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# MINIMAL REDUPLICATION

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# Abstract

Minimal Reduplication

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This dissertation introduces Minimal Reduplication, a new theory and framework within generative grammar for analyzing reduplication in human language. I argue that reduplication is an emergent property in multiple components of the grammar. In particular, reduplication occurs independently in the phonology and syntax components, and in both cases it occurs due to the ordinary workings and independently-motivated properties of those components. Therefore, no special theoretical machinery is necessary in order to analyze reduplication.

Phonological and syntactic reduplication both have distinct properties, which I lay out and explore in some depth. In cases of phonological reduplication (which includes morphological reduplication), reduplication occurs as a phonological repair process. These reduplication constructions are minimal in phonological size, they exhibit TETU, and they interact normally with morphophonology. No RED morpheme or constituents like "base" and "reduplicant" are needed to analyze them successfully.

Syntactic reduplication occurs when a syntactic constituent is copied and merged with another morpheme, creating a complex constituent with two daughters below $X^0$. These cases are not limited in phonological size and do not exhibit TETU. They are restricted in their interaction with morphophonology. In addition, due to the nature of the merged constituent, these constructions sometimes exhibit phonological behavior which appears to be non-optimizing.

Case studies are presented with data from Kwak'wala, Tamil and Samala, with supporting evidence from many other languages.

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For Daniel Bartlett

# Acknowledgments

As I sit and write these words, with my dissertation a *fait accompli*, it is all too easy to imagine that it was always destined to be thus. But it was not so: in fact, on more than one occasion the idea of finishing this project seemed unlikely or impossible. It is therefore fitting to acknowledge the many people whose contributions were the essential preconditions for this work to ever see the light of day.

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A project of this magnitude requires support that is not only intellectual but social as well. The other members of my PhD cohort, Justin Nuger and Vera Gribanova, have shouldered more than their share of this responsibility, but they have not been alone. Among the serried ranks of other students in the UCSC graduate program, Noah Constant and Ember Van Allen provided extraordinary support while managing to make better life decisions for themselves. Ryan Bennett, Anie Thompson, Boris Harizanov, Matt Tucker, Dave Teeple, Andrew Dowd, Paul Willis, both Kaplans and Jeremy O'Brien all offered ideas and criticisms which helped me shape up this project. My classmates at the InField 2008 Kwak'wala field methods course were tremendously fun while inspiring me with their intelligence and dedication. Emily Elfner in particular continued to offer useful input on this project, and my discussion of Kwak'wala is enriched by her contributions. The instructor of our InField course, Pat Shaw, merits inestimable thanks as well.

In the final analysis, all linguistic work rests on fieldwork and other means of gathering primary data from the speakers of the world's languages. Our work can only be as good as the generosity, integrity and insight of those speakers allow. As I worked on this thesis I experienced the great privilege of working with speakers who must be counted among the most generous, insightful and characterized by integrity. These include two native speakers of Kwak'wala and three native speakers of Tamil. I thank them all from the bottom of my heart and can only hope that my contributions to the linguistic scholarship on their languages should approach the high level of quality of the information that they offered to me. My fieldwork on Tamil is drawn on directly in this thesis. Unfortunately my fieldwork on Kwak'wala could not be reported on or discussed in this thesis due to cultural and privacy considerations. Nevertheless I am grateful for the truly remarkable opportunity that I had to work with those speakers and for the ways in which that experience enriched my own understanding of Kwak'wala in general. I offer profound thanks again to all of my informants.

The intellectual atmosphere at UCSC has allowed me the opportunity to learn from and collaborate with many great linguists who have visited our department, and with faculty from outside of our department and even outside our field. Among these estimable individuals are Lev Blumenfeld and Melissa Frazier who have contributed greatly to my success at earlier and later stages of my graduate career. Yi Zhang, from the UCSC Information Systems Management de-

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It is literally impossible to conclude this section adequately without emphasizing the importance of the love and support of my family, whose consistent and unwavering support for me verges on the inexplicable. They have always stood behind me in every one of my endeavors which, between you and me, gives a person a lot of incentive to succeed. Along with my family, my friends and comrades have kept me going through many years and a few hard times. If I were to try and list them all, I might get as far as naming Lauren and Stephanie before realizing that they are all too numerous and their contributions too profound to be justly propounded without writing a second text whose length would be equal to this one. And so then I would stop.

# CHAPTER 1

# Introduction

Reduplication, a phenomenon in which some phonological structure appears to be repeated for some morphological or grammatical purpose, has long been an area of significant linguistic interest, including generative theoretical investigation from the time of Wilbur (1973) onwards. Within mainstream phonology since Marantz (1982), and particularly in Optimality Theory (Prince and Smolensky, 1993/2004) since McCarthy and Prince (1995), the basic analysis of reduplication has been as follows: there is a special reduplicative morpheme that receives phonological exponence through the force of special (reduplication-specific) phonological rules or constraints.

In this thesis I introduce a new theory of reduplication, called Minimal Reduplication. The basic claim of this theory is that reduplication is an emergent property in multiple components of the grammar. In particular, reduplication occurs in both phonology and syntax due to independently-motivated properties of those grammatical components, eliminating the need for special theoretical tools that are uniquely applicable to reduplication. This theory thus situates reduplication as a derivable consequence of the machinery of language rather than an anomaly. In addition to being more theoretically parsimonious and empirically successful, Minimal Reduplication also makes correct typological predictions about the types of reduplication that do and do not exist.

The name Minimal Reduplication alludes to three aspects of the theory that distinguish it from existing theories of reduplication. MR *minimizes* the scope of reduplication as a morphophonological process by identifying a fundamental distinction between morphological reduplication – cases where multiple copies of some phonological structure arise through the interaction of phonological constraints – and syntactic reduplication, in which multiple copies occur due to the copying and multiple spellout of a morphosyntactic node. MR also distinguishes between morphological reduplication (in which reduplication is the means employed to express a morpheme) and phonological reduplication (in which reduplication is a repair for marked structure and has no morphological significance), although there is a formal unity in the phonological conditions under which these types of reduplication occur.

MR predicts that morphological reduplication should be *minimal* in the amount of material copied because it sees this kind of reduplication as a phonological repair process. Like any repair process, it should occur only when compelled to do so, and only to the degree to which it is so compelled. This distinguishes MR from other theories that hold reduplication to be maximal, i.e. that some grammatical force in reduplicative constructions always militates for total reduplication. These are theories in which reduplication is governed by a maximizing relationship between special constituents like a "base" and a "reduplicant," or where reduplication proceeds by copying whole words and then truncating them if necessary.

Finally, MR is inspired in part by the guiding principles of the *Minimalist Program* (Chomsky (1993, 1995); Marantz (1995*b*); Lasnik (2002), etc.) as applied to phonology. Minimalism proceeds from an intention to account for the attested facts of language using only the minimal conceptually necessary elements and interfaces. MR aims at a similar goal in the area of morphophonology, by limiting the inventory of elements in phonological representations to those that are "conceptually necessary" – i.e. those that are attested in surface representations. Adhering to such a limitation will prohibit the existence of morphemes whose underlying phonological form consists of an instruction or a special plea, such as RED, rather than consisting of output-attested phonological elements such as segments, features and prosodic constituents.

## 1.1 Structure of the thesis

In this chapter I lay out the essential assumptions and claims of Minimal Reduplication. In chapter 2 I discuss the MR analysis of morphological reduplication. This is illustrated with an extensive analysis of a reduplication pattern found in Kwak'wala, a Wakashan language of British Columbia. In chapter 3 I present the MR analysis of syntactic reduplication, including the properties that distinguish it descriptively from morphological reduplication and the theoretical claims that I make that account for those observable differences. This analysis is illustrated with evidence from Tamil, a Dravidian language indigenous to southern India. In chapter 4 I consider the theoretical context for Minimal Reduplication in more detail, and contrast it directly with other theories of reduplication developed both inside and outside the framework of Optimality Theory. These differences are explored in the context of Samala, a Chumashan language of southern California whose reduplicative patterns have been analyzed in many different theoretical frameworks. Chapter 5 summarizes the arguments of this thesis, discusses some remaining challenges for the theory and its implications, and lays out some areas of future research.

## 1.2 Overview of the theory

Duplication or repetition of some phonological or morphophonological structure is a very common occurrence; as Sapir (1921) states, "[n]othing is more natural than the prevalence of reduplication." The variety found across different patterns that occur between and within languages is quite extensive. It is not self-evident that all of these patterns should be treated as fundamentally similar or that a single kind of analysis will account for all of them. The claim of theories that have tried to offer a unified general account of reduplication, such as Base-

Reduplicant Correspondence Theory (BRCT) in mainstream OT, is that it is possible to do so in a principled and explanatory way.

MR proposes to redivide the realm of reduplicative phenomena and identify the different origins and properties of different kinds of reduplication. This redivision makes possible simpler analyses of many reduplicative patterns. The independently-motivated properties of the phonological, lexical and syntactic components of the grammar are each capable of producing reduplicative structures under given circumstances. The essential claim of Minimal Reduplication is that those innate tendencies towards reduplication are sufficient explanation for the reduplicative patterns attested in language. No reduplication-specific rules, constraints or representations are necessary to account for those patterns.

### 1.2.1 Goals of MR

Any theory of reduplication that is situated in a multi-component grammatical framework must determine which components are responsible for which reduplicative phenomena, and develop principles for analyzing those phenomena. This classification must follow from our analysis of reduplication to some degree, but it also informs that analysis, as we must make sure that the appropriate theoretical tools are used in each context.

A few examples that can plausibly be discussed under the rubric of "reduplication" suffice to demonstrate the kind of differences that may exist between these patterns, and suggest the need for different analytical routes to account for them all. Under a naive definition of reduplication as the repetition of phonological or morphological structure for some grammatical purpose (excluding purely coincidental cases where strings repeat within or across morphemes without any grammatical import), we would include a vast array of phenomena. The following examples illustrate just some of the kinds of constructions that would be included by such a definition.

(1) REP- wood -eye/face
e- l̓úk$^{w}$ -us
**l̓**e**l̓**úk$^{w}$s 'wooden mask' (Spokane; Bates and Carlson (1992))

(2) make.sound.of.crinkling.paper -MEDIOPASSIVE.REPETITIVE -*pres*
čoɬo -RED -ʔa
**čoɬčo**ʔa
'it makes irregular crackling sounds (as in shaking a paper bag with candy in it)'
(Zuni; Newman (1965); Broselow and McCarthy (1983))

(3) To **re-re**gift (English)

(4) I'm **really really** hungry. (English)

(5) **lirkod** gil lo **yirkod** ba-xayim
**to-dance** Gil not **will-dance** in-the-life
"Dance, Gil never will." (Hebrew; Inkelas and Zoll (2005))

(6) **pā** ń ka' mÉ **pa'** ā
**throw** you fut-a it **throw** Q
"Are you going to throw it?" (Vata; Koopman (1984))

(7)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **kumaaru** | **-kku** | **kuṭu** | **-tt** | **-een** | **-ṇṇu** | **kimaarukku kuṭutteenṇṇu** | poy | collaa | -tee |
| Kumar | DAT | give | -PST | -1SG | -QUOT | ECHO | lie | say | -NEG.IMP |

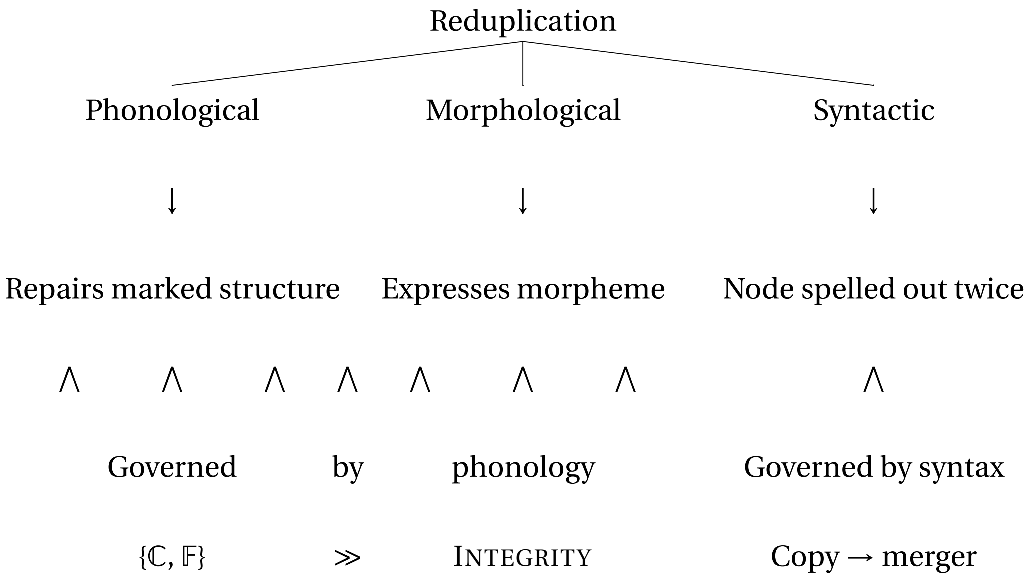
"Don't lie that you gave it to Kumar or some such nonsense." (Tamil; Keane (2001))

The differences between these cases are more salient than their similarities. Examples (1) to (3) exhibit "reduplication" within a word of a string smaller than a word, while the reduplication in examples (4) to (6) involves strings as long as a whole word and (7) involves the reduplication of an entire phrase. Some cases involve identical strings that are adjacent to each other, while in others they are separated by some segments or some words. Some cases involve perfect phonological identity between the copies, whereas in others we see imperfect identity and can identify the copies with each other (in whatever sense) only through analysis of the word or utterance.

Some of these cases are clearly different from reduplication, such as (3). The only challenge in such cases is to make sure that the definition of reduplication that we employ does not include them. But some other cases are ambiguous. Some of the examples above resemble constructions that have been (implicitly or explicitly) excluded from consideration as reduplicative phenomena, as suggested by some names used in the literature for phenomena such as "pseudoreduplication" (Newman, 2000) and "non-reduplicative copying." (Urbanczyk, 1998). However, such analyses have not generally defined the scope and properties of reduplication vs. other kinds of copying, or offered a comprehensive analysis of the different types of copying.

MR divides the world of grammatical copying into phonological, morphological and syntactic reduplication. The most elementary properties of each one and their relations are indicated in the following diagram.

(8) Minimal Reduplication model of reduplicative processes:



Phonological and morphological reduplication both belong to the phonology. A reduplicative phonological structure is one in which an input element has an affiliation with multiple output elements, whether this is managed formally through correspondence relations (McCarthy and Prince, 1995) as in mainstream OT, or through other means. In a correspondence-theoretic

OT framework, reduplication is an inherent possibility, and candidates with multiple output correspondents for input elements must always be considered. The constraint Integrity militates against such multiple correspondence, but like any constraint it can be dominated by other constraints and rendered at least partially ineffective. This is the basic circumstance of phonological and morphological reduplication. Phonological reduplication is the applicable term when reduplication is employed purely to repair a marked structure, with no morphological significance.[1] (This kind of reduplication has been explored by Yu (2005), who terms it “compensatory reduplication.” The concepts are identical.)

For example, Hocank (also known as Winnebago or Hocą̨k; Siouan-Catawban; Wisconsin) repairs certain tautosyllabic consonant clusters through the insertion of a copy of the following vowel between the consonants in question (Miner 1993; this phenomenon is known as Dorsey’s Law):[2]

(9) Hocank clusters repaired through reduplication (Miner, 1979, 1993; Broselow, 2008):

| | |
|---|---|
| /hipres/ | [hipe̲re̲s] ‘know’ |
| /š-wapox/ | [ša̲wa̲pox] ‘you stab’ |
| /š-ruxuk/ | [šu̲ru̲xuk] ‘you earn’ |

The basic MR analysis of this kind of reduplication involves the domination of some constraint $\mathbb{C}$ over Integrity. It is also typically required for Integrity to be dominated also by some relevant faithfulness constraints that militate against other possible repair strategies. For example, reduplication and epenthesis can both provide an extra segment in a surface form, and therefore they are in competition to occur in cases where a particular marked structure can be repaired by the addition of an extra segment. Therefore in order for reduplication to occur as a repair, Dep (the constraint against epenthesis) must dominate Integrity.

In a case like Hocank, the reduplicative behavior seen in the data above can be attributed to the domination of *Complex and Dep over Integrity. This ranking leads to the selection of the attested candidates in Hocank, as illustrated below:[3]

---

[1] The fact that reduplicative candidates must always be created by Gen for consideration and that the constraint Integrity militates against reduplication are rarely commented on in mainstream OT, even though they provide machinery to motivate and regulate reduplication. An exception is Riggle (2003), who points out that the interaction of Integrity and Faith-BR constraints predict the existence of a pathological backcopying of truncation in reduplication cases, quite similar to the Hammond-Kager Conundrum (Prince, 1996). See more on this issue in chapter 4 of this thesis.

[2] On first use, languages discussed in the text are typically followed by parenthetical information including alternative names, genetic affiliation, geographic location and relevant citations. Claims about genetic affiliation come from Ethnologue (2005); Campbell (1997); Mithun (1999).

[3] Appendix C defines all constraints used in this thesis. When relevant or when their conditions of application are not clear, constraints are defined in the text as well. Generic constraints sometimes used for the purpose of abstraction are $\mathbb{C}$, some or any constraint; $\mathbb{F}$, some or any faithfulness constraint; and $\mathbb{M}$, some or any markedness constraint.

(10) Hocank cluster-repairing reduplication: [šawapox] ‘you stab’

| š + wapox | *Complex | Dep | Integrity |
|---|---|---|---|
| a. šwapox | *! | | |
| b. šəwapox | | *! | |
| ☞ c. šawapox | | | * |

The same basic arrangement is responsible for cases of morphological reduplication, in which reduplication expresses a particular morpheme or morphosyntactic structure. Formally speaking, these cases are essentially identical to phonological reduplication. The special element in morphological reduplication cases is that a particular morpheme creates the marked structure that must be repaired by reduplication. This often (but not always) involves a morpheme whose underlying phonological form is underspecified, consisting for example of a prosodic element such as a syllable or mora with no associated segmental content.

For example, nominal pluralization and the reiterative aspect in Washo (isolate; California and Nevada) are expressed through reduplication. This pattern involves copying the onset and nucleus of one syllable, as illustrated in the examples below:

(11) Washo reduplication (Jacobsen, 1964; Winter, 1970; Wilbur, 1973; Yu, 2008):

| *Base form* | *Reduplicated form* | *Base gloss* |
|---|---|---|
| ʔelel | ʔ**ele**lel | ‘mother’s father’ |
| sukuʔ | su**ku**kuʔ | ‘dog’ |
| bokoŋ | bo**ko**koŋ | ‘snore’ |
| bɨk’ɨ | bɨ**k’ɨ**k’ɨ | ‘grandmother’s sister’ |

If the underlying phonological form of the plural agreement morpheme is a syllable lacking segmental affiliation, then reduplication is easily explained as the means chosen to allow that syllable to reach the surface and to be explicitly present in the output, which can only happen by finding some segments to which the syllable can anchor. With the action of a faithfulness constraints such as MaxFloat (Wolf 2006 – prohibiting deletion of floating underlying elements), we can motivate reduplication in these words just as simply as in Hocank:[4]

(12) Washo plural/reiterative reduplication: [bɨk’ɨk’ɨ] ‘grandmother’s sisters’

| bɨk’ɨ, σ̲ | MaxFloat | Dep | Integrity |
|---|---|---|---|
| a. bɨk’ɨ | *! | | |
| b. bɨt̲ə̲k’ɨ | | *! | |
| ☞ c. bɨk̲’̲ɨ̲k’ɨ | | | ** |

---

[4] In this tableau as in many others below, I use underlining to indicate an input floating prosodic unit and the segments to which it anchors in output candidates.

### 1.2.2 Assumptions and predictions

Existing theories of reduplication typically depend on special machinery that aims at creating reduplicative structures *per se*. The claim of MR is that such machinery is unnecessary and, in large part, impossible. With the "base" and "reduplicant" eliminated as constituents in phonological representations, BR correspondence relations and FAITH-BR constraints are also ruled out, simplifying CON considerably. Underlying elements like RED are an obstacle to homology between the alphabet of elements out of which underlying and output representations are composed. Not only is that homology a goal of Minimalism, but it also eliminates certain bad predictions that are made by the existence of RED in OT; see Moreton (1996).

MR does not offer a new set of phonological constraints or formal machinery with which to enrich phonological theory. Rather, it aims to exploit basic aspects of that theory to explain reduplicative phenomena without making use of commonly assumed formal devices that are redundant and unmotivated, as well as being empirically unsuccessful. The central claim of MR with regard to morphological reduplication is that no reduplication-specific phonology is necessary to account for the attested patterns. In Optimality Theory (the basic theoretical framework in which this theory will be presented), this means that a RED morpheme, FAITH-BR constraints and the phonological constituents called "base" and "reduplicant" can all be eliminated. Reduplication is a phonological possibility that can emerge as an active process even in the total absence of such reduplication-specific devices.

Consider for example the constituents called "base" and "reduplicant." As abstract structures, the burden of proof is on the theory that asserts their existence. Several considerations seem to justify these constituents. In derivational models of phonology, their existence mirrored the basic claim that reduplication occurs sequentially at some point in a derivation, and thus the reduplicative form must be derived from some other partially derived form, rather than having direct access to the input. However, this assumption is not maintained in OT, and is explicitly abandoned in the Full Model framework (McCarthy and Prince (1999)) which give both the reduplicant and the base direct access to the input form.

Note that I will continue to use the terms base and reduplicant for descriptive convenience. In reduplicative constructions that result in multiple copies, a copy whose phonological or morphological behavior more closely resembles the root or stem that fed the constructions may be referred to as the base, while a copy that exhibits more severe phonological simplification or more affixal behavior may be referred to as the reduplicant. In Minimal Reduplication, these terms are used for the purpose of descriptive convenience only and they have absolutely no status as special constituents in the morphophonology.

A more concrete justification is the fact that the base and the reduplicant are, of course, similar to one another. Most OT analyses of reduplication attempt to account for that similarity through correspondence constraints. FAITH-BR constraints are the main force driving reduplication and determining its properties. However, allowing correspondence relations to hold between these constituents involves some redundancy, since direct correspondence between reduplicated segments is also necessary. Moreover, the existence of these base-reduplicant correspondence relations subjects theories of reduplication to problems like the one that Prince (1996) has termed the "Hammond-Kager conundrum" (see discussion in chapter 4).

Similarly, BRCT predicts the existence of a scrambling pattern to maximize reduplication. Such an unattested pattern is easily derived from permutations of standard constraints. For example, consider Ilokano (Austronesian; Philippines), which exhibits heavy-syllable reduplication:

(13) Ilokano reduplication (data from Hayes and Abad (1989)):

| | | |
|---|---|---|
| kaldiŋ | kal-kaldiŋ | ‘goat’ / ‘goats’ |
| kuttoŋ | naka-kut-kuttoŋ | ‘thin’ / ‘very thin’ |
| taray | ʔag-tar-taray | ‘run’ / ‘is running’ |

A typical analysis of this pattern would look like the following:

(14) Analysis of Ilokano reduplication:

| red + kaldiŋ | Max-IO | All$\sigma$L | Lin-BR | Max-BR | *Coda |
|---|---|---|---|---|---|
| ☞ a. kalkaldiŋ | | ** | | *** | *** |
| b. kaldiŋkaldiŋ | | ***! | | | **** |
| c. kakaldiŋ | | ** | | ****! | ** |
| d. kladkaldiŋ | | ** | *! | ** | *** |
| e. kalkal | *!** | * | | | ** |

Candidates that never occur in any language should be prohibited either through harmonic bounding, which prevents them from surfacing given any permutation of constraints; or through a universal fixed constraint ranking that prevents the constraint ordering that would select them. But in the Ilokano tableau above, we see a pathological scrambling candidate that is not harmonically bounded. That is *kladkaldiŋ*, in which the linear order of input segments is violated in the reduplicant in order to better satisfy a BR maximality constraint. Thus by reversing the order of two constraints (Linearity-BR and Max-BR) we would produce Ilokano′, a language with scrambling reduplication:

(15) Scrambling reduplication in Ilokano′:

| red + kaldiŋ | Max-IO | All$\sigma$L | Max-BR | Lin-BR | *Coda |
|---|---|---|---|---|---|
| a. kalkaldiŋ | | ** | ***! | | *** |
| b. kaldiŋkaldiŋ | | ***! | | | **** |
| c. kakaldiŋ | | ** | ***!* | | ** |
| ☞ d. kladkaldiŋ | | ** | ** | * | *** |
| e. kalkal | *!** | * | | | ** |

The nonexistence of such patterns has been observed since Marantz (1982), but BRCT predicts that they should exist. The only way to prevent such an outcome is to stipulate an extrinsic constraint ranking Max-BR ≫ Linearity-BR, which lacks principled justification.

Note that it is the assumptions of BRCT that drive us toward this problem. When we claim that base and reduplicant are formal constituents and that phonological constraints actively seek to maximize identity between them, the logic of OT leads to typological predictions about the type of repairs that should occur to bring about that maximization. The unattested nature of many of those repairs then needs separate explanation. By abandoning those assumptions about base and reduplicant, we can avoid altogether such incorrect predictions.

By contrast, MR makes significant correct typological predictions. For example, in MR morphological reduplication occurs through the domination of INTEGRITY by faithfulness constraints including DEP because reduplication and epenthesis are in competition as repair strategies. We therefore expect to find across languages that reduplication and epenthesis should be used to repair the same kind of marked phonological structures.

This prediction appears to be borne out. As examined by Broselow (1982), the only types of marked structure relieved by epenthesis are those that belong to the following three categories (using the terminology of Blumenfeld (2006)): SYLLABICALLY-conditioned epenthesis, MINIMALITY-conditioned epenthesis and SEGMENTALLY-conditioned epenthesis. In (16) we see that for each of these classes, alongside languages that repair the structure through epenthesis we also find languages that repair them through reduplication (Saba Kirchner, 2007*b*):

(16) Epenthesis and reduplication as alternative repair strategies

| | *Language* | *References* |
|---|---|---|
| SYLLABICALLY-conditioned | | |
| **Lack of onset:** | | |
| Epenthesis: | Axininca Campa | Payne (1981), Ito (1989) |
| Reduplication: | Spokane | Bates and Carlson (1998) |
| **Complex codas:** | | |
| Epenthesis: | Lenakel | Lynch (1974), Blevins (1995), Kager (1999) |
| Reduplication: | Cook Island Maori loan phonology | Kitto and de Lacy (1999) |
| MINIMALITY-conditioned | | |
| **Bimoraic word minimality:** | | |
| Epenthesis: | Latin | Mester (1992) |
| Reduplication: | Hausa class 6 for derivations | Newman (1972), Yu (2005) |
| **Bisyllabic word minimality:** | | |
| Epenthesis: | Lardil | Wilkinson (1988), Prince and Smolensky (1993/2004) |
| Reduplication: | Mono | Olson (2003), Hall (2003) |

SEGMENTALLY-conditioned

**Rising sonority across syllable boundaries:**

| | | |
|---|---|---|
| Epenthesis: | Catalan | Pons Moll (2005) |
| Reduplication: | Hocank | Miner (1979), Alderete (1995)<br>Broselow (2008) |

Haugen (2005) suggests another source of evidence for the role of prosodic elements as underlying forms rather than emergent TETU templatic forms. Two Uto-Aztecan languages, Tohono O'odham and Nahuatl, both form distributives through heavy syllable reduplication. However, they use different kinds of heavy syllables. Tohono O'odham adds a prefixed syllable and geminates the stem-initial consonant to close that prefix, as in *nowiu* 'ox' which forms the distributive *nonnowiu*. Nahuatl also involves a prefixed reduplicative CV, but in this case the syllable is closed through glottal stop insertion, as in *koyo:ni* 'be perforated' (orthographic *koyōni*) which yields distributive *koʔkoyo:ni* 'be perforated in several places/all over' (orthographic *koh-koyōni*) (Canger, 1981; Tuggy, 2003).

These similar but distinct patterns receive a straightforward explanation in MR, according to which both Tohono O'odham and Nahuatl preserve a distributive morpheme inherited from proto-(Southern-)Uto-Aztecan, whose underlying form is a segmentally-empty heavy syllable. The differentiation between the languages is one of phonology: in OT terms, constraints related to gemination or to reduplicative codas have reranked in one or both languages. By contrast, a theory that denies the role of elements like empty syllables as underlying forms can explain these two patterns as deriving from distinct grammars, but it has no obvious account for the genetically-derived similarity between the patterns.

## 1.3 Morphological Reduplication

Perhaps the most familiar and most studied class of reduplication cases are those that we can refer to as morphological reduplication. These are cases, in MR terms, in which the addition of a particular morpheme creates a phonological structure that is repaired by reduplication, due to the basic ranking $\{\mathbb{C}, \mathbb{F}\} \gg$ INTEGRITY. This origin leads to a number of distinctive properties that characterize morphological reduplication and distinguish it from syntactic reduplication. We can consider these salient properties of morphological reduplication, and the Minimal Reduplication analysis of them, before turning to syntactic reduplication. The table below lays out some of these properties.

(17) Generalizations and observations about morphological reduplication:

| | |
|---|---|
| FORM | Reduplicant exhibits a fixed (but potentially contextual) size |
| | Reduplication may interact opaquely with phonology |
| | Prominent material is preferentially copied |
| LOCATION | Reduplication is local |
| MEANING | Iconic reduplicative meanings recur |

### 1.3.1 Fixed size

One of the most important early generalizations about morphological reduplication is that the reduplicant usually has a fixed size, and that the size is usually identical to that of prosodic constituent such as the syllable or foot; this is the basic generalization that motivates the Prosodic Morphology theory of reduplication (McCarthy and Prince, 1986/1996, 1990). An example of such fixed-size reduplication comes from Yidinʸ (Pama-Nyungan; Queensland, Australia), in which nominal plurals are formed by adding a prefixed copy of the first foot of the word (omitting a foot-final coda if it is not organic to the root):

(18) Yidinʸ plural nouns (Dixon, 1977*a,b*; Nash, 1979, 1980; Marantz, 1982):

| *Base form* | *Reduplicated form* | *Base gloss* |
|---|---|---|
| bunʸa | **bunʸa**bunʸa | ‘woman’ |
| yalaŋ | **yalaŋ**yalaŋ | ‘big one’ |
| gunʸdʸiːlbay | **gunʸdʸil**gunʸdʸiːlbay | ‘tiger snake’ |
| dʸambuː-l | **dʸambu**dʸambuːl | ‘two’ |

There are many other cases of fixed-size reduplication, including cases with segmental reduplication, e.g. Koasati (Hendricks, 1999); light syllable reduplication, e.g. Bole (Schuh *et al.*, 2009); heavy syllable reduplication, e.g. Seereer-Siin (McLaughlin, 2000); and foot reduplication, e.g. Kaimurá (Everett and Seki, 1985; McCarthy and Prince, 1986/1996, 1993*b*). Languages may have multiple reduplicative patterns exhibiting different fixed-size behavior, such as Bontok (Malayo-Polynesian Austronesian; Mountain Province, Philippines) which is reported to have light syllable reduplication, heavy syllable reduplication, and foot reduplication (Thurgood, 1997). Morphological reduplication of larger constituents such as the Prosodic word are also possible, but they must be considered more carefully according to the other criteria distinguishing morphological reduplication, in order to differentiate them from syntactic reduplication.

Reduplication that seems to create reduplicants whose size is not a prosodic constituent often turn out to be fairly ordinary on closer investigation. For example, expressive reduplication in Semai involves the addition of a prefixed semisyllable whose segments correspond to the first and last segments of the stem:

(19) Semai edge-copying reduplication (Diffloth, 1976*b,a*; Hendricks, 2001; Nuger, 2006):

| *Base* | *Reduplicated* | *Gloss* |
|---|---|---|
| taʔəh | th-taʔəh | ‘appearance of large stomach constantly bulging out’ |
| ruhɔːɲ | rɲ-ruhɔːɲ | ‘appearance of teeth attacked by decay’ |
| hmrʔɛːc | kc-kmrʔɛːc | ‘short, fat arms’ |
| ghʉːp | gp-ghʉːp | ‘irritation on skin (e.g., from bamboo hair)’ |

This two-segment reduplicant does not appear to correspond to any prosodic structure with which we are familiar, but when examined carefully there is good evidence that these reduplicants are actually minor syllables, that is, syllables lacking a nucleus; see argumentation around this point in Semai in Diffloth (1976*b,a*); Gafos (1996*b*); Sloan (1988); Shaw (1993); Hendricks (2001); Nuger (2006), and more generally in Cho and King (1999); Kiparsky (2003) and in chapter 2 of this thesis. Similar patterns susceptible to a similar analysis may be found in the related language Temiar; see Gafos (1995, 1998).

The Minimal Reduplication account for this generalization arises from the possibility of lexical underspecification of a particular kind. Consider a morpheme whose underlying phonological form includes a prosodic unit such as a mora or syllable that is not affiliated with any segment. In order for that prosodic unit – and therefore that mora – to surface faithfully, it will be necessary to find an appropriate segmental anchor. Reduplication is one repair strategy that may be employed to provide such an anchor, depending on the grammar of the language in question.

The idea of unanchored or floating prosodic units in underlying forms is not a novel one. To consider just the case of the floating mora, the table below suggests the large number of diverse languages and constructions whose analysis has called for an underlying floating mora:

(20) Phenomena analyzed with floating moras:

| *Language* | *Gloss* | *Segmental material?* | *Reference* |
|---|---|---|---|
| Arbizu Basque | superlative | yes: /-$^{\mu}$n/ | Sprague (2005) |
| | genitive indef. | yes: /-$^{\mu}$n/ | Sprague (2005) |
| Diegueño | plural | no | Wolf (2006) |
| Dinka | benefactive | no: /-$^{\mu}$, HL, [+breathy voice]/ | Wolf (2006) |
| Guajiro | (many cases) | no | Álvarez (2005) |
| Hausa | relative marker | no | Spencer (1991) |
| Hiaki | habitual | no | Haugen (2003), Haugen (2009) |
| Huallaga Quechua | 1st person | no | Álvarez (2005) |
| Korean | emphatic excl. | no | Kim (1998) |
| Kwak'wala | 'waste product' | yes: /-$^{\mu}$, m'uːt/ | Rodier (1989) |
| Proto-Uto-Aztecan | ? | no (?) | Haugen (2005) |
| Russian | secondary imperfective | no | Gribanova (2010) |
| Shizuoka Japanese | emphatic adj. | no | Davis and Ueda (2002) |
| Slovak | genitive plural | no | Spencer (1998) |
| Southern Sierra Miwok | (several cases) | some yes, some no | Brown (2003) |
| Tawala | durative | no | Hicks Kennard (2004) |
| Tuvan | emphatic | yes: /CVp-/ | Saba Kirchner (2007*b*) |
| Washo | 'with hand, arm, descriptive of hand, paw' | yes: /dul-/ | Yu (2008) |
| Zuni | (several cases) | some yes, some no | Sprague (2005) |

Most of these cases simply involve vowel lengthening, as a floating mora docks on a vocalic segment. But consider a language that prohibits lengthening yet also prohibits deletion of floating moras. Given these restrictions, a language must provide new material to which the mora can anchor. Depending on the constraint ranking that holds, we expect to see morphologically-induced epenthesis, reduplication, and metathesis – as indeed we do. Reduplication is the predicted result if DEP dominates INTEGRITY. This is shown in the following tableau for a hypothetical language:

(21) *Hypothetical* /$\mu$ + badupi/ → [*babadupi*] (underline indicates mora anchor)

| $\underline{\mu}$ + badupi | MaxFloat | *Vː | Dep | Integrity |
|---|---|---|---|---|
| a. badupi | *! | | | |
| b. ʔə̲badupi | | | *!* | |
| c. ba̲ː̲dupi | | *! | | |
| ☞ d. ba̲badupi | | | | ** |

This is one basic avenue of analyzing reduplication patterns with prosodic element-sized reduplicants within MR.[5] It is similar in some ways to the theory of templatic reduplication expressed in the theory of Prosodic Morphology (McCarthy and Prince (1986/1996)), which analyzed reduplication as a process making use of prosodic templates. However, unlike Prosodic Morphology, MR sees reduplication as an emergent property of the interaction of standard constraints, rather than depending on additional reduplication-specific phonological machinery. As well as being preferable on grounds of parsimony, the MR view leads to a different understanding of templates. Whereas templates in Prosodic Morphology are stipulated in the grammar, in MR templates are emergent phenomena from the interaction of segmentally underspecified material with a particular set of constraint rankings.

Therefore the prosodic "templates" for reduplication as analyzed in Minimal Reduplication differ crucially from templates in Prosodic Morphology and OT implementations of the same (e.g. McCarthy and Prince (1995); Gouskova (2007)). Because the templates are emergent generalizations rather than stipulations or goals in their own right, MR predicts that a drive to satisfy these "templates" may have force even if only partial satisfaction is possible.

For example, a morpheme whose underlying form is a segmentally-empty bimoraic syllable may be realized through heavy-syllable reduplication, given the appropriate rankings. However, we also expect to find cases in which the same morpheme is realized by heavy syllable reduplication in some words and light syllable reduplication (or some other realization) in other words. We find what appears to be just such a case in Mbe (Benue-Congo; Nigeria; Bamgbose (1971); Walker (1998)). Mbe is a quantity-insensitive language that allows no codas except nasals homorganic with a following consonant. Class 2 imperative verbs typically reduplicate by adding a prefixed copy of the first CV in the stem:

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[5] Note that this is however not necessarily the only situation that can give rise to reduplication in MR. For example, MR is fully compatible with an active RealizeMorpheme constraint (on which see e.g. Kurisu (2001)). The ranking RealizeMorpheme ≫ Integrity may also produce reduplication, given a phonologically empty morpheme. Note that this reduplication will not necessarily be templatic, since there is no empty prosodic structure that must be filled. Such reduplication must however be minimal. That is, the reduplication that occurs will be the smallest or contextually least-marked possible reduplicative pattern.

(22) Mbe class 2 imperative non-continuous singular forms:

| *Simple* | *Reduplicative* | *Gloss* |
|---|---|---|
| rû | rû-rû | ‘pull’ |
| gê | gə̂-gê | ‘belch’ |
| fûel | fû-fûel | ‘blow’ |
| g͡bárî | g͡bə̂-g͡bârì | ‘embrace’ |

This pattern changes only when the first nucleus of the stem is followed by a nasal consonant. In that case, the reduplicant has the form CVN, with the nasal sharing the place of the stem-initial consonant:

(23) Mbe class 2 imperative non-continuous singular forms:

| *Simple* | *Reduplicative* | *Gloss* |
|---|---|---|
| bîem | bîm-bîem | ‘believe’ |
| g͡bénô | g͡bə̂ŋ͡m-g͡bénò | ‘collide’ |
| lúonî | lûn-lûonì | ‘repair’ |
| bámô | bə̂m-bámò | ‘hide’ |

MR would analyze this pattern as resulting from a prefix with an underlying bimoraic specification. In most words, this bimoraic “template” is thwarted, because no coda is available that conforms to the phonotactics of the word.[6] Just when a nasal segment is present and thus a legitimate coda can be obtained, we see that nasal being copied along with the stem-initial CV.

An analogous situation exists in Kalar-Kalar West Tarangan (Austronesian; Aru archipelago, Indonesia; Nivens (1993); Spaelti (1999)). By default, reduplication takes the form of a heavy syllable:

(24) Kalar-Kalar West Tarangan CVC reduplication:

| *Basic form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| ɛlajir | ɛlajirjir | ‘3s-white’ |
| manɛlay | manɛlnɛlay | ‘sour’ |
| sɛldi | sɛlsɛldi | ‘small prawn’ |

When this CVC reduplication would create an illegal coda or consonant sequence, CVCV reduplication occurs instead:

(25) Kalar-Kalar West Tarangan CVCV reduplication:

| *Basic form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| ituda | itudatuda | ‘3s-prop up’ |
| jɛna | jɛnajena | ‘tide rising’ |
| ijilal | ijilajilal | ‘3s-trill’ |

---

[6] It would also be necessary to prohibit copying more vowels to realize the template, something that could be done as in GTT through ALLσL or similar means. Copying of a nasal consonant from somewhere else in the word can be prevented through the use of constraints like CONTIGUITY or LINEARITY.

In some cases, both CVC and CVCV reduplication threaten to create consonant sequences that are phonotactically disallowed. In these cases, Kalar-Kalar West Tarangan opts for simple CV reduplication instead:

(26) Kalar-Kalar West Tarangan CV reduplication:

| *Basic form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| damama | damamama | ‘3p-chew’ |
| bakir | babakir | ‘small.3s’ |
| jilaŋa | jilalaŋa | ‘worm’ |

The MR analysis of this pattern would posit a lexically specified prosodic structure that tries to be realized through reduplication, due to the constraint ordering that holds in Kalar-Kalar West Tarangan. The best way to express the material associated with this morpheme is through heavy-syllable reduplication. When this is impossible, the next-best choice – reduplication of two light syllables – is chosen instead. If both of those options are impossible, the language “gives up” on realizing the whole morpheme, but still manages to realize some of the morpheme through light-syllable reduplication. The following tableaux illustrate this process, with $\mathbb{M}$ standing in for the relevant phonotactic constraints.

(27) /ɛlajir, $\sigma_{\mu\mu}$/ → [ɛlajirjir] ‘3s-white’

| ɛlajir, $\underline{\sigma_{\mu\mu}}$ | $\mathbb{M}$ | Dep-seg | Max-$\mu$ | Integrity |
|---|---|---|---|---|
| ☞ a. ɛlajirjir | | | | *** |
| b. ɛlajirijir | | | | ****! |
| c. ɛlajijir | | | *! | ** |
| d. ɛlaʔətjir | | *!** | | |

(28) /ituda, $\sigma_{\mu\mu}$/ → [itudatuda] ‘3s-prop up’

| ituda, $\underline{\sigma_{\mu\mu}}$ | $\mathbb{M}$ | Dep-seg | Max-$\mu$ | Integrity |
|---|---|---|---|---|
| a. itudtuda | *! | | | *** |
| ☞ b. itudatuda | | | | **** |
| c. itutuda | | | *! | ** |

(29) /jilaŋa, $\sigma_{\mu\mu}$/ → [jilalaŋa] ‘worm’

| jilaŋa, $\underline{\sigma_{\mu\mu}}$ | $\mathbb{M}$ | Dep-seg | Max-$\mu$ | Integrity |
|---|---|---|---|---|
| a. jilaŋlaŋa | *! | | | *** |
| b. jilaŋalaŋa | *! | | | **** |
| ☞ c. jilalaŋa | | | * | ** |

Spaelti (1999) analyzes these facts and derives these patterns without lexical specification of the reduplicative morpheme. However, several lexically indexed constraints are required in that account. Thus a Generalized Template Theory analysis like that of Spaelti (1999) is no more general than an MR analysis.

### 1.3.2 Phonological opacity

Phonological processes sometimes interact opaquely with reduplication. Examples in which phonological processes underapply and others in which they overapply in the context of reduplication have been identified. Examples have also been adduced that appear to show backcopying, where characteristics motivated in one copy in a reduplicative word appear in the other as well; but these cases are much rarer and I will argue that reduplicative backcopying does not occur.

We see a case of overapplication with reduplication in Texistepec Popoluca (Mixe-Zoquean: Veracruz, Mexico; Reilly (2005)). General assimilation rules hold in this language, including the following:

(30) Texistepec Popoluca assimilation:
/ɲ + t/ → [nǰ]
/n + b/ → [m]

In cases where a stem includes both a prefixal nasal and a suffixal reduplicative affix, assimilation appears to overapply. The following pairs illustrate this opaque interaction:

(31) Overapplication in Texistepec Popoluca reduplication:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| tɨʔks - RED - hoʔy | tɨʔks-tɨʔks-hoʔy | ‘S/he goes pecking all around’ |
| bɨʔm - RED - hoʔy | bɨʔm-bɨʔm-hoʔy | ‘S/he goes bounding all around’ |
| ɲ - tɨʔks - RED - hoʔy | nǰɨʔks-nǰɨʔks-hoʔy | ‘You go pecking all around’ |
| n - bɨʔm - RED - hoʔy | mɨʔm-mɨʔm-hoʔy | ‘I go bounding all around’ |

An example of underapplication with reduplication is found in Southern Paiute (Uto-Aztecan: Southwestern United States), where *w* normally nasalizes (surfacing as *ŋʷ*) when postvocalic (Sapir, 1930). But just when this environment is created by reduplication, nasalization underapplies:

(32) Prevocalic *w* nasalization in Southern Paiute:

| *Stem* | *Derived form* | *Stem gloss* | *Derived gloss* |
|---|---|---|---|
| waʔaŋi- | tɯ-ŋʷaʔaŋi- | ‘shout’ | ‘give a good shout’ |
| wɯ̃nɪ- | ya-ŋʷɯ̃nɪ-yaʔ | ‘stand’ | ‘while standing and holding’ |
| waiya- | ɪaːβɪ-ŋʷaiya-pːɪ̥ | ‘have council’ | ‘council of chiefs’ |

(33) Nasalization underapplies with reduplication:

| *Stem* | *Reduplicated form* | *Stem gloss* | *Reduplicated gloss* |
|---|---|---|---|
| wɯğɯ- | wɯwɯxɯḁ | ‘vulva’ | ‘vulvas’ |
| wağı- | wawaxʔɪ̥pɯğaʔ | ‘several entered’ | ‘all entered’ |
| waʔačɪğɪ- | wawaʔ$^{a}$čɪğɪ | ‘whoop’ | ‘whoop several times’ |

A more controversial kind of reduplicative opacity is backcopying, in which reduplicative segments seem to share a certain property not due to the overapplication or underapplication of a phonological process, but because of a force seeking identity between those segments per se. Malay nasalization is a well-known case of this type. Nasalization spreads rightward iteratively from nasal segments to vowels (and passes through transparent segments *h*, *ʔ*, *w* and *j*) (Onn, 1980; Kenstowicz, 1981; Seong, 1994). Thus /mahasiswa/ yields [mãhãsiswa] ‘undergraduate.’

In cases of reduplication, nasalization appears to occur in the first copy for segments that correspond to nasalized segments in the second copy, even though the phonological environment for nasalization to apply to those segments is met only when the first copy is present. The following data illustrate this process.

(34) Malay nasal overapplication and backcopying:

| *Base* | *Reduplicated form* | *Base gloss* | *Reduplicated gloss* |
|---|---|---|---|
| hamə̃ | hãmə̃-hãmə̃ | ‘germ’ | ‘germs’ |
| waŋĩ | wãŋĩ-wãŋĩ | ‘fragrant’ | ‘very fragrant’ |
| aŋãn | ãŋãn-ãŋãn | ‘reverie’ | ‘ambition’ |
| aŋẽn | ãŋẽn-ãŋẽn | ‘wind’ | ‘unconfirmed news’ |

Unlike cases of underapplication and overapplication, which are amenable to solution through stratal ordering or similar means, backcopying cases seem to require the force of phonological correspondence and active maintenance of faithfulness between the copies in a reduplicative construction.

In BRCT accounts of reduplicative opacity, these effects are simple to explain. The active force of BR faithfulness constraints can motivate changes in features and even segmental changes in order to craft identical base and reduplicant strings. In Minimal Reduplication, which lacks BR faithfulness, there is no equally simple general explanation for reduplicative opacity. However, independently-motivated means unconnected to reduplication can account for many of these cases, and the circumstances that bring about morphological reduplication in MR are capable of explaining some other cases as well. There is also good evidence that some of the most difficult cases, such as those involving phonological backcopying, are not as persuasive as they once might have seemed. Overall, as part of a comprehensive phonological theory, MR is equipped to deal with existing cases of reduplicative opacity without missing important generalizations.

For example, consider Dakota (Siouan; midwestern United States and Canada; Buechel (1939, 1970); Boas and Deloria (1941); Shaw (1980)). Reduplication participates in complex interactions with phonological processes in that language. In particular, we can consider its interactions with velar palatalization, which overapplies, and ablaut, which underapplies (Shaw, 1980; Kiparsky, 1986). When we take the full phonology of Dakota into consideration, it is apparent that both of these opaque interactions can be explained without the need to refer to FAITH-BR constraints.

A rule of Dakota palatalizes prevocalic velar stops when they occur after *i* across a morpheme boundary, that is, /ik + V/ → [ičV]. Thus root *k'a* palatalizes in the word *nač$^h$ič'a* 'I dig it for you by foot' (root underlined; Shaw 1980, 193), etc. But when the velar in this environment is part of the base or reduplicant in a reduplicative construction, palatalization seems to occur in both copies although the proper environment is present only once:

(35) Dakota velar palatalization overapplies with reduplication:

| *Underlying representation* | *Surface form* | *Reduplicated gloss* |
|---|---|---|
| wič$^h$a - ki - kax - RED - ʔiyeya | wič$^h$aki**čaxčax**ʔiyeya | 'he made it for them quickly' |
| nape ki - kos - RED | nape ki**čosčoz**a | 'he waved his hand to him' |

If reduplication and the prefix ending in *i* are added simultaneously, then this is indeed a case of overapplication requiring a device like BR correspondence. But evidence shows that they are not in fact added at the same time. Substantial evidence about the ordered levels in which Dakota morphophonology applies shows that the rule of palatalization after *i* precedes the addition of the reduplicative morpheme. Saba Kirchner (2007*a*) analyzes the morphophonology of Dakota in the framework of Stratal Optimality Theory (Bermúdez-Otero, forthcoming) and shows substantial morphological and phonological evidence for the existence of stem and word levels in Dakota, and for the assignment of post-*i* palatalization to the stem level and reduplication to the word level.

Given that differentiation of the processes into stem-level and word-level morphology, this overapplication receives a simple explanation. A form like *wič$^h$akičaxčaxʔiyeya* reaches the surface after passing through (at least) two CON-based OT simultaneous evaluations of candidates. At the stem level, palatalization occurs when the root and prefixes are joined, yielding *wič$^h$akičağa*. That form serves as the input for word-level phonology, along with word-level morphemes that are added to it, yielding the attested *wič$^h$akičaxčaxʔiyeya* after the regular application of reduplication.[7]

Unlike palatalization, ablaut in Dakota appears to underapply. Dakota ablaut involves fronting of a low vowel *a* or *ą* to *e*; the process is doubly lexically-conditioned, such that it occurs only when a root or suffix belonging to an idiosyncratic class of ablaut-targets is followed by a suffix belonging to an idiosyncratic class of ablaut triggers. Thus for example *kša* 'to be bent' yields the derived form *kšeča* 'he has his joints violently bent.' But just when ablaut would occur with a reduplicative word, ablaut instead fails to apply:

---

[7] Kiparsky (1986) offers a pre-OT stratal analysis of Dakota, reaching conclusions similar in part and different in part to those of Saba Kirchner (2007*a*) which provides a stratal OT analysis of many of the same data. See Saba Kirchner (2007*a*) for more discussion of Dakota morphophonology, including stem-level and word-level processes, intervocalic voicing, and the target and location of the reduplicative affix. A separate palatalization process involving the mid front vowel may be more difficult to accommodate with the MR analysis proposed here, depending on how exactly that palatalization process is analyzed. This issue remains to be explored.

(36) Ablauting stems do not ablaut when reduplicated:

| *Underlying representation* | *Surface form* | *Gloss* |
|---|---|---|
| /ap$^{h}$a - RED - šni/ | [ap$^{h}$a̲p$^{h}$a̲šni] | ‘they do not strike’ |
| | | *cf.* ap$^{h}$e̲šni |
| /hąska - RED - šni/ | [hąska̲ska̲šni] | ‘they are not tall’ |
| | | *cf.* hąske̲šni |

A similar stratal analysis might be attempted here, but there is a problem. Underapplication through stratal ordering would require reduplication to precede the relevant phonology or the creation of the relevant environment, without itself creating an equivalent environment. But reduplication is already motivated to belong to the word level, and there is no evidence for a third level within the morphophonology of the word in Dakota (Saba Kirchner, 2007*a*).

Fortunately, a simpler solution is available in this case. As noticed by McCarthy and Prince (1995), in the underapplication cases seen above, the reduplicant itself is the morpheme adjacent to an ablaut-triggering enclitic. Because ablaut is a doubly lexically-conditioned process, the possibility of ablaut depends first of all on whether the reduplicant belongs to the ablaut target class; affixes, like roots, must be lexically specified as to whether or not they can undergo ablaut. All that is therefore necessary to motivate the attested behavior is to specify the reduplicating morpheme as belonging to the non-ablauting class, which is no more of a stipulation than what Dakota requires for all roots and suffixes. (See Saba Kirchner (2007*a*) for discussion of some further complexities concerning this interaction.)

While the Dakota analysis presented above relied on the theory of Stratal OT and some reexamination of the data in question, many cases of reduplicative opacity can be explained without recourse to a stratal analysis or a reinterpretation of the data. The nature of the structures and grammatical properties that lead to morphological reduplication are capable of producing some opaque interactions on their own without any need for base-reduplicant correspondence. The basic condition for opacity in these cases is that the driving forces for reduplication are powerful enough to overcome the normal workings of phonology as part of a conspiracy to realize the reduplicative morpheme.

For example, consider a case of reduplicative underapplication in Samala (Chumashan; Santa Barbara, California; Applegate (1972, 1976)). Samala has a CVC reduplication process. There is also a process that deletes *l* before any consonant:[8]

(37) Word-level *l*-deletion:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| ʔal-mati-nan’ | ʔamatinan’ | ‘coyote’ (literally ‘the slinker’) |
| ma-l-kitwon | makitwon | ‘what comes out; one who comes out’ |
| p-iš-al-nan’ | pišanan’ | ‘don’t you two go’ |

But when an *lC* sequence is created by reduplication, deletion does not occur:

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[8] See further discussion of this interaction in chapter 4.

(38) *l*-deletion underapplies with reduplication:[9]

| *Underlying form* | *Reduplicated form* | *Gloss* | |
|---|---|---|---|
| s-tal'ik | š**tal**tal'ik' | 'his wives' | *š**ta**tal'ik' |
| c'aluqay | **c'al**c'aluqay' | 'cradles' | ***c'a**c'aluqay' |
| s-pilkowon | s**pil**pilkowon | 'it is spilling' | *s**pi**pilkowon |

The process of *l*-deletion is motivated by the ranking *LC ≫ Max-seg. This ranking is consistent with a more complete constraint set that correctly predicts pre-consonantal *l*-deletion except when deletion would lead to the non-expression of an underlying mora. Successful reduplication is shown in (39):

(39) /$\sigma_{\mu\mu}$-caluqay-ʔ/ → [calcaluqay'] 'cradles'

| $\sigma_{\mu\mu}$-caluqay-ʔ | Max-$\mu$ | *LC | Contig | Max-seg |
|---|---|---|---|---|
| ☞ a. calcaluqay' | | * | * | |
| b. caqcaq' | *!** | | *** | **** |
| c. cacaluqay' | *! | | * | * |

Backcopying is a more serious challenge for a theory like MR that denies the existence of BR correspondence. It is notable therefore that recent work casts doubt on the validity of many of the core data that underlie claims about backcopying. For example, Kiparsky (2007) investigates the Malay nasalization case discussed above (see (34)). He finds evidence that strongly suggests that nasal backcopying does not occur at all, and suggests that the data commonly adduced in support of the claimed existence of this pattern, originally from Onn (1980), may be due to phonetic coarticulation rather than phonological nasalization.

Inkelas and Zoll (2005), who also reject reduplicative backcopying, investigate claims of backcopying in Klamath, Chaha, Eastern Kadazan and Hausa and find them all lacking in support or suitable for reinterpretation. For example, in Chaha (Semitic; Ethiopia; McCarthy (1986); Banksira (1993, 1997); Kenstowicz and Banksira (1999)) the consonants *k* and *x* are essentially in complementary distribution. By an ordinary process, underlying *x* surfaces as *k* when a fricative follows in the second or third consonantal position. Thus root *xtf* 'hash' derives the 3sg. masculine jussive form *yəktif*, with *x* hardening due to following *f*.

Backcopying seems to occur when roots with underlying *x* undergo reduplication. Thus root *xyr* 'hold in armpit,' reduplicating as /xyr-xyr/, surfaces as *kəkɨr*. No derivational analysis can account for this behavior. The hardening of the first *x* can be explained by the presence of a second *x* later in the word; this presumes that the second copy is present already when the first one hardens. The hardening of the second copy can be explained through ordering, if hardening of the first copy occurs before reduplication creates the second copy. But this ordering contradicts the sequence of events needed to explain the hardening of the first *x* to begin with.

However, as Inkelas and Zoll (2005) point out, a simple explanation appears to be available. It seems that there are no Chaha words in which both velar allomorphs occur. Words with

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[9] Note that this process is a derived environment effect, so the non-deletion of the stem-internal *l* in *spilpilkowon* is expected.

one *k* will have *k* throughout. Therefore, rather than analyzing this interaction as reduplicative backcopying, it is more easily explained as a case of consonant harmony. In fact this seems to resemble consonant harmony systems which are well-attested and not uncommon (Walker 2000*b,a*; Rose and Walker 2004; Hansson 2001; see also Krämer 2001*b,a*). This example of backcopying is rejected not because of a theoretical prejudice that it must be removed, but simply because it falls victim to Occam's Razor.

In fact the absence of robust cases of backcopying is troubling for theories like BRCT, but it is just what is expected by MR, which allows for underapplication and overapplication (as well as normal application), but has no obvious means to analyze backcopying.

### 1.3.3 Prominent material preferentially copied

Given that morphological reduplication arises through the presence of a morpheme that must be susceptible to phonological linearization, and that copying is usually local (as discussed below), the answer to the question of what gets targeted in reduplication could simply reduce to the affix linearization algorithm of the language. But this is not the case: in many languages reduplication preferentially targets prominent material, beyond what can be explained by affix ordering. Among other cases, we find reduplication patterns that target syllabified segments rather than stray segments (e.g. Nuxálk; Bagemihl (1991)), stressed syllables rather than unstressed syllables (e.g. Nakanai; Spaelti (1999); Nuger (2006)), prosodic heads rather than non-heads (e.g. Dakota; Saba Kirchner (2007*a*)) and prosodic stems rather than non-stem elements (e.g. Samala; Cole (1994); Downing (1998*b*); Inkelas and Zoll (2005); and chapter 4 of this thesis).

MR offers some insight into the general greater mobility of reduplicative morphemes relative to other morphemes. A morpheme whose underlying form does not include segmental content will be unaffected by Linearity or any other segment-based phonological force that militates for the preservation of the underlying order of morphemes. However, the force that militates for the reduplication of more prominent elements must still be defined. This seems to be an effect in keeping with the spirit of the Root-Affix Faithfulness Metaconstraint (RAFM; McCarthy and Prince (1994)), which requires greater faithfulness to root material than to affix material. The drive to reduplicate prominent material can be conceptualized as a case where more prominent material has first claim to provide content for new segmental positions that become available in the course of a derivation.

The most obvious attempts to motivate this effect through formalization of the RAFM go astray. Standard OT has constraints like Integrity that penalize reduplication, but none that call for it *per se*. In fact, a RAFM-compliant ranking of Integrity constraints (i.e. Integrity$_{\text{Root}}$ $\gg$ Integrity) will lead to exactly the wrong result, with preferential reduplication of non-prominent material. In Saba Kirchner (2007*b*) I proposed a reversal of the RAFM for Integrity constraints in particular. However, aside from lacking justification in principle, as a formal solution this requires the existence of constraints that refer explicitly to non-prominent positions (e.g. Integrity$_{\text{Affix}}$, Integrity$_{\text{Non-head-}\sigma}$, etc.) which should be excluded from the grammar if possible.

If non-prominent positional constraints are to be avoided, it is necessary to use constraints that actively militate for reduplication (or against candidates that lack it), rather than the reverse. One proposal for the existence of such constraints comes from Zuraw (2003), who argues for a constraint REDUPLICATE which is satisfied by the existence of two strings in the output that correspond to each other (with actual identity between those strings being enforced by separate FAITH constraints). If REDUPLICATE can be decomposed into a family of constraints, then these constraints can motivate the attested patterns of preferential reduplicative targeting. If we assume that morpheme alignment is controlled by (potentially morpheme-specific) ALIGN constraints, then the ranking for prominent element reduplication is REDUPLICATE$_{\text{prominent-position}}$ ≫ ALIGN ≫ REDUPLICATE.

Consider Nuxálx (Salish; Bella Coola, British Columbia), a language in which words may contain long strings of unsyllabified segments, e.g. *sc̓qctx* “That’s my animal fat over there” (from root *sc̓q* ‘animal fat’); *xɬp̓χʷɬtɬpɬɬs kʷc̓* “Then he had in his possession a bunchberry plant”; *nuyamɬɬɬ* “we used to sing” (Newman, 1969; Hoard, 1978; Nater, 1984; Bagemihl, 1991). According to Bagemihl (1991), Nuxálk does form syllables, locating a vowel or sonorant to use as a nucleus when possible even if many peripheral segments are thus left unsyllabified.

Nuxálk diminutives involve reduplication of the onset and rime of the first stem syllable. Because Nuxálk reduplication is local, the reduplicant may appear to infix when there are unsyllabified segments at the word edge:

(40) Nuxálk syllabic diminutive reduplication (Newman, 1971; Bagemihl, 1991; Cook, 1994; Marlo, 2004):

| *Base form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| qayt | qaqayti | ‘hat’ (literally: ‘little toadstool’) |
| sqʷciɬ | sqʷciːcɬi | ‘little ventral posterior fin’ |
| skma | skmkmay | ‘little moose’ |
| st̓qʷlus | st̓qʷlqʷlus | ‘little black bear snare’ |

If we take for granted the locality of reduplication (pending discussion below), we can motivate this pattern using the schema already suggested for preferential reduplication of prominent targets. The specific ranking that must hold in Nuxálk is MAX ≫ DEP ≫ INTEGRITY ≫ REDUPLICATE($\sigma$) ≫ ALIGN(diminutive,R,Root,L) ≫ REDUPLICATE. This will produce the attested forms, as illustrated below:

(41) Nuxálk [sqʷciːcɬi] ‘little ventral posterior fin’:

| sqʷciɬ, $\sigma$ | INTEGRITY | REDUPLICATE($\sigma$) | ALIGN | REDUPLICATE |
|---|---|---|---|---|
| ☞ a. sqʷ.ciː.cɬi. | ** | | * | |
| b. sqʷsqʷc.ɬi. | ** | *! | | |

Although REDUPLICATE is independently motivated, its inclusion does represent a compromise of the simple approach with no reduplication-specific machinery that MR seeks to achieve. MR would in any event remain simpler than BRCT theories that require a more complex array of BR faithfulness constraints, especially if the reduplication correspondence relation demanded by the REDUPLICATE constraints can be satisfied by the inherent IO coindexation of reduplicated segments, syllables, etc. A goal for future research is accounting for prominence effects of this type without recourse to REDUPLICATE constraints.

### 1.3.4 Locality of reduplication

The reduplicative copied strings are typically strictly adjacent to each other at the surface. In previous work this has often been taken to be a basic principle of reduplication; it is sometimes referred to as the Adjacent String Hypothesis, which is succinctly stated by Urbanczyk (1999): “Adjacency between base and reduplicant is obtained via the definition of base.” In other words, base-reduplicant adjacency is a property of GEN, and non-adjacent candidates will not be produced for evaluation.

The problem with the ASH is that clear counterexamples with non-adjacent reduplication do exist. One example again comes from Nuxálk, where CV- iterative reduplication can co-occur with an affix *n* meaning ‘limited control.’ When that affix is present it infixes between the base and reduplicant, leaving them non-adjacent at the surface:

(42) Nonlocal reduplication in Nuxálk (Shaw, 2005, 189):

| *Root* | *Reduplicated form* | *Gloss* |
|---|---|---|
| lis | **li**nlis | ‘to push’ |
| ʔut̓ak | **ʔu**nʔut̓ak | ‘to vomit’ |
| ƛ̓ap | **ƛ̓a**nƛ̓ap | ‘to go’ |

Another interesting kind of ASH-violating reduplication is found in Creek (Muskogean; Oklahoma and southeastern United States). An adjectival reduplication process involves infixation of the reduplicant, such that it surfaces between the last two segments of the base:

(43) Nonlocal reduplication in Creek (Riggle, 2004, 3):

| *Singular* | *Plural* | *Gloss* |
|---|---|---|
| a-cáːk-iː | a-caː**ca**k-íː | ‘precious’ |
| cóyh-iː | coy**co**h-íː | ‘frozen, stiff’ |
| fayátk-iː | fayat**fa**k-íː | ‘crooked’ |
| héyy-iː | hey**ho**y-íː | ‘hot’ |
| holwak-íː | holwaː**ho**k-íː | ‘ugly, naughty’ |

Various independently-motivated forces can account for adjacency when it does occur. These include CONTIGUITY (because non-adjacent reduplication often creates additional discontiguous strings) and LINEARITY (because the more non-adjacent reduplication is, the more segment pairs will have surface correspondents with improper precedence relationships). Non-adjacency will occur only when other constraints compel it to do so. This seems to be the case in examples like those above. For example, Shaw (2005) shows that the presence of the segment *n* occurring in the Nuxálk forms between base and reduplicant is due to the force of a constraint aligning the morpheme expressed by *n* with the left edge of the Prosodic Stem.

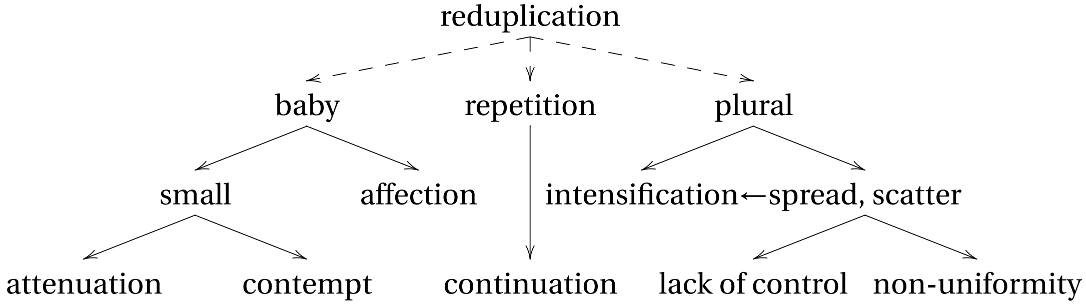
### 1.3.5 Iconicity

An often-noted characteristic of reduplication is the similarity in the meanings of reduplicative constructions across many languages. Sapir (1921), in a passage quoted from above, lays out this observation:

> Nothing is more natural than the prevalence of reduplication, in other words, the repetition of all or part of the radical element. The process is generally employed, with self-evident symbolism, to indicate such concepts as distribution, plurality, repetition, customary activity, increase of size, added intensity, continuance.

Regier (1998) claims that these particular recurring semantic connections to reduplication are due to an inherent iconicity or inherent sound-meaning connection (Hinton *et al.*, 2006), through which reduplicative constructions violate the basic principle of the arbitrariness of the sign (de Saussure, 1911/1972). Irrespective of the particular language, a reduplicative construction has inherent semantics associated with three categories, namely “plural,” “repetition,” and “baby.” Through the ordinary processes of semantic extension (Bybee *et al.*, 1994; Heine *et al.*, 1991; Lakoff, 1987; Sweetser, 1991), these iconic meanings develop into many of the most common uses of reduplicative morphosyntax:

(44) Iconic and semantic connections to reduplication:



Crosslinguistic studies have supported claims that reduplicative constructions tend to be associated with meanings like those in the chart above. Kajitani (2005) surveyed sixteen languages with active reduplication processes. All of them use reduplication for some kind of augmentative use (such as pluralization or repetition); thirteen of them use reduplication for some kind of intensificational purpose. Only three of the languages use reduplication for a diminutive or diminishing purpose.

MR does not offer special insight into the question of why reduplication has these iconic meanings. Like mainstream theories of reduplication since Marantz (1982), MR treats the reduplicative morphemes involved in morphological reduplication as essentially similar to other affixes or morphemes in the language, with a difference only in their phonological specification. Like those theories, MR denies that the iconic meaning of reduplication is due to any active force in the grammar, and an insightful generalization for the facts suggested by the study of Kajitani (2005) and other work must be sought in diachrony or somewhere else outside of the synchronic morphophonology.

Note however that it is far from true that all cases of morphological reduplication express semantic content related to the supposed iconic functions of reduplication. For example, Wakashan languages often have reduplication that is tied to specific derivational morphemes without any plural meaning (Boas, 1947; Jacobsen, 1997; Davidson, 2002; Stonham, 2004; Nakayama, 2006). Among the suffixes in Kwak’wala that trigger reduplication we find -*amak* ‘on surface of water’; -*am̓* ‘suffix for names of plants’; -*g(ə)* ‘to eat’; -*giwiʔ* ‘what is on forehead; forehead; front; bow of canoe’ (Boas, 1947), none of which seem to express an iconic reduplicative meeting. Verbal reduplication in Tübatulabal signifies a telic/atelic aspectual distinction, but which aspect it signifies is an idiosyncratic property of the verb: some verbs are telic by default and atelic when reduplicated, while others are just the reverse (Voegelin (1935)). Presumably both aspects cannot be equally valid extensions of an iconic property of reduplication.

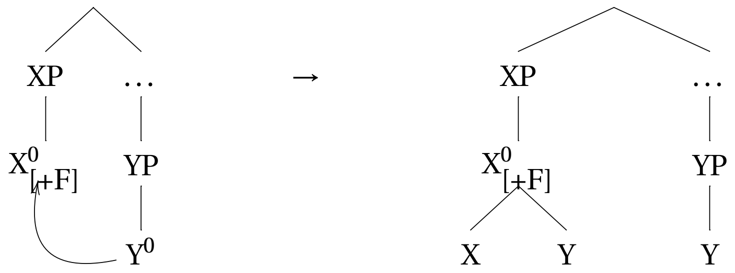
Cases like these suggest that the iconicity found in many cases of reduplication cannot be built into grammar in any fundamental way, because it must be reversible or susceptible to significant attenuation in many cases. This fact then supports the idea that the active role of iconicity in the semantics of reduplication is best situated outside the synchronic grammar.

## 1.4 Syntactic reduplication

The basic MR analysis of morphological reduplication is that it is a phonological repair for the phonological form created by the introduction of some morpheme. However, this is not the only route that can lead to reduplication. There are also cases in which a morphosyntactic node is copied and its phonological form is spelled out more than once: cases that we can call syntactic reduplication. Because of the the different routes by which they arrive at the surface, these two kinds of reduplication have different properties with regard to aspects such as the size of the copied structure, the nature of the target that is copied, and the driving force for the alignment or surface position of the copies.

I analyze syntactic reduplication as the result of a sequence of two syntactic operations, namely copy of a target constituent and fusion of the copy with a trigger morpheme into a single morphosyntactic unit. This copy operation may be similar or equivalent to sideward movement (Nunes, 1995, 2001, 2004, 2006; Bošković and Nunes, 2007; Kimper, 2008). The fusion operation may be similar or equivalent to morphological restructuring (Chomsky, 1995; Nunes, 2001) in Minimalist terms or morphological fusion (Halle and Marantz, 1993, 1994; Acquaviva, 2008) in Distributed Morphology. The trees below illustrate this process.

(45) Copy and merger leads to syntactic reduplication:



The creation of a sub-$X^0$ complex structure has important consequences for syntactic reduplication. When either the trigger or the target morpheme is phonologically null, the result is that the non-null constituent surfaces with no alteration to its phonological form (other than that dictated by the normal phonology of the language). But in some cases both of the merged morphemes contribute some phonological content, which sets up a competition between those phonological structures to be the surface expression of the $X^0$ constituent that both morphemes belong to. This competition can lead to apparent non-optimizing phonological behavior in some cases.

I examine syntactic reduplication in detail in chapter 3. Table (46) lays out the criteria discussed there; in the remainder of this section I summarize and briefly discuss a few of the most important properties and suggest the MR analysis of them.

(46) Diagnostics for syntactic and morphological reduplication:

| | *Morphological* | *Syntactic* |
|---|---|---|
| Phonological size | Fixed | Unlimited |
| Target | (Morpho)phonological | Syntactic |
| Interaction with morphophonology | As affix | As syntax |
| Overwriting | Optimizing (per known grammar) | Optimizing (but may appear special) |
| Identity avoidance | Does not occur | Occurs |
| Adjacency | Enforced through phonology | Enforced through syntax |

The most obvious difference between morphological reduplication and syntactic reduplication is the unbounded size of the latter. Syntactic reduplication typically takes the size of its underlying morphemes without alteration, rather than having a fixed (and usually small) size. This follows from the fact that syntactic reduplication actually involves the morphemes in question being spelled out multiple times, rather than a phonological process of duplicating individual segments or other phonological elements. An illustration of the behavior of syntactic reduplication comes from Indonesian, in which plural nouns are (sometimes) formed through total reduplication:

(47) Indonesian reduplicative plurals (Rafferty, 2002):

| *Reduplicated form* | *Gloss* |
|---|---|
| bapak-bapak | ‘gentlemen’ |
| ibu-ibu | ‘ladies’ |
| saudara-saudara | ‘colleagues’ |
| bank-bank | ‘banks’ |
| kota-kota | ‘cities’ |

Syntactic reduplication is also distinguished by the fact that its targets are morphosyntactic rather than morphophonological. This distinction is not always easy to probe because of the frequent homology between morphosyntactic and morphophonological categories such as the stem and the word. As well, in cases where the target is clearly a morphosyntactic constituent, morphological reduplication may still resemble total reduplication with regard to its targeting in the event that the morphophonology of the language situates the reduplicative affix next to the appropriate target. Nevertheless, there are some cases in which the differences between the two types of reduplication do emerge.

For example, repetitive verbs in Kwak’wala may be formed by total reduplication of the root. The data below illustrate this pattern:

(48) Kwak'wala repetitive verbs (Kalmar, 2003):[10]

| *Reduplicated form* | *Gloss* |
|---|---|
| qʷiɬ-qʷiɬa | 'unscrew over and over' |
| t̓əms-t̓əmsa | 'keep ringing; phoning or ringing' |
| ƛənix-ƛənika | 'keep locking the door' |
| k̓ʷəməlx-k̓ʷəməlka | 'char now and then' |

This pattern appears to involve prefixal total reduplication; notably, apart from reduplicative patterns there is no prefixation in Kwak'wala (or anywhere in Wakashan). An attempt to interpret this pattern as morphological reduplication with a prefixed morpheme thus runs into difficulties. Even if that were to be admitted, the fact that the verbalizing suffix -*a* does not undergo reduplication remains a mystery if the process here is pure phonological reduplication. If however the root is targeted, copied, and spelled out twice, then the facts about the size, location and target seen in this pattern are straightforwardly explained.

Another potential area of difference between morphological and syntactic reduplication concerns the interaction of reduplication and morphophonology. As we have seen, morphological reduplication often involves opaque interactions between reduplication and other phonological processes. Whether syntactic reduplication is also susceptible to opaque interactions depends on whether we accept a late-insertion theory of phonology (Marantz, 1995*a*, 1997; Embick and Noyer, 2001). Some evidence that syntactic reduplication does not participate in morphophonology the way that morphological reduplication does comes from the failure of syntactic reduplication to feed other word-formation processes.

One test case is that of echo reduplication in Tamil, which targets a constituent that may range in size from a root to a phrase. That target is copied and the onset and rime of the first syllable are overwritten by the sequence *ki(i)*. This process can be examined to see whether it feeds any of the three distinct compounding processes of Tamil, two of which belong to the stem level morphology (I and II) and one of which belongs to the word level (III) (Christdas, 1988).

Fieldwork that I conducted indicates that Tamil echo reduplication fails to feed any of these compounding processes. For example, the word *aaṭṭukkuṭṭi* 'kid' is a type I compound made from the stems *aaṭu* 'goat' and *kuṭṭi* 'young.' Speakers reject any ER formation in which the ER form serves as input to a compound process:

(49) a. *Type I:* *aaṭu-kiiṭṭu-kkuṭṭi
b. *Type II:* * aaṭam-kiiṭam-kuṭṭi
c. *Type III*: * aaṭu-kiiṭu-kuṭṭi

But compounding feeds ER successfully:

(50) aaṭṭukkuṭṭi-kiiṭṭukkuṭṭi 'kids and so forth'

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[10] Kalmar (2003) transcribes the verbal suffix *a* at the end of some of these words as *æ*. I retranscribe those data here with *a*, taking the *a* ~ *æ* alternation to be purely phonetic. See chapter 2 for more discussion of my assumptions and representational choices concerning the Kwak'wala data presented in this thesis. Some consonants, especially velars, may spirantize in coda position.

This behavior is just what would be expected if the syntactic reduplication process of echo reduplication were to occur outside of the morphophonological processes of the language. These data do not directly address the issue of phonological opacity, and it is also true that independent factors might also rule out the unattested interactions between these processes. However, until cases of syntactic reduplication participating in phonological opacity emerge, cases like this suggest that syntactic reduplication is distinguished from morphological reduplication by its non-participation in opaque interactions, and that phonological insertion happens late (at least after processes like syntactic reduplication have taken place).

# CHAPTER 2

# Morphological reduplication

As discussed in chapter 1, Minimal Reduplication analyzes morphological reduplication as a morphophonological process whose possibility is inherent in the architecture of grammar. The crucial elements for its occurrence are the domination of INTEGRITY (the constraint against multiple output correspondence for an input element) by another relevant constraint, and some morpheme whose presence creates a phonological structure in need of repair.

On this analysis, because reduplication emerges from the interaction of violable constraints, it is possible for a single reduplicative morpheme to surface with different shapes depending on the context of the phonological form whose candidates are being evaluated. For example, we saw that in Kalar-Kalar West Tarangan, a particular reduplicative morpheme may surface with the form CVC, CVCV or CV due to phonotactic restrictions that hold in that language.

Another example of reduplication that is as minimal as possible, but more substantial when necessary, comes from Pima (Uto-Aztecan; Arizona). Nouns in Pima pluralize by reduplicating the word-initial consonant as a coda in the first syllable; however, just when that consonant is dispreferred as a coda, the entire first syllable is copied instead (Riggle, 2003, 2006; Munro and Riggle, 2004):[1]

(1) Pima noun pluralization:

a. Reduplicate initial C when possible:

| *Singular* | *Plural* | *Gloss* |
|---|---|---|
| mavit | mamvit | ‘lion’ |
| nakʃɨl | nankʃɨl | ‘scorpion’ |
| kuʃva | kukʃva | ‘lower skull’ |

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[1] From a diachronic perspective, this pattern is certainly due to the effect of a regular syncope rule overlaid on the standard Uto-Aztecan CV- reduplication (on which see Voegelin (1962); Langacker (1977); Haugen (2005)), but see Riggle (2006) for arguments against analyzing this pattern as connected with any synchronic syncope process.

b. Reduplicate initial CV when necessary:

| *Singular* | *Plural* | *Gloss* | |
|---|---|---|---|
| hodai | hohodai | ‘rock’ | * hohdai |
| ʔiput | ʔiʔiput | ‘dress’ | * ʔiʔiput |
| ɲulaʃ | ɲuɲulaʃ | ‘peach’ | * ɲuɲlash |

This behavior is entirely straightforward under MR. The guiding idea concerning morphological reduplication is that it should take place only when necessary, only to the extent necessary. Infixing single-consonant reduplication is the least dispreferred way to express this segmentally-empty moraic plural. Only when this copying is impossible (due to more important phonotactic restrictions) does larger reduplication occur.

By contrast, this pattern is unexpected for a theory in which morphological reduplication is maximizing rather than minimizing. CV reduplication is obviously possible in Pima. To explain its nonoccurence in cases like *mamvit*, it is necessary to identify a problem with the structure of non-occurring **mamavit* that does not hold in the attested form. But there is no apparent problem with those non-attested forms, which entirely resemble attested non-reduplicative and non-repaired words. Therefore a maximal-reduplication theory of morphological reduplication must either posit a syncope process that is limited to reduplicative contexts and not otherwise motivated, or rely on a constraint like ALL-$\sigma$-L that finds little use beyond serving as a de facto size restrictor for reduplication.

In this chapter I examine in detail a more complex pattern of reduplication found in Kwak’wala (Wakashan; British Columbia). In this pattern, the expression of a particular morpheme always involves stem expansion, but sometimes this takes the form of vowel lengthening while in other cases it involves reduplication. There are also a number of subpatterns of different reduplicative shapes that occur depending on the form of the root or stem being modified. I present a MR analysis of these patterns, and show how alternative theories that involve maximal reduplication and which treat reduplication as a goal rather than a repair strategy have difficulty accounting for the facts of Kwak’wala.

## 2.1 Case study: Kwak’wala

In chapter 1 we saw that all the structures that are repaired by epenthesis in some language may also be repaired by reduplication in another language. In addition to epenthesis, other competing repair strategies may also be found. One of these is vowel lengthening or gemination, which can provide an appropriate segmental anchor for a morpheme whose underlying form includes a floating mora. These repair strategies should also be in competition. And this competition should be demonstrable not only cross-linguistically, but within individual languages as well.

Exactly such a case is found in Kwak’wala. In this language, the suffix -*m̓ut* triggers expansion in the stem to which it affixes. Depending on the shape of the stem, this change will involve either vowel lengthening or reduplication. Essentially, lengthening occurs whenever it is phonotactically permissible. However, because lengthening would often create super-heavy (trimoraic) syllables, and because these are banned categorically in Kwak’wala, it is often the case that lengthening cannot occur. In these cases, reduplication occurs instead.

For example, when the verb *t̓əs* ‘crack barnacles’ undergoes -*m̓ut* suffixation the stem vowel lengthens, yielding *t̓aːsm̓uːt* ‘barnacle shells’ (literally ‘refuse of barnacle cracking’). But a root like *c̓uːɬ* ‘black’ cannot further lengthen the already long stem vowel. Therefore reduplication occurs instead, giving the derived form *c̓uːc̓əɬm̓uːt* ‘charcoal’.

Further complicating the situation is the fact that several subpatterns of reduplication occur, depending on the shape of the stem before suffixation. Of the two copies present at the output of the reduplicative process, in some cases the first copy is a heavy syllable while the second copy is a light syllable, and sometimes the reverse; but it is never the case that both copies are heavy syllables or both are light syllables. If a coda was present in the stem, it will surface with the first copy in some cases, and the second copy in other cases. With one particular type of stem the coda splits up under this reduplication pattern, as in root *kəmt* ‘clean berries’ which derives *kəmkətm̓uːt* ‘what remains after cleaning berries.’

These patterns receive a straightforward analysis under Minimal Reduplication. The competition between lengthening and reduplication is a natural consequence of a particular ranking of constraints, given an affix that has a phonological underlying form that includes a floating mora. The phonology needs to provide extra material in order to anchor that mora, which it does through lengthening when possible. When lengthening is blocked, the next best repair strategy – reduplication – is employed instead. This pattern arises from the interaction of ordinary, independently-motivated constraints, and MR predicts the existence of systems just like that of Kwak’wala.

By contrast, theories of reduplication that treat the phenomenon as a special area of phonology and a goal in its own right in languages with reduplicative constructions will have trouble with the facts of Kwak’wala. If the phonology of the language is such that reduplication does occur in many cases, its nonoccurence in the lengthening cases is puzzling, because it would be perfectly phonotactically acceptable in those cases. These theories may also struggle to account for all of the subpatterns of reduplication that occur with this suffix, including some in which material present in the input surfaces in the “reduplicant” but not in the “base.” These facts can be accounted for only by adding extra complexity to the model of interactions between input and output and the base and reduplicant constituents. The MR analysis accounts for these facts with much less complexity and no need for morphophonological constituents such as base and reduplicant.

In section 2 of this chapter I present relevant background information and key data. In section 3 I present my analysis of those data. In section 4 I consider another analyses of the data in question (Existential Faithfulness), and show that Minimal Reduplication offers a more comprehensive and successful analysis of all the facts. In section 5 I summarize the MR analysis of -*m̓ut* reduplication and its more general theoretical consequences, discuss an illuminating comparison between reduplication in Kwak’wala and reduplication in the related language Nuu-chah-nulth, and touch on some specific ramifications for other issues in Kwak’wala morphophonology.

## 2.2 Data

Kwak'wala (sometimes misleadingly called Kwakiutl or Kwagiutl) is a Wakashan language of British Columbia. Kwak'wala belongs to the Kawkiutlan branch of the Northern Wakashan subfamily, with its closest relative being Heiltsuk (Campbell, 1997). The language is highly endangered. Of the several thousand members of the seventeen tribes of the Kwakwaka'wakw (an ethnonym meaning "speakers of Kwak'wala"), the number of Kwak'wala speakers today is measured in the low hundreds (Ethnologue, 2005). Some language revitalization efforts are currently underway. See Anonby (1997) for discussion of the difficulties encountered in and prospects for Kwak'wala revitalization efforts.

Descriptive work on Kwak'wala has been conducted for more than a century. It begins with the seminal *Kwakiutl Texts* (Boas and Hunt, 1905, 1906) and *Kwakiutl Grammar* (Boas, 1947), products of the collaboration between Franz Boas and linguist and native Kwak'wala speaker George Hunt. Theoretical work on Kwak'wala phonology has been continued by numerous authors, including Bach (1975); Wilson (1986); Rodier (1989); Zec (1994); Stonham (1994); Struijke (1998, 2000); Bach *et al.* (2005) and Flynn (2007). Of these authors, Rodier, Zec and Struijke are particularly important here because of their analyses of -*m̓ut* reduplication. Their analyses are discussed in more detail below.

### 2.2.1 Phonology

Kwak'wala typifies many of the phonological (and morphological) characteristics that distinguish the Northwest Coast as a significant linguistic area. These include a large consonantal inventory with glottalized stops and affricates; labiovelars; multiple laterals, including affricates; only voiceless fricatives; few labials and few vowels; and the presence of glottalized sonorants (Campbell, 1997). The Kwak'wala consonantal inventory is shown in (2):[2]

(2) Kwak'wala consonantal inventory:

| | *lab.* | *alv.* | *sib.* | *lat.* | *pal.* | *vel.* | *vel. rd.* | *uvu.* | *uvu. rd.* | *lar.* |
|---|---|---|---|---|---|---|---|---|---|---|
| *plain* | p | t | c | ƛ | | k | kʷ | q | qʷ | ʔ |
| *ejective* | p̓ | t̓ | c̓ | ƛ̓ | | k̓ | k̓ʷ | q̓ | q̓ʷ | |
| *voiced* | b | d | dᶻ | λ | | g | gʷ | ɢ | ɢʷ | |
| *fricative* | | | s | ɬ | | x | xʷ | χ | χʷ | h |
| *sonorant* | m | n | | l | y | | w | | | |
| *glottal sonorant* | m̓ | n̓ | | l̓ | y̓ | | w̓ | | | |

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[2] Information about the general orthographic choices made in this thesis is available in Appendix D, and discussion of particular issues concerning Kwak'wala orthography is available in Appendix A.

#### 2.2.1.1 Vowel Length and Quality

Whereas the consonantal inventory of Kwak'wala is extensive, the vocalic inventory appears at first glance to be quite simple. The vowels that occur are those of a typical five-vowel system plus schwa. However, there are some further complications. The full range of vocalic contrasts (excluding ə) is only maintained by long vowels. The only non-long vowels found at the surface level are *a* and ə. Thus *a* is the only vowel for which long and short forms can be observed in surface forms.

Bach (1975) analyzes Kwak'wala as having a much simpler underlying vowel inventory, of *a* ə or perhaps just ə. Some of the reasoning behind this claim is persuasive, and alternations show quite clearly that many surface instances of *iː uː eː oː* are derived from /əy əw əyə əwə/ respectively. However (as Bach concedes), there are other cases of non-alternating full vowels where no direct argument can be made for coalescence from an underlying ə + glide sequence. I take the full vowels as underlying in such cases, though we must remain open to a possible reinterpretation in which these vowels are the product of coalescence. In cases where morphological alternations show clearly that a vowel is derived from ə + glide (+ ə) sequence, I have taken that sequence to be underlying.

The vowels *a* and ə alternate in many contexts. This alternation is presumably predictable but it is not yet fully understood. Inconsistencies are apparent within and between the descriptive works on Kwak'wala. As Boas notes:

> "ə must be considered a weakened vowel, in most, if not in all cases derived from a. ...Notwithstanding the close relations between ə and a they must be distinguished because in certain forms of stem expansion ə changes significantly to a." (*BG* 207)

Grubb (1977) devotes an appendix to the problem of ə. He concludes that underlying schwas, epenthetic schwas, and schwas reduced from other vowels all exist, but we do not yet have a sufficient understanding to identify which source is responsible for each attested schwa.

The greatest difficulty is in distinguishing schwa from short *a*. This is a problem that confronts anyone who would analyze data from the published Kwak'wala materials. Many of the vowels identified as *a* by Boas appear to be a phonological schwa that has lowered or retracted in predictable environments, such as when adjacent to uvulars. However, both vowels can be shown to occur in many of the same environments, and their respective phonemic status is clear. With forms taken from Boas (1947) – which supplies the central data to be considered in this chapter – I have made use of other unpublished and published materials (especially Boas 1948 and Grubb 1977) to confirm vowel quality of words and morphemes wherever possible. In other cases I have assigned vowels to one phoneme or the other by taking any conditioning environment into account. When no corroborative evidence was available, vowels were transcribed as given by Boas. There are therefore also some apparent changes in vowel quality that cannot be explained.

#### 2.2.1.2 Prosody

Several interesting facts concerning Kwak'wala syllable weight must be mentioned. We find that different types of coda consonants differ in their contribution to syllable weight. And we find that two levels of syllable weight are not enough to account for all the facts of the language; it is necessary to recognize three weight classes: heavy, light, and weightless.

The main diagnostic used to give evidence for these claims is the behavior of stress. The overall stress pattern is quantity-sensitive default-to-opposite iambic iterative footing (Wilson, 1986; Zec, 1994).[3] In other words, primary stress falls on the leftmost heavy syllable, if any. In words with no heavy syllables, stress falls on the final syllable. Secondary stress falls on alternating syllables following the primary stress (Wilson, 1986).[4] The following examples illustrate stress falling on the leftmost heavy syllable:[5]

(3) Primary stress on first heavy syllable:

| | | |
|---|---|---|
| χáː.χa.lə.la.q$^{w}$ə.la | ‘cry out “ho-o-o-o-o”’ | (DG) |
| ɢí.ːc̓oː | ‘ask for a donation; stay in bathroom too long’ | (DG) |
| ƛ̓íː.ƛ̓əχ$^{w}$.ba.la | ‘have sea-lions at ends’ | (BD) |
| ƛ̓íː.n̓a.giː.la | ‘give a grease feast’ | (BD) |
| c̓ə.máː.tuːt | ‘melt away something in ear’ | (EB) |
| p̓ə.λə.t̓áː | ‘fly seaward’ | (BG) |
| c̓a.na.na.náː | ‘exclamation of mink’ | (BD) |

When no heavy syllable is present, stress falls on the final syllable (data from DG):

(4) Final stress when no heavy syllables present:

| | |
|---|---|
| nə.pá | ‘throw a round thing’ |
| m̓ə.k$^{w}$ə.lá | ‘moon’ |
| gə.tə.x$^{w}$á | ‘tickle’ |

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[3] The foot pattern of Kwak’wala is an issue of controversy. Kalmar (2003) develops a thorough analysis of Kwak’wala as a trochaic language. In part this rests on different assumptions about vowel length and moraicity. Whereas I claim that vowel length is contrastive (although this is obscured by length-related changes in vowel quality) and that moraic and nonmoraic schwas must be distinguished, Kalmar claims no distinction between long and short vowels and treats all schwas as nonmoraic. Kalmar also offers data that seem to support the claim for trochaic footing, such as *k$^{w}$ə́sk$^{w}$əs* ‘bluejay; stellar’s jay.’ The failure of stress to fall on non-final syllables in words like *mək$^{w}$əlá* ‘moon’ is explained by the nonmoraicity of ə.

I reject this analysis for several reasons. Although primary stress does not fall on syllables headed by ə (barring a sonorant coda; see below), secondary stress may, unless the vowel is epenthetic. This suggests that ə is indeed moraic; the failure of primary stress to rest on schwa alone can be explained by a Stress-to-Weight effect. Given that, iambic footing accounts for the final stress in words like *ƚ̓əχ$^{w}$ƚ̓əq̓$^{w}$ə́s* ‘cinquefoil plant growing in ground’ (Boas, 1948, 173), while trochaic footing cannot. The only counterexample cited by Kalmar is the word *k$^{w}$ə́sk$^{w}$əs*. The suspiciously onomatopoeesque character of this word makes it dubious as evidence for the general stress pattern of the language.

[4] The facts about secondary stress assignment are actually somewhat more complicated. Factors such as glottalization and special stress attraction or repulsion of certain morphemes (or classes of morphemes) can affect secondary stress (and perhaps primary stress as well), leading to opaque surface forms such as *m̓íːd$^{z}$əɬəχd$^{z}$àːyuː* ‘instrument of sea otter penis for chopping out inside of canoe’ (BD 150). I leave aside these counterexamples here in the belief that they will receive satisfactory explanations when our understanding of Kwak’wala morphophonology is more mature.

[5] Having drawn widely on the literature for the Kwak’wala data in this chapter, I note the source for each datum to maximize transparency. Cited works are abbreviated as follows: *BG:* Boas 1947; *BD:* Boas 1948; *DG:* Grubb 1977; *EB:* Bach 1975; *CS:* Struijke (2000).

This generalization about the default-to-opposite stress pattern allows us to give evidence for the different contribution to syllable weight of different types of syllables. As observed by Zec (1994), only sonorant codas are moraic; all other codas do not contribute to syllable weight. Thus in (5), the coda sonorants *m* and *l* are moraic, causing the syllable to be considered heavy and to attract stress away from the final syllable. In (6), the obstruents χ and *x* cannot bear weight, so the syllables remain light and do not attract stress:[6]

(5) **Sonorant codas attract stress (data from BD):**

| | |
|---|---|
| wə́n.d$^{z}$iːs.bə.liːs | ‘snag (as supernatural being)’ |
| mə.mə.l̓ə́mx.ʔiːt | ‘get really twisted’ |
| nə́n.g$^{w}$əs.gə | ‘make love to mother-in-law’ |
| χ$^{w}$ə́l.d$^{z}$uːs | ‘Hexagrammus octognammus’ (fish species?) |
| mə́n.las | ‘place of getting over-satiated’ |

(6) **Obstruent and glottalized sonorant codas do not attract stress:**

| | | |
|---|---|---|
| nəχ.nə.qə.líːɬ | ‘do the right thing in house’ | (BD) |
| p̓əs.bə́s | ‘fond of potlatching’ | (BG) |
| bəx$^{w}$.də́q | ‘kill game without weapons’ | (BG) |
| c̓əx.q̓áː.li.səm | ‘die of feeling sick’ | (BG) |
| gəl̓.d$^{z}$úːt | ‘crawl onto flat thing’ | (BG) |
| gəm̓.χá | ‘use the left hand’ | (BG) |

Our analysis of sonorants as the only mora-bearing coda consonants is confirmed by the absence of any syllable containing both a long vowel and a sonorant coda, or two sonorants in the coda. These gaps result from a prohibition on superheavy syllables (those with more than two moras).[7] (Non-glottalized) sonorant codas seem to be equally as heavy as long vowels. The first syllable to contain either one in a given word will bear primary stress:

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[6] For an OT analysis of the restriction on coda moraicity to sonorants, see Struijke 2000. Kwak’wala appears to be unique among languages with a sonorant-obstruent moraic distinction by treating non-glottalized and glottalized sonorants differently (Zec, 1994). See also Sapir (1938) and Kingston (1990) on the phonological properties and articulation of glottalized sonorants across Wakashan.

[7] A very small number of words violate this generalization, including *ʔuːmp* ‘father’ and *ʔəuːms* ‘man of ordinary power’ (BD). Almost all of these words have the rime *-uːm* (or a superset of that rime) and are derived from Wakashan *-*uk*$^{w}$ roots (Lincoln and Rath, 1980). The only other word that I know of which violates this generalization is *wiːn*, a word that is irregular in a number of other ways as well. I take these words to be exceptional in modern Kwak’wala.

(7) Equal stress attraction of long vowels and sonorant codas (data from BG):

| | | |
|---|---|---|
| *Sonorant codas* | dᶻə́m.bə.təls | ‘bury in hole in ground’ |
| | k̓ə.q̓ʷəχs.də́n.da.la.p̓a | ‘stick through at both ends’ |
| | ə̓əp.sə́mt | ‘pick up round thing in tongs’ |
| *Long vowels* | ƛ̓áː.y̓a.ɬa | ‘be transformed’ |
| | səʔ.kʷíː.lap’ | ‘give seal feasts in rivalry’ |
| | pəc.túːt | ‘pay damages for bite of cannibal dancer’ |

However, there is one further category of syllables: those that are weightless. Like heavy and light syllables, weightless syllables can be identified by their stress behavior. Explaining them also requires a word about Kwak’wala phonotactics.

Onset clusters are prohibited without exception, but single-segment codas and coda clusters that obey the Sonority Sequencing Principle (Sievers, 1876; Vogel, 1977) are generally permitted. Consonants at every place of articulation can surface as codas. But one large class of consonants cannot be codas: laryngeally-marked consonants (Lombardi, 1991, 1995), i.e. voiced and glottalized obstruents. Such segments are kept from occurring in codas by the addition of an epenthetic vowel:[8]

(8) /gʷəd + xʔiːd/ → [gʷədᵊxʔiːt] ‘to begin to untie’ (Boas 1947: 211)[9]

It is these epenthetic vowels that are of interest to us, because they are the weightless vowels of Kwak’wala. This claim develops an observation made by Boas (1947):

> “In determining the place of the accent syllables due to the continued voicing of sonants or to glottalized stops [*i.e. the epenthetic vowels–JSK*] do not count, so that phonemically the voicing which follows the release of the stop, although acoustically important should be omitted.” (219)

This fact by itself suggests that the vowels are only present post-lexically, or are phonetic intrusions with no phonological reality. But several other facts point to the active presence of these vowels: for example, suffix allomorphy sensitive to whether a stem is consonant-final or vowel-final treat stems with final epenthetic vowels as vowel-final.

We can account for all of these facts by treating these vowels as nonmoraic or weightless. They are vocalic segments linked directly to a syllable, with no mora attachment. Constructions similar to this have been called minor syllable or semisyllable and have been proposed in a number of languages (Gafos, 1996*a*; Cho and King, 1999; Féry, 2003; Nuger, 2006). A common

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[8] There are interesting differences in the behavior of these classes when they occur word-finally; just in that case, voiced obstruents devoice, while glottalized obstruents are left unrepaired. This is a pattern that has not been attested in any other language, and which has been claimed to be impossible by authors such as Lombardi (2001). See Davenport (2007) for discussion. Note also that the attested data seem to contradict these generalizations in some cases, even when data and generalization come from the same source material. I have followed the recorded data as faithfully as possible, but it may be hoped that future work will correct mistaken data or establish generalizations that are more correct.

[9] I transcribe epenthetic schwa as ᵊ, in order to distinguish it from an underlying schwa. I make a particular phonological claim about the special origin and status of these vowels, as described below. However, no claim about their phonetic qualities is made or should be suggested by this transcription; there is no evidence to suggest that these epenthetic schwas are in any way phonetically distinct from underlying schwas.

property of minor syllables is that they do not bear stress, thus accounting for Boas' observation (Cho and King, 1999). Note that my analysis contradicts the findings of Bach *et al.* (2005), claiming that all schwas in Kwak'wala are weightless. It is also distinct from analyses of semisyllables like that of Féry (2003), who takes semisyllables to be syllables with an onset but no nucleus. In Kwak'wala, I analyze epenthetic vowels as the nonmoraic nucleus of a syllable, which serves to rescue the preceding consonant by allowing it to surface as an onset.

We have seen that light syllables will accept primary stress when they are in the default position (i.e. word-final) in words with no heavy syllables, as well as accepting secondary stress if they fall an even number of syllables after the primary stress:

(9) Light syllables accept stress:

| | | |
|---|---|---|
| həm̓xdə́m̓ʔs | 'favorite place for eating outside' | BG 366 |
| təɬc̓əbə́s | 'warming himself' | BG 336 |
| ŧ̓əχʷŧ̓əq̓ʷə́s | 'cinquefoil plant growing in ground' | BD 173 |
| bá:xʷi:n̓àkʷəla | 'to be getting secular' | BG 347 |
| w̓á:biƛ̓χàwiʔ | 'saliva' | BG 324 |

But when secondary stress would fall on a syllable headed by an epenthetic vowel, it instead falls on the following syllable. Even when a syllable headed by an epenthetic vowel would be the weak member of a foot it fails to do so, leading to a gap of three syllables rather than two between stresses (BG 219):

(10) Stress-rejecting syllables (epenthetic ᵊ as nucleus):

| | | |
|---|---|---|
| /dᶻaxʷ + =ad + !i:nu:χʷ/ | → dᶻá:wadᵊʔì:nu:χʷ | 'people of Knight Inlet' |
| /qa:k + =kʷ + !ə + =a:s/ | → qá:gᵊk̓ʷəʔà:s | 'place where skulls<br>are hung up on rock' |
| /xʷa: + =əm + i:/ | → xʷá:xʷagʷᵊmì: | 'that small canoe' |

Thus in [dᶻá:wadᵊʔì:nu:χʷ] the secondary stress that should fall on [....dᵊ....] instead skips over to the next syllable, and resumes counting from there. Emily Elfner (p.c.) suggests the possibility of treating these as intrusive vowels in the sense of Hall (2003). Intrusive vowels are non-syllabic vowels that arise from overlapping articulatory gestures, such that the articulation of a nearby vowel may actually extend across a consonantal span to effectively create a phonetically distinct additional vowel. However, this vowel will not be phonologically distinct, and it may share the features of the original vowel or a reduced version of them.

Although tempting in some ways, such an analysis cannot hold for the weightless schwas of Kwak'wala. The crucial fact showing that epenthetic vowels must be phonologically present is their role in allomorphic conditioning. As we will see, *-m̓ut* has two allomorphs, one of which occurs after vowels while the other occurs after consonants. Epenthetic vowels behave exactly like vowel-final forms by conditioning the selection of the same allomorph. This suggests that the epenthetic vowels are phonological present and must be considered for certain phonological phenomena, even though they are not considered for others. This is best explained by treating them as nonmoraic vowels, heading weightless syllables. The same facts also argue against treating these vowels as postlexical insertions. The best analysis is to treat these vowels as epenthetic and weightless. Their phonological presence explains the allomorphy facts, while their nonmoraic status explains their stress behavior.[10]

The possible syllable shapes and their classifications by weight are shown in (11). Syllables of different weights are represented by Σ (heavy syllable, i.e. $\sigma_{\mu\mu}$), $\sigma$ (light syllable, i.e. $\sigma_{\mu}$) and $\varsigma$ (weightless syllable, i.e. a syllable that dominates a vowel directly with no intervening moras).[11]

(11) **Kwak'wala syllable types:**

| *Syllable type* | *Example* | *Gloss* |
|---|---|---|
| **Heavy** | | |
| CVː | d$^z$íː.daq | ‘milky sea eggs’<br>BD 194 |
| CVːT | yáːχ.k̓a | ‘hop on one foot’<br>BD 49 |
| CVːTT | c̓ə.dáːχs.tə.wiː.ƛə.la | ‘woman stands in place of man’<br>BD 208 |
| CVR | ʔa.ƛa.n̓ə.máː.li.səm | ‘die on account of wolfness’<br>BG 342 |
| CVRT | t̓ə́ls.t̓aːs | ‘eat fruit of viburnum pauciflorum Pylaine’<br>BD 173 |
| **Light** | | |
| CV | ƛ̓ə.k$^w$íː.t̓iːt | ‘rub body with seaweed’<br>BD 438 |
| CVR̓ | gəl̓.d$^z$úːt | ‘crawl onto flat thing’<br>EB 13 |
| CVT | y̓ə.y̓áː.ga.da.laɬ | ‘having sea monster dance’<br>BG 376 |
| CVTT | háː.l̓aː.maχs.taː | ‘to eat quickly’<br>BD 81 |
| **Weightless** | | |
| C$^ə$ | ʔúː.d$^{zə}$.giː.l̓a<br>(from /$\sqrt{\text{ʔuːd}^{z}}$ + giːl̓a/) | ‘act wrongly on rock’<br>BD 34 |

Our basic knowledge about Kwak'wala phonology can be summed up as follows. Iterative iambs are built beginning with the first heavy syllable and proceeding to the right; if there is no heavy syllable in a word, then one iamb is built at the right edge of the word. Heavy syllables are those that have a long vowel or a non-glottalized sonorant coda. Superheavy syllables are never allowed. Long vowels reduce to ə when shortened, while ə becomes aː when lengthened. Epenthetic vowels are nonmoraic. They never bear primary or secondary stress, and are invisible to the

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[10] Melissa Frazier (p.c.) raises the important question of whether phonetic correlates can be found for the phonological difference between light and weightless syllables. I am not aware of any work that has been done that could shed light on that matter. But if such a phonological distinction persists in contemporary Kwak'wala, then its phonetic consequences should certainly be investigated.

[11] This is an enlarged version of a similar chart of heavy and light syllables given by Struijke (2000)).

counting algorithm when secondary stress is assigned.

### 2.2.2 Morphophonology

Kwak'wala has a rich morphophonological system, including many affixes that trigger various kinds of stem expansion, including lengthening, reduplication, and epenthesis. Work on various aspects of Kwak'wala morphophonology and related areas of morphosyntax includes Boas (1947), Anderson (1984, 2005) and Chung (2007). The system is characterized above all by the enormous inventory of suffixes. These several hundred suffixes are used for many grammatical functions as well as often providing semantic content comparable to roots. They combine prolifically according to rules that are only incompletely understood.

One significant aspect of these suffixes is their ability to trigger changes in the stems to which they attach. As in other Wakashan languages, we see two basic kinds of changes. One of these is stem expansion effects, such as lengthening a stem vowel or triggering reduplication of a stem. Stem expansion is usually phonologically predictable in the sense that two stems of the same shape (in terms of syllable weight and coda type) will behave identically when a given suffix is added. At the same time, suffixes behave differently from one another. The number of attested expansion patterns is notable; Boas (1947) lists eighteen different classes of suffix depending on which kind of expansion each one triggers in each different shape of stem. Fifteen of those classes include expansion via reduplication for at least some stems. Reduplication is also special in that it appears to be prefixal in many cases, whereas no segmental prefixes ever occur in Kwak'wala (or anywhere in Wakashan). In addition to suffix-triggered reduplication, reduplication with no overt suffixation also occurs frequently to indicate pluralization or aspect.

The other kind of suffix-driven stem change is fortition or lenition of a stem-final consonant – processes referred to as hardening and weakening respectively. A hardening suffix typically glottalizes a stem-final obstruent or sonorant, while a weakening suffix will transform a stem-final voiceless obstruent into its voiced counterpart. They are indicated orthographically by the markers -! and = respectively. This can be seen in the following examples (BG 227):

(12) Hardening and weakening:

| | | | |
|---|---|---|---|
| *Hardening:* | /wənq + -!a/ | → [wənq̓a] | 'deep on rock' |
| *Weakening:* | /wənq + =iːɬ/ | → [wənɢiːɬ] | 'deep on floor' |

### 2.2.3 *-m̓ut*

According to Boas (1947), there are two suffixes in Kwak'wala that trigger -*m̓ut* stem expansion. They are -*m̓uːt* 'refuse, useless' and -*(g)iːsaweːʔ* 'left behind; leave behind.'[12] A semantic connection seems to exist between these morphemes, but it should be noted that *aʔyaweːʔ* 'left over' and *ʔaweːʔ* 'left behind' do not trigger *m̓ut* reduplication. Therefore, the observed expansion seems to be related to the suffixes *m̓uːt* and *(g)iːsaweːʔ* themselves.[13]

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[12] Note that I sometimes write -*m̓ut* rather than *m̓uːt* in contexts where the phonological form of the suffix is not relevant.

[13] There is some inconsistency in BG about whether the stem-expansion effects of these two suffixes are really identical. This is perhaps due to one of the unfortunate typos found in this posthumously-edited work. The data

Kalmar (2003) treats -*m̓ut* reduplication as part of a more general reduplicative pattern that she calls distributive reduplication – one of five reduplicative patterns in Kwak'wala. This pattern occurs in various syntactico-semantic contexts as well as being lexically associated with certain suffixes, as the following examples indicate:

(13) Distributive reduplication (Kalmar, 2003, 7):

a. wá -wap =stola
distRED -water =eye
'watery eyes'

b. kʷəl -kʷəl -χ =stu
distRED -fade -passive =eye
'grey / light eyes'

There is considerable distance between Boas' fifteen categories of reduplicative morphology and Kalmar's five kinds of reduplication; sorting out the complete picture remains a task for future research. In this chapter I avoid extra complication by focusing only on data involving the suffix -*m̓ut*. Whether the claims about this suffix are also valid for words with -*(g)iːsaweːʔ* or other cases included in the domain of distributive reduplication remains to be investigated.

The suffix -*m̓ut* 'refuse, useless' triggers a variety of stem expansion effects, including reduplication of some or all of the stem, lengthening of a stem vowel, and stem-final epenthesis (with some stems exhibiting more than one of these changes). There are two properties of -*m̓ut* stem expansion that are puzzling for standard analyses of reduplication: namely, why reduplication occurs with some stems but fails to occur with others, and why with some stems, some input material surfaces in the "reduplicant" without surfacing in the "base." There are also subpatterns of reduplication to be explained, in that within the class of stems that reduplicate with -*m̓ut*, stems of different shapes have distinct reduplicative shapes.

#### 2.2.3.1 Segmental content

The suffix is added to a stem which in most cases is identical to the root. The segmental portion of this suffix is unexceptional, with one allomorphic complication: the suffix has the form *m̓uːt* after a consonant-final stem, and *muːt* after a vowel-final stem. I do not provide an analysis of this allomorphy, but its occurrence is significant in several ways and will be discussed further in sections 4 and 5. This suffix seems likely to be related to the root *m̓uːt* 'to carry food home from feast' (BD). However, there is no apparent synchronic connection between these morphemes.

-*m̓ut* is attested with many CVC(C) roots (the ordinary root shape in Kwak'wala) and with some stems longer than CVCC which may have some internal morphology. However there are very few attested cases in which -*m̓ut* is added outside any identifiable derivational morphology. Therefore any complete analysis Kwak'wala morphophonology must account for -*m̓ut* being combined with the root closer or earlier than almost any other morphology.

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presented there seem to support the claim that the patterns are identical.

### 2.2.3.2 Stem expansion effects

All monosyllabic stems undergo some kind of stem expansion when -*m̓ut* is added to them. Three kinds of stem expansion occur in -*m̓ut* words: lengthening, reduplication, and epenthesis. Epenthesis may co-occur with either of the other expansion types, but lengthening and reduplication never co-occur. The data below illustrate the different patterns that are attested. The data are organized according to rime shape, which determines the way in which the stem changes. V is any non-schwa vowel; Y is any non-glottalized glide; R is any other non-glottalized sonorant; D is any voiced consonant; T is any non-ejective obstruent; and C̓ is any glottalized consonant. Roots and suffixed forms come from BG 339 except where otherwise noted. Glosses from BD are given for every root listed there. A complete set of all attested -*m̓ut* forms known to me is given in Appendix A, including the source, all known variants or alternative transcriptions, glosses for both the root and derived forms, and original transcriptions.

(14) Lengthening only:

| | *Root* | *With suffix* | *Root gloss* |
|---|---|---|---|
| əT | c̓əx | c̓aːxm̓uːt | ‘singe’ |
| | k̓əxʷ | k̓aːxʷm̓uːt | ‘suck with whole mouth’ |
| | q̓ək | q̓aːxm̓uːt | ‘bite’ |
| | q̓ʷəɬ | q̓ʷaːɬm̓uːt | ‘scratch’ |
| | təp | taːpm̓uːt | ‘break’ |
| | t̓ək | t̓aːxm̓uːt | ‘soil’ |
| | t̓əs | t̓aːsm̓uːt | ‘crack barnacles’ |

(15) Lengthening and epenthesis:

| | *Root* | *With suffix* | *Root gloss* |
|---|---|---|---|
| əD | gʷəd | gʷaːdᵊmuːt | ‘tie’ |
| əTT | kʷəsx | kʷaːsxᵊmuːt | ‘splash’ |
| | cətx | caːtxᵊmuːt | ‘squirt’ |

(16) Reduplication only:

| | *Root* | *With suffix* | *Gloss* |
|---|---|---|---|
| əY | dəy | diːdəmuːt | ‘wipe’ |
| | χəw | χoːχəmuːt | ‘split wood’ |
| əR | kən | kənkəmuːt | ‘scoop up’ |
| | səl | səlsəmuːt | ‘drill’ |
| | wən | wənwəmuːt | ‘drill with auger’ |
| Vː | maː | maːməmuːt | ‘(serpent) crawl’ |
| VːT | c̓aːs | c̓aːc̓əsmuːt | ‘eel grass’ |
| | c̓uːɬ | c̓uːc̓əɬm̓uːt | ‘black’ |
| | guːkʷ | guːgəxʷm̓uːt | ‘house’ |
| | kaːχʷ | k̓aːk̓əχʷm̓uːt | ‘shave’ |
| | k̓aːp | k̓aːk̓əpm̓uːt | ‘(mouse) gnaw’ |
| | tiːɬ | tiːtəɬm̓uːt | ‘bait’ |
| | χʷaːƛ | χʷaːχʷəɬm̓uːt | ‘cut fish’ |
| | w̓aːs | w̓aːw̓əsm̓uːt | ‘dog’ |
| | yuːs | yuːyəsm̓uːt | ‘spoon’ |
| əRT | qəns | qənqəsm̓uːt | ‘adze with long-handled adze’ |
| | kəmt | kəmkətm̓uːt | ‘clean berries’ |
| | k̓əmƛ | k̓əmk̓əɬm̓uːt | ‘adze’ |
| | səmk | səmyəxm̓uː | ‘try fish oil’ |
| | sənq | sənyəχm̓uː | ‘peel bark’ |
| | yənt | yənyətm̓uːt | ‘(non-mouse) gnaw’ |
| əRC̓ | k̓ʷəml̓ | k̓ʷək̓ʷəml̓m̓uːt | ‘burn’ |

(17) Reduplication and epenthesis:

| | *Root* | *With suffix* | *Gloss* |
|---|---|---|---|
| əC̓ | c̓əm̓ | c̓əc̓əm̓ᵊmuːt | ‘melt’ |
| VːC̓ | siːq̓ʷ | siːq̓ʷᵊmuːt | ‘peel bark’ |
| | siːq̓ | (sə)siːqᵊmuːt | ‘eat dry herring eggs’ |
| | q̓ʷaːl̓ | q̓ʷəq̓ʷal̓ᵊmuːt | ‘scorch’ |
| əRD | məndᶻ | məməndᶻᵊmuːt | ‘cut kindling’ |

There are also a few forms built from polysyllabic stems, which behave idiosyncratically, as do a few forms that appear to be simply exceptional. The following examples illustrate:

(18) *Polysyllabic roots:*

| *Root* | *-m̓uːt form* | *Gloss* | |
|---|---|---|---|
| huːləɬ | huːlaɬm̓uːt | ‘few’ | |
| maːmeːm̓ | maːmeːm̓əm̓uːt | ‘leaves’ | (BD 138) |
| | maːmeːmm̓uːt | | (BG 340) |
| ʔameːʔ | ʔameːʔm̓uːt | ‘small’ | |

(19) *Irregular forms:*

| *Root* | *-m̓uːt form* | *Gloss* |
|---|---|---|
| həm̓ | haːʔəmuːt | ‘food’ |
| ʔiːx | ʔiːxm̓uːt | ‘good’ |
| kʷaːx | kʷaːxm̓uːt | ‘smoke’ |
| naːq | nənχm̓uːt | ‘drink’ |
| t̓iːs | t̓iːsm̓uːt | ‘stone’ |
| wiːn | hawiːnəmuːt | ‘war’ |
| χuːɬ | χuːχʷəɬk̓əmuːt | ‘go after mussels’ |

These roots seem to resist reduplication and lengthening, and they seem to be generally unpredictable in their behavior. Of the bisyllabic forms, one of the three attested forms (the one meaning ‘old leaves’) is transcribed with significant differences in the two posthumous Boas works, making it impossible to draw conclusions from.

Several phonological effects triggered by the addition of -*m̓ut* can be seen in these data. The most important ones are listed below:

(20) a. /s/ → [y] / X__V (in derived environments; does not always apply)
b. /c/ → [n] / X__V (in derived environments)
c. /əy, əw/ → [iː, uː] / __ $]_\sigma$
d. /ƛ/ → [ɬ] / __ $]_\sigma$

We can observe some important patterns in the data when we look at which stem expansion effects that correspond to which stem types. A summary chart is given in (21).

(21) Stem changes with -*m̓ut*:

| *Root* | *With suffix* | *Change* | *E.g.* | *With suffix* |
|---|---|---|---|---|
| CəT | CaːT | l | t̓əs | t̓aːsm̓uːt |
| CəD | CaːDə | l, e | gʷəd | gʷaːdᵊmuːt |
| CəTT | CaːTTə | l, e | k̓ʷəsx | k̓ʷaːsxəmuːt |
| CəR | CəRCə | r | kən | kənkəmuːt |
| CəY | CəYCə | r | dəy | diːdəmuːt |
| CVː | CVːCə | r | maː | maːməmuːt |
| CVːT | CVːCəT | r | χʷaːƛ | χʷaːχʷəɬm̓uːt |
| CəRT | CəRCəT | r | qəns | qənqəsm̓uːt |
| CəRC̓ | CəCəRC̓ | r | k̓ʷəml’ | k̓ʷək̓ʷəml̓ |
| CəC̓ | CəCəC̓ə | r, e | c̓əm̓ | c̓əc̓əm̓ᵊmuːt |
| CVːC̓ | CəCVːC̓ə | r, e | siːq̓ | səsiːq̓ᵊmuːt |
| CəRD | CəCəRDə | r, e | məndᶻ | məməndᶻᵊmuːt |

These data include essentially every stem type attested with -*m̓ut*. However, in addition to the irregular forms, two of the classes will henceforth be excluded from consideration because of an absence of reliable data. Only two stems with the shape CəC̓ are attested with -*m̓ut*, from roots *c̓əm̓* and *həm̓*; only the former root follows the listed pattern, while the latter expands idiosyncratically to *haːʔəmuːt*. There is only one attested -*m̓ut* form with a CəRC̓ root. That root happens to be irregular in its combinations with other suffixes (Boas (1948)), and the same word is transcribed with no glottalization (in root or suffix form) by Flynn (2007).

All the other patterns will be explained. It must be noted however that CəD, CVːC̓ and CəːRD roots are all uncommon. For example, Boas' 449-page *Kwakiutl Dictionary* lists only two roots with the shape CəD (*g$^{w}$əd* 'untie' and *w̓əd* 'be cold'). Therefore any conclusions about these patterns must be regarded as somewhat tentative.

#### 2.2.3.3 Types of stem expansion

Our first observation is that the epenthesis attested here is completely predictable given the shape of the suffix, without reference to any special reduplicative or stem-expanding properties that it might have. Any consonant-initial suffix threatens to close off a preceding root into its own syllable, resulting in illicit codas if the root ends in a laryngeally-marked consonant or a consonant cluster with an unacceptable sonority rise or plateau. Generally in the language this is repaired through epenthesis; exactly the same holds true for words with -*m̓ut*:[14]

(22) -*m̓ut* triggers epenthesis:

| *Root* | *With suffix* | *Change* | *E.g.* | *With suffix* |
|---|---|---|---|---|
| CəD | CaːDə | l, e | g$^{w}$əd | g$^{w}$aːd$^{\text{ə}}$muːt |
| CəTT | CaːTTə | l, e | k̓$^{w}$əsx | k̓$^{w}$aːsx$^{\text{ə}}$muːt |
| CVːC̓ | CəCVːC̓ə | r, e | siːq̓ | səsiːq̓$^{\text{ə}}$muːt |
| CəRD | CəCəRDə | r, e | mənd$^{z}$ | məmənd$^{z\text{ə}}$muːt |

Another significant fact is that epenthesis is never the sole stem-expansion effect associated with -*m̓ut*: it always co-occurs with lengthening or reduplication. The conclusion we draw is that the epenthesis seen in these words is due to the same general phonological process we see throughout the language, rather than being specifically tied to this suffix.

Effacing the difference between the epenthetic and non-epenthetic cases, we see a significant difference between the forms that lengthen and those that reduplicate:

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[14] A theoretical objection can be made against this claim. As laid out in the next section, my basic analysis holds that reduplication is generally preferred over epenthesis in Kwak'wala due to the ranking DEP ≫ INTEGRITY. How then can epenthesis occur in these words?

One possibility is that these "epenthetic" vowels may actually be copies of another vowel from the stem or suffix. A general rule forbids these vowels from ever being linked to a mora. And any short vowel – let alone a weightless one – reduces phonologically to schwa. (A possible exception to this generalization is *a*, but when weightless it is plausible to think that even that vowel might reduce.)

Another possibility is that the constraints that cause reduplication to be chosen instead of epenthesis are limited to certain domains such as the stem. Epenthesis at the periphery and reduplication at the core could be motivated by penalizing correspondence of segments across stem boundaries, or by replacing DEP in the crucial ranking with a version of DEP that is specific to roots or stems or some other phonological or morphological domain.

Phonologically there will be no difference between a surface form in which a weightless vowel is reduplicated and one in which it is epenthesized, except for a formal difference in the correspondence relationships of some segments. It is not clear what empirical differences could be found between these representations (something which is part of a more general issue in Correspondence Theory; see McCarthy and Prince 1995). I adhere to the tradition of treating these vowels as epenthetic to distinguish them from the vowels which are demonstrably reduplicated. But we must remain open to the possibility that evidence may emerge to demonstrate that the vowels are reduplicative rather than epenthetic, which would require some parts of my analysis to be revised.

(23) -*m̓ut* words grouped by type of stem change:

| | | | |
|---|---|---|---|
| *Lengthening* | | | |
| *Root* | *With suffix* | *E.g.* | *With suffix* |
| CəT | CaːT | t̓əs | t̓aːsm̓uːt |
| CəD | CaːDə | g$^{w}$əd | g$^{w}$aːd$^{ə}$muːt |
| CəTT | CaːTTə | k̓$^{w}$əsx | k̓$^{w}$aːsx$^{ə}$muːt |
| *Reduplication* | | | |
| CəR | CəRCə | kən | kənkəmuːt |
| CəY | CəYCə | dəy | diːdəmuːt |
| CVː | CVːCə | maː | maːməmuːt |
| CVːT | CVːCəT | χ$^{w}$aːƛ̓ | χ$^{w}$aːχ$^{w}$əɬm̓uːt |
| CVːC̓ | CəCVːC̓ə | siːq̓ | səsiːq̓$^{ə}$muːt |
| CəRT | CəRCəT | qəns | qənqəsm̓uːt |
| CəRD | CəCəRDə | mənd$^{z}$ | məmənd$^{zə}$muːt |

Here we can observe the crucial fact that the roots that lengthen are exactly those that would constitute a light syllable if they surfaced with no suffix. Any root that would constitute a heavy syllable on its own due to having a long vowel or non-glottalized sonorant coda undergoes reduplication instead of lengthening. The best hypothesis to account for this alternation (due to Rodier 1989) is that stems lengthen whenever possible when -*m̓ut* is present. Lengthening is rejected in favor of reduplication only in those cases where a more important constraint (the ban on superheavy syllables, undominated in Kwak'wala) makes lengthening impossible.

#### 2.2.3.4 Subpatterns of reduplication

Reduplicative stems always consist of two or three syllables. The first two syllables can be said to be copies of one another; they have some or all of their segments in common with each other and with the underlying root. The third stem syllable, if any, is epenthetic. The occurrence of epenthesis has already been explained. The trigger for reduplication (namely, a stem that would constitute a heavy syllable) has also been mentioned. However, the precise subpattern – in terms of the weight and shape of the two reduplicative syllables – into which roots of each shape fall still need to be accounted for. These subpatterns are defined by two basic parameters: the weight of the first two stem syllables (heavy-light or light-heavy), and the location in which a coda appears, if any is present (first syllable, second syllable, or spread across both).

In terms of weight, there are only two surface patterns for the first two stem syllables. If the first syllable is light, the second syllable is heavy; if the first syllable is heavy, then the second syllable is light. Example (24) illustrates.

(24) Reduplication patterns by weight:

| | *Stem shape* | *Root type* | *Example* |
|---|---|---|---|
| a. | Σ $\sigma$ | CəR | kənkəmuːt |
| | | CəY | diːdəmuːt |
| | | CVː | maːməmuːt |
| | | CVːT | χ$^{w}$aːχ$^{w}$əɬm̓uːt |
| | | CəRT | qənqəsm̓uːt |
| b. | $\sigma$ Σ ς | CəRD | məmənd$^{zə}$muːt |
| | | CVːC̓ | səsiːq̓$^{ə}$muːt |

The pattern $\sigma$ Σ only and always occurs in epenthetic reduplicative words. The key to explaining this fact is the fact that both patterns are consistent with the creation of good iambs: (Σ) ($\sigma$ Σ) in the non-epenthetic cases (including the suffix), and ($\sigma$ Σ) ς (Σ) in cases of epenthesis. Given the distinction between epenthetic and non-epenthetic cases and assuming that the weightless epenthetic syllables are never footed, we can observe that changing either pattern would result in a metrically inferior structure. Reversing the order for non-epenthetic words would yield ($\sigma$ Σ) (Σ) – an inferior structure due to the adjacent foot heads. Reversing the order for epenthetic words would yield (Σ) $\sigma$ ς (Σ), with an unfootable second syllable (or else the creation of a trochee).

With regard to codas, more options exist. When a bimoraic stem ends in a single obstruent, adding *-m̓ut* triggers reduplication in which the obstruent surfaces as a coda in the second syllable of the word, e.g. *χ$^{w}$aːχ$^{w}$əɬm̓uːt* from stem *χ$^{w}$aːƛ*. Glottalized obstruents behave identically with the exception that epenthesis occurs as well as reduplication; the stem-final obstruent in these words therefore surfaces as an onset rather than a coda. Thus stem *siːq̓* surfaces as *səsiːq̓$^{ə}$muːt* when the suffix is added.

Stem-final sonorants behave quite differently. Modal sonorants surface as codas in the first syllable, as in *kənkəmuːt* from stem *kən*.

The behavior of stem-final clusters depends on the nature of the segments in the cluster. Underlying clusters composed entirely of modal obstruents are only attested in syllables with nucleus ə, as a result of which they exhibit lengthening (and epenthesis) rather than reduplication when suffixed. Stems with a final cluster including a sonorant and a laryngeally marked coda (always a voiced consonant in the attested cases) surface contiguously in the second syllable, followed by an epenthetic vowel, as in stem *mənd$^{z}$* which yields suffixed *məmənd$^{zə}$muːt*. Stems with a final sonorant-obstruent cluster divide the cluster between the first two syllables when *-m̓ut* is added, as in stem *qəns* which surfaces as *qənqəsm̓uːt* when suffixed.

In summary, several patterns that emerged from these data require analysis. Patterns that must be analyzed include the expansion of stems by lengthening in some cases and reduplication in others, and the subpatterns in which a reduplicated word may have one of numerous different forms, varying in terms of heavy and light syllables and in terms of where a coda appears if any does. I offer an analysis of these patterns in the next section.

## 2.3 Analysis

The crucial claim about -*m̓ut* is that in addition to its segmental component, the underlying form of this suffix includes a floating mora. The complete underlying representation thus looks something like this (ignoring the question of the suffix's allomorphy):

(25) /- $\mu$ m̓u$^{\mu\mu}$t/

As shown in the previous chapter, the idea of floating moras in underlying representations has been widely used in the analysis of many languages. In Kwak'wala, given the correct constraint ranking for the language, the presence of a floating mora in -*m̓ut* is sufficient to motivate the stem expansion patterns attested with the suffix.

### 2.3.1 Lengthening and reduplication

The simplest cases are those in which lengthening rather than reduplication occurs. These are words formed from a stem with nucleus ə and no sonorant or laryngeally marked final consonants, e.g. root *c̓əx* 'singe' → *c̓aːxm̓uːt* 'hair singed off.'

The basic logic behind the lengthening behavior is simple: the ranking MAXFLT ≫ IDENT$_{IO}$-(length) causes the floating mora to dock, even at the cost of causing a short vowel to lengthen. However, a few more things must be said in order to get this analysis off the ground. Our ranking will motivate lengthening if a vowel is already linked to a mora underlyingly, because the link to the floating mora will yield a long vowel. However, under Richness of the Base, we must consider a possible underlying contrast between roots with underlying moraic specifications and those not underlyingly linked to any mora. If *c̓əx* has the underlying form /c̓ə$^{\mu}$x/, then adding a floating mora will yield the correct stem form [c̓a$^{\mu\mu}$x]. But an underlying form of /c̓əx/ should presumably be able to dock a floating mora to the vowel and yield a short vowel, i.e. [c̓a$^{\mu}$x]. In effect this predicts an unattested contrast between CəT roots that lengthen and roots that do not.

One maneuver that could allow us to circumvent Richness of the Base problems is to assume a Stratal OT framework (Kiparsky, 1997; Bermúdez-Otero, forthcoming), and place -*m̓ut* at a level after which initial morification has applied. I have advocated such a strategy to account for similar issues with reduplication in other languages, e.g. Dakota (Saba Kirchner, 2007*a*). However, there are several reasons to be dubious about applying the same idea here. Little evidence has been offered to support a distinction between stem-level and word-level morphophonology in Kwak'wala. There are also no attested cases in which another suffix intervenes between the root and -*m̓ut*, suggesting that if there are multiple morphological levels in Kwak'wala then -*m̓ut* should belong to the earliest of them.

A more fruitful approach is to identify a constraint that would penalize words in which the floating mora would surface without causing lengthening. One constraint that performs a very similar function is NOVACDOC (see Wolf 2006 for a formal definition):

(26) NOVACUOUSDOCKING: Floating features cannot dock onto segments that already bore the same feature value in the input.

NOVACDOC serves to avoid situations in which floating features dock in a word and get "realized" by being present at the surface, but are essentially unrecoverable because the surface form would have been identical (except perhaps in correspondence relations) even if the floating feature had not been present at all. A similar logic should be applied to floating moras.

Wolf's constraint cannot be extended directly to apply to floating moras, because of the basic difference between polar or binary features on one hand, and association to prosodic elements – in principle unlimited in number – on the other. We can craft a constraint that will accomplish the same thing for moras as Wolf's constraint does for features. By parallel to the original constraint, this constraint holds that for any segment to which a floating mora anchors, a distinct mora must also anchor to that segment. A restated informal and formal definition are given below:[15]

(27) NOVACUOUSDOCKING($\mu$) (NOVACDOC($\mu$)):
*Informally:* "If a floating mora docks to a non-epenthetic segment, then a correspondent of that segment is also dominated by another mora."
*Formally:* $\forall\ \mu_1 \in \mathrm{S}_1 \nexists\alpha$ s.t. $\mu_1\delta\alpha$: $(\exists\mu_2 \in \mathrm{S}_2$ s.t. $\mu_1\mathfrak{R}\mu_2$ & $\exists x$ s.t. $\mu_2\delta x$ & $\exists\beta \in \mathrm{S}_1$ s.t. $\beta\mathfrak{R}x)$ $\rightarrow$ $(\exists y \in \mathrm{S}_2$ s.t. $\beta\mathfrak{R}y$ & $\exists\mu_3 \in \mathrm{S}_2$ s.t. $\mu_3\delta y$ & $\neg\ \mu_1\mathfrak{R}\mu_3)$

NOVACDOC($\mu$) penalizes words in which floating moras reach the surface linked to segment, unless (some correspondent of) that segment is linked to another mora as well. NOVACDOC($\mu$) is undominated in Kwak'wala. /c̓ə$^{\mu}$x/ and /c̓əx/ will both surface as [c̓a$^{\mu\mu}$x] when a floating mora is added.

(28) Moraic and nonmoraic input contrast neutralized at surface: [c̓ə$^{\mu\mu}$xm̓u$^{\mu\mu}$*t*][16]

a.

| c̓ə$^{\mu}$x + $\mu$ m̓u$^{\mu\mu}$t | NOVACDOC($\mu$) | MAX | IDENT$_{IO}$[length] |
|---|---|---|---|
| ☞ a. c̓a$^{\mu\underline{\mu}}$xm̓u$^{\mu\mu}$t | | | * |
| b. c̓ə$^{\mu}$xm̓u$^{\mu\mu}$t | | *! | |
| c. c̓ə$^{\underline{\mu}}$xm̓u$^{\mu\mu}$t | *! | *! | |
| d. c̓əxm̓u$^{\mu\mu}$t | | *!* | |

b.

| c̓əx + $\underline{\mu}$ m̓u$^{\mu\mu}$t | NOVACDOC($\mu$) | MAX | IDENT$_{IO}$[length] |
|---|---|---|---|
| ☞ a. c̓a$^{\mu\underline{\mu}}$xm̓u$^{\mu\mu}$t | | | * |
| b. c̓ə$^{\mu}$xm̓u$^{\mu\mu}$t | | *! | |
| c. c̓ə$^{\underline{\mu}}$xm̓u$^{\mu\mu}$t | *! | | |
| d. c̓əxm̓u$^{\mu\mu}$t | | *! | |

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[15] See Wolf (2006); Pater (2003); Kager (2003) for more discussion. In this definition $\delta$ indicates domination of a segment or prosodic unit by a higher prosodic unit; thus for example the first universal operator in this definition quantifies over floating moras: $\mu_1 \in \mathrm{S}_1 \nexists\alpha$ s.t. $\mu_1\delta\alpha$ should be read as "a mora in $\mathrm{S}_1$ such that there is no segment dominated by that mora." I adopt this notation from Keane (2006).

[16] Any output mora that corresponds to the floating mora is underlined. This underlining is a notational convenience only, with no theoretical significance.

I take this as the mechanism that avoids undetectable docking, although other means could also be employed to accomplish the same goal, including transderivational anti-faithfulness (Alderete, 2002) or Output-Output faithfulness (Benua, 1995, 1997). It is also worth pointing out that this issue only arises when we accept the theoretical claim of Richness of the Base. If we assume instead that the moraicity of underlying forms in Kwak'wala is always specified, then there is no problem here to begin with. Such an assumption may be particularly plausible in a quantity-sensitive language like Kwak'wala. Nevertheless, this issue is not central to our concerns and I therefore leave it aside.

Adding a few more constraints to our ranking, we correctly select the attested outcomes for these lengthening words. The driving force for stem expansion remains the constraint MaxFloat, which is violated when an underlying floating element is deleted or remains floating in the output. Constraints against epenthesis and reduplication dominate the constraint against changing length specifications, leading to the occurrence of lengthening as the least-costly repair. lengthening Tableau (29) illustrates.

(29) Lengthening with monomoraic stems:

| təp + $\mu$ m̓u$^{\mu\mu}$t | MaxFloat | Dep | Integrity | Ident$_{IO}$[length] |
|---|---|---|---|---|
| ☞ a. ta$^{\mu\underline{\mu}}$pm̓u$^{\mu\mu}$t | | | | * |
| b. tə$^{\mu}$pm̓u$^{\mu\mu}$t | *! | | | |
| c. ʔa$^{\underline{\mu}}$tə$^{\mu}$pm̓u$^{\mu\mu}$t | | *! | | |
| d. tə$^{\mu}$tə$^{\underline{\mu}}$pm̓u$^{\mu\mu}$t | | | *! | |

The situation is similar in cases where lengthening and epenthesis co-occur. These are forms with a root of the shape CəD. The final consonant cannot surface as a coda, and therefore epenthesis is triggered. However, this epenthetic vowel must remain weightless. We can prevent this vowel from being linked to a mora by calling on the following constraint:[17]

(30) NonmoraicEpenthesis (nme):
*Informally:* An epenthetic segment may not be dominated by a mora.
*Formally:* $\forall \alpha \in S_2 : \exists \mu \delta \alpha \rightarrow \exists \beta \in S_1$ s.t. $\alpha \mathfrak{R} \beta$

nme must dominate Syll-$\mu$, the constraint that requires all syllables to dominate at least one mora (Morén, 1999). With *Lar]$_{\sigma}$ forbidding any laryngeally-marked coda to surface in a coda, we derive the attested result:

---

[17] This is essentially an existential version of Campos-Astorkiza (2004)'s P-Dep-$\mu$.

(31) Lengthening with monomoraic epenthetic stem:

| gʷəd + $\mu$ m̓u$^{\mu\mu}$t | *Lar]$_{\sigma}$ | NME | Int | Id$_{IO}$-length | Syll-$\mu$ |
|---|---|---|---|---|---|
| ☞ a. gʷa$^{\mu\underline{\mu}}$dᵊmu$^{\mu\mu}$t | | | | * | * |
| b. gʷa$^{\mu\underline{\mu}}$dmu$^{\mu\mu}$t | *! | | | * | |
| c. gʷə$^{\mu}$də$^{\underline{\mu}}$mu$^{\mu\mu}$t | | *! | | | |
| d. gʷə$^{\mu}$gʷə$^{\underline{\mu}}$dᵊmu$^{\mu\mu}$t | | | *!* | | * |

Floating moras thus are preferentially realized through lengthening stem vowels. But lengthening is not always possible. When the pre-suffix stem would already constitute a heavy syllable, adding an extra would yield a superheavy syllable. And as we have seen, superheavy syllables are never licit in Kwak'wala. Therefore the next-best strategy must be chosen. Max is still dominant, ensuring that the mora is not simply deleted. In order to realize the floating mora without creating a superheavy syllable, a new host must be found to which the floating mora can anchor. To provide this host, a new syllable is created. In principle, epenthesis and reduplication are both possible options to create this new syllable. In Kwak'wala, the ranking Dep-seg ≫ Integrity results in reduplication being chosen instead of epenthesis. This is shown to derive the attested candidate in (32):[18]

(32) CəY roots: *diːdəmuːt* 'refuse of wiping'

| dəy + $\mu$, m̓uːt | *3$\mu$ | Max | Dep | Integrity | Ident$_{IO}$ [length] |
|---|---|---|---|---|---|
| ☞ a. di$^{\mu\mu}$də$^{\mu}$mu$^{\mu\mu}$t | | | | ** | * |
| b. di$^{\mu\mu\mu}$mu$^{\mu\mu}$t | *! | | | | |
| c. di$^{\mu\mu}$mu$^{\mu\mu}$t | | *! | | | |
| d. ʔa$^{\mu\mu}$də$^{\mu}$mu$^{\mu\mu}$t | | | *!* | | |

The same logic drives reduplication in cases of CəR roots. Docking the floating mora in these cases would result in a superheavy syllable. As we expect, reduplication is chosen instead:

---

[18] /əy/ and /əw/ always surface as [iː] and [uː] (respectively) in every context except when followed by a vowel other than schwa. In these tableaux I take this transformation for granted.

(33) CəR roots: *kənkəmuːt* ‘what is left after scooping up’

| kən + $\mu$ m̓u$^{\mu\mu}$t | *3$\mu$ | Dep | Integrity |
|---|---|---|---|
| ☞ a. kə$^{\mu}$n$^{\mu}$.kə$^{\underline{\mu}}$.mu$^{\mu\mu}$t | | | ** |
| b. ka$^{\mu\underline{\mu}}$n$^{\mu}$.m̓u$^{\mu\mu}$t | *! | | |
| c. kə$^{\mu}$n$^{\mu}$.ta$^{\underline{\mu}}$.mu$^{\mu\mu}$t | | *!* | |

## 2.3.2 Subpatterns of reduplication

Our account of reduplication versus lengthening is fairly straightforward. Things become somewhat more complicated when we account for all of the subpatterns of reduplication that occur. However, the added complications are not especially severe. Above all we can call on an insight from Struijke (1998, 2000) that the reduplicative subpatterns are essentially TETU effects (McCarthy and Prince, 1995), i.e. that each subpattern merely reflects the least marked realization of each particular root shape with an invariant suffix and a single constraint ranking.

Whenever reduplication is necessitated, there are many plausible reduplicative candidates to consider. In Kwak’wala we must at least always consider those reduplicative candidates that match the subpatterns attested with some root. These include candidates in which the first syllable of the reduplicated form includes the final consonant of the root while the second syllable does not include any copy of that consonant; another in which the coda surfaces in the second syllable while being absent from the first; one in which the first syllable has a long vowel while the second syllable has a short vowel; and another with a short vowel in the first syllable and a long vowel in the second syllable; etc.

Again following Struijke, I take *Clash to be a major force in determining the exact allocation of root material in the suffixed word. *Clash, which militates against adjacent foot heads, is ranked low enough in Kwak’wala that it has no effect on most words. Neither lengthening nor shortening occurs in order to allow footing without clashes, as shown by the existence of words with adjacent heavy syllables such as *q̓ʷiːtaːna* ‘splitting bone for cedarbark’ (BD 372). Tableau (34) illustrates the ranking that must prevail (parentheses indicate footing and boldface type indicates syllables that are foot heads):

(34) *Clash powerless with non-reduplicative words: *q̓ʷiːtaːna*

| q̓ʷiːt + aːna | Dep | Integrity | Ident$_{IO}$[length] | *Clash |
|---|---|---|---|---|
| ☞ a. (**q̓ʷiː**)(**taː**)na | | | | * |
| b. (**q̓ʷiː**)(ʔə**taː**)na | *! | | | |
| c. (**q̓ʷiː**)(q̓ʷ**itaː**)na | | *!* | | |
| d. (**q̓ʷiː**)(ta**na**) | | | *! | |

But *Clash may become relevant in cases of reduplication. To see how, consider that reduplication with *-m̓ut* occurs with stems that are underlyingly bimoraic (or at least stems that would surface as heavy syllables if left unsuffixed). The floating mora associated with the suffix is a third mora that must be accommodated in the output. Minimal reduplication will add an extra syllable, but constraints like INTEGRITY, MAX and DEP are indifferent as to certain details of that extra syllable. For example, whether the first syllable is heavy and the second syllable light, or the first syllable light and the second syllable heavy, makes no difference as far as those constraints are concerned. This ranking causes the emergence of unmarked structures. This is an example of obtaining a TETU effect without the classical TETU ranking of $\text{FAITH}_{IO} \gg$ MARKEDNESS $\gg \text{FAITH}_{BR}$. The correct selection of the attested reduplicative form for a CəR root is shown below:

(35) CəR roots – Σ $\sigma$ reduplication:

| kən + $\mu$ m̓uːt | INTEGRITY | *CLASH |
|---|---|---|
| ☞ a. (**kən**)(kə**muːt**) | ** | |
| b. (kə**kən**)(**m̓uːt**) | ** | *! |

The same logic correctly selects the output for CVː forms, which reduplicate with the pattern Σ $\sigma$ for the stem. The following tableau illustrates this outcome:

(36) CVː stems – Σ $\sigma$ reduplication:

| maː + $\mu$ m̓uːt | INTEGRITY | *CLASH |
|---|---|---|
| ☞ a. (**maː**)(mə**muːt**) | ** | |
| b. (mə**maː**)(**muːt**) | ** | *! |

Roots with the shape CVːT fall out similarly. The long vowel must surface faithfully once, and it must be copied once (surfacing short) to allow the floating mora to anchor. It is left to relatively low-ranked *CLASH to determine the order of the light and heavy syllables, resulting in the pattern Σ $\sigma$ Σ (including the suffix). We also must rely here on the constraint FOOTFORM – actually a cover for the set of constraints responsible for the iterative iambic default-to-opposite foot construction in Kwak'wala. For our purposes, we can define the cover constraint as follows:

(37) FOOTFORM: Assign one violation for a foot which is not a good iamb, or for a syllable that does not belong to any foot.

FOOTFORM is crucially dominated by INTEGRITY, with the result that reduplication does not occur for the sole purpose of improving metrical structure. Like *CLASH, it is usually inactive but will make itself known by shaping relatively unmarked reduplicative forms. This avoids one category of over-reduplicative candidates, giving the correct result as shown in the following tableau:

(38) CVːT roots – $\Sigma$ $\sigma$ reduplication:

| χʷaːƛ + $\mu$ m̓uːt | Integ | Foot Form | *Clash | O-Contig |
|---|---|---|---|---|
| ☞ a. (χ**ʷaː**)(χʷəɬ**m̓uːt**) | ** | | | * |
| b. (χʷəχ**ʷaːɬ**)(**m̓uːt**) | ** | | *! | * |
| c. (χʷəɬχ**ʷaː**)(**muːt**) | ** | | *! | ** |

It still remains to rule out candidates with less reduplication than the attested forms. Truly minimal (i.e. one-segment) reduplication does not occur, although it certainly could (yielding e.g. *χʷaːəɬm̓uːt* or *aːχʷəɬm̓uːt*). Although the extra reduplication would appear to serve markedness by avoiding hiatus, hiatus is not normally relieved through reduplication. Our TETU story cannot be told here, as the unmarked structure is bought only at the cost of an extra violation of Integrity.

Other constraints must be called upon to justify the extra reduplication here. One class of constraints that may apply here are those in the Align family governing the correspondence between the edges of multiple phonological structures. For concreteness, I assume that there is a phonological constituent called the prosodic stem (PStem), which is derived from but not necessarily coterminous with the morphological stem for the form in question. In particular, I assume that the left edge of the root is required to correspond with the left edge of a PStem. I further assume that the PStem is a subconstituent within the prosodic word (PWord). Note that although these constituents have not been motivated here, there is substantial evidence for their existence in many languages (Selkirk, 1984, 1986; Inkelas, 1990, 1993; Downing, 1998*a*) and proposing their presence with these particular properties in Kwak'wala does not seem especially costly. This general approach to explaining the non-minimality of reduplication in these cases is also relatively tolerant of modification if different details about the rules of prosodic layering in Kwak'wala do emerge.

Given those characteristics for prosodic layering in Kwak'wala, the constraints Align-R(Root, PStem) and Anchor-L(Root, PWord) can be called on in order to produce the correct results:

(39) Reduplication is non-minimal: *χʷaːχʷəɬm̓uːt* 'remains of fish cutting'

| χʷaːƛ + $\mu$ m̓uːt | Align-L (Rt- PSt) | Align-L (Rt, PWd) | Integ |
|---|---|---|---|
| ☞ a. [$_{PWd}$ χʷaː[$_{PSt}$ χʷəɬ]m̓uːt] | | | ** |
| b. [$_{PWd}$ χʷaː[$_{PSt}$ əɬ]m̓uːt] | *! | | * |
| c. [$_{PWd}$ aː[$_{PSt}$ χʷəɬ]m̓uːt] | | *! | * |

Not all reduplicative -*m̓ut* words have the prosodic pattern $\Sigma$ $\sigma$ $\Sigma$. Reduplicative words that also include epenthesis not only have an extra (epenthetic) syllable, but also reverse the prosodic pattern of the first two syllables, resulting in a word with the pattern $\sigma$ $\Sigma$ $\varsigma$ $\Sigma$. This follows from the analysis of Kwak’wala phonology that we have already developed. Given the presence of an epenthetic syllable between the stem and suffix, no clash is possible between the stem and suffix. The remaining issue then is how to construct a good iamb in the first two syllables. And just as we would expect, it is the good iamb $\sigma$ Σ that emerges.

Thus the constraints already motivated will rule out most of the failed candidates for epenthetic reduplicative -*m̓ut* words. One candidate that fares equally well in terms of foot structure is ruled out by an *Align* constraint requiring the root and PStem (not shown here) to correspond – this effectively anchors the right edge of the root to the right edge of the pre-suffix stem, and is required to account for other data as well, as shown below. The tableau below illustrates the selection of the attested candidate. Note that all of these forms violate FootForm as that constraint is defined above. Higher-ranked constraints such as *Lar]$_\sigma$ and NonmoraicEpenthesis (not shown here) rule out candidates in which epenthesis does not occur or in which the epenthetic syllable is moraic and therefore footable.

(40) CVːĊ̓ roots – $\sigma$ Σ ς reduplication:

| siːq̓ + *μ* m̓uːt | Int | Foot Form | *Clash | Al-R (Rt, PSt) | O-Cont |
|---|---|---|---|---|---|
| ☞ a. (sə**siː**)q̓$^ə$(**muːt**) | ** | * | | | *** |
| b. (**siː**)q̓$^ə$(sə**muːt**) | ** | * | | *! | *** |
| c. (**siː**)səq̓$^ə$(**muːt**) | ** | **! | | | ** |
| d. (siː**sə**)q̓$^ə$(**muːt**) | ** | **! | | | * |
| e. (**siː**)(**sə**)q̓$^ə$(**muːt**) | ** | **! | * | | * |

The surface locations of coda consonants in reduplicative -*m̓ut* words is also determined by relatively low-ranked constraints that can exercise authority only in cases like these where several candidates will all equally satisfy the more highly-ranked constraints. For example, stem-final obstruents must surface once (to satisfy Max) but not twice (to keep reduplication relatively minimal). Coda obstruents have no influence on syllable weight and are therefore irrelevant to constraints like *Clash. But their placement does matter to constraints like Align-R(Root, Stem). Even when low-ranked, this constraint can motivate the attested forms for obstruent codas given the same assumptions about where made earlier about where prosodic stems and prosodic words are built (though they are not again shown in the tableau below for the sake of clarity):

(41) Reduplication with single obstruent coda:

| χ$^{w}$aːƛ + *μ* m̓uːt | INTEG | *CLASH | ALIGN-R (Root, Stem) | O-CONTIG |
|---|---|---|---|---|
| ☞ a. (χ$^{\mathbf{w}}$**aː**)(χ$^{w}$əɬ**m̓uːt**) | ** | | | * |
| b. (χ$^{\mathbf{w}}$**aː**ɬ)(χ$^{w}$ə**muːt**) | ** | | *! | ** |
| c. (χ$^{w}$əχ$^{\mathbf{w}}$**aː**ɬ)(**m̓uː**t) | ** | *! | | * |
| d. (χ$^{w}$əɬχ$^{\mathbf{w}}$**aː**)(**muːt**) | ** | *! | * | ** |

By a similar logic we predict exactly the attested forms for CəRD stems. These forms will require both epenthesis and reduplication. With the epenthetic syllable being weightless and therefore unfootable, FOOTFORM militates for a $\sigma$ $\Sigma$ sequence, which requires the coda sonorant to surface in the second syllable. Depending on exactly where PStems are constructed, ALIGN-R may suffice to motivate the location of the stem-final voiced obstruent. Specifically, if a PStem is built contiguous with the root, then ALIGN-R will allow the attested candidate with the shape *CəCəRDəmuːt* and rule out the candidate with the shape *CəDəCəRm̓uːt*. But this assumption is not necessary. Consider a less-favorable PStem construction algorithm that requires PStem edges to align with syllable edges. Laryngeally-marked D will never surface in a coda and therefore will never sit at the right edge of a PStem. ALIGN-R succeeds in distinguishing these two candidates. Thus we correctly select the optimal candidate, as seen in the following example:

(42) Reduplication and epenthesis with RD clusters:

| mənd$^{z}$ + *μ* m̓uːt | FOOT FORM | *CLASH | ALIGN-R (Root, Stem) | O-CONT |
|---|---|---|---|---|
| ☞ a. (mə**mən**)d$^{zə}$(**muːt**) | * | | | * |
| b. (**mən**)d$^{zə}$(mə**muːt**) | * | | *! | * |
| c. (**mən**)məd$^{zə}$(**muːt**) | **! | | | ** |
| d. məd$^{zə}$(**mən**)(**muːt**) | **! | * | * | *** |

The ranking we have motivated already derives the attested remarkable reduplicative forms for əRT stems, in which the postvocalic stem sonorant surfaces in the first syllable and the obstruent that follows it surfaces in the second syllable. This arrangement satisfies the prohibition on metrical clashes and the constraint anchoring the right edge of the root to a PStem. Reduplication is kept relatively minimal by avoiding extraneous copies of the stem-final obstruent. Although the constraint O-CONTIGUITY militates against this solution, it is too lowly-ranked to make any difference here:

(43) RT clusters split in reduplication:

| qəns + $\mu$ m̓uːt | Int | Foot Form | *Clash | Al-R (Rt, PSt) | O-Cnt |
|---|---|---|---|---|---|
| ☞ a. (**qən**)(qəs**m̓uːt**) | ** | | | | ** |
| b. (qəs**qən**)(**m̓uːt**) | ** | | *! | * | *** |
| c. (**qəns**)(qə**muːt**) | ** | | | *! | ** |
| d. (qə**qəns**)(**m̓uːt**) | ** | | *! | | ** |
| e. (**qəns**)(**qəns**)(**m̓uːt**) | ***! | | ** | | * |

## 2.4 An alternative analysis: Existential Faithfulness

In this section I consider another analysis that has been proposed to account for Kwak'wala -*m̓ut* reduplication. Two significant analyses of m̓ut reduplication have been advanced by Struijke (1998, 2000). The most comprehensive of these analyses is Struijke (2000), which develops the theory of Existential Faithfulness to account for the alternations including the ones that we have seen.

The essential idea behind Existential Faithfulness is that faithfulness constraints should be unidirectional (Input to Output, rather than bidirectional constraints that can go in either direction) and existentially quantified (meaning that the constraints will be satisfied if input material surfaces faithfully anywhere in the output). The prototypical example of an existentially quantified constraint is ∃-Max$_{IO}$:

(44) ∃-Max$_{IO}$: Let seg ∈ input; then there is some seg′ ∈ output such that seg$\mathfrak{R}$seg′

This idea has several important consequences. Reduplication is treated quite differently from the Full Model of correspondence (McCarthy and Prince, 1995), in which separate sets of correspondence relations exist between the input and the base, and the input and the reduplicant, as well as faithfulness between the base and reduplicant. Struijke treats the whole input as standing in a relationship with the whole output, including the base and the reduplicant. This is important for languages like Kwak'wala where as we have seen some inputs may split up their material between the "base" and "reduplicant." Struijke does assume that reduplication is regulated by a red morpheme and BR correspondence, with the associated Faith$_{BR}$ constraints.

Struijke's elimination of output to input faithfulness constraints is also significant. This removes constraints like Dep that militate for everything in the output to be faithful to something in the input. The work of those constraints is to be left to other existential faithfulness constraints or markedness constraints. For example, Struijke suggests that the effects of Dep-seg can be approximated by the use of ∃-Contiguity to prevent stem-internal epenthesis, and Anchor constraints to prevent epenthesis at stem peripheries.

In addition to a new approach to reduplication and a reanalysis of cases relying on constraints like Dep, Existential Faithfulness offers a different treatment of cases of fission, where one input segment splits into two output segments. This behavior is attributed to the desire to realize all underlying features somewhere, even if multiple features attached to one input segment surface on different output segments. For example, French [bɔ̃bɔ̃] 'candy' is borrowed into English as [banban]. On the analysis of Struijke, this English form allows the underlying vowels and their nasalization to surface faithfully – as distinct segments, thus respecting the rules of English phonology. The constraint that militates against this fission is INTEGRITY. Struijke states that reduplicative words do not violate INTEGRITY (unless they involve multiple reduplication, in which case they do.)

For Struijke, the complex patterns in Kwak'wala *-m̓ut* reduplication result from the interaction of markedness constraints, existential faithfulness constraints, and base-reduplicant faithfulness constraints. She analyzes the underlying form of *m̓ut* words as including the root and suffix, as well as a RED morpheme prefixed to the root. As we have seen, with some stems the first syllable (the reduplicant, for Struijke) is more faithful to the input in terms of vowel length or the presence of a coda, while with other stems it is the second syllable (Struijke's base) which is more faithful. The general analysis of cases in which the reduplicant is more faithful is as follows. Some existential faithfulness constraint ∃-$\mathbb{F}$ dominates some markedness constraint $\mathbb{M}$, leading to routine violations of $\mathbb{M}$. When a RED morpheme is added, the extra syllable gives the word a chance to satisfy $\mathbb{M}$ without running afoul of $\mathbb{F}$.

We can see this illustrated in the analysis of CVːT roots. These roots reduplicate and surface with a long initial open vowel and a short closed second syllable, e.g. /ċaːs/ → [ċaːċəsm̓uːt] 'old eel-grass.'[19] The relevant constraints here are ∃-MAX and *CLASH. ∃-MAX dominates *CLASH, leading to violations of *CLASH in many words with underlying adjacent heavy syllables, such as *haːd*$^z$*aːpaːmaː* 'yarrow.' The same fate would be suffered by *ċaːsm̓uːt*, but the reduplicative syllable gives the word another chance. The bimoraic vowel can be surface in the reduplicant while the vowel in the base is reduced. This allows *CLASH to be satisfied, and ∃-MAX is satisfied as long as all elements of the input have an output correspondent somewhere.

A very similar ranking argument is also responsible for cases in which the base is more faithful than the reduplicant. This can also be illustrated with the same class of words. We see in these words an input coda that surfaces in the base but is absent in the reduplicant. Here the relevant constraints are ∃-MAX, *$\mu$/OBSTR and WEIGHTBYPOSITION (WxP). ∃-MAX and *$\mu$/OBSTR (which prohibits linking between an obstruent consonant and a mora) must dominate WxP, because non-moraic obstruents regularly surface in codas. But when a reduplicative syllable is added, WxP can exert its influence. As long as the coda is present in the base, then by avoiding a coda in the reduplicant, no violation of WxP will occur, while ∃-MAX will remain satisfied (cf. Struijke 2000, 51. Underlines indicate nonmoraic obstruent codas.):

---

[19] To facilitate comparisons, I have retranscribed Struijke's examples in the same orthography used throughout this chapter. Some discrepancies between our data remain because Struijke interprets some data from other sources differently than I do. I have discussed those differences where relevant, but all data and tableaux reflecting Struijke's analysis are transcribed consistent with her interpretation of the data.

(45) *c̓aːc̓əsm̓uːt* ‘old eel-grass’

| RED + c̓a$^{\mu\mu}$s + mu$^{\mu\mu}$t | ∃-Max | *$\mu$/obstr | WxP |
|---|---|---|---|
| a. c̓a$^{\mu\mu}$$\underline{\text{s}}$c̓ə$^{\mu}$$\underline{\text{s}}$m̓u$^{\mu\mu}$$\underline{\text{t}}$ | | | ***! |
| ☞ b. c̓a$^{\mu\underline{\mu}}$–c̓əs$^{\mu}$m̓u$^{\mu\mu}$$\underline{\text{t}}$ | | | ** |

Many of the subpatterns of reduplication fall out simply from the ranking of a few existential faithfulness constraints and *Clash. The domination of ∃-Max over *Clash accounts for the non-epenthetic words reduplicating as Σ $\sigma$. Reduplication with CəR roots is derived as shown below (foot heads underlined; Struijke 2000, 62):

(46) *wənwəmuːt* ‘refuse of drilling’

| RED + wən + mu$^{\mu\mu}$t | ∃-Max | *Clash |
|---|---|---|
| a. ($\underline{\text{wə}^{\mu}\text{n}}$)($\underline{\text{wə}^{\mu}\text{n}}$)($\underline{\text{mu}^{\mu\mu}}$t) | | **! |
| b. (wə$^{\mu}$$\underline{\text{wə}^{\mu}\text{n}}$)($\underline{\text{mu}^{\mu\mu}}$t) | | *! |
| ☞ c. ($\underline{\text{wə}^{\mu}\text{n}}$)(wə$^{\mu}$$\underline{\text{mu}^{\mu\mu}}$t) | | |

The $\sigma$ Σ pattern of reduplication for epenthetic words is motivated by the ranking ∃-Ident[weight]$_{IO}$ ≫ *Clash. Example (47) illustrates for CVːC̓ roots (Struijke, 2000, 64):

(47) *q̓$^{w}$əq̓$^{w}$aːl̓əmuːt* ‘embers’

| RED + q̓$^{\text{w}}$a$^{\mu\mu}$l̓ + mu$^{\mu\mu}$t | ∃-Max | *Clash |
|---|---|---|
| a. ($\underline{\text{q̓}^{\text{w}}\text{a}^{\mu\mu}}$)($\underline{\text{q̓}^{\text{w}}\text{a}^{\mu\mu}}$)(l̓ə$^{\mu}$$\underline{\text{mu}^{\mu\mu}\text{t}}$) | | *! |
| ☞ b. (q̓$^{\text{w}}$ə$^{\mu}$$\underline{\text{q̓}^{\text{w}}\text{a}^{\mu\mu}}$)(l̓ə$\mu$$\underline{\text{mu}^{\mu\mu}\text{t}}$) | | |
| c. ($\underline{\text{q̓}^{\text{w}}\text{a}^{\mu\mu}}$)(q̓$^{\text{w}}$ə$^{\mu}$$\underline{\text{l̓ə}^{\mu}}$)($\underline{\text{mu}^{\mu\mu}\text{t}}$) | | *! |
| d. (q̓$^{\text{w}}$ə$^{\mu}$$\underline{\text{q̓}^{\text{w}}\text{ə}^{\mu}}$)(l̓ə$^{\mu}$$\underline{\text{mu}^{\mu\mu}\text{t}}$) | *! | |

Non-reduplicative forms involve a more complex interaction. Struijke (who does not consider these forms to involve lengthening) suppresses reduplication by ranking both IO-Faith and *Clash above Max$_{BR}$ and MorphReal. The result of this ranking is that even when RED is present, reduplication will occur only if it can do so without incurring a violation of *Clash (or if its presence allows a form to reduce the number of violations of *Clash that would otherwise occur.) This is shown in the failure of reduplication to occur with *ʔaxm̓uːt* ‘waste left after some work’ (Struijke, 2000, 66):[20]

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[20] Note that Struijke takes the stem vowel in this form to be short, while I take it to be long. See Appendix A for discussion.

(48) *ʔaxm̓uːt* 'waste left after some work'

| RED + ʔax + m̓u$^{\mu\mu}$t | IO-FAITH | *CLASH | MAX$_{BR}$ | MORPH REAL |
|---|---|---|---|---|
| a. (ʔa$^{\mu}$$\underline{\text{ʔa}^{\mu}\text{x}}$)($\underline{\text{mu}^{\mu\mu}\text{t}}$) | | *! | **** | |
| ☞ b. (ʔa$^{\mu}$x$\underline{\text{mu}^{\mu\mu}\text{t}}$) | | | ****** | * |

This excludes the most obvious reduplicative candidate. But there are several alternatives that would allow reduplication to occur without violating *CLASH or IO-FAITH. Struijke calls upon several reduplication-specific constraints to rule out those candidates (Struijke, 2000, 67):

(49) *ʔaxm̓uːt* 'waste left after some work'

| RED + ʔax + m̓u$^{\mu\mu}$t | DEP$_{BR}$ | ID[weight]$_{BR}$ | MAX$_{BR}$ | MORPH REAL |
|---|---|---|---|---|
| a. ($\underline{\text{ʔa}^{\mu\mu}\text{x}}$)(ʔa$^{\mu}$x$\underline{\text{mu}^{\mu\mu}\text{t}}$) | | *! | *** | |
| b. ($\underline{\text{ʔa}^{\mu}\text{l}^{\mu}\text{x}}$)(ʔa$^{\mu}$x$\underline{\text{mu}^{\mu\mu}\text{t}}$) | *! | | *** | |
| ☞ c. (ʔa$^{\mu}$x$\underline{\text{mu}^{\mu\mu}\text{t}}$) | | | ****** | * |

Overall, Struijke's analysis explains most of the *-m̓ut* reduplication facts in a simple and insightful way. The use of just a few markedness constraints to drive all the subpatterns of reduplication is particularly compelling and important. The arguments in favor of preferring existential faithfulness to a more mainstream correspondence theory approach are persuasive. Nevertheless, there are important empirical and theoretical shortcomings in Struijke's analysis. Minimal Reduplication is a framework that can incorporate the significant contributions of Struijke's analysis into an analysis that is simpler and more successful.

Some of the problematic empirical claims of Struijke (2000) have been touched on above. The lengthening of CəT roots is an important pattern that must be accounted for. Struijke's analysis relies on the footing of epenthetic syllables. This implies that such syllables could be foot heads and thus bear stress, but as we have seen these syllables are systematically excluded from the syllable count when stress is assigned.

The details of *-m̓ut* reduplication cause Struijke to vitiate some of the claims made for the theory of existential faithfulness. The elimination of DEP is a very significant development. If it is adopted generally, many analyses will be changed and perhaps streamlined. But it is not clear how successful or complete this elimination can be. Struijke is forced to rely on DEP$_{BR}$ to rule out reduplication in the case of CəT roots. Of course the existence of DEP$_{BR}$ does not entail the existence of DEP$_{IO}$; but it does indicate a more conventional version of correspondence theory than one might otherwise expect. The unidirectionality of IO faithfulness constraints is not a general fact about correspondence theory, which may in principle still be bidirectional; it is instead a narrower claim about the IO relationship in particular.

A more serious weakness is the fact that this analysis overfits the data. In other words, by motivating the stem expansion effects triggered by *-m̓ut* by positing an associated RED morpheme and letting that morpheme's surface shape be determined entirely through constraint interaction, Struijke has produced an analysis that will be difficult to extend to the other dozen or more classes of morphological stem expansion. This analysis predicts that reduplication does not involve fixed segmentism. How then do we account for suffixes that trigger reduplication with fixed *iː* or fixed *aː*? Struijke offers a clever account for the failure of reduplication with CəT roots. But other morphemes do trigger reduplication of CəT roots as well as roots of other shapes.

For example, we can compare the effects of -*m̓uːt* (which sometimes triggers reduplication and sometimes triggers lengthening) with the effects of *-!d$^{z}$ək$^{w}$* 'to do before doing something else'. This suffix always triggers reduplication, regardless of the shape of the stem (although the shape of the stem does determine the precise shape of the reduplicative form). Table (50) compares the effect of these suffixes on stems of various shapes:

(50) Stem alternations triggered by -*m̓ut* and *-!d$^{z}$ək$^{w}$*:

| | *Shape* | *e.g.* | *Suffixed form* | *Gloss* | *Stem change* |
|---|---|---|---|---|---|
| a. | CəT | qək | qaːxm̓uːt | 'piece bitten out' | lengthening |
| | | yəp | yəyəp̓$^{ə}$d$^{z}$ək$^{w}$ | 'weave … ' | reduplication |
| b. | CəR | kən | kənkəmuːt | 'left after scooping up' | reduplication |
| | | w̓ən | w̓ənw̓$^{ə}$d$^{z}$ək$^{w}$ | 'hide … ' | reduplication |
| c. | CVːC | χ$^{w}$aːƛ | χ$^{w}$aːχ$^{w}$ałm̓uːt | 'remains of fish cutting' | reduplication |
| | | ciːt | ciːcət̓$^{ə}$d$^{z}$ək$^{w}$ | 'tilt … ' | reduplication |

An analysis such as Struijke's can always be extended to account for other morphemes with different reduplicative patterns through the use of lexically indexed constraints. There is good evidence that such constraints may be necessary in some cases. But accounting for Kwak'wala in this way would be problematic for several reasons. The most obvious one is that it turns a simple and insightful analysis into a very complex and idiosyncratic account of reduplicative behavior. We will maintain a single constraint ranking and simple representations at a cost of adding scores of extra versions of many constraints, all indexed to lexical items or classes of lexical items. That fact that we must refer to classes of morphemes is another concern. We find that many suffixes share a single reduplicative or stem expansion pattern. Sometimes these suffixes may be phonologically similar, but in other cases they are not. To account for these facts through constraint indexation, it will be necessary to customize constraints not for specific morphemes but for a large number of arbitrary morphological classes. Such a situation is certainly possible, but we should not posit it in our analysis unless we have no other choice.

Minimal Reduplication provides a simpler way to account for the many stem expansion effects found in Kwak'wala. The behavior of -*m̓ut* is motivated through a certain constraint ranking, and through the fact that -*m̓ut* is associated with an underlying floating mora. This raises the possibility that other floating prosodic units or other kinds of underspecified material be present in the underlying representations of other suffixes. It seems quite likely that suffixes like *-!d$^{z}$ək$^{w}$* might underlying include an empty syllable. Suffixes that trigger reduplication with a fixed vowel may have an underlying syllable that is specified for its rime but has an empty onset.

Of course it remains to be shown that such representations would actually produce the attested forms, given the constraint rankings already motivated for -*m̓ut*. Such an investigation should be undertaken. But it is clear that MR provides a framework to explain and analyze multiple reduplicative patterns in a single language without relying on indexed constraints. This preserves a simple constraint set, while placing idiosyncratic facts (like which reduplication class a morpheme belongs to, in cases where it is not phonologically predictable) in the lexicon where they belong.

## 2.5 Conclusions

In this chapter I presented a new analysis of Kwak'wala -*m̓ut* reduplication. In this section, I consider the practical conclusions and next research questions posed by these findings for Kwak'wala and for Wakashan, and then summarize what this chapter demonstrated about morphological reduplication and Minimal Reduplication.

### 2.5.1 Implications for Kwak'wala

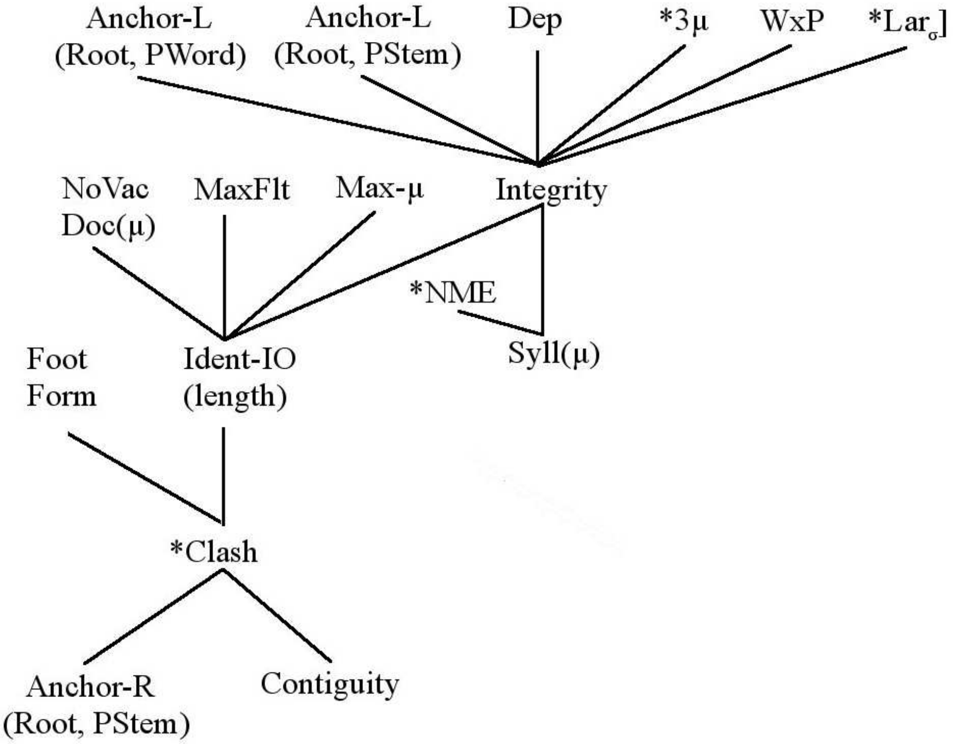
The stem expansion pattern associated with -*m̓ut* is not unique to that suffix. The other suffix that Boas (1947) notes as triggering the same pattern, -*(g)isaweʔ*, should be accounted for with the exact same analysis, namely that the suffix is associated with a floating mora. Whether other difficulties with that suffix arise remains to be seen. More significantly, Kalmar (2003) claims that -*m̓ut* stem expansion is actually a pattern of distributive reduplication not directly connected to the suffix. Further work is required to corroborate this claim and determine whether the difference between the patterns found by Kalmar and those of Boas are due to missed generalizations by the latter author, or whether they reflect changes in Kwak'wala grammar that took place during the twentieth century. The analysis presented here is not fundamentally challenged if the expansion pattern turns out to be a distributive formation rather than one associated with a particular suffix or set of suffixes; in fact it would be somewhat simpler to assume that there is a distributive morpheme with the underlying form $\mu$.

The MR approach to morphological reduplication also lays out a plan of investigation to analyze the other reduplication and stem expansion patterns found in Kwak'wala. These patterns should be consistent with the constraint ranking established for -*m̓ut*, and it should be possible to connect them to legitimate underlying forms with floating prosodic units or underspecified structures of some kind. A general prediction made by the established constraint ranking is that lengthening should always serve as a backup for reduplication, and vice versa; we should not find suffixes that trigger lengthening when possible and nothing otherwise. This prediction is not borne out: one set of suffixes trigger lengthening of stems when possible, and have no effect on the stem when lengthening is impossible.

This is a problem for MR, but some peculiarities concerning these suffixes suggests that it is not insuperable. In particular, all of the suffixes of this type given by Boas (1947) are vowel-initial. This contrasts with other stem-expansion patterns, which generally have no limitations on the phonological shape of their trigger morphemes. The vowel-initiality of these suffixes is important because it conditions the stems to which lengthening can apply. Stems with a final sonorant cannot lengthen with *-m̓ut* because the sonorant would occupy a coda position and cause the syllable to be superheavy. With a vowel-initial suffix, these stems can lengthen the vowel while safely allowing the final sonorant to be parsed as an onset. This leaves only stems with underlying long vowels as impermissible targets for lengthening by these suffixes. Accounting for the generalization about the vowel-initiality of these suffixes while explaining their unexpected behavior is a priority for future MR analysis of Kwak'wala morphophonology.

In this chapter I motivated the following rankings for the grammar of Kwak'wala:

(51) Kwak'wala constraint hierarchy:



The allomorphy associated with *-m̓ut* provides insight into the organization and ordering of the components of Kwak'wala morphophonology. The fact that stems ending in epenthetic vowels behave just the same as stems ending in non-epenthetic vowels with regard to this allomorphy (triggering the selection of *muːt* rather than *m̓uːt*) shows that, contra Wilson (1986), epenthesis cannot be postlexical. The distribution of allomorphy also appears to be anti-optimizing in terms of markedness, choosing the allomorph with a glottalized sonorant when following a consonant and the allomorph with the non-glottalized sonorant after a vowel, even though the perceptually optimal position for a glottalized sonorant is postvocalic Um (2001*b*). Given the typical tendency of allomorphy to be optimizing Mester (1994); Mascaró (1996*a,b*, 2007), this behavior is unexpected. An analysis that stipulates allomorph priority can produce the correct result here, but this pattern should be investigated within the context of Kwak'wala grammar to determine whether there is a deeper reason why this pattern occurs.

The analysis of this allomorphy should also shed light on an interesting wrinkle in the Kwak'wala stress rules. Initial long vowels in syllables immediately preceding *-m̓ut* do not bear stress. This appears to violate the basic stress rule, which says that primary stress must fall on the first heavy syllable in a word. But it may conform to a more specific rule about the effect of morphology on stress assignment, given in Boas (1947) in the following terms:

> “All stems of the type cv̆c and cv̆m if followed by a weakening or hardening suffix or one beginning with a glottal stop have the accent on the suffix.” (218)

There seems to be a clear relationship between -*m̓ut* and stems that begin with a glottal stop, since one allomorph of the suffix begins with a glottalized consonant. On the other hand, other suffixes that begin with a glottalized consonant have not been shown to act this way. More intriguing is the fact that weakening and hardening suffixes and glottal-initial suffixes all behave as a natural class. Hardening suffixes, which cause a stem-final stop to become ejective and a stem-final sonorant to become glottalized, are surely amenable to analysis as having some kind of underlying glottal stop or floating laryngeal feature. But why should weakening suffixes, which have just the opposite effects, behave the same way? The fact that -*m̓ut* patterns together with this class of suffixes is an important clue in the analysis of weakening and hardening.

### 2.5.2 Implications for Wakashan

In this chapter our primary focus was on the behavior of a single reduplicative suffix. Nevertheless it is useful to consider the implications of our analysis for the larger realm of reduplication in Kwak’wala. One issue that must be considered is that of multiple reduplication. This refers to cases in which more than one reduplicative morpheme is present within a single word. Although the large number of reduplicative morphemes and flexible morphology of Kwak’wala allow ample scope for the interaction of reduplicative morphemes, relatively few such forms have been introduced in the literature. We do however see a clear pattern in those forms that are available: reduplicated syllables appearing to “stack up,” that is, multiple reduplicative syllables appear in addition to the original stem.

For example, the root *bək*$^{w}$ ‘man’ can take the diminutive stem-expanding suffix =*əm* to form *baːbag*$^{w}$*əm* ‘boy.’ This form pluralizes as *baːbəbag*$^{w}$*əm* ‘boys.’ (BG 301)

This is similar to the behavior of multiple reduplication cases found in languages like Lushootseed (Salishan; British Columbia; Urbanczyk 1996). But as Ryan Waldie (p.c.) points out, an interestingly different generalization holds in the neighboring language of Nuu-chah-nulth. Traditionally spoken by the community neighboring the Kwakwaka’wakw to the south, Nuu-chah-nulth shares a genetic link to Kwak’wala, belonging to the Southern branch of the Wakashan family. As laid out in Stonham (1999) and Stonham (2007), Nuu-chah-nulth typically eschews multiple reduplication even when more than one trigger is present in a word. Instead, the triggers seem to share a single reduplicative syllable, which may surface with traits of both (or all) triggers. For example, the suffix -*iyaqḥ* ‘sing’ triggers CV reduplication:

(52) ‘we sing all these songs’ (Stonham, 2007, 121):

q$^{w}$aq$^{w}$am’iyaqḥʔaƛqun

| | | | |
|---|---|---|---|
| q$^{w}$am’aˑ | -iyaqḥ | -’aƛ | -qun |
| all | sing | NOW | 1PL.COND |

Reduplication triggered by -*iyaqḥ* does not affect the shape of the stem to which it is added. Contrast that with the repetitive aspect, which involves simultaneous lengthening of the initial syllable (if short and not followed by a sonorant coda), and reduplication of that syllable (with coda ƛ if the syllable being copied is open):

(53) '... while (you keep on) filing so as to lull me to sleep.' (Stonham, 2007, 118):

kʷiiƛkʷiiya weʔičup

| | | | |
|---|---|---|---|
| kʷi | -(y)a· | weʔič | -u·p |
| file | DUR | sleep | MC |

When the suffix -*iyaqḥ* appears in a word with the repetitive aspect, the repetitive reduplication – a segmental and featural superset of the reduplication triggered by -*iyaqḥ* for any given stem – occurs in full:

(54) čiimaakʔi 'as he sang, he kept on filing with his mussel-shell knife' (Stonham, 2007, 121):

kʷiiƛkʷiiyaqḥʔaƛ

| | | | | |
|---|---|---|---|---|
| kʷi | -iyaqḥ | -'aƛ | č'iimaak | =ʔi· |
| file | sing | NOW | mussel.shell.knife | DEF |

Multiple reduplication does not occur, suggesting that the reduplicative drive associated with -*iyaqḥ* and that associated with the repetitive aspect are both realized by the same reduplicative syllable.

The difference between Kwak'wala and Nuu-chah-nulth with regard to multiple reduplication falls out from a single constraint ranking, that of Uniformity and Integrity. The former militates against a single output structure having multiple input correspondents. Although the original definition of both constraints referred to segments, it can naturally be expanded to apply to other phonological structures, including moras and syllables. Uniformity (or Uniformity($\sigma$) if it is necessary to differentiate them) will be violated if a single syllable in the output corresponds to more than one input syllable. This is the constraint that must lose out in order to allow a word like *kʷiiƛkʷiiyaqḥʔaƛ*, in which the first syllable corresponds to two separate reduplicative morphemes.

On the other hand, by forcing those two morphemes to share a single syllable, Nuu-chah-nulth does minimize the number of Integrity violations that would result from wanton multiple reduplication. It is Integrity that must lose out in Kwak'wala relative to Uniformity, to allow a form like *baːbəbagʷəm* to surface. (Buckley (1997) makes a similar argument concerning a case of multiple reduplication in Manam.) The ranking that must hold in Nuu-chah-nulth is shown in the following example:

(55) Nuu-chah-nulth: *kʷiiƛkʷiiyaqḥʔaƛ* 'as he sang'

| $\sigma_{\mu\mu}$ ƛ + kʷi + iyaqḥ $\sigma$ 'aƛ | MaxFloat | NoVacDoc | Integ | Unif |
|---|---|---|---|---|
| a. kʷiiƛkʷiikʷiiyaqḥʔaƛ | | | ***!* | |
| ☞ b. kʷiiƛkʷiiyaqḥʔaƛ | | | ** | * |
| c. kʷiiyaqḥʔaƛ | | *!* | | |

Whereas the non-coalescent Kwak'wala forms arise due to the fact that the reverse ranking of the two constraints in question holds. This is shown in the following example:

(56) Kwak'wala: *baːbəbəgʷəm* 'boys'

| $\underline{\sigma_{\mu\mu}}$ + bəkʷ + σ =əm | MaxFloat | NoVacDoc | Unif | Integ |
|---|---|---|---|---|
| ☞ a. baːbəbəgʷəm | | | | **** |
| b. baːbəgʷəm | | | *! | ** |
| c. baːgʷəm | | *!* | | |

A further complication is found in the fact that in certain circumstances, more than two copies of the same syllable actually do occur in a single word through reduplication in Nuu-chah-nulth, as in (57):

(57) 'you with your urethras fastened on with gum' (Stonham, 2007, 123):

ʔiʔiʔiščatee kʷan̓uxy̓ak

| | | | | |
|---|---|---|---|---|
| ʔiiš | -či | -'at | -ee | kʷan̓uxy̓ak |
| chew.gum | -attached.to | -INAL | -VOC | urethra |

Stonham (2007) argues convincingly that this kind of overt multiple reduplication is only found in words with both stem-level and word-level reduplicative morphology. This is part of a larger Stratal OT analysis of Nuu-chah-nulth. Thus for Stonham, multiple reduplication only occurs through the interaction of the successive stages in which a word is derived, with a maximum of one reduplicative syllable being added by any given phonological calculation. Such an analysis is quite well founded for Nuu-chah-nulth, where the distinct phonological behavior of stem-level and word-level morphology has been known (under different names) since Sapir and Swadesh (1939), and the inventory of stem-level and word-level morphemes is well established. Unfortunately, published data concerning multiple reduplication and the empirical evidence concerning the possibility of a separation of suffixes into stem-level and word-level in Kwak'wala are too thin on the ground to enable us to make any useful comparisons with the full range of facts from Nuu-chah-nulth.

### 2.5.3 General implications

Minimal Reduplication provides a simple analysis of the complex pattern occurring in Kwak'wala. This analysis captures the insights that come from a descriptive account of this pattern, which are difficult to assimilate in non-MR analyses. In particular, MR makes sense of the fact that reduplication and lengthening compete in Kwak'wala to be the expression of a single morpheme. Just as epenthesis and reduplication are used as means of phonological repair for exactly the same kinds of constructions (see chapter 1), reduplication and lengthening may compete as the realization of a morpheme whose underlying form includes a floating prosodic unit. This is essentially similar to the purely phonological cases: reduplication and lengthening occur as a repair for a marked structure (i.e. the prosodic unit not anchored to segmental material).

MR therefore predicts the existence of a language like Kwak'wala. It also predicts that reduplication should compete with repairs such as epenthesis, lengthening, and metathesis in other languages. This competition should be apparent typologically as well as within individual languages. Some remarkable languages may exhibit several of these phenomena as competing realizations for a single morpheme; we find this for example in Saanich (Straits Salishan; Washington and British Columbia; Montler (1986, 1989); Kurisu (2001)), where formation of the actual aspect may include reduplication, epenthesis or metathesis affecting the stem. The pursuit of more examples like these remains a goal for future research. An interesting aspect of this is the prediction of cases where a similar morphophonological problem is resolved through epenthesis. An epenthetic solution will not appear to involve epenthesis on casual analysis: it will rather appear as a segmental affix whose segments happen to be the contextually least-marked segments of the language. In many cases it will not be possible to distinguish the epenthetic or non-epenthetic origins of such cases. But if such epenthetic cases do exist, they should behave differently in certain circumstances; for example, in a language with a phonological derived environment effect, that DEE should be triggered by an epenthetic candidate but not by an ordinary affix. The identification of such cases would further strengthen the case for MR.

It is also significant that an MR analysis of the Kwak'wala pattern succeeds not in spite of but because of the fact that it does not refer to the existence of constituents such as a base and reduplicant with differential access to the UR or different phonological priority. The existence of those constituents is intended to explain properties of reduplication such as the common tendency for one copy in a reduplicative construction to be relatively unmarked. However, the pattern in Kwak'wala – which includes cases where both copies may uniquely have some material from the underlying form – exhibits TETU in the way underlying material is realized across the two copies in reduplicative words. Specifically, the underlying material surfaces in such a way that stress clashes are avoided and other constraints are satisfied, while minimizing violations of constraints like INTEGRITY. This fact is missed on a view that assumes the existence of a base that most resembles the input, and a reduplicant that is a no-more-marked copy of the base. The MR analysis of reduplication, which excludes such constituents, is therefore the one that best captures the markedness-avoiding behavior of a case like Kwak'wala -*m̓ut* reduplication. See also Clements and Keyser (1983) for a case in Klamath where input material appears in the reduplicant but not in the base.

# CHAPTER 3

## Syntactic reduplication

If all reduplication patterns were phonological or morphological in origin, then the properties of those types of construction would be characteristic of all cases of reduplication. For example, reduplication would always be minimal in size, occurring only to the extent required to accomplish a certain repair and no more. This of course is not the case: reduplicative constructions of unbounded phonological size exist in many languages.

For example, in the Bantu language Kikerewe, several reduplicative patterns are found (Odden, 1996). In nominal reduplication, stems of any length can be copied. Although some minimal size constraints obtain (enforced by enlarging the phonological domain for reduplication), there is no maximum size for stems, which are not reduced in size when copied:

(1) Nominal reduplication in Kikerewe:

| *Base form* | *Reduplicated form* | *Reduplicated form gloss* |
|---|---|---|
| o-mu-gólé | o-mu-**gólé**ꜝ-gólé | ‘real queen’ |
| e-ki-swéélá | e-ki-**sweelá**ꜝ-swéélá | ‘real biting ant’ |
| e-ki-kóómbe | e-ki-**kóómbé**ꜝ-kóómbe | ‘real cup’ |
| o-lu-paapúlá | o-lu-**paapulá**-pááꜝpúlá | ‘real paper’ |

Similar phonologically unbounded reduplication is found in the Dravidian language Tamil, where a distributive reduplication pattern fully copies a stem of arbitrary size (Sankaranarayanan, 1982):

(2) Distributive reduplication in Tamil:

a. nalla-nalla
'good (ones)'

b. muuṭṭayy-muuṭṭayy-an
'bags and bags'

c. apparam-apparam
'afterwards'

d. palleeruntu-palleeruntu
'repeatedly out from the teeth'

I argue that cases like these are not counterexamples to Minimal Reduplication. Rather, unbounded phonological size is one distinctive property of syntactic reduplication, which has a different origin and properties that distinguish it from from the phonological and morphological patterns considered in the previous chapters. In this chapter I lay out and defend this claim. In section 2, I present my basic analysis of syntactic reduplication. In section 3 I catalog a series of diagnostic properties that distinguish syntactic reduplication from morphological reduplication. In section 4 I explore in more detail evidence from one particular syntactic reduplicative pattern, namely Echo Reduplication in Tamil, and I present an analysis of this pattern as syntactic reduplication. In section 5 I consider theoretical approaches that have been taken to account for reduplicative patterns of this kind. Theories that attempt to analyze syntactic and morphological reduplicative patterns with the same tools each encounter serious difficulties, while a theory that explains each type of reduplication using the resources available in those respective components can successfully account for the properties of each type of reduplication.

## 3.1 Analysis of syntactic reduplication

In its most basic form, the MR analysis of morphological reduplication analyzes a reduplicative segment as an extra copy (or copies) in a surface form of a single underlying segment. By contrast, syntactic reduplication occurs when a single morpheme or morphosyntactic node is copied and spelled out more than once. Both morphological and syntactic reduplication can therefore lead to the surface realization of identical or semi-identical phonological structures. However, the different routes by which they arrive at this point lead to different behavior in many areas, including the size of the copied structure, the nature of the target or "base" that is copied, and the nature of the force that determines the alignment or surface position of the copies. As well, properties of the syntactic process that allows this copying of a morphosyntactic node (as explained below) result in different behavior with regard to identity between the copies, and lead to apparent anti-optimizing behavior.

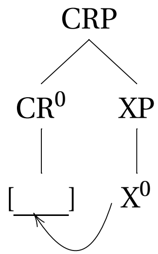
The idea that syntactic movement actually reflects copying, with only one link in a chain being spelled out phonologically, is not a new one; see e.g. Chomsky (1993). In order to motivate reduplication as derived from copying of this sort, it is necessary to account for the movement in question, and for why multiple links in the movement chain are spelled out in this case. Answers to these questions have been offered by Ghomeshi *et al.* (2004) and Kimper (2008).

Ghomeshi *et al.* (2004) present their theory in the context of an analysis of so-called Contrastive Reduplication (CR) in English. CR is a construction in which (generally) a word or phrase is copied, with one copy bearing a special intonational contour, in order to express prototypicality or salience, e.g.:

(3) We're living together, but we're not LIVING TOGETHER-living together.
She wasn't a fancy cow, a Hereford or Black Angus or something, just a COW-cow.
I'll make the tuna salad and you make the SALAD-salad.

Ghomeshi *et al.* propose the existence of a phonologically-null morpheme with the features [P(rototypical)/E(xtreme)/S(alient)] (responsible for the semantic contribution of the CR construction) and [+contrast] (which is eventually responsible for the use of the Rise-Fall-Rise contour on this copy, although this is a semantico-syntactic feature with no phonological significance of its own). The presence of this CR morpheme, heading a CR Phrase and requiring a lexically-filled head due to its strong features, triggers head-movement of an adjacent head (Ghomeshi *et al.*, 2004, 347):

(4) English contrastive reduplication:



On a view of syntax that decomposes movement into copy and chain reduction, the fact that both links in the chain are spelled out in these cases needs to be explained. The fact that only one copy in a movement chain is typically spelled out is often taken to be a linearization problem (Nunes, 1995, 2001). For example, Nunes (2001) considers possible surface forms for the structure in (5), in the derivation in which the lexical item *John* is present only once in the numeration and has been copied from its original position inside VP to the Spec, TP position:

(5) [$_{TP}$ John$_i$ [T$'$ T [VP was [VP kissed John$_i$]]]]

(6) a. John was kissed.
b. *John was kissed John.

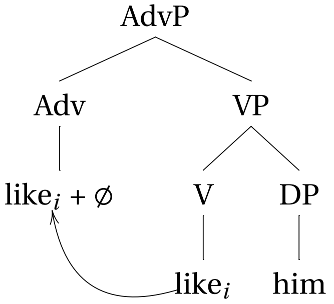
Why is it that (6-a) alone is a grammatical surface form while (6-b) is prohibited? Nunes takes the problem with (6-b) to be its violation of the rules governing linearization of syntactic structure. These rules are expressed in the Linear Correspondence Axiom of Kayne (1994):

(7) *Linear Correspondence Axiom (LCA):*
Let X, Y be nonterminals and x, y terminals such that X dominates x and Y dominates y. Then if X asymmetrically c-commands Y, x precedes y.

Sentence (6-b) falls afoul of the LCA, as the lexical item *John* both precedes and is proceeded by the lexical item *was*. This derivation thus crashes and (6-a) is the only legitimate surface form. (The alternative tail-only chain realization candidate * *Was kissed John* is out on the assumption that "[a] strong feature instructs PF to pronounce the copy in a chain with which it is in a feature-checking relation.” (Richards, 1997, 122).)

Developing the ideas of Ghomeshi *et al.*, Kimper (2008) offers an explicit justification for spelling out multiple links in a movement chain in certain cases. The key to Kimper’s analysis is the syntactic distinctness of the two copies. For Kimper this operation is an example of “derivational copying” in which the new copy of a node that is added to check the features of another head merges with that head, such that the resulting node is syntactico-semantically distinct from the original link in the chain. For example, a sentence like (8) is formed as shown in the tree below:

(8) “Do you like him, or LIKE-like him?”



Thus from the perspective of the syntax, there is no chain that threatens to run afoul of the LCA. Kimper avoids this problem through the semantic distinctness of the base and reduplicant in the reduplication patterns that he considers. On his analysis, reduplication involves movement to join with a null morpheme. It is that combined element that is spelled out, and is conceptually distinct from the bare element in the original position. The node $like_i + \emptyset$ is not coindexed with the node *like*. Therefore spelling out both nodes entails no violation of the LCA.

Kimper’s analysis successfully explains many cases of syntactic reduplication. However, I propose some developments to the theory in order to account for other cases that cannot easily be explained in this approach.

Consider a case of echo reduplication (ER; a class of reduplication patterns that is ubiquitous in the Indian subcontinent as well as occurring in many languages of southeast, central and western Asia). These cases (which are considered in more detail below) involve total reduplication of some morphosyntactic constituent, along with the overwriting of the first segment or syllable of one copy with a fixed sequence characteristic of the ER pattern. (The fixed sequence varies from one language to another.)

For example, the ER pattern found in Hindi can be (roughly) stated as follows: copy a word and overwrite the initial consonant (or unfilled onset position, if vowel initial) with a fixed *v* (Nevins and Wagner, 2001):

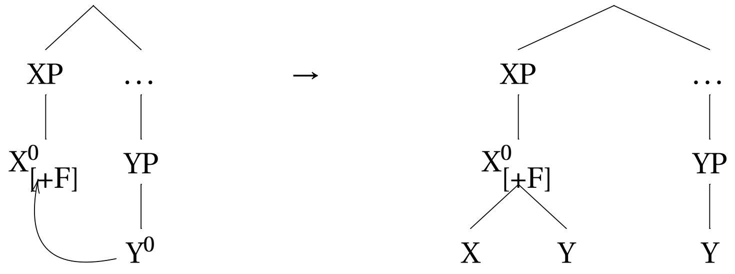
(9) Hindi echo reduplication:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| aam | aam vaam | ‘mangoes and such’ |
| tez | tez vez | ‘tables and such’ |
| tras | tras vras | ‘grief and such’ |
| roti | roti voti | ‘bread and such’ |

These facts are best explained by an analysis that treats the reduplication as syntactic in nature, originating from the multiply-spelled out copy of an original syntactic node. At first glance, the pattern appears perfectly amenable to treatment as purely phonologically-governed reduplication. However, on closer investigation, this pattern seems to violate the principle of optimization that Optimality Theory understands as fundamental to phonology. Consider the forms in (9). On the assumption that ER involves a morpheme with the form *v*, we can explain forms like *tras vras* (in which the first segment of the original word does not copy) as due to phonological pressure to realize as many segments and morphemes as possible. However, if such pressures are active, how do we explain the selection of *roti voti* rather than a candidate like **roti vroti*, which would be phonotactically well-formed in Hindi? It cannot be a TETU effect, or we would get **tras vas* in the former case.[1]

I claim that these effects can be explained within the framework of Optimality Theory, given similar assumptions about syntactic movement to those of Kimper. Syntactic reduplication occurs through the combined effects of syntactic copying and a morphosyntactic merger of the trigger and target constituents. A particular morpheme (the "trigger") has a strong feature that must be checked, causing another constituent (the "target") to copy and merge with the trigger. This copy operation may be similar or identical to the idea of sideward movement (Nunes, 1995, 2001, 2004, 2006; Bošković and Nunes, 2007). This merger has been taken to be a case of morphological restructuring, in earlier Minimalist Program terms (Chomsky, 1995; Nunes, 2001) or morphological fusion in Distributed Morphology terms (Halle and Marantz, 1993, 1994; Acquaviva, 2008). Fusion is a morphological operation that takes two terminals and returns a single terminal with the features of both. A schematic illustration of this process is shown below:

(10) Affixation causing copy and merger:



In cases where both of the morphemes now merged below $X^0$ contribute some phonological content, a competition exists between those phonological structures to be the surface expression of the $X^0$ constituent that both morphemes belong to. This competition can be mediated by constraints in the normal OT way.[2] In the case of echo reduplication, relevant constraints concern the alignment of morphemes. Extending the traditional idea of alignment constraints, we can define a force that motivates the alignment of the edge of a phonological structure be-

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[1] Similar objections have been made in previous literature, especially in work by Andrew Nevins.

[2] This theory proceeds on the common but not universal assumption that the same morphosyntactic system holds below and above the level of the word, and only the different phonological properties of those structures or different levels will be able to account for phonological differences between them. An alternative route would be to propose different morphosyntactic systems holding above and below the level of the word; see e.g. Ackema and Neeleman (2004, 2007). The compatibility of such theories with the MR model of syntactic reduplication proposed here remains to be explored.

longing to a morpheme at the level $X^{-1}$ with the corresponding edge of the dominating $X^0$'s phonological representation. This can be expressed in the form given in (11):

(11) ALIGN-L($X^{-1}$, $X^0$): The left edge of a constituent below the level of $X^0$ corresponds to the left edge of the constituent $X^0$ that dominates it.

In a case like Hindi, the trigger morpheme contributes the phonological component *v* (or the allomorph *š* when appropriate). That segment competes with the phonological form of the constituent merged into the trigger morpheme for realization. Various solutions are possible to resolve the competition between these forms for proper alignment: for example, one morpheme or the other might simply win out. I propose that another option is chosen, and the phonology of the two morphemes coalesces. This is accomplished formally by the domination of ALIGN over UNIFORMITY. The selection of the correct candidate for the form *tras vras* is shown below.[3]

(12) Phonological coalescence to satisfy alignment in Hindi ER:

| M: [$_{X^0}$ &C GRIEF]<br>P: v tras | ALIGN-L | MAX-IO | UNIFORMITY |
|---|---|---|---|
| ☞ a. vras | | | * |
| b. tvras | *! | | |
| c. tas | | *! | |
| d. vas | *! | *! | |
| e. vas | | *! | * |

The same ranking will account for the behavior of ER in the case of *roti-voti*, which seemed to contradict *trans-vras*. In both cases, the segment *v* of the trigger morpheme coalesces with the first position of the onset in the copied constituent, allowing both constituents to express proper alignment with $X^0$. The selection of attested *roti-voti* is illustrated in the tableau below.[4]

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[3] The fact that it is the trigger rather than the target morpheme whose features win out at the surface is not explained in this tableau. Various means could be used to motivate this outcome, such as REALIZEMORPHEME. See discussion below of ER in Bhojpuri and Tamil for cases where both morphemes exercise some control over the features of the shared segment.

This tableau and many of those below include a two-line underlying representation. These representations include a morphological line, which corresponds to the hierarchical morphosyntactic structure of the word or words under consideration; and a phonological line including the phonological structure associated with those morphemes. The correspondence between those two kinds of structures is indicated through matching underlines, which are used in candidate output forms as well. This correspondence can be managed formally within the phonology through the ternary model of morphophonology of Walker and Feng (2004). However, the details of how this should be done are generally not relevant for our concerns in this chapter.

[4] It is still necessary to motivate the fact that both copies are spelled out in this case, rather than just the head or the tail. I ignore this here, but see further discussion on Ghomeshi *et al.* (2004) in section 5.

(13) Overwriting even when alternatives are phonotactically well-formed:

| M: [$_{X^0}$ &C BREAD]<br>P: v roti | Align-L | Max-IO | Uniformity |
|---|---|---|---|
| a. vroti | *! | | |
| b. roti | | *! | |
| ☞ c. voti | | | * |

Interesting support for this analysis comes from the case of Bhojpuri, an Eastern Indo-Aryan language spoken near the India-Nepal border as well as in several countries in the Caribbean. Echo reduplication in Bhojpuri has the form CVX-{o, u}X, i.e. a constituent is copied but loses its onset and has its vowel replaced with a fixed *o* or *u* in the second copy (Tiwary, 1968).[5] The examples below illustrate.

(14) Echo words in Bhojpuri:

a. *ER with fixed o:*

| *Base form* | *ER form* | *Base gloss* |
|---|---|---|
| k$^{h}$et | k$^{h}$et-ot | ‘field’ |
| ser | ser-or | ‘seer (a unit of weight)’ |
| g$^{h}$asi | g$^{h}$asi-osi | ‘grass’ |
| k$^{h}$alə | k$^{h}$alə-olə | ‘(you) eat’ |
| kəria | kəria-oria | ‘black’ |
| əgəhən | əgəhən-ogəhən | ‘(name of a month)’ |
| rog | rog-og | ‘disease’ |
| ḍori | ḍori-ori | ‘rope’ |

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[5] Tiwary (1968) mentions an interesting complication to this pattern:

> It has been noted that in one situation, viz., heated, angry exchanges, the normal pattern of echo-word which begins with either /o/ or /u/ is replaced by another which begins with consonants, mainly /s/ and /ph/. For example, an angry man is more likely to say /dudh - phudh/ rather than /dudh - udh/. We are not in a position at this stage of the investigation to say anything more about the typical contexts of situation in which this construction occurs.

I have not been able to locate any more information about this kind of register difference in ER in Bhojpuri or other languages. Therefore I mention this only in order to raise it as a possible area for future research.

b. *ER with fixed u:*

| *Base form* | *ER form* | *Base gloss* |
|---|---|---|
| $k^h$ira | $k^h$ira-ura | ‘cucumber’ |
| piələ | piələ-uələ | ‘have you drunk?’ |
| nimən | nimən-umən | ‘good’ |
| suwər | suwər-uwər | ‘pig’ |
| u$k^h$i | u$k^h$i-u$k^h$i | ‘sugarcane’ |
| pua | pua-ua | ‘(a kind of sweet dish)’ |

If the nonoccurence of an underlying onset in the second copy is due to morphological truncation, then this pattern will be difficult to explain as non-templatic truncation cases always are in OT (see e.g. Kosa (2008)). However, an alternative explanation is suggested by our account of Hindi ER. Let us assume that the trigger morpheme has an underlying phonological form with two allomorphs, *u* and *o*. If the same ranking holds in Bhojpuri as in Hindi, then coalescence will occur and other means including deletion may also be used to bring about proper alignment of the $X^{-1}$ constituents with $X^0$.

This analysis directly extends to an account of the selection of the proper trigger allomorph in these cases. As the data above suggest, the *u* allomorph occurs when the initial vowel of the constituent being copied is high; otherwise the *o* allomorph is chosen. If this vowel at the surface corresponds to the (first) vowel in both morphemes, then this allomorph selection is a matter of maximizing faithfulness: one of the two presumably listed allomorphs of the trigger morpheme is chosen and surfaces faithfully, and at least the [+/- high] feature of the copied constituent's first vowel can be preserved. This behavior is in fact much easier to explain on a coalescence account than on an account in which this vowel belongs purely to the trigger. The correct selection of the attested candidate *$k^h$et-ot* ‘fields and such’ is shown below:[6]

(15) Allomorph corresponding to initial root vowel chosen:

| M: [$_{X^0}$ &C FIELD]<br>P: o, u $k^h$et | Align-L | Max-IO | Uniformity | Ident[hi] |
|---|---|---|---|---|
| a. $k^h$oet | *! | | | |
| b. $k^h$ot | *! | * | | |
| c. $k^h$oet | *! | | * | |
| ☞ d. ot | | * | * | |
| e. ut | | * | * | *! |

A comparable case is found in Vietnamese, in which reduplication is used to form diminutive adjectives. The first copy in the construction carries a (partially) fixed tone. If the target has no coda or a nasal coda, the segmental portions of the two copies are identical, but if the target

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[6] An equivalent analysis employing Max[+high] or Max[-high] and Priority could easily be constructed. It is also necessary to rule out a non-deletion candidate in which $k^h$ corresponds to both $k^h$ and *o, u*. Presumably featural identity constraints are responsible for ruling out that form.

ends in an obstruent then the first copy ends in a nasal homorganic with the target's coda (Vu, 1998, 171):

(16) Diminutive adjectival reduplication in Vietnamese:

a. *No segmental changes:*

| *Base form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| nhẹ | nhe nhẹ | 'be rather light in weight' |
| khá | kha khá | 'rather mediocre' |
| buồn | buồn buồn | 'be a little sad' |
| loãng | loãng loãng | 'rather diluted' |
| chậm | châm chậm | 'be somewhat slow' |

b. *First copy has homorganic nasal:*

| *Base form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| đẹp | đèm đẹp | 'be rather pretty' |
| sạch | sành sạch | 'be rather clean' |
| tốt | tôn tốt | 'be rather good' |
| chắc | chăng chắc | 'more or less certain' |

This segmental alternation can be explained if the diminutive trigger morpheme includes a [+nasal] floating feature in its underlying form. (The form may also include a tonal specification, or the tonal effects here may be a case of TETU. I leave aside analysis of the tonal alternation here, but see discussion on this pattern and on markedness in Vietnamese in Vu (1998); Agbayani (1996).) When an obstruent coda is present, the nasal feature can dock on it, resulting in phonological coalescence which yields a nasal homorganic with the target coda:

(17) Nasalization when coda present in target:

| M: [$_{X^0}$ BEAUTIFUL DIMIN]<br>P: đẹp [+nasal] | Align | Max-IO | Unif | Id[nasal] |
|---|---|---|---|---|
| a. đẹp | | *! | | |
| ☞ b. đèm | | | * | * |

When no coda is present in the target, no phonological exponent of the affix can surface (again leaving aside tonal alternations), due to a highly ranked Align constraint:

(18) No nasalization when coda absent:

| M: [$_{X^0}$ GOOD DIMIN]<br>P: khá [+nasal] | Align-R | Max-IO | Unif | Ident[nasal] |
|---|---|---|---|---|
| ☞ a. kha | | * | | |
| b. khan | *! | | * | * |

A successful BRCT analysis of these data is more difficult to construct. The floating [+nasal] aspect of the analysis can be maintained, with coalescence resulting from the ranking Max-IO, Max-BR ≫ Uniformity. More problematic is the fact that the shape of the reduplicant (with or without a coda) depends on the shape of the target, rather than tending to be maximal in each case as far as the grammar of the language allows. In particular, the fact that codas do not occur in some cases would normally be explained by the ranking Max-IO ≫ *Coda ≫ Max-BR. But the cases in which codas do occur require exactly the contradictory ranking Max-BR ≫ *Coda.

The MR analysis of cases like these explains several characteristics of echo reduplication that have eluded analysis in other accounts. This account explains why the fixed segment is always peripheral (because of the inherent edge-seeking force of Align); why truncation is initial and corresponds with fixed vowels when it occurs (same reason); why overwriting occurs even when all the underlying material could be realized on the surface, phonotactically speaking (because coalescence is less bad than non-alignment); why Dravidian echo reduplication exhibits weight preservation with the overwritten vowel (because the surface vowel corresponds to both morphemes); and why backcopying never occurs (because there is no Base-Reduplicant relationship between the apparent copies).

I investigate these points in more detail in section 4 (examining Tamil ER in detail) and section 5 (comparing this theory with others that have been proposed to cover some cases that I classify as syntactic reduplication). But first, in section 3 I lay out and analyze the common descriptive properties that distinguish syntactic reduplication from morphological reduplication.

## 3.2 Distinctive properties of syntactic reduplication

Among cases of reduplication, we can distinguish a number of properties that characterize morphological and syntactic reduplication and distinguish them from one another. The following table (repeated from chapter 1) illustrates these properties.

(19) Diagnostics for syntactic and morphological reduplication:

| | *Morphological* | *Syntactic* |
|---|---|---|
| Phonological size | Fixed | Unlimited |
| Target | (Morpho)phonological | Syntactic |
| Interaction with morphophonology | As affix | As syntax |
| Overwriting | Optimizing (per known grammar) | Optimizing (but may appear special) |
| Identity avoidance | Does not occur | Occurs |
| Adjacency | Enforced through phonology | Enforced through syntax |

Descriptively speaking, we find that certain properties typically co-occur, and although not all of these properties will always co-occur in every case of reduplication, we do see a strong correlation overall. At the level of analysis, I identify each of these parameters as a diagnostic of syntactic vs. morphological reduplication. Although not all of these parameters is testable in every case of reduplication, and some orthogonal factors may confound the tests in some cases, in general it is possible to predict reduplication type from these parameters and vice versa.

In this section I will examine each property in turn, and then sum up by stating the typical behavior of each type of reduplication for each parameter and explaining how they follow from the nature of syntactic or morphological reduplication.

### 3.2.1 Arbitrary phonological size

One of the clearest distinguishing characteristics of different reduplicative patterns is whether the size of one of the copies is constrained – whether "templatic" or non-templatic but minimal and optimizing – or whether they both are faithful to the size of the underlying morpheme or constituent. We can see the contrast between these types of reduplication by examining two processes found in a single language, Kwak'wala.

Kwak'wala (explored in more detail in chapter 2) has several distinct reduplication processes, which convey different meanings and have different morphological and phonological properties. Most of these reduplication processes are constrained in size and are best analyzed as morphological. For example, pluralization is often expressed through the addition of a prefixing Ci- syllable, which copies the onset of the root:

(20) Kwak'wala pluralization with Ci- (Kalmar, 2003, 3):

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| p̓əsp̓əy̓u | p̓i-p̓əsp̓əy̓u | 'ears' |
| ɢaɢəs | ɢi-ɢaɢəs | 'grandfathers' |
| ɬuq$^{w}$a | ɬi-ɬuq$^{w}$a | 'feast dishes' |

Other fixed-size reduplication patterns in Kwak'wala have the shapes Ca-, Cə-, and the more complex reduplication pattern characteristic of -*m̓ut* (Kalmar, 2003). As I argue in chapter 2, the -*m̓ut* pattern falls out in a relatively straightforward way from the grammar of the language, given an underlying form of $\sigma_{\mu}$. Thus that pattern can also be said to be an example of fixed-size reduplication, even though it is non-templatic (at least by many definitions).

However, there is another pattern in Kwak'wala in which an entire stem is copied. Kalmar (2003) characterizes this as repetitive reduplication:

(21) Kwak'wala reduplication with Ci- (Kalmar, 2003, 68):

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| q$^{w}$iɬ-a | q$^{w}$iɬ-q$^{w}$iɬ-a | 'unscrew over and over' |
| d$^{z}$əlx$^{w}$-a | d$^{z}$əlx$^{w}$-d$^{z}$əlx$^{w}$-a | 'run again and again' |
| ganuɬ | ganuɬ-ganuƛ-a | 'every night' |
| k̓$^{w}$əməlk-a | k̓$^{w}$əməlx-k̓$^{w}$əməlk-a | 'char now and then' |

We may note that although this pattern will copy a stem of any size, it is not interested in copying the verbal suffix -*a* that occurs at the end of these verbs. This is straightforward to explain if this copying is really the duplication of a particular morphosyntactic node and its associated phonological form. But alternative accounts based on Base-Reduplicant correspondence and faithfulness must explain why that faithfulness is imperfect or why verbal -*a* is not part of the base.

Examples abound as well in English, which has two reduplication constructions and both of those exhibit arbitrary phonological size. Depreciative reduplication ("shm- reduplication") may target a constituent of any phonological size, and that phonological structure is copied in its entirety (except for the fixed "shm-" onset), as in the following example:

(22) Antidisestablishmentarianism schmantidisestablishmentarianism.
(`http://www.cortjstr.com/wizdumb.html`)

Contrastive reduplication ("salad-salad reduplication") exhibits the same property, as may be seen in the examples below.

Overall, arbitrary size of both copies is characteristic of syntactic reduplication, while constrained size of one copy is typical of morphological or phonological reduplication – and the reverse implications hold as well. As with all of these distinguishing criteria, the strongest evidence comes from the correlation of several characteristics for a particular process.

### 3.2.2 Target is a syntactic constituent

Reduplication patterns that are syntactic in origin are distinguished by the fact that their target is a morphosyntactic constituent, rather than a phonological structure. English contrastive reduplication (CR) is one such process (Ghomeshi *et al.*, 2004). This reduplicative pattern involves repetition of a "base" that meets certain qualifications. Both copies are segmentally identical, but the first one must carry a distinctive pitch contour. The following examples illustrate this construction (following Ghomeshi *et al.* (2004), the fixed contour is indicated through small capitals):

(23) a. I'll make the tuna salad and you make the SALAD-salad.
b. She wasn't a fancy cow, a Hereford or Black Angus or something, just a COW-cow.
c. Well, we're not LIVING TOGETHER-living together.

English CR can target constituents as small as an uninflected stem, in which case inflection occurs after the second copy. Ghomeshi *et al.* (2004) cite some attested examples:

(24) a. ... and here are the GLOVE-gloves. (i.e. real boxing gloves as opposed to smaller practice ones.)
b. We're not one of those COUPLE-couples.
c. In fact I barely talked to him. Not TALK-talked.
d. [I] didn't have a lot of FRIEND-friends. Girlfriends.
e. Those GUY-guys, y'know? Those guys with skills?

The flexibility of CR in selecting its target is apparent when we consider cases where a full word including inflectional morphology is copied:

(25) a. There's a guy who collects fans, these are not sports fans but FANS-fans.
b. You mean CRIED-cried, or cried because something heavy fell on you?
c. It has will-have-going-to-have-happened happened. But it hasn't actually HAPPENED-happened yet … actually.

CR can also target constituents larger than single words. Whole phrases can be targeted, with two identical copies of the entire phrase being produced:

(26) a. Do you like him, or LIKE HIM-like him?
b. We're living together, but not LIVING TOGETHER-living together.

Although the target selection of CR is flexible, it is not unrestrained. There are both minimal and maximal size restrictions on the target; crucially, though, those size restrictions are syntactic in nature, rather than phonological. As Ghomeshi *et al.* (2004) show, although noun stems can usually be targeted inside plural suffixation, CR cannot target a noun stem that is part of an irregular plural form (and therefore, by assumption, would be inside derivational morphology). The following pair illustrates the difference:

(27) a. Do you mean gloves, or GLOVE-gloves?
b. *Do you mean geese, or GOOSE-geese?

Irregular verbal inflection fares just as badly:[7]

(28) *Did you say he went, or he GO-went?

In addition, the maximal size of the constituent that CR can target is limited. Although phrases at the level of the minimal XP are legitimate targets, nothing larger seems to be permissible, ruling out examples like the following:

(29) **Then I realized that* MY GOOSE WAS COOKED-*my goose was cooked.*

Many syntactic reduplication patterns show similar flexibility, although they may differ in some details. Echo reduplication in Tamil also shows reduplication of whole phrases:

(30) [kumaaru -kku kuṭu -tt -een -ṇṇu] [kimaarukku kuṭutteenṇṇu] poy collaa -tee
[Kumar DAT give -PST -1SG -QUOT] [ECHO ] lie say -NEG.IMP
"Don't lie that you gave it to Kumar or some such nonsense." (Keane, 2001, 190)

Many (but not all) ER constructions allow reduplication of a stem inside inflection:

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[7] Thanks to Vera Gribanova for helping me construct this example. She also observes that forms like these present a challenge to Distributed Morphology or other theories with a late insertion of vocabulary. This difference in grammaticality hinges on the irregularity of the form in question; therefore any irregular forms must have already been inserted at the time when this copying takes place.

As a further undeveloped observation, I note that the following example has a middling acceptability according to my own intuitions and those of other speakers with whom I have consulted:

(i) ?Was he herding oxen, or OX-oxen?

(31) mer -e ṭer -e -č$^{h}$ -i
beat -PERF ECHO -PRES -1PL
'I beat and such' (Bengali; Keane (2001))

Compare this with full phrase echo reduplication in East Bengali (Fitzpatrick-Cole, 1996):

(32) kalo makorša ṭalo makorša
black spider ECHO
'black spiders and such' (e.g. black spiders and spiders of other colors)

(33) k$^{h}$ub patla šari ṭub patla šari
very thin sari ECHO
'very thin saris and such'

Some patterns may target morphosyntactic constituents smaller than the uninflected stem. Unlike English CR, which cannot target below the level of the uninflected stem, Kannada ER can target roots and partial stems (as long as the target is itself a morphosyntactic constituent) even inside derivational morphology. For example, Kannada ER can target roots inside "prototypical … derivational" morphology such as reflexives (Lidz, 2001, 380):

(34) hogaḷi-koḷḷu
praise-REFL
'to praise oneself'

(35) rašmi tann-annu hogaḷi-**gigaḷi**-koṇḍ-aḷu anta heeḷa-beeḍa
Rashmi self-ACC praise-**ECHO**-REFL.PST-3SF that say-PROH
'Don't say that Rashmi praised herself **and did related activities**.'

Patterns also differ in the size of maximal targets. Kannada ER, again unlike English, allows targeting a phrase larger than $XP_{min}$ (Ghomeshi *et al.*, 2004). Kannada ER is also more free than English CR in targeting subparts of idioms. Such constructions are problematic at best in English:

(36) ??She didn't KICK-kick the bucket.[8]

But similar targeting of subparts of idioms is well-formed in Kannada (Lidz, 2001):

(37) rašmi hari-ge maṇṇu giṇṇu tinn-is-id-aḷu
Rashmi Hari-DAT mud ECHO eat-CAUS-PST-3SF
'Rashmi ruined Hari etc.' (lit. 'Rashmi made Hari eat mud.')

Ghomeshi *et al.* (2004) show that the targets (at least in English) cannot be defined in prosodic terms. Some prosodic structures do not correspond to syntactic constituents, e.g. some created by cliticization. In these cases, CR is impossible:

(38) *I wouldn't DATE A-date a linguist.

We can compare this with a case of morphological reduplication. Such cases often exhibit apparently comparable behavior when they target particular morphemes or morphological cat-

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[8] This is my judgment, confirmed by other speakers.

egories. On my account, this follows from the fact that reduplication in many of these cases is tied to the presence of a particular reduplicative affix (whether that is reduplicative due to empty prosodic structure or some other reason), the surface position of which is governed by morphology in predictable ways, and the fact that morphological reduplication is typically local (due to the force of CONTIGUITY, LINEARITY, etc.).

For example, consider CVC prefixing reduplication in Samala (Applegate (1972); this pattern is explored in detail in chapter 4). That process typically targets the left edge of roots, even in words with many prefixes and suffixes:

(39) Samala CVC prefixing reduplication:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| s-$\sigma_{\mu\mu}$-$\sqrt{\text{kitwon}}$ | s**kit**kitwon | ‘s/he is coming out’ |
| $\sigma_{\mu\mu}$-$\sqrt{\text{ʔonoq}}$ | **ʔon**ʔonoq’ | ‘turkey vultures’ |
| $\sigma_{\mu\mu}$-$\sqrt{\text{kawayu}}$ | **kaw**kawayuʔ | ‘horses’ |

However, this is not due to a morphosyntactic process that targets the root or some other category. It is due to the placement of the reduplicative affix (an empty heavy syllable), which surfaces as the outermost of the Inner prefixes. Therefore we expect that this reduplication pattern will also target other prefixes that occur to its right, even to the exclusion of copying material from the root; but it will not copy prefixes that occur outside of itself. This is exactly what happens:

(40) Reduplication copies from following stem:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-$\sigma_{\mu\mu}$-$\sqrt{\text{nowon}}$ | k**now**nowon | ‘I am standing’ |
| ma-p-$\sigma_{\mu\mu}$-$\sqrt{\text{kawayu}}$-iwaš | map**kaw**kawayuʔiwaš | ‘the horses that were yours’ |
| s-$\sigma_{\mu\mu}$-xili-$\sqrt{\text{wayan}}$ | s**xil**xiliwayan | ‘it is floating’ |

The target can shift to another morpheme for phonological reasons as well. In case of a vowel-initial root or Internal prefix, copying VC would yield an open syllable and not allow faithful realization of the affix’s underlying shape. In these cases, a vowel on the immediate left of the reduplicative prefix is conscripted into the string to be copied:

(41) Reduplication with V-initial stems:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-$\sigma_{\mu\mu}$-$\sqrt{\text{ičtïn'}}$ | **kič**kičtïn’ | ‘my children’ |
| s-iy-$\sigma_{\mu\mu}$-$\sqrt{\text{eqwel}}$ | si**yeq**yeqwel | ‘they are making’ |
| s-$\sigma_{\mu\mu}$-uti-ali-max-$\sqrt{\text{keken}}$ | **sut**sutalimexkeken | ‘s/he suddenly gives it a stretch’ |

Behavior like this – copying based on the location of the reduplicative affix, and interacting with the phonology of the word being copied – is characteristic of morphological reduplication, and distinct from what occurs in cases of syntactic reduplication.

### 3.2.3 Limited interaction with morphophonology

The standard analysis of reduplication since Marantz (1982) has assumed that reduplication is driven by reduplicative morphemes (whatever the properties of those morphemes are). This assumption leads to the claim that reduplication should be able to interact with other morphophonological processes in the same way that other morphemes do, e.g. interacting transparently or opaquely with morphophonological processes.

For example, reduplication in Tohono O'odham feeds the application of a special stress pattern (Zepeda, 1983; Hill and Zepeda, 1992; Fitzgerald, 1999; Yu, 2000; Inkelas and Zoll, 2005). Tohono O'odham exhibits typical Uto-Aztecan initial primary stress, and also prohibits secondary stress on final syllables in monomorphemic words. However, final secondary stress is licensed in morphologically derived words, including reduplicative words:

(42) Tohono O'odham: Final stress prohibited in monomorphemic words:

| *Form* | *Gloss* |
|---|---|
| kíː | 'house' |
| píːba | 'pipe' |
| ʔásugal | 'sugar' |
| síminǰul | 'cemetery' |

(43) Tohono O'odham: Final stress allowed in derived words:

a. With suffix:

| *Form* | *Gloss* |
|---|---|
| číkpan-dàm | 'worker' |
| máːginà-kam | 'one with a car' |
| pímiàndo-màd | 'adding pepper' |

b. With reduplicative prefix:

| *Form* | *Gloss* |
|---|---|
| pí-pibà | 'pipes' |
| pá-padò | 'ducks' |
| sí-sminǰùl | 'cemeteries' |
| tá-tablò | 'shawls' |

Syntactic reduplication does not fit into the larger scheme of the morphophonology in the same way. For example, Tamil ER fails to feed any of the compounding processes that are found in the language.

Christdas (1987) shows that the three nominal compounding processes of Tamil fit into two morphological levels. The compound processes, known as I, II and III, are distinguished by their interaction with two gemination processes that hold more generally within Tamil (among other ways). These processes include one of final-consonant gemination (referring to the rightmost consonant within a stem, regardless of whether or not it is followed by vowels) and another one of initial-consonant gemination. Compounds formed by process I undergo both gemination rules. Compounds formed by process II undergo final gemination but not initial gemination. Compounds formed by process III undergo neither gemination process. In terms of stem and word level, processes I and II appear to belong to the stem level, and process III appears to be a word-level process. (I and II are distinguished by the fact that II selects for oblique stems, an issue that is not important for our present purposes.)

If ER arises because of a reduplicative morpheme interacting with the normal morphophonology of the language, then we must countenance the idea of ER interacting with processes like these compounds. More concretely, we must consider whether ER can feed any of these processes. On the assumption that there are two morphological levels (stem and word), we would expect ER to potentially be able to feed all three processes (if it is stem-level morphology) or just III (if it is word-level morphology). But in fact it cannot feed any of these processes. My fieldwork shows a rejection of any ER formation targeting the individual stems within compounds, regardless of the type of compound in question. That is, while the whole compound may be echoed, attempts to echo components of it are rejected. For example, the word *aaṭṭukkuṭṭi* 'kid' is a (type I) compound made from the stems *aaṭu* 'goat' and *kuṭṭi* 'young.' As shown below, speakers reject any ER formation in which the ER form serves as input to a compound process:

(44) a. *Type I:* *aaṭu-kiiṭṭu-kkuṭṭi
  b. *Type II:* * aaṭam-kiiṭam-kuṭṭi
  c. *Type III*: * aaṭu-kiiṭu-kuṭṭi

But compounding feeds ER successfully:

(45) aaṭṭukkuṭṭi-kiiṭṭukkuṭṭi 'kids and so forth'

It is possible that ER cannot feed compounding processes due to some idiosyncratic condition on the ER process itself or on the interaction between the morphemes in question. However, a theory that offers a principled explanation of the failure of such processes to feed stem-level or word-level morphophonology will be preferred to an explanation that relies on such parochial constraints.

### 3.2.4 Occurrence of non-optimizing overwriting

Syntactic reduplication patterns in which the first or last segment or segments of the second copy are overwritten by a fixed sequence characteristic of that reduplication construction are attested across a great number of languages, especially those in the South Asian linguistic area. These are the patterns referred to as echo reduplication. In many of these cases, the construction contributes a semantic contribution whose meaning is suggested by the Turkish term for these words, *mühmele*, glossed as 'ramshackle collectivity.' Southern (2005) identifies four properties of *mühmele*:

(46) Properties of *mühmele*:
  a. They have a strong, defining affective or expressive component;
  b. Their force is usually collectivizing, occasionally intensifying;
  c. They have obligatory indefinite reference;
  d. Their tone is mildly disparaging – occasionally affectionate or playful.

These properties are generally true of most ER constructions, although not all apply in every case. The phonological behavior of an echo reduplication construction is shown below, with data from Hindi (Nevins and Wagner, 2001):

(47) Hindi echo reduplication:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| aam | aam vaam | 'mangoes and such' |
| tez | tez vez | 'tables and such' |
| tras | tras vras | 'grief and such' |
| roti | roti voti | 'bread and such' |

Not all languages employ the same fixed segments. The map of echo reduplication patterns included in Appendix B of this thesis indicates some of the different fixed segments used in various echo reduplication patterns found in India. The real situation is even more complicated than that shown in the map; Trivedi (1990) identifies at least 33 different echo word patterns found within India alone, which differ in their fixed segments, in their non-default fixed segments if any, and in their behavior when echo reduplication would create identical copies.

Some of those patterns are worthy of further attention. Among those are the languages that exhibit overwriting of a fixed zero pattern – i.e. they involve copying a complete target and then deleting some portion of it. Trivedi (1990) presents data from some Indo-Aryan languages in which echo word formation involves the deletion of the first-syllable onset in the reduplicant, similar to the Bhojpuri case considered above:

(48) Braj and Kanauji:

| | | |
|---|---|---|
| $p^h$uul | $p^h$uul-uul | 'flowers etc.' |
| suuraǰ | suuraǰ-uuraǰ | 'sun etc.' |
| din | din-in | 'day etc.' |

Of course, the presence of a fixed segment associated with a reduplication pattern by itself is not diagnostic of the syntactic or morphological nature of that pattern. Alderete *et al.* (1999) explore several cases in which reduplication is associated with a fixed segment that can be persuasively analyzed as emergence of the unmarked (McCarthy and Prince, 1995) rather than a segment with an underlying morphological identity of its own. Non-default fixed segments also occur in many morphological reduplicative contexts; e.g. Halq'eméylem and Nuxálk (Brown, 2004), Kwak'wala (Kalmar, 2003), and Tuvan (Harrison and Raimy, 2004).

What is characteristic of syntactic reduplication is overwriting behavior that appears to be non-optimizing. This can include cases in which the fixed segment replaces a copied segment even though both could surface faithfully without phonotactic distress, as in Hindi; and cases where overwriting is associated with deletion, as in Braj, Kanauji and Bhojpuri.

On my analysis, the behavior exhibited in these cases is actually optimizing. However, it optimizes according to the force of constraints whose presence can be detected only in cases of morphosyntactic merger below the level of $X^0$; as a result, this behavior will appear non-optimizing when judged by the behavior of the rest of the language's grammar.

Overwriting in cases of morphological reduplication, by contrast, should not draw on constraints that will not be in evidence elsewhere in the grammar, and thus they will appear to be optimizing. For example, consider telic/atelic aspect formation in Tübatulabal (Uto-Aztecan; Kern county, California; Voegelin (1935); Crowhurst (1991); Alderete *et al.* (1999)). This morphological reduplication pattern involves the addition of a prefixal syllable with a fixed onset ʔ, a nucleus identical to the first nucleus in the stem, and a coda nasal if the first vowel in the stem is followed by a nasal (Voegelin, 1935):

(49) Tübatulabal aspectual fixed-segment CV- reduplication (Voegelin, 1935):

| *Base form* | *Reduplicated form* | *Root gloss* |
|---|---|---|
| taluːmatu | ʔataluːmatu | ‘to make a breechclout’ |
| yoːm | ʔoːyom | ‘to copulate’ |
| ʔaːbaʔiw | ʔaːʔabaʔiw | ‘to be showing’ |
| pɨŋw̥ | ʔɨmbɨŋw | ‘to roll string on thigh’ |

Alderete *et al.* (1999) analyzes this case as an example of TETU, with a reduplicative prefix causing the nucleus copy, while constraint interaction causes the insertion of a default onset rather than a reduplicative onset. This analysis is basically maintained in an MR account. The reduplicative affix in question has a segmentally-empty syllable for its underlying phonological form. Reduplication of the nucleus and insertion of the onset fall out directly when DEP is divided into the more specific constraints DEP-C and DEP-V, with the ranking DEP-V ≫ INTEGRITY ≫ DEP-C.

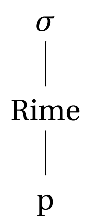
Note that there are also cases where non-default fixed segment morphological reduplication occur. Consider the case of Tuvan (Turkic; Siberia; Harrison (2000); Harrison and Raimy (2004)). The Tuvan emphatic morpheme is formed by adding a CVp- reduplicative affix to the stem, as shown in (50):

(50) Tuvan emphatic reduplication

| *Base form* | *Reduplicated form* | *Reduplicated form gloss* |
|---|---|---|
| qara | **qap**qara | ‘very black’ |
| qɨzɨl | **qɨp**qɨzɨl | ‘very red’ |
| uzun | **up**uzun | ‘very long’ |
| borbaq | **bop**borbaq | ‘completely spherical’ |
| saɣbas | **sap**saɣbas | ‘will definitely not milk’ |

It is not possible to apply the analysis of Alderete *et al.* (1999) here, since *p* is not the default consonant in Tuvan. But the MR analysis is almost identical for a case like this. The difference between reduplication with no fixed segment and reduplication like the case found in Tuvan is that the reduplicative morpheme in Tuvan is partially segmentally specified. Specifically, it consists of a syllable with an underlying *p* coda but otherwise no segmental material, i.e.:

(51)



As shown in Saba Kirchner (2007*b*), this underlying form with standard MR rankings for reduplication will yield the pattern found in Tuvan.

### 3.2.5 Identity avoidance

By its very nature, reduplication leads to the creation of identical phonological structures. Many syntactic reduplication patterns faithfully copy their targets, creating two identical structures. Due to their unbounded size, these copies are often more faithful than the copies created by morphological reduplication. However, in another respect we find systematic unfaithfulness across many other syntactic reduplication patterns, namely in cases of fixed segment reduplication with active identity avoidance. Such cases do not seem to exist for morphological reduplication constructions.

A relevant class of cases are ER constructions. In these patterns, the presence of that fixed segment typically interferes with total identity between the two copies. For example, in East Bengali *pani tani* 'water, etc.', the fixed *t* of the second copy prevents complete identity between the first and second copies. However, this does not distinguish syntactic and morphological reduplication patterns. Many cases of fixed-segment morphological reduplication patterns are well known.

What does distinguish the two kinds of cases is their behavior in cases where a reduplicative fixed segment is identical to the corresponding section of the melody that is to be overwritten. In syntactic reduplication, we find many languages taking active measures to avoid full identity when forming echo words whose base form already begins with the overwriting sequence. Common measures include the substitution of another fixed segment, and the total ineffability of such constructions. For example, East Bengali ER uses a fixed *t* except for words beginning with *t* (or a sufficiently-similar coronal consonant; v. Khan (2006)).[9] In those cases, an alternative fixed consonant is used instead, avoiding total identity:

(52) Echo reduplication with fixed *t*-:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| pani | pani tani | 'water, etc.' |
| kaši | kaši taši | 'cough, etc.' |

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[9] Careful readers will note that Kimper (2008) takes the East Bengali ER fixed segment to be *ṭ*, while Khan (2006) takes it to be *t*. I do not know whether this discrepancy is due to error, differences in transcription, or differences in dialect. Consequently I cite data from each author without alteration.

(53) Avoidance of (near-)complete identity:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| tika | tika fika | 'vaccines, etc.' |
| čakɹi | čakɹi bakɹi | 'careers, etc.' |

Similarly, Hindi ER is normally formed with fixed *v*, but it uses another consonant when forming an echo version of a *v*-initial word (Nevins, 2005):

(54) a. Echo reduplication with fixed *v*-:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| aam | aam vaam | 'mangoes and the like' |
| tras | tras vras | 'grief and the like' |
| roti | roti voti | 'bread and the like' |

b. Avoidance of complete identity:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| vakiil | vakiil šakiil | 'lawyers and such' |
| vajpayee | vajpayee šajpayee | 'Vajpayee (name of former prime minister) and such' |
| vidyaartʰii | vidyaartʰii šidyaartʰii | 'students and such' |

In other languages an identical echo word is simply ineffable. This is the case for Turkish echo words, the formation of which is illustrated in the following examples:

(55) a. kitap mitap
book ECHO
'books and such'
b. attila mattila
Atilla ECHO
'Atilla and his family'
c. ozturk mozturk
Ozturk ECHO
'Ozturk and his family'

Words that begin with *m* cannot undergo echo reduplication (Nevins and Wagner, 2001):[10]

(56) a. masa
'table'
b. *masa masa
'tables and such'

Vietnamese offers another case that illustrates this ineffability of identical reduplication, and

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[10] The fact that *m*-initial words are absent from the native Turkish lexicon, due to the change of Proto-Turkic initial **m* > *b*, is very likely relevant to the history of this construction, but it does not have any apparent synchronic significance. See Southern (2005) for discussion of this pattern. See also Taneri (1990); Wedel (1999, 2000); Sofu (2005); Dhillon (2007) for more discussion on this and other reduplication patterns in Turkish.

another kind of "too similar" effect within the realm of identity avoidance in syntactic reduplication. Vietnamese is a tonal language in which each morpheme (almost always one syllable in length) is lexically associated with one of six lexical tones. Vu (1998) groups these into three tone pairs according to their contour (or more accurately, contour and a bundle of phonetic features that pattern together), with each pair having one tone in the +High register and one in the -High register, as shown below:

(57) Vietnamese tone registers and contours (Vu, 1998, 167):

| | | *Contour* | | |
|---|---|---|---|---|
| | | **l** | **h** | **lh** |
| *Register* | **+High** | 1 | 2 | 3 |
| | **-High** | 4 | 5 | 6 |

The grouping of tones by contours is important when we consider pejorative reduplication, an echo reduplication-type construction in which the final syllable of the second copy is overwritten with the fixed rime -*iếc* (in Vietnamese orthography). The standard language pattern is for the fixed vowel to have tone 2, that is, (+H,h) – a short rising tone with a tense glottal stricture and final glottalization (Vu, 1998, 167). However, in some Southern and Central dialects, the fixed vowel adopts the register of the tone belonging to the rime that it replaces, while retaining its own contour (h). Some pejorative formations representing such a nonstandard dialect are shown below, with the tones of each syllable listed alongside (Vu, 1998, 173):

(58) Vietnamese pejorative reduplication:

| *Base* | *Reduplicated form* | *Base gloss* | *Tone pattern* |
|---|---|---|---|
| bạn | bạn biệc | 'friends' | (-H,h) (-H,h) |
| ngu$^{ʔ}$ | ngu$^{ʔ}$ ngiếc | 'sleep (v.)' | (+H,lh) (+H,h) |
| uông thuốc | uông thuốc uông thiếc | 'take medicine' | (+H,h) (+H,h) (+H,h) (+H,h) |

In any dialect of the language, pejorative formation is prohibited when the would-be target has a rime too similar to -*iếc*:

(59) Vietnamese pejorative reduplication blocked:

| *Base* | *Gloss* | *Blocked form* |
|---|---|---|
| liếc | 'scam' | * liếc liếc |
| tiếc | 'regret' | * tiếc tiếc |

In general, pejorative formation fails when the segmental final rime of the target is *iec* and the contour of the tone is (h) – regardless of the register of the tone. Thus cases of total identity, with tone (+H,h), as well as cases of excessive similarity, with tone (-H,h), are blocked. In all of these cases, when pejorative formation is blocked, there is no way to choose another allomorph or otherwise alter the form in order to achieve sufficient difference between the forms (or sufficient realization of the affix that triggers copying). Expression of the meaning that would be conveyed by these blocked constructions can only be achieved approximately through paraphrasis or the selection of a different lexical item as the base.

Ineffability in case of total identity is also the state of affairs for many speakers of English with regard to the depreciative reduplication construction ("shm- reduplication"). These speakers reject or hesitate to accept forms like ?? *shmuck-shmuck*, ?? *Schmidt-Schmidt*. Compare that to the original Yiddish pattern, which employed an alternative consonant to avoid identity: e.g. *šmatə-špatə* 'rags and such.'[11]

As pointed out by Singh (2005), this is essentially a case of anti-faithfulness on a view that assumes the existence of Base-Reduplicant faithfulness constraints that are actively trying to achieve total identity between the copies. However, on the analysis of these cases as syntactic reduplication with the merger of two morphemes within one node, that problem does not arise. In this theory, these identity avoidance facts can be explained through the activity of a constraint requiring explicit realization of morphemes (Samek-Lodovici (1992); Yip (1993, 1996); Kurisu (2001)). It is precisely the combination of these morphemes and their phonological coalescence that creates a potential problem for morpheme realization, in cases where the trigger morpheme's segmental contribution is identical (or too similar) to the original form of the constituent with which it is being merged. We can see how this plays out by applying the definition for RealizeMorpheme given by Kurisu (2001):

(60) RealizeMorpheme (RM): Let $\alpha$ be a morphological form, $\beta$ be a morphosyntactic category, and F($\alpha$) be the phonological form from which F($\alpha + \beta$) is derived to express a morphosyntactic category $\beta$. Then RM is satisfied with respect to $\beta$ iff F($\alpha + \beta$)$\neq$F($\alpha$) phonologically.

In a case like *vakiil šakiil*, the relevant consideration is the combination of *vakiil* with the default allomorph of the trigger morpheme responsible for ER, which is *v*. Overwriting that segment would produce an output in which F($\alpha + \beta$) and F($\alpha$) are phonologically identical, with the shape *vakiil*. Proper constraint ranking will motivate the selection of the non-default trigger allomorph in just these cases, as shown below:

(61) Overwriting even when alternatives are phonotactically well-formed:

| M: [$_{X^0}$ &C LAWYER]<br>P: v, š vakiil | Align-L | RM | Uniformity | Priority |
|---|---|---|---|---|
| a. vakiil | | *! | * | |
| ☞ b. šakiil | | | * | * |

A similar story can be told about cases in which reduplication that would achieve total identity are ineffable. To explain the pattern found in Turkish, we can posit that RealizeMorpheme dominates MParse. In that case, rather than attempt a repair, a construction in which the reduplicant would fail to explicitly realize the trigger morpheme's phonological component *m*,

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[11] See Nevins and Vaux (2003) for very interesting discussion, experimental data and analysis of the English pattern. This pattern is much more limited in its scope than is contrastive reduplication; depreciative reduplication appears to be limited to occurrence with topics. See Grohmann and Nevins (2004, 2005).

the entire construction simply cannot be expressed.[12]

Some languages do allow total identity. Tamil speakers with whom I have worked accept fully identical words as equally well formed as other echo words with different bases that do not exhibit total identity. Some English speakers also allow total identity, accepting cases like *shmuck-shmuck*. These cases are easy enough to explain in the terms of the syntactic reduplication theory: REALIZEMORPHEME is effectively inactive in these languages.

However, the active force of RM in many cases of syntactic reduplication with overwriting is sharply different from what we find in cases of morphological reduplication with fixed segmentism. As far as I am aware, active avoidance of identity between the two copies never takes place in these cases.[13] For example, fixed segment reduplication that is insensitive to the identity or non-identity of the output is found in Halq'eméylem, a Salishan language of British Columbia. A reduplicative morpheme with several meanings is characterized by a prefixed copy of the first syllable, with fixed nucleus ɛ (Brown, 2004):

(62) Halq'eméylem fixed-segment reduplication:

| *Base* | *Reduplicated form* | *Reduplicated form gloss* |
|---|---|---|
| mələ | mɛmələ | 'children' |
| spəɬχləl | spɛpəɬχləl | 'meadow' |
| yilɛw | yɛyilɛw | 'a little after' |
| hik$^{w}$θə | hɛhik$^{w}$θə | 'getting big' |
| stiwəl | stɛtiwəl | 'sibling's children' |

The pattern does not change in words whose first nucleus is *ɛ*. Thus *ʔɛlθɛ* 'I, me, it's me' reduplicates as *ʔɛʔɛlθɛ* 'it's really me.' The counterexample would be a language like Halq'eméylem except that the forms like *ʔɛʔɛlθɛ* are avoided through allomorphy or ineffability. Thus the active avoidance of identity between two copies is a strong indication that the pattern in question is syntactic rather than morphological in origin.

### 3.2.6 Location determined by syntax

A common observation is that reduplication tends to be local: the base and reduplicant are typically adjacent or very nearly so. However, this is not always the case. Adjacency is sometimes disrupted in one way on another. Syntactic and morphological reduplication behave quite differently with regard to adjacency. Syntactic reduplication will be adjacent only if the trigger morpheme responsible for the copy and multiple spellout happens to be merged at the appropriate point in the derivation to bring about such adjacency. This is often but by no means always the case. For example, some Tamil reduplication patterns show affixation intervening between the two copies (see section 4). A more striking cases is found in verb copy in

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[12] Note that in order to account for the full range of ER identity-avoidance facts, the definition of REALIZEMORPHEME given above will not suffice. We must also explain cases like ER in East Bengali and Tamil (see section 4), in which identity and near-identity are both avoided. However, a constraint that employs the same logic of RM is certainly plausible and entirely in keeping with the spirit of this analysis.

[13] Some data in Turkish and Persian appear to contradict this claim at first glance, but these effects are probably due to the force of OCP or other non-morpheme-specific properties of the phonology of the language in question. See e.g. Wedel (1999); Ghaniabadi (2005).

Vata (Kru, Ivory Coast; Koopman (1984); Kimper (2008)):

(63) **pā** ń ka' mÉ **pa'** ā
**throw** you fut-a it **throw** Q
"Are you going to throw it?"

Another case comes from Turkana (Nilotic, Kenya; Dimmendaal (1983); Kimper (2008)):

(64) k-à-**ìmùrì**-a-kì̥ ɛ̀-ra-ì a-k-**ìmurı**-a-kìnı̥
T-1SG-**forget**-E-DAT 3SG-be-ASP INF-**forget**-E-DAT
"I really FORGOT!"

A similar construction notably exists in American Sign Language, expressing intensification through long-distance copying of a single constituent (Petronio and Lillo-Martin, 1997; Kimper, 2008):

(65) HE$^{topic}$ **hate** LIGHTS-FLASHING-ON **hate**
"He HATES lights flashing on and off."

A more elaborate set of examples in a similar vein come from Fongbe (Niger-Congo; Benin and Togo). Four syntactic constructions in this language (namely temporal adverbials, causal adverbials, factives and predicate clefts) involve a verb being copied and spelled-out twice, once in its ordinary (post-subject) position and once sentence-initially (Collins, 1994; Lefebvre and Brousseau, 2002; Inkelas and Zoll, 2005):[14]

(66) a. **sísɔ́** Kɔ́kú **sísɔ́** tlóló bɔ̀ xɛ́sí ɖì Báyí
**tremble** Koku **tremble** as.soon.as and fear get Bayi
'As soon as Koku trembled, Bayi got frightened'
b. **sísɔ́** Kɔ́kú **sísɔ́** útú xɛ́sí ɖì Báyí
**tremble** Koku **tremble** cause fear get Bayi
'Because Koku trembled, Bayi got frightened'
c. **sísɔ́** ɖé-è Báyí **sísɔ́** ɔ́ vɛ́ nú mi
**tremble** OP-RES Bayi **tremble** DEF bother for me
'The fact that Bayi trembled bothered me'
d. **sísɔ́** wɛ̀ Kɔ́kú **sísɔ́**
**tremble** it.is Koku **tremble**
'It is tremble that Koku did'

Similar examples are found with some ER constructions, in which one of the base or the echo reduplicant either undergo movement or are formed at some distance from each other, resulting in a potentially considerable distance between them at PF. For example, at least some speakers of Telugu tend to produce sentences like the following, in which the base word *peḷḷi* is significantly distant at the surface from its echo *giḷḷi* (Bhaskararao, 1977; Keane, 2001):

---

[14] Inkelas and Zoll (2005) note that in all of these constructions, the first copy of the verb is sometimes truncated to a single syllable. However, this effect is apparently particular to only some speakers, and the conditions governing the variation between full and truncated spellout are not given. Furthermore, it is not stated whether this truncation occurs elsewhere in the language or with any other fronting constructions, if any exist. Therefore, I ignore the issue of truncation in this construction.

(67) peḷḷi ayindi kaani giḷḷi avaleedu
‘The marriage (*peḷḷi*) took place but not the consummation (*giḷḷi*).’

Thus the two copies present at PF in cases of syntactic reduplication are by no means bound to be adjacent to one another. However, their surface locations are not random or unconstrained. They must obey the principles generally active in the language governing the merger of morphemes into the derivation and governing copying in general and sideways movement specifically.

The surface position of the copies in morphological reduplication is controlled by quite different forces, namely those at work in the phonological component. Here again adjacency is quite common but not universal. In chapter 1 I discussed several examples of non-adjacent reduplication, including this example from Nuxálk:

(68) Nonlocal reduplication in Nuxálk (Shaw, 2005, 189):

| *Root* | *Reduplicated form* | *Gloss* |
|---|---|---|
| lis | linlis | ‘to push’ |
| ʔul̓ak | ʔunʔul̓ak | ‘to vomit’ |
| ƛ̓ap | ƛ̓anƛ̓ap | ‘to go’ |

Shaw (2005) analyzes this pattern as falling out from the interaction of morpheme-specific ALIGN constraints. Nonlocal morphophonological reduplication patterns like this exhibit behaviors typical of ALIGN effects such as peripherality and adjacency to constituent edges. This is quite different from the surface location patterns of syntactic reduplication patterns, which appear to reflect the ordering of syntactic constituents.

## 3.3 Case study: Tamil

Tamil is a Dravidian language spoken by more than sixty million people. Most speakers live in southern India (Tamil Nadu), with significant populations also in Sri Lanka and a worldwide diaspora. Tamil has a literary history comparable to that of Sanskrit. The current state of the language is markedly diglossic, with a single shared written standard that hews closely to the classical version of the language, and many dialects (divided by region, urban/rural distinctions, and caste) that vary significantly from one another and are all quite distinct from the written standard. Speakers are generally quite aware of literary/colloquial differences, and consider some linguistic phenomena to be characteristic of just one or the other of those. Relevant for our purposes is the fact that echo words are considered to be very colloquial. Speakers agree that echo words would never occur in written Tamil, and this colloquiality makes the pattern unproductive in certain semantic or grammatical contexts.

Despite its long history and large population of speakers, Tamil is relatively understudied in the generative linguistic literature. A fortunate exception to this generalization is the existence of an entire thesis on echo reduplication in Tamil has been written (Keane, 2001). ER data in this section come from that thesis as well as from my own fieldwork with Tamil speakers. I worked with three native speakers, males from around the age of 30 to over 50. All three were raised speaking Tamil in Chennai, the capital city of Tamil Nadu. The data from those speakers is broadly consistent with the data given by Keane (2001), though there are some systematic differences as well which may be due to dialectal differences rooted in geography or caste.

Schiffman (1999) describes five kinds of reduplication in Tamil. All of these patterns may involve reduplication of arbitrary length (although that is not entirely clear in the case of some less productive patterns). As shown by Abbi (1985) (who considers only non-ER patterns), similar reduplicative constructions are widespread across the South Asian linguistic area. After identifying these non-ER patterns, I focus in some detail on the Tamil ER.

### 3.3.1 Reduplication types

#### Positive-negative reduplication

**Function:** Verbal; means “simultaneously with X,” or “even before X.”
**Form:** Positive past participle + negative past participle:[15]

(69) saappiṭṭum saappiḍaame
‘before eating; before even getting a chance to eat; as soon as (s.o.) ate’

(70) endiruccadum eendirukkaadadumaa
‘before (I) even have a chance to get out of bed’

#### Emphatic reduplication

**Function:** Verbal; emphatic meaning.
**Form:** Infinite verb + emphatic -*ee* + finite verb:

(71) vaanga maaṭṭa-v-ee maaṭṭeen
‘I just won’t buy it, that’s all’

(72) irukka-v-ee irukku ...
‘It’s there, no doubt about it’

#### Distributive reduplication

**Function:** Pronominal; distributive.
**Form:** Full reduplication:

(73) ennenna
‘what (all) kinds of (things are there)?’

(74) avangavanga
‘all kinds of different people’

#### Onomatopoeic reduplication

Idiosyncratic.

---

[15] Voice and continuancy of Tamil consonants are often (but not always) predictable depending on whether the consonant is syllable-initial, syllable-final or geminate. These values often change depending on the morphological context, because suffixes can change the syllabic role of a consonant as well as lexically triggering gemination. Thus for example in (69), the comparable strings are *saappiṭṭ* and *saappiḍ*, both reflexes of stem *saappiḍu* ‘to eat (a meal)’.

**Echo reduplication**

See below.

### 3.3.2 Echo reduplication

Although observed in linguistic literature at least as early as Emeneau (1938), and discussed in the Schiffman (1999) grammar of Tamil, comprehensive research on ER began with Keane (2001, 2006). Tamil ER illustrates the ways in which syntactic reduplication patterns differ from morphological reduplication.[16]

#### 3.3.2.1 Arbitrary phonological size

Tamil ER can target constituents of any phonological size, faithfully (pace overwriting) copying the entire phonological string. We find examples from the size of one or two syllables:

(75) a. naay kiiy
dog ECHO
'dogs and such'
b. puli kili
tiger ECHO
'tigers and other beasts'

We also find examples of single words or phrases of significant length being copied in toto:

(76) [citampara -ttu -kku] [kitamparattukku] kumaar pooka maaṭṭ -aan
[Chidambaram -OBL -DAT] [ECHO] Kumar go.INF will.not -3SM
'No way is Kumar going to Chidambaram or any place like that.' (Keane, 2001, 185)

#### 3.3.2.2 Target is syntactic constituent

Tamil ER may target bases belonging to a wide range of constituent sizes. For example, we find ER targeting a single word:

(77) a. puli
'tiger'
b. puli kili
tiger ECHO
'tigers and other beasts'

But phrases may also be targeted:

(78) [kumaaru -kku kuṭu -tt -een -ṇṇu] [kimaarukku kuṭutteenṇṇu] poy collaa -tee
[Kumar DAT give -PST -1SG -QUOT] [ECHO ] lie say -NEG.IMP
"Don't lie that you gave it to Kumar or some such nonsense." (Keane, 2001, 190)

---

[16] Data in this section are from my field notes except where otherwise attributed. Dots beneath consonants indicate retroflex articulation. Long vowels and geminates are noted through orthographic doubling.

Crucially, this targeting is syntactic rather than phonological in nature. Prosodic constituents that do not correspond to syntactic constituents are routinely rejected as targets for ER. Other restrictions on ER targeting do exist, but they are similarly morphosyntactic in nature. For example, almost all word classes can be targeted by ER, including nouns, verbs, adjectives, and adverbs, as well as pronouns and proper names; but Keane (2001) finds that genitive nouns and negative imperative verbs are generally not acceptable as ER targets. If this reduplication process were morphophonological in origin, we would expect to see the class of potential targets be defined prosodically rather than syntactically.

#### 3.3.2.3 Limited interaction with morphophonology

As shown in (44) above, Tamil ER fails to feed any of the three compounding processes in Tamil. Interactions with other morphophonology do not yield clear evidence about ordering of processes.

#### 3.3.2.4 Overwriting with fixed segments

The first syllable of the second copy in an echo word is overwritten by fixed sequence [ki]. The length of the original vowel is retained, so words with an initial long vowel are overwritten with [ki:]. First-syllable codas and final geminates are also retained:

(79) a. paambu
‘snake’
b. paambu kiimbu
snake ECHO
‘snakes and other reptiles/pests’

(80) a. tummi
‘sneeze’
b. tummi kimmi
sneeze ECHO
‘sneezing and other inauspicious noses’

#### 3.3.2.5 Avoidance of total identity

My consultants accepted echo words that created total identity as readily as any others. However, Keane (2001) found that the speakers with whom she consulted rejected identical or excessively similar echo words. Words of this type include those beginning with *ke*-. Thus speakers in Keane’s study rejected examples like (81) while accepting structurally similar words that did not begin with *ki* or *ke*.

(81) *[keṭṭa kanav -ai] [kiṭṭa kanavai] keekkaa -tee
[bad dream -ACC] [ECHO ] listen -NEG.IMP.
‘Don’t heed bad dreams and so forth.’ (Keane, 2001, 188)

This difference is perhaps one of dialect. Almost all of the speakers in the study of Keane (2001) were natives of Pondicherry, while the speakers with whom I consulted were all from Chennai.

This dialect difference may therefore be geographical in nature.

#### 3.3.2.6 Adjacency of base and reduplicant

ER typically requires strict adjacency between the base and reduplicant. However, some interesting (though marginal) exceptions suggest that separating base and reduplicant is not impossible and is in fact countenanced in the minds of speakers. As (Keane, 2001, 57-58) relates:

> Interestingly, a folk-tale motif common to several of the Dravidian languages relies on precisely this kind of dissociation between the two parts of an echo word. The expression in question takes the form puli kili 'tiger and such like animal' in Tamil. According to Emeneau (1938: 116), the story involves a tiger hearing this expression, and identifying itself with the first part, but mistakenly assuming that the second part refers to some other creature, which it then imagines to be active in subsequent events.

By itself this does not prove the status of the echoed second copy in Tamil ER as an independent syntactic constituent. However, it does show that that copy has the characteristics necessary to behave as an independent word and that in the minds of speakers, such a reinterpretation is a plausible, if humorous, possibility. It is difficult to imagine one copy in Kwak'wala -*ṁut* reduplication or any other morphological reduplication process being treated similarly.

### 3.3.3 Analysis of Tamil ER

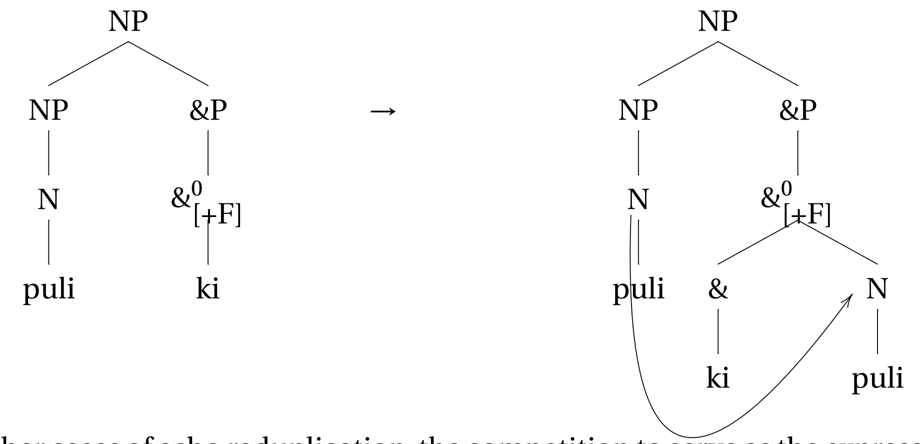
An MR analysis of echo reduplication in Tamil proceeds in a relatively straightforward way. We identify a morpheme that has an underlying form with allomorphs:

(82) *ki*, *kii*

The morpheme is perhaps of type &, i.e. a conjunctive morpheme. As Travis (2001) notes, echo reduplication often behaves similarly to conjunction in that it may target heads or maximal projections, and also because it creates a constituent of the same type as its target (distinguishing it somewhat from similar constructions like English contrastive reduplication; see Kimper (2008).)

The morpheme *ki* causes the target constituent to undergo copy and merger into the same node. The trees below illustrate such a derivation for *puli kili* 'tigers and such':

(83) Example of Tamil ER: [puli kili] ‘tigers and such’



As in other cases of echo reduplication, the competition to serve as the expression of $\&^0$ between *ki* and the phonological structure merged into the same constituent with it is determined by the constraint ALIGN-L($X^{-0}$,$X^0$). Just as in Hindi, that constraint dominates UNIFORMITY in Tamil, causing coalescence between the two morphemes. The selection of the correct output is shown below.

(84) Tableau for [puli kili] ‘tigers and such’:

| M: [$_{\&^0}$ &C TIGER]<br>P: ki, kii puli | ALIGN-L | REALMORPH | ID[length] | UNIF |
|---|---|---|---|---|
| a. puli | | *! | | |
| b. pili | *! | | | * |
| c. kiili | | | *! | ** |
| ☞ d. kili | | | | ** |

This coalescence is not directly observable in the onset, because the first onset of the target is completely overwritten by the *k* of the reduplicative morpheme. But the coalescence is detectable when we look at the nucleus of the first syllable, where the length of the fixed vowel *i* corresponds to the length of the nucleus in the first syllable of the target. Similar to the case of Bhojpuri, the simplest analysis is to assume that the reduplicative morpheme has two allomorphs: in this case *ki* and *kii*. The allomorph that best satisfies IDENT[length] for the target vowel (or the corresponding MAX-$\mu$ constraint, depending on our analysis of length) will be chosen:[17]

---

[17] Non-allomorphic analyses depending on constraints like IDENT[length] or MAX-$\mu$ are also quite tenable and equally consistent with my analysis of syntactic reduplication.

(85) Allomorph selection depends on length of the first target nucleus:

| M: [&0 &C SNAKE]<br>P: ki, kii paambu | ALIGN-L | REALMORPH | ID[length] | UNIF |
|---|---|---|---|---|
| a. paambu | | *! | | |
| b. piimbu | *! | | * | * |
| ☞ c. kiimbu | | | | ** |
| d. kimbu | | | *! | ** |

Speakers who avoid ER when the result would have identity (or near-identity) between the two copies have a grammar in which REALIZEMORPHEME (or a version of the same constraint revised to require more than minimal difference) dominates MPARSE. This is shown in the following tableau.

(86) Derivation crashes when trigger not detectable in output:

| M: [&$^0$ &C DREAM]<br>P: ki, kii keeli | ALIGN-L | RM | MPARSE | ID[length] | UNIF |
|---|---|---|---|---|---|
| a. keeli | | *! | | | |
| b. kiili | *! | | | * | * |
| c. kiili | | *! | | | ** |
| ☞ d. ⊙ | | | * | | |

This analysis accounts for the properties of Tamil echo reduplication. In the next section I explore some alternative analyses for Tamil ER and other syntactic reduplication patterns, identifying the differences between them and MR.

## 3.4 Other accounts of syntactic reduplication

In this section I consider a variety of approaches that have been taken in the literature to deal with some or all of the cases that I analyze as syntactic reduplication.

### 3.4.1 Morphological Fixed Segmentism: Alderete *et al.*

Several cases of overwriting reduplication, including Kamrupi ER, were analyzed by Alderete *et al.* (1999). They take these cases to basically have the form Root + Affix + RED. English depreciative reduplication ("shm- reduplication") is analyzed in this way. *šm-* is taken as an independent prefix, which occurs together with a (suffixing) reduplicant in this construction. The correct result falls out out from the basic ranking shown below:

(87) English depreciative reduplication; cf. Alderete *et al.* (1999)

| table + RED + šm | Max-IO | Max-BR |
|---|---|---|
| ☞ a. table šmable | | t |
| b. table table | š!m | |
| c. šmable table | t! | šm |
| d. šmable šmable | t! | |

A similar ranking would select the attested output from a similar set of candidates in Tamil:

(88) Tamil echo words:

| puli + RED + ki | Max-IO | Max-BR |
|---|---|---|
| ☞ a. puli kili | | pu |
| b. puli puli | k!i | |
| c. kili puli | p!u | ki |
| d. kili kili | p!u | |

But some other important candidates are not accounted for by this ranking, such as the following:

(89) Tamil echo word candidates unaccounted for:

| puli + RED + ki | Max-IO | Max-BR |
|---|---|---|
| ☜ a. puli kili | | p!u |
| ☞ b. puli ki-puli | | |

Similar candidates must be considered for English depreciative reduplication as well. For example, the ranking given above does not rule out candidates such as **table shmutable* or **table shmtable*. But whereas such candidates will be ruled out by independently motivated properties of English phonology, the Tamil pattern is much more difficult to motivate.[18]

There is no explanation for the fact that *ki-* never occurs as a prefix without reduplication. If *ki-* and RED are two independent affixes, then the fact that *ki-* can only occur together RED needs further explanation. My analysis does explain this co-occurrence: the morpheme with the phonological shape *ki* also has some property that compels copy and merger resulting in syntactic reduplication.

---

[18] Several of these points about Alderete *et al.* (1999)'s analysis of English depreciative reduplication were first made by Nevins (2005)

Unlike *šm-*, as an affix *ki* would not create phonotactic problems. *[puli-ki-puli] or *[puli-puli-ki] would be well formed and no more marked than [puli-kili]. The only exception is in terms of the number of syllables. Therefore it would be possible to motivate overwriting for the purpose of syllable minimization through proper constraint ranking. But this analysis predicts that overwriting will be a general feature of reduplication; whenever another affix is in the vicinity, we should see it overwriting a similar stretch of the reduplicant rather than occurring outside of the reduplicant. This is not what happens: in fact only one of the six reduplicative processes in Tamil involves overwriting.

The Alderete account does not inherently provide any insight into the length transfer that occurs in Dravidian ER (whereby long first syllables are overwritten with *kii/gii* rather than *ki/gi*). There are ways to extend the Alderete account to these facts. For example, weight identity is accounted for in non-overwriting reduplication through BR segmental correspondence, motivated by constraints like the following:

(90) WEIGHT-IDENT($S_1$, $S_2$):
If $\alpha$ is mono(bi)-moraic and $\beta$ = f($\alpha$), then $\beta$ is mono(bi)-moraic (where $\alpha$ and $\beta$ are segments belonging to strings S1 and S2 respectively). (Urbanczyk, 1996, 214)

This constraint cannot apply to echo words, because the segments with corresponding weights are not themselves correspondents. A version of WEIGHT-IDENT that refers to syllables, or a constraint like MAX$_{BR}$-$\mu$, can explain the transference facts. But note that this theory now requires reference through constraints to prosodic elements – as well a whole family of BR constraints.

By contrast, the theory of syntactic reduplication that I have put forward in this chapter explains the weight transfer straightforwardly. The vowel in the echoed copy corresponds to both of the morphemes that constitute the relevant $X^0$. Vowel length is certainly faithfully maintained in the grammar of Tamil, as vowel length is contrastive in the language. Therefore whether that faithfulness in general is motivated by a WEIGHT-IDENT constraint, by IDENT(length) or by some other means, the same force applies to yield the correct outcome in ER cases. Even if we account for this faithfulness using moraic correspondence and the extra constraints that are necessary for the Alderete account, this syntactic reduplication account avoids the extra theoretical baggage of BR correspondence and BR faithfulness constraints.

The analysis of Alderete *et al.* suggests an explanation for the ineffability or avoidance of completely identical overwriting reduplication (cases where some "repair strategy" interferes with the normal overwriting pattern for words that begin with the overwriting sequence). They suggest that this is a "not too similar" OCP kind of effect. This answer runs into various problems: what about the other five reduplicative processes that do allow total base-reduplicant identity? The appeal to general principles in such an analysis is weakened considerably when there are many patterns that behave differently, which must all be accounted for with many lexically-indexed constraints.

Finally, the Alderete account does not offer any insight into why Tamil echo words never feed compounding or target the components of compounds. If this reduplication really is the result of ordinary affixation and BR faithfulness, then this lack of interaction is unexpected and needs to be explained. On my account, the lack of interaction is due to the fact that the reduplication is driven by syntactic copying rather than affixation. If spellout of phonological structure proceeds in phases or otherwise through stages that leave their internal properties opaque to later operations (a common though not necessary view), a syntactic operation like copy and merger will often be unable to participate in morphophonology (depending on exactly where phase boundaries are located and what the properties of phases are) except to be fed by it.

### 3.4.2 CONTROL: Orgun & Sprouse

Orgun and Sprouse (2002) propose a CONTROL module that rules out certain morphophonological representations; cf. Halle (1973)'s Filter. This is intended to account for problems of ineffability in morphophonology. For example, Tagalog *um*-infixation fails with labial-initial roots:

(91) Failure of *um*-infixation with labial-initial stems:

| | | |
|---|---|---|
| abot | umabot | 'reach for' |
| sulat | sumulat | 'write' |
| misti | – | 'be misty' |

As Orgun and Sprouse (2002) show, MParse entails a fatal ranking paradox here. MParse cannot rule out hyperinfixation, because that does occur to avoid onset violations. But labial-initial *um*- forms are simply ineffable:

(92) Hyperinfixation to avoid OCP violation wrongly predicted:

| um + RED + misti | OCP | MParse | Onset | *Coda | Align |
|---|---|---|---|---|---|
| a. mumimisti | *! | | | * | m |
| b. ummimisti | | | *! | ** | |
| ☜ c. mimistumi | | | | * | mimist |
| d. ⊙ | | *! | | | |

A CONTROL analysis removes MParse and the relevant OCP constraint from consideration by GEN:

(93) Hyperinfixation to avoid OCP violation wrongly predicted:

| um + RED + misti | Onset | *Coda | Align |
|---|---|---|---|
| ☞ a. mumimisti | | * | m |
| b. ummimisti | *! | ** | |
| c. mimistumi | | * | mi!mist |

And CONTROL then culls ineffable candidates that won out in GEN:

(94) CONTROL rules out ineffable forms:

| CONTROL | OCP-*um* |
|---|---|
| ✄ a. mumistumi | *! |

They propose instead a language-specific entry in the CONTROL module that rules out any labial-initial *um*-word. Echo reduplication patterns that are ineffable when they would create total identity are perfect targets for a CONTROL analysis. We can let the overwritten echo form always emerge as the winner from GEN; just in the case where it violates OCP-RED does CONTROL step in and throw out the form altogether:

(95) CONTROL rules out ineffable forms:

| CONTROL | OCP-RED |
|---|---|
| ✄ a. masa-masa | *! |

However, the third class of languages, in which identity is avoided through use of a second-choice fixed consonant, remain problematic. Cases like these are not compatible with an account in which CONTROL simply functions as a filter. What is needed is for CONTROL to remand these forms back to the phonology and to reduplicate again with the second-best allomorph.[19]

Alternatively, we can treat these cases as allomorphy and the second class of languages as cases of ineffability. But this misses the essential unity between them: employing various strategies to avoid total identity. (Witness the change from Yiddish to English.)[20]

### 3.4.3 Anti-faithfulness: Ghaniabadi; Nevins and Wagner

Nevins and Wagner (2001) (analyzing Hindi and other languages) and Ghaniabadi (2005) (analyzing Persian) offer similar analyses relying on Anti-faithfulness to motivate the identity avoidance effects found in many ER patterns.

For example, Ghaniabadi (2005) accounts for the ER pattern in Persian that always involves a fixed labial segment – either *m* or *p*. Although there is some tendency towards *m* serving as the default fixed segment, most cases allow either segment; e.g. *tærazu* ‘scale’ can undergo ER (deriving the meaning ‘scale and so on’) and be realized either as *tærazu-mærazu* or *tærazu-pærazu*. However, identity and near-identity are obligatorily avoided. Words that begin with *m* can only undergo ER with a fixed *p*. And words that begin with a labial stop – whether *p* or *b* – always take fixed *m* in ER.

Ghaniabadi (2005) notes two significant problems encountered by an analysis like that of Alderete *et al.* (1999). In the case of *m*-initial words, ER forms are wrongly predicted to choose the fixed-*m* ER allomorph. In fact, this forms harmonically bounds the attested outcome, which chooses fixed *p* instead (these forms are indicated with the 💣 and ☹ symbols respectively):

---

[19] McCarthy and Wolf (2007) propose an MPARSE-based account that allows for allomorphy and ineffability to compete for morphological expression. However, this account is essentially processual, and it leaves unresolved the problem of cases like Tagalog where MPARSE can not be relevant, but the result is still ineffable.

[20] See also Raffelsiefen (2004) for an extensive critique of the CONTROL proposal.

(96) Identical base and reduplicant in ER wrongly predicted:

| mix + {m-, p-} + RED | MAX-IO | DEP-BR | MAX-BR |
|---|---|---|---|
| 💣 a. mix-mix | | | |
| ☹ b. mix-pix | | *! | * |

In the case of vowel-initial words, the same BR correspondence constraints that militate for total identity between base and reduplicant will motivate selection of a backcopying candidate rather than the actual attested candidate in which the fixed segment occurs only once, on the second copy:

(97) Backcopying wrongly predicted:

| eškal + {m-, p-} + RED | MAX-IO | DEP-BR | MAX-BR |
|---|---|---|---|
| 💣 a. meškal-meškal | | | |
| ☹ b. eškal-meškal | | *! | * |

To solve these problems, Ghaniabadi offers an analysis that makes use of the idea of Transderivational Anti-Faithfulness (TAF) (Alderete, 2002). Abandoning the idea of Alderete *et al.* (1999) that MFS reduplication patterns involve non-correspondence between the base and the fixed segment morpheme, Ghaniabadi assumes that the first onset of the base and the first onset of the reduplicant crucially do correspond. Given this correspondence, non-identity is achieved through the intervention of a TAF constraint, for which the fixed-segment morpheme subcategorizes (Ghaniabadi, 2005, 7):

(98) ¬OO-IDENT(Onset): It is not the case that corresponding segments in the word onset of the base and the reduplicant are identical.

Because *m* and *p* are both listed allomorphs for the morpheme, either one may be chosen without incurring any additional faithfulness violations. Selection of the correct forms can therefore proceed successfully just by ranking the anti-faithfulness constraint over its non-TAF counterpart, OO-IDENT(Onset):

(99) Non-identity in ER correctly predicted:

| mix + {m-, p-} + RED | ¬OO-ID(Onset) | OO-ID(Onset) |
|---|---|---|
| a. mix-mix | *! | |
| ☞ b. mix-pix | | * |

Backcopying is avoided through similar means. Non-copying of the fixed segment prevents total identity of the base and reduplicant (including the first onsets, which are the formally crucial non-identical segments), and selecting another allomorph offers no advantage because

IO Faithfulness is already fully satisfied, and BR faithfulness is not enhanced by the addition of a non-identical corresponding onset:

(100) Avoidance of backcopying in ER correctly predicted:

| eškal + {m-, p-} + RED | ¬OO-ID(Onset) | OO-ID(Onset) |
|---|---|---|
| a. meškal-meškal | *! | |
| ☞ b. eškal-meškal | | * |

The anti-faithfulness analysis of Ghaniabadi (2005) successfully accounts for the pattern found in Persian and can apply to languages with similar patterns and characteristics. A further advantage for this theory is the possibility of extension to account for languages like Turkish in which echo reduplication fails altogether with words that begin with the same segment as the fixed segment characterizing the pattern. If the Persian pattern arises through the constraint ranking ¬OO-IDENT ≫ OO-IDENT and a fixed-segment affix with multiple allomorphs, then an affix with only one allomorph and the ranking ¬OO-IDENT ≫ {MPARSE, OO-IDENT} will produce a construction in which the null parse is chosen rather than allowing the two copies to be identical. This is essentially the pattern found in Turkish.

However, along with its advantages, this theory comes with certain costs as well. The theory of transderivational anti-faithfulness requires significant additional theoretical machinery, and is not the most parsimonious theoretical move available to solve this problem alone. If TAF is accepted, the implementation given by Ghaniabadi (2005) requires further formalization that may necessitate missing important generalizations. The pattern found in Persian requires non-identity of onsets between the base and reduplicant. This analysis will not account for the pattern in dialects of Tamil that reject echo words identical to their bases, because this pattern depends on the non/identity of syllables rather than syllable onsets. In Vietnamese pejorative reduplication, it is identity of final syllable rimes that must be avoided. TAF analyses of these languages will require analysis of different correspondences (which may not be clearly identifiable with the prominent positions of ordinary positional faithfulness); it does not explain why the area of affix placement and the identity requirement is always peripheral. In a TAF typology of echo reduplication, we expect to find initial-syllable rimes and final-syllable onsets being checked for identity as well as the reverse. But this is not what occurs: overwriting and identity requirements occur only at the edges. Indeed, when initial-syllable rimes are relevant, it is exactly in cases where the affixation is large enough to include that portion of the word (as in Tamil with its syllable-sized fixed segmentism), or in cases where affixation compels deletion (as in Bhojpuri); this is unexplained by TAF.

A practical problem with TAF as a theory of reduplication is noted by Kurisu (2005), who demonstrates that TAF wrongly predicts the existence of what he calls anti-templatic reduplication. Consider a language with only CV syllables, and the rankings MAX-IO ≫ ¬MAX-IO and ¬MAX-BR ≫ MAX-BR. Reduplication in such a language will take the form of a reduplicant that is always one syllable shorter than its base, regardless of exactly what that length is. The following tableaux illustrate the pattern:

(101) Hypothetical anti-templatic reduplication:

a.

| badu + RED | ¬MAX-BR | MAX-BR |
|---|---|---|
| a. badu-badu | *! | |
| ☞ b. badu-ba | | ** |

b.

| badupi + RED | ¬MAX-BR | MAX-BR |
|---|---|---|
| a. badupi-badupi | *! | |
| ☞ b. badupi-badu | | ** |
| c. badupi-ba | | ***!* |

c.

| badupiko + RED | ¬MAX-BR | MAX-BR |
|---|---|---|
| a. badupiko-badupiko | *! | |
| ☞ b. badupiko-badupi | | ** |
| c. badupiko-ba | | ***!*** |

The prediction of this nonexistent pattern illustrates the overgeneration of reduplicative types that occurs if TAF is employed as a reduplicative theory.

More generally, TAF shares many of the problems of the Alderete *et al.* (1999) analysis, with which it shares many assumptions. These analyses treat echo reduplication patterns as a phonological process, with FAITH-BR constraints maximizing the relationship between the base and reduplicant. They fail to account for the syntactic properties of these patterns that distinguish them from morphological reduplication, such as the fact that the targets are syntactic, often larger than single words, and the fact that these patterns do not feed other morphophonology the way other phonological phenomena do. Adopting TAF therefore does not provide a complete analysis of syntactic reduplication.

Using arguments similar to Ghaniabadi (2005), Nevins and Wagner (2001) analyze Hindi echo reduplication and conclude argue that the non-identical base and reduplicant onsets actually do correspond. However, rather than formalizing this idea in the framework of TAF, they sketch an analysis of Hindi ER that follows the theory of reduplication laid out by Raimy (2000) which analyzes reduplication as looping precedence relationships. This analysis is only roughly sketched and a detailed discussion of it is therefore not possible. However, the general framework in which it is advanced is one that is problematic as a general theory of reduplication; see discussion of this subject in chapter 4.

# CHAPTER 4

# Theoretical context

In this chapter I explore some of the most important contemporary theories of reduplication, and compare those theories and their predictions with Minimal Reduplication and its predictions. In section 1 I consider several theories within the mainstream OT Base-Reduplicant Correspondence Theory, including Generalized Template Theory and templatic reduplication; reduplication through REALIZEMORPHEME or an equivalent force; Morphological Doubling Theory; and reduplication through readjustment of phonological precedence relations. In section 2 I explore in some depth a reduplicative construction in Samala that has been a central example for several of these theories. I present a MR analysis of the facts, and contrast it with previous analyses of the same data.

## 4.1 Other theories of reduplication

Important early generative theoretical work on reduplication includes Wilbur (1973); Munro and Benson (1973); Moravcsik (1978); Carrier (1979); McCarthy (1979); Shaw (1980) and Marantz (1982). In Optimality Theory, issues of reduplication helped lead to the development of correspondence theory (McCarthy and Prince (1995)), which has grown to have implications far beyond the area of reduplication. The original Base-Reduplicant Correspondence model has been extended or revised in various ways in subsequent work, such as the Existential Faithfulness framework of Struijke (2000), and Generalized Template Theory (Spaelti (1999), McCarthy and Prince (1999)), the most prominent contemporary OT framework for analyzing reduplication.

Other recent theories have challenged the basic correspondence model of McCarthy and Prince (1995), both within and outside the framework of Optimality Theory. OT models without RED include Baker (2003), Kawahara (2001), Elfner and Kimper (2008) and particularly Raimy and Idsardi (1997), which appears to have been the first attempt to theorize RED-less reduplication according to Minimalist ideas (although with important differences from MR). Kurisu (2001) analyzes reduplication in line with other nonconcatenative morphology, as a phenomenon arising due to a drive for morpheme realization. Other significant recent contributions include Inkelas and Zoll (2005) (proposing a reduplicative framework orthogonal to OT) and Raimy (2000) (which rejects OT).

### 4.1.1 Mainstream OT: Base-Reduplicant Correspondence Theory

McCarthy and Prince (1995) laid the foundations for most work on reduplication in the framework of Optimality Theory. Continuing to develop the observation of Marantz (1982) that reduplication shares many properties in common with affixation, McCarthy and Prince (1995) claim that reduplication occurs when a special phonologically empty RED morpheme is present. The major novel element of McCarthy and Prince's analysis is the idea that the two copies are related to one another in a systematic way through a special Base-Reduplicant correspondence relationship. Identity between the strings is enforced (not necessarily perfectly) through BR faithfulness constraints. There is always a tendency towards maximal reduplication, due to the force of the constraint MAX-BR. However, other forces often intervene and prevent full reduplication. For McCarthy and Prince (1995), following the ideas of Prosodic Morphology (McCarthy and Prince, 1986/1996), these forces are typically constraints that stipulate reduplicant size, e.g. RED=$\sigma$.

Chang (1998) gives an example of such an analysis for a reduplication pattern found in Thao (Austronesian, Taiwan). This pattern, known as Ca- reduplication, involves the reduplication of the first consonant in the target stem, followed by a fixed *a*:[1]

(1) Thao Ca- reduplication:

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| diplhaq | ma-da-diplhaq | 'muddy all over; covered with mud' |
| buqnur | pashi-ba-buqnur | 'anger, hatred' |
| pa-lhinuna | ma-lha-lhinuna | 'to talk, speak' |
| kalagkan | pish-ka-kalagkan | 'to writhe; to twist and turn' |
| rusaw | tu-ra-rusaw | 'odor of fish' |
| cumay | tu-ca-cumay | 'odor of a bear' |
| cpiq | ca-c-um-piq | 'to keep swatting or beating' |
| qaran | pish-qara-qaran | 'to rejoice in s.o. else's misfortune' |

Chang views the relationship between the reduplicant and the base in these cases as one mediated by Base-Reduplicant correspondence, with the shape of the reduplicant emerging through the interaction of Base-Reduplicant faithfulness constraints with standard markedness constraints. In this case the relevant constraints are RED $\leq \sigma$, NO-CODA and **i, u*. The interaction of those constraints can yield Ca- reduplication:

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[1] Thao data are given in the orthography used by Chang. *q* represents a voiceless pharyngeal stop. Letters *c* and *g* represent IPA $\theta$ and ŋ respectively. Digraphs *lh* and *sh* represent IPA ɬ and ʃ respectively.

(2) Ca- reduplicate in Thao: *ma-da-diplhaq* ‘muddy all over’

| ma + RED + diplhaq | RED ≤ $\sigma$ | *CODA | **i, u* | MAX-BR |
|---|---|---|---|---|
| ☞ a. ma-da-diplhaq | | * | i | ***** |
| b. ma-di-diplhaq | | * | i i! | **** |
| c. ma-dip-diplhaq | | **! | i i | *** |
| d. ma-diplha-diplhaq | *! | * | i i | * |

In subsequent work such templatic constraints are often abandoned. In particular, the Generalized Template Theory of reduplication attempts to derive reduplicative shape largely from principles of general markedness and in particular to explain cases of incomplete reduplication as examples of the emergence of the unmarked (TETU). In recent work some authors have challenged the GTT and advocated for a return to a template-based BRCT theory of reduplication. I consider the merits of each of these positions below.

#### 4.1.1.1 Generalized Template Theory

The Generalized Template Theory of reduplication (Spaelti (1999), McCarthy and Prince (1999), Ito *et al.* (1996), Urbanczyk (1996) and Alderete *et al.* (1999) *inter alia*) analyzes templatic reduplication without explicit templatic constraints. In GTT, templatic and a-templatic reduplication patterns alike arise from the interaction of basic well-motivated constraints, the reduplication-specific FAITH-BR constraints, and a segmentally empty RED morpheme. Because of pressure from FAITH-BR constraints, especially MAX-BR, reduplication is maximal by default; therefore full reduplication occurs when no other markedness constraints intervene. When they do intervene, we see various non-full reduplicative patterns. In particular, various constraints that are effectively anti-structure in nature are used to control reduplicant size, such as ALL-$\sigma$-L or ALL-FT-R to limit reduplicant size, *CODA and *COMPLEX to simplify reduplicant structure, etc.

For example, Kurisu and Sanders (1999) analyze nominal reduplication in Mangarayi (Gunwingguan; Northern Territory, Australia). Roughly speaking, this construction involves the reduplication of an internal VCC sequence, as shown below:[2]

(3) Mangarayi nominal reduplication:

| *Base* | *Reduplicated form* | *Glosses* | |
|---|---|---|---|
| guɾjag | guɾjuɾjagɟi | ‘lily’ | ‘having a lot of lilies’ |
| gaɳɟi | gaɳɟaɳɟiji | MMBC, MMBSSC | pl. |
| gambuɻa | gambambuɻaji | MB, ZC | pl. |
| banban | banbanban | ‘woomera’ | ‘having woomera’ |

Kurisu and Sanders motivate the infixation of the reduplicant through the interaction of two

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[2] Following Kurisu and Sanders (1999), glosses for kinship terms use the following abbreviations: M = mother, B = brother, Z = sister, C = child, and S = son, with sequences being read as sequential possessives. Thus for example MMBC is “mother’s mother’s brother’s child.”

constraints, with ALIGN-L(RED, Pwd) dominated by ANCHOR-L(IO). With this established, it is still necessary to limit the size of the reduplicant in order to avoid total reduplication. The constraint that accomplishes this is ALLσLEFT (Mester and Padgett, 1994), which effectively penalizes the addition of new material that adds additional syllables to a word. This constraint is placed in a classic TETU ranking (i.e. FAITH-IO ≫ MARKEDNESS ≫ FAITH-BR) by being sandwiched between MAX-IO and MAX-BR. This ensures that words of more than one syllable can surface, but the reduplicant cannot add any more syllables to the word:[3]

(4) Mangarayi nominal reduplication limited to one syllable:

| guɾjag, RED | MAX-IO | ALL-σ-*Left* | MAX-BR |
|---|---|---|---|
| ☞ a. g-$\underline{\text{uɾj}}$-uɾjag | | */** | g/ag |
| b. g-$\underline{\text{uɾ}}$-uɾjag | | */** | g/jag! |
| c. g-$\underline{\text{uɾjag}}$-uɾjag | | */**/***! | g |
| d. g-$\underline{\text{uɾ}}$-uɾj | ag! | * | g |

GTT offers several advantages over theories that rely on reduplication-specific templatic constraints. The absence of templatic constraints eliminates is intended to eliminate the Hammond-Kager Conundrum (HKC). The HKC refers to the prediction of templatic backcopying that afflicts templatic BRCT analyses of reduplication. In certain permutations, templatic constraints plus BR faithfulness constraints lead to the base being truncated in order to match a reduplicant which is kept small for markedness reasons, e.g.:[4]

(5) Illustration of the Hammond-Kager Conundrum (cf. Riggle (2006) ex. 59):

| RED + $\sigma_1\ \sigma_2\ \sigma_3$ | RED=σ | MAX-BR | MAX-IB | MAX-IR |
|---|---|---|---|---|
| a. $\underline{\sigma_1}\ \sigma_1\ \sigma_2\ \sigma_3$ | | *!* | | ** |
| ☞ b. $\underline{\sigma_1}\ \sigma_1$ | | | ** | ** |
| c. $\underline{\sigma_1\ \sigma_2}\ \sigma_1\ \sigma_2$ | *! | | * | * |
| d. $\underline{\sigma_1\ \sigma_2\ \sigma_3}\ \sigma_1\ \sigma_2\ \sigma_3$ | *!* | | | |

GTT avoids the HKC because there are no templatic constraints controlling reduplicant size. BR correspondence remains a force that could compel backcopying; however, the size of the reduplicant will be determined by general properties of the language. Therefore a force that compels the reduplicant to minimize its size will independently apply to the base, and in other constructions – in other words it will be a general property of the language rather than a backcopied behavior.

GTT parsimoniously explains the fact that the templates in templatic reduplication are gen-

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[3] The fact that the reduplicant can add a single syllable must be accounted for through a constraint enforcing morpheme realization or some other means.

[4] See McCarthy and Prince (1999) for more discussion.

erally identical to (relatively) unmarked prosodic shapes by relying on independently motivated constraints to control reduplication shape. It also unites templatic reduplication cases with full reduplication cases and with cases where a single reduplicative morpheme surfaces with different sizes or shapes in different words, but always in a way that is contextually unmarked (Spaelti (1999) analyzes a language of this type, Nakanai, at considerable length).

However, GTT encounters serious challenges in several regards. Using TETU to motivate reduplicant shape leads to predictions of unattested languages. GTT does not offer any explanation for the differences between morphological and syntactic reduplication patterns. GTT also does not allow an explanation for cases in which reduplication seems to compete with other phonological repairs to express a given morphosyntactic structure. I explore each of these problems below.

GTT aims to analyze reduplicative behavior without specifying any phonological information about the reduplicant's shape in the lexicon. The specific reduplication pattern exhibited by a particular language depends entirely on the constraint ranking that holds in that language. However, many languages exhibit multiple distinct reduplicative patterns; these cannot all fall out from the same constraint ranking. To account for these cases, GTT typically must make use of lexically-indexed constraints. This is consistent with the theory, but it undercuts the idea that reduplication can be fully explained without lexical specification.[5]

The prominent attention paid to TETU in GTT is important, since TETU does play a very significant role in reduplicative processes. However, GTT makes no distinction between templatic cases (where TETU has a powerful effect) and reduplication of arbitrary size (where TETU patterns do not occur). For example, McCarthy and Prince (1999) analyze a pattern in Balangao (Austronesian; Philippines; Shetler (1976)) in which the "reduplicant copies the first two syllables of the base, minus the final coda" (272). The following tableau illustrates this pattern:

(6) TETU removes final coda in Balangao (cf. McCarthy and Prince (1999) ex. 55):

| red + tagtag | Max-IO | Contiguity | *Coda | Max-BR |
|---|---|---|---|---|
| ☞ a. tagta-tagtag | | * | *** | * |
| b. tagtag-tagtag | | * | ****! | |
| c. tata-tagtag | | **! | ** | ** |
| d. tata-tata | *!* | *** | | |

McCarthy and Prince (1999) also note that Contiguity must be active here, to preserve the medial coda in the reduplicant. A presumably possible lower ranking would lead to reduplication in which no codas at all occur. But as Raimy (2000) observes, we never find such a TETU effect with full reduplication. The following unattested example illustrates a pattern whose existence is predicted by GTT:

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[5] Kennedy (2008) proposes a development within GTT that attempts to resolve this problem by connecting different reduplicative patterns to the location of morphemes relative to stem boundaries. However, this theory also encounters difficulties. See discussion in fn. 9 below.

(7) Unattested TETU in full reduplication (cf. Raimy (2000) ex. 144):

| RED + tagtagtag | MAX-IO | *CODA | MAX-BR | CONTIGUITY-IO |
|---|---|---|---|---|
| a. tagtagtag-tagtagtag | | ****!** | | |
| b. tagtagta-tagtagtag | | ****!* | * | |
| ☞ c. tatata-tagtagtag | | *** | *** | ** |
| d. tatata-tatata | *!** | | | ** |

This problem does not arise in MR, which sees patterns of reduplication involving copying arbitrary phonological size as instances of syntactic rather than morphological reduplication. In those cases, a morphosyntactic head or constituent is spelled out twice, but in each case only the normal phonology of the language applies. Therefore codas will only be ruled out in the reduplicant if they are prohibited in the language in general, in which case they would not occur in the base to begin with.

GTT also must contend with counterexamples to its prediction that reduplication should always take either the largest possible or the contextually least marked form (depending on the relative rankings of markedness constraints and FAITH-BR). Gouskova (2007) presents data from Tonkawa, where reduplication takes the form of a light syllable – even though heavy syllables can be shown to be contextually less marked, and would better satisfy MAX-BR. Similarly, Tuvan exhibits multiple different FSR patterns with non-default fixed segments (Harrison and Raimy, 2004). Examples such as these suggest that lexical specification may play a role in determining reduplicant shape, even when the chosen shape is cross-linguistically unmarked.

Like its predecessors in OT and in rule-based phonology, GTT sees reduplication *per se* as a phonological goal. This makes it difficult to account for cases where a single morpheme triggers reduplication in some words, but some other process in other words. These cases are especially difficult when reduplication is not the default choice, but rather something that is resorted to only when the language fails to express the morpheme when every other way is blocked. We find exactly such a case in Kwak'wala, where the suffix -*m̓ut* triggers stem lengthening whenever possible; just when lengthening is blocked, reduplication is triggered instead.

Minimal Reduplication aims to preserve the important insights of GTT while avoiding the obstacles mentioned above. The fact that TETU plays a prominent role is incorporated into the analysis, but it does not rely on the relative ranking of FAITH-BR constraints, whose existence is rejected. Instead, it follows from the inherent minimality of reduplication. Markedness constraints that are not powerful enough to overcome faithfulness constraints like MAX-IO get a second bite at the apple when reduplication would introduce new copies of underlying segments that are expressed elsewhere in the word.

For example, Tagalog (Austronesian; Philippines; Llamzon (1966); Carrier (1979)) allows complex onsets, but simplifies them in reduplicative contexts. Thus stem *trabaho* reduplicates as *(ka-)ta-trabaho* 'just finished working' (McCarthy and Prince (1986/1996)). An MR analysis of this TETU effect would use a constraint ordering like the one in the following tableau:

(8) Cluster simplification in Tagalog reduplication:[6]

| $\sigma$ + trabaho | Max-IO | *Complex | Contiguity | Integrity |
|---|---|---|---|---|
| ☞ a. ta-trabaho | | * | ** | ** |
| b. tra-trabaho | | **!* | * | *** |
| c. trabaho-trabaho | | **!* | * | ******* |
| d. ta-tabaho | *! | | *** | ** |

The permutations available with these constraints yield desirable outcomes for other languages. If *Complex moves up the hierarchy to dominate Max-IO, clusters in general will be prohibited in the language. Clusters will not be found in basic surface forms nor in underlying representations (through Stampean Occultation; Stampe (1973); Prince and Smolensky (1993/2004); cf. Ito *et al.* (1995)), and will be similarly prohibited from appearing in reduplicative forms.

A non-TETU ordering obtains if we reverse the ordering of *Complex and Contiguity instead. This predicts a language in which clusters surface faithfully in basic forms and in reduplicative forms, due to a higher priority placed on maintaining underlying segment order. Exactly such a case is found in closely-related Ilokano, where the related form *trabaho* reduplicates with a cluster, as in *(ʔag-)trab-trabaho* 'is working' (Hayes and Abad, 1989). (9) shows how this reversal yields the correct result for Ilokano:

(9) Clusters reduplicate in Ilokano:

| $\sigma_{\mu\mu}$ + trabaho | Max-IO | Contiguity | *Complex | Integrity |
|---|---|---|---|---|
| a. tab-trabaho | | **! | * | *** |
| ☞ b. trab-trabaho | | * | *** | **** |
| c. trabaho-trabaho | | * | *** | *****!** |
| d. tab-tabaho | *! | *** | | *** |

Thus the presence and the absence of TETU effects (where appropriate) can be modeled without reference to Faith-BR constraints.

Another HKC problem arises even within GTT unless core assumptions of the theory are changed, as pointed out by Riggle (2003). In GTT, if Integrity penalizes reduplication of segments (as it must unless it is redefined specifically in order to avoid this problem), then the domination of Integrity over Max-BR will lead minimized. But if Max-BR also dominates the IO faithfulness constraints then both constituents will shrink as far as possible in order to best satisfy the constraints, thus recreating templatic backcopying:

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[6] I assume here that reduplication and deletion each result in Contiguity violations. This issue is somewhat more complicated if we follow custom by dividing Contiguity into I-Contiguity and O-Contiguity, but the correct result can still be achieved with substantially the same analysis.

(10) Pathological reduplication with Integrity ≫ Max-BR ≫ Max-IO

| red + badupi | Integrity | Max-BR | Max-IO |
|---|---|---|---|
| a. badupi-badupi | ***!** | | |
| b. badu-badupi | ***!* | ** | |
| c. ba-badupi | ** | *!** | |
| ☞ d. ba-ba | ** | | **** |

Riggle (2006) also notes another problematic class of candidates, in which output material shifts from the base into the reduplicant in order to escape the pressure of Faith-BR. This predicts reduplication patterns in which the phonology of a stem is radically different just when reduplication of that stem occurs. To avoid these problems, Riggle redefines Integrity to refer only to cases where the multiple correspondents of an input segment occur within the same morpheme; informally: “If an element of S1 has multiple correspondents in S2 they must be in different morphemes.”

Although this will avoid some of the problems that arise in BRCT, it is not clear what principled motivation exists to define Integrity in this way that makes it quite different from other correspondence constraints like Max or Dep. MR avoids this problem and retains the original definition of Integrity.

The insight behind GTT accounts of a-templatic reduplication or reduplicative morphemes with many different shapes is not incompatible with MR. GTT crucially observes that these patterns do not strive to create a particular shape; they strive to create the contextually least marked reduplicative form. The shape assumed in these cases is driven by constraints that are not specific to reduplication, and this logic applies equally well in an MR analysis. All that is lacking is a motivating force for reduplication to occur, since no empty prosodic structure triggers the phenomenon. But it is possible to call on other pressures, such as RealizeMorpheme.

Combining these theories in this way does not endanger parsimony; both theories are striving to analyze reduplication without extraneous or redundant theoretical machinery. Although MR cannot adopt the framework of GTT *in toto*, it does aim to take advantage of its strong points, albeit in a more parsimonious way and more widely applicable way.

#### 4.1.1.2 Templatic reduplication

Gouskova (2007) revives the idea that explicit templates tied to specific morphemes are necessary to account for reduplication. Gouskova does strive to derive these templatic forces from independently motivated phonological constraints, rather than simply asserting the existence of constraints like red$\leq \sigma$, so her theory can be seen as an attempt to recuperate some of the valuable ideas of the Prosodic Morphology theory that were maintained by McCarthy and Prince (1995).

Gouskova bases her claims on an analysis of reduplication in Tonkawa (Coahuiltecan; Texas; Hoijer (1933, 1946, 1949)). Tonkawa reduplication is prefixing and takes the shape CV. Gouskova argues that a GTT analysis of these facts cannot succeed because the CV shape of the reduplicant is not the least marked shape in that position in Tonkawa. As Gouskova shows, there is no limit on the size of prefixes in general in the language. Moreover, the unmarked state of initial syllables is actually to be heavy rather than light, with productive lengthening of the initial syllable (whether belonging to a stem or a prefix) in general. This lengthening fails to occur only in the case of reduplication.

Reduplicants are thus contextually marked in that they are light, never having a long vowel or coda, regardless of the length of the base vowel or the availability of a consonant to serve as a coda. Since heavy syllable reduplication would be less marked, and since it will better satisfy MAX-BR, the fact that CV reduplication is the actually selected outcome cannot be explained under GTT.

Gouskova's major observation – that reduplicants do not always have the least marked possible shape – is a very important one. Appeals to general principles of markedness in order to explain the behavior of particular morphology can be compelling. But within Optimality Theory, it is always necessary to remember that markedness is not only general, it is also specific. Interactions between markedness and faithfulness constraints may create structures that are marked from some perspectives even though they are unmarked from others; any appeal to markedness must take these local conditions into account.

MR is also informed by an awareness of this role of local markedness and its limitations in accounting for attested reduplication patterns. However, despite some similarities there are important differences between the templatic analysis of Gouskova (2007) and MR. Gouskova continues to make use of the base and reduplicant constituents and FAITH-BR constraints; therefore the problems that we have already seen with these devices remain.

Gouskova notes that the existence of templatic constraints plus FAITH-BR constraints leads to the prediction of templatic backcopying – the Hammond-Kager Conundrum. She takes this to be advantageous, pointing to what appears to be just such a case of templatic backcopying in Tonkawa. This is the failure of syncope to occur in reduplicative forms. Syncope applies regularly in Tonkawa, producing heavy syllables – the unmarked syllable type in the language. In reduplicative forms, syncope often fails to apply, which Gouskova takes to be a kind of templatic backcopying (as syncope would erode the identity between the two copies). However, this process appears to be much more idiosyncratic than this generalization would suggest. As Gouskova notes, in the attested Tonkawa data syncope fails to apply when conditioned in 33 reduplicative examples, but it does apply in 17 other reduplicative forms. Such a high rate of exceptions suggests that lexical specification or memorization may play a role in these cases comparable to that of productive morphophonology.

This Tonkawa example belongs to body of recent work in which Hammond-Kager is considered to be a valid prediction rather than a conundrum. See also Downing (2000) on Kinande; and Caballero (2006) on Guarijio. This claim is of course contrary to that of MR, which denies reduplicative backcopying altogether; see discussion on this point in chapter 1. Because of similar issues concerning the productivity or generality of each of these examples, their status as persuasive cases of templatic backcopying is questionable. For example, Caballero (2006) makes the case for truncatory backcopying in Guarijio; however, while the alternation itself looks compelling, the fact that it is limited to just a few dozen verbs calls into question whether the process is productive at all.

Another case in which templatic backcopying appears to occur is Japanese, in the context of renyookei reduplication (Kageyama, 1977; Poser, 1990; Ito, 1990; Kurisu, 2005; Shibasaki, 2005).[7] Japanese normally allows words of many lengths, including numerous monomoraic forms (at least among Yamato words) such as *i* 'stomach', *o* 'tail', *ka* 'mosquito' and *yu* 'hot water' (Kurisu, 2005, 180). Although these forms normally surface without any moraic augmentation, there are certain constructions in Japanese that do entail augmentation of words to at least a bimoraic minimum; these include mimetic reduplication and the language game zuuzya-go. Another of these is renyookei reduplication, which derives verbs with a meaning of 'while doing [verb].' Formation of renyookei verbs involves duplication of the entire verb:

(11) Renyookei verbs: (Ito, 1990, 226)

| *Base* | *Derived form* | *Gloss* |
|---|---|---|
| tabe | tabe-tabe | 'while eating' |
| nak(i) | naki-naki | 'while crying' |
| odor(i) | odori-odori | 'while dancing' |

When a renyookei form is derived from a monomoraic verb, both copies surface with a lengthened vowel (and are therefore each bimoraic):

(12) Renyookei verbs from monomoraic bases: (Kurisu, 2005, 179)

| *Base* | *Derived form* | *Gloss* |
|---|---|---|
| mi | mii-mii | 'while seeing' |
| ne | nee-nee | 'while sleeping' |
| si | sii-sii | 'while doing' |

As Kurisu (2005) shows, this lengthening is prohibited with non-derived instances of a monomoraic verb, but required with renyookei forms:

(13) a. seNtaku-o si/*sii, sigoto-o hazimeta
washing-ACC do work-ACC started
'After doing laundry, I started my job.'
b. seNtaku-o sii-sii, sigoto-o hazimeta
washing-ACC do-RED work-ACC started
'I started doing my job, doing laundry.'

Kurisu analyzes these as cases of backcopying, but instead of involving a shape determined by templatic constraints, it is motivated here by the self-conjunction of FTBIN. The general low ranking of FTBIN allows monomoraic forms to surface normally, but words that violate the constraint twice are prohibited. This would allow a reduplicative form in which one copy lengthens while the other remains short; this is avoided by the force of IDENT-BR-$\mu$. The following tableau illustrates this analysis:

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[7] Thanks to Armin Mester for bringing this case to my attention

(14) Analysis of renyookei monomoraic forms (Kurisu, 2001, 188):

| si-RED | Ident-BR-$\mu$ | FtBin & FtBin | Dep-IO-$\mu$ | FtBin |
|---|---|---|---|---|
| a. (si)-(si) |  | *! |  | ** |
| b. (si)-(sii) | *! |  |  | * |
| c. (sii)-(si) | *! |  | * | * |
| ☞ d. (sii)-(sii) |  |  | * |  |

However, the generality of this analysis is compromised by the fact that constraints must be relativized to the particular reduplicative morpheme in question. While renyookei reduplication involves lengthening and backcopying, mimetic reduplication involves augmentation of only one of the two copies; and this lengthening is achieved through ʔ-insertion rather than lengthening:

(15) Monomoraic mimetic reduplication:

| *Base* | *Derived form* | *Gloss* |
|---|---|---|
| do | do-doʔ | ‘at a breath’ |
| bi | bi-biʔ | ‘tingly’ |
| zu | zu-zuʔ | ‘forcefully’ |

In order to produce different results for two reduplicative patterns in one language using the framework of GTT, Kurisu (2005) divides the constraint Dep-BR-seg into two constraints: one general constraint of the same name, and one version called Dep-BR-seg$_S$ that applies only to BR relationships involving the renyookei reduplicative morpheme (with S standing for “simultaneity”). With Dep-IO-seg and Dep-BR-seg$_S$ dominating Dep-IO-$\mu$, backcopying will occur in the renyookei construction, while the ranking of Dep-IO-$\mu$ above Dep-BR-seg ensures that backcopying will not be forced in general.

Minimal Reduplication will take a rather different view of these data. Backcopying remains an impossibility in morphological reduplication according to MR, and its existence in Japanese would substantially weaken the theory. However, it is not necessary to treat these data as backcopying. Indeed, some authors have already proposed to do so. For example, Ito (1990) states that “Intuitively, it appears that the base must be a valid prosodic unit before it can be mapped onto another prosodic template in reduplication.” This amounts to treating the apparent backcopying as the result of overapplication through the application of one rule (lengthening to create a word of the minimal size for derived words) before the other (reduplication). Augmentation of monomoraic forms in a derived context is common in Japanese.

On an MR analysis, much of this essentially processual view of the data can be maintained. Renyookei must be a case of syntactic reduplication, as indicated by its unbounded phonological size. If some force compels the reduplicant (i.e. the copy created by merger) to lengthen, there is no way to transfer that length to the base (i.e. the other copy); but if the base lengthens before the merger and copy occurs, then the attested behavior is straightforward. This will occur if the trigger morpheme responsible for renyookei copy and merger targets a derived verb. It will then only occur with verbs embedded in such a frame; by the general phonology of Japanese, lengthening of monomoraic stems will occur in that context. This analysis requires stipulation only for lexical idiosyncrasies, which is exactly where stipulation should occur. (An alternative analysis in which the trigger morpheme selects a target which constitutes a well-formed prosodic word may also be entertained, and will accomplish essentially the same thing as this derived word analysis. In either case, renyookei does not constitute a compelling counterexample to Minimal Reduplication.)

### 4.1.2 Morpheme Realization

A quite different approach to accounting for reduplication comes from theories of reduplication as morpheme realization. Seeing a reduplicant as the expression or realization of a morpheme is of course common to most theories of reduplication; but some authors have observed that particular theoretical frameworks – particularly Optimality Theory – allow reduplication to emerge as a least-marked morpheme realization process without any special reduplicative morphology or phonology, if we grant morpheme realization the force of a phonological constraint.

Such a theory of morpheme realization is developed by Kurisu (2001), who proposes accounting for nonconcatenative morphology through a REALIZEMORPHEME constraint. REALIZEMORPHEME requires that each morpheme added to a word have some impact on the shape of the word. This impact may be achieved through adding or deleting segments or features, through metathesis, or a variety of other possible changes. The particular change associated with a given morpheme will be the most harmonic change possible, depending on the ordering of constraints in the language.

Kurisu includes reduplication among the phenomena that may be analyzed by morpheme realization theory. He examines how morpheme realization theory can motivate complex patterns in which reduplication interacts with and competes with other phonological processes. For example, the actual aspect in Saanich (Straits Salishan; Washington and British Columbia; Montler (1986, 1989)) is expressed in one of three ways: reduplication, metathesis, or ʔ-infixation (Montler, 1989). These patterns are predictable in the sense that the shape of the stem reliably determines which form the actual aspect will take.

Kurisu shows that a single constraint ordering with active REALIZEMORPHEME and an actual aspect whose underlying form is ʔ will suffice to predict the correct behavior in all cases. For example, reduplication occurs with stems of the shape CVC or CVCC. The following tableau illustrates the selection of the reduplicative candidate in these cases:

(16) Reduplication in the Saanich actual aspect (Kurisu, 2001, 161):

| qen’ | RM | *Cplx(ons) | *Cplx(coda) | Lin | Integ | Contig |
|---|---|---|---|---|---|---|
| a. qen’ | *! | | | | | |
| b. qeʔn’ | | | *! | | | * |
| c. eqn’ | | | *! | * | | |
| d. qn’e | | *! | | * | | |
| ☞ e. qe-qen’ | | | | | ** | |

The same constraint ranking also derives metathesis and ʔ-insertion in stems of the appropriate shape. Such an analysis is satisfyingly simple and reliant on general mechanisms, with the result that it accounts for complex patterns without stipulation or unnecessary complication. This makes morpheme realization an attractive device to explain some cases of reduplication (note also that it remains available as a motivator for reduplication in MR as well). However, morpheme realization cannot succeed as a general theory of reduplication, running into at least three fundamental problems: multiple reduplicative patterns co-occur in the same language; marked reduplicative patterns occur; and some reduplication occurs in constructions involving triple (or more) exponence, which morpheme realization theory cannot account for (at least in implementations such as that of Kurisu (2001).

Morpheme realization theory claims that nonconcatenative morphology is emergent. Depending on the constraint ranking in a given language, a nonconcatenative change will occur when it is the least costly way to express the presence of a morpheme with no other exponence of its own. Since there is no connection between this change and any lexically-specific phonological underlying information, multiple empty morphemes should be realized through the same change. However, we can find instances where a particular language exhibits numerous different nonconcatenative patterns.

For example, Nuu-chah-nulth (Wakashan; British Columbia) has many distinct reduplicative morphemes, which are associated with a number of different reduplicative patterns. Stonham (2007) analyzes three reduplicative patterns just in stem-level morphology:

(17) Multiple reduplication patterns in Nuu-chah-nulth

a. *Distributive: copy initial consonant and vowel:*

| | |
|---|---|
| ʔuːʔuːcsuƛweʔin | ‘each took along their’ |
| n’un’upqimɬayiːʔat | ‘he gave a dollar to each’ |

b. *Repetitive: copy initial syllable of base, lengthening base vowel if necessary to make both syllables heavy; and add -ya:*[8]

| | | |
|---|---|---|
| ciːqciːqya | ‘talking’ | (√ciq ‘talk’) |
| ʕimtʕimta | ‘naming’ | (√ʕimt ‘name’) |

c. *Iterative: copy initial syllable, leaving base vowel length unchanged; and add š:*

| | | |
|---|---|---|
| muːmuːčiɬkʷaɬš | ‘He goes off for four days at a time’ | (√muː ‘four’) |
| č’itč’itš | ‘it dodged from side to side’ | (√č’it ‘sidewise’) |

Morpheme realization theory is challenged by these distinct patterns occurring in exactly the same location. Although it is always possible to accommodate facts like these through heavy use of lexically-indexed constraints, that solution undercuts the generality of the theory.[9]

Another problem comes from cases like the Tonkawa reduplication pattern discussed above, analyzed by Gouskova (2007). Tonkawa reduplication actually involves construction of a form which is distinctly marked in the language in general as well as in the particular context where reduplication occurs. Because morpheme realization and GTT rely on the markedness patterns that hold in the language in general to derive the shape of the reduplicant, they have difficulty explaining reduplicative patterns that violate the markedness patterns of the language. Morpheme realization and GTT do differ in that GTT assumes a drive for maximization of the reduplicant, while morpheme realization does not necessarily do so. Therefore morpheme realization may be able to explain a case like Tonkawa where the reduplicant is marked but smaller than the unmarked structure of the language. However, it will have a more serious problem in cases of the reverse type, where a reduplicative construction is larger than the unmarked structure of the language (such as heavy syllable reduplication in languages where the default syllable type is a light syllable). Minimal Reduplication, by contrast, has no problem with cases like these because the size of the reduplicant may be determined by the lexical specification of the reduplicative morpheme.

The final problem for morpheme realization is accounting for multiple exponence for a single morpheme. An implementation of morpheme realization theory such as that of Kurisu (2001), with its use of a REALIZEMORPHEME constraint, will only come into play when a mor-

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[8] Not shown in these forms: The reduplicant adds a coda ƛ iff the base begins with an open syllable.

[9] These data also bear on recent developments within the framework of GTT such as Kennedy (2008). Kennedy proposes to account for multiple reduplicative patterns along the lines of GTT, without making use of indexed constraints. Different patterns emerge entirely from the interplay of constraints, as in GTT generally, but the crucial difference between different reduplicative morphemes depends on whether a particular morpheme is stem-internal or stem-external.

However, this theory necessarily predicts that no language will exhibit more than two distinct reduplicative patterns in a single location (i.e. prefixing, suffixing or infixing). This theory is therefore difficult to reconcile with the behavior of Nuu-chah-nulth, which exhibits at least three distinct reduplicative prefixes – all of which are claimed to be stem-internal.

pheme makes no segmental contribution of its own and thereby runs the risk of being unrecoverable in the surface word. However, there are many morphemes that are associated with both segmentism and nonconcatenative behavior.

Kurisu is aware of this issue and accounts for it by use of Sympathy Theory (Ito and Mester, 1997; McCarthy, 1999). By setting up correspondence between output forms and other (losing but sympathetic) output forms, as well as between output forms and the input form, morpheme realization theory can be extended to account for morphemes associated with two different nonconcatenative phenomena, or a nonconcatenative change and a segmental portion (as in the Tagalog case that Kurisu discusses).

However, as pointed out by Wolf (2006)), there are other cases in which a morpheme is associated with three or more distinct changes. Wolf (2006) presents data from Dinka (Nilo-Saharan; Sudan; Andersen (1992, 1995)) in which second person forms involve three simultaneous changes: tone sandhi, ablaut and a segmental augment. The examples below illustrate:

(18) Dinka verbal inflection:

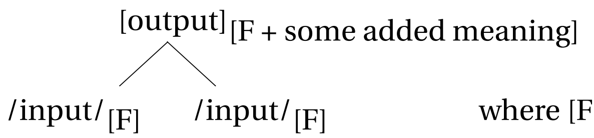
| *Root* | *2ps form* | *Gloss* |
|---|---|---|
| wḛ̀c | wá̰ckà̤ | ‘kick’ |
| tḛ̀ŋ | tá̰ŋkà̤ | ‘dust’ |

There is no obvious way to extend Sympathy Theory to account for data like these. Similar problems are found in reduplicative contexts. For example, in (17-b) above, we saw a particular morpheme realized through reduplication, stem lengthening, and suffixation. Cases like these are difficult to analyze in morpheme realization theory, leading us to continue the search for a more adequate general theory of reduplication. However, we may notice that although morpheme realization cannot be a comprehensive theory of reduplication, it may well still be an active force in phonology and it may account for some cases of reduplication. On the MR view in which reduplication is a phonological repair process, it is always available without the need for a special RED morpheme. Therefore we expect to find cases in which morpheme realization takes place through reduplication, assuming that morpheme realization is an active force.

### 4.1.3 Morphological Doubling Theory

Morphological Doubling Theory is a theory of reduplication developed by Inkelas and Zoll (2005) and others. MDT is distinguished from the mainstream of post-Marantz (1982) reduplicative theory by the assumption that the basic operation responsible for reduplication is the copying of a particular semantic feature bundle, rather than the targeting and copying of a phonological structure. A reduplicative form therefore does not exhibit phonological correspondence between the two (or more) copies; instead it exhibits morphological correspondence between morphosyntactic bundles that themselves express the same semantic features. The meaning contribution of reduplication comes from the mother node that compels or licenses the combination of the two copies, and modifies their (necessarily identical) meanings in a predictable way. The abstract structure of this kind of reduplication is shown in (19):

(19)



where [F] = semantic feature bundle

Several consequences follow from this model of reduplication. One interesting result is that reduplicative structures appear structurally quite similar to compounding with a semantic identity requirement between the elements of the compound. In cases where complete synonymy exists for a given pair of morphemes, appropriate constructions may be satisfied either by copying one element, or by creating a compound out of the two elements. Such compounds of synonymous distinct lexical items exist and are for example quite widespread in southeast Asia. For example, Khmer exhibits many such compounds, often with two elements that have different etymologies but supposedly identical meanings, such as *peel-weeli*ə 'time', made up of Sanskrit-derived *peel* 'time' and Pali-derived *weeli*ə 'time' (Ourn and Haiman, 2000). More examples of this type are given below:

(20) Khmer synonym compounds (Ourn and Haiman, 2000):

| *Compound* | *Gloss of components* | *Gloss of compound* |
|---|---|---|
| cah-tum | 'old' + 'mature' | 'village elder' |
| kee-mɔrdɔk | 'heritage' + 'heritage' | 'legacy' |
| cɑmnəj-ʔahaa(r) | 'food' + 'food' | 'food' |
| ʔaar-kɑmbaŋ | 'secret' + 'secret' | 'secret' |
| cbah-prakɑt | 'exact' + 'exact' | 'exact' |

In appropriate cases, these compounds therefore may compete with reduplication for the realization of a particular semantic combination. This is claimed to be the case in Hindi. Hindi exhibits a number of "redundant compounds" (Singh, 1982), typically formed by combining a native morpheme with a synonymous word of Perso-Arabic origin:

(21) Hindi redundant compounds:

| *Compound* | *Gloss of components* |
|---|---|
| tan-badan | 'body' + 'body' |
| vivaah-šaadi | 'marriage' + 'marriage' |
| d$^{h}$an-daulat | 'money' + 'money' |
| šaak-sabji | 'vegetable' + 'vegetable' |
| d$^{h}$arm-imaan | 'religion' + 'religion' |
| sneh-muhabbat | 'love' + 'love' |
| laaj-šarm | 'deference' + 'deference' |
| naata-rista | 'relation' + 'relation' |

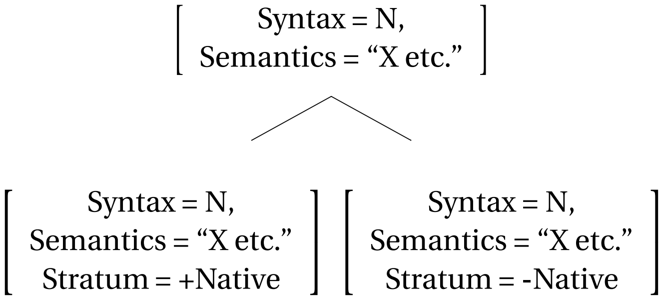
As Inkelas and Zoll (2005) note, these compounds are clearly not derived from phonological copying. An analysis of reduplication that depends on the phonological copying of a given element will not apply to these cases, which can therefore be judged to be distinct from reduplication. But Singh (1982) further claims that these compounds are semantically identical to the Hindi echo reduplication pattern, in which a word is reduplicated and has an overwritten fixed segment to express a meaning of “X and things like X” (Hindi echo reduplication, and echo reduplication in general, are discussed in detail in chapter 3.) The examples below illustrate:

(22) Hindi echo reduplication (Nevins and Wagner, 2001):

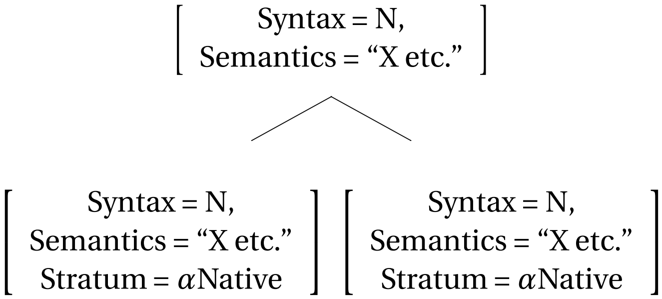
| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| aam | aam vaam | ‘mangoes and such’ |
| tez | tez vez | ‘tables and such’ |
| tras | tras vras | ‘grief and such’ |
| roti | roti voti | ‘bread and such’ |

MDT captures the similarity between these two constructions by the similarity of the structures by which they are produced (Inkelas and Zoll, 2005, 61):

(23) Hindi redundant compounds:

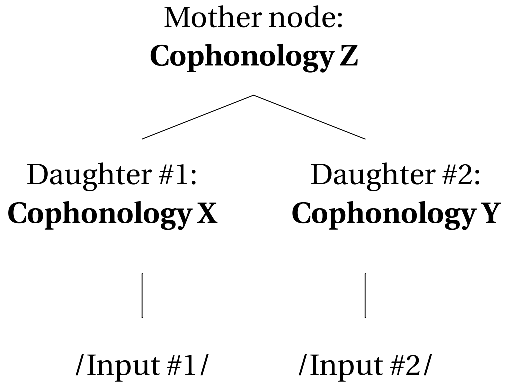


(24) Hindi echo reduplication:



Reduplication often involves incomplete copying. For MDT, this is due to a cophonology particular to one copy or the other in a reduplicative construction, enforced by the mother node which oversees the entire construction. Special cophonologies may also be specified for both copies and for the mother node (and therefore the entire construction); thus there are three potential domains for cophonologies, all of which may simultaneously be active and distinct from the general phonology of the language. The following tree illustrates.

(25) Cophonologies in MDT:



For example, reduplication in Diyari (Pama-Nyungan; South Australia; Trefry (1970); Austin (1981); Poser (1989)) involves truncation or incomplete copying of the first copy so that it is exactly one foot in size (Poser, 1989; McCarthy and Prince, 1999):

(26) Diyari reduplication:

| *Reduplicated form* | *Gloss* |
|---|---|
| wil̪a-wil̪a | ‘woman’ |
| t$^{y}$ilpa-t$^{y}$ilparku | ‘bird species’ |

In MDT, this pattern is due to the special cophonology of the first copy (Cophonology X in the schema given above). This cophonology restricts the size of a word to one foot; in OT terms, the ranking {Lex ≈ PWd, PWd ≈ Foot} ≫ Max-IO holds for this morpheme.

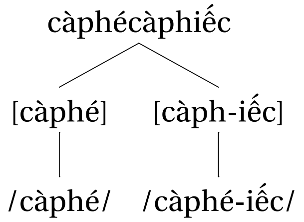
Inkelas and Zoll (2005) offer an analysis of melodic overwriting cases (reduplication constructions in which one or both copies exhibit a partial fixed segmental component in place of copied material that might otherwise be expected to occur) in the framework of MDT. As with Alderete *et al.* (1999) and similar analyses, Inkelas and Zoll assume that melodic overwriting is due to the presence of an affix with segmental specification, which must be phonologically merged in with the root or stem being targeted. They consider for example the Vietnamese pejorative reduplication construction, a melodic overwriting construction that “supplies some emotional coloring (disinterest, irony, etc.) to the meaning of any base.” (This construction is also discussed in chapter 3.) This construction is illustrated by the data below (Nguyen, 1997; Vu, 1998):

(27) Vietnamese melodic overwriting reduplication:

| *Base* | *Reduplicated form* | *Base gloss* |
|---|---|---|
| hát | hát hiếc | ‘sing’ |
| càphé | càphé càphiếc | ‘coffee and the like’ |
| câulạcbộ | câulạcbộ câulạcbiếc | ‘clubs and the like’ |
| uông thuốc | uông thuốc uông thiếc | ‘take medicine’ |

In MDT, *-iếc* is taken to be a semantically empty morph required by the overall reduplication construction. This is formally similar to other cases in which reduplication occurs with a semantically inert linker affix, with the exception that in this case the affix must overwrite part of the root instead of simply being added to it. This is motivated by a faithfulness force that requires an identical number of syllables in the input and output of the relevant cophonology (Cophonology Y). The structure of the entire construction thus looks something like the following:

(28) MDT analysis of Vietnamese melodic overwriting reduplication:



Because it involves a phonological differentiation between the two copies in a reduplication construction without a corresponding semantic difference between them, Inkelas and Zoll take melodic overwriting to be "a prototypical case of what MDT predicts in reduplication." They also investigate a further prediction made by this treatment, which is the possibility of double melodic overwriting. The fixed segments in *càphécàphiếc* are there because of an empty morph and a particular ranking that holds in Cophonology Y. There is no reason to expect that an empty morph and a similar cophonology might not be found in the context of the first copy (Cophonology X) as well. Exactly such a case is found in Hua (Papuan), in which verbal intensification is indicated through total reduplication and the addition of a helping verb *hu*. In one subpattern, the final vowel of the first copy is overwritten with *u*, and the final vowel of the second copy with *e* (Haiman, 1980):

(29) Hua double melodic overwriting reduplication:

| *Base* | *Reduplicated form* | *Gloss of reduplicated form* |
|---|---|---|
| kveki | kveku kveke hu | 'crumple' |
| ebsgi | ebsgu ebsge hu | 'twist and turn' |
| ftgegi | ftgegu ftgege hu | 'all coiled up' |
| ha-vari | ha-varu ha-vare hu | 'grow up' |

Developing an idea of Saperstein (1997), Inkelas and Zoll (2005) take this construction to involve the selection of an *e*-final stem in Cophonology Y, while merging the root with a semantically null suffix -*u* in Cophonology X.

However, some problems with the MDT approach to melodic overwriting may be observed. Recall that overwriting (as opposed to simple affixation) was motivated in a case like Vietnamese by faithfulness to the syllable count of the input. This device crucially assumes that syllabification is present in the underlying form: something that is often explicitly rejected within OT for reasons of Richness of the Base (e.g. the "Faithfulness-free syllabification" principle (McCarthy, 2003)). If we assume that the grammar is not required to actually count syllables, what must be active in these cases is something like (in OT terms) DEP($\sigma$). That constraint is one that could have significant negative typological consequences if allowed into the grammar (van Oostendorp, 2006).

Relatedly, this account will not explain the behavior of cases like Hindi echo reduplication and Bhojpuri echo reduplication (see chapter 3) that appear to be non-optimizing. This is illustrated by the following data, from Hindi (identical to (22) above):

(30) Hindi echo reduplication (Nevins and Wagner, 2001):

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| aam | aam vaam | 'mangoes and such' |
| tez | tez vez | 'tables and such' |
| tras | tras vras | 'grief and such' |
| roti | roti voti | 'bread and such' |

The problem here for MDT is *roti voti*. If we assume that *v*- is a semantically empty morph that is added and overwrites within Cophonology Y, we have no easy explanation for the selection of *voti* as the output of this phonological calculation, rather than the more faithful and phonotactically well-formed **vroti*. That onset cluster reduction is not active in Cophonology Y is shown by the fact that *tras vras* is chosen rather than *tras vas*.

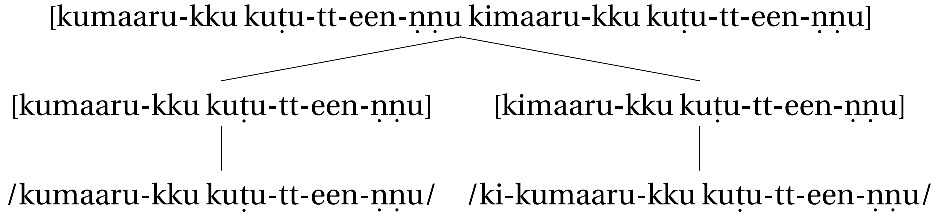
We can make some progress toward reconciling MDT with the full range of echo reduplication facts by abandoning some of the details of Inkelas and Zoll's analysis while searching for another that preserves the spirit of their idea. We can employ an idea from the Minimal Reduplication analysis of echo reduplication presented in chapter 3. If overwriting is not due to the preservation of a certain number of syllables but rather to an ALIGN-type constraint that requires all morphemes to align to the left edge of the PStem (or something similar), then we can explain cases like Hindi, as well as generally preserving the analysis of cases like Vietnamese (without requiring a constraint like DEP($\sigma$).

However, this approach still encounters significant problems in the analysis of certain other echo reduplication cases. If overwriting occurs due to a coalescence-inducing cophonology, then we should see rampant overwriting of affixes within the copy in which overwriting does occur. But that is never what we find: instead, it is only the reduplicative affix itself (that is, the fixed segment associated with a particular reduplicative construction) that overwrites, regardless of whether other affixes are present as well. For example, consider again an example from Tamil that was discussed in chapter 3:

(31) [kumaaru -kku kuṭu -tt -een -ṇṇu] [kimaarukku kuṭutteenṇṇu] poy collaa
[Kumar DAT give -PST -1SG. -QUOT] [ECHO ] lie say
-tee
-NEG.IMP
"Don't lie that you gave it to Kumar or some such nonsense." (Keane, 2001, 190)

Presumably such a construction should be taken to consist of two daughters, each with their own cophonology, and a mother node that dominates both of them, more or less as shown in the following tree:

(32) Possible MDT analysis of Tamil echo reduplication:



The cophonology of the second daughter (Cophonology Y) must be such that the first affix, *ki-* is compelled to overwrite. However, if that is due to a general ranking, then we have no explanation for the failure of every affix to overwrite its stem, giving us a form like * *ki-kku tt-een-ṇṇu* as the output of Cophonology Y in this example. It would be possible to avoid this outcome by treating *ki-* as a morpheme with its own indexed constraints. However, this not only creates an argument against MDT from parsimony (since we now need coindexed constraints as well as reduplicative cophonologies, while Minimal Reduplication requires only the former, at most), but it is also formally difficult to realize within MDT, given that *ki-* is not actually a morpheme but rather semantically inert phonological structure required by the overall reduplication construction. Furthermore, even if we can allow the correct result in Tamil, what's needed is to disallow the unattested result given above and its equivalents in every language. There is no attested case in which a reduplication construction with an overwriting affix leads to overwriting behavior for all affixes within the word in question; but if overwriting is a property of a cophonology active at the level of the word (or higher), then we should see cases of precisely that type.

We can consider one final problem with the MDT analysis of melodic overwriting, which is why reduplication and overwriting co-occur so often and why the patterns in which they occur so often exhibit a cluster of related typological properties. Of course not every case of reduplication involves overwriting, and not every case of overwriting involves reduplication. However, there is a strong correspondence between those patterns that goes well beyond being simply an areal feature of the Indian Sprachbund. As Inkelas and Zoll (2005) note, echo reduplication is essentially a pan-Asian phenomenon, with examples attested from Indonesia to Bulgaria and families including Indo-European, Sino-Tibetan, Austronesian, Mon-Khmer, Dravidian, Caucasian, and Altaic. When we consider equivalent phenomena that are not normally considered echo reduplication but are functionally comparable, the pattern extends even wider, including to phenomena such as contrastive reduplication and depreciative reduplication in English. And in a great number of these cases, across geographical regions and language families, we find a cluster of facts: these patterns involve total rather than partial reduplication; they involve a fixed segment being overwritten at the periphery of one of the copies; and they often exhibit identity avoidance effects.

MDT does not offer an explanation of the coincidence of these factors in so many cases. Reduplication patterns involve particular cophonologies, but other affixation processes or morphosyntactic constructions may also be connected with idiosyncratic cophonologies. But we do not find any other kind of construction that correlates with so many facts across so many languages.

The key advantage of the MR analysis of these patterns is that the syntactic operation that causes the apparent reduplication (i.e. copying a syntactic node) also creates a special morphophonological structure that allows these constructions to be treated differently from all others by the phonology of the language. Of course, this does not guarantee the correlation of all of the facts mentioned above; it is possible, for example, for copy and merger with affixation to result in non-overwriting affixation rather than overwriting affixation given the appropriate phonological ranking. This is just as it should be: despite the tendency for all of these facts to align across many cases, there are exceptions, and the grammar must be able to account for them. This analysis also does not count the role of history in spreading constructions of this type across so many languages. However, by being based on the connection between a presumably universal syntactic operation and a particular morphophonological structure, the MR account offers an explanation for the ubiquity and persistence of such a construction whatever its origins; it allows these structures to behave differently without implicating all morphophonological structures in the targeted nodes to behave differently from the general grammar of the language; and it explains why this special behavior centers on reduplication in particular rather than truncation, ablaut, or any other type of morphophonological construction.

Some of the predictions that follow from the MDT model of reduplication should be investigated. One area to consider is the typological predictions that follow from the model. Reduplication that is less than total in MDT is brought about because of forces within the relevant cophonologies. Thus a one-syllable reduplicative prefix will have the size that it does due to the influence of constraints (within the relevant cophonology) limiting the size of the output to one syllable. This does not cause problems elsewhere within the language (which may have many words of more than one syllable) because it is restricted to the cophonology of the reduplicant or the reduplication construction. But it does remain to be explained why patterns common to reduplicative phonology are not more common as general patterns for more languages. For example, CV reduplication is very common; languages in which all words are restricted in size to CV are rare or nonexistent. The share of reduplication patterns with no coda are probably quite disproportionate to the share of all languages that prohibit codas. The cophonologies of the constituent parts in a reduplicative construction are not subject to conditions that make them special. Therefore the null hypothesis is that cophonologies of any part of the reduplicative construction should resemble phonologies of all languages, typologically speaking. Unless it can be shown that the structure of composite cophonologies involved in reduplication inherently leads to a distinctive set of properties, then it remains to be explained why the subparts of reduplicative processes should differ from phonological outputs of languages in general.

Reduplication in MDT involves the targeting and copying of a particular morphosyntactic constituent, with the meaning of the construction derived in a predictable way from the meaning of that target. With the correct arrangement of cophonologies, it is possible to obscure exactly which constituent was targeted, such as when a complex constituent is targeted and then undergoes phonological reduction that eliminates the visible evidence of some of those sub-constituents. MDT is thus a very flexible theory capable of accounting for many patterns. However, one behavior that is unexpected is demonstrable morphological targeting of any constituent (or multiple constituents) within a larger constituent, with a meaning that modifies the upper constituent. Haugen (2009) identifies exactly such a case in Pima.

Nominal compounds in Pima (Uto-Aztecan; Arizona) may be recursively formed, leading to complex nominal structures as in the following example:

(33) li-miida -hoas -ha'a -dagkuanakud:
glass -basketry -jar -wiper
'glass dish cloth'

Plural nouns in Pima are formed through initial CV reduplication (which is often obscured by subsequent vowel coalescence). When nominal compounds are pluralized, reduplication may target any or all of the constituents that make up the compound, with the same ultimate meaning (pluralization of the entire compound); thus a compound with $n$ stems has $2^n$-1 plural variants (Munro and Riggle, 2004). The examples below illustrate:

(34) Pima Noun-Noun compounds: ['onk'us] 'tamarack'

a. 'onk 'us
salt tree
'tamarack'

b. 'o 'onk 'us
RED salt tree
'tamaracks'

c. 'onk 'u 'us
salt RED tree
'tamaracks'

d. 'o 'onk 'u 'us
RED salt RED tree
'tamaracks'

(35) Pima Noun-Noun compounds: [limidahoashaadakguanakud:] 'glass dish cloth'

a. li-miida -hoas -ha'a -dagkuanakud:
glass -basketry -jar -wiper
'glass dish cloth'

b. **li**l-**mi**mida -**h**oahas -**hoa**ha'a -**da**dagkuanakud:
**RED**.glass.**RED** -basketry.**RED** -jar.**RED** -wiper.**RED**
'glass dish cloths'

MDT holds that the two daughters in a reduplicative construction are connected by their morphosemantic identity, but crucially not by any phonological connection. Inkelas and Zoll (2005) capture this claim in part in the Thesis of Morphological Targets:

(36) **The Thesis of Morphological Targets:** a reduplication construction calls for morphological constituents (affix, root, stem, or word), not phonological constituents (mora, syllable, or foot).

This property leads to some advantages of MDT relative to BRCT. For example, consider Mokilese (Micronesian Austronesian; Mokil Atoll; Harrison (1973, 1976); Blevins (1996)), which exhibits CVX suffixing reduplication in the formation of statives, e.g. *kadip* 'betray' yields *kadipdip* 'treacherous'; and CVC prefixing reduplication in the formation of progressives, e.g. *kapang* 'see' yields *kapkapang* 'watching' (Harrison, 1973, 1976; Inkelas, 2005). But just in the case of monosyllabic verbs, the progressive is formed through double reduplication (Inkelas (2005); orthographic transcription):

(37) Mokilese progressives of monosyllabic verbs:

| *Denotative* | *Progressive* | *Gloss* |
|---|---|---|
| kang | kang-kang-kang | ‘eat’ |
| doau | doau-doau-doau | ‘climb’ |
| soal | soal-soal-soal | ‘black’ |
| daun | daun-daun-daun | ‘fill’ |
| jahk | jah-jah-jahk | ‘bend’ |

Inkelas (2005) notes that this behavior is unexpected if RED is a real morpheme that makes a particular semantic contribution. Multiple reduplication should entail a multiplicity of that meaning, or at least some variation on it; but these words in Mokilese are functionally identical to *kapkapang*, and undergo double reduplication only for phonological reasons. In MDT, by contrast, it is the reduplicative construction as a whole that makes a semantic contribution, and regardless of whether the cophonologies at play compel reduplication once or more than once, the meaning of the whole construction should not change. (Of course, the argument made here against the mainstream BRCT theory of reduplication does not apply to Minimal Reduplication. Since morphological reduplication occurs due to the ranking $\{\mathbb{C}, \mathbb{F}\} \gg$ INTEGRITY, we precisely predict the existence of cases in which reduplication occurs more than once to resolve a phonological problem of some kind. In the case of Mokilese, this is presumably a trisyllabic (or x > Foot) minimality requirement for progressive verbs, which will lead to reduplication above and beyond anything that may be needed to allow expression of an underlying $\sigma_{\mu\mu}$.)

However, we do also encounter cases in which reduplication can occur more than once with the expected accretion of meaning. One such case is frequentative verb formation in Tigre (Semitic; Ethiopia and Sudan; Rose (2003)). The frequentative form of the verb in Tigre is typically formed through the addition of *-aːCə* following the second root consonant, with C being a copy of that consonant (since this is a root and pattern language, it is a matter of analysis whether to characterize the reduplicant’s location as infixal or something else):

(38) Tigre frequentative formation:

| *Regular form* | *Frequentative* | *Frequentative gloss* |
|---|---|---|
| gərf-aː | geraːrəf-aː | ‘whip a little’ |
| kətb-aː | ketaːtəb-aː | ‘write a little’ |
| nəsħ-aː | nesaːsəħ-aː | ‘advise a little’ |
| məzz-aː | məzaːzəz-aː | ‘give a little responsibility’ |

Interestingly, frequentative reduplication may apply more than once within a word, resulting in repeated reduplicative structure and enhanced attenuated meaning:

(39) Tigre multiple frequentatives:

| | |
|---|---|
| dəgm-aː | ‘tell, relate’ |
| dəgaːgəm-aː | ‘tell stories occasionally’ |
| dəgaːgaːgəm-aː | ‘tell stories very occasionally’ |
| dəgaːgaːgaːgəm-aː | ‘tell stories infrequently’ |

A case like this presents some problems for MDT. Even in cases where the frequentative morpheme applies only once, there are certain difficulties in constructing a MDT account of it. In cases where reduplicative infixation occurs, MDT assumes that the cophonology operative at the mother node of the reduplicative construction (Cophonology Z) aligns the copies, causing one of them to infix inside the other due to the active force of a constraint like ALIGN(MRoot, PRoot) (in OT terms). Inkelas and Zoll (2005) show how this schema works for infixation in cases like Eastern Kadazan reduplication.

However, it is difficult to identify the landmarks that will allow an alignment constraint to motivate proper infixation in a case like the Tigre frequentative. Regardless of whether we take the regular form of the Tigre verb as the base from which the frequentative is built, or allow the consonantal root and vocalic prefix as independent morphemes, there is no obvious reason to infix after the second consonant, nor means to motivate such an alignment. The shape of the reduplicant is also a difficulty. The cophonologies involved in forming the reduplicant must be optimizing at each level, i.e. the output of Cophonology X must be optimal given the ranking that holds in that cophonology, the output of Cophonology Y must be similarly optimal, etc. Although the interaction of these different cophonologies does allow some scope for opacity and apparently non-optimal outputs, it is difficult to see how *-aːCə-* emerges as the winning reduplicative shape.

The cases of multiple application present a further challenge. Unlike Mokilese, in which the phonological form involved in reduplication was irrelevant to the semantic contribution, here we see regular correspondence between phonological form and semantics – precisely evidence that the phonology in question is an expression of certain morphology.

Reduplication in MDT occurs essentially for no reason other than that an explicitly reduplicative construction exists. This leads to the prediction that reduplication will not compete with other phonological repair strategies for the realization of a particular morpheme or semantic feature bundle; epenthesis or vowel lengthening (to give just two examples) are not reduplication and do nothing to satisfy a construction that calls for reduplication. However, as noted by Haugen and Hicks Kennard (2009); Haugen (2009), we do find cases in which reduplication competes with other means to express a particular morpheme.

Haugen (2009) notes the case of Hiaki (also known as Yaqui, Yoeme; Uto-Aztecan; Arizona and Sonora, Mexico). The Hiaki habitual is formed through reduplication for some verbs, but gemination for others and vowel lengthening for still others (Haugen, 2003; Haugen and Harley, 2008; Molina *et al.*, 1999):

(40) Hiaki habitual allomorphy:

| *Base form* | *Habitual form* | *Base gloss* |
|---|---|---|
| ivakta | **i**ivakta | ‘embrace’ |
| kinakta | **kina**kinakta | ‘squint, grimace’ |
| maveta | ma**v**veta | ‘receive’ |
| yepsa | ye**e**psa | ‘arrive’ |

MDT cannot explain why a particular morpheme feature bundle should be realized through reduplication in some cases but gemination or vowel lengthening in others. It may be felt that the strength of this argument is weakened when resting only on evidence from Hiaki; the allomorphy of the habitual morpheme is suppletive, and each verb must list its habitual allomorph.

It is plausible to claim that the entire habitual form is listed, and that a productive reduplication/gemination/lengthening competition need not be posited for Hiaki.

However, the same cannot be said for another case that we have already seen: *-m̓ut* reduplication in Kwak'wala (examined in detail in chapter 2). The suffix in question here triggers a variety of lengthening effects on the stem to which it affixes. Essentially these can be boiled down to two morphologically-linked changes: vowel lengthening, and reduplication. Vowel lengthening occurs when it is possible to do so without creating a superheavy syllable (which is barred across the board in Kwak'wala); reduplication occurs otherwise. The following data illustrate (Boas, 1947):

(41) Kwak'wala stem expansion with *-m̓ut*:

a. Lengthening:

| *Root* | *With suffix* | *Root gloss* |
|---|---|---|
| q̓ʷəɬ | q̓ʷaːɬm̓uːt | 'scratch' |
| təp | taːpm̓uːt | 'break' |
| y̓əχʷ | y̓aːχʷm̓uːt | 'tide rises' |
| ʔəxʷ | ʔaːxʷm̓uːt | 'skim off scum' |

b. Reduplication:

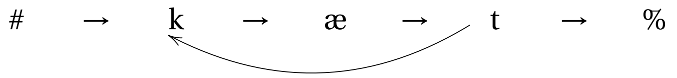
| *Root* | *With suffix* | *Gloss* |
|---|---|---|
| kən | kənkəmuːt | 'scoop up' |
| ciːx | cicəxm̓uːt | 'melt tallow' |
| k̓aːp | k̓aːk̓əpm̓uːt | '(mouse) gnaw' |
| kəmt | kəmkətm̓uːt | 'clean berries' |

MDT offers no insight into why a morpheme should be connected with reduplication in some cases but vowel lengthening (or other expansion processes) in others. By contrast, behavior like that of *-m̓ut* is a direct prediction of Minimal Reduplication, and one that is accounted for without stipulation or reliance on any theoretical devices beyond those which have been independently motivated.

### 4.1.4 Reduplication as readjustment of precedence structures

All the theories of reduplication considered so far assume that some kind of duplication does occur in cases of reduplication, whether that involves copying phonological structures or the copy and multiple spellout of morphosyntactic structures. Contra this assumption, Raimy (1999, 2000); Fitzpatrick (2006) and others advance a theory of reduplication in which there is no copying of phonological or morphosyntactic structures. Apparent duplication is due to a loop in the (ordinarily unilinear) precedence relationship holding between segments in a given phonological representation. Thus a reduplicative structure like [kætkæt], related morphologically to the form [kæt], surfaces due to a loop in the precedence structure of that representation as shown below (Raimy, 2000):

(42)



= [kætkæt]

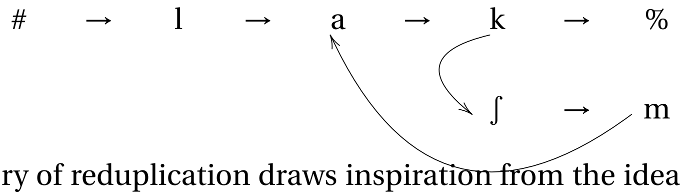
These precedence loops (sometimes called “Raimy Rules,” e.g. by Carins and Raimy (2006)) are taken to be the result of a readjustment process in the sense of Halle and Marantz (1993, 1994). A reduplicative affix, like any affix, may add new segments and new precedence relations between themselves and between them and the other segments of the word. It is left to the phonology in the end to linearize the precedence relations created by the morphology; when those relations include loops, a reduplicative structure can appear.

A more complex example illustrating this theory is the treatment of English depreciative reduplication (“shm- reduplication”). Raimy (2000) gives an informal definition of the underlying form of the depreciative affix as follows:

(43) -schm- /‘after’ → ʃ → m → ‘before’/

A depreciative form like “lock shmock” is formed through the addition of this affix to the root:

(44)

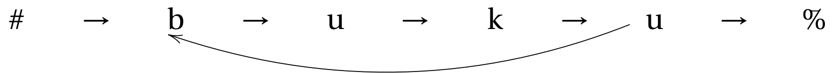


= [lakʃmak]

This theory of reduplication draws inspiration from the ideas behind Minimalism such as the insistence on limiting computations to the minimal conceptually necessary elements. Unambiguous linearization between morphemes and between segments is not a necessary input condition for phonological representations. However, it is necessary as an output condition on phonological structures, which must be strictly ordered for phonetic implementation, due to the limited nature of the human vocal apparatus. Therefore Raimy (2000) presents linearization as an optimizing process that is a component of the phonology. More concretely, linearization takes place after cyclic phonology is complete, before non-cyclic phonology applies; an algorithmic process converts the precedence relationships present in the phonological output into a unilinear string of segments suitable for post-cyclic phonology and phonetic implementation. (Raimy (2000) does explicitly leave open the option for multiple spell-out in separate phases, which will allow reduplication to feed cyclic phonology across word boundaries.) That process attempts to use every link in the precedence chains exactly once, and especially to realize each morpheme by including some of its segments in the output. Sometimes not all of these goals can be met, and the process optimizes the output as well as it can.

For example, consider the pattern of total reduplication in Indonesian seen in words like *bukubuku*. The structure produced by the morphology in this word looks like this:

(45)



The linearization algorithm can consider many possible unilinear outputs given this structure, including the following candidates:

(46) a. # → b → u → k → u → %
b. # → b → u → k → u → b → u → k → u → %
c. # → b → u → k → u → b → u → k → u → b → u → k → u → %

Out of these candidates, (46-a) is dispreferred because it fails to make use of some links in the underlying form (the reduplicative link from *u* to *b*). (46-c) is dispreferred because it repeats links two and three times for no benefit. Therefore (46-b) will be chosen; although it also uses some links more than once, it does so the minimum amount possible to realize every link at least once.

This theory also aims to fully realize one of the guiding ideas of reduplicative theory since Marantz (1982), that reduplicative affixes are affixes generally behave like other affixes and that reduplication-specific phonology and morphology should be minimized or eliminated. Reduplication in this theory is very similar to affixation. The only difference is that the specifications of reduplicative morphemes with regard to their beginning and ending points are such that precedence loops are created. Other than on that point, reduplicative affixes are like any affixes, and pattern as they do in the language.

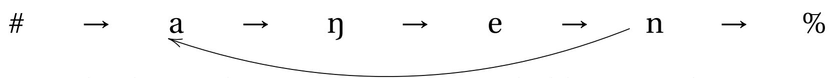
Because this theory denies the existence of multiple copies within the phonology, cases of reduplicative opacity are a central concern. The easiest cases to explain are those in which overapplication occurs. Consider the case of Malay nasalization (discussed also in chapter 1). Nasalization spreads rightward iteratively from nasal segments to vowels (passing through transparent segments *h*, *ʔ*, *w* and *j*) (Onn, 1980; Kenstowicz, 1981; Seong, 1994). In cases of reduplication, this nasalization not only occurs in both copies, but it also seems to backcopy, with segments becoming nasalized in the first copy with no nasal segment occurring to their left, if their corresponding segment in the other copy is appropriately positioned to undergo nasalization. The following data illustrate this process:

(47) Malay nasal overapplication and backcopying:

| *Base* | *Reduplicated form* | *Base gloss* | *Reduplicated gloss* |
|---|---|---|---|
| hamə̃ | hãmə̃-hãmə̃ | 'germ' | 'germs' |
| waŋĩ | wãŋĩ-wãŋĩ | 'fragrant' | 'very fragrant' |
| aŋãn | ãŋãn-ãŋãn | 'reverie' | 'ambition' |
| aŋẽn | ãŋẽn-ãŋẽn | 'wind' | 'unconfirmed news' |

Here we see that not only does nasalization occur across the border between the two copies, it also occurs at the beginning of the reduplicated words although no environment for nasalization can possibly be found there. In BRCT, this nasal agreement is motivated through a BR faithfulness constraint. In the theory of reduplication through precedence loops, the explanation is quite different. At the relevant stage – when nasalization occurs – this theory holds that each of these segments is only present once. These words all have a structure like the following:

(48)



The Malay nasal rule nasalizes any vowel preceded by a nasal segment. Both of the vowels in this word are preceded by a nasal segment: *a* by the final *n* through the reduplicative loop link, and *e* by *ŋ*. Therefore both vowels undergo nasalization, and both copies of each vowel will remain nasalized when they are spelled out during linearization.[10]

Overapplication is thus quite straightforward. Underapplication is seemingly more challenging: why should a rule fail to apply simply because extra precedence loops are present in some phonological representation? Raimy (2000) attributes this difference to the morpheme-

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[10] As discussed in chapter 1, Kiparsky (2007) casts serious doubt on the validity of these data and on whether such backcopying phenomena actually exist.

particular setting of the Uniformity Parameter. This parameter determines whether a rule applies only when the environment for the application of a rule must be met in every relevant link in order for the rule to apply, or whether the rule is triggered when any link meets the relevant description. This parameter is set to *off* in Malay, allowing nasalization to take place for initial vowels even though the environment is not met in one of the relevant links (i.e. # →). In cases where a rule underapplies in a reduplicative context, this is because the Uniformity Parameter is set to *on* for that construction.

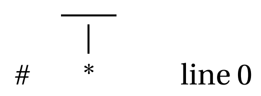
The remaining possibility is normal application: cases where a phonological rule is triggered for one copy of a reduplicative pair but not the other. This kind of rule application seems most challenging for the theory under consideration; if there is only one copy of the segment in question, how can it have two different forms in the copies of it that surface? The answer given by Raimy (2000) is essentially that it cannot do so. However, we must remember that linearization of the phonological structure is not the last step in the phonology. Linearization takes place after all cyclic phonology is complete, but it precedes non-cyclic phonology. Normal application is accounted for by treating it as the result of non-cyclic phonology.

For example, the connection between the copies produced in a Korean reduplication pattern is obscured by the phonological alternations that affect one copy or the other. Base *moks* yields the reduplicative form *moŋmokʃi*, with cluster simplification and regressive nasalization affecting the first copy and palatalization the second. All of these rules apply normally, that is, ʃ is not deleted in the second copy to match its deletion in the first copy. For Raimy (2000), this is due to the fact that all of these phonological processes are non-cyclic. Therefore these rules apply only after the non-unilinear phonological form has been linearized into the intermediate form *moks-moks-i*.

Raimy (2000) discusses the extension of this theory of reduplication to echo reduplication constructions and other cases of melodic overwriting. The specific case that Raimy considers is Kamrupi ER (Alderete *et al.*, 1999), a construction in which the first onset position of the second copy is overwritten with *s*. Thus *g*$^h$*ara* 'horse' and *k*$^h$*ori* 'fuel' yield *g*$^h$*ara-sara* and *k*$^h$*ori-sori* respectively.

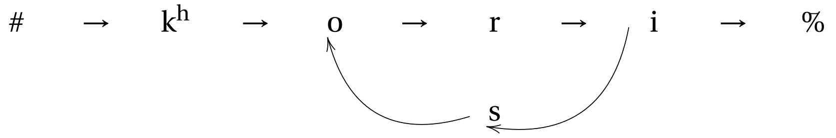
The morpheme responsible for this construction in Kamrupi is formally defined as follows:

(49) a. *begin* → s → *end*
b. *begin:* ____ → %
*end:*



This definition can be restated informally as follows: insert s; create a precedence link from the final segment to that *s*; create a precedence link from that *s* to the first vowel in the representation. This leads to the desired phonological structure, e.g.:

(50)



Although this analysis may account for the facts of Kamrupi, there are problems when we look into other echo reduplication constructions and similar patterns. One problem, by now familiar, arises in Hindi, where echo reduplication occurs with the construction of forms like those in the following examples:

(51) Hindi echo reduplication (Nevins and Wagner, 2001):

| *Base* | *Reduplicated form* | *Gloss* |
|---|---|---|
| aam | aam vaam | 'mangoes and such' |
| tez | tez vez | 'tables and such' |
| tras | tras vras | 'grief and such' |
| roti | roti voti | 'bread and such' |

To account for all of these forms, a precedence readjustment account must correctly identify the segment in the root that the ER fixed segment must precede. But which segment is that? In some cases it is the first vowel in the word (in *aam vaam*); in others it is the second consonant in the onset (as in *tras vras*). Although we can generalize about the location of the fixed segment by saying that it always occurs in the first onset position, there is no obvious way to express this condition in the language of segmental precedence.

Similar problems are found in other echo reduplication constructions. As seen in chapter 3, Bhojpuri ER involves copying with the second copy exhibiting deletion of an onset and the replacement of the first stem vowel with a back round vowel that matches the [high] specification of the vowel that was replaced:

(52) Echo words in Bhojpuri (Tiwary, 1968):

a. *ER with fixed o:*

| *Base form* | *ER form* | *Base gloss* |
|---|---|---|
| $k^h$et | $k^h$et-ot | 'field' |
| ser | ser-or | 'seer (a unit of weight) |
| $g^h$asi | $g^h$asi-osi | 'grass' |

b. *ER with fixed u:*

| *Base form* | *ER form* | *Base gloss* |
|---|---|---|
| $k^h$ira | $k^h$ira-ura | 'cucumber' |
| piələ | piələ-uələ | 'have you drunk?' |
| nimən | nimən-umən | 'good' |

This appears to be a case of allomorphy, in which the reduplicative morpheme contributes the vowel *o* or *u* depending on the quality of the vowel that it replaces. In a sense this is similar to the allomorphy of ER in Tamil, where the length of the vowel in the fixed sequence [ki] will match the length of the vowel that was replaced (see chapter 3). Patterns like these are particularly difficult to account for in a precedence readjustment theory of reduplication, which denies the existence of two separate copies that can be compared with one another (at least at the level of representation or derivation at which this matter of allomorphy must be resolved). Nevins and Wagner (2001) offer an analysis of Hindi ER allomorphy within a precedence readjustment framework, according to which the decision about which allomorph to apply depends on whether the material in the root that the reduplicative morpheme will precede is also preceded by another copy of the same segment. This will suffice to choose the correct allomorph in cases of identity avoidance. But it offers no help in cases like Bhojpuri and Tamil, where allomorphy involves a comparison of subsegmental or supersegmental properties of certain segments in the root.

More fundamentally, a precedence readjustment theory of reduplication lacks the explanatory power of Optimality Theory analyses that identify and explain phonological conspiracies. Raimy (2000) notes that Optimality Theory is also not capable of identifying and accounting for all phonological conspiracies. Although this may be true, it remains the case that OT analyses of reduplication are able to account for many cases in which a language employs multiple different means in order to bring about a certain structure, and that these accounts are lost if reduplication is viewed as a simple act of precedence structure readjustment. In the discussion below of the analysis offered by Raimy (2000) for the opaque application of *l*-deletion in Samala, I show that a precedence readjustment analysis of the facts in question is not only empirically inadequate, but it also fails to account for the fact that the behavior of *l*-deletion in reduplicative cases precisely appears to be part of a reduplicative conspiracy with the aim of creating an extra heavy syllable.

## 4.2 Case study: Samala

Samala (formerly known as Ineseño or Ynezeño Chumash) is an extinct (but undergoing revitalization) Chumashan language, spoken until the 20th century in Santa Barbara County, California. The data cited here are taken from Applegate (1972) and Applegate (1976). They are all originally due to fieldwork conducted by J. P. Harrington, who collected more than one hundred thousand pages of materials on the Chumashan languages (Santa Ynez Band of Chumash Indians, 2007). The main informant who provided Harrington with information on Samala was María Solares.

The Samala reduplication pattern examined here has a particularly important place in the history of reduplicative theory because it has been at the center of many controversies and extensive analyses have been developed for it in many different theoretical frameworks. Authors who have devoted significant attention to the process examined here include Wilbur (1973); Mester (1986); Cole (1994); McCarthy and Prince (1995); Downing (2000); Golston and Thurgood (1999); Raimy (2000); Inkelas and Zoll (2005).

I begin this section by presenting a description of the reduplicative phenomenon of interest in Samala, along with relevant background information about the general morphophonology of the language. I then present an analysis of the reduplication pattern in the framework of Minimal Reduplication, showing how an analysis in which reduplication occurs in order to express a segmentally empty prefix explains the basic reduplication facts and is compatible with a straightforward explanation for the opaque interactions and other properties of the process. Finally I consider the analyses presented by previous authors, contrasting their analyses with the MR analysis in theoretical and practical terms.

At least six different reduplicative patterns are found in Samala, with varying degrees of ubiquity and productivity. These patterns are exemplified in the table below.

(53) Samala reduplication patterns (Applegate, 1972):

| *Type* | *Example* | *Gloss* |
|---|---|---|
| CVC- | lewlew | ‘mythological creature’ |
| CV- | ani-kʰokʰoʔ | ‘to hop on one leg’ |
| -VC | aqs-mumuy | ‘to make a kissing sound’ |
| Medial | oqs-pololon | ‘to slap-yell’ |
| wuluwul (CVCV-) | tïq’ïtïq’ | ‘blackberry’ |
| Bisyllabic | wuluwulun | ‘to shake, wiggle’ |

I focus here on CVC- reduplication, which is the best documented and most productive of these processes (and will be referred to simply as reduplication below). This process expresses plurality or collectivity in nouns and distributive/repetitive aspect in verbs. Reduplication typically involves copying the first CVC of the stem, which is often but not always the first CVC of the root as well. Reduplication normally occurs “inside” personal prefixes (which indicate subject or possessor agreement), but just when the stem begins with a vowel, reduplication will copy the first VC of the stem together with a preceding personal prefix consonant or similarly remote prefix. Several phonological processes apply opaquely in Samala, all of which result in reduplication having the shape CVC.

My analysis takes the reduplicative affix to have an underlying phonological form that is segmentally empty but includes a heavy syllable that must be expressed by copying in material from the stem. It is not clear where in the derivation of the word this reduplicant merges, because it effectively targets the stem of the word (as the most prominent constituent) to copy. The copying of a non-stem prefix is not due to phonological backcopying, but rather due to the incorporation of such a segment into the PStem due to a requirement that the left edge of the PStem align with the left edge of a syllable. The opaque interactions exhibited by reduplicative words are all part of a conspiracy that aims at realizing the complete heavy syllable form of the reduplicant.

### 4.2.1 Language background

Samala morphology is characterized by complex agglutinative affixation, with a particularly large and intricate set of prefixes. Morphologically speaking, there are three basic classes of prefix in Samala, which Applegate (1972) labels Outer, Personal, and Inner. In terms of phonologically significant groupings, there are two types of prefixes, which Applegate calls Close and Remote. I take those prefixes to be stem-level and word-level affixes respectively. The morphological and phonological distinctions do not correspond neatly: of the Inner prefixes, some are Remote and some are Close.[11] All Personal prefixes are Remote, as are the Outer prefixes. (Suffixes are similarly divided, but I mostly ignore them here.)

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[11] It appears that morpheme ordering is consistent with the analysis of this distinction as one of stratal ordering, which I adopt below. Such an analysis predicts that all Close affixes surface closer to the root than Remote affixes. Applegate does not explicitly state that this is always the case, but as far as I can tell it is true; I have not come across any counterexamples to such a claim.

Outer prefixes appear to be mostly clitics, although with more data it might be possible to divide them into a group of proclitics and a group of true prefixes. In any event, they are relatively rare and few in number, and mostly ignored here. Personal prefixes are also few in number, but they are very common and play a central role in Samala morphosyntax. With verbs they indicate the person and number of the subject and are generally obligatory. With nouns they indicate the possessor and are generally optional, except with a small class of inalienable nouns (typically body parts and kinship terms). The personal prefixes are listed below (taken from Applegate (1972)).

(54) Samala personal prefixes:

| | *singular* | *dual* | *plural* | *indefinite* |
|---|---|---|---|---|
| first | k- | k-iš- | k-iy- | |
| second | p- | p-iš- | p-iy- | |
| third | s- | s-iš- | s-iy- | s-am- |
| third relative | ma-l- | ma-iš-al- | ma-iy-al- | ma-l-am- |

The structure of the Samala word is shown below, including Applegate's analysis and my reinterpretation of the same in a comparative view.

(55) Structure of the Samala word:

| Applegate: | Outer | - Personal | - Inner | - Root | - Suffixes |
|---|---|---|---|---|---|
| My analysis: | Clitics | - Inflection | - Derivational | - Root | - Suffixes |
| | $(_{Post-lexical}$ | $[_{Word\ level}$ | $\{_{Stem\ level}$ | | $\} \quad ])$ |

### 4.2.2 Reduplication in Samala

The following data illustrate CVC- reduplication in verbal and nominal contexts:

(56) Basic reduplication data:[12]

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| s-$\sqrt{\text{kitwon}}$ | s**kit**kitwon | ‘s/he is coming out’ |
| $\sqrt{\text{ʔonoq}}$ | **ʔon**ʔonoq’ | ‘turkey vultures’ |
| $\sqrt{\text{kawayu}}$ | **kaw**kawayuʔ | ‘horses’ (Spanish borrowing) |

Reduplication appears to be the outermost of the Inner prefixes. It typically copies the first CVC of the following stem (composed of other Inner prefixes, a root, and any suffixes):

---

[12] The reduplicative morpheme is not shown in underlying forms until §4.2.3. In surface forms the apparent reduplicant is printed in boldface in this section, for purposes of clarity. However, some of the assumptions about which segments are reduplicative and which are not will be revisited in §4.2.3. In addition, roots in underlying forms are indicated as $\sqrt{\text{Root}}$.

(57) Reduplication copies from following stem:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-$\sqrt{\text{nowon}}$ | k**now**nowon | ‘I am standing’ |
| s-xili-$\sqrt{\text{wayan}}$ | s**xil**xiliwayan | ‘it is floating’ |
| ma-p-$\sqrt{\text{kawayu}}$-iwaš | map**kaw**kawayuʔiwaš | ‘the horses that were yours’ |

Reduplication has an additional exponent in nominal cases. Vowel-final nouns receive a suffixed glottal stop, and consonant-final nouns glottalize:

(58) Nominal glottalization:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| $\sqrt{\text{kawayu}}$ | **kaw**kawayuʔ | ‘horses’ |
| $\sqrt{\text{xas}}$ | **xas**xas’ | ‘beach’ |
| $\sqrt{\text{xšap}}$ | **xšap**šap’ | ‘rattlesnakes’ |

#### 4.2.2.1 Mobility of reduplication

There is a small (n ≈ 12) set of lexically-marked Inner prefixes that atypically reject reduplication. When these prefixes are present in a reduplicative word, reduplication targets the stem to the right of the lexically-marked prefix, whether that stem begins with another Inner prefix or a root. These special prefixes do not form a semantic or phonological class, nor do they occur in the same position in the word. Included in this class are disparate prefixes like *ʔal-* ‘agentive, habitual’; *ni-* ‘transitive’; *wi-* ‘by blows’ and *ašni-* ‘with the feet.’ Some reduplicative examples are shown in (59).

(59) Special prefixes reject reduplication:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-wi-$\sqrt{\text{č’eq}}$ | kwi**č’eq**č’eq<br>**kwičwič’eq* | ‘I pound it to pieces’ |
| s-ni-$\sqrt{\text{wïy}}$ | šni**wïy**wïy<br>**šniwniwïy* | ‘s/he is notching it’[13] |
| s-am-ti-$\sqrt{\text{lok’in}}$ | smti**lok**lok’in<br>**smtiltilok’in* | ‘they cut it off’ |

Although these prefixes resist reduplication, their resistance is not absolute. If the stem following a non-reduplicating prefix is vowel-initial, the prefix will contribute its final consonant to the reduplicant, as shown in 4.2.2.2. As well, when a normally reduplicating Inner prefix occurs outside of the non-reduplicating prefix (relative to the root), the non-reduplicating prefix behaves like a normal reduplicating prefix. This is shown by the behavior of *ni-*, a non-reduplicating prefix, in the following example:

(60) /k-xul-ni-yïw/ → [k**xun**xuniyïw] ‘I am looking all over for it’[14]

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[13] *s* and *c* laminalize to *š* and *č* before a coronal consonant.

[14] The final *l* of *xul-* deletes by regular phonology, as described in (71).

#### 4.2.2.2 Stem shape and reduplication of inflection

With C-initial stems, Personal morphemes preceding the reduplicative morpheme do not participate in reduplication.

(61) Reduplication with C-initial stems:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-su-√pšeʔ | k**šup**šupšeʔ | ‘I’m putting out (a fire)’ |
| s-√tal’ik | š**tal**tal’ik’ | ‘his wives’ |
| s-√k’om’in | s**k’om**k’om’in | ‘(the wind) is dying down’ |

With V-initial stems, however, Personal morphemes do reduplicate:

(62) Reduplication with V-initial stems:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-√ičtïn’ | **kič**kičtïn’ | ‘my children’ |
| s-iy-√eqwel | si**yeq**yeqwel | ‘they are making’ |
| s-uti-ali-max-√keken | **sut**sutalimexkeken | ‘s/he suddenly gives it a stretch’ |

#### 4.2.2.3 Reduplication of non-standard stem shapes

Most Samala roots have the form CVC or a longer form beginning with this sequence. However, there are a few roots that diverge from this pattern in one of two ways: roots that are shorter than CVC, and roots that begin with a consonant cluster.

**CV roots**

Roots that are smaller than CVC have the shape CV. Most of these roots surface in their bare form with an epenthetic final glottal stop, although one common noun, *ku* ‘person’ surfaces as a bare CV. (CV verbs may also surface without a final epenthetic consonant in their bare forms, but verbs are much more likely than nouns to be attested with other affixes.) When CV roots reduplicate, the reduplicant always surfaces with a final epenthetic *h*. This epenthetic segment does not occur with reduplication of any other stem shapes, and it does not match the root (which surfaces bare or with a final glottal stop).[15] Examples of reduplication with sub-CVC roots are shown in (63).

---

[15] There is one form that occurs without epenthesis or a final glottal stop:

(i) /s-c’ï/ → s**c’ï**c’ï ‘it is sharp’

This is the only attested verb with a CV root that occurs without a final glottal stop in its singular form and without an additional epenthetic consonant in its reduplicated form. This is also almost the only attested form of any kind with a light reduplicative syllable. I treat this form as an exception.

(63) Reduplication with CV roots:

| *Underlying form* | *Bare form* | *Reduplicated form* | *Gloss* |
|---|---|---|---|
| $\sqrt{\text{ku}}$ | ku | **kuh**kuʔ | ‘people’ |
| $\sqrt{\text{t’o}}$ | t’oʔ | **t’oh**t’oʔ | ‘mussels’ |
| $\sqrt{\text{ya}}$ | yaʔ | **yah**yaʔ | ‘arrows’ |
| s-$\sqrt{\text{yi}}$ | syiʔ | s**yih**yiʔ | ‘s/he spends the night’ |

#### CCVC roots

With stems that have an initial consonant cluster, the full cluster is simplified in one instance and surfaces fully only in one location. Interestingly, it is the reduplicant in which the cluster surfaces faithfully, while the stem simplifies, deleting the first consonant. Schematically, $/C_1C_2VC_3/ \rightarrow [C_1C_2VC_3C_2VC_3]$.[16] Examples are given in (64).

(64) Reduplication with CCVC roots:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| $\sqrt{\text{štexex’}}$ | **štex**texex’ | ‘rivers’ |
| $\sqrt{\text{skon}}$ | **skon**kon’ | ‘worms, reptiles’ |
| $\sqrt{\text{xšap}}$ | **xšap**šap’ | ‘rattlesnakes’ |

### 4.2.2.4 Interaction with other phonology

Reduplication interacts opaquely with many other phonological processes in Samala. The nature of these interactions generally support Applegate’s statement that reduplication is a relatively late process. However, these interactions must be examined individually in order to fully understand the nature of Samala reduplication.

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[16] There are a few attested exceptions, in all of which the full cluster is retained in both copies:

(i) Exceptions to cluster simplification in reduplication:

| | | |
|---|---|---|
| /cyïw’/ | → [**cyïw**cyïw’] | ‘kinds, sorts’ |
| /xšap/ | → [**xšap**xšap’] | ‘rattlesnakes’ |
| /qweleqwel’/ | → [**qwel**qweleqwel’] | ‘cottonwood trees’ |

The first two examples are also attested in other instances with the second cluster simplified, i.e. *cyïwyïw’* and *xšapšap’*. These alternants all fit the normal pattern for CCVC roots. Given the size of the corpus available, it is difficult to make judgments about these exceptional forms. The fact that several forms are variants of forms that are also attested with forms fitting the standard pattern may suggest that both forms may have been in free variation; or these alternants could reflect the grammatical simplification characteristic of language obsolescence. Given our limited knowledge in this area, I take these forms as lexical exceptions to the generalization about CCVC roots.

### Cluster conflation

There are several processes by which a sequence of consonants is reduced to a single consonant sharing features of each. Each of these rules seems to apply without regard to the syllabic role of the consonants in question. Therefore these can be considered cluster rules rather than rules concerning the licensing of certain consonants in particular syllabic roles.

**4.2.2.4.a Laryngeal conflation:** Any sequence of a consonant followed by a glottal stop, or an obstruent followed by *h*, surfaces as a glottalized or aspirated version of the first consonant:

(65) Laryngeal conflation:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| k-iy-is-$\sqrt{\text{ʔeneq}}$ | kiyis’eneq | ‘our sister’ |
| ma-l-ʔip-$\sqrt{\text{us}}$ | mal’ipus | ‘what s/he says to her/him’ |
| s-iš-$\sqrt{\text{halala}}$ | šiš$^{\text{h}}$alala | ‘they (dual) are quarreling’ |

**4.2.2.4.b Doublet aspiration:** Any sequence of two identical obstruents surfaces as a single aspirated version of the same obstruent:

(66) Doublet aspiration:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| p-$\sqrt{\text{popoč’}}$ | p$^{\text{h}}$opoč’ | ‘your paternal grandfather’ |
| k-tak-$\sqrt{\text{kuy}}$ | ktak$^{\text{h}}$uy | ‘I take hold of it’ |
| s-was-$\sqrt{\text{sisin}}$ | swas$^{\text{h}}$isin | ‘(the terrain) is rugged’ |

The phoneme *x*, which uniquely among obstruents does not have an aspirated counterpart, simplifies potential geminates to singletons. e.g. /RED-xuxaw’/ → [xuxuxaw’] ‘coyotes’ instead of **xuxxuxaw’* or **xux*$^{h}$*uxaw’*.

**4.2.2.4.c Velar-uvular conflation:** a /kq/ sequence surfaces as [q$^{\text{h}}$]:

(67) Velar-uvular conflation:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| k-$\sqrt{\text{qoʔ}}$ | q$^{\text{h}}$oʔ | ‘my dog, pet’ |
| k-qili-$\sqrt{\text{weʔ}}$ | q$^{\text{h}}$iliweʔ | ‘I am sleepy’ |

This may actually be a simple place-assimilation rule that precedes rule 4.2.2.4.b. Note that all attested instances of this rule involve the first person prefix *k*-. However, I assume that this is a general phonological rule for these segments.

All of these rules seem to precede reduplication, as shown by the following data:[17]

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[17] Applegate (1972) notes that the interaction of reduplication and aspiration is much less regular than that of reduplication and glottalization. Reduplicative processes involving aspiration include many apparent lexical exceptions, and many words with more than one attested form. In general, glottalization is a much more significant and pervasive phenomenon in Samala, while aspiration is much rarer and more limited. I abstract away from this

(68) Laryngeal conflation precedes reduplication:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| s-$\sqrt{\text{ʔamïn}}$ | **s’am**s’amïn | ‘s/he is naked’ |
| p-ʔaya-$\sqrt{\text{kuy}}$ | **p’ay**p’ayakuy’ | ‘your baskets’ |
| ma-s-iy-$\sqrt{\text{ʔap}}$ | masi**y’ap**yap’ | ‘their houses’ |
| ma-k-$\sqrt{\text{hik}}$-iwaš | ma**k$^{\mathbf{h}}$i**k$^{h}$ik’iwaš | ‘the things that used to be mine’[18] |

(69) Doublet aspiration precedes reduplication:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-$\sqrt{\text{kuti}}$-in | **k$^{\mathbf{h}}$ut**k$^{h}$utiyin | ‘I see you’ |
| s-$\sqrt{\text{šoyin}}$ | **š$^{\mathbf{h}}$oy**š$^{h}$oyin | ‘it is very dark, black’ |
| ha-s-$\sqrt{\text{šay’}}$ | a**š$^{\mathbf{h}}$ay**š$^{h}$ay’ | ‘her/his daughters’ |

(70) Velar-uvular conflation precedes reduplication:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| k-$\sqrt{\text{qilik}}$ | **q$^{\mathbf{h}}$il**q$^{h}$ilik | ‘I am taking care of (something)’ |

Note that reduplication counterfeeds at least rule 4.2.2.4.a, as would be expected on an analysis where the conflation rules precede reduplication.

(71) Reduplication counterfeeds laryngeal cluster conflation:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| $\sqrt{\text{ʔonoq}}$ | **ʔon**ʔonoq’ | ‘turkey vultures’ |
| $\sqrt{\text{ʔemet}}$ | **ʔem**ʔemet’ | ‘ground squirrels’ |
| $\sqrt{\text{huču}}$ | **huč**hučuʔ | ‘dogs’ |

In (69) we see data involving the well-known Chumashan sibilant harmony (Poser, 1982, 1993, 2004; Lieber, 1987; Harrison, 2000; Kula, 2006; McCarthy, 2007). Sibilant harmony appears to precede conflation, and thus transitively to precede reduplication. Reduplication feeds deglottalization of post-obstruent sonorants, as shown in (68), and thus must precede that rule.

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difference and treat aspiration and glottalization as if they were equally well-behaved.

[18] Forms like this appear to violate the generalization (very important later on) that reduplication always creates a heavy syllable. However, there is reason to think that these forms should actually be analyzed as phonological geminates. Applegate (1972) notes a good deal of variability around aspiration in our attested examples. He writes that between reduplication and a rule of aspiration there is “essentially an anomaly in the rule ordering,” and that “further evidence of this anomalous ordering is that geminate clusters created through reduplication may undergo aspiration, transcribed by Harrington in such environments as both pre- and post-aspirated.” This variability is found only with reduplication. This can be explained and made consistent with other generalizations about reduplication if we take these forms to be phonological geminates. Thus, the form transcribed as *ma**k$^{\mathbf{h}}$i**k$^{h}$ik’iwaš* should be regarded phonologically as *ma**k$^{\mathbf{h}}$ik**k$^{h}$ik’iwaš*. Aspiration can then be regarded as a phonetic reflex of these true geminates, rather than a phonological property. This offers a better explanation for the variability of aspiration in attested reduplication forms.

### Pre-consonantal *l*-deletion

There are two processes whereby *l* deletes in a certain consonantal context. At the stem level, *l* deletes obligatorily before an alveolar consonant, and optionally before a palatal consonant or a non-alveolar sonorant:

(72) Stem-level *l*-deletion:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| tal-$\sqrt{\text{sïq}}$ | tasïq | ‘to grasp firmly, tightly’ |
| xal-$\sqrt{\text{nowon}}$ | xanowon | ‘to fly’ |
| qil-$\sqrt{\text{č’om’in}}$ | qič’om’in ~ qilč’om’in | ‘to soften by soaking’ (intrans.) |

At the word level, *l* deletes before any consonant:

(73) Word-level *l*-deletion:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| ʔal-mati-$\sqrt{\text{nan’}}$ | ʔamatinan’ | ‘coyote’ (literally ‘the slinker’) |
| ma-l-$\sqrt{\text{kitwon}}$ | makitwon | ‘what comes out; one who comes out’ |
| p-iš-al-$\sqrt{\text{nan’}}$ | pišanan’ | ‘don’t you two go’ |

But when reduplication creates an *lC* sequence, *l*-deletion fails to apply:

(74) *l*-deletion underapplies with reduplication:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| s-$\sqrt{\text{tal’ik}}$ | š**tal**tal’ik’ | ‘his wives’ |
| $\sqrt{\text{c’aluqay}}$ | **c’al**c’aluqay’ | ‘cradles’ |
| s-pil-$\sqrt{\text{kowon}}$ | s**pil**pilkowon | ‘it is spilling’ |

### Pre-consonantal delaryngealization

Aspirated and glottalized consonants delaryngealize when they surface before another consonant:

(75) Laryngeal segments delaryngealize preconsonantally:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| sïp’-$\sqrt{\text{muʔ}}$ | sïpmuʔ | ‘load, burden’ |
| s-xuti-nan’-$\sqrt{\text{pi}}$ | sxutinanpi | ‘it is bothersome, harmful’ |
| p-$\sqrt{\text{tišik’}}$-waš | ptišikwaš | ‘you recognized him’ |

Since word-final laryngealization surfaces faithfully, we can take this to be a cluster effect rather than a coda effect. In any event, this process is fed by reduplication:

(76) Reduplication feeds pre-consonantal delaryngealization:

| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| ha-s-√šay’ | a**šʰay**šʰay’ | ‘her/his daughters’ |
| s-√k’om’in | s**k’om**k’om’in | ‘(the wind) is dying down’ |
| √ʔoqʰoš’ | **ʔoq**ʔoqʰoš’ | ‘sea otters’ |

**Post-obstruent sonorant delaryngealization**

Glottalized sonorants delaryngealize when they surface after an obstruent:

(77) Glottal sonorants delaryngealize after obstruents:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| s-iy-itax-√m’ay | siyitaxmay | ‘they are astonished’ |
| s-aqta-ax-√l’eqen | seqtexleqen | ‘(an arrow) passes clear through it’ |

This process is also fed by reduplication:

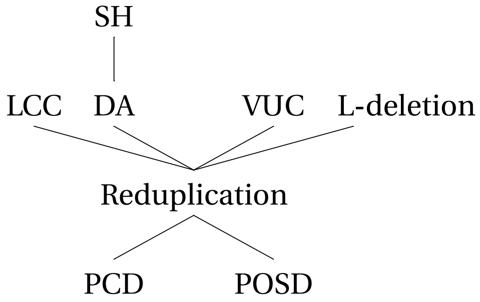
(78) Reduplication feeds post-obstruent sonorant delaryngealization:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| ma-s-iy-√ʔap | masi**y’ap**yap’ | ‘their houses’ |
| k-ʔal-√ʔip | k’a**l’ip**lip | ‘I think; I say’ |

**Summary of interactions**

The relations between interacting processes are shown in figure (79).

(79) Precedence relations involving reduplication (earliest at top):



**Key:**
SH: Sibilant Harmony
LCC: Laryngeal Cluster Conflation
DA: Doublet Aspiration
VUC: Velar-Uvular Conflation
PCD: Pre-Consonantal Delaryngealization
POSD: Post-Obstruent Sonorant Delaryngealization

### 4.2.3 A Minimal Reduplication analysis

The crucial generalization about CVC reduplication in Samala is that the reduplicant is always a heavy syllable. Facts such as the "backcopying" that occurs with vowel-initial roots and less exotic facts such as the opaque interactions of reduplication reveal a widespread conspiracy to create heavy-syllable reduplication. The analysis that best accounts for this generalization is one in which CVC reduplication corresponds to a segmentally underspecified morpheme. More specifically, the morpheme is a prefix with an underlying form like $/\sigma_{\mu\mu}/$.

In this section I build an MR analysis of Samala reduplication in separate pieces, tackling each of the significant generalization about the data introduced above. Although these pieces are separable, I show that they are consistent with one another and when put together they yield an analysis of CVC reduplication that is both comprehensive and explanatory.

As an initial assumption, I adopt the framework of Stratal OT (Bermúdez-Otero, forthcoming; Kiparsky, 2007; Stonham, 2007; Gribanova, 2007) for a general means to account for the many morphophonological differences observed by Applegate (1972) between Close and Remote affixes. This entails that there are multiple levels involved in the construction of a word, which occur sequentially. Two levels occur within the construction of a word, the stem level and word level. At each of these levels, appropriate affixes may be added *en bloc* to a root, and the phonology pertaining to that level (a parallel-candidate simultaneous OT evaluation) occurs; the phonology of each level (i.e. the particular constraint ranking that holds) is independent of the phonology of other levels. At least one postlexical phonological level also occurs, at which level multiple words are evaluated simultaneously.

Within this stratal framework, each affix must belong to the stem level or the word level. I take the reduplicative affix to belong to the word level. This is principally a matter of convenience (though see Inkelas and Zoll (2005) for some arguments in favor of reduplication being composed late in the derivation in terms of the semantics), but since every morpheme must be stipulated as belonging to one level or the other, it is not a costly assumption. Because the constituent that is reduplicated (the "base") can be defined both in morphological and phonological terms (it is typically left edge of the stem, as well as the root plus stem-level prefixes), it is not self-evident whether those constituents are copied because they are targeted or because the reduplicative affix is added at such a time that it is copying that constituent locally.

Following Inkelas and Zoll (2005), I analyze the fact that the stem is targeted in reduplication as due to the prominence of that target (relative to non-stem material). As discussed in chapter 1, there is a general tendency towards the reduplication of prominent material rather than less prominent material. To account formally for this fact, I assume that the reduplicative affix is not phonologically linearized by the morphophonology. Its surface position (and the surface position of reduplication) is determined by constraints from the REDUPLICATE class. These constraints are satisfied by the existence of a correspondence relationship between two strings. Developing the original idea for these constraints from Zuraw (2003), I take there to be separate constraints of this type for prominent positions or structures – e.g. REDUPLICATE(PStem), REDUPLICATE($\sigma$), etc.

The underlying form of the affix is $\sigma_{\mu\mu}$, i.e., a heavy syllable with no segmental content.[19]

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[19] Note that other underlying forms than a heavy syllable are possible; for example, two unattached moras could yield the same result. The essential part is the presence of at least two distinct moras in the input. There are other issues implicated by the presence of syllables in underlying forms, but I ignore those here, and take the underlying

Following Cole (1994); Downing (1998*b*); Inkelas and Zoll (2005), I assume that the Prosodic Stem (PStem) is a morphophonological constituent that can be seen and changed by the phonological component of the grammar. Typically the output of the stem-level phonology is both the morphological and prosodic stem, which are coterminous but may be separately manipulable; as we will see below, the availability of the boundaries of the PStem for manipulation is a crucial part of this analysis. In tableaux below, PStem boundaries are indicated with curly brackets, as in {stem}. In word-level tableaux, the input will include a PStem surrounding the material that has undergone stem-level phonology.

#### 4.2.3.1 Core data: CVC reduplication

Our first generalization is that the plural/distributive reduplicant always takes the form of a heavy syllable. This is due to pressure to realize faithfully the underlying form of the reduplicative affix: a heavy syllable with no segmental content. In order to realize this form, it is necessary to provide extra segments and associate them with that empty syllable. Although this morpheme differs from most others in that it lacks its own underlying segmental material, it is otherwise quite ordinary. We can assume that its location when the phonological calculation begins is determined by the morphosyntax, just like the other affixes of Samala; this will be obscured however by the fact that it is driven to copy from a particular prominent constituent, namely the PStem.

Selection of the correct candidate against some likely contenders is shown in the following tableau.[20]

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form of this morpheme to be /$\sigma_{\mu\mu}$/ as a simplifying assumption.

[20] The original definition of certain faithfulness constraints such as CONTIGUITY are ambiguous as to how the constraint should apply when an input structure has multiple correspondents in the output. Existential faithfulness (Struijke, 2000) corrects this problem by proposing faithfulness constraints that are satisfied existentially, i.e. if any output correspondent occurs in a context that would satisfy the constraint, then the constraint is satisfied. I adopt existential faithfulness constraints here when it is necessary to resolve an otherwise ambiguous constraint. Note that it is possible to approach these data from a framework that rejects existential faithfulness, in which case different constraint rankings and arguments will be needed; however, it is necessary in any event to redefine and remove ambiguity from constraints like simple CONTIGUITY à la McCarthy and Prince (1995) just for reasons of computability. The contiguity constraints used below are defined as follows:

(i) ∃-I-CONTIGUITY: "For any string *xy* in the input, assign a violation unless there is a string $\alpha\beta$ in the output such that $x\Re\alpha$ and $y\Re\beta$.

(ii) ∃-O-CONTIGUITY: "For any string $\alpha\beta$ in the output, assign a violation unless there is a string *xy* in the input such that $x\Re\alpha$ and $y\Re\beta$.

Note also that the PStems in these candidates are all left-aligned to syllable edges; as shown in the discussion below of V-initial stem reduplication, this is due to the force of a constraint from the ALIGN family.

(80) /s-$\sigma_{\mu\mu}$-kitwon/ → [skitkitwon] ‘it is coming out’[21]

| $\sigma_{\mu\mu}$, s-{kitwon} | Max-$\mu$ | Dep | WxP | ∃-I-Contig | Integrity |
|---|---|---|---|---|---|
| ☞ a. skit{kitwon} | | | | | *** |
| b. skit{skitwon} | | | | | ****! |
| c. ski{kitwon} | *! | | | | ** |
| d. {skitwon} | *!* | | | | |
| e. səʔ{kitwon} | | *!* | | | |
| f. ski{kitwon} | | | *! | | ** |
| g. sit{kitwon} | | | | *! | ** |

In the implementation of our analysis, the first important issue is the high rank of Max-$\mu$. Specifically, this constraint must outrank Contiguity (since reduplication creates discontiguous strings) and Integrity (which is routinely violated in reduplication cases). As well, Dep must outrank Integrity – our basic ranking to yield reduplication rather than epenthesis. Candidates that violate Max-$\mu$ are shown to lose (*b* and *c*) as is the epenthetic competitor (*e*).

Another candidate to consider is one in which copying is minimized by associating the underlying empty mora with a stem-edge consonant that must be copied in any case (to better satisfy stem contiguity) – *f* in the tableau above. However, such a candidate associates a mora with a syllable onset, and runs afoul of high-ranking WeightByPosition.

Candidate *g* attempts to minimize Integrity violations while satisfying Max-$\mu$, by neglecting to copy the stem onset. But this is a losing strategy because it creates an extra discontiguous string (*si* is present in the output but does not occur in the input). Contiguity must therefore outrank Integrity.[22]

#### 4.2.3.2 “Backcopying”

Reduplication of vowel-initial stems exhibits behavior that has been analyzed as backcopying. In these words, the final consonant of an inflectional prefix preceding the reduplicating morpheme is copied along with the first two segments of the stem.

The special behavior of these words is due to the need to realize the moras associated with the reduplicating morpheme. Complete satisfaction of Integrity can only be achieved by leaving one mora unassociated (violating Max-$\mu$) or by copying consonants from further inland in the stem, creating extra violations of Contig.

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[21] In this tableau, underlined segments are those to which the underlying moras affiliated with the reduplicating morpheme are associated.

[22] A crucial assumption here is that the reduplicative morpheme in the input is effectively invisible when computing Contiguity violations. This is quite natural if we are considering contiguity on the segmental or root tier, which should be the default interpretation of this constraint.

(81) /$\sigma_{\mu\mu}$, s-{ikmen}/ → [siksikmen] '(the surf) comes in'

| $\sigma_{\mu\mu}$, s-{ikmen} | ALIGN-L (Pstem-$\sigma$) | ∃-I-CONTIG | ∃-O-CONTIG | INTEG |
|---|---|---|---|---|
| ☞ a. sik{sikmen} | | | * | *** |
| b. sis{kikmen} | | | **!* | *** |
| c. skik{sikmen} | | | **!* | *** |
| d. siks{ikmen} | *! | | * | *** |

I follow Inkelas and Zoll (2005) in claiming that the grammar compels the left edge of the PStem to coincide with a syllable edge; this is enforced here through ALIGNMENT. Given that claim, these constraints compel contiguous heavy-syllable reduplication. There is no need to propose backcopying or other accounts that are typologically problematic. The "extra" copying (of prefix *s*-, which would not copy with a C-initial stem) is not only accounted for but explained as part of the general need to faithfully realize the reduplicative morpheme.

There is one loose end that remains. Although this constraint ranking will successfully compel copying of a contiguous string of the correct size, it will not necessarily suffice to determine which string is copied – specially since reduplication is relatively mobile, as we have seen. A comparable contender copying another string from inside the word would fare similarly well, as shown in example (82):

(82) /$\sigma_{\mu\mu}$, s-{ikmen}/ → [siksikmen] '(the surf) comes in'

| $\sigma_{\mu\mu}$, s-{ikmen} | MAX-$\mu$ | DEP | ∃-O-CONTIGUITY | INTEGRITY |
|---|---|---|---|---|
| ☞ a. sik{sikmen} | | | * | *** |
| ☞ b. sik{mikmen} | | | * | *** |

Both of these candidates violate ∃-O-CONTIGUITY once (by the sequences *ks* and *km* respectively) and INTEGRITY three times. Another constraint or set of constraints must be considered to decide between these candidates. One such set of constraints are those from the REDUPLICATE family – specifically REDUPLICATE($\sigma$) and the generic REDUPLICATE constraint. Those are defined here as follows (cf. Zuraw (2003)):

(83) REDUPLICATE($\sigma$): "For some syllable in the output there is a distinct syllable in the output that stands in correspondence with it."

(84) REDUPLICATE: "For some phonological structure in the output there is a distinct phonological structure in the output that stands in correspondence with it."

REDUPLICATE($\sigma$) must dominate REDUPLICATE.[23] This yields the correct result as shown below:

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[23] See Saba Kirchner (2007*b*) for another approach to a similar question of which constituent to target in Kwak'wala.

(85) /$\sigma_{\mu\mu}$, s-{ikmen}/ → [siksikmen] '(the surf) comes in'

| $\sigma_{\mu\mu}$, s-{ikmen} | ∃-O-CONTIG | INTEG | REDUP($\sigma$) | REDUP |
|---|---|---|---|---|
| ☞ a. sik{sikmen} | * | *** | | |
| b. sik{mikmen} | * | *** | *! | |

#### 4.2.3.3 Mobility of reduplication

As we have seen, there is a class of prefixes that do not allow reduplication to target them, even though their morphophonological position suggests that they should be appropriate targets. It is clear that these morphemes are exceptions as far as reduplication is concerned, rather than simply being added outside reduplication, because they can reduplicate when they are preceded by another prefix that does allow reduplication.

Conceptually, I account for this reduplication anomaly by claiming that these morphemes are special stem-level morphemes that are not incorporated into the PStem, although they undergo all other stem-level phonology normally (an idea borrowed from Inkelas and Zoll (2005)). (Note that this level of stipulation is impossible to avoid, given the reality of a dozen dissimilar prefixes that resist reduplication but otherwise appear quite normal.) I leave the formal means of creating these structures (which involves stem-level phonology and lexical diacritics) unstated.

Tableau (86) illustrates this analysis, with prefix *ni-* belonging to the non-reduplicating class:

(86) /$\sigma_{\mu\mu}$, k-ni-{č'eq}/ → [knič'eqč'eq] 'I'm tearing it up'[24]

| $\sigma_{\mu\mu}$, k-ni-{č'eq} | ∃-I-CONTIGUITY | INTEGRITY | DEPSTEM |
|---|---|---|---|
| ☞ a. kni{č'eqč'eq} | * | *** | |
| b. {kč'eq}ni{č'eq} | **! | *** | |
| c. {kničnič'eq} | * | *** | *!** |

If PStem-internal material is copied non-locally, unnecessary violations of CONTIGUITY are incurred. A candidate that extends the PStem leftward to incorporate the non-reduplicating *ni-* prefix gets in trouble for violations of DEPSTEM, which we define as follows:[25]

(87) DEPSTEM : "Assign a violation for each segment that belongs to a PStem in the output unless it corresponds to an input segment that also belongs to a PStem."

As seen in (86), this constraint succeeds at penalizing PStem expansion and prevents rampant incorporation of the entire word into the PStem.

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[24] INTEGRITY(Stem) here stands in for the two positional faithfulness constraints of the INTEGRITY family that were called on in (85).

[25] Although it would be possible to rule out this candidate through the use of REDUPLICATE($\sigma$), that is not always the case.

### 4.2.3.4 Non-standard root shapes

**CV roots**

The CVC reduplicative morpheme is associated with epenthesis instead of reduplication in only one context: with sub-CVC roots. Notably, in nominal forms, the reduplicative morpheme is realized through reduplication (or epenthesis) and through a suffixed glottal stop. This extra glottal stop should create a CVC string that could be reduplicated. But the final consonant is not copied, and reduplication is augmented with an epenthetic *h* instead of copying the final glottal stop.

It is notable that this behavior occurs only with nominal forms, and nominal reduplicative forms are distinguished from their verbal counterparts by the presence of a final glottal stop. Note that if this glottal stop were not present, epenthesis would be very easy to explain. Reduplication requires the presence of some coda consonant to realize the second coda of the reduplicative affix. No underlying coda would be present; copying the initial segment would lead to conflation and the second mora would remain unexpressed. Epenthesis, then, must be chosen as a last resort.

We can get exactly this effect if we take the final glottal stop as a separate enclitic that is only joined with the word at the postlexical level. This separation is plausible given that the presence of the glottal stop corresponds to a syntactic category difference. Its co-occurrence with reduplication may be the kind of redundancy that often occurs in marking and agreement systems. The correct result comes out on these assumptions, as shown in the following tableaux (the motivation for *h* as the epenthetic segment is not given):

(88) Word level: /$\sigma_{\mu\mu}$, {ku}/ → *kuhku*

| $\sigma_{\mu\mu}$, {ku} | OCP | Max-$\mu$ | Dep | ∃-I-Contiguity | Integrity |
|---|---|---|---|---|---|
| ☞ a. kuh{ku} | | | * | | ** |
| b. ku{ku} | | *! | | | ** |
| c. kuk{ku} | *! | | | | ** |

(89) Postlexical: /kuh{ku}, ʔ/ → [kuhkuʔ] ‘people’

| kuh{ku}, ʔ | Max-IO |
|---|---|
| ☞ a. kuh{ku}ʔ | |
| b. kuh{ku}h | *! |
| c. kuʔ{ku}ʔ | *! |
| d. kuh{ku}ʔ | *! |

**CCVC roots**

Root-initial clusters simplify under reduplication. Notably, it is the “reduplicant” in which the complete cluster reaches the surface, and the “base” which simplifies. Given our MR analysis, this pattern is not at all surprising. We copy a heavy syllable to realize the reduplicative morpheme. As long as every input segment has at least one output correspondent (to satisfy Max-seg), we will minimize copying in order to avoid unnecessary Integrity violations. Finally, we will simplify clusters in a way that minimizes our violations of Contiguity – that is, by simplifying at exactly those points where a Contiguity violation is already required. The following tableau shows the selection of the attested candidate.[26]

(90) /$\sigma_{\mu\mu}$, {xšap}-ʔ/ → [xšapšap’] ‘rattlesnakes’

| $\sigma_{\mu\mu}$, {xšap}-ʔ | Max-$\mu$ | ∃-I-Contig | ∃-O-Contig | Integrity |
|---|---|---|---|---|
| ☞ a. {xšap.šap’} | | | * | *** |
| b. {xšap.xšap’} | | | * | ****! |
| c. {xap.šap’} | | *! | ** | ** |
| d. {xša.xšap’} | *! | | * | *** |
| e. {xša.šap’} | *! | | * | ** |
| f. {xšap.xap’} | | | *! | *** |

This takes care of the major substantively different candidates. However we are left with another candidate to consider in which a complex “base” and a simplified “reduplicant” surface rather than the reverse. That candidate and the optimal candidate appear to fare equally well:

(91) /$\sigma_{\mu\mu}$, {xšap}-ʔ/ → [xšapšap’] ‘rattlesnakes’

| $\sigma_{\mu\mu}$-{xšap}-ʔ | Max-$\mu$ | ∃-I-Contiguity | Integrity | *Complex |
|---|---|---|---|---|
| ☞ a. {xšap.šap’} | | * | *** | * |
| ☞ b. šap.{xšap’} | | * | *** | * |

Because both candidates receive identical evaluations from these constraints, we can decide between them with the addition of any constraint that differentiates between them. One such constraint is Anchor-L(Word), which requires the underlying left edge of the word to surface at the left edge in the output. This leads to the selection of the attested candidate, as shown below:

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[26] To simplify representations, I include the final glottal stop in these tableaux in order for the output of the word-level phonology to match the attested surface form. But note that this is actually combined postlexically, as discussed above.

(92) /$\sigma_{\mu\mu}$-{xšap}-ʔ/ → [xšapšap'] 'rattlesnakes'

| $\sigma_{\mu\mu}$-{xšap}-ʔ | ANCHOR-L(WORD) | CONTIG | INTEG | *COMPLEX |
|---|---|---|---|---|
| ☞ a. {xšap.šap'} | | * | *** | * |
| b. šap.{xšap'} | *! | * | *** | * |

#### 4.2.3.5 Interaction with other phonology

**Conflationary phonology**

All the conflationary phonology (glottalization of Cʔ and aspiration of Ch, $C_\alpha C_\alpha$ and *kq*) feeds reduplication. Here I give an analysis for glottalization, which extends to all the aspiration patterns as well.

Cʔ sequences surface as C', motivating the rankings shown in the following tableau:

(93) /k-iy-is-{ʔeneq}/ → [kiyis'eneq] 'our sister'

| k-iy-is-{ʔeneq} | *Cʔ | CONTIG | MAX-seg | UNIFORMITY |
|---|---|---|---|---|
| ☞ a. kiyi{s'eneq} | | | | * |
| b. kiyi{seneq} | | *! | * | |
| c. kiyis{ʔeneq} | *! | | | |

In reduplicative contexts, conflation appears to feed reduplication – that is, an underlying *CʔV* sequence reduplicates as *C'VC'V*. Lexical phonology often accounts for such opaque interactions because one process occurs before the context for the other process is created. But this is not the case in Samala reduplication, where the pre-glottal stop consonant may belong to the word level, together with reduplication, while the glottal stop itself may have been introduced at the stem level.

In an OT analysis, this interaction is not due to temporal ordering of rules. Conflation itself remains a strategy for marked structures due to the rankings given above, while reduplication is a process taking place simultaneously; the apparent feeding relationship must emerge from the interaction of them. This is in fact relatively simple to describe in terms of parallel evaluation of candidates and the known properties of each process.

Take a $C_1ʔVC_2$ sequence. By the ranking given above, $C_1$ and *ʔ* must coalesce into a segment *C'*, corresponding to both of them. Copying that combined segment, rather than just one or the other (or both) of the underlying consonants that coalesced into it, is the best way to satisfy the various faithfulness constraints in play. The tableau below illustrates.

(94) /$\sigma_{\mu\mu}$, p-{ʔayakuy}-ʔ/ → [p’ayp’ayakuy’] ‘your baskets’

| $\sigma_{\mu\mu}$, p-{ʔayakuy}-ʔ | Max-$\mu$ | *Cʔ | ∃-I-Contig | ∃-O-Contig | Unif |
|---|---|---|---|---|---|
| ☞ a. p’ayp’ayakuy’ | | | * | * | ** |
| b. p’aypayakuy’ | | | * | **! | ** |
| c. p’ayʔayakuy’ | | *! | * | * | * |
| d. p’ay’ayakuy’ | *! | | * | | ** |
| e. pay’ayakuy’ | *! | | * | * | ** |
| f. payʔayakuy’ | | *! | * | * | * |
| g. payp’ayakuy’ | | | * | **! | ** |
| h. paypayakuy’ | | | * | **! | * |

Every candidate that consistently conflates *pʔ* incurs a violation of ∃-I-Contiguity, because that input sequence is never found in the output. (Candidates that do not conflate them are ruled out by higher-ranking *Cʔ.) However, conflation is helpful from the perspective of ∃-O-Contiguity, because it increases the number of input relationships corresponding to a given output relationship and therefore increases the chances that that constraint will be satisfied. This constraint thus rules out candidates that choose one consonant or the other rather than conflating them. Candidates that try to minimize Integrity violations (not shown) by conflating fewer times incur extra violations of Contiguity (such as *b*, *g* and *h*).

To extend this analysis to other conflationary phonology, we only need to add alongside *Cʔ constraints such as *Ch, *Geminate, etc.

However, this is not the end of the story concerning reduplication and conflationary phonology. While conflation feeds reduplication, reduplication counterfeeds conflation, that is, when reduplication creates a potentially conflationary sequence, conflation does not occur. Although counterfeeding is often a very difficult problem in OT (Blumenfeld, 2003; Anttila, 2006; Wolf, 2008), in this case it follows straightforwardly from the analysis that we have developed. Conflation is motivated in general, but it must give way when the alternative is to violate Max-$\mu$:

(95) /$\sigma_{\mu\mu}$, ʔemet-ʔ/ → [ʔemʔemet’] ‘ground squirrels’

| $\sigma_{\mu\mu}$, ʔemet-ʔ | Max-$\mu$ | *Cʔ | ∃-I-Contig | Unif | Integ (Stem) |
|---|---|---|---|---|---|
| ☞ a. ʔemʔemet’ | | * | * | | *** |
| b. ʔem’emet’ | *! | | * | * | ** |

The only other alternative that stands a chance is pulling a segment from elsewhere in the word, in order to create an affix-realizing coda without the offending Cʔ sequence. Because this strategy is not adopted, we need to rule it out. The constraint Linearity will do just this, penalizing reduplication that is not minimally local. The selection of the correct output and the role of LINEARITY are shown in the following tableau.

(96) /$\sigma_{\mu\mu}$, ʔemet-ʔ/ → [ʔemʔemet’] ‘ground squirrels’

| $\sigma_{\mu\mu}$, ʔemet-ʔ | LIN | *Cʔ | ∃-I-CONTIG | ∃-O-CONTIG | INTEG |
|---|---|---|---|---|---|
| ☞ a. ʔemʔemet’ | *** | * | | * | *** |
| b. ʔem’emet’ | * | | | | ** |
| c. ʔemtemet’ | ****!* | | | ** | *** |
| d. ʔemt’emet’ | ****!** | | | * | **** |

**Deletion**

Word-level deletion of *l* before any consonant motivates the domination of a markedness constraint (call it *LC) over MAX-seg and ∃-O-CONTIGUITY:

(97) /ʔal-mati-nan’/ → [ʔamatinan’] ‘coyote’ (literally ‘the slinker’)

| ʔal-mati-nan’ | *LC | ∃-O-CONTIGUITY | MAX-seg |
|---|---|---|---|
| ☞ a. ʔamatinan’ | | * | * |
| b. ʔalmatinan’ | *! | | |

This deletion process counterfeeds reduplication. Given the high ranking of *LC, we might expect to see discontiguous reduplication, borrowing a non-lateral consonant from elsewhere in the word to form the reduplicative coda. To avoid this, we call once again of LINEARITY. If LINEARITY dominates *LC we get the right outcome, as shown in Tableau (98):[27]

(98) /$\sigma_{\mu\mu}$, caluqay-ʔ/ → [calcaluqay’] ‘cradles’

| $\sigma_{\mu\mu}$, caluqay-ʔ | MAX-$\mu$ | LINEARITY | *LC | ∃-O-CONTIG | MAX-seg |
|---|---|---|---|---|---|
| ☞ a. calcaluqay’ | | *** | * | * | |
| b. caqcaq’ | *!** | *** | ** | *** | **** |
| c. caqcaluqay’ | | ***!** | ** | ** | |
| d. cacaluqay’ | *! | * | * | * | * |

---

[27] Notice that candidate *b* (the pathological candidate) is not only not chosen here but is also harmonically bounded by the optimal candidate (as well as by candidate *d*). Whereas a simple BRCT analysis predicts the possibility of templatic backcopying in cases like this (as pointed out by Spaelti (1999)), the MR analysis predicts their impossibility.

### Feature reduction

Two feature reduction effects occur in Samala: delaryngealization of a consonant preceding another consonant, and delaryngealization of a sonorant following an obstruent. We can use a constraint MaxLaryngeal, defined as follows:

(99) MaxLaryngeal : “A laryngeal feature ([+constricted glottis] or [+spread glottis]) present in the input has a correspondent in the output.”

This constraint must be ranked below the relevant Markedness constraints, as shown in the following tableaux:

(100) /s-xuti-nan’-pi/ → [sxutinanpi] ‘it is bothersome, harmful’

| s-xuti-nan’-pi | *C’C | Max(Laryngeal) |
|---|---|---|
| ☞ a. sxutinanpi | | * |
| b. sxutinan’pi | *! | |

(101) /s-iy-itax-m’ay/ → [siyitaxmay] ‘they are astonished’

| s-iy-itax-m’ay | *CR’ | Max(Laryngeal) |
|---|---|---|
| ☞ a. siyitaxmay | | * |
| b. siyitaxm’ay | *! | |

In reduplicative cases, both effects exhibit normal application. Without considering any more constraints, this is already the outcome that we would predict. Normal application will afford reduplicative forms an opportunity to obey relevant markedness constraints while preserving the laryngeal features in question somewhere in the word. That this returns the attested candidates is shown in the following tableaux:

(102) /$\sigma_{\mu\mu}$, s-k’om’in/ → [sk’omk’om’in] ‘(the wind) is dying down’

| $\sigma_{\mu\mu}$, s-k’om’in | *C’C | Max(Laryngeal) |
|---|---|---|
| ☞ a. sk’omk’om’in | | |
| b. sk’om’k’om’in | *! | |
| c. sk’omk’omin | | *! |

(103) /$\sigma_{\mu\mu}$, k-ʔal-ʔip/ → [k'al'iplip] "I think; I say"

| $\sigma_{\mu\mu}$, k-ʔal-ʔip | *CR' | MAX(Laryngeal) |
|---|---|---|
| ☞ a. k'al'iplip | | |
| b. k'al'ipl'ip | *! | |
| c. k'aliplip | | *! |

### 4.2.4 Alternative analyses

Several authors have examined some of the Samala facts considered in this section from the perspective of a number of different theories of reduplication. I consider several of these in turn, and compare each analysis with an analysis in MR.

#### 4.2.4.1 BRCT – McCarthy and Prince (1995)

For McCarthy and Prince (1995), reduplication in Samala occurs due to the presence of a RED morpheme. The size of this morpheme is controlled largely by the constraint R=$\sigma_{\mu\mu}$, implementing the observation of Applegate (1972) that reduplication always has the form of a heavy syllable. This constraint compels heavy-syllable reduplication in ordinary CVC cases. It also accounts ingeniously for the cases where a personal prefix is copied with a V-initial stem: because the reduplicant must be a heavy syllable, and because this syllable must be identical to the base, an unmatched onset in the reduplicant can backcopy into the base. This also accounts for cases where normal phonology fails to apply, such as *l* deletion before consonants and conflation feeding reduplication.

However, as Spaelti (1999) shows meticulously, this analysis is fatally flawed. What the analysis of McCarthy and Prince (1995) predicts in cases where the reduplicant and base form an especially marked consonant cluster (such as *lC*) is not blocking of the normal repair strategy, but rather a repair through truncatory backcopying. Thus the plural form of *caluqay* 'cradle' is predicted to be not the attested *c'alqc'aluqay* but rather *c'aqc'aq*:

(104) Incorrect prediction for plural of *caluqay* (Spaelti, 1999, 77):

| RED-c'aluqay | R=$\sigma_{\mu\mu}$ | MAX-BR | **l*[cor] | *Max*-LS |
|---|---|---|---|---|
| a. c'al-c'aluqay | | ****! | | |
| b. c'al-c'al | | | *! | **** |
| ☞ c. c'aq-c'aq | | | | **** |

As Spaelti (1999) notes, this prediction is not an accident nor is it something that can be easily solved by the addition of more constraints. There is a basic contradiction in the rankings required for Samala in the framework of McCarthy and Prince (1995), summarized as follows:

(105) Max-LS ≫ ‘size restrictor’ ≫ Max-BR: partial reduplication ranking
Max-BR ≫ ‘phonotactics’ ≫ Max-LS: over/underapplication ranking

The contradiction between these rankings predicts that overapplication and underapplication with reduplication should occur only in cases of total reduplication. This is not the case, so we can conclude that the theory is flawed in its general predictions. In addition, it remains without a solution for the facts of Samala.

Some further problems encountered by this analysis may be discussed. CV nominal reduplication, which surfaces as CVh-CVʔ, presents a problem for a BRCT analysis. Recall that I analyzed these as cases where epenthesis occurs at the word level (because no other consonant is available to supply the all-important coda), with ʔ joining the word postlexically. A BRCT analysis may choose whether to accept this multilevel analysis or reject it. In either case, the problem is why the reduplicant does not copy its coda into the base the same way it does with its onset in *siksikuk*.

#### 4.2.4.2 MDT – Inkelas and Zoll (2005)

Like McCarthy and Prince (1995), Inkelas and Zoll (2005) is particularly interested in accounting for why V-initial stems behave differently than C-initial stems (V-initial stems reduplicate a preceding inflectional C, while C-initial stems do not). Since backcopying is impossible in MDT, Inkelas and Zoll (2005) set out to disprove McCarthy and Prince (1995)’s analysis. They first distinguish their analysis from that of McCarthy and Prince (1995) by noting a peculiarity about the target or location of reduplication. Recall that there are around a dozen Inner prefixes that exceptionally do not allow reduplication. When these prefixes are present, reduplication targets the following prefix or root, as in the examples below:

(106) Some Inner prefixes exceptionally reject reduplication:

| *Underlying representation* | *Surface form* | *Gloss* |
|---|---|---|
| k-RED-ni-č’eq | knič’eqč’eq | ‘I’m tearing it up’ |
| s-RED-am-ti-lok’in | smtiloklok’in | ‘they cut it off’ |
| RED-naqulu-kuti | naqulukutkuti | ‘to aim’ |

It is not the case that these prefixes occur outside of the location where reduplication happens. This is proved by the fact that non-reduplicating prefixes can occur inside reduplicating prefixes, as in /wi-su-ni-apay/ → [wisunapay] ‘(sea) to cast ashore,’ where non-reduplicating *ni-* occurs inside reduplicating *su-*. In fact, in cases where a non-reduplicating prefix occurs inside a reduplicating prefix, both prefixes allow reduplication freely, as in /k-xul-ni-jïw/ → [kxunxunijïw] ‘I am looking all over for it’ (non-reduplicating *ni-* here undergoes reduplication).

The mobility of the reduplicant is not discussed in McCarthy and Prince (1995). Inkelas and Zoll (2005) use these facts to argue that the reduplicant is not a prefix with a stable location. Rather, it is an infix that aligns with the left edge of a PStem. The difference between the two classes of Inner prefixes is due to a (presumably lexical) distinction between PStem-external and PStem-internal prefixes.[28]

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[28] Inkelas and Zoll (2005) suggest that the Inner/Outer distinction corresponds to a difference between stem level and word level phonology in Samala. However, this overlooks the fact that the Inner/Outer division is purely mor-

Inkelas and Zoll (2005) propose that the reduplicating prefixes are PStem-internal, and the prefixes that do not reduplicate are PStem-external. Since the reduplicant infixes to align with the PStem, this motivates the failure of PStem-external prefixes to reduplicate. Reduplication in Samala targets a PStem preferentially. A V-initial PStem incorporates a preceding C. On this MDT analysis – which is compatible with OT but not necessarily realized in those terms – reduplication proceeds as follows:

(107) Procedure to derive Samala CVC- reduplication:
1. Morphemes are ordered (with the reduplicating morpheme not among them).
2. Various phonological processes occur (e.g. Laryngeal Cluster Conflation and preconsonantal *l* deletion).
3. A PStem is built, including the root and any PStem-internal prefixes.
4. If the PStem begins with a vowel, the preceding consonant is conscripted to join the PStem.
5. Reduplication occurs, as a copy of the entire PStem is infixed to the left of the existing PStem.
6. Due to its own cophonology, the reduplicant truncates to CVC.

Consider a "backcopying" example, /uti-axsïn/ → [utaxtaxsïn] 'to give a start, be frightened.' It is derived as follows:

(108) /uti-axsïn/ → [utaxtaxsïn] 'to give a start, be frightened':
1. uti-axsïn
2. utaxsïn
3. ut{axsïn}
4. u{taxsïn}
5. u{taxsïn}{taxsïn}
6. u{tax}{taxsïn}
Surface representation: [utaxtaxsïn]

This analysis accounts for regular CVC-copying cases and "backcopying" cases. It also accounts for several opacity effects (such as LCC feeding reduplication, and reduplication counterfeeding preconsonantal *l* deletion) by the fact that phonology precedes reduplication. Inkelas and Zoll (2005) also note that a late-reduplication analysis fits with the fact that reduplication seems to have scope over the whole word, and the observation by Applegate (1972) that reduplication appears to be a late process. Epenthetic cases (e.g. /RED-kuʔ/ → [kuhkuʔ]) are not discussed, but could perhaps be accounted for if we stipulate a word minimality requirement in the truncatory cophonology. (The analysis Inkelas and Zoll (2005) offer for Mokilese might be extended to account for these cases.)

Although this accounts for much of the data involving CVC- reduplication, it offers no insight into the behavior of other reduplicative processes in Samala because each process involves its own unique cophonology. For example, the infixing behavior of the reduplicant lacks

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phological. Samala phonology is indifferent to this distinction; the phonology does, however, pays great attention to the difference between "close" and "remote" prefixation (in Applegate (1972)'s terminology), which is not the same as the distinction between Inner and Outer prefixes. However, the fundamental claims of Inkelas and Zoll (2005) are not necessarily vitiated by this apparent oversight.

motivation or connection to the behavior of other morphemes. For example, there is another productive reduplication process in Samala that clearly involves infixation within the root (probably aligned to stress). Inkelas and Zoll (2005) could analyze this morpheme as also having a special infixing property; but the connection between two reduplicative processes that both infix in order to align with prominent material cannot be explained.[29]

Inkelas and Zoll (2005) account for the interaction of reduplication with other phonology by making reduplication a late process. This successfully explains a number of opaque interactions. However, reduplication does feed some word-level processes (e.g. sibilant harmony and pre-coronal laminalization). This can be made to work if these processes all at the stratum where reduplication occurs, but fewer assumptions are required if all behavior involving reduplication falls out already at the word level.

Neither McCarthy and Prince (1995) nor Inkelas and Zoll (2005) account for the epenthesis cases. Although both accounts can be jury-rigged to account for these facts, neither one can connect the facts about epenthesis with the facts about the mobility of the reduplicant. The MR account does connect these facts to each other, as well as motivating them through general predictions about reduplicative behavior. McCarthy and Prince (1995) does not easily extend to allow other reduplicative processes in Samala. Inkelas and Zoll (2005) can be extended, but the cost is allowing multiple cophonologies that each exist only in the context of a single morpheme, and more than one of which may occur within a single word – creating potential processing issues as well as significant analytic complexity. MR allows multiple reduplication patterns that fall out from a single phonology; different shapes are due to different lexical specifications.

Inkelas and Zoll (2005) require a cophonology in which truncation occurs, although truncation is not otherwise attested in Samala grammar. More significantly, an extension of the Inkelas and Zoll (2005) analysis that does account for sub-patterns like the epenthetic cases and the failure of *l*-deletion will still not treat these cases as part of a conspiracy to realize the segmentally-empty affix. (McCarthy and Prince, 1995) did account for that conspiracy, but at the cost of untenable R=$\sigma$ constraints. By contrast, MR accounts for the conspiracy without requiring lexical stipulation anywhere outside of the lexicon (where it belongs) and also without the whole array of Base-Reduplicant faithfulness constraints.

#### 4.2.4.3 Precedence readjustment – Raimy (2000)

Raimy (2000) considers some of these data and presents an analysis of Samala reduplication in the theory of reduplication as precedence structure loops. In particular, Raimy is concerned with the problem of *l*-deletion. Considering the rule of *l* deletion before alveolar consonants, Raimy (2000) notes that the rule underapplies in some cases and overapplies in others. As seen in the examples below (repeating (72) above), pre-alveolar *l* deletion is obligatory at the stem level:

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[29] It should also be noted that Inkelas and Zoll (2005) cast their analysis of the Samala reduplicant as infixing rather than prefixing as a major distinction between their analysis and that of McCarthy and Prince (1995). But – while it is true that McCarthy and Prince (1995) does not consider the possibility that RED is an infix rather than a prefix – there does not seem to be a general reason why BRCT is incompatible with an infixed RED morpheme.

(109) Stem-level *l*-deletion:

| *Underlying form* | *Surface form* | *Gloss* |
|---|---|---|
| tal-$\sqrt{\text{sïq}}$ | tasïq | ‘to grasp firmly, tightly’ |
| xal-$\sqrt{\text{nowon}}$ | xanowon | ‘to fly’ |
| qil-$\sqrt{\text{č’om’in}}$ | qič’om’in ˜ qilč’om’in | ‘to soften by soaking’ (intrans.) |

But when reduplication creates an *lC* sequence, *l*-deletion fails to apply:

(110) *l*-deletion underapplies with reduplication:

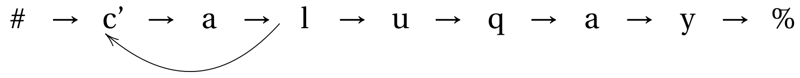
| *Underlying form* | *Reduplicated form* | *Gloss* |
|---|---|---|
| s-$\sqrt{\text{tal’ik}}$ | š**tal**tal’ik’ | ‘his wives’ |
| $\sqrt{\text{c’aluqay}}$ | **c’al**c’aluqay’ | ‘cradles’ |

An apparently contradictory case of overapplication is also reported, with /s-RED-pil-tap/ surfacing as *spitpitap* ‘it is falling in’ (Applegate, 1972). Raimy rests this different behavior on a structural difference between these cases: where underapplication occurs, the rule’s target (*l*) and the alveolar trigger both belong to the same morpheme. In *spitpitap*, they belong to different morphemes. By treating *l*-deletion as a derived environment effect, it can be blocked in the former cases (leading to underapplication) and allowed in the latter case (leading to overapplication).

The underapplication cases are quite straightforward to explain. By assumption, the apparent deletion of l in the normal rule is taken to be coalescence in reality. This allows the structure to avoid unbridgeable gaps in precedence that would lead to unlinearizability. This rule is taken to be dependent on the Derived Environment Condition (Kiparsky, 1982). This condition must be modified somewhat to fit this theory’s view of precedence relations; crucially, the rule must consider whether precedentially adjacent segments belong to the same morpheme, regardless of whether the precedence relation itself was introduced as part of the same morpheme or a different morpheme. This leads to an interesting prediction about the different behavior of reduplicative morphemes that do and do not contribute segmental material of their own. Those that do will be triggers for derived environment effects, while those that do not (as in Samala) will not trigger those effects. This prediction is not important within the context of Samala itself (since there are no reduplication patterns with fixed segmentism), but it requires further testing in other cases as it would represent a significant generalization.

Thus in an underapplication case like *c’alc’aluqay*, we have the following structure produced by the morphological component:

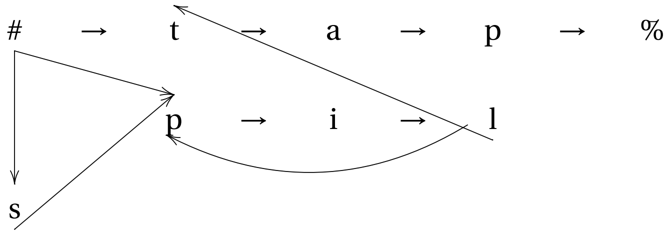
(111)



The environment for the pre-alveolar *l* coalescence rule is met, as *l* precedes *c’*. But because both segments belong to the same morpheme, the environment is effectively nonderived, and the rule (as a derived environment effect) does not apply. Linearization will then take place after the cyclic phonology is complete, and yield the attested surface form *c’alc’aluqay*.

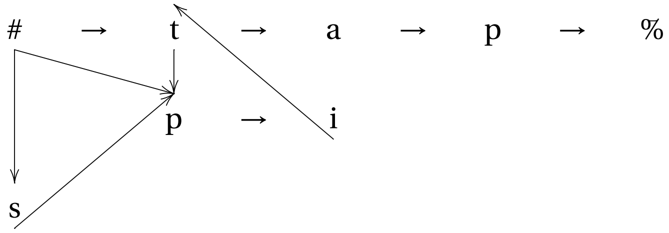
Things proceed differently in the case of *spipitap*. In this word, formed from underlying /s-RED-pil-tap/, the output of the morphological component is a structure like the following:

(112)



With the Uniformity Parameter presumably set to *off* for the coalescence rule, *l* and *t* merge and the structure resolves to a simpler one:

(113)



Unfortunately for this analysis, underapplication vs. overapplication of *l*-deletion is not a simple matter of derived vs. non-derived environments. As we saw above, there are two *l*-deletion processes in Chumash: stem-level pre-alveolar *l*-deletion, and word-level pre-consonantal *l*-deletion.[30] Because reduplication is a word-level process, it applies after any cross-morpheme stem-level *l*-alveolar sequence has already been deleted, and that deletion will therefore appear to overapply. This fact is responsible for the different behavior of these sequences when they are created my morpheme combination versus when they are created by reduplication. It is the cases of non-deletion that need to be explained, and the failure of deletion in them is best explained as an attempt to realize both of the underlying moras associated with the reduplicative affix. This is part of a larger conspiracy to realize those moras. As we have seen, that conspiracy motivates not only the failure of these deletion processes but also the avoidance of coalescence, the copying of CVC rather than simply CV, and so on. This conspiracy cannot be captured in the framework of reduplication as simple precedence structure readjustment.

It is apparently only an artifact of our limited data that we do not see cases where pre-alveolar *l*-deletion fails across morpheme boundaries. This is due in part to to the well-known pattern of sibilant harmony in Chumash, in which all sibilants are changed regressively to agree in coronality. Because the most common prefixal alveolar is the *s*- prefix which indicates third person, and because most suffix sibilants happen to be [+distributed] rather than [-distributed], there is a tendency to remove the surface appearance of this rule in many valid cases by turning *ls* sequences into *š*. However, these cases still must be accounted for; we can consider examples like *šalšalkïyïmič* '(the waves) are breaking,' derived from /s-al-kïyïmïn-š/ (Applegate, 1972, 264). Presumably the output of the morphology must be a structure like the following:[31]

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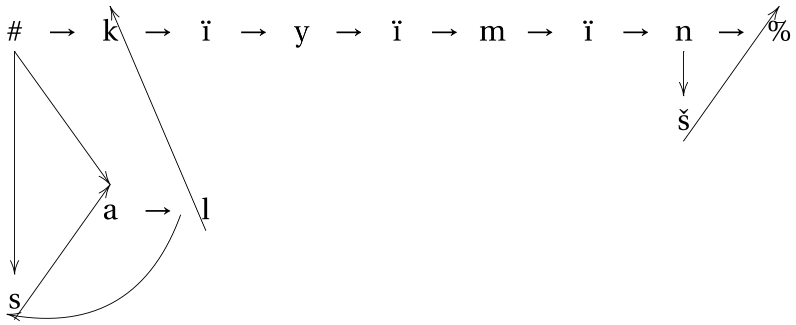
[30] The rule given by Raimy (2000) for coalescence of *l* before a [coronal] segment is incomplete. This rule is obligatory before alveolar consonants, but optional before palatals.

[31] It is not clear to me exactly how reduplication will be defined such that its end relation targets *s* (as it must), given that *s* belongs to a different morpheme from *al* and that *s* is not the beginning of the root nor at this point

(114)



Given this representation, the environment for *l*-deletion is precisely met: an *l* precedes an *s* belonging to another morpheme. It does not uniformly precede that *s* (it also precedes *k*), but as long as one precedence relation is present this rule should be triggered. Therefore we have every expectation that *l*-deletion should apply here, as it does in *spitpitap*. But it does not. We can save the day by having sibilant harmony apply before coalescence. This will give the correct result, as the environment for coalescence will no longer be met in that case. However, there is no obvious reason why these rules – both cyclic – should be ordered in this way. The necessity for extrinsic rule ordering makes this analysis suspect.

In addition, the failure of pre-consonantal *l*-deletion in cases of reduplication still remains to be accounted for. Along with forms like *spitpitap* in which deletion occurs, we also find *spilpilkowon* ‘it is spilling,’ from underlying /s-pil-kowon/ (Applegate, 1972, 281). Deletion fails to take place here across this morpheme boundary only because it is a reduplicative structure. An account based on the idea of reduplication as precedence readjustment can try to explain this by asserting that for this rule the Uniformity Parameter is turned *on*. But this will not save the day: consider the structure that must exist for this form as the output of the morphological component (essentially identical to the one shown in (112)). *l* will precede *k* and *p*. Both of these precedence relations are in the correct environment for the deletion rule to apply. Therefore we expect deletion, but it does not occur. Neither can this deletion rule be claimed to be non-cyclic; if it were then we should see normal application – which would actually apply in both cases, and lead to apparent overapplication. What happens instead is underapplication. The theory of reduplication as precedence readjustment therefore fails to account for the patterns of *l*-deletion and reduplication in Samala.

## 4.3 Summary

In this chapter I discussed several theories of reduplication that are already on the market, including several varieties of Base-Reduplicant Correspondence Theory (including the Generalized Template Theory and a neo-templatic variant of BRCT), morpheme realization, Morphological Doubling Theory and a theory of reduplication through readjustment of precedence relationships. I contrasted these theories with Minimal Reduplication, showing strengths and weaknesses of the existing theories and pointing to the general advantages of MR as an overall

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in the derivation of this word is it clear that it will emerge as the first segment of the word. Raimy (2000) does not offer definition of the reduplicative morpheme itself, leaving this point somewhat unclear. Nevertheless, for the sake of argument we can grant that the proper reduplicative precedence structure can be constructed.

theory of reduplication.

In order to compare these theories, I explored in some detail CVC- reduplication in Samala. This pattern involves heavy-syllable reduplication and, notably, requires several deviations from the ordinary phonology of the language in order to always create that heavy syllable. I presented an MR analysis of these data that accounts for the attested pattern and the subpatterns with a plausible ranking of independently-motivated constraints. I contrasted this analysis with previous analyses of these data in the BRCT, MDT and precedence readjustments frameworks. Of these analyses, BRCT best captured the conspiratorial nature of these interactions but ran into other problems and involved more complexity than MR. MDT and precedence readjustment both miss the essentially conspiratorial nature of the whole range of data for this phenomenon.

# CHAPTER 5

# Conclusion

In this chapter I summarize the major claims that I made in this thesis and the consequences that follow from them, and then conclude with some remaining questions for future research.

## 5.1 Main claims

In this thesis I introduced and argued for Minimal Reduplication, a new theory and framework for the analysis of reduplication. MR views reduplication as an emergent property in multiple components of the grammar. Concretely, reduplication occurs in the phonology and syntax through independently-motivated forces active in those components. No special reduplication-specific theoretical machinery is needed to analyze these cases. However, because the phonological and syntactic processes have distinct origins and properties, the patterns characteristic of each type must be described and analyzed.

In the phonological component, the basic tenets of Optimality Theory lead us to expect that reduplicative candidates must always be considered for any input, since it is clearly within the power of GEN to construct them. Constraints against reduplication will prevent the profligate emergence of reduplicative forms, but in the right circumstances these forms may nonetheless be selected as optimal. This is true in cases where reduplication occurs purely for phonological reasons, such as to repair an illicit consonant cluster, or where the reduplication is morphological in nature, as when the phonological specification of an affix includes an empty syllable that must receive a segmental anchor.

Syntactic reduplication is also emergent, but it emerges in quite a different way. Copy and merger of a morphosyntactic node into another node creates a construction in which two links in a movement change do not stand in a c-command relationship, nor do they have complete syntactico-semantic identity (due to the merger). This creates a circumstance which, depending on characteristics of the language, may allow both links in the movement chain to reach the phonological output with explicit exponents. The effect is reduplication, but a kind of reduplication with different properties from processes that are morphophonological in nature.

## 5.2 Consequences

Because phonological reduplication (also known as compensatory reduplication) and morphological reduplication are essentially identical, they share important common properties. This reduplication occurs within the phonological component and may interact opaquely with other phonological processes. It is minimal, that is, reduplication occurs only to the extent that it is needed in order to repair or improve a particular structure. Because reduplicative segments have an IO correspondence relation with the same underlying material, they have a shared relationship that may influence their opaque behavior.

MR claims that "base" and "reduplicant" are not constituents that have any reality in phonological representations or processes. FAITH-BR relations therefore do not exist, and all else being equal, in reduplicative forms neither copy has a privileged relationship with the underlying form. An important consequence of this claim is that reduplicative backcopying cannot occur. Encouraging support for this position comes from recent work such as Kiparsky (2007) and Inkelas and Zoll (2005) casting doubt on the canonical cases of alleged reduplicative backcopying. However, this remains a live issue and one in which MR predictions diverge most clearly from those of GTT and other mainstream theories of reduplication.

More generally, the claim of MR is that no special reduplicative constituents or phonological relationships or rules are necessary to account for cases of phonological or morphological reduplication. This is the more theoretically parsimonious view. In this thesis I have presented evidence suggesting that MR is also more empirically successful at accounting for these cases of reduplication.

Syntactic reduplication, because it occurs through quite a different grammatical interaction than morphological reduplication, also has its own distinctive characteristics. These reduplication patterns have no drive towards minimality in the reduplication, because they involve the complete spellout of multiples copies of a single lexical item or larger morphosyntactic structure. The targeting and surface location of reduplication in these cases follow syntactic principles rather than phonological principles. Because the merger of two morphosyntactic nodes may put multiple phonological structures in competition to be the expression of a single merged morphosyntactic node, syntactic reduplication often exhibits overwriting behavior that sometimes appears to be non-optimizing.

A fundamental questions in linguistics that is not asked often enough is this: why is grammar not entirely transparent? If the purpose of language is to communicate, and if we take as a given the arbitrary set of pairings between signifiers and signifieds, then the simplest and most straightforward way to communicate should be the unambiguous arrangement of morphemes read directly off of their semantic organization, with little or no phonological change that can obscure that structure. From a certain perspective, it is surprising that no human language seems to meet this description.

The great insight which is systematized in Optimality Theory is that transparency is limited by the existence of competing and contradictory forces within grammar. Although OT is most often seen as a theory of phonology, the basic idea is one which can apply within and across multiple components of the grammar, and can lead us to testable hypotheses about why language is non-transparent and what kind of non-transparencies can occur. Minimalism approaches some of the same problems from a different direction, by asking us to eliminate all the elements and operations in our theory that are not conceptually necessary, and then to see what we need to say in order to account for the attested facts using the elements and operations that remain.

My work in thesis is driven by very similar concerns. Reanalyzing reduplication as a purely emergent process rather than one rooted in a special reduplicative component of the linguistic machinery eliminates some unnecessary complications in the linguistic system, and lets us understand how reduplication (and more broadly, repetition in language) can arise due to the competition or contradictions inherent within the system. If this view is correct, then we can hope to apply the same logic to the analysis of other nonconcatenative morphology such as truncation, morphological reversals, etc.

At the same time this theory of reduplication remains strongly falsifiable. Minimal Reduplication makes clear predictions about the kinds of reduplicative constructions that should exist, both in terms of the kind of reduplication that will emerge within a given grammar, and the typology of reduplication patterns that should be attested. If counterexamples do emerge in these areas, they will tell us something not only about the MR view of reduplication but also about the complexity required in our theory and presumably in the human language faculty as well.

## 5.3 Future research

The MR analysis of reduplication opens up new avenues for research and poses questions to be answered through further investigation. For example, syntactic reduplication emerges in MR as a process through which we can probe questions about the timing of phonological insertion. Where some work has proposed treating phonological and syntactic structures as constructions that exist in parallel from the first concatenation of morphemes until a surface representation is produced (e.g. Walker and Feng (2004)), other work, especially in the framework of Distributed Morphology (Halle and Marantz, 1993, 1994; Harley and Noyer, 1998; McFadden, 2007), has assumed what is known as a late insertion view that holds that phonological forms are not spelled out until a certain point in the construction of an utterance (Marantz, 1995*a*, 1997; Embick and Noyer, 2001). With the MR view that syntactic reduplication involves the pronunciation of multiple links in a chain formed by copy and merger (although there is no chain from the perspective of the Linear Correspondence Axion), it should be possible to examine evidence from allomorphy and interaction with phonological processes to determine whether or not phonological structure is present before movement occurs. (See also Bennett (2010) on issues concerning reduplication and Distributed Morphology.)

Taking phonological material to be present from the beginning of a derivation and potentially influential in morphosyntactic decision-making has serious consequences for the Principle of Phonology-Free Syntax (PPFS), assumed to be inviolate in much previous work (Zwicky, 1984, 1987, 1992; Zwicky and Pullum, 1986*a*,*b*, 1988). Treating echo reduplication and other cases of syntactic reduplication in this way sets up an interesting parallel with another kind of construction that has been claimed to violate PPFS, namely Literal Alliterative Concord (LAC; Dobrin (1995)).

In LAC, morphosyntactic agreement is indicated by repeating some portion of the phonological structure that makes up the head word that is being agreed with. Dobrin (1995) presents a case of LAC in Bainuk (West Atlantic; Senegal and Guinea; Sauvageot (1967)). Nouns in Bainuk belong to one of a number of different classes, indicated in most cases by prefixation. Nouns may move from one class to another when morphosyntactic features like number change. The table below shows the prefixing nominal classes:[1]

(1) Bainuk noun classes:

| *Class* | *Type* | *Prefix* | *Example* | *Gloss* |
|---|---|---|---|---|
| 1 | Singular | u- | | |
| 2 | Singular | i- | | |
| 3 | Singular | ra- | | |
| 4 | Singular | si- | si-nɔx | ‘tree’ |
| 5 | Plural | n̯a- | | |
| 6 | Plural | mu- | mu-nɔx | ‘trees’ |
| 7 | Singular | gu- | gu-sɔl | ‘tunic’ |
| 8 | Plural | ha- | ha-sɔl | ‘tunics’ |
| 9 | Singular | bu- | bu-sumɔl | ‘snake’ |
| 10 | Plural | i- | i-sumɔl | ‘snakes’ |
| 11 | Singular | ko- ˜ kɔ- | | |
| 12 | Plural | ko- ˜ kɔ- | | |
| 13 | Singular | da- | | |
| 14 | Plural | dĩ- | | |
| 15 | Other | ba- | | |
| 16 | Other | di- | | |
| 17 | Other | ti- ˜ pi- ˜ bi- | | |
| 18 | Other | d̯a- | | |

In addition to these prefixing nouns, another class of nouns exist that take no prefixes. As shown by the examples in (2), features in these nouns are indicated through suffixation rather than prefixation:

(2) Bainuk prefixless nouns:

| *Singular* | *Plural* | *Gloss* |
|---|---|---|
| kataːma | kataːma-ã | ‘river’ |
| d̯apɔn̯ | d̯apɔn̯-ɔ | ‘grass’ |
| sahri | sahri-ẽ | ‘village’ |
| d̯ibon̯ | d̯ibon̯-õ | ‘horse’ |

Bainuk marks agreement with a head noun on demonstratives, adjectives, interrogatives, pronouns and numbers through nine. In the case of prefixed nouns, agreement is expressed through

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[1] See Dobrin (1995) for more information on the correspondence between different classes.

the use of prefixed syllable that is similar or identical to the prefix of the head noun (Dobrin, 1995, 136–137):

(3) Bainuk prefix agreement:
a. si-nɔx se-rã
PFX-tree AGR-which
‘which tree?’ (Interrogative)
b. mu-deːn mu-nak
PFX-pirogue AGR-two
‘two pirogues’ (Number)
c. si-deːn-o in-si
PFX-pirogue-SFX this-AGR
‘this pirogue’ (Demonstrative)
d. in-si
this-AGR
‘this one (pirogue)’ (Pronoun)
e. si-deːn si-wuri
PFX-pirogue AGR-long
‘long pirogue’ (Adjectives)

As Dobrin (1995) points out, these facts do not necessarily contradict PPFS. Because this agreement concerns a limited (although large) set of morphological classes, these agreement markers could be similarly delimited, and their phonological similarity to the prefixes on the noun that they agree with could be coincidental or merely of diachronic significance. But a more direct challenge to PPFS comes from the behavior of prefixless nouns. In agreement contexts, the agreement marker consists of the first CV of the prefixless head noun, whatever those segments happen to be:[2]

(4) Bainuk prefixless agreement:
a. d̯apɔn̯ d̯ə-rã
grass AGR-which
‘which grass?’ (Interrogative)
b. kataːma-ã ka-nak-ã
river-SFX AGR-two-SFX
‘two rivers’ (Number)
c. kataːma-ŋɔ in-ka
river-SFX this-AGR
‘this river’ (Demonstrative)
d. in-ka
this-AGR
‘this one (river)’ (Pronoun)
e. kataːma ka-wayi
river AGR-large
‘large river’ (Adjectives)

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[2] The vowel change in the first example is not explained by Sauvageot (1967). We may presume that it is an unrelated regular process of vowel reduction.

There is no way to deny syntactic constructions access to information about phonological forms while accounting for these data, unless every possible CV sequence in Bainuk is to be accepted as a distinct morphological class. Dobrin describes the role of the morphosyntax in Bainuk agreement:

> "... [T]he role of morphology in Bainuk agreement is merely to provide a window of a specified size and placement through which syntax may look to retrieve the appropriate agreement features. What stands behind the window is the phonological form of the noun." (138)

These constructions have a certain similarity with cases of echo reduplication that we have seen. ER involves a fixed segment (or segments), while the rest of the phonological shape is spelled out by copying another constituent. In the case of LAC, a segment (or segments) are copied from another constituent, while the rest of the phonological shape is fixed. There appears to be a functional difference between ER and LAC: LAC indicates agreement while ER does not. One might speculate about whether this is connected with the fact that syntactic reduplication involves "derivational copy" (Kimper, 2008), while LAC appears to be an expression of inflectional morphology. Whether this phonological difference consistently corresponds to that functional difference remains to be determined through further investigation.

Some of the weak points of MR as presented in this thesis may be improved upon in future work. The targeting of material in prominent positions by reduplicative processes remains difficult to explain convincingly in the theory as it currently exists. The method that I proposed to account for these cases involves the use of the REDUPLICATE family of constraints in order to access a prominence hierarchy and allow the targeting of these constituents in particular. Obviously this is not desirable in a theory that aims to eliminate all reduplication-specific theoretical machinery. This is not necessarily a fatal weakness because the REDUPLICATE have some independent support, and because allowing those constraints does not entail allowing FAITH-BR constraints. Thus an MR analysis with REDUPLICATE still remains significantly more parsimonious than a standard BRCT analysis.

Nevertheless it may be hoped that an alternative account of the preferential reduplication of prominent material will be developed, in which case reliance on REDUPLICATE constraints can be abandoned. One avenue in which such an account may be sought is the fact that reduplicated elements will have identical coindexation in the output, due to their shared correspondence with a single input element. Careful use of this "vertical" (IO) relationship with new or redefined constraints may eliminate the need for any "horizontal" (BR) relationship in these forms. A different line of attack would be to emphasize another horizontal dimension, namely Output-Output correspondence. Constraints referring to this dimension may be available for strategic use to limit the material that may be copied or to promote material in prominent positions for priority in reduplication. Constraints like the syllable role correspondence constraint of Kenstowicz (2005) may also apply to help produce the correct output forms in cases of prominence priority in reduplication and also in cases where reduplication seems to have an interest in prosodic identity between copied structures. (Semai, Temiar and other Austroasiatic languages may be examples of languages with this type of reduplication.)

The use of syntactic copying and sub-$X^0$ merger to explain syntactic reduplication, as advocated here, may have implications for other areas of morphology that have been difficult to analyze before. It may provide an avenue to explain cases such as the remarkable morphological reversal in P'urhépecha nominal inflection, in which the same phonological sequences are recycled to express different person agreement depending on the context (subject or object) (Foster, 1969). Other cases of morphological reversal should be considered as well; see Baerman (2007) for a number of interesting cases. As a theory for the best-known type of nonconcatenative morphology, MR might be expected to shed light on other nonconcatenative processes such as truncations as well. Insofar as truncation and morphological reversals are truly morphological processes, the relevant guiding principle from MR is to identify the grammatical forces that may be responsible for these patterns emerging effectively as repairs. However, the investigation of these questions remains to be undertaken.

The related but more general issue is what kinds of abstraction are or can be at work in the minds of speakers. This question must be asked of surface representations, of underlying forms, and of intermediate steps on any view that entertains a derivational view of grammar or some components of grammar. What kind of abstraction does or must exist in the minds of speakers? The major force behind MR is the drive to simplify representations whenever possible, and to try to reduce phonological structures at all stages to the minimal conceptually-necessary constituents, which are those that are present in surface representations. In this thesis I showed that such a simplifying approach can yield useful insights in the area of reduplication. To what extent the same technique can succeed across other areas of morphophonology remains to be discovered.

# Appendix A: -*m̓ut* Words

This appendix includes all words with -*m̓ut* that occur in Boas (1947) or Boas (1948) to the best of my knowledge. Words are organized alphabetically according to the word root, with a few doubtful forms included at the end of the list.

## Orthography

A word about the orthography used in this appendix (and throughout this thesis) is in order. Unfortunately there is no Kwak'wala orthography which is accepted throughout the Kwakwaka'wakw community, nor is there an agreed-upon standard used in linguistic descriptions of the language. Orthographies developed within the Kwakwaka'wakw community or in collaboration with the community include Grubb (1977), Sewid-Smith (1988), and the system used by the U'mista Cultural Center (see e.g. Galois 1994). Systems that have been used for descriptive and analytic linguistic work have included the unwieldy system of Boas (1947, 1948), variants of the Americanist system (e.g. Bach 1975; Zec 1994), and the IPA (e.g. Saba Kirchner 2006). Other systems used in the anthropological literature include those of Curtis (1915), Duff (1965), Mauzé (1984) and Assu and Inglis (1989). (See Galois 1994 for a table comparing many of these orthographies.) Compounding this embarrassment of orthographic riches is the problem that many of these systems were designed with the typesetting capabilities of typewriters rather than computers in mind.

In order to integrate data from different sources, it was necessary to transcribe all of the Kwak'wala data in this chapter using a single, consistent orthography. The symbols that were chosen can be seen in this consonantal inventory. These symbols are generally those of Sewid-Smith (1988). A few deviations are made to follow the Americanist tradition for some sounds, especially uvular consonants.

The following alphabetic order is used to organize the words:

(1) a b c c̓ d d$^{z}$ λ e ə f g g$^{w}$ ɢ ɢ$^{w}$ h i k k$^{w}$ k̓ k̓$^{w}$ l l̓ ɬ m m̓ n n̓ o p p̓ q q$^{w}$ q̓ q̓$^{w}$ s t t̓ ƛ ƛ̓ u w w̓ x x$^{w}$ χ χ$^{w}$ y y̓ ʔ

# Analysis

Because of inconsistent and incomplete transcriptions in the source materials, some analysis is required in order to make sense of these data. A particularly controversial point is the analysis of əT forms, which I crucially consider to lengthen in the context of -*m̓ut* suffixation. Other authors, including Struijke (1998, 2000) do not describe lengthening in these forms.

Vowels marked as long by Boas can be safely taken to be long, but unmarked vowels may also be long; many vowels identified by other sources and conforming to Boas' generalizations for long vowels or heavy syllables are not marked as long in Boas' works. Boas lists twelve -əT roots that are attested with -*m̓ut*. Only one of these forms is consistently transcribed with a long vowel: *t̓aːsm̓uːt t!āsmuˈt* 'shells of barnacles,' from *t̓əs* 'to crack barnacles, eat barnacles' (BD 171). Another of these forms, *c̓aːxm̓uːt* 'hair singed off' is transcribed with a long vowel in BD but no macron indicating length in BG (these transcriptions also shows different stress placement). The other ten forms do not have an explicit indication of length, but they all show a change in vowel quality from ə or ă (an allophone of /ə/) in the root to *a* in the suffixed form. This is straightforward if the vowels have lengthened, because lengthening necessitates a change from ə to *a*.

One possible objection to treating these vowels as long is the fact that in all of these cases, stress falls on the final syllable. This would seem to be incompatible with the first syllable being lengthened, since primary stress falls on the first heavy syllable. But this objection fails on two grounds. Kwak'wala stress assignment is actually more complicated, with some morphophonological interference undermining the simple stress generalization. In particular circumstances, the addition of a glottal-initial suffix or a weakening or hardening suffix causes stress to shift unexpectedly to the suffix:

> "All stems of the type cv̆c and cv̆m if followed by a weakening or hardening suffix or one beginning with a glottal stop have the accent on the suffix." (Boas, 1947, 218)

In the case of əT roots, they will always lose stress when a suffix is added, but note that -əR syllables, which should attract stress, will also cede it to the suffix when one of the right shape is added. And -*m̓ut* is a suffix with initial glottalization. The exact parameters that define weakening and hardening suffixes and glottal-initial suffixes as a natural class are not entirely clear and therefore it is not completely clear whether -*m̓ut* should be expected to trigger the same stress shift, but it seems plausible that it would do so.

The second argument that stress does not demonstrate the shortness of these vowels is that the form consistently transcribed by Boas with a long vowel, *t̓aːsm̓uːt*, is also transcribed with primary stress on the suffix rather than on the root. If this transcription is accurate, then stress cannot be a diagnostic of vowel length in these forms.

These vowels should thus be considered long because it offers a consistent analysis of the entire class of roots, and it explains the attested quality alternation facts. Struijke's treatment of these vowels as short leaves the quality alternations unexplained, and we would be forced to treat *t̓aːsm̓uːt* as an irregular form.

## Sources

The main sources of data for this appendix are Boas (1947) (BG) and Boas (1948) (BD). A few entries come from Grubb (1977) (DG).

Flynn (2007) explores stress and glottalization in Kwak'wala, with discussion of *-m̓ut* words. However, the source of these data is not clear, and it is not apparent whether these forms represent the same dialect as those forms collected by Boas and Hunt. Flynn's analysis also relies on several claims about Kwak'wala phonology that I have rejected here, including following Bach *et al.* (2005) in claiming that all schwas in Kwak'wala are nonmoraic and all other vowels are monomoraic and in asserting the existence of glottalized vowels. Because of the uncertainties concerning these data, I have not included them in this appendix. Future work that constructs a wider consensus about some of these grammatical issues will allow us to probe more deeply into questions about particular morphological and phonological patterns.

## Structure of the appendix

Entries in this appendix are given in the following format:

| | | | |
|---|---|---|---|
| caːk | 'eat sea-eggs' | VːT | B1 |
| ceːxm̓uːt | 'l.a. eating sea-eggs' | tsäʹx·$^{\varepsilon}$mut | BG 340 |

The columns in the first row respectively present the word root, the root gloss (according to either BG or BD), and two classifications for the root type: the first one describing the shape of the root according to relevant properties (e.g. VːT in the example above), and the classification used for roots of this type in BG (e.g. B1 in the example above). Forms in which the stem expansion occurring with *-m̓ut* appear irregular are marked with an additional "I" in this column.

The second row presents the derived word itself, the gloss for that derived word from BG or BD, the original transcription given for the word, and the source for the word. Root definitions come from BD whenever possible. Many of these glosses include the abbreviation 'l.a.', which corresponds to 'left after [doing something]' or one of the many synonyms for that used in glosses in the source materials, such as 'left by', 'leaving after', 'remains of', 'refuse left after', 'what is left after', or 'waste left after'. When words have multiple forms given in one source, or different forms given in BG and BD, all forms are listed separately, and footnotes provide further information where relevant.

In addition to retranscription, some data from published sources were changed to reflect automatic phonological rules. These include word-final devoicing and ʔ-epenthesis before vowel-initial roots. This was necessary to make forms consistent and comparable, since these rules were already followed in some data sources but not in others. It should also be noted that all Kwak'wala non-rounded velars exhibit prominent phonetic palatalization. Following common practice in Kwak'wala orthographies, I do not transcribe this palatalization. In addition, many of these forms exhibit a change of *s* (or less commonly *c*) to *y* (or less commonly *n*) in derived environments, including when created by reduplication. This may lead to opaque forms as this rule feeds the mid-vowel formation rule /əyə/ → [eː].

# -*m̓ut* words

| | | | |
|---|---|---|---|
| caːk | ‘eat sea-eggs’ | VːT | B1 |
| ceːxm̓uːt | ‘l.a. eating sea-eggs’ | tsäʹx·ᵋmut | BG 340 |
| cək | ‘chop’ | əT | A1[1] |
| caʔːxm̓uːt | ‘l.a. cutting brush’ | tsax·ᵋmuʹt | BG 340 |
| ciːx | ‘melt tallow’ | VːT | B1–I[2] |
| cicəxm̓uːt | ‘l.a. melting tallow’ | tseʹtsax·ᵋmut | BG 340 |
| cinəxm̓uːt | | tseʹnax·mut | BG 340 |
| c̓aːs | ‘eel grass’ | VːT | B1[3] |
| c̓aːc̓əsmuːt | ‘old eel grass’ | ts!āʹts!ᴇsᵋmut | BG 340 |
| | | ts!āʹts!ᴇsmut | BD 209 |
| | | ts’áts’esmut | DG 62, 67, 213 |
| c̓əm̓ | ‘melt’ | əC̓ | A5 |
| c̓əc̓əm̓ᵊmuːt | ‘l.a. melting’ | ts!ᴇts!ᴇᵋmᴇmuʹt | BG 340 |
| | | ts!ᴇts!ᴇᵋmōt | BD 207 |
| cətx | ‘squirt’ | əTT | D |
| caːtxᵊmuːt | ‘l.a. squirting’ | tsatx·ᴇmuʹt | BG 340 |
| c̓əx | ‘singe’ | əT | A1 |
| c̓aːxm̓uːt | ‘hair singed off’ | ts!ax·ᵋmuʹt | BG 339 |
| | | ts!āʹx·ᵋmōt | BD 213 |
| c̓iːkʷ | ‘eat clams’ | VːT | B1 |
| c̓iːc̓əxʷm̓uːt | ‘clam shells’ | ts!ēʹts!ăx̣ᵘᵋmut | BG 340, BD 221 |
| c̓uːɬ | ‘black’ | VːT | B1 |
| c̓uːc̓əɬm̓uːt | ‘charcoal’ | ts!ōʹts!ăɬᵋmut | BG 340 |
| | | ts!ōʹts!aɬmut | BD 226 |
| dən | ‘pull down with rope’ | əR | A2 |
| dəndəmuːt | ‘logged-over area’ | déndemut | DG 97, 162 |

| | | | |
|---|---|---|---|
| dəy | ‘wipe’ | əY | A3[4] |
| diːdəmuːt | ‘refuse of wiping’ | dē′dᴇmut | BG 340 |
| dᶻuːs | ‘get cockles’ | VːT | B1–I |
| dᶻuːdᶻəsṁuːt | ‘cockle shells’ | dzō′dzasᵋmut | BG 340 |
| dᶻuːsṁuːt | | dzō′sᵋmut | BG 340 |
| guːkʷ | ‘house’ | VːT | B1 |
| guːgəxʷṁuːt | ‘deserted remains of house’ | g·ō′g·ax̣ᵘᵋmut | BG 340 |
| gʷəd | ‘tie’ | əD | A4 |
| gʷaːdᵊmuːt | ‘l.a. untying (as a piece of string)’ | gwa′dᴇmut | BG 340 |
| ɢʷəniːʔ | ‘ashes’ | Polysyllabic | E[5] |
| ɢʷənaːyiːmuːt | ‘rest of ashes’ | g̣wᴇnāᵋyemut | BD 324 |
| ɢʷəneːṁuːt | | g̣wᴇnä′ᵋmut | BD 324 |
| həṁ | ‘food’ | əC̓ | A5–I |
| haːʔəmuːt | ‘remains of food (e.g. crumbs, bones)’ | ha′ᵋămut | BG 340 |
| | | ha′ᵋamot | BD 85 |
| | | ha′ᵋămut | BD 82 |
| huːləɬ | ‘few’ | Polysyllabic | E |
| huːləɬṁuːt | ‘rejected because too few’ | ho′laɫmut | BG 340 |
| kəmt | ‘clean berries’ | əRT | C |
| kəmkətṁuːt | ‘l.a. cleaning berries’ | k·ᴇ′mk·atɛmut | BG 340 |
| | | k·î′mk·atɛmut | BD 262 |
| kən | ‘scoop up’ | əR | A2 |
| kənkəmuːt | ‘l.a. scooping up’ | k·ᴇ′nk·ᴇmut | BG 339, BD 263 |
| kʷaːx | ‘smoke’ | VːT | B1–I |
| kʷaːxṁuːt | ‘smoke left over’ | kwā′x·ᵋmut | BG 340 |
| kʷəsx | ‘splash’ | əTT | D |
| kʷaːsxᵊmuːt | ‘l.a. splashing’ | kwāsx·ᴇmu′t | BG 340 |

| | | | |
|---|---|---|---|
| kʷiːχ | ‘club, swing, strike with stick’ | V:T | B1–I |
| kʷiːχoːmuːt | ‘l.a. killing (tribal name)’ | kwē′xâmut | BD 302 |
| k̓aːp | ‘(mouse) gnaw’ | V:T | B1 |
| k̓aːk̓əpm̓uːt | ‘gnawings of mouse’ | k·!a′k·ᴇpᵋmut | BG 340 |
| k̓aːxʷ | ‘shave wood with straight knife’ | V:T | B1–I[6] |
| k̓aːk̓əxʷm̓uːt | ‘shavings’ | k·!ā′k·!ăxᵘᵋmut | BG 340 |
| k̓əmƛ̓ | ‘adze’ | əRT | C |
| k̓əmk̓əɬm̓uːt | ‘chips made by adzing’ | k·!ᴇ′mk·!ăɬᵋmut | BG 340 |
| k̓əxʷ | ‘suck with whole mouth’ | əT | A1[7] |
| k̓aːxʷm̓uːt | ‘l.a. sucking out’ | k·!ax̣ᵘmu′t | BD 278 |
| k̓ʷəml̓ | ‘burn’ | əRC̓ | C5 |
| k̓ʷək̓ʷəml̓muːt | ‘l.a. burning’ | k!wᴇk!wᴇ′mᵋlmut | BG 340 |
| ləɢʷiːlas | fireplace | Polysyllabic | E[8] |
| laːɢʷiːlasm̓uːt | ‘remains of fireplace’ | lā′g̣wilasᵋmut | BD 395 |
| luːp | ‘empty’ | V:T | B1 |
| luːləpm̓uːt | ‘l.a. emptying’ | lōlapᵋmut | BD 403 |
| maː | ‘fish, seal, whale swims; serpent crawls’ | V: | Other |
| maːməmuːt | ‘tracks of serpent’ | mā′mᴇmot | BD 136 |
| maːmeːm̓ | ‘leaves’ | Polysyllabic | E |
| maːmeːmm̓uːt | ‘old leaves’ | mā′mämᵋmut | BG 340 |
| maːmeːm̓əm̓uːt | | mā′mäᵋmᴇᵋmut | BD 138 |
| m̓aːw̓ | ‘move away’ | V:C̓ | B5–I[9] |
| ʔəm̓aːw̓əmuːt | ‘deserted village’ | ămā′ᵋwᴇmut | BG 340 |

| | | | |
|---|---|---|---|
| məndᶻ | ‘cut kindling wood’ | əRD | C4 |
| məməndᶻᵊmuːt | ‘l.a. cutting kindling wood’ | mᴇmᴇ′ndzᴇmut | BG 340 |
| naːq | ‘drink’ | VːT | B1–I |
| nənχm̓uːt | ‘l.a. drinking’ | nᴇ′nxᵋmut | BG 340 |
| n̓ək | ‘steam’ | əT | A1 |
| n̓aːxm̓uːt | ‘stones discarded after steaming’ | ᵋnax·ᵋmu′t | BG 339 |
| | | ᵋnᴇx·mo′t | BD 240 |
| qaːs | ‘walk’ | VːT | B1 |
| qaːqəsm̓uːt | ‘tracks’ | qā′qăsᵋmut | BG 340 |
| | | qā′qᴇsᵋmot | BD 337 |
| qəns | ‘adze with long-handled adze’ | əRT | C |
| qənqəsm̓uːt | ‘chips’ | qᴇ′nqasᵋmut | BG 340 |
| q̓ək | ‘bite’ | əT | A1 |
| q̓aːxm̓uːt | ‘piece bitten out’ | q!ax·ᵋmu′t | BG 339 |
| q̓ʷaːl̓ | ‘scorch’ | VːC̓ | B5[10] |
| q̓ʷəq̓ʷaːl̓ᵊmuːt | ‘embers’ | q!wᴇq!wā′ᵋlᴇmut | BG 340 |
| q̓ʷəɬ | ‘scratch’ | əT | A1 |
| q̓ʷaːɬm̓uːt | ‘marks left from scratching’ | q!wałᵋmu′t | BG 339 |
| saːkʷ | ‘dig ferns’ | VːT | B1 |
| seːkʷm̓uːt | ‘l.a. digging fern roots’ | sä′kᵘᵋmut | BG 340 |
| saːp | ‘skin’ | VːT | B1 |
| seːpm̓uːt | ‘l.a. skinning’ | sä′pᵋmut | BG 340 |
| saːq̓ʷ | ‘peel bark’ | VːC̓ | B5–I |
| səsaːq̓ʷᵊmuːt | ‘l.a. peeling bark’ | sᴇsa′q!wᴇmut | BG 340 |
| | | sᴇsā′q!wᴇmut | BD 187 |
| seːq̓ʷᵊmuːt | | sä′q!wᴇmut | BG 340 |

| | | | |
|---|---|---|---|
| saːʔxʷ | ‘butcher’ | VːCC | Other–I |
| səsaːʔxʷmuːt | ‘l.a. butchering’ | sᴇsaʔx̣ᵘmu′t | BG 340 |
| | | | |
| səl | ‘drill’ | əR | A2 |
| səlsəmuːt | ‘l.a. drilling’ | sᴇ′lsᴇmut | BG 339 |
| | | | |
| səmk | ‘try fish oil’ | əRT | C |
| səmyəxm̓uːt | ‘l.a. trying fish oil’ | sᴇ′myax·ᵋmut | BG 340 |
| | | | |
| sənq | ‘peel cedar bark’ | əRT | C |
| sənyəχm̓uːt | ‘l.a. peeling bark’ | sᴇ′nyaxᵋmut | BG 340 |
| | | sᴇ′nyaxmut | BD 182 |
| | | | |
| siːq̓ | ‘eat dry herring eggs’ | VːC̓ | B5–I |
| səsiːqᵊmuːt | ‘l.a. eating dry | sᴇsē′q!ămut | BG 340 |
| siːqᵊmuːt | herring eggs’ | sē′q!ămut | BG 340 |
| | | | |
| siːx | ‘peel sea-grass’ | VːT | B1–I |
| siːsəxm̓uːt | ‘l.a. peeling | se′săx·ᵋmut | BG 340 |
| siːyəxm̓uːt | sea-grass’ | se′yax·ᵋmut | BG 340 |
| siːnəxm̓uːt | | se′nax·ᵋmut | BG 340 |
| | | | |
| suːp | ‘chop’ | VːT | B1 |
| suːyəpm̓uːt | ‘chips’ | sō′yapᵋmut | BG 340 |
| | | súyapmut | DG 54, 153, 206 |
| | | | |
| təp | ‘break’ | əT | A1 |
| taːpm̓uːt | ‘broken pieces’ | tapᵋmu′t | BG 339 |
| | | | |
| tiːɬ | ‘bait’ | VːT | B1 |
| tiːtəɬm̓uːt | ‘remains of bait’ | tē′tăɬᵋmut | BG 340 |
| | | | |
| t̓ək | ‘soil’ | əT | A1[11] |
| t̓aːxm̓uːt | ‘dirty cloths’ | t!ax·ᵋmu′t | BG 339 |
| | | | |
| t̓əs | ‘crack barnacles’ | əT | A1 |
| t̓aːsm̓uːt | ‘barnacle shells’ | t!āsmu′t | BD 171 |
| | | | |
| t̓iːs | ‘stone’ | VːT | B1–I |
| t̓iːsm̓uːt | ‘discarded stones’ | t!ē′sᵋmut | BG 340 |
| | | t!ē′smut | BD 176 |

| | | | |
|---|---|---|---|
| xəlt | ‘saw’ | əRT | C |
| xəlxətm̓uːt | ‘sawdust’ | x·ᴇ′lx·atᵋmut | BG 340 |
| wən | ‘drill with auger’ | əR | A2 |
| wənwəmuːt | ‘refuse of drilling’ | wᴇ′nwᴇmut | BG 339 |
| wiːn | ‘war’ | VːR | Other–I |
| həwiːnəmuːt | ‘l.a. war’ | hă′wī′nᴇmut | BG 340 |
| w̓aːs | ‘dog’ | VːT | B1 |
| w̓oːsm̓uːt | ‘useless dog’ | wâ′sᵋmut | BG 340 |
| χəw | ‘split wood’ | əY | A3 |
| χuːχəmuːt | ‘refuse of splitting wood’ | xo′xᴇmut | BG 340 |
| χuːɬ | ‘go after mussels’ | VːT | B1–I |
| χuːχʷəɬk̓ᵊmuːt | ‘shells’ | xō′xwᴇłk·!ᵋᴇmut | BG 340 |
| χʷaːƛ | ‘cut fish’ | VːT | B1 |
| χʷaːχʷəɬm̓uːt | ‘remains of fish cutting’ | xwā′xwăłᵋmut | BG 340 |
| yənt | ‘(non-mouse) gnaw’ | əRT | C |
| yənyətm̓uːt | ‘gnawings not of mouse’ | yᴇ′nyătᵋmut | BG 340 |
| yuːs | ‘spoon’ | VːT | B1 |
| yuːyəsm̓uːt | ‘l.a. eating with spoons’ | yū′yasᵋmut | BG 340 |
| y̓aːk | ‘bad’ | VːT | B1 |
| y̓eːxm̓uːt | ‘refused on account of badness’ | ᵋyä′x·ᵋmut | BG 340 |
| y̓əχʷ | ‘tide rises’ | əT | A1[12] |
| y̓aːχʷm̓uːt | ‘high water mark’ | ᵋya′xᵘᵋmut | BG 339 |
| | | ᵋyaᵋxᵘᵋmō′t | BD 52 |
| ʔəɬ | ? | əT | A1 |
| ʔaːɬm̓uːt | ‘new tracks’ | ałᵋmu′t | BG 339 |
| ʔəmeːʔ | ‘small’ | Polysyllabic | E |
| ʔəmeːʔm̓uːt | ‘rejected because too small’ | ămä′ᵋmut | BG 340, BD 6 |

| | | | |
|---|---|---|---|
| ʔəχ | ‘do, handle’ | əT | A1 |
| ʔaːχm̓uːt | ‘l.a. some work’ | ax$^{\varepsilon}$mu′t | BG 339 |
| | | ăx$^{\varepsilon}$mō′t | BD 12 |
| ʔəx$^{w}$ | ‘skim off scum’ | əT | A1 |
| ʔaːx$^{w}$m̓uːt | ‘waste scum’ | aẋ$^{u\varepsilon}$mu′t | BG 339 |
| ʔiːk | ‘good’ | VːT | B1 |
| ʔiːxm̓uːt | ‘good ones left over’ | ē′x·$^{\varepsilon}$mut | BG 340 |

**Doubtful forms:**

| | | | |
|---|---|---|---|
| cənχ$^{w}$muːdəm | ‘rejected because fat’ | tsᴇ′nx$^{u}$mōdᴇm | BD 199[13] |
| haːy̓amuːt | ‘sign, mark; shadow, echo’ | ha′$^{\varepsilon}$yamut | BD 82 |
| hiʔəmuːt | ‘l.a. doing something; signs; marks’ | he′$^{\varepsilon}$ămut | BD 82 |
| m̓aːmuːt | ‘food taken home from feast’ | $^{\varepsilon}$mā′mut | BG 340[14] |

# Notes

1. Glottal stop in BG perhaps erroneous; form unattested in BD.

2. BD 204 gives the same word (tse′nax·mut) with the meaning ‘parts burnt off’ and associates it with a different but homophonous lexical item glossed as ‘light fire (old word).’

3. BD lists the root as *c̓əs* ts!ᴇs, presumably in error.

4. BD 151 gives *dədiːχm̓uːt* dᴇdēxmōt ‘used toilet sticks,’ which would be a very irregular stem expansion.

5. BD identifies these two derived forms as dialectal variants.

6. BG lists root *kaːχ*$^{w}$ k·ax$^{u}$ (no root gloss), and derived form with glottalized onsets and uvular coda and gloss ‘shavings.’ However, BD 282 lists no such root, instead having *k̓aːx*$^{w}$ k·!āẋw ‘shave wood with straight knife.’ On the preponderance of the relevant evidence, I have reconciled the conflicting forms in favor of the BD form.

7. BD gives *k̓*$^{w}$*oːxm̓uːt* k!wâx·mut ‘slow match, left after sucking; sucked’ and tentatively identifies it with *k̓aːx*$^{w}$*m̓uːt* k·!aẋ$^{u}$mut, which is noted as an obsolete form.

8. The word *ləɢʷiːlas* ‘fireplace’ is not given in BD or BG, but it is reconstructible as *ləɢʷiːɬ* ‘fire in house’ (BD 395, from root *ləqʷ* ‘firewood’) + =*as* ‘place of’ (BG 318).

9. This forms appears very irregular and the transcription is suspect. Does not appear in BD.

10. BD 371 gives *q̓ʷəq̓ʷaːl̓ᵊmuːt* q!wᴇq!waᵋlᴇmut as a plural form, and the singular form as *q̓ʷaːl̓ᵊmuːt* q!waᵋlᴇmut.

11. BG also gives plural form *t̓iːt̓əxm̓uːt* t!e′t!ax·ᵋmut.

12. BD gives plural form *y̓iːy̓aːχʷm̓uːt* ᵋyeᵋya′xᵘᵋmu′t.

13. From root *cənχʷ* tsᴇ′nxw ‘(fish, deer) be fat’. I suspect that this form is *cənχʷm̓uːt* with passive/instrumental suffix =ə*m*.

14. No corresponding root is listed in BG. This word seems better analyzed as a form built on root *m̓ut* ‘carry food home from feast’ (BD 150) rather than a word formed from suffix -*m̓ut*.

# Appendix B: Language maps

## Languages of British Columbia

The Pacific Northwest is home to many languages that have played an important role in linguistic theory and in this thesis. Because they often exhibit many properties that are typologically unusual, the relationships between them are of great interest for linguists who wish to draw conclusions about issues of language universals, diffusion of linguistic patterns, and other topics. The map of indigenous languages of British Columbia provided on the following page provides information about one dimension of those relationships, namely the geographical one.

Note that although the map boundaries are linguistic, the labels correspond to the people who speak the languages rather than to the languages themselves. Thus for example Kwak’wala is the language of the Kwakwa̱ka̱’wakw.

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# Languages of British Columbia

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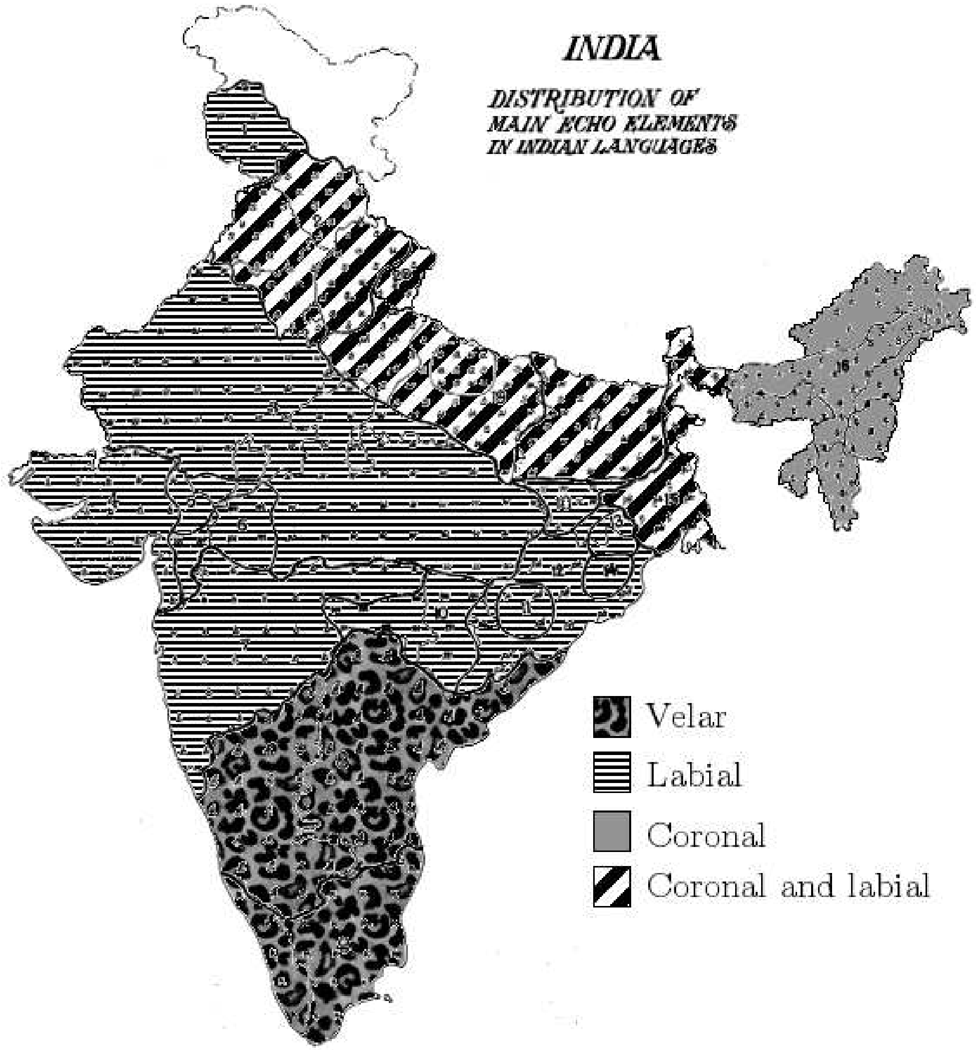
# Echo reduplication patterns of India

The distribution of echo reduplication patterns across India is shown in the following map, which is adapted from the map in Trivedi (1990). To that map I have added textures corresponding to the characteristic place of articulation of the fixed segment.

Dravidian languages are neatly distinguished by their use of velar consonants; the other language families of India (especially Indo-Aryan and Tibeto-Burman) exhibit echo word formation as well, typically using labial or coronal consonants, or some combination of both, although the Austroasiatic Munda languages form echo words with fixed vocalic rather than consonantal patterns.

Of course the phenomenon of echo reduplications is not limited by the political boundaries of India. Equivalent patterns occur across a broad region, extending west to Europe in Yiddish and Bulgarian (Southern, 2005), and east to Thai, Vietnamese and some Indonesian languages (Williams, 1991) as well as some Chinese dialects (Yip, 1982, 1998). And there is no essential difference between South Asian echo word formations and patterns found elsewhere in many languages of the world, including the Contrastive Reduplication pattern found in English, Spanish and Russian (among other languages). A comprehensive map of these patterns remains to be made, although see Southern (2005) for a great deal of investigation of them.

# Echo reduplication patterns of India



# Appendix C: Constraints in this Thesis

This appendix provides definitions and original sources for all of the phonological constraints used in this thesis. Minor changes to names and definitions have been made in some cases in order to standardize across different authors using equivalent constraints. For example, *CODA is used in all cases, rather than alternating between *CODA, NOCODA and NO-CODA depending on the author under discussion. However, even logically equivalent constraints are listed separately here if the names or definitions used for them by different authors are significantly distinct; e.g. REALIZEMORPHEME and MORPHREAL are listed separately.

Constraints whose meaning and definition can be derived straightforwardly from those of a related constraint are not listed separately. For example, because MAX is defined, there is no need to separately list the constraints MAX-seg and MAX-$\mu$ or MAX$_{BR}$. One class of constraints that are not listed separately for this reason are existential faithfulness constraints (Struijke, 2000). The derivation of these constraints is predictable. For example, IDENT$_{IO}$-length states that the length specification for input segment *x* is identical to the length specification for its output correspondent *y*. The existential version of the constraint, ∃-IDENT$_{IO}$-length, states that for an input segment *x*, there exists some corresponding output segment *y* such that *x* and *y* have identical weight specifications. See Struijke (2000) for formalization and more discussion of existential faithfulness.

Some constraints are not defined in the original source, in which case I have supplied a definition according to the way in which they are used. In other cases the definitions of constraints required some modification for clarity or because of different underlying theoretical assumptions. All of these cases are indicated by a citation beginning with with cf. Constraints that have no citation are introduced in this thesis, indicating that I was unable to find any direct precedent for such a constraint.

| | |
|---|---|
| ALIGN-L(Root, PStem)<br>cf. McCarthy and Prince (1993*a*) | The left edge of a root corresponds with the left edge of a PStem. |
| ALIGN-L($X^{-1}$, $X^0$) | The left edge of a constituent below the level of $X^0$ corresponds to the left edge of the constituent $X^0$ that dominates it. |
| ALL-$\sigma$-L<br>cf. Spaelti (1999) | *Equivalent to* ALIGN-*L(σ, Pwd).* |
| ANCHOR-L(IO)<br>cf. McCarthy and Prince (1993*b*)<br>(as LEFT-ANCHOR) | Any element at the left edge of the Pstem has a correspondent at the left edge of the Pwd. |
| *CLASH<br>Struijke (2000) | Adjacent foot heads are prohibited. |
| *CODA<br>McCarthy and Prince (1993) | Syllables are open. |
| *COMPLEX<br>Prince and Smolensky (1993/2004) | No more than one C or V may associate to any syllable position node. |
| CONTIGUITY | *See* I-CONTIGUITY *and* O-CONTIGUITY*.* |
| *CR’ | The sequence *CR’* (C = any consonant; R’ = any glottalized sonorant) is disallowed in the output. |
| *Cʔ | The sequence *Cʔ* (C = any consonant) is disallowed in the output. |
| *C’C | The sequence *C’C* (C’ = any glottalized consonant; C = any consonant) is disallowed in the output. |

| | |
|---|---|
| DEP<br>McCarthy and Prince (1995) | Every element of $S_2$ has a correspondent in $S_1$. |
| DEPLINKMORA<br>cf. Morén (1999) | Let $S_i$ be segments in corresponding phonological representations $\mathbb{I}(\mathbb{nput})$ and $\mathbb{O}(\mathbb{utput})$. If $S_1 \in \mathbb{O}$ and $S_1$ is associated with a mora, then $\exists$ $S_2$ such that $S_2 \in \mathbb{I}$ and $S_2$ is associated with a mora and $S_1 \mathfrak{R} S_2$. |
| DEPSTEM | Assign a violation for each segment that belongs to a PStem in the output unless it corresponds to an input segment that also belongs to a PStem. |
| *FLOAT<br>cf. Wolf (2006) | No floating elements in the output. |
| FOOTFORM<br>cf. Kager (1999) | A cover for several constraints which combine to enforce iterative iambic footing. A violation is assigned for a foot which is not a good iamb, e.g. $(\Sigma\ \sigma)$; or for a syllable that does not belong to any foot. |
| I-CONTIGUITY<br>McCarthy and Prince (1995) | The portion of $S_1$ standing in correspondence forms a contiguous string. (“No skipping.”) |
| IDENT$_{IO}$-F | Featural or other specification F is identical for corresponding input and output segments. |
| INTEGRITY<br>McCarthy and Prince (1995) | *Informal:* No element of $S_1$ has multiple correspondents in $S_2$.<br>*Formal:* For $x \in S_1$ and $w,z \in S_1$, if $x\mathfrak{R}w$ and $x\mathfrak{R}z$, then $w=z$. |
| **i, u*<br>Chang (1998) | Low vowels are least marked. |

| | |
|---|---|
| *LAR]$_\sigma$<br>Um (2001*a*),<br>Davenport (2007) | Violated when a segment in coda position bears a laryngeal feature ([voice] [glottalized] [aspirated]). |
| *l[cor] | The sequence *lT* (T = any segment with a [coronal] feature) is disallowed in the output. |
| LEX ≈ PWD<br>Prince and Smolensky (1993/2004) | A lexical word corresponds to a prosodic word. |
| LINEARITY<br>McCarthy and Prince (1995) | $S_1$ is consistent with the precedence structure of $S_2$, and vice versa. |
| MAX<br>McCarthy and Prince (1995) | Every element of $S_1$ has a correspondent in $S_2$. |
| MAXFLOAT<br>Wolf (2006) | INFORMAL: All autosegments that are floating in the input have output corresponedents. FORMAL: $\forall$ F $\in$ I, where F is a feature: [ $\neg$ [ $\exists$ S $\in$ I s.t. S is a segment, and F is attached to S ] ] $\rightarrow$ [ $\exists$ F′ $\in$ O s.t. $F\mathfrak{R}F'$ ] |
| MAX(Laryngeal) | A laryngeal feature ([+constricted glottis] or [+spread glottis]) present in the input has a correspondent in the output. |
| MAX-LS<br>Spaelti (1999) | *Equivalent to* MAX$_{IO}$. |
| MORPHORDER | Assign a violation for any pair of morphemes whose surface order is inconsistent with the order of their underlying constituents. |
| MORPHREAL<br>Struijke (2000) | EQUIVALENT TO REALIZEMORPHEME. |

| | |
|---|---|
| MParse<br>McCarthy and Prince (1993) | Morphemes are parsed into morphological constituents. |
| NonmoraicEpenthesis<br>(nme) | $\forall \alpha \in \mathrm{S}_2 : \exists \mu \delta \alpha \rightarrow \exists \beta \in \mathrm{S}_1$ s.t. $\alpha \mathfrak{R} \beta$ |
| NoVacuousDocking($\mu$)<br>(NoVacDoc($\mu$)) | *Informal:* "If a floating mora docks to a non-epenthetic segment, then a correspondent of that segment is also dominated by another mora." Formal: $\forall\ \mu_1 \in \mathrm{S}_1\ \nexists \alpha$ s.t. $\mu_1 \delta \alpha$: $(\exists \mu_2 \in \mathrm{S}_2$ s.t. $\mu_1 \mathfrak{R} \mu_2\ \&\ \exists x$ s.t. $\mu_2 \delta x\ \&\ \exists \beta \in \mathrm{S}_1$ s.t. $\beta \mathfrak{R} x) \rightarrow (\exists y \in \mathrm{S}_2$ s.t. $\beta \mathfrak{R} y\ \&\ \exists \mu_3 \in \mathrm{S}_2$ s.t. $\mu_3 \delta y\ \&\ \neg\ \mu_1 \mathfrak{R} \mu_3)$ |
| O-Contiguity<br>McCarthy and Prince (1995) | The portion of $\mathrm{S}_2$ standing in correspondence forms a contiguous string. ("No intrusion.") |
| OCP<br>Ito and Mester (1996) | Adjacent identical autosegments are prohibited. |
| OO-Ident(Onset) | Corresponding segments in the word onset of the base and the reduplicant are identical. |
| ¬OO-Ident(Onset)<br>Ghaniabadi (2005) | It is not the case that corresponding segments in the word onset of the base and the reduplicant are identical. |
| Positional-Dep-$\mu$<br>(P-Dep-$\mu$)<br>Campos-Astorkiza (2004) | "A non-positional $\mu$-licenser in $\mathrm{S}_2$ has a correspondent in $\mathrm{S}_1$." |
| Pwd ≈ Foot<br>Prince and Smolensky (1993/2004) | A prosodic word corresponds to a foot. |

| | |
|---|---|
| RealizeMorpheme (RM)<br>Kurisu (2001) | Let $\alpha$ be a morphological form, $\beta$ be a morphosyntactic category, and F($\alpha$) be the phonological form from which F($\alpha + \beta$) is derived to express a morphosyntactic category $\beta$. Then RM is satisfied with respect to $\beta$ iff F($\alpha + \beta$)$\neq$F($\alpha$) phonologically. |
| Reduplicate<br>Zuraw (2003)<br>(as Redup) | A word must contain some substrings that are coupled. |
| Red = $\sigma$<br>cf. McCarthy and Prince (1995) | A reduplicant is exactly one syllable. |
| Red $\leq \sigma$<br>Chang (1998) | A reduplicant is no larger than a syllable. |
| Syll-$\mu$<br>Morén (1999) | A syllable must be minimally mono-moraic. |
| Uniformity<br>McCarthy and Prince (1995) | No element of $S_2$ has multiple correspondents in $S_1$. |
| *Vː<br>cf. Holt (1998) | No vowel may be associated to two moras. |
| WeightByPosition (WxP)<br>cf. Kager (1999) | A cover for several constraints which ensure that sonorant codas and no other consonants are linked to moras. A violation is assigned for any onset consonant or coda obstruent linked to a mora, or a sonorant coda not linked to a mora. |
| Weight-Ident($S_1$, $S_2$):<br>Urbanczyk (1996) | If $\alpha$ is mono(bi)-moraic and $\beta$ = f($\alpha$), then $\beta$ is mono(bi)-moraic (where $\alpha$ and $\beta$ are segments belonging to strings S1 and S2 respectively). |
| *3$\mu$<br>Morén (1999)<br>(as *TriMora) | Trimoraic syllables are prohibited. |
| *$\mu$/Obstr<br>Struijke (2000) | Obstruents are nonmoraic. |

# Appendix D: Orthography and Transcription

Most American Indian language data in this thesis is transcribed using a version of the North American Phonetic Alphabet. Symbols in this orthography which differ from those in the International Phonetic Alphabet are shown below.

(1) NAPA - IPA correspondence for non-identical symbols:

| *IPA* | *NAPA* |
|---|---|
| t͡s | c |
| d͡z | $d^z$ |
| t͡ɬ | ƛ |
| d͡l | λ |
| ʃ | š |
| ʒ | ž |
| t͡ʃ | č |
| d͡ʒ | ǰ |
| j | y |
| *γ* | ǧ |

Vˑ̆ indicates variable length vowels, a particular kind of segment found in Nuu-chah-nulth. They surface as long vowels when they occur in the first two syllables of the word, and short vowels elsewhere. V̨ indicates nasalization of vowels in some Native American languages. Ṽ and C̃ are used when customary in the representation of nasalization in other languages, such as Malay.

An apostrophe is used to indicate glottalization of consonants. These apostrophes are sometimes struck above the consonant and sometimes directly afterwards (e.g. *p̓* vs. *p'*) depending on the conventions of the language in question.

Data from languages from the Indian subcontinent are usually given in an orthography standard for those languages rather than in IPA transcription. These systems are generally similiar, with the exception of the use of *y* for IPA *j* in the Indian orthography, and the use of underdots for retroflex consonants. Thus *ṭ* is IPA ʈ, etc. Long vowels are indicated through orthographic doubling rather than the use of a length mark; e.g. orthographic *ii* corresponds to IPA *iː*.

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# Bibliography

Abbi, Anvita (1985) “Reduplicative Structures: A Phenomenon of the South Asian Linguistic Area.” *Oceanic Linguistics Special Publication* 159–171.

Ackema, Peter and Ad Neeleman (2004) *Beyond Morphology: Interface Conditions on Word Formation.* Oxford University Press.

Ackema, Peter and Ad Neeleman (2007) “Morphology ≠ Syntax.” In Gillian Ramchand and Charles Reiss, eds., *The Oxford Handbook of Linguistic Interfaces.* Oxford University Press, 325–352.

Acquaviva, Paolo (2008) “Roots and Lexicality in Distributed Morphology.” Paper presented at the Fifth York-Essex Morphology Meeting.
**URL:** *http://ling.auf.net/lingBuzz/000654*

Agbayani, Brian (1996) “Phonological Constraints and Base-Reduplicant Non-Identity: The Case of Vietnamese.” In *Proceedings of the South Western Optimality Theory Workshop (SWOT II).*

Alderete, John (1995) “Winnebago Accent and Dorsey’s Law.” In *Papers in Optimality Theory.* University of Massachusetts Occasional Papers. ROA 860-0806.

Alderete, John (2002) “Dominance Effects as Transderivational Anti-faithfulness.” *Phonology* 18(02): 201–253.

Alderete, John, Jill Beckman, Laura Benua, Amalia Gnanadesikan, John McCarthy and Suzanne Urabnczyk (1999) “Reduplication with Fixed Segmentism.” *Linguistic Inquiry* 30(3): 327–364.

Álvarez, José (2005) “Vocalic Mora Augmentation in the Morphology of Guajiro/Wayuunaiki.” In *Proceedings from the Eighth Workshop on American Indigenous Languages.* volume 16.

Andersen, Torben (1992) “Vowel Quality Alternations in Dinka Verb Inflection.” *Phonology* 10: 1–42.

Andersen, Torben (1995) “Morphological Stratification in Dinka: On the Alternations of Voice Quality, Vowel Length and Tone in the Morphology of Transitive Verbal Roots in a Monosyllabic Language.” *Studies in African Linguistics* 23: 1–63.

Anderson, Stephen R. (1984) “Kwakwala Syntax and the Government-Binding Theory.” *Syntax and Semantics* 16: 21–75.

Anderson, Stephen R. (2005) *Aspects of the Theory of Clitics*. Oxford University Press.

Anonby, Stan (1997) *Reversing Language Shift: Can Kwak’wala Be Revived?* Master’s thesis, University of North Dakota.

Anttila, Arto (2006) “Variation and Opacity.” *Natural Language and Linguistic Theory* 24(4).

Applegate, Richard (1972) *Ineseño Chumash Grammar*. Ph.D. thesis, University of California, Berkeley.

Applegate, Richard (1976) “Reduplication in Chumash.” In *Hokan Studies*. Mouton de Gruyter.

Assu, H. and J. Inglis (1989) *Assu of Cape Mudge: Recollections of a Coastal Indian Chief*. University of British Columbia Press.

Austin, Peter (1981) *A Grammar of Diyari*. Cambridge University Press.

Bach, Emmon (1975) “Long Vowels and Stress in Kwakiutl.” *Texas Linguistic Forum* 2: 9–19.

Bach, Emmon, Darin Flynn (Howe) and Patricia Shaw (2005) “On Epenthesis and Moraicity in Northern Wakashan.” Handout for presentation at SSILA conference.

Baerman, Matthew (2007) “Morphological Reversals.” *Journal of Linguistics* 43(01): 33–61.

Bagemihl, Bruce (1991) “Syllable Structure in Bella Coola.” *Linguistic Inquiry* 22: 589–646.

Baker, Adam (2003) “Reduplication as Minimal Copying to Fill Empty Prosodic Structure.” Handout for University of North Dakota colloquium, June 12, 2003.
**URL:** *http://www.u.arizona.edu/˜tabaker/baker-2003-pfm.pdf*

Bamgbose, Ayo (1971) “Nasal Harmony in Mbe.” *Annales de l’Université d’Abijdan* 101–107.

Banksira, Degif Petros (1993) *La deŕivation verbale en Chaha*. Master’s thesis, Université du Québec à Montréal.

Banksira, Degif Petros (1997) *The Sound System of Chaha*. Ph.D. thesis, Université du Québec à Montréal.

Bates, Dawn and Barry Carlson (1992) “Simple Syllables in Spokane.” *Linguistic Inquiry* 23: 653–659.

Bates, Dawn and Barry Carlson (1998) “Spokane (Npoqínicn) Syllable Structure and Reduplication.” In *Salish Languages and Linguistics: Theoretical and Descriptive Perspectives*. Mouton de Gruyter.

Bennett, Ryan (2010) “Reduplication and Morphological Locality.” Unpublished manuscript, University of California, Santa Cruz. To appear in Morphology at Santa Cruz.

Benua, Laura (1995) “Identity Effects in Morphological Truncation.” In Jill Beckman, Laura Walsh Dickey and Suzanne Urbanczyk, eds., *University of Massachusetts Occasional Papers: Papers in Optimality Theory*. volume 18, 77–136.

Benua, Laura (1997) *Transderivational Identity: Phonological Relations Between Words*. Ph.D. thesis, University of Massachusetts, Amherst. Published by Garland, 2000.

Bermúdez-Otero, Ricardo (forthcoming) *Stratal Optimality Theory*. Oxford University Press.

Bhaskararao, Peri (1977) *Reduplication and Onomatopoeia in Telugu*. Centre of Advanced Study in Linguistics.

Blevins, Juliette (1995) “The Syllable in Phonological Theory.” In *The Handbook of Phonological Theory*. Oxford University Press.

Blevins, Juliette (1996) “Mokilese Reduplication.” *Linguistic Inquiry* 27(3): 523–530.
**URL:** *http://www.jstor.org/stable/4178949*

Blumenfeld, Lev (2003) “Counterfeeding, Derived Environment Effects, and Comparative Markedness.” *Theoretical Linguistics* 89–99.

Blumenfeld, Lev (2006) *Constraints on Phonological Interactions*. Ph.D. thesis, Stanford. ROA 877-1006.

Boas, Franz (1947) *Kwakiutl Grammar*. American Philosophical Society.

Boas, Franz (1948) “Kwakiutl Dictionary.” Unpublished manuscript, American Philosophical Society.

Boas, Franz and Ella Deloria (1941) *Dakota Grammar*. United States Government Printing Office.

Boas, Franz and George Hunt (1905) *Kwakiutl Texts*. G. E. Stechert.

Boas, Franz and George Hunt (1906) *Kwakiutl Texts: Second Series*. G. E. Stechert.

Bošković, Željko and Jairo Nunes (2007) “The Copy Theory of Movement: A view from PF.” In Norbert Corver, and Jairo Nunes, eds., *The Copy Theory of Movement*. John Benjamins, 151–174.

Broselow, Ellen (1982) “On Predicting the Interaction of Stress and Epenthesis.” *Glossa* 16(2): 115–132.

Broselow, Ellen (2008) “Stress-Epenthesis Interactions.” In *Rules, Constraints, and Phonological Phenomena*. ROA 446-0701.

Broselow, Ellen and John McCarthy (1983) “A Theory of Internal Reduplication.” *Linguistic Review* 3(1): 25–88.

Brown, J. C. (2003) “Floating Moras and Features in Southern Sierra Miwok.” In *Proceedings from the Sixth Workshop on American Indigenous Languages*. Santa Barbara Papers in Linguistics.

Brown, J. C. (2004) “Marked Fixed Segments in Salish.” In *Proceedings of WSCLA 9*.

Buckley, Eugene (1997) “Integrity and Correspondence in Manam Double Reduplication.” In *Proceedings of NELS*. volume 28, 59–67.

Buechel, Eugene (1939) *A Grammar of Lakota: The Language of the Teton Sioux Indians*. Saint Francis Mission.

Buechel, Eugene (1970) *A Dictionary of the Teton Dakota Sioux Language*. Red Cloud Indian School.

Bybee, Joan, Revere Perkins and William Pagliuca (1994) *The Evolution of Grammar: Tense, Aspect, Modality in the Languages of the World*. University of Chicago Press.

Caballero, Gabriela (2006) ““Templatic Backcopying” in Guarijio Abbreviated Reduplication.” *Morphology* 16: 273–289.

Campbell, Lyle (1997) *American Indian Languages: The Historical Linguistics of Native America*. Oxford University Press.

Campos-Astorkiza, Rebeka (2004) “Faith in Moras: A Revised Approach to Prosodic Faithfulness.” In Keir Moulton and Matthew Wolf, eds., *Proceedings of NELS*. volume 34, 163–174.

Canger, Una (1981) “Reduplication in Nahuatly in Dialectal and Historical Perspective.” In Francis Karttunen, ed., *Nahuatl Studies in Memory of Fernando Horcasitas*. Texas Linguistic Forum, volume 18, 29–54.

Carins, Charles and Eric Raimy (2006) “Raimy Rules in Spokane (and Nxaʔamxcín).” Handout for presentation at MOT.

Carrier, Jill (1979) *The Interaction of Phonological and Morphological Rules in Tagalog*. Ph.D. thesis, Massachusetts Institute of Technology.

Chang, M. Laura (1998) “Thao Reduplication.” *Oceanic Linguistics* 37(2): 277–297.

Cho, Young-mee Yu and Tracy Holloway King (1999) “Semisyllables and Universal Syllabification.” In Caroline Féry and Ruben van de Vijver, eds., *The Syllable in Optimality Theory*.

Chomsky, Noam (1993) “A Minimalist Program for Linguistic Theory.” In Kenneth Hale and Samuel Jay Keyser, eds., *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*. MIT Press, 1–52.

Chomsky, Noam (1995) *The Minimalist Program*. The MIT Press.

Christdas, Prathima (1987) “On Constraining the Power of Lexical Phonology: Evidence from Tamil.” In Joyce McDonough and Bernadette Plunkett, eds., *Proceedings of NELS*. volume 17, 122–146.

Christdas, Prathima (1988) *The Phonology and Morphology of Tamil.* Ph.D. thesis, Cornell University.

Chung, Yunhee (2007) “The Internal Structure of Kwak’wala Nominal Domain.” In Kristin Jóhannsdóttir and Martin Oberg, eds., *Papers for ICSNL XLII (The 42nd International Conference on Salish and Neighbouring Languages)*. UBC Working Papers in Linguistics, 101–118.

Clements, George and Samuel Keyser (1983) *CV Phonology: A Generative Theory of the Syllable.* M.I.T. Press.

Cole, Jennifer (1994) *A Prosodic Theory of Reduplication.* Ph.D. thesis, Stanford University.

Collins, Chris (1994) “The Factive Construction in Kwa.” *Travaux de Recherche sur le Créole Haïtien* 23: 31–65.

Cook, Eung-Do (1994) “Against Moraic Licensing in Bella Coola.” *Linguistic Inquiry* 25(2): 309–326.

Crowhurst, Megan (1991) “Demoraification in Tübatulabal: Evidence from Initial Reduplication and Stress.” In *Proceedings of NELS*. GLSA, volume 21, 49–64.

Curtis, E. (1915) *The North American Indian, vol. 10: The Kwakiutl.* Johnson Reprint Co. Facsimile reproduction, 1970.

Davenport, Tristan (2007) *Alternations in Place and Laryngeality: On the Coda Condition of Kwakw’ala.* Master’s thesis, University of California, Santa Cruz.

Davidson, Matthew (2002) *Studies in Southern Wakashan (Nootkan) Grammar.* Ph.D. thesis, SUNY Buffalo.

Davis, Stuart and Isao Ueda (2002) “The Typology of Mora Augmentation.” In Shosuke Haraguchi, Bohumil Palek and Osamu Fujimura, eds., *Proceedings of Linguistics and Phonetics 2002.*
**URL:** *http://wata-net.com/proceedings/IsaoUeda/DavisandUeda2.pdf*

de Saussure, Ferdinand (1911/1972) *Cours de linguistique générale.* Payot.

Dhillon, Rajdip (2007) “Turkish Emphatic Reduplication: Balancing Productive and Lexicalized Forms.” Unpublished manuscript, Yale University.

Diffloth, Gerard (1976*a*) “Expressives in Semai.” In Philip Lenner, Laurence Thompson and Stanley Starosta, eds., *Austroasiatic Studies, Part I.* 249–264.

Diffloth, Gerard (1976*b*) “Minor-Syllable Vocalism in Senoic Languages.” In Philip Lenner, Laurence Thompson and Stanley Starosta, eds., *Austroasiatic Studies, Part I.* 229–247.

Dimmendaal, Gerrit Jan (1983) *The Turkana Language.* Foris.

Dixon, Robert (1977*a*) *A Grammar of Yidin*$^y$, volume 19 of *Cambridge Studies in Linguistics.* Cambridge University Press.

Dixon, Robert (1977*b*) “Some Phonological Rules in Yidin$^{y}$.” *Linguistic Inquiry* 8(1): 1–34.

Dobrin, Lise (1995) “Theoretical Consequences of Literal Alliterative Concord.” In Audra Dainora, ed., *Proceedings of CLS*. volume 31, 127–142.

Downing, Laura (1998*a*) “On the Prosodic Misalignment of Onsetless Syllables.” *Natural Language and Linguistic Theory* 16(1): 1–52.

Downing, Laura (1998*b*) “Prosodic Misalignment and Reduplication.” *Yearbook of Morphology 1997* 83–120.

Downing, Laura (2000) “Morphological and Prosodic Constraints on Kinande Verbal Reduplication.” *Phonology* 17.

Duff, W. (1965) “The Southern Kwakiutl.” Unpublished Manuscript, Royal British Columbia Museum.

Elfner, Emily and Wendell Kimper (2008) “Reduplication without RED: Evidence from Diddly-infixation.” In Natasha Abner and Jason Bishop, eds., *Proceedings of WCCFL*. volume 27, 150–158.

Embick, David and Rolf Noyer (2001) “Movement Operations after Syntax.” *Linguistic Inquiry* 32(4): 555–595.

Emeneau, Murray (1938) “An Echo-Word Motif in Dravidian Folk-Tales.” *Journal of the American Oriental Society* 553–570.

Ethnologue (2005) “Ethnologue: Languages of the World, Fifteenth edition.” Published by SIL International.
**URL:** *http://www.ethnologue.com/*

Everett, Dan and Lucy Seki (1985) “Reduplication and CV Skeleta in Kamaiurá.” *Linguistic Inquiry* 16: 326–330.

Féry, Caroline (2003) “Onsets and Nonmoraic Syllables in German.” In Caroline Féry and Ruben van de Vijver, eds., *The Syllable in Optimality Theory*. 213–237.

Fitzgerald, Colleen (1999) “Loanwords and Stress in Tohono O’odham.” *Anthropological Linguistics* 41: 193–208.

Fitzpatrick, Justin (2006) “Sources of Multiple Reduplication in Salish and Beyond.” In Shannon Bischoff, Lynnika Butler, Peter Norquest and Daniel Siddiqi, eds., *Studies in Salishan*. volume 7 of *MIT Working Papers on Endangered and Less Familiar Languages*, 211–240.

Fitzpatrick-Cole, Jennifer (1996) “Reduplication meets the phonological phrase in Bengali.” *The Linguistic Review* 13(3-4): 305–356.

Flynn, Darin (2007) “Default [a] in North Wakashan Prosodic Morphology.” Handout for presentation at WSCLA 12.

Foster, Mary (1969) *The Tarascan Language.* University of California Press.

Gafos, Adamantios (1995) "On the Proper Characterization of 'Nonconcatenative' Languages." Unpublished manuscript, Johns Hopkins University. Posted online at ROA-106.

Gafos, Adamantios (1996*a*) *The Articulatory Basis of Locality in Phonology.* Ph.D. thesis, Johns Hopkins University.

Gafos, Adamantios (1996*b*) "On "Minor Syllables" in South-East Asia." Paper presented at the 1996 GLOW Workshop on Weight Effects.

Gafos, Adamantios (1998) "A-templatic Reduplication." *Linguistic Inquiry* 29(3): 515–527.

Galois, Robert (1994) *Kwakwa̱ka̱'wakw Settlements, 1775-1920: A Geographical Analysis and Gazetteer, with Contributions by Jay Powell and Gloria Cranmer Webster (On Behalf of the U'mista Cultural Centre, Alert Bay, BC).* University of British Columbia Press.

Ghaniabadi, Saeed (2005) "M&p-echo Reduplication in Colloquial Persian: An OT Analysis." Handout for presentation at the First International Conference on Aspects of Iranian Linguistics.

Ghomeshi, Jila, Ray Jackendoff, Nicole Rosen and Kevin Russell (2004) "Contrastive Focus Reduplication in English (The Salad-Salad Paper)." *Natural Language and Linguistic Theory* 22: 307–357.

Golston, Chris and Elzbieta Thurgood (1999) "Reduplication as Echo: Evidence from Bontok and Chumash." ROA 456-0801.

Gouskova, Maria (2007) "The Reduplicative Template in Tonkawa." *Phonology* 24: 367–396.

Gribanova, Vera (2007) "Russian Prefixes, Prepositions and Palatalization in Stratal OT." In *Proceedings of WCCFL.* volume 26.

Gribanova, Vera (2010) *Composition and Locality: The Morphosyntax and Phonology of the Russian Verb Complex.* Ph.D. thesis, University of California, Santa Cruz.

Grohmann, Kleanthes and Andrew Nevins (2004) "Echo Reduplication: When Too-Local Movement Requires PF-Distinctness." In Pritha Chandra, Tomohiro Fujii, Usama Soltan and Masaya Yoshida, eds., *University of Maryland Working Papers in Linguistics.* volume 13, 84–108.

Grohmann, Kleanthes and Andrew Nevins (2005) "On the Expression of Pejorative Mood." In Pierre Pica, Johan Rooryck and Jeroen van Craenenbroeck, eds., *Linguistic Variation Yearbook.* John Benjamins, volume 4, 143–179.

Grubb, David (1977) *A Practical Writing System and Short Dictionary of Kwakw'ala (Kwakiutl).* Canadian Ethnology Service.

Haiman, John (1980) *Hua: A Papuan Language of the Eastern Highlands of New Guinea,* volume 5 of *Studies in Language Companion Series.* John Benjamins.

Hall, Nancy (2003) *Gestures and Segments: Vowel Intrusion as Overlap.* Ph.D. thesis, University of Massachusetts, Amherst.

Halle, Morris (1973) "Prolegomena to a Theory of Word-Formation." *Linguistic Inquiry* 4.

Halle, Morris and Alec Marantz (1993) "Distributed Morphology and the Pieces of Inflection." In Kenneth Hale and Samuel Jay Keyser, eds., *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*. MIT Press, 111–176.

Halle, Morris and Alec Marantz (1994) "Some Key Features of Distributed Morphology." *MIT Working Papers in Linguistics* 21(275): 88.

Hansson, Gunnar Ólafur (2001) *Theoretical and Typological Issues in Consonant Harmony*. Ph.D. thesis, University of California, Berkeley.

Harley, Heidi and Rolf Noyer (1998) "Licensing in the Non-Lexicalist Lexicon: Nominalizations, Vocabulary Items and the Encyclopaedia." In Heidi Harley, ed., *MIT Working Papers in Linguistics: Papers from the UPenn/MIT Roundtable on Argument Structure and Aspect.* volume 32, 119–137.

Harrison, K. David (2000) *Topics in the Phonology and Morphology of Tuvan.* Ph.D. thesis, Yale University.

Harrison, K. David and Eric Raimy (2004) "Reduplication in Tuvan: Exponence, Readjustment and Phonology." In Aniko Csirmaz, Youngjoo Lee and M. Walter, eds., *Proceedings of Workshop in Altaic Formal Linguistics 1.*

Harrison, Sheldon (1973) "Reduplication in Micronesian Languages." *Oceanic Linguistics* 12: 407–454.

Harrison, Sheldon (1976) *Mokilese Reference Grammar.* University of Hawaii Press.

Haugen, Jason (2003) "Allomorphy in Yaqui Reduplication." In L. Barragan and Jason Haugen, eds., *Studies in Uto-Aztecan.* MIT Working Papers on Endangered and Less Familiar Languages, volume 5, 75–103.

Haugen, Jason (2005) "Reduplicative Allomorphy and Language Prehistory in Uto-Aztecan." In Bernhard Hurch, ed., *Studies on Reduplication.* Mouton de Gruyter, 315–350.

Haugen, Jason (2009) "Three Challenges for Morphological Doubling Theory." Paper given at the Workshop on the Division of Labor between Morphology and Phonology, Meertens Instituut, Amsterdam.

Haugen, Jason and Heidi Harley (2008) "Reduplication and Compounding in Hiaki (Yaqui) Compound Verbs." Paper given at the Annual Meeting of the LSA.

Haugen, Jason and Cathy Hicks Kennard (2009) "Morphological Moras and Morphological Doubling Theory." Paper given at the Annual Meeting of the LSA.

Hayes, Bruce and May Abad (1989) “Reduplication and Syllabification in Ilokano.” *Lingua* 77: 331–374.

Heine, Bernd, Ulrike Claudi and Friederike Hünnemeyer (1991) *Grammaticalization: A Conceptual Framework.* University of Chicago Press.

Hendricks (1999) *Reduplication Without Template Constraints: A Study in Bare-Consonant Reduplication.* Ph.D. thesis, University of Arizona.

Hendricks, Sean (2001) “Bare-Consonant Reduplication Without Prosodic Templates: Expressive Reduplication in Semai.” *Journal of East Asian Linguistics* 10: 287–306.

Hicks Kennard, Cathy (2004) “Copy but Don’t Repeat: The Conflict of Dissimilation and Reduplication in the Tawala Durative.” *Phonology* 21: 303–323.

Hill, Jane and Ofelia Zepeda (1992) “Derived Words in Tohono O’odham.” *International Journal of American Linguistics* 40: 355–404.

Hinton, Leanne, Johanna Nichols and John Ohala (2006) *Sound Symbolism.* Cambridge University Press.

Hoard, J. E. (1978) “Syllabication in Northwest Indian Languages, with Remarks on the Nature of Syllabic Stops and Affricates.” In Alan Bell and Joan Hooper, eds., *Syllables and Segments.*

Hoijer, Harry (1933) “Tonkawa. An Indian Language of Texas.” *Handbook of American Indian Languages* 3.

Hoijer, Harry (1946) “Tonkawa.” In *Linguistic Structures of Native America.* Viking Fund Publications in Anthropology.

Hoijer, Harry (1949) *An Analytical Dictionary of the Tonkawa Language.* University of California Press.

Holt, Eric (1998) “The Sonority Hierarchy and NO LONG VOWEL: Theoretical Implications.” Presentation at the 72nd LSA Annual Meeting.

Inkelas, Sharon (1990) *Prosodic Constituency in the Lexicon.* Garland. Revision of the author’s PhD thesis, Stanford University, 1989.

Inkelas, Sharon (1993) “Deriving Cyclicity.” In Sharon Hargus and Ellen Kaisse, eds., *Studies in Lexical Phonology.* Academic Press, 75–110.

Inkelas, Sharon (2005) “Morphological Doubling Theory: Evidence for Morphological Doubling in Reduplication.” In Bernhard Hurch, ed., *Studies on Reduplication.* Mouton de Gruyter, 65–88.

Inkelas, Sharon and Cheryl Zoll (2005) *Reduplication: Doubling in Morphology.* Cambridge University Press.

Ito, Junko (1989) “A Prosodic Theory of Epenthesis.” *Natural Language and Linguistic Theory* 7(2): 217–259.

Ito, Junko (1990) “Prosodic Minimality in Japanese.” In Michael Ziolkowski, Manuela Noske and Karen Deaton, eds., *Proceedings of CLS*. volume 26, 213–239.

Ito, Junko, Yoshihisa Kitagawa and Armin Mester (1996) “Prosodic Faithfulness and Correspondence: Evidence from a Japanese Argot.” *Journal of East Asian Linguistics* 5: 217–294.

Ito, Junko and Armin Mester (1996) “Rendaku I: Constraint Conjunction and the OCP.” Presentation at the Kobe Phonology Forum, 1996. Available online, ROA 144-0996.

Ito, Junko and Armin Mester (1997) “Sympathy Theory and German Truncations.” In Phonological Society of Japan, ed., *On’in kenkyuu Phonological Studies*. 51–66.

Ito, Junko, Armin Mester and Jaye Padgett (1995) “Licensing and Underspecification in Optimality Theory.” *Linguistic Inquiry* 26: 571–615.

Jacobsen, William (1964) *A Grammar of the Washo Language*. Ph.D. thesis, University of California, Berkeley.

Jacobsen, William (1997) “Makah Ablaut and Reduplication Patterns.” Paper presented at the Thirty-Second International Conference on Salish and Neighbouring Languages.

Kager, René (1999) *Optimality Theory*. Cambridge University Press.

Kager, René (2003) “Lexical Irregularity and the Typology of Contrast.” In Kristin Hanson and Sharon Inkelas, eds., *The Structure of Words*. MIT Press.

Kageyama, Taro (1977) “Incorporation and Sino-Japanese Verbs.” *Papers in Japanese Linguistics* 5(1977): 117–155.

Kajitani, Motomi (2005) “Semantic Properties of Reduplication among the World’s Languages.” In *Proceedings of the Workshop in General Linguistics*.
**URL:** *http://ling.wisc.edu/lso/wpl/5.1/LSOWP5.1-08-Kajitani.pdf*

Kalmar, Michele (2003) *Patterns of Reduplication in Kʷak̓ʷala*. Master’s thesis, University of British Columbia.

Kawahara, Shigeto (2001) “Reduplication Not Driven by a RED Morpheme.” Paper delivered at Phonology Association In Kansai.
**URL:** *http://people.umass.edu/kawahara/red_handout.pdf*

Kayne, Richard (1994) *The Antisymmetry of Syntax*. MIT Press.

Keane, Elinor (2001) *Echo Words in Tamil*. Ph.D. thesis, Oxford University.

Keane, Elinor (2006) “Fixed Segmentism and Dual Description.” *Linguistics* 44(4): 645–687.

Kennedy, Robert (2008) “Evidence for Morphoprosodic Alignment in Reduplication.” *Linguistic Inquiry* 39: 589–614.

Kenstowicz, Michael (1981) "Functional Explanations in Generative Phonology." In Didier Goyvaerts, ed., *Phonology in the 1980s*. Story-Scientia, 431–444.

Kenstowicz, Michael (2005) "Paradigmatic Uniformity and Contrast." In Laura Downing, T. Hall and Renate Raffelsiefen, eds., *Paradigms in Phonological Theory*.

Kenstowicz, Michael and Degif Petros Banksira (1999) "Reduplicative Identity in Chaha." 30(4): 573–585.

Khan, Sameer ud Dowla (2006) "Similarity Avoidance in East Bengali Fixed-Segment Reduplication." In *Proceedings of Western Conference on Linguistics 17*. 257 – 271.

Kim, Soohee (1998) "What Looks Like a CV Must Be a CV." In Byung-Soo Park and James Hye Suk Yoon, eds., *11th International Conference on Korean Linguistics*.
**URL:** *http://faculty.washington.edu/soohee/ickl.pdf*

Kimper, Wendell (2008) "Syntactic Reduplication and the Spellout of Movement Chains." Unpublished manuscript, University of Massachusetts, Amherst.

Kingston, John (1990) "Articulatory Binding." *Papers in Laboratory Phonology* 1: 406–434.

Kiparsky, Paul (1982) "Lexical Morphology and Phonology." In In-Seok Yang, ed., *Linguistics in the Morning Calm*. Hanshin Publishing Co.

Kiparsky, Paul (1986) "Dakota." Unpublished manuscript.

Kiparsky, Paul (1997) "LP and OT." Handout from LSA Summer Linguistic Institute, Cornell University.

Kiparsky, Paul (2003) "Syllables and Moras in Arabic." In Caroline Féry and Ruben van de Vijver, eds., *The Syllable in Optimality Theory*. Cambridge University Press, 147–182.

Kiparsky, Paul (2007) "Reduplication in Stratal OT." In Linda Ann Uyechi and Lian-Hee Wee, eds., *Reality Exploration and Discovery: Pattern Interaction in Language and Life*. CSLI Publications.

Kitto, Catherine and Paul de Lacy (1999) "Correspondence and Epenthetic Quality." In Catherine Kitto and Carolyn Smallwood, eds., *Proceedings of AFLA*. volume 6, 181–200.

Koopman, Hilda (1984) *The Syntax of Verbs: From Verb Movement Rules in the Kru Languages to Universal Grammar*. Foris.

Kosa, Loredana Andreea (2008) *An Argument for Process-Based Morphology: Subtractive Morphology in Tohono-O'odham (Uto-Aztecan)*. Master's thesis, Simon Fraser University.

Krämer, Martin (2001*a*) *Vowel Harmony and Correspondence Theory*. Ph.D. thesis, Heinrich-Heine-Universität.

Krämer, Martin (2001*b*) "Yucatec Maya Vowel Alternations: Harmony as Syntagmatic Identity." *Zeitschrift für Sprachwissenschaft* 20(2).

Kula, Nancy (2006) “Derived Environment Effects in GP.” *SOAS Working Papers in Linguistics* 14: 95–108.

Kurisu, Kazutaka (2001) *The Phonology of Morpheme Realization.* Ph.D. thesis, University of California, Santa Cruz.

Kurisu, Kazutaka (2005) “Gradient Prosody in Japanese.” *Journal of East Asian Linguistics* 14(3): 175–226.

Kurisu, Kazutaka and Nathan Sanders (1999) “Infixal Nominal Reduplication in Maŋarayi.” In *Phonology at Santa Cruz.* volume 6, 47–56.

Lakoff, George (1987) *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind.* University of Chicago Press.

Langacker, Ronald, ed. (1977) *Studies in Uto-Aztecan Grammar.* Summer Institute of Linguistics.

Lasnik, Harold (2002) “The Minimalist Program in Syntax.” *Trends in Cognitive Science* 6: 432–437.

Lefebvre, Claire and A. M. Brousseau (2002) *A Grammar of Fongbe.* Mouton de Gruyter.

Lidz, Jeffrey (2001) “Echo Reduplication in Kannada and the Theory of Word-Formation.” *The Linguistic Review* 18: 375–394.

Lieber, Rochelle (1987) *An Integrated Theory of Autosegmental Processes.* State University of New York Press.

Lincoln, Neville J. and John C. Rath (1980) *North Wakashan Comparative Root List.* National Museum of Man / Musée national de l’homme.

Llamzon, Teodoro (1966) “Tagalog Phonology.” *Anthropological Linguistics* 8(1): 30–39.

Lombardi, Linda (1991) *Laryngeal Features and Laryngeal Neutralization.* Ph.D. thesis, University of Massachusetts, Amherst. Published by Garland, 1994.

Lombardi, Linda (1995) “Laryngeal Neutralization and Syllable Wellformedness.” *Natural Language and Linguistic Theory* .

Lombardi, Linda (2001) “Why Place and Voice are Different: Constraint-Specific Alternations in Optimality Theory.” In Linda Lombardi, ed., *Segmental Phonology in Optimality Theory: Constraints and Representations.* Cambridge University Press, 13–45. Available on Rutgers Optimality Archive, ROA-105.

Lynch, John (1974) *A Grammar of Lenakel.* Pacific Linguistics Series B 55.

Marantz, Alec (1982) “Re Reduplication.” *Linguistic Inquiry* 13(3): 435–482.

Marantz, Alec (1995*a*) “A Late Note on Late Insertion.” In Young-Sun Kim, Byung-Choon Lee, Kyoung-Jae Lee, Hyun-Kwon Yang and Jong-Yurl Yoon, eds., *Explorations in Generative Grammar: A Festschrift for Dong-Whee Yang*. Hankuk Publishing Co., 396–413.

Marantz, Alec (1995*b*) “The Minimalist Program.” In Gert Webelhuth, ed., *Government and Binding Theory and the Minimalist Program*. Blackwell, 351–82.

Marantz, Alec (1997) “No Escape from Syntax: Don’t Try Morphological Analysis in the Privacy of Your Own Lexicon.” In Alexis Dimitriadis, Laura Siegel, Clarissa Surek-Clark and Alexander Williams, eds., *Proceedings of the Penn Linguistics Colloquium*. University of Pennsylvania Working Papers in Linguistics, volume 4, 201–225.

Marlo, Michael (2004) “CVX Theory in CCCCCCVX Languages.” In Carson Maynard, Catherine Fortin, Ruth Rouvier and Hamid Ouali, eds., *Graduate Linguists at Michigan Working Papers*. volume 1.

Mascaró, Joan (1996*a*) “External Allomorphy and Contractions in Romance.” *Probus* 8(2): 181–205.

Mascaró, Joan (1996*b*) “External Allomorphy as Emergence of the Unmarked.” In Jacques Durand and Bernard Laks, eds., *Current Trends in Phonology: Models and Methods*. CNRS-ESRI, volume 2, 473–483.

Mascaró, Joan (2007) “External Allomorphy and Lexical Representation.” *Linguistic Inquiry* 38(4): 715–735.

Mauzé, M. (1984) *Enjeux et jeux du prestige: des Kwagul Méridionaux aux Lekwitoq (côte nord-ouest du Pacifique)*. Ph.D. thesis, Ecole des Hautes Etudes en Sciences Sociales.

McCarthy, John (1979) *Formal Problems in Semitic Morphology and Phonology*. Ph.D. thesis, Massachusetts Institute of Technology.

McCarthy, John (1986) “Lexical Phonology and Nonconcatenative Morphology in the History of Chaha.” *Revue québécoise de linguistique* 16: 209–228.

McCarthy, John (1999) “Sympathy and Phonological Opacity.” *Phonology* 16: 331–399.

McCarthy, John (2003) “Sympathy, Cumulativity, and the Duke-of-York Gambit.” Cambridge University Press, 23–76.

McCarthy, John (2007) “Consonant Harmony via Correspondence: Evidence from Chumash.” In Leah Bateman, Michael O’Keefe, Ehren Reilly and Adam Werle, eds., *University of Massachusetts Occasional Papers in Linguistics: Papers in Optimality Theory III*. volume 32, 223–237.

McCarthy, John and Alan Prince (1986/1996) “Prosodic Morphology.” Technical report, Rutgers University Center for Cognitive Science.

McCarthy, John and Alan Prince (1990) “Foot and Word in Prosodic Morphology: The Arabic Broken Plural.” *Natural Language and Linguistic Theory* 8: 209–283.

McCarthy, John and Alan Prince (1993*a*) “Generalized Alignment.” In Geert Booij and Jaap van Marle, eds., *Yearbook of Morphology*. 79–154.

McCarthy, John and Alan Prince (1993*b*) “Prosodic Morphology I: Constraint Interaction and Satisfaction.” Unpublished manuscript, University of Massachusetts, Amherst, and Rutgers University.

McCarthy, John and Alan Prince (1994) “The Emergence of the Unmarked: Optimality in Prosodic Morphology.” In Merce González, ed., *Proceedings of NELS*. volume 24, 333–379.

McCarthy, John and Alan Prince (1995) “Faithfulness and Reduplicative Identity.” In Laura Dickey Jill Beckman and Suzanne Urbanczyk, eds., *University of Massachusetts Occasional Papers in Linguistics*.

McCarthy, John and Alan Prince (1999) “Faithfulness and Reduplicative Identity.” In Rene Kager, Harry van der Hulst and Wim Zonneveld, eds., *The Prosody-Morphology Interface*.

McCarthy, John and Matthew Wolf (2007) “Less Than Zero: Correspondence and the Null Output.” In Curt Rice, ed., *Modeling Ungrammaticality in Optimality Theory*.

McFadden, Thomas (2007) “Default Case and the Status of Compound Categories in Distributed Morphology.” In Tatjana Scheffler, Joshua Tauberer, Aviad Eilam and Laia Mayol, eds., *Proceedings of the 30th Annual Penn Linguistics Colloquium*. University of Pennsylvania Working Papers in Linguistics, volume 13, 225–238.

McLaughlin, Fiona (2000) “Consonant Mutation and Reduplication in Seereer-Siin.” *Phonology* 17: 333–363.

Mester, Armin (1986) *Studies in Tier Structure*. Ph.D. thesis, University of Massachusetts, Amherst.

Mester, Armin (1992) “The Quantitative Trochee in Latin.” *Natural Language and Linguistic Theory* .

Mester, Armin (1994) “The Quantitative Trochee in Latin.” *Natural Language and Linguistic Theory* 12(1): 1–61.

Mester, Armin and Jaye Padgett (1994) “Direct Syllabification in Generalized Alignment.” In *Phonology at Santa Cruz*. volume 3, 79–85.

Miner, Kenneth (1979) “Dorsey’s Law in Winnebago-Chiwere and Winnebago Accent.” *International Journal of American Linguistics* 45: 25–33.

Miner, Kenneth (1993) “On Some Theoretical Implications of Winnebago Phonology.” In *Kansas Working Papers in Linguistics*. volume 18, 111–130.

Mithun, Marianne (1999) *The Languages of Native North America*. Cambridge University Press.

Molina, Felipe, Herminia Valenzuela and David Shaul (1999) *Hippocrene Standard Dictionary: Yoeme-English English-Yoeme, with a Comprehensive Grammar of Yoeme Language.* Hippocrene Books.

Montler, Timothy (1986) *Morphology and Phonology of Saanich.* University of Montana Publishers.

Montler, Timothy (1989) "Infixation, Reduplication, and Metathesis in the Saanich Actual Aspect." *Southwest Journal of Linguistics* 9(1).

Moravcsik, Edith (1978) "Reduplicative Constructions." In Joseph Greenberg, ed., *Universals of Human Language: Word Structure*. Stanford University Press, 297–334.

Morén, Bruce (1999) *Distinctiveness, Coercion and Sonority: A Unified Theory of Weight.* Ph.D. thesis, University of Maryland at College Park.

Moreton, Elliot (1996) "Non-computable Functions in Optimality Theory." Unpublished manuscript, University of Massachusetts, Amherst.

Munro, Pamela and P. J. Benson (1973) "Reduplication and Rule Ordering in Luiseño." *International Journal of American Linguistics* 39: 15–21.

Munro, Pamela and Jason Riggle (2004) "Productivity and Lexicalization in Pima Compounds." In *Proceedings of BLS*. volume 30.

Nakayama, Toshihide (2006) *Nuuchahnulth (Nootka) Morphosyntax.* University of California Press.

Nash, David (1979) "Yidiny Stress: A Metrical Account." In Edwin Battistella, ed., *Proceedings of NELS*. volume 9.

Nash, David (1980) *Topics in Warlpiri Grammar.* Ph.D. thesis, Massachusetts Institute of Technology.

Nater, H. F. (1984) *The Bella Coola Language*, volume 92 of *National Museum of Man Mercury Series.* National Museums of Canada.

Nevins, Andrew and Bert Vaux (2003) "Metalinguistic, Shmetalinguistic: The Phonology of shm-Reduplication." *Proceedings from the Annual Meeting of the Chicago Linguistic Society* 39: 702–721.

Nevins, Andrew and Michael Wagner (2001) "Can Correspondence Fix Fixed Segmentism?" Handout for presentation at the LOT-NWCL Conference.

Nevins, Andrew Ira (2005) "Overwriting Does Not Optimize in Nonconcatenative Morphology." *Linguistic Inquiry* 36: 275–287.

Newman, Paul (1972) "Syllable Weight as a Phonological Variable." *Studies in African Linguistics* 3: 301–324.

Newman, Paul (2000) *The Hausa Language: An Encylopedic Reference Grammar*. Yale University Press.

Newman, Stanley (1965) *Zuni Grammar*. University of New Mexico Press.

Newman, Stanley (1969) "Bella Coola Paradigms." *International Journal of American Linguistics* 35: 299–306.

Newman, Stanley (1971) "Bella Coola Reduplication." *International Journal of American Linguistics* 37(1): 34–38.

Nguyen, Dình-hoà (1997) *Vietnamese: Tieng Viet Khong Son Phan*. John Benjamins.

Nivens, Richard (1993) "Reduplication in Four Dialects of West Tarangan." *Oceanic Linguistics* 32: 353–388.

Nuger, Justin (2006) "Discontiguous Reduplication." ROA 831-0506.

Nunes, Jairo (1995) *The Copy Theory of Movement and Linearization of Chains in the Minimalist Program*. Ph.D. thesis, University of Maryland, College Park.

Nunes, Jairo (2001) "Sideward Movement." *Linguistic Inquiry* 32(2): 303–344.

Nunes, Jairo (2004) *Linearization of Chains and Sideward Movement*, volume 43 of *Linguistic Inquiry Monograph*. MIT Press.

Nunes, Jairo (2006) "Linearization of Chains and Sideward Movement." In Željko Bošković and Howard Lasnik, eds., *Minimalist Syntax: The Essential Readings*. Blackwell.

Odden, David (1996) "Patterns of Reduplication in Kikerewe." In *OSU Working Papers in Linguistics 48*. 111–149.

Olson, Kenneth (2003) "Word Minimality and Non-Surface-Apparent Opacity in Mono." Paper given at WOCAL 4.

Onn, Farid (1980) *Aspects of Malay Phonology and Morphology: A Generative Approach*. Ph.D. thesis, Universiti Kebangsaan Malaysia.

Orgun, Cemil Orhan and Ronald Sprouse (2002) "From MPARSE to CONTROL: Deriving Ungrammaticality." *Phonology* 16(02): 191–224.

Ourn, Noeurng and John Haiman (2000) "Symmetrical Compounds in Khmer." *Studies in Language* 24: 483–514.

Pater, Joe (2003) "Balantak Metathesis and Theories of Possible Repair in Optimality Theory." Unpublished manuscript, University of Massachusetts, Amherst.

Payne, D. L. (1981) *The Phonology and Morphology of Axininca Campa*. Summer Institute of Linguistics.

Petronio, Karen and Diane Lillo-Martin (1997) “Wh-movement and the Position of Spec-CP: Evidence from American Sign Language.” *Language* 73: 18–57.

Pons Moll, Claudia (2005) “It is All Downhill from Here: The Role of Syllable Contact in Romance Languages.” In *13th Manchester Phonology Meeting*. ROA 802-0106.

Poser, William (1982) “Phonological Representations and Action-at-a-Distance.” In Harry van der Hulst and Norval Smith, eds., *The Structure of Phonological Representations*. Foris, 121–158.

Poser, William (1989) “The Metrical Foot in Diyari.” *Phonology* 6(1): 117–148.
**URL:** *http://www.jstor.org/stable/4419992*

Poser, William (1990) “Evidence for Foot Structure in Japanese.” *Language* 66: 78–105.

Poser, William (1993) “Are Strict Cycle Effects Derivable?” *Studies in Lexical Phonology and Morphology* 315–321.

Poser, William (2004) “On the Status of Chumash Sibilant Harmony.” Unpublished manuscript, University of Pennsylvania.

Prince, Alan (1996) “Aspects of Mapping Under OT.” Handout from talk given at the University of California, Santa Cruz, October 11, 1996.

Prince, Alan and Paul Smolensky (1993/2004) *Optimality Theory*. Blackwell.

Raffelsiefen, Renate (2004) “Absolute Ill-formedness and Other Morphophonological Effects.” *Phonology* 21(1): 91–142.

Rafferty, Ellen (2002) “Reduplication of Nouns and Adjectives in Indonesian.” In Marlys Macken, ed., *Papers from the Tenth Annual Meeting of the Southeast Asian Linguistics Society*. 317–332.

Raimy, Eric (1999) *Representing Reduplication*. Ph.D. thesis, University of Delaware.

Raimy, Eric (2000) *The Phonology and Morphology of Reduplication*. Mouton de Gruyter.

Raimy, Eric and William Idsardi (1997) “A Minimalist Approach to Reduplication in Optimality Theory.” In Kiyomi Kusumoto, ed., *Proceedings of NELS*. volume 27.

Regier, Terry (1998) “Reduplication and the Arbitrariness of the Sign.” In Morton Ann Gernsbacher and Sharon Derry, eds., *Proceedings of the Twentieth Annual Conference of the Cognitive Science Society*. 887–892.
**URL:** *http://www.psych.uchicago.edu/ regier/papers/redup-cogsci98.pdf*

Reilly, Ehren (2005) “Choosing Just the Right Amount of Over-application: An Acquisition Puzzle in Texistepec Popoluca.” Presented at the HUMDRUM Conference on Optimality Theory, University of Massachusetts, Amherst.

Richards, Norvin (1997) *What Moves Where and in Which Language.* Ph.D. thesis, Massachusetts Institute of Technology.

Riggle, Jason (2003) “Infixing Reduplication in Pima and Its Theoretical Consequences.” In *Proceedings of LSA 77.*

Riggle, Jason (2004) “Nonlocal Reduplication.” In *Proceedings of NELS*. volume 34.

Riggle, Jason (2006) “Infixing Reduplication in Pima and its Theoretical Consequences.” *Natural Language and Linguistic Theory* 24(3): 857–891.

Rodier, Dominique (1989) “Prosodic Affixation in Kwakiutl.” In *Proceedings of the Annual Meeting of the Eastern States Conference on Linguistics*. volume 6, 218–228.

Rose, Sharon (2003) “Triple Take: Tigre and the Case of Internal Reduplication.” In Richard Hayward, Jamal Ouhalla and Denise Perrett, eds., *Studies in Afroasiatic Grammar*. John Benjamins.

Rose, Sharon and Rachel Walker (2004) “A Typology of Consonant Agreement as Correspondence.” *Language* .

Saba Kirchner, Jesse (2006) “Cleaning Up the Scraps: A New Analysis of Kwakw’ala m’uːt Reduplication.” In Aaron Kaplan and Dave Teeple, eds., *Phonology at Santa Cruz*.

Saba Kirchner, Jesse (2007*a*) “Is Any Theory Enough? Building a Comprehensive Analysis of Dakota Morphophonology.” Unpublished manuscript, University of California, Santa Cruz.

Saba Kirchner, Jesse (2007*b*) “The Phonology of Lexical Underspecification.” Unpublished manuscript, University of California, Santa Cruz.

Samek-Lodovici, Vieri (1992) “Universal Constraints and Morphological Gemination: A Cross-Linguistic Study.” Unpublished manuscript, Brandeis University.

Sankaranarayanan, G. (1982) “Reduplication in Tamil.” *Pàkha Sanjam* 15: 457–464.

Santa Ynez Band of Chumash Indians (2007) *Samala-English Dictionary: A Guide to the Samala Language of the Ineseño Chumash People.* Santa Ynez Band of Chumash Indians.

Saperstein, Andrew (1997) *A Word-and-Paradigm Approach to Reduplication*. Ph.D. thesis, Ohio State University.

Sapir, Edward (1921) *Language.* Harcourt, Brace, and World.

Sapir, Edward (1930) “Southern Paiute, a Shoshonean Language.” *Proceedings of the American Academy of Arts and Sciences* 65: 1–296.

Sapir, Edward (1938) “Glottalized Continuants in Navaho, Nootka, and Kwakiutl.” *Language* 14: 248–274.

Sapir, Edward and Morris Swadesh (1939) *Nootka Texts: Tales and Ethnological Narratives.* Linguistic Society of America.

Sauvageot, Serge (1967) “Note sur la classification nominale en Bainouk.” In *La classification nominale dans les langues Négro-Africaines.* Centre National de la Recherce Scientifique.

Schiffman, Harold F. (1999) *A Reference Grammar of Spoken Tamil.* Cambridge University Press.

Schuh, Russell, Umaru Mamu Goge and Jibir Audu Janga Dole (2009) ““ish” Reduplication in Gudi Ngamo.” In *Topics in Descriptive and African Linguistics: Essays in Honor of Distinguished Professor Paul Newman.* Lincom.

Selkirk, Elisabeth (1984) *Phonology and Syntax: The Relation between Sound and Structure.* MIT Press.

Selkirk, Elisabeth (1986) “On Derived Domains in Sentence Phonology.” *Phonology Yearbook* 3: 371–405.

Seong, Teoh Boon (1994) *The Sound System of Malay Revisited.* Dewan Bahasa dan Pustaka.

Sewid-Smith, Daisy (Mayaniɫ) (1988) *Liq̓ʷala Kʷak̓ʷala Textbook.* School District #72, First Nations Education Department.

Shaw, Patricia (1980) *Theoretical Issues in Dakota Phonology and Morphology.* Garland Publishing.

Shaw, Patricia (1993) “The Prosodic Constituency of Minor Syllables.” In Erin Duncan, Donka Farkas and Philip Spaelti, eds., *Proceedings of WCCFL.* volume 12, 117–132.

Shaw, Patricia (2005) “Non-adjacency in Reduplication.” In Bernhard Hurch, ed., *Studies on Reduplication.* Mouton de Gruyter, 161–210.

Shetler, Joanne (1976) *Notes on Balangao Grammar.* Summer Institute of Linguistics.

Shibasaki, Reijirou (2005) “On the Grammaticalization of Verbal Reduplication in Japanese.” In Bernhard Hurch, ed., *Studies on Reduplication.* Mouton de Gruyter, 283–314.

Sievers, Eduard (1876) *Grundzüge der Lautphysiologie.* Breitkopf und Hartel.

Singh, Rajendra (1982) “On Some ‘Redundant Compounds’ in Modern Hindi.” *Lingua* 56: 345–351.

Singh, Rajendra (2005) “Reduplication in Modern Hindi and the Theory of Reduplication.” In Bernhard Hurch, ed., *Studies on Reduplication.* Mouton de Gruyter, 263–281.

Sloan, Kelly (1988) “Bare-Consonant Reduplication: Implications for a Prosodic Theory of Reduplication.” In Hagit Borer, ed., *Proceedings of WCCFL.* volume 7, 319–330.

Sofu, Hatice (2005) “Acquisition of Reduplication in Turkish.” In Bernhard Hurch, ed., *Studies on Reduplication.* Mouton de Gruyter, 493–509.

Southern, Mark (2005) *Contagious Couplings: Transmission of Expressives in Yiddish Echo Phrases.* Praeger.

Spaelti, Philip (1999) *Dimensions of Variation in Multi-Pattern Reduplication.* Ph.D. thesis, University of California, Santa Cruz.

Spencer, Andrew (1991) *Morphological Theory.* Cambridge University Press.

Spencer, Andrew (1998) “Morphophonological Operations.” In Andrew Spencer and Arnold M. Zwicky, eds., *The Handbook of Morphology*. Blackwell, 123–143.

Sprague, Colin (2005) “A Constraint Based Account of Floating Morae.” Paper given at LSA 2005. **URL:** *http://home.uchicago.edu/˜sprague/docs/lsa_2005.pdf*

Stampe, David (1973) *A Dissertation on Natural Phonology.* Ph.D. thesis, University of Chicago.

Stonham, John (1994) *Combinatorial Morphology.* John Benjamins.

Stonham, John (1999) *Aspects of Tsishaath Nootka Phonetics & Phonology.* Lincom Europa.

Stonham, John (2004) *Linguistic Theory and Complex Words.* Palgrave Macmillan.

Stonham, John (2007) “Nuuchahnulth Double Reduplication and Stratal Optimality Theory.” *Canadian Journal of Linguistics/Revue canadienne de linguistique* 52: 105–130.

Struijke, Caro (1998) “Reduplicant and Output TETU in Kwakwala.” In Haruka Fukuzawa, Frida Morelli, Caro Struijke and Yi-Ching Su, eds., *University of Maryland Working Papers in Linguistics.*

Struijke, Caro (2000) *Existential Faithfulness: A Study of Reduplicative TETU, Feature Movement, and Dissimilation.* Ph.D. thesis, University of Maryland.

Sweetser, Eve (1991) *From Etymology to Pragmatics: Metaphorical and Cultural Aspects of Semantic Structure.* Cambridge University Press.

Taneri, Mübeccel (1990) “A Type of Reduplication in Turkish.” In *Kansas Working Papers in Linguistics*. volume 15.

Thurgood, Elzbieta (1997) “Bontok Reduplication and Prosodic Templates.” *Oceanic Linguistics* 135–148.

Tiwary, K. M. (1968) “The Echo-Word Construction in Bhojpuri.” *Anthropological Linguistics* 10(4): 32–38.

Travis, Lisa (2001) “The Syntax of Reduplication.” In *Proceedings of NELS*. volume 31.

Trefry, David (1970) “The Phonological Word in Dieri.” In Donald Laycock, ed., *Linguistic Trends in Australia.* Australian Institute for Aboriginal Studies, 65–73.

Trivedi, G. M. (1990) “Echo Formation.” In Shree Krishan, ed., *Linguistic Traits Across Language Boundaries (A Report of All India Linguistic Traits Survey)*. Director General, Anthropological Survey of India.

Tuggy, David (2003) “Reduplication in Nahuatl: Iconicities and paradoxes.” In Eugene Casad and Gary Palmer, eds., *Cognitive Linguistics and Non-Indo-European Languages.* Mouton de Gruyter.

Um, Hye-Young (2001*a*) “Laryngeal Segments and Laryngeal Neutralization.” *Studies in Phonetics, Phonology and Morphology* 6.

Um, Hye-Young (2001*b*) “Typology of Glottalized Sonorants: Distributional Patterns and Phonetic Explanations.” *Studies in Phonetics, Phonology and Morphology* 7(2): 333–352.

Urbanczyk, Suzanne (1996) *Patterns of Reduplication in Lushootseed.* Ph.D. thesis, University of Massachusetts, Amherst.

Urbanczyk, Suzanne (1998) “A-templatic Reduplication in Halq’eméylem.” In Kimary Shahin, Susan Blake and Eun Sook Kim, eds., *Proceedings of WCCFL.* volume 17, 655–669.

Urbanczyk, Suzanne (1999) “Double Reduplications in Parallel.” In Rene Kager, Harry van der Hulst and Wim Zonneveld, eds., *The Prosody-Morphology Interface.* Cambridge University Press, 390–428.

van Oostendorp, Marc (2006) “A Theory of Morphosyntactic Colours.” Unpublished manuscript, Meertens Institute, Amsterdam.
**URL:** *http://egg.auf.net/06/docs/Hdt Oostendorp coulours. pdf*

Voegelin, Charles (1935) “Tübatulabal Grammar.” *University of California Publications in American Archaeology and Ethnology* 34: 55–190.

Voegelin, Charles Frederick (1962) *Typological and Comparative Grammar of Uto-Aztecan*, volume 17 of *Indiana University Publications in Anthropology and Linguistics.* Waverly Press.

Vogel, Irene Barrie (1977) *The Syllable in Phonological Theory, with Special Reference to Italian.* Ph.D. thesis, Stanford.

Vu, Sonny X. (1998) “A Unified Analysis of Some Vietnamese Reduplication Forms.” In Mark Alves, Paul Sidwell and David Gil, eds., *Papers From the Eighth Annual Meeting of the Southeast Asian Linguistics Society.* 165–191.

Walker, Rachel (1998) “Minimizing RED: Nasal Copy in Mbe.” ROA 264.

Walker, Rachel (2000*a*) “Long-distance Consonantal Identity Effects.” In Roger Billerey and Brook Danielle Lillehaugen, eds., *Proceedings of WCCFL.* volume 19, 532–545.

Walker, Rachel (2000*b*) “Yaka Nasal Harmony: Spreading or Segmental Correspondence?” In Lisa Conathan, Jeff Good, Darya Kavitskaya, Alyssa Wulf and Alan Yu, eds., *Proceedings of BLS.* volume 26, 321–332.

Walker, Rachel and Bella Feng (2004) “A Ternary Model of Morphology-Phonology Correspondence.” In Vineeta Chand, Ann Kelleher, Angelo J. Rodríguez and Benjamin Schmeiser, eds., *Proceedings of WCCFL.* Cascadilla Press, volume 23.

Wedel, Andy (1999) “Turkish Emphatic Reduplication.” Unpublished manuscript, University of California, Santa Cruz.

Wedel, Andy (2000) “Perceptual Distinctiveness in Turkish Emphatic Reduplication.” In *Proceedings of WCCFL*. volume 19, 546–559.

Wilbur, Ronnie Bring (1973) *The Phonology of Reduplication*. Ph.D. thesis, University of Illinois at Urbana-Champaign.

Wilkinson, Karina (1988) “Prosodic Structure and Lardil Phonology.” *Linguistic Inquiry* 19: 325–334.

Williams, Jeffrey (1991) “A Note on Echo Word Morphology in Thai and the Languages of South and South-East Asia.” *Australian Journal of Linguistics* 11: 107–111.

Wilson, Stephen (1986) “Metrical Structure in Wakashan Phonology.” In Vassiliki Nikiforidou, Mary VanClay, Mary Niepokuj and Deborah Feder, eds., *Proceedings of BLS*. volume 12, 283–91.

Winter, Werner (1970) “Reduplication in Washo: A Restatement.” *International Journal of American Linguistics* 36: 190–198.

Wolf, Matthew (2006) “For an Autosegmental Theory of Mutation.” ROA 754-0705.

Wolf, Matthew (2008) *Optimal Interleaving: Serial Phonology-Morphology Interaction in a Constraint-Based Model*. Ph.D. thesis, University of Massachusetts Amherst.

Yip, Moira (1982) “Reduplication and C-V Skeleta in Chinese Secret Languages.” *Linguistic Inquiry* 13: 637–661.

Yip, Moira (1993) “Identity Avoidance in Phonology and Morphology.” Unpublished manuscript, Rutgers Optimality Archive.

Yip, Moira (1996) “Repetition and its Avoidance: The Case of Javanese.” Unpublished manuscript, Rutgers Optimality Archive.

Yip, Moira (1998) “Multiple System of Reduplication in a Single Language: A Markedness Account.” Talk delivered at Oxford University.

Yu, Alan (2000) “Stress Assignment in Tohono O’odham.” *Phonology* 17: 117–135.

Yu, Alan (2005) “Toward a Typology of Compensatory Reduplication.” In John Alderete, ed., *Proceedings of WCCFL*. Cascadilla Press, volume 24, 397–405.

Yu, Alan (2008) “Two Patterns of Reduplication in Washo.” In *Proceedings of BLS*. volume 34.

Zec, Draga (1994) *Sonority Constraints on Prosodic Structure*. Garland Publishing.

Zepeda, Ofelia (1983) *A Papago Grammar*. University of Arizona Press.

Zuraw, Kie (2003) “Aggressive Reduplication.” *Phonology* 19(3): 395–439.

Zwicky, Arnold (1984) “Autonomous Components and Limited Interfacing: Phonology-Free Syntax, the Hallean Syllogism, and Their Kin.” In Joseph Drogo, Veena Mishra and David Testen, eds., *Proceedings of CLS*. volume 20.

Zwicky, Arnold (1987) “Phonologically Conditioned Agreement and Purely Morphological Features.” Technical report, University of California, Santa Cruz, Syntax Research Center. Report SRC-87-06.

Zwicky, Arnold (1992) “Some Choices in the Theory of Morphology.” In Robert Levine, ed., *Formal Grammar: Theory and Implications*.

Zwicky, Arnold and Geoff Pullum (1986*a*) “The Principle of Phonology-Free Syntax: Introductory Remarks.” *Ohio State Working Papers in Linguistics* 32: 63–91.

Zwicky, Arnold and Geoff Pullum (1986*b*) “Two Spurious Counterexamples to the Principle of Phonology-Free Syntax.” *Ohio State Working Papers in Linguistics* 32: 92–99.

Zwicky, Arnold and Geoff Pullum (1988) “The Syntax-Phonology Interface.” In Frederick Newmeyer, ed., *Linguistics: The Cambridge Survey*.