Oroqen, in which the process only applies to color terms, the reduplicant copies a stem coda if there is one (14)a), and otherwise inserts the fixed segment [b] (14)b) (Li & Whaley 2000:356):

(14)	a.	'white'	bagdarın	bag-bagdarın	'very white, white as snow'	[Oroqen]
	b.	'yellow'	ʃiŋarın	ʃib-ʃinarın	'very yellow, golden yellow'	
		'black'	kara	kab-kara	'glossy black, very dark'	

GenS

There are at least two plausible reasons why Melodic Overwriting in general, and echo reduplication in particular, are more common in total reduplication than in partial reduplication. One is the role of anti-homophony considerations. To the extent that anti-homophony is a motivating factor in the morphological modification of one of the two copies, this asymmetry makes sense: partial reduplication intrinsically differentiates base and reduplicant, in most cases, removing the functional motivation for further modification.

Another reason that Melodic Ovewriting has not been documented as often as an accompinament to partial reduplication as it has for total reduplication is that there is an alternative analysis for many of the apparent partial reduplication cases, namely affixation plus partial reduplication.

5 The phonology of reduplication

Any theory of reduplication must pay particular attention to the phonological form of reduplicants. As mentioned earlier, there are two basic approaches to reduplicative form:

Morphological doubling (discussed in section 4.1) and **Phonological copying**, to be discussed in this section. These approaches are distinguished in part by the differing interpretations they supply to the phonological identity effects accompanying — if not defining — reduplication, and the different ranges of effects they predict.

Phonological copying approaches, developed in e.g. Marantz 1982, Steriade 1988, McCarthy & Prince 1995, and Raimy 2000a,b, assume that a morphological imperative, namely the realization of an abstract morpheme, compels phonological copying from a base constituent. By contrast, the morphological doubling approach treats morphosemantic identity as basic. Phonological identity is a side-effect of inserting the same morpheme(s) twice, rather than an explicit imperative of the construction. Recent literature (Singh 2005, Yu 2005, Inkelas 2008) has suggested that phonological copying and morphological doubling may both be required, but in different, complementary contexts.

In this section we survey the most important issues involved in determining the phonological form of reduplicants, drawing mainly, in analyses, on the dominant phonology-centric approach to reduplication, Base-Reduplicant Correspondence Theory (McCarthy & Prince 1995).

5.1 Form of reduplicant

Partial reduplication is the result of a tension between the imperative to preserve base segments in the reduplicant and the imperative that the reduplicant should assume a particular prosodic shape: mora, syllable, foot, or prosodic word. This tension is observed whether the reduplicant is generated by phonologically copying base segments, as in phonological copying theories, or by morphologically supplying an independent double of the

base and truncating it, as is done in Morphological Doubling Theory (Inkelas & Zoll 2005). We will focus in this discussion on the phonological considerations that affect reduplicant shape and which relate the output form of the reduplicant to the morphological constituent that is its source.

5.1.1 Templatic form

In seminal articles, Moravcsik (1978) and Marantz (1982) observed that partial reduplication does not in general seem to duplicate an existing phonological constituent (e.g. syllable) of the base. Rather, partial reduplicants tend to have their own invariant overall shape, to which copied base segments are compelled to conform. In Mokilese (Oceanic), for example, partial reduplication, marking progressive aspect, always prefixes a bimoraic syllable to the base (Blevins 1996:523, citing Harrison 1973, 1976):

(15)	a.	pɔdok	pɔd-pɔdok	'plant/planting'	[Mokilese]
		kasɔ	kas-kasɔ	'throw/throwing'	
		nikid	nik-nikid	'save/saving'	
	b.	soorɔk	soo-soorɔk	'tear/tearing'	
	c.	diar	dii-diar	'find/finding'	
		wia	wii-wia	'do/doing'	

In each case, the bimoraic monosyllabic reduplicant is fleshed out by copying segmental material from the base. However, the copied material does not itself necessarily constitute a bimoraic syllable in the base. In examples like (15)a), the duplicated strings ([pɔd], [nik]) are

split over two syllables in the base of reduplication [pɔ.dok], [ni.kid], but constitute a bimoraic syllable in the reduplicant. In examples like (15)c), the reduplicant copies material which corresponds only to a monomoraic CV in the base ([di], [wi]), lengthening the copied vowel in order to project two moras (→ [dii], [wii]). These data thus illustrate an important point made by Marantz (1982), namely that reduplication can copy either less than or more than the designated prosodic constituent from the base, as long as the segments that are copied can be reconfigured to form the desired shape.

Mokilese progressive reduplication also illustrates a second key generalization about partial reduplication, namely that what is invariant about reduplicant shape is prosodic, not skeletal or (usually) segmental. Early autosegmental approaches to reduplication, starting with Marantz 1982, proposed that reduplicant shape is characterized by CV units. However, pioneering work by McCarthy & Prince (1986, published 1996) and Steriade (1988) made clear that CV skeletal units are not the right level of generality; instead, reduplicants are more accurately and succinctly characterized in prosodic terms. Mokilese reduplicants can assume skeletally diverse shapes: CVC (15)a) or CVV (15)b, c). As seen in (16), vowel-initial bases in Mokilese give rise to yet a third reduplicant type, namely VCC:

(16)	andip	and-andip	'spit/spitting'	[Mokilese]
	uruur	urr-uruur	'laugh/laughing'	
	alu	all-alu	'walk/walking'	

What unites the CVC, CVV and VCC reduplicant shapes is the size of the prosodic constituent added to the base as a result of reduplication. Each stem increases in size by exactly a bimoraic syllable.

The data in (16)c illustrate a third key generalization about reduplicant prosodic shape to which work in Optimality Theory has drawn particular attention, namely that while reduplication typically increases prosodic size by a fixed amount, as in (15) and (16), the reduplicant itself is not always coextensive, in the output, with the added prosodic constituent. This is clearly seen in the examples in (16)c. The syllabification of *and-andip* is [an.d-an.dip], with the reduplicated string [and] split across two syllables; it is not *[and.-an.dip], in which the reduplicant [and] is a surface syllable. This fact supplements the observation made earlier that syllable reduplication does not necessarily copy existing syllables in the base; rather, it copies enough material to make up a new syllable — and, as in cases like this, it can copy even more than that if the copied material can fit into an existing base syllable. The analysis given to this data by McCarthy & Prince (1986) is shown below:

(17)

$\sigma_{\mu\mu}$	$\sigma_{\mu\mu}$	$\sigma_{\mu\mu}$	
/\	/ \\	/| \	Maximal association of copied segments to
a n	d [i p] -a n	d i p	available syllables
	↓		
	Ø		Stray erasure of unassociated copied segments

In Optimality Theory, the patterns in (15)-(16) have been taken as evidence that constraints on reduplicant shape (e.g. REDUPLICANT = $\sigma_{\mu\mu}$) are minimally violable (Blevins

1996; McCarthy & Prince 1994a,b, 1995; among many others); this is discussed in greater detail below.

The typology of shapes that reduplicants can be constrained to assume has been a major topic of discussion in the literature. McCarthy and Prince (1986) contributed the central observation that the range of possible reduplicant shapes mirrors the range of patterns that are found in truncation: both reduplicative and nonreduplicative truncation make use of the constituents in the prosodic hierarchy, namely mora, syllable, foot, and prosodic word. The examples from Tohono O'odham (Uto-Aztecan, Tepiman), Hausa, and Manam (Oceanic) in (18) illustrate reduplicants of one mora (18)a, a bimoraic syllable (18)b, and a bimoraic foot (18)c, respectively. The Diyari (Pama-Nyungan) pattern in (18)d can be described either as a disyllabic foot or as a minimal prosodic word. The Acehnese pattern in (18)e can be described as maximal prosodic word reduplication, which amounts to the same thing as total reduplication, with no upper limit on the size of the reduplicant:

(18) a. Tohono O'Odham pluralizing reduplication: monomoraic syllable (Fitzgerald 2001:942,945)

'duck'	pado	→	pa-pado	'ducks'
'shawl'	tablo	→	ta-tablo	'shawls'
'cemetery'	siminǰul	→	si-siminǰul (→ sisminǰul)	'cemeteries'

b. Hausa pluractional reduplication: bimoraic syllable (Newman 2000:424)

'call'	kira:	→	kik-kira:	'call (pluractional)'
'beat'	bùga:	→	bub-bùga:	'beat (pluractional)'

c. Manam reduplication forming adjectives, nouns and continuative verbs: bimoraic foot (Lichtenberk 1983, Buckley 1998)

'long'	salaga	→	salaga-laga
'knife'	moita	→	moita-ita
'ginger species'	ʔarai	→	ʔarai-rai
'go'	laʔo	→	laʔo-laʔo
'flying fox'	malaboŋ	→	malaboŋ-boŋ

d. Diyari reduplication (multiple functions): minimal prosodic word (Poser 1990:132, citing Austin 1981; see also McCarthy & Prince 1996):

'boy'	kanku	→	kanku-kanku
'bird species'	tʲilpa	→	tʲilpa-tʲilparku
'catfish (pl)'	ŋanka	→	ŋanka-ŋankaɳ̈ti

e. Acehnese emphatic reduplication: maximal prosodic word

'drum'	tambô	→	tambô-tambô
'mother'	ma	→	ma-ma

In 'full copy' theories like Steriade (1988) and Morphological Doubling Theory (Inkelas and Zoll 2005), partial reduplication results from the truncation of one of the two copies in total reduplication. The question of what forms reduplicants can assume, therefore, reduces to the question of what truncation operations are possible in language.

In BASE-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince 1993, 1994b, 1995, 1999), a theory of reduplication couched within Optimality Theory (Prince & Smolensky 1993), reduplicative templates are instantiated as constraints on the surface shape of reduplicants. BRCT attributes reduplication to a phonological correspondence relation holding between two substrings in the output form of a word: the substring instantiating an

abstract morpheme RED, and the substring ('BASE') which is the output correspondent of the input. The RED-BASE correspondence is regulated by BR-Faithfulness constraints: MAX-BR (every element in BASE must have a correspondent in RED), DEP-BR (every element in RED must have a correspondent in BASE), and IDENT-BR (corresponding elements must be identical). If the BR-faithfulness constraints are completely satisfied, reduplication is total. If, however, a constraint on the shape of the reduplicant, e.g. RED=$\sigma_{\mu\mu}$, outranks MAX-BR, reduplication will be partial. This is illustrated in (19) with Mokilese data from (15):

(19)

	/RED-pɔdok/	RED=$\sigma_{\mu\mu}$	MAX-BR
a.	pɔdok-pɔdok	*!	
☞ b.	pɔd-pɔdok		* (ok)

A virtue of attributing reduplicant shape to constraints in a theory where constraints are ranked and violable is that the theory is capable of accounting for contextual variation in reduplicant shape and makeup. In Mokilese, for example, reduplication of vowel-initial bases copies not just the material needed to flesh out a bimoraic reduplicant syllable but also enough to provide an onset to the base-initial syllable. This is why *andip* reduplicates as *and-andip* instead of *an-andip* (16). This 'overcopy' of [d], as shown by the analysis in (20), follows readily in BRCT, in which not only RED=$\sigma_{\mu\mu}$ but also syllable well-formedness constraints like ONSET ('a syllable must begin with a consonant') can determine how much material is copied. In (20)a), the reduplicant is exactly bimoraic, but as its final consonant is a coda, the base-initial syllable and the reduplicant are both onsetless. In (20)b), the reduplicant-final [n] provides the base with an onset, but leaves the reduplicant one mora

below target. Candidate (20)c) copies one segment more than will fit into the two moras projected from the reduplicant, but this is optimal because that extra copied segment, [d], provides the base-intial syllable with an onset, besting candidate (20)a). The total reduplication candidate overcopies wildly without improving performance on the markedness constraints ONSET and RED=$\sigma_{\mu\mu}$, and loses to candidate (20)c).

(20)

	RED-andip	ONSET	RED=$\sigma_{\mu\mu}$	FAITH-BR
a.	an.-andip	**!		(dip)
b.	a.n-andip	*	(-μ, +n)	(dip)
☞ c.	an.d-andip	*	(+d)	(ip)
d.	an.di.p-an.dip	*	(+μμ, +dip)	

In recent work on reduplication in Optimality Theory, there has been a movement towards deriving reduplicant shape instead of stipulating it with constraints like RED=σ. Under this umbrella fall the theories of Generalized Template theory (McCarthy & Prince 1994b; Urbanczyk 1996, 2006; Downing 2006, inter alia) and a-templatic reduplication (Gafos 1998, Hendricks 1999).

Generalized Template Theory arose out of the desire to derive, rather than to stipulate, reduplicant shape. McCarthy & Prince (1994b) observe that, cross-linguistically, roots are often subject to foot-sized minimality constraints requiring them to be bimoraic or disyllabic, whereas affixes are often syllable-sized or smaller. Connecting this morphological observation to reduplication, McCarthy & Prince propose that instead of stipulating

reduplicant size constraints such as RED=σ and RED=FOOT , it would be preferable to derive the size of an individual reduplicative morpheme from the classification of that morpheme as an Affix (thus smaller than or equal to a syllable) or a Root (thus larger than or equal to a binary foot). Downing (2006) observes that roots and affixes are not as uniform in prosodic size across languages as GTT presupposes, and proposes a revised version of GTT with a wider range of morphological categories — Affix, Root, Stem, Word — and a different mapping to phonological shape. Downing argues that reduplicative morphemes tend to assume the canonical shape in that language for the morphological category they correspond to, even when this shape is not one of the classic metrical categories. On this view, Ndebele reduplicants, discussed in section 4.2.1, assume the shape [CVCa] because that is the canonical shape of verb stems in the language. Whatever the details, however, the goal of GTT is clear: to provide language-internal and cross-linguistic motivation for reduplicative templates.

By contrast, *a-templatic* reduplication analyses have been given to cases of reduplication in which reduplicants are not directly subject to shape constraints and in which reduplicant form is simply a byproduct of constraints on stem shape. One example can be found in Temiar (Mon-Khmer, Aslian), in which continuative aspect is marked by consonant reduplication. Biconsonantal roots prefixally reduplicate both consonants (21)a); triconsonantal exhibit infixing reduplication of their final consonant only (21)b) (Gafos 1998:517, citing Benjamin 1976):

(21)	a.	'to call'	kɔɔw	→	kwkɔɔw	[Temiar]
		'to sit down'	gəl	→	glgəl	
	b.	'to lie down'	slɔg	→	sglɔg	
		'to ask a question'	smaaɲ	→	sɲmaaɲ	

Gafos observes that the primary generalization is output stem shape (CC.CVC), which reduplication helps to achieve. A template is clearly involved, but the reduplicant itself is not fixed; the reduplicant is whatever size and in whatever place is needed to convert an input to a CC.CVC output. Hendricks (1999) develops a 'compression' model for similar minimal reduplication effects in other languages in which reduplication appears to have the effect of slightly increasing stem size, but not by an amount equivalent to any of the familiar prosodic constituents (mora, syllable, foot).

5.1.2 Reduction of reduplicant (TETU)

A major achievement of approaches to reduplication within the BRCT framework is the ability to characterize and motivate the types of phonological reduction found in partial reduplication. Niepokuj (1991) and Steriade (1988), among others, were instrumental in drawing attention to the fact that partial reduplicants often exhibit structural simplification, e.g. in restrictions on syllable shape or reduction of length contrasts, as well as segmental reduction, e.g. neutralization of segmental contrasts. For example, Sanskrit intensive reduplication eliminates onset clusters in the reduplicant (Steriade 1988:108). Stems in (22) are shown in their full grade form:

(22)	'cry out'	krand	→	kan-i-krand	[Sanskrit]
	'fall'	bhranç	→	ban-i-bhranç (→ bani:bhranç)	
	'sleep'	svap	→	sa:-svap-	
	'sound'	dhvans	→	dhan-i-dhvans- (→ dani:dhvans-)	

Steriade attributes the form of the prefixed reduplicants in (22) to a principle requiring reduplicants to exhibit the unmarked setting for the complex onset parameter, namely prohibition. This insight that reduplicants can have more stringent markedness restrictions than the bases they are derived from plays a key role in BRCT, in which reduplicant unmarkedness effects are analyzed as the emergence of general unmarkedness effects in the language which are normally subordinated to higher-ranking IO-faithfulness. In Sanskrit, complex onsets are not simplified in all syllable nuclei; MAX-IO protects onset clusters in bases and in unreduplicated words. However, by hypothesis, Sanskrit nonetheless shares *COMPLEX, the universal markedness constraint against complex onsets. If *COMPLEX outranks FAITH-BR, it will exert an effect in reduplicants. The reason it does not exert its effects everywhere is that it is outranked by FAITH-IO, which protects outputs that correspond to input stems:

(23)

	RED-svap	MAX-IO	*COMPLEX	MAX-BR
a.	sva:-svap		**!	
☞ b.	sa:-svap		*	* (v)
c.	sa:-sap	*! (v)		! (p)

TETU effects obtain almost exclusively in partial reduplication (see e.g. Steriade 1988, Niepokuj 1991, Urbancyk 1996, Downing 2006). It is possible to imagine segmental TETU effects in total reduplication, but cases of this sort do not seem to occur. For example, one does not find total reduplication constructions in which all the vowels of one copy are replaced by schwa or [i] (e.g. hypothetical *sandroga* → *sandroga-sindrigi*); one does not find all complex onsets reduced to simple onsets (*sandroga-sandoga*), or all codas eliminated (*sandroga-sadroga*), just in one copy in total reduplication, even though reduction to schwa, simple onsets, and coda reduction are all hallmarks of partial reduplicants.

5.2 Phonological identity effects in reduplication

Phonological identity effects in reduplication are not surprising: whether it is analyzed as phonological copying or morphological doubling, in most cases the logical starting point in reduplication is two phonologically identical copies. In partial reduplication, identity is necessarily disrupted in terms of quantity, because the reduplicant must conform to a template which is smaller (or bigger) than the base. Identity can also be disrupted along the quality dimension, often in cases in which the reduplicant undergoes reduction while the base remains intact. These effects were discussed above in sections 5.1.1 and 5.1.2, respectively. BASE and reduplicant can diverge further if normal, word-level phonology applies to the output of reduplication, effecting changes such as assimilation or epenthesis at the base-reduplicant juncture (e.g. Hausa *tam-tambaya:* → *ta**nt**anbaya:* ~ *ta**tt**ambaya:* 'ask (pluractional)'; Newman 2000:425), or assigning word-level accent which happens to target a syllable which is in the base or the reduplicant (e.g. Chamorro *hugándo* 'play' → *hu**gágan**do* 'playing'; Topping 1973:259).

5.2.1 Wilbur's Identity principle

Many researchers in reduplication have been struck by the impression that there is less phonological divergence in reduplication than might be expected. Wilbur (1973) terms this the 'Identity Effect', pointing to cases in which an ordinary phonological alternation is either inhibited from applying if it would create divergence between base and reduplicant ('underapplication'), or applies even when not conditioned ('overapplication'), in order to keep base and reduplicant the same in some respect.

Underapplication and overapplication are opacity effects. The ability to capture them with the same mechanisms that drives copying in the first place — an identity relation between base and reduplicant — is a cornerstone of BRCT.

5.2.2 Reduplicative opacity in BRCT

As seen in section 5.1, BRCT (McCarthy & Prince 1993, 1994b, 1995, 1999) attributes reduplication to a phonological correspondence relation holding between two substrings in the output form of a word: the substring instantiating an abstract morpheme RED, and the substring ('BASE') which is the output correspondent of the input. The faithfulness constraint MAX-BR compels every element in BASE to have a correspondent in RED; DEP-BR compels every element in RED to have a correspondent in BASE; and IDENT-BR compels corresponding elements to be identical.

(24) RED ⇔ BASE ⇳ Input — Original ('Basic') model of BRCT

In the original model of BRCT there is no correspondence relation between RED and the input; RED is thus entirely dependent, for its substance, on BASE. (See McCarthy & Prince 1995 and Struijke 2000 for arguments that the input may in some cases directly influence RED, forcing a change in the architecture of BRCT.)

In BRCT, overapplication and underapplication result from high-ranking BR-Faithfulness that mandate identity, causing the same alternation to apply to both BASE and RED even if it is only transparently conditioned in one of them, or preventing an alternation from applying because its effects would introduce a discrepancy between the copies. As an example of overapplication of an effect in RED, McCarthy & Prince (1995) cite the following example from of CVC reduplication in Madurese. In these data the glides *ʔ, w* are inserted between adjacent vowels. As seen, a glide epenthesized into the base will also appear in the (underlined) reduplicant, even when not intervocalic there (25)a, b). Overapplication of nasal harmony, normally conditioned only by a preceding nasal consonant, is also illustrated in the reduplicant in (25)b).

(25) a. /a–taña–a/ a-ña̲ʔ-tañãʔã 'will ask often' [Madurese]

b. /moa/ w̃a̲-mõw̃ã 'faces'

/RED-moa/	MAX-BR	ONSET	DEP-IO
☞ wa̲-.mo.wa	** (mo)		* (w)
a̲-.mo.wa	***! (mow)	*	* (w)
a̲-.mo.a	** (mo)	**!	

BR-Faithfulness simply requires identity between RED and BASE; it does not in itself privilege BASE and require RED to conform. McCarthy & Prince cite several examples of overapplication and underapplication that have a 'backcopying' character, in which a base conforms to RED rather than the reverse. Such effects are difficult to describe in theories of reduplication without BR correspondence. To support backcopying, McCarthy & Prince cite examples in which external juncture effects are copied from RED to BASE, as in the Ineseño Chumash overapplication examples below. As seen, a segmental interaction between a prefixal reduplicant and a preceding prefix is reflected in the base, even though it is not transparently conditioned there (Applegate 1976, cited in Mester 1986 and McCarthy & Prince 1995):

(26) Ineseño Chumash: C_i-ʔ → C_i'

k-RED-ʔaniš	→ k'an-k'aniš	*k'an-ʔaniš

5.2.3 Opacity as a cyclic effect

Cyclicity is a potential source of many opacity effects in reduplication, and constitutes an alternative to surface BR correspondence constraints in many cases. For example, the 'overapplication' of nasal harmony in Madurese reduplication, illustrated in (27), can be accounted for if nasal harmony applies to the stem prior to reduplication, which copies its effects. In this instance, 'overapplication' of nasal harmony is simple input-output faithfulness:

(27)	Stem cycle:	/mowa/	→	[mõwã]	[Madurese]
	Reduplication cycle:	[RED-mõwã]	→	[wã-mõwã]	

Inkelas & Zoll (2005) and Kiparsky (2006) have argued that most, if not all, cases of overapplication and underapplication yield to a cyclic account that obviates the backcopying power accorded to BRCT. As Inkelas & Zoll (2005) and Kiparsky (2006) observe, cyclicity is independently needed outside of reduplication. By contrast, bidirectional BR correspondence was introduced just to handle reduplicative opacity. If cyclicity turned out to be sufficient to handle opacity effects, bidirectional BR correspondence would be unnecessary.

The most celebrated example of backcopying does not yield to a cyclic analysis. McCarthy & Prince cite Onn's (1976) intriguing example of overapplication of nasal harmony in Johore Malay (Western Malayo-Polynesian, Sundic) (28). According to Onn, the rightward spread of nasality from consonants to vowels crosses the internal boundary in reduplication and is then reflected back into the first copy:

(28)	hamə	hãmə-hãmə	'germ/germs'	[Johore Malay]
	aŋãn	aŋãn-aŋãn	'fragrant/(intensified)'	

As McCarthy and Prince argue, these data require the Identity constraints of BRCT, and cannot be handled cyclically. Even if nasal harmony applies cyclically, before and after reduplication, it is only possible, on a cyclic analysis without Identity constraints, to derive **hamə-hãmə*, from reduplication of *hamə* and assimilation of nasality across the internal boundary (*hamə → hamə hamə → hamə-hãmə*).

While this case falls outside the descriptive capacity of cyclic accounts, the more restrictive predictions of cyclicity do capture a generalization pointed out by McCarthy & Prince (1995) and Inkelas & Zoll (2005). BRCT predicts possible opacity effects that appear not to occur, one example being the overapplication of internal junctural effects in reduplication. For example, effects like *tami* → *tan-tani*, with overcopying of the assimilatory *m* → *n* alternation at the internal RED-BASE juncture, appear not to exist. These cannot be generated cyclically, a point in favor of cyclic approaches to opacity.

Raimy (2000a,b) has proposed an alternative phonological account of opacity effect in reduplication. Related in some ways to that of Mester (1986) or Clements (1986), Raimy's account achieves opacity effects by providing an intermediate representation to which phonological rules can apply in which base and reduplicant are associated but not linearized. This allows them to act as one for the purpose of phonological rule application, even if subsequent linearization make the effects of the phonological rules seem opaque. Raimy's approach is to represent reduplication as the instruction to 'loop back' within a phonological string, as shown in (27). Arrows (e.g. in 27a) indicate precedence relationships; the curved arrow (in (27b, c) represents the loop which results in reduplication:

(29) Reduplication of aŋen 'wind' in Malay (Raimy 2000b)

a. Input: # → a → ŋ → e → n → %

b. Reduplication: # → a → ŋ → e → n → %

c. Nasalization: # → ã → ŋ → ẽ → n → %

d. Linearization: # $ã_1$ $ŋ_1$ $ẽ_1$ n_1 - $ã_2$ $ŋ_2$ $ẽ_2$ n_2 %

Raimy's account is designed to capture opacity effects in reduplication; it extends less easily to reduplicative unmarkedness (section 5.1.2) and prosodic constraints on reduplicant size (see section 5.1.1), phenomena which Raimy suggests may be less robust that is generally thought (though see Downing (2001) for a rejoinder).

5.2.4 Templatic backcopying

McCarthy & Prince (1999) credit Philip Hamilton and René Kager with an interesting prediction of BRCT. The so-called Hamilton-Kager prediction has to do with the possibility of backcopying a reduplicant's templatic restrictions to the base, in service of base-reduplicant identity. The result would be simultaneous reduplication and truncation, e.g. hypothetical *harpin* → *har-har* or *pin-pin*. At one point thought not to occur (McCarthy & Prince 1999), this pattern has since turned up in several languages. Inkelas & Zoll (2005) and Downing (2006) point out cases in several different languages in which a base word corresponds to a reduplicated, truncated counterpart, without the existence of independently truncated forms that would motivate an intermediate stage, or a third point in a triangle of related forms.

Double truncation has been attested as an established grammatical construction in several languages. It occurs in nickname formation, e.g. *Lebron* → *BronBron* or *Collette* →

CoCo. A striking case is found in Guarijio (Uto-Aztecan, Tarahumaran) inceptive reduplication, which applies to verbs denoting iterated punctual events (Caballero 2006; data from Miller 1996:65-66):

(30)					
	toní	'to boil'	to-tó	'to start boiling'	[Guarijio]
	sibá	'to scratch'	si-sí	'to start scratching'	
	čonó	'to fry (intr.)'	čo-čo	'to start frying'	
	nogá	'to move'	no-nó	'to start moving'	
	kusú	'to sing (animals)'	ku-kú	'to start singing'	
	suhku	'to scratch body'	su-sú	'to start scratching the body'	
	muhíba	'to throw'	mu-mú	'to start throwing'	

According to Caballero (2006:278), Guarijio has no independent process of truncation. These Guarijio inceptives are thus structurally parallel to *BronBron*, but without the wordplay dimension that can enter into nickname formation.

Once the possibility of double truncation is acknowledged to exist, a different question arises: why is it uncommon, if it is so easy for theories to generate? The answer to this question may be functional: truncation + reduplication removes a lot of lexical material from bases, and can therefore present recoverability problems. From this perspective, it is not surprising that our two examples have the properties that they do. Nicknames are notoriously exempt from recoverability concerns. In Guarijio, according to Caballero 2006 and Miller 1996, the class of verbs that undergoes abbreviated reduplication is tightly semantically restricted, therefore a small set, reducing the potential for neutralization. It would be surprising to see a productive construction applying to a large, open class of items (e.g.

inflection, or nominalization) exhibit the extreme phonological curtailment seen in Guarijio inceptives. Nonetheless, this construction type seems to be possible in human language.

6 Phonological (compensatory) duplication

A challenge in developing theories of morphological reduplication is disentangling imposter cases of reduplication that may be purely phonological, instance of phonologically conditioned long-distance assimilation. In this section we will explore the boundary between morphological reduplication and phonological copying.

Yu (2005) and Inkelas (2008) discuss a number of cases of what Yu calls 'compensatory reduplication' in which phonological considerations such as syllable well-formedness or the need to supply segments to a prosodic template can induce copying of single segments, substrings, or even syllabic constituents. For example, loanwords into Cantonese undergo syllable rhyme reduplication in order to break up a consonant-liquid onset cluster (Yu 2005):

(31)	'break'	[p^hɪkˉlɪk]	[Cantonese]
	'clutch'	[kɪkˉlɪkˉtsi]	
	'blood'	[pʌtˉlʌtˉ]	

Phonological copying theories such as BRCT could handle these phenomena using the same type of correspondence constraints used for morphological reduplication, except that the correspondence would be between output syllables instead of between BASE and RED per se. In Cantonese, syllable structure considerations force epenthesis, but a

high-ranking prohibition on epenthesizing default features forces the epenthetic segments to assimilate to, or correspond with, existing segments, mimicking the effects of morphological reduplication but without an abstract RED morpheme. Long-distance phonological assimilation, seen commonly in harmony systems, is at work in non-morphological reduplicative effects of the kind documented by Zuraw (2002:396), e.g. *orangutan* → *orangutang, smorgasbord* → *smorgasborg, persevere* → *perservere,* etc.

Taking this analysis one step farther, it is possible to attribute at least some cases previously analyzed as morphological reduplication to the phonology, as well. For example, monomoraic reduplications like the Yoruba gerundive (e.g. *g͡bóná* → *g͡bí-g͡bóná*) (see section 5.1.2) could be analyzed as prefixation of an underspecified vowel, which in turn triggers epenthesis of an underspecified onset consonant; both vowel and consonant acquire surface feature specifications through a combination of assimilation and default feature fill-in.

Yu (2005) and Inkelas (2008) find that phonological duplication and morphological reduplication have a number of distinct properties, including locality and size restrictions. These suggest a division in which phonological duplication is modeled like phonological assimilation (using correspondence constraints as in BRCT), whereas morphological reduplication is modeled like synonym compounding (using a theory like Morphological Doubling Theory).

Nonetheless, there exists a continuum of cases, both synchronic and diachronic, which straddles any line that can be drawn between phonological duplication (including lengthening and gemination) and partial morphological reduplication. Examining or questioning this line more closely is likely to illuminate future theoretical models of reduplicative phenomena.

7 Conclusion

Reduplication has been and is likely to continue to be a phenomenon of enduring interest to morphologists and phonologists alike. It has a unique capacity to shed light on the internal structure of words, and it is a constant thorn in the side of reductionist theories which try to lump morphology with phonology or to lump morphology with syntax. It is innovated readily in creoles and in the course of first language acquisition, and it is easily spread from one language to another. Of all of the elements in language games, reduplication is arguably the one that occurs most often in ordinary grammar as well. Reduplication is at the same time commonplace, occurring in virtually every language, and mysterious; its historical trajectory remains elusive. The study of reduplication has burgeoned in the last thirty years and is by no means exhausted; future decades are likely to turn up new typological discoveries as well as historical and psycholinguistic revelations about the nature of reduplication.

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