ASYMMETRIC ANCHORING

by

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ABSTRACT OF THE DISSERTATION

Asymmetric Anchoring

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In this dissertation I reveal an inherent asymmetry in the grammar regarding faithfulness constraints across representations; only left edge anchoring constraints are necessary. Anchoring constraints are, I argue, Positional Faithfulness constraints, and the asymmetry is grounded in the type of psycholinguistic privilege commonly associated with initial position. Reduplicative morphemes furthermore are positioned by anchoring and locality alone.

Several encouraging predictions result from this Positional Anchoring proposal. Most importantly, reduplication or truncation that does exhibit right edge correspondence

with the base must be compelled; in terms of edge correspondence, only left edge correspondence can function as the default. Second, violation of Marantz's Generalization cannot be required merely in order to satisfy reduplicant alignment constraints. In addition, a system may allow a reduplicant to alternate between left and right edges of a stem, as dictated by other constraints in the language. I argue that Lakhota exhibits just such a pattern.

Several questions arise from proposal. The first involves cases where the segment near but not at the left edge of the relevant morpheme is the one targeted. I propose a system of base formation that leads such "gradient" cases to involve copying of the segment that indeed stands at the left edge of the base, as the base is constructed by independent constraints. The dramatic case of Bella Coola is used to illustrate the proposed system.

Some cases of apparent right edge copying support a novel constraint, EDGE-ANCHOR, which targets segments at both edges of the main stressed foot of the base, which may or may not be coextensive with morpheme edges. Data from Semai, Ulu Muar Malay, Dutch, Tagalog, Yidiɲ, and Makassarese are examined in this light.

Additional apparent counter-examples involve stressed syllable copying. Several examples, including data from Nancowry, French, and Lakhota illustrate that a main stressed syllable target offers a superior explanation of the attested patterns.

Finally, other apparent counter examples are argued not to involve reduplication at all. Rather, these examples show augmentation to a requisite size by means of copying.

The examples are taken from Tzotzil, Tzeltal, and Yoruba. An augmentation analysis is independently motivated for each, offering further support for the more restrictive theory of asymmetric anchoring.

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CHAPTER 1

INTRODUCTION TO POSITIONAL ANCHORING

1.1 Introduction

One of the central findings of prosodic morphology is that it is necessary to refer to edges and stressed syllables in order to account for the behavior of reduplication, truncation, and infixation. In this dissertation, I further note that left and right edges demonstrate an asymmetry cross-linguistically that is not witnessed in fixed-segment affixation. Whereas suffixing appears to be the unmarked mode with fixed-segment affixes (Hawkins & Cutler 1988, e.g.), reduplicative affixes typically appear before the related base. In other words, we find comparatively few instances of right edge correspondence in so-called suffixing reduplication, for example in hypothetical *badupi*$_6$-*pi*$_6$. A wide survey of the literature (including the main sources Key (1965), Moravcsik (1978), Marantz (1982), McCarthy & Prince (1996), and Weeda 1992)) suggests that left edge preservation of the base in these processes is notably more prevalent (31 right edge vs. 64 left edge cases in Key and Moravcsik's reduplication examples; 5 right edge vs. 15 left edge cases in Weeda's templatic truncation examples).[1] Right edge preservation however is not only undeniably less common; I argue here that all cases that seem to involve targeting of the right edge are only apparent counter-examples to the proposed asymmetry. When taken as a group, it becomes striking that right edge copying can be

[1] The number for right edge cases given is a worst-case scenario for the proposed theory, as it includes any example that the author characterized as copying right edge material. However examination of Appendix A, which lists all cases of right edge copying in these studies that are not addressed in the text of this dissertation, will show that several of these cases appear to be templatic, and thus not even reduplication, *per se*. In Weeda's right edge cases, each was qualified as "uncertain", "few examples and idiosyncratic", or else "tentative".

contingent on some other process, e.g. targeting of the stressed syllable. The position advanced here is thus that "suffixing" reduplication can only occur by accident, when other constraints conspire to leave final position as the best position for the reduplicative morpheme. Cases of truncation to right edge base material are taken to be similarly contingent on other factors. Motivation for a left edge bias is argued to fall naturally from the theory of Positional Faithfulness (Beckman 1998).

This proposal of underlying asymmetry goes against the common assumption in the literature that association of reduplicative or truncating morphemes to a related base can begin at either the left or the right edge, as prescribed by the grammar (Marantz 1982, McCarthy & Prince 1996, Weeda 1992). Examples showing left and right edge correspondence between the base and the reduplicative morpheme (RED) or the truncating morpheme follow.

(1) Left edge examples: Reduplication

a. Tohono O'odham (Papago) plural (Moravcsik 1978)

kuna	kuu-kuna	'husband'[2]
paga	paa-paga	'hole'

b. Gokana gerundive (Hyman 1982)

dɔ	dɔ-dɔ̀	'fall'
darà	da-darà	'pick up'
pìiga	pi-pììgà	'try'

[2] In most examples, the orthography used is the one found in the sources cited in examples. Phonetic interpretation is included where necessary for the discussion. Transcription is modified in some cases, where I have substituted a more common symbol, or standardized in the case of multiple sources for the same language. Tone markings have been left out in some examples when it is not central to the problem under discussion.

c. Agta plural (Moravcsik 1978)

takki	tak-takki	‘leg’
uffu	uf-uffu	‘thigh’

(2) Left edge examples: Truncation

a. French (Weeda 1992, Scullen 1993)

sympathique	sympa	‘nice’
adolescent	ado	‘adolescent’
faculté	fac	‘university’

b. Japanese loan word truncation (Itô 1988, Weeda 1992)

anauNsa	ana	‘announcer’
anaakisto	ana	‘anarchist’
konekushoN	kone	‘connection’

c. Swedish nicknames (plus *-is* suffixation) (Weeda 1992:121)

alkoholist	alkis	‘alcoholic’
daːghem	daːgis	‘day care center’
laboratoriːum	labbis	‘lab’

(3) Right edge examples: Reduplication

a. Siriono continuative (Key 1965)

erasi	erasi-rasi	‘he is sick’
ečisia	ečisia-sia	‘he cuts’
ea^{n}du	ea^{n}du-a^{n}du	‘he listens’

b. Karuk derived intensive verb (Marantz 1982)

tasir̃	tasin-sir̃[3]	‘to brush/ to brush (repeatedly)’
parak	parak-rak	‘to separate with a wedge/ to split logs with wedges’

[3] *r̃* is a morpho-phoneme that nasalizes to *n* before a consonant.

c. Yoruba ideophones (Awoyale 1989)

rogodo	rogodo-<u>do</u>	‘being very round and small’
gɛ̀gɛ̀rɛ̀	gɛ̀gɛ̀rɛ̀-<u>rɛ̀</u> (~gɛ̀gɛ̀rɛ̀-<u>gɛ̀</u>)	‘being very stout and bulky’

(4) Right edge examples: Truncation

a. Catalan hypocoristics (Cabré & Kenstowicz 1995)

Ambros	Bros
Salvador	Vador
Elizenda	Zenda
Margalida	Lida

b. Madurese (Stevens 1968, McCarthy & Prince 1996)

duwaʔ	waʔ	‘two’
enghi	ghi	‘yes’
uriŋ	riŋ	‘person’

c. English

magazine	zine
parents	rents
pizza	za

Although examples such as these seem to demonstrate symmetry in the grammar, a cross-linguistic study of right edge cases in particular reveals a hidden dependency. The characterization of these cases as demonstrating a right edge bias is shown to be superficial; right edge association is merely a side effect of another independent process. Often, a right edge target is attributed to a right edge stress system.[4] In other cases, I argue that what we see is not morphological reduplication, but rather augmentation to fit a template. Apparent counter-examples will be the focus of Chapter 4.

[4] The only alternative to right edge targeting considered seriously here is stress, however it is certainly possible that other qualities that are characteristic of “privilege” in the relevant sense (e.g. final syllable vowel length, cf. Barnes 2000) could force parasitic right edge reduplication or truncation.

As mentioned above, the asymmetry in reduplication and truncation is argued to fall from the theory of Positional Faithfulness (Beckman 1998). Beckman showed that positions that were either "acoustically prominent" (stressed) or "psycholinguistically prominent" (morpheme-initial, part of the root) could be singled out by specialized Positional Faithfulness constraints (e.g. FAITH ONSET, FAITH(root), etc.). The constraints coexist with the general faithfulness constraints that target all segments equally. The theory of Positional Faithfulness was developed to account for the preservation of contrasts in privileged positions while contrasts may be neutralized in non-privileged positions.

In reduplication, the relevant kind of faithfulness constraint is one that requires correspondence between the targeted position in the base and the segment standing in the same position in the reduplicant.[5] McCarthy & Prince (1993a, 1995a,b) call this constraint ANCHOR:

(5) LEFT-ANCHOR (Base, Reduplicant): The left edge of the reduplicant corresponds to the left edge of the base.

In the literature, it is assumed that the left and right edge are each the subject of an independent anchoring constraint. In line with the research in Positional Faithfulness, I argue against the common assumption that a RIGHT-ANCHOR constraint exists in the grammar. Rather, the observed asymmetry is due to an asymmetry in the constraints themselves. Thus, whereas the left edge can be targeted outright, the right edge cannot. I call this proposal "Positional Anchoring".

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[5] Given the parallel nature of reduplication and truncation, all claims that refer to one should be taken to hold of the other unless explicitly noted.

1.2 Positional Anchoring

ANCHOR constraints (McCarthy & Prince 1993a, 1995a,b) are used to determine which edge of the base of reduplication will be in correspondence with the reduplicative morpheme, as in (5) above.

I assume that, rather than positing mirror anchoring constraints in the grammar, only the left edge can be targeted. Under the Positional Anchoring view, anchoring then targets only "privileged" positions.

(6) Positional Anchoring:
   a. Anchoring can target the *initial* position (important for root access).
   b. Anchoring can target a *stressed* position (acoustically prominent).
   c. The right edge does not qualify as a target for anchoring.

This theory of partial reduplication exclusively singles out these privileged positions, in the same way that other Positional Faithfulness constraints are relativized to apply to only such targets.

The base-reduplicant faithfulness constraint that targets stressed syllables is the following:[6]

(7) MAX-σ́ (Base, Reduplicant): Each segment in the main stressed syllable of the base must have a correspondent in the reduplicant.

The chart below is idealized according to the constraints above, (namely LEFT-ANCHOR and MAX-σ́). It shows what is actively targeted for copying.

[6] Later (Chapter 4), I argue that this faithfulness constraint targets the main stressed *rhyme*.

(8) Anchoring can cause copying of material in the following combinations:

Copying of the:		*reduplication*	*(templatic) truncation*
Left edge	with initial stress:	Diyari **tʲilpa-tʲilpa**rku 'catfish'	Hungarian **ɛ́rš**ebɛt/**ɛ́rši** hypocoristic
	without initial main stress:	Tagalog **da-da**lawá 'only two'	French **karo**lín/**karó** hypocoristic
Right edge	with final stress:	Manam mala**bóm-boŋ** 'flying fox'	Catalan səl**βəðó**/**βəðó** hypocoristic
	without final stress:	see Appendix B	see Appendix C
Stressed syllable	not necessarily at edge:	Samoan ga-**lu-lúe** 'work' non-erg. pl.	English rə**bɛ́k**ə/**bɛ́ki** hypocoristic

What this system rules out is explicit targeting of an unstressed right edge. For example:

(9) a. Reduplication: $\acute{\sigma}\sigma\sigma \rightarrow *\acute{\sigma}\sigma\sigma_3\text{-}\sigma_3$, mámbodin → *mámbodin-din
    b. Truncation example: $\acute{\sigma}\sigma_2\sigma_3 \rightarrow *\sigma_2\sigma_3$, Cánada → *Náda

That is, the Positional Anchoring Hypothesis rules out: a) reduplication of non-positional ("non-prominent") material, and b) truncation of more prominent material.

An additional constraint that enforces locality is needed in any analysis of reduplication:

(10) LOCALITY: The copied portion of the base and the corresponding reduplicant must be adjacent (cf. Marantz 1982, Yip 1988, McCarthy & Prince 1993b, 1995a, Urbanczyk 1996, 2000, Hogoboom 2002, Riggle 2002).[7]

In the following formalization of locality, violations are assigned for each segment that intervenes between base and reduplicant such that the segment in question is not itself copied: [8]

[7] Locality is of course trivially irrelevant in the case of truncation.

(11) Let $A = \langle a_1, \ldots a_{r1}, \ldots a_{rk}, \ldots a_n \rangle$ be a string of the language L, where $r_1 \geq 1$ and $r_k \leq n$. (Intuitively, $a_{r1}, \ldots a_{rk}$ is a subsequence of A that occurs *somewhere* in A).

LOCALITY (formal): If A′ is an expression in which $a_{r1}, \ldots a_{rk}$ is a reduplicant, then $A' = \langle a_1, \ldots a_{r1}, \ldots a_{rk}, a_{r1}, \ldots a_{rk}, \ldots a_n \rangle$.

If B is an expression in which $a_{r1}, \ldots a_{rk}$ is reduplicated *not* in accordance with LOCALITY, then B must have the form:

$$B = \langle a_1, \ldots \underbrace{a_{r1}, \ldots a_{rk},}_{\textbf{\textit{Base}}} \underbrace{a_{e1}, \ldots a_{ej}}_{\textbf{\textit{extra}}},\ \underbrace{a_{r1}, \ldots a_{rk},}_{\textbf{\textit{RED}}} \ldots a_n \rangle$$

OR

$$B = \langle a_1, \ldots \underbrace{a_{r1}, \ldots a_{rk},}_{\textbf{\textit{RED}}} \underbrace{a_{e1}, \ldots a_{ej}}_{\textbf{\textit{extra}}},\ \underbrace{a_{r1}, \ldots a_{rk},}_{\textbf{\textit{Base}}} \ldots a_n \rangle$$

This definition of locality and its violation will apply regardless of whether copying is motivated by morphological reduplication or by some other means, e.g. augmentation.

1.3 RED placement

How is RED positioned in the output? Marantz (1982), building off of McCarthy (1979), proposed that the RED morpheme is merely a segmentally empty affix that is attached to the left or right edge of a stem in the same manner as fixed-segment affixes. Marantz observed that transformation rules were too powerful, capable of expressing rules not found in any language. A striking example is illustrated with the "mirror-image" reduplication rule below (Marantz's (3)):

(12) a. $C_1V_1C_2V_2 + V_2C_2V_1C_1$
b. CVCV
1 2 3 4 $\rightarrow$ 4, 3, 2, 1, 1, 2, 3, 4

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[8] Thanks to Kent Johnson for help with this formalization.

In order to rule out the over-generation of reduplication systems caused by transformation rules, Marantz proposes that reduplication is simply affixation. Thus, just like fixed-segment affixation, it is the result of affixation of a C-V skeletal morpheme to a stem. The only difference is the lack of pre-specification of segmental content. In reduplication, the C-V morpheme associates with a copy of the stem's phonemic melody. McCarthy & Prince (1996) further propose that reduplicative affixes must be selected from the units of prosody; they could not be any arbitrary conglomeration of Cs and Vs.

The analysis here takes a different tack. RED morphemes are not placed at one edge or the other, but rather they appear there by default, to satisfy anchoring, as well as locality. This goes against the standard method of placing RED via alignment constraints, with RED being aligned to one edge of the stem or the other:

(13) Alignment of affixes (McCarthy & Prince 1993a:24)

a. Prefix: ALIGN (*affix*, L, *stem*, L).
b. Suffix: ALIGN (*affix*, R, *stem*, R).

The asymmetric approach derives the well-known tendency for reduplicants to occur to the left of roots, even in languages that allow no fixed-segment prefixes (e.g. Turkish). Under this theory, reduplicative morphemes are positioned by locality and anchoring alone. Turkish then shows the ideal state; this distribution of affixes is not merely a coincidence.

For the sake of this dissertation, I assume that fixed segment affixes are placed by alignment constraints such as the ones in (13). However, this leaves the link between left anchoring of the root and the preference for suffixing of fixed segment affixes to be elusive. Perhaps a better solution lies in the adoption of the theory of Horwood (2002), which offers a proposal in which affixes are ordered by (violable) precedence requirements given in the input. As pointed out by Alan Prince (p.c.), Horwood's theory also may entail that RED is not explicitly placed, as its segments would share indices with the base, and thus in Horwood's theory not fall under any precedence requirement. Rather, as with the proposed system, the position of RED would be left to other constraints in the grammar.

Section 1.3.1 reviews the theory-internal benefits to these assumptions regarding RED-placement. The independent advantages to this theory are outlined in §§1.3.2-1.3.5.

1.3.1 ALIGN RIGHT plus locality

Doing away with constraints that explicitly align RED to one edge of the stem or the other eliminates the typological prediction that locality would ever be systematically violated to satisfy ANCHOR and RED-alignment. (15) shows that if LOCALITY were ranked low enough, both ANCHOR and an opposite edge alignment constraint would be satisfied by a viable candidate (15d).

(14) a. IO-CONTIGUITY: Output corresponds to a contiguous substring of the base.
b. ALIGN-RIGHT (RED, Stem): RED is rightmost in the stem.

(15) Typology (not a tableau)

	LEFT-ANCHOR	IO-CONTIGUITY	ALIGN-R (RED, Stem)	LOCALITY
a. badupi-<u>pi</u>	*			
b. badu-<u>pi</u>-pi		*	**	
c. <u>ba</u>-badupi			******	
d. badupi-<u>ba</u>				****

If no alignment constraint however were in fact working against the asymmetric anchoring constraint, then the LOCALITY-violating candidate is harmonically bounded, as shown in (16).

(16) Primacy of left edge copying

	LEFT-ANCHOR	IO-CONTIGUITY	LOCALITY
a. ✗badupi-<u>pi</u>	*		
b. ✗badu-<u>pi</u>-pi		*	
c. <u>ba</u>-badupi			
d. ✗badupi-<u>ba</u>			****

This is not to say that we never see winning candidates that look like (16a,b,d). However if we do, then some additional constraint (e.g. MAX-σ́) or set of constraints (see the next sub-section) are necessarily at work.

1.3.2 Marantz's Generalization

So-called "wrong side" reduplication is typically taken to be a marked universal option. Marantz (1982:447) claims, "In the unmarked case, reduplicating prefixes associate with their melodies from left to right, reduplicating suffixes from right to left". He also notes that in marked instances, association can begin from the opposite edge of the base to which the reduplicative morpheme is affixed. I draw together all of the possible examples of this marked phenomenon known to me. For each case, I offer evidence that the wrong side placement of the reduplicative morpheme is an epiphenomenon, and thus not required by the grammar to explicitly violate Marantz's Generalization. Examples of purported violations follow (the reduplicant is underlined; the portion of the base in correspondence with the reduplicant is in bold):

(17) Wrong side prefixing

a. Madurese plural (Stevens 1968, McCarthy & Prince 1996)

/neat/	ỹãt-nẽ**ỹãt**	'intentions'
/moa/	w̃ã-mõ**w̃ã**	'faces'

b. Ulu Muar Malay (Hendon 1966)

putɪh	tɪh-pu**tɪh**	'no matter how white'
on**toʔ**	toʔ-on**toʔ**	'without making any sound'

c. Indonesian reflexive (adds prefix *meN-* as well; Uhrbach 1987, Sneddon 1996:104)

pukul	pukul-me**mukul**	'hit'
tikam	tikam-me**nikam**	'stab'

d. Nancowry (Radhakrishnan 1981)

rom	ʔum-r**om**	'flesh of fruit/to eat pandarus fruit'
ɲiak	ʔuk-ɲ**iak**	'binding/to bind'

(18) Wrong side suffixing

a. Chukchee singular absolutive (Krause 1980)

/piŋe/	**piŋ**e-piŋ	'falling snow'
/jilʔe/	**jil**ʔe-jil	'gopher'

b. Yoruba ideophones (Awoyale 1974, 1989, 2000)

gɛ̀gɛ̀rɛ̀	**gɛ̀**gɛ̀rɛ̀-gɛ̀	'of being very stout and bulky'
pepere	**pe**pere-pe	'of being very cute and robust'

c. Tzeltal repeated action (adds suffix *-u* as well; Berlin 1963)

b'ah	**b'**ah-b'u	'to strike with a hammer'
t'aš	**t'**aš-t'u	'to strike with open hand'

d. Tillamook plural or continuative (Reichard 1959)

tq	dæš q̲-tə́**q**-ən	‘break/they tried to break it’
æš	š̲-á**š**-un	‘hold/he is holding it’

Descriptively, all cases of course violate the generalization. However, the question is whether wrong side reduplication can be directly flouted by a grammar. I suggest that all of the discovered cases that superficially exhibit this behavior submit to alternative, independently motivated analyses.

The alternative explanations for the apparent violations fall into three sub-groups. The first is a group that exhibits undue sensitivity to the make-up of the base.

1.3.2.1 Base sensitivity

In these cases, the reduplicant exhibits sensitivity to the base that would go unexplained if the pattern merely involved blind affixation of the reduplicative morpheme to the opposite edge of the base to which association/correspondence was anchored (Nancowry, Chukchee, Yoruba, Tzeltal). In all of these cases, if wrong-side reduplication were the primary objective of the pattern, then the issues highlighted here should not matter. Suggestions are made in each case regarding the direction of the correct analysis; when a more thorough account is offered later in the dissertation, the relevant section is indicated.

The first example comes from Nancowry, repeated below:

(19) Nancowry (Radhakrishnan 1981, Alderete et al. 1999, Nelson 2000)

rom	ʔu̲m̲-r**om**	‘flesh of fruit/to eat pandarus fruit’
ɲiak	ʔu̲k̲-ɲ**iak**	‘binding/to bind’

Reduplication only occurs when the base is monosyllabic:

(20)	Monosyllabic roots:	ʔVC$_n$-CV́C$_n$	(e.g. *ʔit-sút*)
	Disyllabic roots:	*ʔVC$_n$-σCV́C$_n$	(e.g. **ʔin-siʔún*)

Nelson (2000) argues that this is really a case of *stressed rhyme* reduplication, not wrong-side reduplication. The rhymes are adjacent at the level of the rhyme, and in this sense copying is local. This case is discussed further in Chapter 4.

The next set of examples comes from Chukchee.

(21) Chukchee (Krause 1980, Marantz 1982)

/piŋe/	**piŋ**e-<u>piŋ</u>	'falling snow'
/jilʔe/	**jil**ʔe-<u>jil</u>	'gopher'

Reduplication only occurs with a relatively small subset of the possible root shapes: CVC, (C)VCV, (C)VCC, and (C)VCCV. Reduplication is never found in roots of the following shapes: CVV, CVVC, CCVC, CVCVC, CVVCV, VCCVC, etc. The shapes that do undergo the reduplication are "uniquely those bases whose morpheme-final sequences would be predicted to undergo the word-final phonological mutations of final vowel reduction and/or schwa apocope and/or final epenthesis if left unaffixed". (Krause 1980:157). Krause himself characterizes the pattern as "not so much morphological as it is phonologically protective in nature" p. 157.

The Yoruba examples have not yet been presented in the literature as potential wrong-side cases; the data follow:

(22) Yoruba ideophones (Awoyale 1974, 1989, 2000)

gɛ̀gɛ̀rɛ̀	**gɛ̀**gɛ̀rɛ̀-gɛ̀	‘of being very stout and bulky’
pepere	**pe**pere-pe	‘of being very cute and robust’

The shape of ideophones that appear to undergo wrong-side reduplication is quite restricted (penultimate onset is always *r*; the first two syllables are always identical). Also, the outcome is always four syllables. It is important to note the impossibility of wrong-side reduplication in other forms: *pogodo-do (****po**godo-po)* ‘being completely used up’ *; fágádá-dá (****fá**gádá-fá)* ‘being totally wiped off’. In Chapter 4, I argue that the Yoruba case in fact involves no reduplicative morpheme, but rather copying to fulfill an imposed template.

The final two cases in this category are marginal, but are included for the sake of completeness. The first is Tzeltal:

(23) Tzeltal (Berlin 1963, McCarthy & Prince 1996)

b’ah	**b’**ah-b’u	‘to strike with a hammer’
t’aš	**t’**aš-t’u	‘to strike with open hand’

McCarthy & Prince (p. 74) suggest that this “is a case of total root reduplication in which material other than the initial consonant is fixed (prespecified)”. Alternatively, it could be fixed segment suffixing with spreading of the onset to fill this slot.

The last case is Tillamook:

(24) Tillamook plural or continuative (Reichard 1959)

tq	dæš q-tə́**q**-ən	‘break/they tried to break it’
æš	š-á**š̆**-un	‘hold/he is holding it’

Root size in this Northwest Coast language is so restrictive that no other consonant appears to be available to form a non-geminating C- reduplicant. Of this pattern, McCarthy & Prince aptly say it “is so poorly described and inconsistent that a number of plausible alternatives (like cluster simplification) simply cannot be tested”.

1.3.2.2 Deletion

The second subgroup consists of Madurese and the related language Ulu Muar Malay.

(25) Madurese and Ulu Muar Malay

a. Madurese plural (Stevens 1968, McCarthy & Prince 1996)

/neat/	ỹãt-nẽ**ỹãt̃**	‘intentions’
/moa/	w̃ã-mõ**w̃ã**	‘faces’

b. Ulu Muar Malay (Hendon 1966)

putɪh	tɪh-pu**tɪh**	‘no matter how white’
ontoʔ	toʔ-on**toʔ**	‘without making any sound’

In these cases, wrong side reduplication results from the regular application of deletion that occurs to the first syllable of a compound, e.g. *tuzhuʔ*, *zhuʔ-ənpul* ‘pinky’ (‘finger’ + ‘pinky’). The deletion is also found in word shortenings; of these, Hendon says “The shorter alternant occurs optionally when the word does not bear stress in these cases”. Of course, a wrong side reduplication analysis and a first syllable deletion analysis diverge in the case of bases larger than two syllables. However, any word larger than two syllables that I found to undergo this process contained an infix, such as -*ar*-, e.g. *dus-garadus*, thus preserving the ambiguity; no data firmly prove or disprove either approach.

Given the lack of extreme cases in *any* examples of wrong side reduplication (e.g. hypothetical *pik-mambodu**pik***), I assume that this gap is further evidence in favor of dependence of the type suggested here. That is, such a long-distance wrong-side example is impossible when wrong-side reduplication is strictly an epiphenomenon (and no independent process compels it).

1.3.2.3 Total reduplication followed by affixation

In Indonesian, prefixation of transitivity-emphasizing *meN-* to the base of reduplication occurs after total reduplication of the root morpheme.

(26) Indonesian reflexive (adds prefix *meN-* as well; Uhrbach 1987, Sneddon 1996:104)

pukul	pukul-me**mukul**	'hit'
tikam	tikam-me**nikam**	'stab'

These examples are shown to contrast with ones like *meŋ-urut-urut*, 'stroke repeatedly', in which the action is non-reciprocal. This pattern requires more investigation; Uhrbach (1987) observes that all related languages that exhibit the *pukul-me**mukul*** type of reduplication also have a pattern with total reduplication where the prefix occurs initially. Tentatively, I suggest that in these examples, the input consists of a form that has already undergone total reduplication. Thus, the relevant correspondence constraints are not between base and reduplicant, but rather between outputs.

(27) Constraints:

*NC̥: A voiceless consonant must not follow a nasal. (Pater 1996)
IDENT-OO: Corresponding segments in the output base and the affixed form must agree in nasality (cf. Benua 1997).
ALIGN (məN, R, root, L): *məN*- must prefix to the root.

(28) (Root is italicized)

[pukul-*pukul*], məN	*NC̥	ALIGN (*məN*, R, root, L)	IDENT-OO
a. ☞pukul-mə*mukul*			*
b. pukul-məN*pukul*	*!		
c. məmukul-*mukul*		*!	**
d. mukul-mə*mukul*			**!
e. pukul-*pukul*-məN		*!	

The issue of adjacency is thus moot, as it was satisfied at the time of reduplication.

If the restriction that no wrong side reduplication *per se* exists is indeed correct typologically, then it eliminates a large class of sources of locality violations, that is, violations of an adjacency requirement between base and reduplicant, namely the class predicted to be impossible in this theory. The remaining non-local cases are a subset of ones where the onset is simplified (e.g. *stambh/ta-**stá**mbh-a* Sanskrit perfect full grade 'leap' (Steriade 1988)), or where foot structure restrictions imposed on the derived form shapes the word (e.g. West Tarangan *tar**pu**ran*, (Moore 1996)). These are forced by markedness concerns that, if given priority, have no other choice but to oblige non-adjacency of the base and reduplicant. Shaw (1987) examines additional cases (Nisgha and Ewe). If the claim that wrong edges cannot be actively used to violate Marantz's Generalization is correct, and the generalization is only surface-false in cases where an independent requirement causes the contravention, then the typological expectations are beneficially minimized under the proposed theory.

1.3.3 Anticipated gap

A gap that is anticipated in the current theory is borne out. Whereas there are numerous examples of languages where reduplicants anchor to the left edge of an optimal prosodic word (Manam, Siriono, Nakanai, Samoan, etc.) there are no examples of reduplication that appear to the *right* of an optimized base, e.g. hypothetical **[síwa]-<u>wa</u>-nak*.

(29) Affixing to minimal prosodic word

	Fixed segment	Reduplicative
Prefix/left-anchored	English (McCawley 1978) [Càli]-**fuckin**-[fórnia]$_{PrWd}$	Nakanai (Spaelti 1997) ka-**go**[góve]$_{PrWd}$
Suffix/ no right-anchored	Ulwa (M&P 1993a,b) [siwá]$_{PrWd}$-**ka**-nak	

Only the proposed theory can account for this gap, as it is impossible to formulate the requirement that RED suffix to the main stress foot using only left anchoring and locality. That is, RED could obviously not right anchor to the base in the proposed theory, and I assume that material following the main-stressed foot is not a valid base. Base construction is discussed in detail in Chapter 2.

1.3.4 Internal reduplication

Retracting the option for RED to be positioned by an alignment constraint derives the result that reduplication behaves as an "internal" affix, attracted to the stem even when it must be ordered after other affixes (Carrier-Duncan 1984). That is, positional faithfulness to the root will draw the affix inward, regardless of when it is added in the word formation process.

The table in (31) illustrates the typology predicted in a system in which RED may be independently aligned; a new constraint needed is defined in (30):

(30) RED≤Root: The reduplicant must copy material from the root. Violated when non-root material appears in the reduplicant. (McCarthy & Prince 1993, Urbanczyk 2000).

(31) (not a tableau)

/badupi, mu, RED/	ALIGN-LEFT (RED, Stem)	ALIGN-LEFT (mu, Stem)	RED≤Root	L-ANCHOR
a. mu-mu-badupi		**	**	
b. mu-ba-badupi	**			
c. ba-mu-badupi		**		*

(32) a. Forced copying of non-root material
ALIGN-L (RED, Stem) >> {ALIGN-L mu, RED ≤ Root} and
L-ANCHOR >> RED ≤ Root

b. Local copying of root material
ALIGN-L mu >> ALIGN-L (RED, Stem) or
RED ≤ Root, L-ANCHOR >> ALIGN-L (RED, Stem)

c. Non-local copying across fixed segment affix
ALIGN-L (RED, Stem), RED ≤ Root >> ALIGN-L mu, L-ANCHOR

The combined effect of ALIGN-RED and the constraint RED ≤ Root (McCarthy & Prince 1993, Urbanczyk 2000), which requires the reduplicant to copy material from the root, leads to the undesirable potential optima whereby the reduplicant can copy a prefix (32a), or the reduplicant can be separated from the stem by an intervening fixed segment affix

(32c). (33) shows that in the proposed system, no alignment constraint can pull the RED morpheme away from root material.

(33) RED is root-adjacent

/badupi, mu, RED/	ALIGN-L mu	"LOCALITY"	L-ANCHOR
a.✗ ba-mu-badupi	**	**	*
b. mu-ba-badupi			
c. ✗mu-mu-badupi	**		

The only constraints acting on these forms are reduplicative anchoring constraints, alignment of fixed segment affixes, and LOCALITY. When RED is present, it must copy adjacent root material. The other candidates are harmonically bounded, as indicated by '✗'.

This prediction in its strong form is largely correct. Apparent exceptions where affixal material is nonetheless copied are discussed in Chapter 2, §2.2.3.

1.3.5 Affix mobility

Under Positional Anchoring, RED placement is open to the possibility of being determined by constraints on the structure of the whole output. The reduplicant need not appear in the same position relative to the base; i.e., it need not always be a "prefix". An example of the type of affix mobility predicted by the theory can be found in Lakhota. Compare: *čoka-<u>ka</u>* vs. *<u>ksa</u>-ksapa*. This pattern will be looked at in detail in Chapter 4.

1.4 Extensions: asymmetry and Positional Faithfulness

The noted asymmetry in fact extends to further cases, all involving Positional Faithfulness.

1.4.1 Fixed segment affix placement

Even fixed segment affixation is governed by Positional Faithfulness. As Hawkins & Cutler (1988) claim, suffixation is the universally unmarked mode of (fixed segment) affixation. They explain this preference by stressing the processing advantages of early access of the root. This is another way of saying that output-output anchoring of the left edge of the affixed form to the root drives suffixation.

Positional Anchoring thus offers a solution to a longstanding puzzle: why is most reduplication "prefixing", when fixed-segment affixation has such a clear bias toward suffixing? The answer is that in both cases, early access to the root morpheme drives left edge placement of material identified with the root. What is special about reduplication is that, unlike fixed segment affixation, placing this affix initially does not hamper (or only minimally impairs) root access, while offering early introduction of the reduplicative morpheme. Thus early access of both the root and the morphological information carried by RED is uniquely possible.

Both systems of affix placement are skewed in order to allow early lexical access of the root morpheme. Hawkins and Cutler (1988) show lexical access to contribute to the suffixing preference for fixed segment morphemes. Root access is not less important in reduplication. However, since left edge copying does not hamper root access (or only minimally does), prefixing reduplication allows for both immediate access of the root, as well as the earliest possible processing of the RED morpheme "for free". Reduplicative morphemes are positioned by the combined effects of constraints that anchor base-reduplicant correspondence at a given point within the base and locality (i.e. base-reduplicant adjacency). The constraints placing fixed segment morphemes should likewise reflect the bias toward having root-identifiable material appear first in the word. The alignment constraints used here do not achieve this goal. I set the suffixing preference for fixed segment affixes aside, noting the direction in which research on this topic should follow.

1.4.2 Augmentative epenthesis

As far as I know, it has not yet been observed that augmentative epenthesis displays a parallel asymmetry: all other things being equal, epenthesis to satisfy a minimal prosodic size will occur at the right edge, (in order to left-anchor the root, with heightened initial faithfulness). A well-known example comes from Axininca Campa *naTA*, **TAna* (McCarthy & Prince 1993a).[9] The following less-familiar cases also involve right edge epenthesis:

(34) Southern Sierra Miwok CVCVC-imposing suffix: *-kuH* (Sloan 1992)

/wyks/	wykUs-kuH	'to go/someone evidently went'
/loːt/	lotUʔ-kuH	'to catch, to grasp, to grab/capture'

(35) Mexican Spanish *-(s)ito/a*[10] diminutive suffix (Crowhurst 1992)

a. Stem > 2σ

la čamaka	čamakita	'girl'
el molačo	molačito	'toothless one'

---

[9] Mohawk (Piggott 1995), Shona (Myers 1987) and Iraqi Arabic (Broselow 1982) appear on the surface to offer examples of problematic left edge epenthesis, but these cases can be plausibly analyzed as prefixes that appear only when needed to satisfy a prosodic minimality requirement.

[10] The suffix is *a*- or *o*-final, depending on the gender of the stem. /s/ deletes when the base is C-final.

b. Stem = 1σ

la bos	bosEsita	‘voice’
el pan	panEsito	‘bread’

The location of epenthesis at the right edge in all cases is due to asymmetric left edge faithfulness.

1.4.3 Subtractive morphology

Subtractive morphology exhibits an analogous asymmetry: all unambiguous cases involve *deletion* at the right edge, suggesting that heightened faithfulness to the left edge of the root inhibits left edge deletion (Horwood 2001).[11]

(36) Koasati plural formation

ataká:-li-n	aták♦-li-n	‘to hang something’
pitáf-li-n	pit♦♦-li-n	‘to slice up the middle’
albití:-li-n	albít♦-li-n	‘to place on top of’

Here, we see deletion at the right edge, also due to asymmetric left edge faithfulness.

1.4.4 V_1 deletion in hiatus context

In addition, Casali (1997:496) notes that at the boundary between two lexical words, elision is always of the *first* vowel in a …V+V… context.

[11] Horwood does cite languages that purportedly involve left edge deletion, (which his system predicts to be possible), but these all involve either cases of “scant” evidence, or else a possible alternative analysis of *morpheme* deletion (in which case the location of the deletion at the right edge would be a mere coincidence). Horwood’s theory can be amended to prevent the prediction of left edge deletion by allowing transderivational anti-faithfulness to apply only to general (i.e. not positional) faithfulness constraints.

(37) Etsako word-final vowel deletion

/dɛ akpa/	d♦akpa	'buy a cup'
/ukpo ɛnodɛ/	ukp♦ɛnodɛ	'yesterday's cloth'

Casali attributes this to a word-initial faithfulness constraint.

1.4.5 Markedness drives right edge reference

Some processes do seem to require right edge reference; the proposal is not in fact that right edge reference is never possible. The right edge appears to be a necessary factor in determining placement in (most likely, among other processes): tone association, stress assignment, and fixed segment affixation. These however are governed by *markedness* constraints. Thus, not surprisingly, the reduplication pattern falls in line with other Positional Faithfulness cases. The asymmetry applies to all and only cases that are affected by Positional Faithfulness.[12]

These right edge markedness constraints however can be the source of a type of prominence that will ultimately lead to right edge copying. For example, a right aligned stress-assigning constraint, e.g. ALIGN-R (Head-foot, Prosodic Word), which would place the main stressed foot at the right edge when highly ranked, will be the source of parasitic right edge copying when the reduplicant is sensitive to stress.

[12] A significant and puzzling exception to this tentative markedness/positional faithfulness division is the behavior of alignment constraints (which are considered to be markedness constraints at heart, as they penalize output structures) in syntax. Grimshaw (2001) notes that even head-final languages can be accounted for using only left edge sensitive alignment constraints such as SPEC-LEFT and HEAD-LEFT.

1.5 Conclusion

This dissertation explores the observed asymmetry with respect to edge association in reduplication and truncation. The left edge bias is argued to fall out from the theory of Positional Anchoring, which is developed from the general theory of Positional Faithfulness.

Besides explaining merely the preponderance of left edge examples cross-linguistically, accounting for the asymmetry at the level of the constraints themselves in this way leads to other more subtle positive results. The correct predictions of this approach are summarized here:

(38) List of correct predictions

- Reduplicants or truncated morphemes which do exhibit right edge correspondence with the base must be somehow compelled (§1.3.1).
- Violation of Marantz's Generalization cannot be required merely in order to satisfy RED-alignment constraints (§1.3.2).
- Suffixation of a RED morpheme to an optimal prosodic word cannot be required in the current system, and is indeed unattested (§1.3.3).
- All other things being equal, prefixing reduplication does not appear to the left of fixed segment prefixes (§1.3.4).
- A system may allow RED to alternate between the left and right edges of a stem, as dictated by other constraints in the language (§1.3.5).

In addition to these results, there are other encouraging predictions that are made by similarly extending the left edge bias to other domains that require faithfulness across representations:

(39) Extensions of the proposal

- The well-known preference for suffixing of fixed segment affixes is explained (§1.4.1).
- Augmentative epenthesis is predicted to occur at the right edge, all other things being equal (§1.4.2).
- Deletion in subtractive morphology is predicted to occur at the right edge (§1.4.3).
- V_1 deletion in a hiatus context will target the first vowel in a …V + V… context. (§1.4.4).

These findings also lead to the tentative hypothesis that only markedness constraints can explicitly refer to the right edge.

The following chapters of the dissertation further develop the theory of positional anchoring, motivating a typology of reduplication based on positional base-reduplicant faithfulness constraints. Chapter 2 explores the variations of left edge reduplication encountered cross-linguistically. Whereas most reduplicants target the left edge of the stem, some patterns copy material that is merely *close* to the left edge. I define the sense of 'close' needed in these contexts, and develop a system that will generate all and only the desired patterns. Chapter 3 examines a group of cases in which right edge copying appears to be contingent on left edge copying. Moreover, the relevant constituent targeted in all of these cases is the head foot of the base. The constraint proposed is called EDGE-ANCHOR; it targets these head foot edge segments simultaneously. Chapter 4 is devoted to addressing apparent counter-examples. These cases are shown either to fall from constraints unrelated to right edge reference, (as with stressed syllable copying, which would only target the right edge indirectly in the case of final stress), or else from an illusion of reduplication. Some cases that have been labeled as reduplicative in the literature show evidence of being augmentative, thus not due to an input RED morpheme at all. The group of right edge effects that fall from the proposed left edge faithfulness is also discussed in this chapter.

Appendix A: Apparent Right-Anchoring cases

The following are examples of apparent cases of right anchoring that are not discussed in the dissertation. Although any one could be extremely damaging to the proposal if no alternative account is both possible and reasonable, I note that in those cases I was able to pursue further, an alternative explanation was at least plausible. It is my position that further investigation of any one of these cases along the lines of the proposal will yield insight into what is really driving the right edge copying in these cases. When possible, the most likely line of analysis is suggested. The languages are organized by the source from which they came.

I. Marantz (1982)

(40) Karuk[13] derived intensive verb

parak	'to separate with a wedge'	parak-rak	'to split logs with wedges'
tasir̃	'to brush'	tasin-sir̃[14]	'to brush (repeatedly)'

Remarks: Marantz presents this as a case of suffixing reduplication. However, Macaulay (1993) provides additional data, as well as a convincing analysis that Karuk actually

[13] Marantz refers to this language as "Karok", but Macaulay (1993) explains that "Karuk" is the more faithful pronunciation, apparently preferred by the Karuk community.
[14] *r̃* is a morpho-phoneme that nasalizes to *n* before a consonant.

exhibits *root* reduplication. The verb stem has more internal structure that was originally attributed it in the source of Marantz's data (Bright 1957).

II. Key 1965

Key (1965:101) explains that a large portion of his data was acquired through verbal exchange between colleagues and friends. I have made an effort here to seek additional information regarding these patterns, where possible.

(41) Chinanteco (Key 1965:90)

a. "To distinguish plural subject from singular. This function, in another analysis, is defined as length of vowel; here, it is analyzed as reduplication of final V of root, in construction with tone features":

hu^{4}uʔu^{2} 'I fold' → huu^{42}uʔu^{24} 'we (excl. fold)'; hu^{4}uʔu^{24} 'you(sg. fold)'; huu^{42}uʔ^{4} 'you(pl. fold)'

ni^{4}iʔi^{2} 'I sprinkle' → nii^{42}iʔi^{24} 'we (excl.) sprinkle';ni^{4}iʔi^{24} 'you(sg. sprinkle)';nii^{42}iʔi^{4} 'you(pl. sprinkle)'

b. Reduplication and multiples of reduplication for final consonant, with tone and glottal involved in unanalyzed circumstances. (This is further involved with pluralization):

hm^{4} 'blood' → hmʔm^{4} 'your blood' → hmmmʔ$^{2-4}$ 'your (pl.) blood' → hmm$^{2-3}$ 'liquid, water, blood' → hmmm$^{1-2}$ 'my water' → hmmm^{123}ʔm^{4} 'our (exclusive) water, blood'

Remarks: These patterns appear to be cases of spreading to satisfy a template that applies to the output, rather than evidence of a right-aligned reduplicative morpheme.

(42) Yawelmani

Continuative formed by “reduplication of final VC of proclitic to a limited root, *wiyi*. Multiple reduplication occurs to show continuous or persistent action”:

simwiyi ‘drizzle’ → simimimwiyi ‘keep drizzling’
*t’abwiyi → t’abababwiyi ‘makes fluttering sounds’
*’unwiyi → ’ununununwiyi ‘shiver’

Remarks: Alan Prince (p.c.) points out that this looks like Cupeño in reverse, i.e. possibly templatic (cf. Crowhurst 1994).

(43) Cayuvava

“Reduplication of CV of a predicative root with substantive-indicating affixes” (not right edge?):

iraˈtɔ-<u>tɔ</u>-kɔ	‘the serving of food’
riˈhæ-<u>hæ</u>-bæ	‘lightning’
kiraˈsi-<u>si</u>-bi	‘the jumping’

Remarks: According to Key (1967)’s characterization of stress (assigned to every third syllable, counting right to left), these examples suggest a stressed syllable analysis. However, this may be hasty; the fixed-segment suffix present in each of these examples leads to the desired placement of stress. More research on this pattern is needed.

(44) Baure (Bolivia)

a. “Reduplication of final stem syllable (or infix?) with stress sometimes shifted to the reduplicated syllables”:

raβérèc̈in ‘is far’ → raβere´-ré-c̈in ‘is very far’
roetobɨko ‘is sweet’→ roetobɨ-bɨ-ko ‘is very sweet’

b. ‘Augmented volume or increased amount of same quality as named, distinct from plurality, is found…reduplication of stem-final syllable’:

ndori ‘my friend’ → ndori-ri ‘my very good friend’

c. Reduplication of the last CV of a basic stem to which final word formatives are suffixed:

čopórik̈in ‘round’ → čopóri-ri-k̈in ‘very round’
etóbiyar̈in ‘sweet’ → etóbĭ-bĭ-yar̈in ‘very sweet’

Remarks: More information is needed regarding stress in this language.

(45) Salish

a. “Activator, in which RED indicates state of *something becoming* or *taking on the quality*” indicated by the morpheme involved, is found with reduplication of CV or VC of root, with other unidentified changes nonpertinent to reduplication :

tog ‘straight’ → tgo’-go ‘it became straight’
moko ‘swell’ → es-mko-ko-mi ‘it swells up, becomes swollen’
pin ‘full’ → pin-in ‘becomes full’

b. “Diminutive, young and plural simultaneously. The patterns of this somewhat complex combination may be generally indicated as: reduplication of final V of root with glottal (’) intervening = *young*; reduplication of final root syllable and voiceless quality of V in the original syllable, plus above pattern for *young*, plus voiceless quality of final V of the word = *diminutive* + *young*: R of the initial syllable of the root plus all the features described in the *diminutive* + *young* category = *plural*’.

qoē’s̥p ‘buffalo’ → qos̥ē’et ‘young buffalo’ → qosepE-pē-’Et ‘small young buffalo’ → qosqos’pE’pēt ‘several small, young buffaloes

k̥lōtn'ē' 'mouse' → k̥lotE'ne'Et 'small young mouse' → k̥lotk̥lotnE'nē'Et
'several small young mice'

Remarks: Roots in Salish are typically monosyllabic, and thus reduplicative patterns copying root material are severely limited.

(46) Mundurucú (Brazil) (Key 1965:93)
"The act of possessing has been found in the phonemic shape of reduplication of final syllable of noun possessed. (Tone is omitted in illustrations.)":

ñūn 'I' + kobɛ 'canoe' → ñūn kobɛ-<u>bɛ</u>-ʔ 'I have a canoe'
rarɨk 'bow' → rarɨg-<u>rɨk</u> 'have a bow'
xõ 'pet' → xõ-<u>xo</u> 'have a pet'

(47) Tonkawa

a. "Reduplication of final VC of stem, with substitution of any non-voiceless, syllable-final C by /ʔ/ with some loss of V lengths":

na^{ə}ton[15] 'mountain' → na^{ə}to-<u>ʔo</u>-n range of mountains'
ʔo^{ə}n 'blood (vein)' →ʔo^{ə} -<u>ʔo</u>-n 'blood (veins)'

b. RED as infix in stem-final CVC in which ʔV is inserted before the final C:

hosas 'young (sing.)' > hosa-<u>ʔa</u>-s 'young (refer to plural noun)'
henox 'pretty (sing.)' > heno-<u>ʔo</u>-x 'pretty (in agreement with plural noun)'

(48) Comanche

a. "Reduplication of final CV to indicate subject plural, in substantive stem compounds of root plus locative":

tabeʔikahpetu '(it,he) towards sun' → tabeʔikahpetu-<u>tu</u> '(they) towards sun'

[15] I am not sure that the raised symbol is a schwa; it must be something to indicate V length, though.

b. Possessive, agreeing in number with the subject possessing, not with the noun possessed, is found as R of final V of pronominal root (appears to be lengthening):

pï ‘his’ pïi ‘their’

c. Subject pluralization: R of final V of pronominal root plus additional suffixes pertinent to the R function (also appears to be lengthening):

surïkïseʔ ‘he’ surïïkïseʔ ‘they’

Remarks: Key cited a colleague for these data. Charnee (1993:73) lists *-pehtu* as the locative postposition meaning ‘to, toward’, but this reduplication process is not mentioned in either her work or in Robinson & Armagost (1990). And while it is true that third person pronouns (b,c) have long final (always second) vowels (Robinson & Armagost 1990), it is not clear that this is due to productive reduplication.

(49) Abyssinian

Augmentative is found in the following linguistic shape: RED as infixed CV before final C of a stem-final CVC.

tiniš ‘small’ > tini-ni-š ‘very small’
tilik ‘big’ > tili-li-k ‘very big’

(50) Aztec

“Complete reduplication of CV word final (CVC) syllable”:

swa ‘girl’ + pil ‘child’ > swapipil ‘girls’
tagat ‘man’ + čin ‘honorific’ > tagacičin ‘men, honorable’ (with loss of length on one V)
kal- ‘house’ + čin ‘honorific, endeared’ > kalcičin ‘dear honorific house’

Remarks: This appears to be *prefixing* reduplication, to the second morpheme/suffix.

(51) Hopi

Reduplication of root-final CV: multiple or repetitive action, or progressive action

ʔewi	‘a flame occurs’	ʔewíwità ‘flickering flames’
soma	‘ties it’	sósòMta ‘is tying’

Remarks: Regarding stress, Kalectaca (1978) gives the following rules: a) in words with one or two syllables, stress the first syllable.; b) in words with more than two syllables, accent the first if it is heavy (i.e. closed or long vowel), otherwise, stress the second syllable. There are in fact no data with reduplication in which the first syllable is heavy. Additional forms from Albert & Shaul (1985:4), although unmarked for stress, are thus consistent with a stressed-syllable analysis (as all roots are CVCV), obviating reference to the right edge in this case.

III. Moravcsik 1978

There is some overlap between Moravcsik and Key; the patterns not yet mentioned are:

(52) Marshallese

kagir	‘belt’	kagir-gir	‘wear a belt’
takin	‘socks’	takin-kin	‘wear socks’

Remark: Zewen (1977:40) says of reduplicated morphemes of this type that they “always carry the stress on the first element of the iteration”. Thus, the possibility of a successful analysis of this pattern as *stressed syllable* reduplication is high.

(53) Hausa

suna 'name' → sunanaki 'names'

Remarks: This appears to be part of a complicated system; more study is needed.

Appendix B: Chamorro reduplication

Chamorro (Topping 1973, Klein 1997), which is well documented, remains a troubling potential counter-example. This language has a productive pattern of intensifying reduplication in which the final *CV* in a stem appears to be targeted for copying:

(54) Intensive reduplication

a. dánkolo	dánkolo-lo	'big/very big'
b. buníta	buníta-ta	'pretty/very pretty'
c. ñálang	ñála-la-ng	'hungry/very hungry'
d. métgot	métgo-go-t	'strong/very strong'

Secondary stress is not reported in reduplicated forms. Bound roots reduplicate in the same way: *nǽta-ta* 'hollow/not deep'; **nǽta*.

Although in reduplication stress remains on the same vowel that bears stress in the non-reduplicated form, all fixed-segment suffixes cause stress shift to the default, penultimate position.

(55) Default stress penultimate

nána	'mother'	naná+hu	'my mother'
gúmaʔ	'house'	gùmaʔ+níha	'their house'

In lexically stressed words, antepenultimate stress is possible. However, stress shifts to penultimate position once again upon fixed-segment suffixation.

(56) Lexical antepenultimate stress

dánkolo	'big'	dànkoló+ña	'bigger'
éŋŋuluʔ	'to peep'	in+èŋŋuluʔ+níha	'their peeping'

Reduplicated forms exhibit otherwise rare antepenultimate word stress (and *pre-antepenultimate* word stress in *dánkolo-lo*, which is otherwise limited to words including stress-attracting prefixes (Chung 1983)).

I propose a tentative solution in which, although no secondary stress is reported for reduplicated forms, it could happen in a word where two syllables preceded the main stressed syllable (e.g. postulated **bù-buníta*). Therein lies the problem for an initial reduplicant; a HEAD-MATCH$_{BR}$ violation would result. The constraints requiring penultimate stress, (here, a cover constraint 'PENULTIMATE') would be dominated by HEAD-MATCH.

(57) HEAD-MATCH: If μ_1 is stressed and $\mu_1\Re\mu_2$, then μ_2 must also be stressed. (Pater 1995, Alderete 1996, McCarthy 2000)

(58) HEAD-MATCH >> {'PENULTIMATE', LEFT-ANCHOR}

/ RED, bunita/	HEAD-MATCH$_{BR}$	'PENULTIMATE'	L-ANCHOR
a. ☞ buníta-ta		*	*
b. bù-buníta	*!		

If correct, a HEAD-MATCH account would explain the failure of left anchored candidates like **ña-ñálang* as well.[16] Alternatives like **dán-ko-kolo* could be explained by contiguity; there are no data offered with antepenultimate lexical stress that are C-final, the reduplicant of which would be undetermined in this system. However, it is not clear whether any such forms exist in the language.

If this suggestion is in fact right, it would illustrate a case where no base-reduplicant anchoring occurred. This would broaden the typology of reduplication; reduplicants could both actively target privileged positions, as well as passively avoid violating a constraint, without targeting anything in particular. Further research is needed to see whether other cases involve merely this avoidant behavior in RED selection.

Appendix C: English truncation to right edge

Data from English on the surface in fact seem to challenge this generalization.[17]

(59) English right edge preserving truncation

za	'pizza'
rents	'parents'
zine	'magazine'
burbs	'suburbs'
shmen	'freshmen'
nads	'gonads'
shrooms	'mushrooms'
tard	'retard'
gator	'alligator'
Nam	'Vietnam (War)'

[16] See Klein (1997) for an account in which faithfulness to lexical stress plays an active role in determining the optimal candidate.

[17] Thanks to Alan Prince and Nancy Hall for reminding me of these type of examples; *za* and *shmen* were in fact new to me.

As Nancy Hall (p.c.) points out, several of these words fall in the domain of "adolescent language", and are less than transparent to the unfamiliar native English speaker. Other examples are recognizable from 1960's counter-culture. Indeed, the examples do seem to flout the conventional left edge preserving rule found generally in the language, e.g. *condominium* → *condo*; *facsimile* → *fax*, etc. (Weeda 1992). The cases in (59) then can convincingly be considered intentionally masked, part of a secret language using an unnatural system to preserve its covert nature. Moreover, the right edge preserving English truncation process does not seem to be productive (in contrast with the much more widely attested left anchored pattern, e.g. *dorm (< dormitory), ad (< advertisement)*, etc.) And finally, the phonological correspondence with the base is idiosyncratic; note in particular the pronunciation of [zɑ], the truncated form for *pizza*; in the full word, the syllable is unstressed, and the vowel is schwa. This example clearly draws from the orthography, and is far from a regular, productive pattern. For these reasons, I do not consider the case a genuine counter-example.

CHAPTER 2

BASE CONSTRUCTION AND LEFT EDGE REDUPLICATION

2.1 Introduction

As argued in Chapter 1, the observed asymmetry regarding left edge correspondence in reduplication and truncation falls from an asymmetry in the constraints themselves, stemming from the general theory of Positional Faithfulness. That is, as only privileged positions are targeted, only such positions will be preserved. Thus there is a left edge base-reduplicant correspondence constraint (LEFT-ANCHOR), and no parallel constraint calling for preservation of the right edge of the base. The question that this chapter explores is: given the priority of the left edge, how do we account for cases in which the segment targeted for copying is close to, but not coextensive with, the left edge of the root? Moreover, how do we limit the target to elements 'near the left edge'? Finally, if lexical access is central to the importance of left edge correspondence between base and reduplicant, then how can 'close to the left edge' be sufficient?

This chapter addresses each of these questions, while building an account of the typology of left edge copying. In looking closely at this typology, it becomes evident that the base of affixation must be redefined. One of the psycholinguistically prominent positions noted by Beckman is the root. There is a conspicuous cross-linguistic preference for copying root material; Urbanczyk (1996) and Spaelti (1997) observe a strong tendency, if not outright requirement, that at least some of the reduplicant's material come from the root, largely ignoring affixes. Certain patterns are observed that suggest McCarthy & Prince's (1993a) proposal, that the base is the 'string adjacent to the reduplicant in the output', although appealing in its simplicity, is not sufficiently restrictive. This chapter further develops the claim that partial reduplication is driven by positional faithfulness. The tendency for RED's content to be drawn from the root serves as the guiding intuition for this chapter. The proposal advocated here, which draws in part from earlier work by Downing (1998a,b) is: the base is by default the root, and can deviate from this only under limited conditions.

Empirically, it appears that if the left edge of the base is anything other than the left edge of the root, then it will be one of the following:

(1) Left edge of base[1]

a. The first syllable that *begins with* root material (e.g. *sam* in *n-osampi* 'ask'; Axininca Campa).

b. The first syllable that *contains* root material (e.g. *sik* in *s-ikuk; *kuk* 'chop, hack'; Chumash).[2]

c. The nearest syllable edge that constitutes the 'minimal base' edge (e.g. *no* in *no-na* 'chew', Axininca Campa).

d. The leftmost edge of an affix that must be targeted for independent syntactic or semantic reasons (e.g. *ma* in <u>*má*</u>*-ma-gimen*; Chamorro nominalizing reduplication, 'drinkable', from passive *ma-gimen* 'be drunk').

e. The leftmost onset of an optimized prosodic constituent (e.g. optimal prosodic word, which is a disyllabic foot in Samoan, e.g. *fa-na-náu*).

If this list is indeed exhaustive, then it is important to note what is left out. We cannot, for example, target the leftmost *coronal*, the leftmost *low vowel*, etc. I will leave aside for the moment the cases involving appeal to the minimal base (§2.3.1), reduplication of a specific affix (§2.3.2), or optimal prosodic word (Chapter 3), as these involve deviation

[1] See §2.4 for additional discussion, and references.
[2] In all probability, this should be further restricted to the first *vowel* of the root; this issue discussed in §2.6.3.

from the default case where the root is still driving the determination of the base. We are then limited to (1a-b). I will refer to these cases as ‘minimal displacement’ cases. These involve elements that are still the leftmost *something*, namely leftmost: root segment (default), root onset (1a), or onset of a syllable bearing a root segment (1b).

Only structural considerations can force the base to deviate from left root edge material. This restriction is achieved through a fixed ranking in which root-base faithfulness dominates all featural markedness. The details are explained in section 2.4; a comparison with Downing’s system occurs in section 2.6. Finally, an example from Bella Coola illustrates the proposal at work (§2.7).

How does this pliable left edge affect the claim that lexical access drives the underlying bias toward left-edge anchoring? The results of allowing for base expansion and shrinkage relative to the root edge are non-trivial with respect to the proposed left-edge preference for anchoring. These assumptions imply that now in addition to the leftmost root segment, other leftmost positions within the base (namely those described in (1a-b)) are salient. The importance of the first onset of a word could indeed be proven with ‘tip of the tongue’ (TOT) experiments, which would require in this case inducing a TOT state with V-initial words, and investigating whether the first onset was helpful in terms of bringing the subject out of this state, e.g. *n* in *a<u>n</u>imal*. The proposal then would be that this output base has psychological reality, to the extent that it can play a role in lexical access. The privileged position argument then goes through, even in cases of imperfect left edge correspondence. This proposal adds a layer of complexity to the computation, and thus must be adequately supported. I assume that the base is assigned by GEN, and ultimately decided by the constraints. The remainder of this chapter aims to provide the needed support for a dynamically assigned base.

2.2 The importance of the left edge

Hawkins and Cutler (1988) give evidence for the importance of the beginnings of mono-morphemic words, which are essentially stems:

(2) Word left edge salience

a. The beginning portions are the most effective cues for successful recall or recognition of a word.

b. The effects of distorting the beginning of a word are much more severe than the effects of distorting later portions, for the purpose of word recognition.

c. In a 'tip-of-the-tongue' (TOT) state, the most effective cue for bringing a person *out* of a TOT state is to provide or confirm the word onset.[3]

In addition to these findings, they also note that just over 0% of O(bject)-V(erb) languages in four different surveys (two out of just under 345 languages)[4] have exclusive prefixing of fixed segment prefixes, which is striking. Their main claim is that heads are identically ordered with respect to their modifiers, with the addition of psycholinguistic effects. The main force at play then is the importance of early access of the root. So languages with VO and/or Preposition + Noun Phrase word order in their syntax regularly have either prefixes and/or suffixes in their morphology. But in a large number of cases, languages with OV and/or Noun + Postposition have *suffixes only*.

[3] It is unfortunate that no data with V-initial roots is discussed.
[4] The four surveys include a total of 345 languages, however Hawkins and Cutler note that a small number of languages belong to more than one of these samples.

A reduplicative morpheme on the other hand will not impede root access, or only minimally will, no matter where it is placed.[5] By targeting initial position in partial reduplication, then the presence of the affix is indicated as early as possible in word retrieval.

These and other properties of the left edge are shown to be more relevant than either the word middle or end. [6],[7] More generally, Beckman (1998:1) notes that "positions which are psycholinguistically prominent are those which bear the heaviest burden of lexical storage, lexical access and retrieval, and processing".

2.3 Base of reduplication as root with possible structural optimization of output

The observation that root material is generally preferred for the purpose of reduplication has been parlayed into constraints that require the reduplicant to contain such material, as with RED ≤ Root (McCarthy & Prince 1993a, 1994, 1995, Urbanczyk 2000), RED = Root (Futagi 1998). This is the tradeoff required by allowing the *base* to

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[5] This argument is presumed to include cases involving neutralization of some type of markedness, for example simplification of onset clusters, as in Tagalog reduplication to mark the recent perfective (McCarthy & Prince 1996 and references therein): (*ka*)-*ta-trabaho* 'just finished working', (*ka*)-*bo-bloat* 'just gave a special treat', etc. Aspectual reduplication in Tübatulabal (Alderete et al. 1999, and references therein) shows consonant neutralization to glottal stop: *tumuːga* → *ʔun-dumuːga* 'to dream'; *ʃɨʔiwɨ* → *ʔi-ʃɨʔiwɨ* 'it looks different', etc. Vowel neutralization in Igboo reduplication (Alderete et al. and references therein is slightly more complicated in that neutralization is not always to a single unmarked vowel. However, the reduplicant's vowel is always high, depending on what the corresponding base vowel is (high vowels are copied exactly, e.g. *ti-ti* 'cracking', *mu-mu* 'learning'); otherwise, the initial consonant conditions the RED vowel, with labial/palatal attraction (e.g. *cɪ-cɔ* 'seeking', *bu-be* 'cutting'), or else rounding harmony with the base vowel occurs (e.g. *ki-ke* 'sharing', *nu-no* 'swallowing'). The claim is that once the reduplicant and the corresponding portion of the base are uttered, then a simplified base can be correctly reconstructed. For example, upon hearing *ta-tra*…, the cluster neutralization in the reduplicant is undone, for the purposes of lexical access.

[6] The left/right asymmetry studied by Casali (1997:496) (see Chapter 1 §1.4.4) also lends support to the prominence of initial material: at the boundary between two lexical words, elision is always of the *first* vowel in a …V+V… context.

[7] For the sake of word retrieval at least, Hawkins and Cutler do cite a study that found that the word end is more salient than word middles.

be defined, as mentioned above, as merely the 'string adjacent to the reduplicant in the output' (McCarthy & Prince 1993a).

Of concern here are the minimal displacement cases where the edge of the base for copying is not consistent with the left edge of the root. Two questions must be answered for each example. First, what compels departure from the left edge of the root? Also, in what way does the base in the optimal candidate violate left edge correspondence to the root? There is a limit to the types of constraints that may cause displacement of the base edge. There is overwhelming evidence that it must be a structural constraint, such as ONSET (which requires that syllables have onsets), or *COMPLEX (which bans complex onsets); featural markedness is not sufficient. In order to satisfy the appropriate markedness constraints, the copying will begin at the onset immediately to the left or the right of the stem edge, as determined by the constraint ranking.

The system is illustrated here using examples where ONSET plays the compelling role, forcing base displacement. Examples of each kind of mis-alignment that we find are given below; (the root is italicized; the base according to the proposed analysis is in parentheses):

(3) Base manipulation to satisfy ONSET

a. Mokilese

<u>wad</u>-(*wadek*)	base = root, by default	/RED, wadek/

b. Ineseño Chumash

<u>sik</u>-(s-*ikuk*)	base *expansion*	/RED, s+ikuk/

c. Axininca Campa

n-*o*(*sampi*)-<u>sampi</u>	base *shrinkage*	/RED, n+osampi/

In (3b-c), ONSET dominates the constraints that otherwise lead to exact root/base correspondence. As first proposed by Downing (1998a,b), these are faithfulness constraints between the root and the base:[8]

(4) Faithfulness constraints determine base content

a. $\text{MAX}_{\text{Root-Base}}$ (MAX-RtB): Each segment in the root must have a correspondent in the base. (No deletion)

b. $\text{DEP}_{\text{Root-Base}}$ (DEP-RtB): Each segment in the base must have a correspondent in the root. (No insertion)

The constraint in (4a) has the effect of preferring *expansion* of the base under compelled violation. (4b), alternatively, prefers base *shrinkage* from the left edge of the root. Examples are given below:

(5) Base expansion: MAX(RtB), ONSET >> DEP(RtB)

/RED, s-ikuk/	$\text{MAX}_{\text{RT-BASE}}$	ONSET	$\text{DEP}_{\text{RT-BASE}}$
a. ☞sik-(s-*ikuk*)$_B$			*
b. s-ik-(.*ikuk*)$_B$		*	
c. s-*i*-kuk-(*kuk*)$_B$	*		

(6) Base shrinkage: DEP(RtB), ONSET >> MAX(RtB)

/RED, n-osampi/	$\text{DEP}_{\text{RT-BASE}}$	ONSET	$\text{MAX}_{\text{RT-BASE}}$
a. ☞n-*o*(*sampi*)$_B$ -sampi			*
b. (n-*osampi*)$_B$ -nosampi	*		
c. n-(*osampi*)$_B$ -osampi		*	

In the default situation, the Root-Base faithfulness constraints are ranked high, forcing perfect mapping from root to base. In the cases studied in this chapter however, we see minimal, compelled violation.

[8] These are identical in function but not in name to the constraints proposed by Downing. Her proposal is outlined in §2.6. Numerous other assumptions made here differ from those made in her proposal.

2.4 Reduplication of affixes

2.4.1 Satisfying prosodic minimality

In some cases of affix copying, the affix is only included in the base when a minimality requirement is imposed. For patterns like this, the default case still involves copying of the left edge of the root. It is only when the base is sub-minimal that shifting of the base edge will occur. The minimality requirement is imposed in fact on the *reduplicant*, by means of the Emergence of the Unmarked (TETU), McCarthy & Prince 1994. We see from the total reduplication of the Axininca Campa example *kawosi* that it is only minimality, and not concomitant maximality, that is imposed. Examples where the base is expanded in order to supply the minimal material for RED are given below (once again, the root is in italics; the base is in parentheses).

(7) MINIMALITY compels expansion of base

a. Axininca Campa (Spring 1990, McCarthy & Prince 1993, Downing 1998a)[9]

'long root' $\geq \sigma\sigma$

word	reduplicated form	stem	base
koma	no-(*koma*)-<u>koma</u> (*nokoma-nokoma)	/koma/	koma
kawosi	no-(*kawosi*)-<u>kawosi</u>	/kawosi/	kawosi

'Short roots' $\leq \sigma$

word	reduplicated form	stem	base
no-na	(no*na*)-<u>nona</u>	/na/	nona
no-wa	(no*wa*)-<u>nowa</u>	/p/	nowa

[9] Reduplication indicates 'VERB more and more'. The glosses for these verbs are: *paddle, bathe, chew*, and *give*.

b. Kinande[10] (Mutaka & Hyman 1990)[11]

stem = σσ				
	o-mú-twe	o-<u>mútwé</u>-(mú*twe*)	/twe/	mútwe
	a-ká-tì	a-<u>kátí</u>-(ká*tì*)	/tì/	kátì
stem = σ				
	e-∅-swa[12]	e-<u>swa-(swa</u>-*swa*)[13]	/swa/	swaswa

In the Axininca Campa example, reduplication appears to be total, with copying of the root (7a). However, when the root is sub-minimal (i.e. smaller than two syllables), then the prefix will be included in the base for copying. My analysis for this augmentation follows.

The observation that the prosodic word plays a crucial role in this pattern is due to Spring (1990), whose analysis required the base to be a (maximal) prosodic word. This too is the effect of McCarthy & Prince's (1993b) SUFFIX-TO-PROSODIC-WORD, which required the left edge of the suffix to align to the right edge of a prosodic word. This constraint is discussed more below.

Here, I claim the *reduplicant* must be a prosodic word; in the context of the general prosodic requirements of Axininca Campa, this means that it must be disyllabic.[14] The constraint that I propose then is 'RED = PROSODIC WORD'. This constraint is flawed, as it predicts back-copying of the type discussed in McCarthy & Prince (1999); the

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[10] Expansion can be compelled for additional reasons in Kinande; onset maximization is also witnessed, as é-m-buli → é-mbulí-(m*buli*), 'sheep' shows.
[11] Glosses are: *head, stick,* and *cabbage*.
[12] The symbol '∅' indicates a null prefix; the *e* here is an augment. Augments never reduplicate; Mutaka and Hyman (1990) take this to be evidence that reduplication takes place at a stage when the augment is not present. A further complication however is that although the augment may never be copied in noun reduplication in Kinande, it must be present on (or preceding) the noun in order for reduplication to take place at all. It is unknown whether this is for structural or semantic reasons.
[13] I assume in this case that the second *swa* corresponds to both RED and the base, in violation of BR-INTEGRITY (cf. de Lacy 1999 for discussion of this sort of haplology).
[14] McCarthy & Prince (1995) entertain and reject such a possibility.

problem has been dubbed the 'Hamilton Kager Conundrum'. By naming the template in the constraint, a typological prediction is that the template can be *back-copied* onto the base. That is, in a language where the base is smaller than a prosodic word, prosodic word requirement can be imposed on the base by virtue of RED = PrWd and highly ranked base-reduplicant faithfulness, MAX-BR. However, if we admit the constraint for the sake of argument, then the rest of the analysis is fairly straightforward: RED = PrWd dominates the constraint that otherwise requires faithful mapping between the root and the base (DEP-RTB).

(8)

	RED = PRWD	DEP-RtB
a. ☞(no*na*) $_{B}$ - [nona] $_{PrWd}$		**
b. no(*na*) $_{B}$ - na	*!	

The base is compelled to encompass the prefix only when it would otherwise not contain enough for RED to copy an entire prosodic word. Once the root is disyllabic, the prefix once again ceases to copy.[15]

(9)

	RED = PrWd	DEP-RtB
a. ☞no-(*kawosi*) $_{B}$ -kawosi		
b. (no-*kawosi*) $_{B}$ -nokawosi		*!*

The preference for root copying, all other things being equal, is achieved in McCarthy & Prince's (1993a) analysis with their constraint RED ≤ Root.

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[15] An example of reduplication that may optionally include prefixes may be found in a dialect of Axininca Campa, 'Axininca 2' (Spring 1990:118). Apparently, roots two syllables or longer may optionally include the prefix in the base of reduplication, e.g. /koma/ *no-(*koma*)-koma-waitsi* ~ *(no-*koma*)-no-koma-waitsi* 'paddle/paddle more and more'. However, Spring notes some hesitancy on the part of the informant regarding reduplicated forms.

McCarthy & Prince account for the augmentation of the base in part by positing a constraint that requires the base of suffixation to be a prosodic word, ‘SUFFIX-TO-PROSODIC WORD’. Both fixed segment suffixes (e.g. *piro* in *naTA-piro*) and reduplicative suffixes require that the base augment, which is captured by this constraint. The above analysis, using a reduplication-specific constraint, fails to capture this generalization. However, SUFFIX-TO-PROSODIC WORD, which is represented in the Generalized Alignment scheme as ALIGN (Suffix, L, PrWd, R) has suffered some criticism. First, Spaelti (1997), while not addressing the Axininca Campa case in particular, claims that opposite-edge alignment constraints like this one, which aligns the left edge of the suffix to the right edge of the prosodic word, are excluded in principle. He cites the problem of comparing violations of under- vs. over-shooting the desired alignment configuration, as he illustrates in the diagram below.

(10) Mis-alignment of opposite-edge aligned constituents

a. b.

This problem of comparing violations may not be insurmountable,[16] but there is a second problem. Once violation of this constraint is compelled, one possible solution is to *delete* the second, argument of the constraint, thus the internal prosodic word, altogether. This

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[16] For example, we could conceivably construct two separate constraints: one for the case of overlap, another for when alignment falls short of the target.

option is illustrated in the tableau below (the tableau is taken directly from McCarthy & Prince, and is in Containment Theory, (Prince & Smolensky 1993)).

(11) Constraints:

ONSET: Syllables must have onsets.
FOOT BINARITY (FTBIN): Feet must be binary under syllabic or moraic analysis.
FILL: Do not insert structure.

(12) V-initial Suffixation /na+aanc^{h}i/

	ONSET	FTBIN	SFX-TO-PRWD	FILL
a. na].| aanc^{h}i	*!	*!		
b. naTA].| aanc^{h}i	*!			**
c. na.| aanc^{h}i]	*!		*	
d. naTA].T| aanc^{h}i			*	***!
e. ☞na.T| aanc^{h}i]			$\underline{*}$	*

The underlined violation of SFX-TO-PRWD should be compared to the violation of candidate (12d) on the same constraint. These violations must be identical for the sake of the analysis (so that the decision can be passed on to FILL; we know that FILL is ranked lower because augmentation occurs with C-initial suffixes, e.g. *naTA-piro*). Thus, I argue that RED = PrWd avoids this problem of distance vs. existence.

2.4.2 Additional cases of compelled affix copying

If the reduplicant were able to be positioned by a constraint like LEFTMOSTNESS (McCarthy & Prince 1993), then typologically, we would expect to find cases where the reduplicant would seek out the left edge of the word, regardless of the morphological identity of the material directly to its right. Given the overwhelming tendency for RED to copy root material, this prediction does not appear to be correct.

The constraints thus far predict that any copying of affixes must be compelled. This section presents some examples where reduplication of affixes occurs.[17]

2.4.2.1 Tagalog

In some cases, it appears that the stem is at least optionally the base for reduplication, as variation can be found in the output. No meaning difference appears to result from the affix movement. Thus, the placement of the reduplicant is clearly dependent on the structure of the base. The examples of this type of variation can be found in Tagalog (Carrier-Duncan 1984, Martin 2002), and in Choctaw (Lombardi & McCarthy 1991).

The Tagalog case involves the addition of a topic-marking (TM) affix. A TM affix on a verb indicates the role played by the NP marked by the particle *ang*; all Tagalog sentences contain an *ang*-marked NP. The TM itself can be reduplicated only if it is not word-initial. Alternatively, the left edge of the root may also reduplicate. All options have exactly the same meaning, i.e. 'contemplated' (unrealized) and imperfective aspects.

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[17] Wolio (Uhrbach 1987, Anceaux 1987) may provide a case to challenge the claim made here, as the source of the compelling force is not clear. Uhrbach cites Wolio as a case where the base for reduplication is the full word, including any affixes: e.g. */RED, ma+puti/* → *mapu-maputi* 'whitish'; */RED, po+pa+lala/* → *popa-popalala* 'give each other opportunities'. Uhrbach explains that unfortunately further details concerning the glosses were not available in the text she consulted. Anceaux (1987) is a Wolio-English dictionary. However, the additional illumination provided here remains dim; *ma-* is an 'intransitive verbal prefix', *po-* is a 'verbal prefix', and *pa-* is a 'verbal prefix for causatives'. The data are duly noted as potential counter-examples, however, until more can be uncovered regarding their glosses and productivity, I set them aside for the time being.

(13) ma + ʔi + pag + bigay

potentative (ability) Topic marker Transitivity marker give

‘happen to be given’

a. ma+**ʔi**+pag+bigay → ma+ ʔiː -ʔi+pag+bigay

b. ma+ʔi+**pag**+bigay → ma+ʔi+ paː -pag+bigay

c. ma+ʔi+pag+**bi**gay → ma+ʔi+pag+ biː -bigay

‘will happen to be given’

In spite of the fact that the reduplicant has alternative locations, Carrier notes that it may occur only once in a word. What is of interest in the context of the discussion is that the left edge of the root constitutes one of the possible base edges for anchoring.

2.4.2.2 Balangao

The case of Balangao is similar. Continuous aspect reduplication can apply to a root or to a stem (Lombardi & McCarthy 1991:60). In Lombardi & McCarthy’s analysis, a gemination rule makes the first mora of the stem extraprosodic. The output varies depending on whether gemination occurs before or after prefixation.

(14) Two possible derivations for *dakál* 'make bigger'

a.			b.	
Root:	dakál		Root:	dakál
Base:	(da)kál		Prefixation:	padakál
Prefix μ:	μ + kal		Base:	(pa)dakál
Spread:	kkal		Prefix μ:	μ + dakal
Concatenate:	dakkál		Spread:	ddakal
Reduplication:[18]	dadadakkál		Concatenate:	paddakal
Prefixation:	padadadakkál		Reduplication:	papapaddakal
Prefixation:	ʔepadadadakkál		Prefixation:	ʔepapapaddakal
'continuously make bigger'			'continuously make bigger'	

Here again, no meaning change results in the placement of the affix in the two possible positions within the stem.

Although these cases seem to provide a counter-example to the claim that prefixes do not copy, note that in each case the root-initial syllable is still one of the possibilities. This is a thorn in the side of the claim that affixes cannot be included in the base for copying unless compelled for structural or semantic reasons (see below); they must be considered as research in base left edges continues.

2.4.2.3 Chamorro

One case that poses less of a problem however is when a particular affix is targeted for copying. One example comes from Chamorro (Topping 1973:258). In the relevant pattern, when verbs containing the passive prefix *ma* are nominalized through reduplication, then it is the passive marker, and not the left edge of the root, which serves as the left edge of the base:

[18] The light syllable reduplicant is optionally repeated.

(15) Nominalizing reduplication

Root		*Root + Passive*		*Reduplicated form*	
kannoʔ	'eat'	ma+kannoʔ	'be eaten'	<u>má</u>+makannoʔ	'edible'
gimen	'drink'	ma+gimen	'be drunk'	<u>má</u>+magimen	'drinkable'
chupa	'smoke'	ma+chupa	'be smoked'	<u>má</u>+machupa	'smokeable'
tugeʔ	'write'	ma+tugeʔ	'be written'	<u>má</u>+matugeʔ	'writeable'
taitai	'read'	ma+taitai	'be read'	<u>má</u>+mataitai	'readable'

For reasons that are admittedly not altogether clear, reduplication targets the passive prefix specifically. I assume that this requirement overrides the otherwise default situation in which the root and base are in correspondence, and it is thus the prefix itself that is 'privileged' for the purpose of this process.

2.5 Constraining base movement

Although the proposal entails that perfect alignment of the base and root is violable, this violation must be constrained to keep it from extending or shrinking in unattested and implausible ways. As mentioned in the beginning of this chapter, the limit for expansion appears to be the syllable to which the root-initial segment belongs; the limit for shrinkage seems to be the first onset of the root. A common problem for systems of RED placement (McCarthy & Prince 1993b *et seq*., as well as Downing 1998a,b, Kim to appear) is avoiding the prediction that RED copy material too far inward, thus shrinking the base excessively, in order to avoid additional violation of a given constraint. For example, when ALIGN-L (RED, Stem) pulls RED leftward, this has the desired base-maximizing effect.

(16) Left-aligned RED

/RED, badupi/	*VELAR	ALIGN-L(RED, Stem)
a. ☞<u>ba</u>-badupi		
b. ba-<u>du</u>-dupi		*!*
c. badupi-<u>pi</u>		*!*****

In the above tableau, things are as we would expect; RED appears at the left edge of the word and the base is maximized. However, markedness of the place feature *velar* leads to an unattested type of infixation in the following example:

(17) Emergent velar markedness: *VELAR >> ALIGN-L(RED, Stem)

/RED, kanumi/	IDENT-BR	*VELAR	ALIGN-L(RED, Stem)
a. <u>ka</u>-kanumi		**!	
b. ❽ ka-<u>nu</u>-numi		*	**
c. kanumi-<u>mi</u>		*	***!***
d. <u>t_1a</u>-$k_1$anumi	*!	*	

Although the over-eager RED infixation is illustrated here using a RED-alignment constraint, the problem is one that exists for root expansion (Kim to appear) and base optimization (Downing 1998a,b) as well. Below, I illustrate the possibility that *VELAR could force base contraction.

(18) Emergent velar markedness: *VELAR >> MAX(Rt,B)

/RED, kanumi/	*VELAR	LEFT-ANCHOR	MAX(Rt,B)
a. <u>ka</u>-(*kanumi*)$_B$	**!		
b. ❽ ka-<u>*nu*</u>-(numi)$_B$	*		**
c. (*kanumi*)$_B$ -<u>mi</u>	*	*!	

LEFT-ANCHOR can be satisfied regardless of the content of the base (18a,b). Given that *VELAR is ranked highly enough to abbreviate base content here, the infixing candidate (18b) is the unlikely winner.

This problem is related to the longstanding puzzle in the IO realm: why is featural markedness typically resolved by simplification, but not outright deletion? This lack of root-base deletion for featural markedness gain is striking, given that it holds even in languages where certain types of markedness-generated shrinkage are tolerated.

A tentative solution to this recalcitrant problem is to impose a fixed ranking of constraints: MAX-RtB >> Featural Markedness. (This ranking however simply encodes the observation.)

(19) Universal fixed ranking I: inhibits unwarranted base expansion or shrinkage
MAX-RtB >> Featural Markedness

With such a ranking in place, a candidate such as (18b) could never be optimal.[19] Only structural constraints, such as ONSET, could appear high enough in the hierarchy to force this behavior.

Base-reduplicant faithfulness constraints need to be subdued as well. There are two ways to satisfy base-reduplicant maximization (i.e. MAX-BASE REDUPLICANT, (MAX-BR)). One is by total reduplication. The other is by infixing to a smaller base (cf. Spaelti 1997). ALL-σ-LEFT functions here as a minimizer, penalizing each syllable not aligned to the left edge of a prosodic word (Ito & Mester 1997). Both strategies are illustrated below.

(20) Total reduplication

/RED, badupi/	MAX-BR	ALIGN-L (RED, Stem)	ALL-σ- LEFT
a. ☞badupi-(*badupi*)$_B$			*****
b. ba-(*badupi*)$_B$	d!upi		***
c. *badu*-pi-(*pi*)$_B$		*!***	

---

[19] Given the architecture of constraint hierarchies, there is the possibility that a constraint 'C', highly ranked, could force violation of MAX-RtB, and then an infixing candidate could emerge. However, I do not foresee any such constraint arising.

(21) Infixing to a smaller base

/RED, badupi/	MAX-BR	ALL-σ- LEFT	ALIGN-LEFT (RED, Stem)
a. badupi-(*badupi*) B		*****!	
b. ba-(*badupi*) B	d!upi	***	
c. ☞*badu*-pi-(*pi*) B		***	****

I assume that MAX-BR cannot compel infixation of the sort seen in candidate (20c, 21c). There are no clear cases in the literature that require this type of exploitation of MAX-BR. Furthermore, for theory-internal reasons, it would be problematic to allow apparent right-edge copying in a case such as this, which is independent of all other qualities of the language (most notably for the discussion here, stress). The winning candidate in (21) would effectively target right edge material. Rather than allow for this type of analysis for apparent right-anchored cases, I eliminate the possibility of this kind of winner generally, by positing another fixed ranking: MAX-RtB >> MAX-BR.

(22) Universal fixed ranking II: inhibits unwarranted base shrinkage
MAX-RtB >> MAX BASE-REDUPLICANT

By ruling out the typological possibility that right-edge material can form the base for the sole purpose of MAX-BR satisfaction, another result is that reduplicative copying will necessarily be achieved only by active targeting of a privileged position, by means of a Positional Anchoring constraint.[20]

In addition to ruling out *badu-pi-(pi)*, where the base has shrunk in order to satisfy MAX-BR, the system also rules out the gratuitous shrinking of the base in the other direction, e.g. *ba-(ba)dupi*. This base-shrinking candidate will always lose out to the base-maximized *ba-(badupi)*.

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[20] This assertion is slightly overly optimistic. See appendix B of Chapter 1 for a case in which HEAD-MATCH BR alone seems to condition the position of RED.

2.6 What is in a base?

The study of what exactly constitutes the base for reduplication is still an unresolved issue in the literature.[21] Earlier work has isolated morphological and prosodic constituents as possible bases (Broselow & McCarthy 1983, McCarthy & Prince 1996). Later work in terms of Optimality Theory characterized the base as the string adjacent to the reduplicant in the output, with no direct conditions on what the base may be (McCarthy & Prince 1993b, Urbanczyk 2000). Giving the notion such a general character allows for maximum results to come from constraint interaction as opposed to having special requirements made by the constraints themselves. Markedness conditions and BR-Faithfulness then determine what ultimately will copy. A third proposal (Downing 1998a,b) claims that the base is optimized on the surface, in terms of satisfaction of a structural constraint at the periphery of the base. My proposal incorporates all of the above proposals.

In the account proposed here, as we have seen, the base is a malleable string drawn from the root or stem. Optimization does not target the base; it may only evaluate the form as a whole with respect to a given markedness constraint. Moreover, as discussed in §2.3, only structural markedness constraints can have the effect of shifting

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[21] In addition to the systems outlined here, I have found two isolated examples in the literature of direct appeal to the base shape/content. These examples occur without any discussion of the reference to the base shape within the constraint. Spaelti (1997:141, 155) proposes for Oykangand the constraint: ALIGN-EDGE (Base, PrWd), which crucially requires the left edge of the base to coincide with the left edge of a prosodic word. One problem with this constraint: when it is threatened to be violated, e.g. in *i.yal$_{PrWd}$[mal.mey]*, the best solution is to delete the prosodic word, in order to get rid of the alignment violation, (thus, *i.yal.m- e.y-ey*, by his constraint ranking). Ola (1995:80) also appeals to the base within an alignment constraint in her account of the optimality of V-initial reduplicant/base in Owon Afa distributive reduplication, e.g. *bàtà* (which is in variation with *ɪbàtà*) → *ɪbɪ-ɪbàtà* 'every shoe': ALIGN-L (Base, L; Nucμ, L), 'the base must begin with a V'. This constraint however overlooks the fact that the canonical Benue Congo noun shape is *VCV*; clearly, such a constraint could do much damage to the typology, contravening TETU of onsetless syllables in a language without such an independent requirement for vowel-initial morphemes. If a general markedness constraint $*\#V_{Noun}$ is active in the language, then one possible solution would be to locally self conjoin (Smolensky 1995) $*\#V_{Noun}$ & $*\#V_{Noun}$ in the domain of the word.

the edges of the base. Thus, 'global structural markedness', i.e. structural markedness that evaluates the output form as a whole, is the only force that can cause displacement of the base left edge from the left edge of the root.

The theories to be compared are briefly outlined here. First, there is the Morphological Constituent Hypothesis (MCH). (Broselow & McCarthy 1983, McCarthy & Prince 1996). Under this hypothesis, the base is the root. This hypothesis also allows for prosodic constituents as well to serve as the base, but in this section we will set these examples aside (see Chapter 3).

Second, we have the Adjacent String Hypothesis (ASH). This hypothesis is included here for comparison, however the failure of this approach to delimit the correct bases typologically was already outlined in the previous section, 2.5. Moreover, RED-alignment is not a possible means of base-maximization in the current theory (Chapter 1), thus root-base correspondence is the proposed alternative.

Third, we have Downing's Optimized Base Hypothesis (OBH). We will see here that under Downing's assumptions, her theory of bases allows for ambiguity in analysis when the base is altered to satisfy ONSET. Also, more damagingly, the system fails to limit the typological possibilities and does not generalize to the relevant fixed segment cases.

Comparing the three previous accounts of base formation with the Minimal Base Adjustment proposal made here (MBA), we have the following discrepancies. For a root that is C-initial, e.g. /RED, wadek/ → wad-(*wadek*): All theories agree that in the default case, the morphological left edge aligns with the left edge of the base.

2.6.1 Base expansion

Differences begin to arise when we consider a case of base expansion, e.g. /RED, s-ikuk/ → sik-(s-*ikuk*). The theories are compared below.

2.6.1.1 Morphological Constituent Hypothesis

In the MCH, the base is (*ikuk*). The data are not analyzable in these terms.

2.6.1.2 Adjacent String Hypothesis

In the ASH, the base is (s-*ikuk*). McCarthy & Prince (1995) discuss two possible means of achieving this output; ‘exfixation’, as is assumed here, where the *s* of the base is associated with the prefix (23a) and prefix/reduplicant ‘fusion’, whereby the *s* of the base has no morphological affiliation in the output (23b).

(23) Possible analyses for reduplication of s-*ikuk*[22]

a. Exfixation:

```
Prefix   RED           Stem
  |      | | |        / | | \
  s_i    | | |        i k u k        Input
         | | |        | | | |
         s i k   s_i  i k u k        Output
         RED     BASE
```

[22] We know that RED is prefixed to the root due to examples like */s-iš-RED-expeč/* → *s-i* *<u>šex</u>-šexpeč*, where the reduplicant is once again adjacent to the root, with an interloping C, which appears to correspond to the C from the closest prefix.

b. Fusion:

```
Prefix      RED         Stem
  |        /|  |        /| |\
  s       / |  |        i k u k       Input
  |      /  |  |        | | | |
  s         i  k    s   i k u k       Output
RED                 BASE
```

McCarthy & Prince argue against the 'immediately plausible' exfixation analysis because it requires metathesis of *s* and RED (assuming the input /s+RED+ikuk/), when these morphemes are not sisters. This violates a universal Scope Concordance Condition that they posit (see McCarthy & Prince 1995, as well as Downing 1998b:100-108 for discussion). The advantage of the exfixation plus base adjustment analysis is that it straightforwardly defines a typology of root-base misalignment, as pointed out by Downing 1998b. It is not clear whether a fusion analysis makes similar typological predictions.

2.6.1.3 Optimized Base Hypothesis

Downing (1998a,b) refers to the base as a 'P-Stem', or morpho-prosodic stem, citing Inkelas (1989). Inkelas argued in favor of a morpho-prosodic constituent that is smaller than the prosodic word, but is distinct from constituents of the metrical hierarchy, (foot, syllable). The grounds for this proposal is Selkirk's (1986) proposal that all phonological rules apply not within domains defined on morpho-syntactic structure, but rather within morpho-prosodic domains. Evidence that Inkelas presents in favor of morpho-prosodic constituents comes from extraprosodicity, which she analyses as a mismatch between morphological and morpho-prosodic constituents. An immediate example comes from English final syllable extraprosodicity (Inkelas 1993, Downing 1998b). The domain of stress assignment is argued to be the morpho-prosodic (P-)noun, which excludes the final syllable (except in cases of monosyllabic words, which are forced to include the final and only syllable in order to be parsed).

(24) Extraprosodicity as evidence of a P-Stem

a. <Pamela>$_m$	[Páme]$_p$ la	
b. <dog>$_m$	[dóg]$_p$	(*[ ]$_p$ dog)

Downing exploits this sub-lexical morpho-prosodic constituent, P-Stem, claiming that this constituent can serve as the base for reduplication. Misalignment of the morpho-prosodic constituent and the morphological constituent from which it is formed can be motivated to improve the prosodic well-formedness of the base.

The system proposed here, in which the base is a maximized version of the root, draws from Downing's (1998a,b) proposal. In her system of base formation, markedness at edges can compel circumscription of the marked element at the edge of a base. Reduplicants could then subcategorize for these 'Prosodic Stem' bases, per an alignment constraint requiring the right edge of RED to align to the left edge of a Prosodic Stem. Thus, in Timugon Murut, vowels are skipped over when forming the reduplicant because ONSET does not allow them to be included in the Prosodic-Stem:

(25) Timugon Murut reduplication

a. C-initial roots

bu-bulud	'hill/ridges in which tuberous crops are planted'
li-limo	'five/about five'

b. V-initial roots

om-po-podon ‘flatter/always flatter’
in-di-dimo ‘five times/about five times’

She argues that the analysis in terms of circumscription is superior to one in which emergent structural markedness determines the shape of the reduplicant. Her evidence for this claim comes from parallel cases of circumscription of marked structure at the edges of bases for stress and tone assignment. As the Emergence of the Unmarked in reduplication depends crucially on the addition of at least one violation for the repeated marked structure in reduplication, (which does not happen in cases involving no reduplication), then the TETU ranking cannot generalize to cases involving only tone and stress. An example is given from high tone assignment in KiKerewe to illustrate this point.

(26) No TETU, yet onset-initial domain preferred

akaluunduma, H	MAX-IO	ONSET	M-Stem ≈P-Stem
a. ☛ desired winner {a[kálúunduma			*!
b. ☞ actual winner {[ákáluunduma			

(26b), which has a perfectly left-aligned pair of high tones, is selected as optimal; there is no increase in ONSET violation by aligning perfectly. However, (26a) is the actual winner. This candidate avoids placing a high tone on a peripheral onsetless syllable. Downing claims that this is achieved through maximizing the base while circumscribing the onsetless vowel at the left edge.

One problem arises because this argument crucially depends on the non-existence of independent constraints that would rule out high tone or stress on onsetless syllables. In fact, evidence abounds that constraints against stress or high tone on onsetless syllables are needed. Kawu (2000) (and references therein) shows that onsetless high-toned *i* is marked in Yoruba; he argues that prefixation of an affix of this nature leads to copying in order to provide an onset.

(27) Gerundive formation: C_1í+C_1V_1

jó	jíjó	'dance'
kú	kíkú	'die'
mɔ̀	mímɔ̀	'know'
là	lílà	'split'

There is also various evidence that foot onsets can be independently required. This is further proof that 'onsetless initial syllables' do not deserve the special category status that they receive in Downing's system.

German glottal stop insertion, for example, calls for Onset to be satisfied foot-initially, regardless of morpheme structure.

(28) German glottal stop insertion (Alber 1999, Féry 1991, Hall 1992)

a. onsetless syllable is unstressed (no insertion of ʔ)

[Théo]	'Theo'	
Mu[séum]	'museum'	
[géhe]	'go 1 sing'.	= [geːə]

b. onsetless syllable is stressed (insertion of ʔ)

The[ʔáter]	'theater'
Be[ʔámte]	'civil servant'
Ru[ʔín]	'ruin'

The German data do not lend themselves to an analysis in terms of extraprosodicity, or mis-alignment of morphological and morpho-prosodic constituents.

Moreover, an analysis of Aranda data, in which an initial onsetless syllable does seem to be circumscribed for stress assignment, does qualify as a case for P-Stem formation. Giving it a P-Stem analysis however precludes a unifying analysis of the data in (28) and (29).

(29) Aranda stress (Strehlow 1943-44, Takahashi 1994, Goedemans 1996, Downing 1998b)[23]

a. C-initial words: stress is initial

bálkala	'in vain'	rínbinba	'beak, lips'
kála	'already'	ká:puta	'head'

b. V-initial words: stress peninitial; initial in disyllabic words

arátja	'straight'	ergúma	'to seize'
ilúlama	'to descend'	indá:go:bma	'mountain devil'
but: ílba	'ear'	ápma	'snake'

I suggest rather that the two cases are related, both due to a markedness constraint, something to the effect of ONSET(foot), as already proposed by Takahashi (1994) and Goedemans (1996) for the Aranda data.

To go one step further in exploring the circumscription of marked elements at edges, cases like the two following ones also show failure of the mis-alignment of a morphological and a morpho-prosodic constituent to generalize to additional cases that are clearly related. For example, Nanni (1977) shows that suffixation of *–ative* in American English is sensitive to the quality of onset of the foot built on it would have. That is, whether a foot is constructed or not depends on whether or not the onset is an obstruent.

[23] Additional data show that minimality effects can lead to a V-initial foot.

(30) *-Ative/-ətive* suffixing (Nanni 1977)

Conditioned by the *quality of the would-be foot onset*:

ínno(**v**àtive)	but	íte**r**ətive
quáli(**t**àtive)		nómi**n**ətive
légi(**sl**àtive)		manípu**l**ətive

A secondary stress foot is built if the onset will be an *obstruent*; foot-building is foregone if the foot onset will be a *sonorant.* Reference to a P-Stem is of no help. Below, I offer a tentative solution, using the following constraints:

(31) a. HEAD-MATCH-OO$_{\text{ATIVE}}$ (HD-MCH(main)): The main stressed vowel in the output string S1 corresponds to the main stressed vowel in S2. Alderete 1996, Pater 1995.

b. Parse-σ: All syllables must belong to feet. McCarthy & Prince 1993a,b.

c. ALIGN-RIGHT (HEAD FOOT, PROSODIC WORD) (ALIGN-R): The right edge of the head foot must align with the right edge of a prosodic word. McCarthy & Prince 1993a.

d. *ONSET/foot(sonorant) (*ONSET/foot(son)): The foot onset must not be a sonorant consonant.

e. HEAD-MATCH-OO$_{\text{ATIVE}}$(HD-MCH(*Ӑtive*)): Any stressed vowel in the output that corresponds to a vowel in the suffix -*Ӑtive* must not be stressed. (Penalizes any vowel in –*ative* that is stressed in the output.)

*ONSET/foot(son) is assumed to be part of a markedness hierarchy in which this constraint will dominate the less marked *ONSET/foot(obstruent). In addition, the analysis makes reference to a conjoined constraint, HD-MCH(-*Ӑtive*) & *ONS/ft(son). This constraint, following Smolensky (1995), rules out the “worst of the worst”, in other words, the candidate that violates both of these constraints.

(32) Secondary stress depends on quality of foot onset

[ínnovàte], +*Ative*	HD-MCH (main)	HD-MCH(-*Ative*) & *ONS/ft(son)	PARSE -σ	ALN-R(HDFT , PRWD)	*ONSET/ ft(son)
a. ☞(ínno)(vàtive)				σσ	
b. (ínno)vative			σ!σ	σσ	
c. inno(vátive)	*!		σσ		
[íteràte], +Ative					
a′. (íte)(ràtive)		*!		σσ	*!
b′. ☞(íte)rative			σσ	σσ	
c′. ite(rátive)	*!	*	σσ		

When the would-be secondary stress foot has a sonorant onset, it is no longer able to be a foot that would include the lexically unstressed *-Ative*. The special main stress HEAD-MATCH constraint for this suffix leads to the preservation of the original main stressed foot.

A final case sensitive to onset quality is stress assignment in Pirahã. Stress is assigned based on the following condition: 'Stress the rightmost token of the heaviest syllable type in the last three syllables of the word'.

(33) Pirahã 'onset-sensitive stress' (Everett 1988)

Scale of heaviness: $C_{[-voice]}$ VV > $C_{[+voice]}$ VV > VV > $C_{[-voice]}$ V > $C_{[+voice]}$ V

That is, all other things being equal, voiceless foot onsets are preferred over voiced ones.

These examples show that circumscription of marked elements at the edge of the base as a methodical approach will not generalize in a satisfactory way. Moreover, in order to apply the notion of P-Stem as base to reduplication and non-reduplicative cases of stress and tone assignment, Downing resorted to constraint conjunction, using Hewitt & Crowhurst's (1996) logical conjunction. Logical conjunction, rather than ruling out the 'worst of the worst', the effect of Smolensky's proposed conjunction, rules *in* only the best of the best. In other words, in order to satisfy a constraint, a candidate must satisfy both conjuncts. The crucial type of conjoined constraint for her analysis is: ONSET ∩ ALIGN-L(Tonal Domain, σ). That is, all tonal domains must be left-aligned with a syllable, and that syllable must contain an onset.

To return to the Kikerewe example, we see that using the conjoined constraint allows us to construct a P-Stem that is analogous to the bases in reduplication that also avoided initial onsetless syllables. The following are taken from Downing (1998a), with minimal adjustment. The P-Stem is in braces; the tonal domain is in brackets. The new constraints are defined below

(34) a. DEP M-P: Every element of the morpho-prosodic-Stem (P-Stem) has a correspondent in the morphological-Stem (M-Stem).

b. MAX-M-P: Every element of the M-Stem has a correspondent in the P-Stem.

(35)

akaluunduma, H	DEP M-P	DEP-IO	ONSET ∩ ALIGN-L (TD, σ)	ONSET	MAX M-P
a. ☞{a[kálúunduma				*	*
b. {[ákáluunduma			*!	*	
c. {Y[ákáluunduma	*!	*			

The analysis does unite the data in terms of the behavior of onsetless initial syllables in these cases. However, the cost of doing so is too great, and the benefits are unclear, given the apparent difference underlying non-reduplicative cases, as illustrated in particular by the stress cases discussed above. I reject the constraint conjunction adopted by Downing to unify these cases, and suggest rather that the Emergence of the Unmarked is sufficient to account for markedness reduction in reduplication. In both cases, markedness reduction is "global" in the sense that the overall markedness of the resulting form is always reduced. The persistent role of global markedness reduction is relevant in fixed segment affixation as well (see §2.8 for a comparison of the two approaches). Independent markedness constraints will rule out cases of edge markedness in the types of non-reduplicative examples that Downing examines.

2.6.2 Base shrinkage

Using the Axininca Campa example, /RED, n+osampi/ → n-*o(sampi)*-sampi, we have one more source for comparing the different ways of assigning a base.

2.6.2.1 Morphological Constituent Hypothesis

In the MCH, the base is (*osampi*). For infixing reduplication like this, McCarthy & Prince 1996 posit vowel-initial syllable extra-metricality, word-initially. The apparent arbitrariness of such an environment is better explained in a constraint-based analysis, in which the effects of the constraint ONSET, even though violated in the language generally, plays an active role (McCarthy & Prince 1993a).

2.6.2.2 Adjacent String Hypothesis

In the case of base shrinkage, an analysis in terms of the ASH is straightforward: MAX-IO >> ONSET >> MAX-BR.

2.6.2.3 Optimized Base Hypothesis

Under the OBH, the base is also taken to be (*sampi*). Once again however, there is an ambiguity of analysis. Either ONSET simply dominates the base-maximizing constraint MAX-MP, or else there is (logical) constraint conjunction.

2.6.3 Consonant clusters as base budgers

We see that ONSET can cause base expansion or shrinkage. Before listing several cases where ONSET can play this role, I will also note that *CC, the constraint against onset clusters, may also lead to base alteration. However, only shrinkage appears to be compelled by *CC. That is, when the base begins with an onset cluster, the reduplicant can effectively infix just enough to shrink the adjacent base so that the base begins with a simple onset, and thus RED does as well (36a). What we do not see are cases that will expand to include prefixes in the base when the root begins with a consonant cluster. The pattern would be as in (36b):

(36) Hypothetical data, pattern presumed to be unattested

	no reduplication	*reduplication*
a. No fixed segment prefix:	bladupi	*b*-la-(*ladupi*)
b. With CV prefix *pe*-:	pebladupi	pe-(pe*bladupi*)

It is not clear whether this type of expansion should be ruled out. Presently, it is predicted to exist, and is thus taken to be an accidental gap.

Furthermore, what this approach predicts is that infixation cannot go further than the rightmost onset consonant of the leftmost onset cluster to resolve the additional *CC violation. That is, barring additional constraints, a candidate like **tra-<u>ba</u>-baho* would always be harmonically bounded by the candidates *t-<u>ra</u>-rabaho* (parallel with cluster simplification in Latin *s-<u>po</u>-pondi*), and *<u>ta</u>-trabaho* (Tagalog), which will have the same number of *CC violations, but will fare better on MAX-RtB.[24]

The chart below summarizes the examples of languages that exhibit each type of displacement. As we see, it is possible for one language to exhibit more than one type of behavior.

(37) Typology of L-ANCHOR cases: Structural constraints compel shifting of base

	ONSET	*CC
Expand base	Ineseño Chumash, Kinande (noun), Kihehe	(?)
Shrink base	Axininca Campa, Isi Xhosa (Bella Coola)	Latin, Ineseño Chumash

In order to better satisfy ONSET, the base can be either contracted or expanded. This appears to be an option limited to a window of an onset that precedes the root-initial vowel and the onset that follows this vowel. For *CC, only cases of shrinkage have been found thus far.

2.6.4 Examples of base adjustment

In this section, I offer examples of both ONSET and *CC-compelled cases of base alteration from the default left edge of the root. In the cases of ONSET-compelled expansion (38), the reduplicant will copy affixal material only when this will lessen syllabic markedness.

[24] The same is true of an alignment account, *CC >> ALIGN L(RED, Stem).

(38) ONSET compels expansion of base

a. Ineseño Chumash

C-initial stems: no expansion

<u>tʃʰum</u>-*tʃʰumaʃ*	'islanders, Chumash people'	base = *tʃʰumaʃ*
<u>pon</u>-*pon'*	'trees'	base = *pon'*

V-initial stems: expanded

s-ikuk	<u>sik</u>-s*ikuk*	'he is chopping'	base = s*ikuk*
s-iʃ-expetʃ	ʃi-<u>ʃex</u>-ʃ*expetʃ*	'they two are singing'	base = ʃ*expetʃ*

b. Kinande nominal reduplication, 'a real X'

C-initial stems: no expansion

o-ku-<u>gulu</u>-(*gulu*)	'a real leg'	base = *gulu*
o-mu-<u>longo</u>-(*longò*)	'a real village'	base = *longò*

V-initial stems: expanded

ó-mw-ana	ó-<u>mw-aná</u>.(mw-*ana*)	'a real child'	base = mw-*ana*
e.ky-úmbà	e.ky-<u>úmba</u>-(ky*úmbà*)	'a real room'	base = ky*úmba*

c. Kihehe

C-initial stems: no expansion

kú-<u>ceenga</u>-(*ceénga*)	'build'	base = *ceénga*
kú-<u>teleka</u>-(*teléka*)	'cook for'	base = *teléka*

V-stem: expanded

kw-íimbíla	<u>kwíimbila</u>-(kw*iimbíla*)	'sing'	base = kw*iimbíla*
kw-áaka	<u>kwáaka</u>-(kw*aáka*)	'burn'	base = kw*aáka*

In other cases where satisfaction of ONSET is at issue, a different typological possibility is witnessed. The base shrinks in order to satisfy the constraint; the root-initial vowel (as well as any coda consonants) are excluded from the base.

(39) ONSET compels shrinkage of base:

a. Axininca Campa

C-initial stem

word	reduplicated form	stem	base
non-tʰaaŋki	non-*tʰaaŋki*-tʰaaŋki	/tʰaaŋki/	tʰaaŋki
noŋ-kawosi	noŋ-*kawosi*-kawosi	/kawosi/	kawosi

V-initial stem (RED is suffixed)

n-osampi	n-*o*(*sampi*)-sampi	/osmapi/	sampi
n-osaŋkina	n-*o*(*saŋkina*)-saŋkina	/osaŋkina/	saŋkina

b. IsiXhosa

C-initial

word	reduplicated form	stem	base
ndi-ya-táka 'I am jumping'	ndi-ya-taká-(*taka*)	/táka/	taká
ndi-ya-fumána 'I am getting'	ndi-ya-fuma-(*fumána*)	/fumána/	fumana

V-initial

ndi-y-oyísa 'I am defeating'	ndi-y-*o*-yisá-(*yisa*)	/oyísa/	yisa
ndi-y-onwábisa 'I am making happy'[25]	ndi-y-*o*-nwabi-(*nwábisa*)	/onwábisa/	nwabisa

It is also possible for a base to shrink in order to minimize violations of *CC. The only examples I have found involve shrinking the base in order to perform better on this constraint.

[25] I am setting aside variants that differ only with respect to the placement of tone.

(40) Chumash

C-initial

<u>*word*</u>	<u>*reduplicated form*</u>	<u>*stem*</u>	<u>*base*</u>
lew	lew-(*lew*)	/lew/	lew
‘mythological creature’			
mux	mux-(*mux*)	/mux/	mux
‘to crumble’			

CC-initial

skon	*s*-kon-(*kon*)	/skon/	kon
‘worms, reptiles’			
xšap	*x*-šap-(*šap’*) (~xšap-xšap’)	/xšap/	šap’ (~xšap’)
‘rattlesnakes’			

The Bella Coola case, which shows dramatic base contraction, is examined in more detail in the next section.

2.7 Bella Coola

2.7.1 Background: syllables in Bella Coola

The syllable structure of Bella Coola has been hotly debated in the literature. At the heart of the matter is the syllabification of obstruents, given the numerous vowelless words, e.g. *ɬχʷtɬcxʷ* ‘you spat on me’ (Bagemihl 1991, and references therein). Bagemihl claims that the maximal syllable is CRVVC;[26] all other segments are syllabically unaffiliated. Evidence from reduplication shows that CR is the only complex onset allowed in the language. He argues that unsyllabified obstruents however are not deleted, but rather are licensed moraically. Moraically licensed obstruents contrast with those that are copied but unlinked; the latter suffer deletion.

[26] Here, R = resonant, i.e. sonorant consonant; V = vowel or sonorant consonant.

Cook (1994) challenges the notion of moraic licensing, claiming that this innovation unduly complicates the prosodic structure of Bella Coola, and adds no insight into the behavior of obstruents. Cook's contention is that unsyllabified obstruents persist in the language due to an absence of Stray Erasure, not to the innovation of moraic licensing.

Setting aside the question of moraic licensing, what is crucial to the present discussion is that the only possible complex onset is CR, and that sonorant consonants can function as a syllable nucleus. Thus, syllabification of a string like *skma*, 'moose' would in present terms involve the interaction of the constraints *COMPLEX$_{obs}$/$_{obs}$, MAX-SEG-IO, and ONSET.

(41) a. ONSET: Syllables must have onsets.

b. MAX-SEG: All segments in the input must have a correspondent in the output.

c. *COMPLEX$_{obs}$/$_{obs}$: Onset obstruent/obstruent clusters are not allowed.

d. LICENSE(C): All consonants must be dominated by a syllable node.

I assume that *COMPLEX is part of a hierarchy that reflects the universal implications of onset clusters, e.g. a language that allows obstruent/obstruent onset clusters will allow obstruent/sonorant clusters. Thus, *COMPLEX$_{obs}$/$_{obs}$ >> *COMPLEX$_{obs}$/$_{son}$.

The following tableau shows the constraints at work, syllabifying the string *skma*:

(42) Syllabification of *skma*

/skma/	MAX-SEG	ONSET	*COMPLEX$_{obs\ obs}$	LICENSE(C)	*COMPLEX$_{obs\ son}$
a. σ s k m a			*!		*
b. ☞ σ s k m a				*	*
c. σ s k m a				**!	
d. σ k m a	*!				*
e. σ σ s k m a		*!		*	

These constraints on syllable structure play an important part in reduplication. We see that maximization of the base will drive the reduplicant to be syllabified differently than the corresponding base segments in some cases.

2.7.2 Reduplication

Reduplication in Bella Coola shows evidence of gradient sensitivity to the left edge of the root morpheme. In selecting material for the reduplicant, the following considerations come into play: a) the onset must be a single consonant, and b) the minimum sonority requirement for the nucleus of the reduplicant is that it be a sonorant segment. We see this both in the infixation that results when the leftmost segment(s) in the root do not contain a sonorant segment, and also in the outright failure of all-obstruent words to reduplicate.[27] Also, adjacency relations between segments in the base must be respected by corresponding segments in the reduplicant (CONTIGUITY-BR).

2.7.2.1 With an adjustable base

Within the proposed system, the gradience is achieved through minimal violation of MAX-RtB. In this discussion, I will be concerned only with the CV pattern, although similar restrictions hold of all of the reduplication patterns in the language.[28]

(43) Bella Coola CV reduplication data

#C roots			
	qayt	qa-(*qayt*)	‘hat/toadstool, diminutive’
	t̩l̩k^{w}	t̩l̩-(*t̩lk^{w}*)	‘swallow/continuative’
#CC roots			
	p'ɬa	*p'*-ɬa-(*ɬa*)	‘wink, bat the eyes/continuative’
	tqn̩k	*t*-qn̩-(*qn̩k*)	‘be under/underwear’
	skma	*s*-km̩-(*kma*)	‘moose/diminutive’
#CCC roots			
	stχ^{w}m̩	*st*-χ^{w}m̩-(*χ^{w}m*)-i	‘floor mat/diminutive’
	st'q^{w}lus	*st'*-q^{w}l̩-(*q^{w}lus*)-i	‘black bear snare/diminutive’
	t'ksn̩	*t'k*-sn̩-(*sn̩*)	‘shoot with a bow/cont’.

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[27] Bagemihl reports that nearly 10% of the Bella Coola lexicon is made up of all-obstruent words. For the few exceptions he notes of all-obstruent words that do reduplicate, either *i* or *n* is inserted into the base, providing a nucleus that is then acceptable in the system: ɬq’- → ɬn̩q’ → ɬn̩-ɬn̩q’.

[28] There are two other basic patterns: CVC- and V-. Both these and the CV- pattern examined here can combine with a syncope process that deletes the first stem vowel, as well as undergo phonological modification that is seen in unreduplicated forms as well, such as vowel lengthening. Other additional patterns are variations of the three basic types of reduplication. The pattern that a given lexical item exhibits is not predictable from its form; it must be lexically marked. The semantic content contributed by reduplication is also not consistent, and must be designated for each stem. The meaning associated with reduplication is usually diminutive for nouns, continuative for verbs, or else it may combine with other affixes to produce a derived form, which sometimes carries an idiosyncratic meaning. For discussion of the additional patterns and auxiliary phonological processes, see Bagemihl (1991).

#CCCC roots

qpsta	*qps*-ta-(*ta*)	‘to taste/iterative (actual)’
pɫtkn̩	*pɫt*-kn̩-(*kn̩*)-ɫp	‘bark of bitter cherry tree/~tree’

The data exhibit several interesting qualities. First, the reduplicant can be infixed deeply inside the root. However, RED only goes as far as is necessary to copy a sonorant nucleus. Even when a more sonorous nucleus is available, for example, with *skma* in **sk-ma-ma*, the leftmost possible string is still the one to serve as the base: *s-km̩-kma*. The same example also shows us the possible variation in syllable role. In this case, *m* is syllabic in the reduplicant, whereas it is a member of the onset in the base.

Assuming the syllabification above, we know that obstruent/obstruent clusters are not allowed in the language. Thus I assume in the candidates below that each syllable contains maximal syllabification of segments, (C, CR), but no CC clusters. Violations of LICENSE(C) are only counted for the reduplicated material.

(44)

	LICENSE(C)	MAX-RtB
a. ☞*s*-km̩-(*kma*)$_B$ –y		*
b. *sk*-ma-(*ma*)$_B$ -y		**!
c. sk-(*skma*)$_B$ -y	*!*	
d. skm̩-(*skma*)$_B$ -y	*!	

Examples such as this show that proximity of the correspondent of the leftmost segment of the root to the leftmost segment in the base is crucial. Candidate (44b) is preferable to (44a) with respect to the increased sonority of the nucleus. It is this comparison that shows the need for a constraint sensitive to the left edge of the root, here MAX-RTB.

2.7.2.2 Criticism of Bagemihl's analysis

Bagemihl claims that reduplication in this case is to a base characterized as a *foot*. The intuition behind Bagemihl's analysis is clear. Given the obvious link between reduplication and syllable structure, he first posits prefixing of RED at the leftmost syllable boundary. He revises this to prefixation to the left of the *foot*, given cases in CVC reduplication where the second C is a member of a second syllable in the base, e.g. *milix^{w} → mil-milix^{w}-ɬp, * mii-milix^{w}-ɬp* 'bear berry/ plant of the bear berry'. Bagemihl admits that this hypothesis "depends on complete analysis of the stress system of the language… given that stress most often appears to fall on the final syllable (occasionally the penult or antepenult, under conditions that are unclear), with no consistent secondary stresses, it does not appear that the foot structures posited here will be incompatible with this analysis", p. 613.

However, under this claim it is reduced to a coincidence that a language in which reduplication would behave like this has an apparent prosodic limit on roots, (namely, no larger than one foot). His attempt to capitalize unduly off of this fact leads the analysis astray. Moreover, in the couple of cases where footing does not seem to give the proper designation of the base, his analysis makes the prediction that infixing would occur, whereas we can see that sensitivity to the left edge of the morpheme (with emergent unmarked syllable structure) is clearly at play: (CVx- example with 'Initial Consonant Deletion'): t'iiχɬalam → ʔix-t'iiχɬalam; $_{\sigma}$(t'iiχ)$_{\text{ft}}$[$_{\sigma}$**(ɬa)** $_{\sigma}$(lam)] also, $\sigma_{\mu\mu}$ with syncope (p.628): kuɬulmx → kuɬ-k^{w}ɬulmx $_{\sigma}$(ku); $_{\text{ft}}$[$_{\sigma}$**(ɬu)** $_{\sigma}$(lm̩x)]. In both examples, the base seems to be an unfooted syllable, thus posing a problem for the generalization. Stress is not given for these forms, so they may in fact have the initial syllable exceptionally encompassed by a foot. However, then it would be a coincidence that in all cases where the base has more syllables than a single foot, the stressing was exceptional. More likely is that Bagemihl's original intuition was correct: affixation picks out the onset of the first syllable as a starting point. All cases, regardless of footing, would be covered under the proposed analysis. RED placement is contingent on syllable structure, as is implied by Bagemihl. In addition, the emergent requirement that the RED be syllabifiable entails that RED will copy from syllabified material. The further markedness reduction witnessed in this pattern is the exclusion of any unlicensed consonants. Thus, the leftmost C of the base will correspond to the leftmost C of RED; the second segment, whether vocalic or resonant, will serve as the RED nucleus.

2.7.2.3 Problems with a non-dynamically assigned base

McCarthy & Prince (1993/2001:137 fn.) note that Bella Coola provides an example where RED can be compelled to skip over one or more initial C's, in what is presumably prosodically compelled infixation. The constraint that they informally suggest forces the infixation is 'obstruents are not nuclei', or *NUC/obs. Although this seems reasonable, the problem comes when this constraint is considered in terms of its typological predictions. Without further stipulation, we should assume that any member of the '*NUC' family should be able to emerge. However, then we would make predictions along the lines of those discussed in §2.5. A concrete example can be constructed using the sub-hierarchy *NUC/i >> *NUC/a. If ALIGN-L RED >> *NUC/i (and a faithfulness constraint requiring the vowel quality of corresponding base and reduplicant segments to agree is undominated), then unattested infixation of RED can occur. For example:

(45) Unattested typology

dami → <u>da</u>-(*dami*)
dima → *di*-<u>ma</u>-(*ma*)

(46) Unattested infixing to syllable with unmarked nucleus

/RED, dima/	*NUC/i	ALIGN-L RED
a. ❽ *di*-<u>ma</u>-(*ma*)	*	**
b. <u>di</u>-(*dima*)	*!*	

In other words, by infixing, RED is then able to locally and faithfully copy the optimal nucleus, *a*. However, this type of affixation is unattested. In the proposed theory, it is ruled out by a combination of factors. First, alignment constraints do not position RED. Secondly, the fixed ranking proposed in 2.5 does not allow featural markedness, such as the constraint against the vowel *i* in the nucleus, to force shrinking of the base. Thus, we avoid this problematic prediction.

2.8 Minimal base adjustment and fixed segment affixation

Does an optimized base play a role in fixed segment affixation? The answer could very well be affirmative. In exploring the theory of RED placement, it was necessary to claim that RED could not be positioned by explicit alignment constraints, as is broadly assumed to be the mode of affixation of both reduplicative and fixed segment affixes. With respect to fixed segment affixes, it may be the case that in examples where a *VC* affix is infixed, e.g. *gr-um-adwet*, that the global structural optimization forces base shrinkage here as well. This could be forced with NO CODA, a constraint banning syllable codas, dominating MAX-RtB:

(47) Global structural markedness reduction

/um, gradwet/	NO CODA	MAX-RTB
a. ☞*gr*-u.m-(*ad.wet*)B	**	**
b. um.-(*grad.wet*) B	***!	
c. *gra.d*-um.-(*wet*) B	**	***!*

This is a major point of departure from Downing's theory. Under her formulation, the OBH could only serve to optimize the *base*. Here, the base in the optimal form begins with a (marked) onsetless syllable. This is tolerated in the theory promoted here, as the global results are improved. However, under Downing's theory, this case would be unrelated and would not involve base correspondence.

2.9 Minimal base adjustment hypothesis and truncation

We would expect that the proposed system of base formation would extend to truncation. A pattern in which ONSET caused base shrinkage would have the following properties: C-initial words would truncate as expected; the left edge of the word would correspond with the left edge of the base. However, in a V-initial word, the base would shrink. For example, hypothetical *abadupi* would have the base *a*(*badupi*). If L-Anchor characterized the truncation pattern, then *badu* would be a possible truncated form for *abadupi*. Such a prediction does not on the surface seem terribly unreasonable; further research will have to uncover whether such a pattern is indeed attested.

2.10 Conclusion

The boundary of the base for reduplication may diverge minimally from the edge of the root. This is caused by an optimization that does not target the base (contra Downing), but rather will occur in order to improve the markedness profile of the output as a whole. Structural markedness constraints can dominate constraints that require the base to be coextensive with the root. Because these base-root faithfulness constraints are directly involved in determining the base, we derive the fact that reduplicative morphemes are ‘internal’ affixes (Carrier 1984), in that they can be drawn inward toward the root, (even when additional affixes are added before RED). In addition, we see how a Positional Faithfulness account of anchoring can be preserved, even when the left edge of the maximized base, and not the actual root, is what is targeted for copying.

CHAPTER 3

EDGE ANCHORING

3.1 Introduction to Edge Anchoring

This chapter motivates constraints that target the *edges* of constituents for copying in reduplication. Two edge anchoring constraints are argued to be needed: one that targets main stressed foot edges and requires them to correspond with the edges of the reduplicant (EDGE-ANCHOR $_{\text{Head-foot}}$), another that targets morpheme edges, also requiring the correspondents to stand at RED's edges (EDGE-ANCHOR $_{\text{Base}}$).

(1) EDGE-ANCHOR $_{\text{Head-foot}}$: Each segment at each edge of the main stressed foot of the base must have a correspondent at the same edge in the reduplicant.[1]

(2) EDGE-ANCHOR $_{\text{Base}}$: Each segment at each edge of the base must have a correspondent at the same edge in the reduplicant.

The primary evidence in favor of these constraints are cases where (a) the right edge of the main stressed foot is copied, in addition to the left edge, and (b) both edges of the base are copied and edge oriented in RED. These are illustrated in (3a,b) respectively:

(3) Evidence of EDGE-ANCHOR

a. Yidiɲ (Dixon 1977, McCarthy 1997)

mulari	<u>mula</u>-[mula]$_{\text{Foot}}$ ri	'initiated man'
t^{j}ukarpa	<u>t^{j}ukar</u>-[t^{j}ukar] $_{\text{Foot}}$ pa-n	'unsettled mind'

[1] Although similar to a simpler constraint that would require relativization of MAX-BR to the onset and coda of a foot, we see in discussion of Makassarese (§3.4.3) that the onset and coda must not only be present, but must also appear at the edges of the base.

b. Tagalog (Carrier 1979, Carrier-Duncan 1984, McCarthy & Prince 1994)

walis	(mag)-walis-[walis] $_{\text{Base}}$	'sweep/sweep a little'
linis	(mag)-liːnis-[liːnis] $_{\text{Base}}$	'clean/clean a little'

(compare: baluktot → baluː-baluk[tot], 'bent/variously bent')

However, these constraints do not seem to be independently re-rankable relative to each other, when cross-linguistic predictions are taken into account. Most importantly, it does not appear that the edges of an indiscriminately large base can be targeted, e.g. hypothetical *mek*$_{10}$*-metgodupik*$_{10}$. The edges of the base are targeted only if it is coextensive with the head foot. Thus, I propose an inclusion hierarchy (Prince 1997) that captures the observed implications, as well as the additional edge effects outlined below.

Several languages are characterized according to the way in which their sensitivity to edges determines the reduplication pattern they exhibit. The proposed inclusion hierarchy is meant to track various degrees of partial reduplication that are incrementally closer to total reduplication. The hierarchy works as follows. In addition to constraints (1) and (2) above, the hierarchy involves and begins with the constraint LEFT-ANCHOR, discussed in Chapter 2:

(4) LEFT-ANCHOR (Base, Reduplicant): The left edge of the reduplicant corresponds to the left edge of the base.

Numerous patterns cross-linguistically satisfy only this constraint among the three mentioned. The inclusion hierarchy leaves LEFT ANCHOR as an independent constraint, the most "general" (i.e. least stringent). If any of the anchoring constraints can be satisfied, it will be LEFT-ANCHOR.

The next constraint is the following, which is the set including both LEFT-ANCHOR and EDGE-ANCHOR$_{\text{Head-foot}}$.

(5) {LEFT-ANCHOR, EDGE-ANCHOR$_{\text{Head-foot}}$}

This constraint is more stringent than either individual constraint alone; in order to be satisfied, a candidate must anchor to not only the left edge of the base, but to the edges of the main-stressed foot as well. [2] Any violation of either of these components will lead to violation of the constraint (i.e. violation is categorical). This constraint will be used to account for the Yidiɲ data seen above in (3a).

The next constraint to be added to the hierarchy is one that anchors to the edges of the *base*. Thus, (2) is added to the set in (5):

(6) { LEFT-ANCHOR, EDGE-ANCHOR$_{\text{Head-foot}}$, EDGE-ANCHOR$_{\text{Base}}$}

These three component constraints working together as a single constraint in the inclusion hierarchy have the effect of preserving a morpheme-final segment (Tagalog, §3.4.2), or inhibit RED-final epenthesis, even in the face of a constraint requiring consonants prosodic word-finally (Makassarese, §3.4.3). In addition, the constraint in (6) will be shown to force "contraction" of the base, where foot-medial segments from the base have no correspondents in the reduplicant. The constraint is also used to account for cases where reduplication becomes impossible when the base exceeds one foot in size; in these examples, periphrasis is required to convey what is otherwise expressed with

[2] McCarthy & Prince (1995) note that although a base *syllable* cannot be copied straightforwardly, with no sensitivity to whether the syllable is light, heavy, coda-final, etc., a foot can. This distinction is achieved in a rather heavy-handed way in the current system: a main-stressed foot edge faithfulness constraint is proposed, whereas none is proposed to target the edges of a stressed syllable. However, none of the theories I am aware of achieve this result in a less stipulative manner.

reduplication. Impressionistically, the constraints in this hierarchy represent intermediate gradations between left-anchoring and total reduplication.

As we will see, adopting this inclusion hierarchy will account for several right edge effects, without ever singling out the right edge alone as a target. The theory promoted here directly captures the dependence of right edge copying on left edge copying. In any of the contexts discussed in this chapter, copying of the right edge of a domain implies that copying of the left edge of the same domain must also occur. This is an effect not achieved by past accounts of the same cases, as will be pointed out. Adopting the above inclusion hierarchy allows us to generate the predicted typology, while ruling out numerous patterns that are otherwise predicted by the symmetric theory of anchoring.

The relevant data are presented below, grouped into the classes predicted by the existence of such a constraint. We see in (7) cases of contracting reduplication, where edge anchoring compels violation of base-reduplicant CONTIGUITY.

(7) RED-contracting reduplication

a. Semai (Diffloth 1976a,b, Sloan 1988, Hendricks 1998)

kʉːʔ	<u>kʔ</u>$_3$-[kʉːʔ$_3$]	'to vomit'
payaɲ	<u>pɲ</u>$_5$-[payaɲ$_5$]	'appearance of being disheveled'

b. Ulu Muar Malay (Hendon, 1966, Kroeger 1989)

sieʔ	<u>siʔ</u>$_4$-[sɪéʔ$_4$]	'is torn repeatedly'
dayaŋ	<u>dan</u>$_5$-[dayáŋ$_5$]	'friend'

Size considerations force reduplication to be partial; however, edge anchoring ensures that the consonants at each edge of the base will have correspondents in RED. We will examine these cases in closer detail in §3.2.

The following two familiar cases illustrate the prediction that EDGE-ANCHOR can lead to copying of all and only the main stressed foot. In Tagalog (3b), repeated below in (8), the requirement interacts with independent LEFT-ANCHOR, which above all else requires left anchoring of the base and the reduplicant.

(8) Base-delineating reduplication

Tagalog (McCarthy & Prince 1994, Carrier-Duncan 1984, Carrier 1979)

walis	(mag)-walis-[walis]	'sweep/sweep a little'
linis	(mag)-liːnis-[liːnis]	'clean/clean a little'

(compare: baluktot → baluː-baluk[tot], 'bent/variously bent')

We will return to these cases in section 3.3 to examine them in detail, relating them to a similar but more complicated pattern in Makassarese.

In the final class, EDGE-ANCHOR restricts copying to cases where the base is coextensive with the head foot.

(9) Exhaustive base-delineating reduplication

a. Yoruba (dialectal) (Pulleyblank 2000)

wolé	wolé-[wolé]	'look at the house/sanitary inspector'
lámi	lámi-[lámi]	'lick water/type of water insect'

(but: fɛ́nilɔ́mɔ → a-[fɛ́ni][lɔ́mɔ], * fɛ́nilɔ́mɔ- fɛ́nilɔ́mɔ, 'marry someone's child/someone who takes peoples' daughters and marries them')

b. Kinande (Mutaka & Hyman 1990, McCarthy & Prince 1995)[3]

ku-gulu	ku-[gulu]-gulu	‘sheep/real sheep’
mú-twe	[mú-twe]-mú-twe	'real head'
m-bulí	[m-bulí]-m-buli	'sheep/real sheep'

(but: -gotseri 'sleepiness' *has no reduplicated form*: *-gotse-gotseri, *-gotseri-seri. '*real sleepiness'; must be expressed periphrastically) [4]

[3] In these examples, the prefixal augment (*e*- or *o*-) has been omitted, as it does not participate in reduplication.

When RED cannot satisfy the relevant EDGE-ANCHOR constraint, these languages show that sometimes periphrasis wins over imperfect reduplication. Each class will be discussed in more detail in the following sections.[5]

3.2 Base contracting reduplication

3.2.1 Semai reduplication

The "expressive minor reduplication" pattern of Semai (Diffloth 1976a,b, Sloan 1988, Hendricks 1998) is a case showing the contracting effect of edge anchoring. We see copying of initial and final segments of the root.

Anchoring here is aggressive in that the intermediate material is not copied:

(10) Semai minor reduplication

a. Monosyllabic bases

kʉːʔ	$\underline{\text{kʔ}}_3$-[kʉːʔ$_3$]	'to vomit'
dŋɔh	$\underline{\text{dh}}_4$-[dŋɔh$_4$]	'appearance of nodding constantly'
cfaːl	$\underline{\text{cl}}_4$-[cfaːl$_4$]	'appearance of flickering red object'

b. Disyllabic bases

payaɲ	$\underline{\text{pɲ}}_5$-[payaɲ$_5$]	'appearance of being disheveled'
cayɛm	$\underline{\text{cm}}_5$-[cayɛm$_5$]	'contracted fingers of human animal, not moving'
cruhaːw	$\underline{\text{cw}}_6$-[cruhaːw$_6$]	'sound of waterfall, monsoon rain'

The transcriptions are taken directly from Diffloth 1976b. However, Diffloth 1976a explains that the minor syllables have a vowel on the surface. He calls these vowels

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[4] Philip Mutaka (p.c.) kindly provides the relevant data: *nyilwé nyíkwire ehigotseri ehyekwenene lero*, (lit.) 'I had the sleepiness of real this time', i.e. 'This time, it was the sleepiness of real that I had'. Another alternative is: *otwo tulwe itwotugotseri*, (lit.) 'that it was sleepiness', 'that was real sleepiness'.

[5] One thing to bear in mind regarding the data that will be appealed to in support of the proposed constraints is that in each case where the right edge of the base is preserved through EDGE-ANCHOR, that edge segment is a consonant, the final consonant of the prosodic word. As it stands, the constraint does not require consonant-hood of this segment, although quite possibly it should.

'minor', indicating that they are short and unstressed. All of the information that he provides suggests that this vowel is predictable from the surface environment: *a* before a back consonant: <u>*dah*</u>- *[dŋɔh]; <u>kaʔ</u>-[kʉːʔ]*, and *u* where a *w* has been vocalized: <u>*cu*</u>-*[cruhaːw]*. Unfortunately, information regarding the rest of the environments is not given. The generalization seems to be that the minor vowel corresponds to the place of the final consonant. If true, then this is the same correspondence that emerges in Nancowry (see chapter 4); however, rather than copying a vowel from the base, an epenthetic vowel agrees in place with the final C of the base, in satisfaction of AGREE(place) (Lombardi 1997, Alderete *et al*. 1999) in this context.

In Semai, some minimizing constraint must cause the reduplicant to be as small as possible. Hendricks proposes that it is highly-ranked ALIGN-ROOT-LEFT, which requires that the root align with the left edge of the prosodic word. This constraint would be violated by intervening material, namely the contents of the reduplicant, and would dominate MAX_{BR} (which demands total reduplication) and CONTIGUITY_{BR}, the constraint against "skipping" segments, relative to the order of their correspondents in the base. Thus, full reduplication is prevented. With left- and right-anchoring constraints in turn dominating ALIGN-ROOT-L, the reduplicant would then contain the first and last segments of the base:

(11) L-ANCHOR, R-ANCHOR » ALIGN-ROOT-L » MAX_{BR}, CONTIGUITY

Given that the AGREE constraint suggested above will also serve to minimize markedness in terms of place specification, the minimizing constraint is more likely Place Markedness, emerging via TETU. In evaluating Place Markedness below, one star is shown for each place-linked segment in the reduplicant; segments of the base of course also violate Place Markedness, but these violations are forced by highly-ranked MAX-IO. Thus, for simplicity, these stars are omitted from the tableau. The same method is used in discussion of Ulu Muar Malay in the next section. In the example at hand, E-ANCHOR then requires correspondence to both edge segments.

(12) { LEFT-ANCHOR, EDGE-ANCHOR$_{\text{Head-foot}}$, EDGE-ANCHOR$_{\text{Base}}$} » Place Markedness » MAX$_{\text{BR}}$

/RED,cʔɛːt/	E-ANCHOR	Place Markedness	MAX$_{\text{BR}}$
a. ☞ct- [cʔɛːt]		**	**
b. cʔɛːt- [cʔɛːt]		***!*	
c. c- [cʔɛːt]	*!	*	***

Thus, a candidate that anchors to both edges, adding only a minimal minor vowel would best satisfy this ranking (a), even though this candidate violates CONTIGUITY$_{\text{BR}}$. Given the satisfaction of the constraint requiring edge anchoring, the ranking of L-ANCHOR is no longer crucial. The reduplicant in (b) fatally violates Place Markedness; in (c), it fails to copy the segment from the right side of the base. Another candidate, *cʔɛːt-ct*, would tie with the winner on the above constraints. However, given that the language generally only allows a minor syllable to precede a right-aligned foot, the active prosodic constraints would prefer candidate (a).

3.2.2 Ulu Muar Malay

Ulu Muar Malay exhibits a similar edge-anchoring pattern. Reduplication can occur in one of six types in Ulu Muar Malay, in spite of the fact that there is no meaning difference contrasting the different shapes (Hendon 1966:58). The form that RED takes is, however, dependent to a certain extent on the shape of the stem. In addition, stylistic factors are also reported to affect the shape of the reduplicant, with shorter forms occurring in faster speech. One of these patterns is of particular interest to the present discussion. This RED copies the edgemost consonants of the base (and usually the first vowel) ;[6] all other base segments are excluded from RED.

To illustrate the six types of reduplication, Hendon uses a hypothetical stem; this is because no real stem is attested in all six forms, although several stems occur with more than one variant. I repeat his example here, which uses the hypothetical stem /patɪŋ/ (Type III (13c) is the focus of discussion):

(13) Reduplication alternants

a. Type I: patɪŋ-patɪŋ (total reduplication)
   Stems of any shape can occur in this shape.

b. Type II: patɪm-patɪŋ (total reduplication with assimilation at morpheme juncture)
   Markedness of the stem-final consonant is reduced in this pattern. Stem-final nasals are replaced by the nasal homorganic with the following stop when the stem begins with a stop, as in the example above. Stem-final stops are replaced by [ʔ]. In all other cases, such as when the stem does not begin with a stop, the stem-final consonant is deleted.

c. Type III: pam-patɪŋ
   This type of reduplication is found only with stems which
   i. end in a stop, [h], or [ʔ] and begin with a consonant
   ii. end in a nasal and begin with a stop or [s]

d. Type IV: pa-patɪŋ
   Found only with stems that begin with a single consonant. (This is the only pattern cited with an example of a vowel-final stem, *suko*.)

[6] The vowel of the reduplicant may be optionally deleted before NC clusters; I am abstracting away from this fact here.

e. Type V: ppatɪŋ
   This type is found with stems that begin with a consonant or a cluster of consonants.

f. Type VI: tɪŋ-patɪŋ
   This type is dubbed “uncommon”.

Additional data of the crucial edge anchoring “Type III” is given here.

(14) Ulu Muar Malay reduplication

a. sieʔ	sɪʔ-siéʔ	‘is torn repeatedly’
b. dayaŋ	dan-dayáŋ	‘friend’
c. budaʔ	bʊʔ-budáʔ	‘children’
d. laɲit	laʔ- laɲít	‘palate’

RED-final consonants appear only as *ʔ, h,* or a nasal. Oral stops are neutralized to *ʔ*. The Coda Condition yields place assimilation of nasal codas. The vowels *i* and *u* appear as their lax counterparts *ɪ* and *ʊ*, respectively. Malay has final stress. So maintenance of the initial vowel must be due to a constraint requiring faithfulness to V_1.[7] The final coda's only virtue is its position at the right edge of the foot (and base). No data directly shows that the base edge (rather than the foot) is crucial. However, its importance here can be inferred from the complete lack of reduplication data with bases larger than a foot; the language does have a limited number of stems larger than two syllables.

In (15), the emergent reduplicant is CVC, as forced by edge anchoring plus faithful copying of V_1 of the base. Place Markedness violations are again noted for the reduplicant only. The reduplicants in (d & e) fail to copy both edges of the base, fatally.

[7] Such a constraint has independent justification from some dialects of French e.g. Parisian, and also in Quebec French in certain environments (Charette 1991:203). Although schwa deletion is allowed word-internally in both Parisian and Quebec French (e.g. *mat~~e~~las* ‘mattress’), schwa is not deleted in initial position in a disyllabic word in Parisian French (*ch**e**val,* vs. Quebec French *ch~~e~~val* ‘horse’). In both dialects, deletion is not allowed in polysyllabic words (*c**e**pendant* ‘however’).

In (b), the reduplicant is too large, as it causes gross violation of Place Markedness. Finally, (c) copies the unstressed vowel of the base, as opposed to the first vowel as in the winning candidate (a).

(15) E-ANCHOR, FAITH V_1» Place Markedness

/RED + budaʔ/	{ LEFT-ANCHOR, EDGE-ANCHOR$_{Head\text{-}foot}$, EDGE-ANCHOR$_{Base}$}	FAITH V_1	Place Markedness
a. ☞ <u>buʔ$_5$</u>- [budáʔ$_5$]			***
b. <u>budaʔ$_5$</u>- [budáʔ$_5$]			****!*
c. <u>baʔ$_5$</u>- [budáʔ$_5$]		u!	***
d. <u>bud$_3$</u>- [bud$_3$áʔ]	*!		***
e. <u>bu$_2$</u>-[bu$_2$dáʔ]	*!		**

In sum, anchoring of the edges plus faithfulness to V_1 of the base are required of the reduplicant; however, copying of any additional material is foregone in order to minimally violate the relevant minimizing constraint, which is suggested to be Place Markedness.

3.3 Base-contracting truncation: Dutch hypocoristics

In Dutch hypocoristics (Hanks & Hodges, 1990, Struijke, p.c.) we see truncation to the edges of a foot-long base name:

(16) Foot-long base names

a. [Gérrit] Gert
b. [Jákob] Jaap
c. [Wíllem] Wim
d. [Jósef] Joop

Note that in spite of such a pattern, targeting the edges of the name in larger names is not possible, e.g. *Leonardus, *Les.*

(17) Anchoring to foot/base edges

[Gérrit]	{L-ANCHOR, E-ANCHOR$_{HdFt}$, E-ANCHOR$_{Base}$}	CONTIG	L-ANCHOR
a. ☞ Gert		*	
b. Ger	*!		
c. Rit	*!		*

When the base is coextensive with the head foot, then it is possible to anchor to both edges of the base. However, when the two are not coextensive, as with *Leonardus*, then CONTIGUITY is shown to be active.

(18) No edge-anchoring

Leo[nárdus$_9$]	{L-ANCHOR, E-ANCHOR$_{HdFt}$, E-ANCHOR$_{Base}$}	CONTIG	L-ANCHOR
a. Les$_9$	*	*!	
b. ☞Leo	*		
c. Dus$_9$	*		*!

At no time is it necessary to appeal explicitly to the right edge. Rather, the right edge becomes important when it is both rightmost in the base name and in the head foot of the base. Even then, the right edge is only singled out as part of a pair that necessarily includes the left edge of the base as well.

3.4 Additional main stressed foot edge cases

3.4.1 Yidiɲ reduplication

Accounting for the reduplication pattern found in Yidiɲ is entirely straightforward in the current proposal. As can be seen from the data below, the reduplicant is anchored to both edges of the main stressed foot in the base.

(19) Yidiɲ (Dixon 1977, McCarthy 1997)

mulari	<u>mula</u>-[mula]$_{\text{Foot}}$ ri	'initiated man'
t^jukarpa	<u>t^jukar</u>-[t^jukar] $_{\text{Foot}}$ pa-n	'unsettled mind'

This account can be compared to that of McCarthy (1997). In the context of the exploration of the connection between prosodic circumscription and faithfulness, McCarthy notes that the foot-final segment can be targeted using a prosodic anchoring constraint that requires base-reduplicant correspondence to preserve a segment's status as foot final (INPUT-ANCHOR-POSITION$_{\text{BR}}$(Foot, Foot, Final)). The problem with invoking such a constraint is that it requires explicit preservation of final material with no implication regarding other more prominent positions in the base. The proposed EDGE-ANCHOR constraint safely preserves the needed implication that the left edge of the main stressed foot is targeted, along with the right edge.

3.4.2 Tagalog reduplication

In Tagalog (Carrier 1979, Carrier-Duncan 1984, McCarthy & Prince 1994), reduplication of the final consonant of the base is performed in all and only cases where this final C is at the end of a disyllabic stem. When the stem is longer, then the reduplicant has no final coda:

(20) Tagalog disyllabic reduplication: compelled violation of E-ANCHOR

a. Coda in reduplicant

walis	(mag)-walis-[walis]	'sweep a little'
linis	(mag)-liːnis-[liːnis]	'clean a little'

b. No coda in reduplicant

baluktot	baluː-baluktot	'variously bent'
ʔintindin	ʔintiː-ʔintindiŋ	'several small understandings'

Reduplicants are always disyllabic. So the only case in which the reduplicant allows a faithful final coda is when it is the stem-final C that is copied; otherwise, the reduplicant is V-final.

In the case of a disyllabic root, both edges would clearly be copied (e.g. *(mag)-walis-walis*), showing that E-ANCHOR » NO CODA. With the ranking NO CODA » MAX_{BR}, we see that in longer roots, since satisfaction of E-ANCHOR is no longer possible*: baluː-baluktot*, NO CODA decides in favor of a V-final reduplicant (a):

(21) Emergence of NO CODA

/RED, baluktot/	L-ANCHOR	E-ANCHOR	NO CODA	MAX_{BR}
a. ☞balu-baluk[tót]		*	**	ktot
b. baluk-baluk[tót]		*	***!	tot

This example illustrates that EDGE-ANCHOR $_{\text{Head-foot}}$ is needed to explain why copying of the coda only occurs for disyllabic bases. It is also clear that the responsible constraint cannot be a version of STRUCTURE ROLE, which requires that corresponding segments have identical syllabic roles (McCarthy & Prince 1993a, 1994). Even if the constraint were expanded to go beyond merely requiring corresponding segments to have the same structure role to requiring that corresponding syllables have identical internal structure, the correct candidate would not be selected. Such a constraint would predict **baluk-baluktot* instead, unlike E-ANCHOR. This right edge effect by which the right edge of the stem is coped (and the head foot, with which it is co-extensive), is not due to a right edge constraint. By attributing this behavior to EDGE-ANCHOR $_{\text{Head-foot}}$, the implication is clear that right edge copying in a disyllabic stem entails left edge copying; the edges are targeted together as a unit. Also, by constructing the hierarchy where base edge copying implies foot edge copying, we do not predict that IO-CONTIGUITY will be violated in order to satisfy E-ANCHOR in this case: **balut$_8$-baluktot$_8$*; there is no way to satisfy both with a base so large.

The EDGE-ANCHOR approach is useful, in that it helps derive the implication that right edge copying must be accompanied by another force of the grammar, (in these cases, copying of both edges of the head foot). The constraint is necessarily categorical, assigning one violation for any form that fails to copy *both* edges of this foot. The claim in Nelson (1998), that EDGE-ANCHOR was violated once for each edge that went unanchored, is ultimately rejected, since this formulation allows for the emergence of targeted unstressed right edge copying in situations where violation of left edge copying was compelled. No such cases seem to exist.

Thus, in summary, both edges of the head foot are copied when possible; as we see in Tagalog, this is not always feasible. Left edge copying is preferred over both right edge copying and copying of a non-edge. E-ANCHOR assigns one violation whether one or both edges go unanchored. Due to the relativization of E-ANCHOR to the head foot, the comparison below is only valid for cases where the base is coextensive with the head foot:

(22) Non-edge and right edge copying equally marked

edge copied	L-ANCHOR	E-ANCHOR
a. both edges	✓	✓
b. left edge only	✓	*
c. right edge only	*	*
d. neither edge	*	*

This formulation has the following result: if violation of L-ANCHOR (and thus E-ANCHOR) is compelled (c,d), then some other constraint altogether must determine what is to be copied.

In the next section, I will explore reduplication in Makassarese. The system proposed here allows us to capture how closely this pattern resembles reduplication of the type just explored in Tagalog.

3.4.3 Makassarese

The importance of the reduplication pattern of Makassarese for base-reduplicant relations was pointed out in McCarthy & Prince (1994), citing previous work by Aronoff et al. (1987). The interest of this language for our purposes is the complex set of conditions that govern whether the right edge of the base will be faithfully copied or not; I argue that E-ANCHOR plays a crucial role in this decision.

First, I will list some preliminary details about the language. There are no long vowels or diphthongs; each vowel is then a member of its own syllable. The only permissible word-final codas are ŋ and ʔ; medially, codas must be either nasal (with coda nasals homorganic to the following consonant), ʔ, or the first half of a geminate sonorant. Coda ʔ is realized as gemination of a following voiceless stop. Stress is on the penultimate syllable, however epenthetic vowels are ignored. The minimal word is a foot, with the minimal foot being a disyllabic trochee.

Before discussion of reduplication in this language, the conditions governing word-final epenthesis must be made clear. The points made here are all drawn from McCarthy & Prince (1994); the analysis given here departs from theirs only in matters that concern right edge correspondence and reduplication.

The stringent coda condition outlined above leads to a dilemma in the case of a disallowed stem-final consonant. Epenthesis occurs in order to parse these segments (epenthesized segments are underlined):

(23) Epenthesis in Makassarese (McCarthy & Prince 1994's (40))

/rantas/	rántas$\underline{\text{aʔ}}$	'dirty'
/teʔter/	téʔter$\underline{\text{eʔ}}$	'quick'
/jamal/	jámal$\underline{\text{aʔ}}$	'naughty'

At first glance, epenthesis does not appear to be minimal; rántas$\underline{\text{aʔ}}$ ≻ rántas$\underline{\text{a}}$, even though both obey the coda condition. Thus, McCarthy and Prince propose that an additional constraint, FINAL-C, must dominate DEP:

(24) {CODA COND, FINAL-C} » DEP

/rantas/	CODA COND	FINAL-C	DEP
a. ☞rántas$\underline{\text{aʔ}}$			**
b. rántas$\underline{\text{a}}$		*!	*
c. rántas	*!		

This ranking then will work well for generating the correct output for C-final inputs, however there is another twist as far as V-final inputs are concerned.

With V-final inputs, the parse is faithful, in spite of the FINAL-C violation incurred by the faithful candidate. Thus, one additional constraint is needed to prohibit epenthesis stem-finally. I suggest that EDGE-ANCHOR can accomplish this. In the case of input-output correspondence, no main stressed foot is present in the input for anchoring. This leaves only input-output anchoring where the input (root) anchors to the output (prosodic word).

(25)

/lompo/	CODA-COND	EDGE-ANCHOR-IO	FINAL-C	DEP
a. ☞lom.po|			*	
b. lom.po|ʔ		*!		*

(26) Reduplication in Makassarese (Aronoff et al. 1987, McCarthy & Prince 1994, McCarthy 1999)

a. Reduplication of disyllabic, unsuffixed roots

/batu/	batu-[bátu]	'small stone(s)'	
/golla/	golla-[gólla]	'sweets'	
/tau/	tau-[táu]	'doll'	
/tauŋ/	tauŋ-[táuŋ]	'yearly'	[taun-tauŋ]
/ballaʔ/	ballaʔ-[bállaʔ]	'little house'	
/bulaŋ/	bulaŋ-[búlaŋ]	'monthly'	[bulam-bulaŋ]

b. Disyllabic reduplication of longer roots

/manara/	manaʔ-ma[nára]	'sort of tower'
/balao/	balaʔ-ba[láo]	'toy rat'
/baine/	baiʔ-ba[íne]	'man women'

c. ʔ-final disyllabic reduplication of disyllabic roots with final epenthesis

/ak+beser/	ak-beseʔ-[bése]reʔ	‘quarrel in jest’

d. ʔ-final reduplication of C-final root with stress-determining *-i* (‘transitive’)

/gassiŋ+i/	gassiʔ-ga[ssíŋi]	‘make strong’
cf. /lompo+i/	lompo-lom[pói]	‘make somewhat big’
cf. /gassiŋ#i/	gassiŋ-[gássiŋ]i	‘he is strong’ (stress-neutral –*i* ‘3rd sub’)

The analysis of reduplication with bases larger than two syllables has the same structure as that for bases that exceed a foot in Tagalog: satisfaction of EDGE-ANCHOR is not possible, thus left anchoring occurs, and the effect of anticipated markedness constraint (here, FINAL-C) is allowed to emerge.

(27) Emergence of FINAL-C

/RED, manara/	L-ANCHOR	{ LEFT-ANCHOR, EDGE-ANCHOR$_{Head-foot}$, EDGE-ANCHOR$_{Base}$}	FINAL-C
a. ☞<u>manaʔ</u>-ma[nára]			
b. <u>mana</u>-ma[nára]			*!

It is only when the satisfaction of EDGE-ANCHOR is an option, as with disyllabic bases, that faithful correspondence of head foot edges to base edges precludes FINAL-C satisfaction.

(28)

/batu, RED/	{ LEFT-ANCHOR, EDGE-ANCHOR$_{Head-foot}$, EDGE-ANCHOR$_{Base}$}	FINAL-C
a. ☞<u>batu</u>-[batu]		**
b. <u>batuʔ</u>-[batu]	*!	*

The additional candidate *<u>batuʔ</u>-[batuʔ]* is ruled out by EDGE-ANCHOR-IO.

Finally, something must be said of disyllabic roots that are suffixed with an internal, stress-attracting suffix, as in *<u>lompo</u>-lom[pói]* in (26). Why not **<u>lompoʔ</u>-*

lom[pói]? This pattern complicates matters slightly. I tentatively suggest that this outcome can be avoided if we appeal to output-output constraints. If output-output constraints require maximization of all segments from the unsuffixed reduplicated form to the suffixed one, both C-final and V-final forms receive an explanation.

(29) a. DEP-OO$_{Reduplicated}$: Every segment in the suffixed reduplicated form has a correspondent in any reduplicated form that is not suffixed.

b. STROLE: A segment in RED and its correspondent in the base must have identical syllabic roles (McCarthy & Prince 1993a, 1994).

c. IDENT(nasal): Corresponding segments must agree in nasality.

This is illustrated below, where for *gassiŋ*, the assumption is that *ŋ* is in correspondence with the glottal stop (rather than inserted, as in McCarthy & Prince 1994). MAX-IO will compel violations of DEP-OO caused by parsing of the suffix; these violations have been left out of the tableau below.

(30) C-final suffixed root

/RED,gassiŋ-i/ [gassiŋ$_6$-gassiŋ$_6$]$_{Reduplicated}$	DEP-OO$_{Reduplicated}$	FINAL-C	STROLE	IDENT(nasal)
a. ☞gassiʔ$_6$-gassiŋ$_6$i				*
b. gassi-gassiŋi		*!		
c. gassiʔ-gassíŋ$_6$i	*!			
d. gassiŋ$_6$-gassí.ŋ$_6$i			*!	

(31) V-final, suffixed root

/RED,lompo-i/ [lompo$_6$-lompo$_6$]$_{Reduplicated}$	DEP-OO$_{Reduplicated}$	FINAL-C	STROLE	IDENT(nasal)
a. ☞lompo$_6$- lompo$_6$i		*		
b. lompoʔ-lompoi	*!			

The addition of the output-output faithfulness constraint will enhance paradigm uniformity. A system like that of Makassarese is predicted that *does* allow for emergence of FINAL-C when stress is drawn away from the foot that earlier encompassed the root. In Makassarese however, once the main stressed foot and the root have served coextensively as the base for reduplication, addition of an epenthetic consonant to the reduplicant is not possible, no matter how the surface environment is altered upon further derivation.

3.5 Edge anchoring alternating with no anchoring

In several examples reported in the literature, the availability of reduplication is conditioned by the size of the base. If the base is disyllabic, then reduplication may occur. If the base is larger, however, the meaning imparted by reduplication in the disyllabic forms is conveyed by a fixed segment affix or other periphrastic means. Examples follow:

(32) Kinande noun reduplication (Mutaka & Hyman 1990)[8]

ku-gulu	ku-[gulu]-gulu	‘sheep/real sheep’
mú-twe	[mú-twe]-mú-twe	'real head'
m-bulí	[m-bulí]-m-buli	'sheep/real sheep'
gotseri	No Reduplication	'sleepiness/real sleepiness'
	*got[seri]-seri.	(see fn. 4 for periphrastic expression)
nyurúgúnzù	No Reduplication	'butterflies/real butterflies'
	*nyurú[gúnzù]-gúnzù	

[8] I am setting aside the issue of monosyllabic stems. In this case, the output is trisyllabic, e.g. *swa* $\rightarrow$ *swa-swaswa.* My suspicion is that the base augments via copying to fulfill the disyllabic requirement, reduplicates, and then deletes a syllable by haplology.

(33) Yoruba agentive reduplication (Pulleyblank 2000)

wolé	<u>wolé</u>-[wolé]	'look at the house/sanitary inspector'
lámi	<u>lámi</u>-[lámi]	'lick water/type of water insect'
yínrùn	<u>yínrùn</u>-[yínrùn]	'twist neck/meningitis'
náwó	<u>náwó</u>-[náwó]	'spend money/extravagant person'
fɛ́nilɔ́mɔ	a-fɛ́nilɔ́mɔ	'marry someone's child/someone who takes people's daughters and marries them'
ʃèbàjɛ́	a-ʃèbàjɛ́	'do evil/evil-doer'
yániláʃɔ	a-yániláʃɔ	'lend someone cloth; cloth-lender'

In order to explain the restriction in Yoruba, Mutaka and Hyman propose that a "Morpheme Integrity Constraint" requires copying of the entire morpheme:

> Mapping of a melody to a reduplicative template takes place by *morpheme*. If the whole of a morpheme cannot be successfully mapped into the bisyllabic reduplicative template, then none of the morpheme may be mapped. (Mutaka and Hyman 1990, p. 83)

This result can be captured here without the stipulation of an independent restriction on the grammar. I assume that the now familiar ANCHOR constraints each dominate a 'Realize Morpheme' constraint (Samek-Lodovici 1992), 'REALIZE ('real X')'. This constraint, when undominated, will allow for the realization of the meaning intended for an input reduplicative morpheme to be expressed rather through periphrasis in cases where a dominating constraint would thus be better-satisfied (here, EDGE-ANCHOR). Assuming base maximization, as discussed in chapter 2, then the base on which L-ANCHOR is assessed in the following example is {-gotseri}.[9] An additional constraint

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[9] In Kinande, Yoruba, and Tagalog, two distinct anchoring constraints agree on winners in the case of a disyllabic base, and then diverge. In Coeur d'Alene truncation (Doak 1990, McCarthy p.c.), which is apparently similar to contraction in English, deletes every segment after the stressed vowel. Stress is lexical; the resulting form can be of varying length:

Full form	Truncated form	
$\text{tk}^{\text{w}}\text{ar}^{\text{w}}$aréqɛʔst	$\text{tk}^{\text{w}}\text{ar}^{\text{w}}$arɛ́	'orange (fruit)'
st'm'áltmʃ	st'm'á	'buffalo'

against periphrasis must be assumed; here, I crudely employ *PERIPHRASIS for this purpose.

(34)

/-gotseri, RED‘real X’/	{ LEFT-ANCHOR, EDGE-ANCHOR$_{\text{Head-foot}}$, EDGE-ANCHOR$_{\text{Base}}$}	RLZ (‘real X’)	* PERIPHRASIS
a. -gotseri		*!	
b. ☞ *nyilwé nyíkwire ehigotseri ehyekwenene lero*[10]			*
c. -gotseri-got[seri]	*!		
d. -gotse-got[seri]	*!		
e. -got[seri]-seri	*!		
f. -got-seri-[seri]	*!		

Similarly, in the case of Yoruba, the ranking only allows reduplication to occur when both edge and left anchoring will be satisfied.[11]

(35) Affixation in lieu of reduplication

/fɛ́nilɔ́mɔ, RED$_{\text{agentive}}$/	E-ANCHOR	RLZ(agentive)	*PERIPHRASIS
a. ☞a-fɛ́ni[lɔ́mɔ]			*
a. fɛ́ni[lɔ́mɔ]		*!	
b. fɛ́nilɔ́mɔ-fɛ́ni[lɔ́mɔ]	*!		
c. fɛ́ni-fɛ́ni[lɔ́mɔ]	*!		
d. fɛ́ni[lɔ́mɔ]-lɔ́mɔ	*!		
e. fɛ́ni-lɔ́mɔ-lɔ́mɔ	*!		

hnq’wəq’wosm’ítʃnʃn hnq’wəq’wosm’í ‘dog’

This is another case of two separate base-truncatum anchoring constraints (here, MAX-ŕ-BT, L-ANCHOR-BT), actively determine the output.

[10] Philip Mutaka (p.c.) clearly states that not all speakers will converge on this means of expressing the notion ‘real sleepiness’. The important point however is that the notion of ‘real sleepiness’ is not ineffable in the language.

[11] A similar result can be found in Ancient Greek perfect reduplication (Steriade 1982, Suzuki 1984). In this case, it is onset sonority rather than base size that dictates the threshold of what constitutes an acceptable base. When the onset of the base is neither a single C not a voiceless stop + sonorant cluster, *e*-epenthesis rather than initial consonant reduplication results: *sper, e-sparmai ‘to sow’* (cf. *pneu, pe-pneuka ‘to breathe’; krag, ke-kraga ‘to cry’*, etc.).

Here again, an alternative to reduplication is found when EDGE-ANCHOR cannot be satisfied.

3.6 Exploring the formulation of EDGE-ANCHOR

This section discusses the formulation of the proposed constraint. The foot-based version will be justified in comparison to a morpheme-based one used in Nelson (1998b), and also a modification of that version. In entertaining the earlier and intermediate formulations of EDGE-ANCHOR, I intend to address the problems inherent in these alternatives, and to thus explain why the version I have utilized in the above discussion is preferred. In presenting the constraints, I examine the different targets that are predicted, as well as the different effects that the constraints can have.

As mentioned upon the introduction of the constraint at the beginning of the chapter, EDGE-ANCHOR is formulated in a categorical fashion. That is, if a candidate fails to copy from both sides of the foot or base, then the candidate receives a violation mark for the appropriate EDGE-ANCHOR constraint. Under this approach, it is of no relevance to the constraint if the candidate copies material from one or neither edge; once edge-anchoring has failed to be fully satisfied, the constraint is violated. Crucial to the decision of what the constraint should ultimately distinguish is the validity of the prominence classes predicted to be distinct. For example, a symmetric system with no edge-anchoring constraint, but rather independent left- and right-anchoring constraints predicts three classes.

(36) Non-edge copying is most marked

edge copied:	L-ANCHOR	R-ANCHOR
a. both edges	✓	✓
b. left edge only	✓	*
c. right edge only	*	✓
d. neither edge	*	*

The following three distinction classes are predicted in that theory:

(37) *most prominent* ————► *least prominent*
both edges > {left edge, right edge} > non-edge

The indeterminacy in the middle of the scale is due to the free re-ranking assumed to be available to constraints in an OT grammar. Even if we revise this to further claim that the ranking is fixed between L-ANCHOR and R-ANCHOR such that L-ANCHOR » R-ANCHOR, there is still the problem of over-classification:

(38) both edges > left edge> right edge > non-edge

The problem resides at the least-prominent end of the scale. These constraints predict both a distinction between right edge and non-edge, and furthermore that the right edge is privileged over internal material. Given the lack of support typologically for such a partitioning of the two alleged categories, I maintain that it is better to allow the two to be conflated, as in the proposed theory, until evidence dictates the need for separate categories.

Moreover, any theory with independent LEFT- and RIGHT-ANCHOR constraints makes a variety of predictions that are unattested. Below, I summarize these predictions. First, a symmetric anchoring theory predicts that copying of edges can be compelled when the base is of any length. If both anchoring constraints dominate CONTIGUITY-BR, (as is argued to be the case in Semai in Hendricks 1998, e.g.), then a base of any length could potentially be thus contracted, as in hypothetical *metgodupik*$_{10}$ → *mek*$_{10}$-*metgodupik*$_{10}$. Assuming a monosyllabic reduplicant, then the following tableau illustrates the problematic prediction.

(39)

/RED, metgodupik/	ANCHOR-LEFT (Base, RED)	ANCHOR-RIGHT (Base, RED)	CONTIGUITY-BR
a. ☞mek$_{10}$-metgodupik$_{10}$			*
b. met-metgodupik		*!	
c. metgodupik-pik	*!		

This pattern of dramatic edge-selection is unattested as far as I know, and I presume and predict it to be ruled out universally. This proposal aims to eradicate the pattern by relativizing EDGE-ANCHOR minimally to main stressed foot edges only.

Another prediction is that unstressed right edge copying could still be compelled. All that is needed is a constraint **C** that would force violation of L-ANCHOR. Then right-anchoring would be free to exert its effects under the ranking: **C** » L- ANCHOR » R-ANCHOR. We can create such a pattern by considering hypocoristic formation in hypothetical French′. In order to remove any possible alternative that appeals to stress, let us assume this language has initial stress.

(40) Hypocoristics in French′

C-initial names		*V-initial names*	
Cároline	Caro	Élizabeth	Zabet
Dóminique	Domi	Álexandra	Sandra
Béatrice	Bea	Ámelie	Melie

In this case, if ONSET is the constraint dominating LEFT-ANCHOR, which in turn dominates RIGHT-ANCHOR, then we predict that an unstressed right edge anchoring system can be compelled. Again, given no cases typologically to support the singling out of an unstressed right edge, I take the failure of the proposed theory to generate a system like the one described above to be an asset.[12]

In earlier work (Nelson 1998), I formulated E-ANCHOR as follows, sensitive to degrees of satisfaction of the constraint:

(41) *Multiple-violation, morpheme-based version*

EDGE-ANCHOR$_{BR}$: Each segment at an edge of the base corresponds to the segment standing at the same edge in the reduplicant. One violation is given to each edge of the base to which the reduplicant fails to anchor.

However, this formulation leads to the prediction of the same problem with respect to distinction classes, as shown below.

(42) Non-edge copying most marked

edge copied:	L-ANCHOR	E-ANCHOR
a. both edges	✓	✓
b. left edge only	✓	*
c. right edge only	*	*
d. neither edge	*	**

Four distinction classes are predicted in that theory:

(43) both edges > left edge > right edge > non-edge

[12] In the future, I plan to investigate this prediction experimentally; the experiment would test the hypothesis that a language that truncates to unstressed right edges is more difficult to learn than a system that truncates to unstressed left edges. If correct, this result would obviously provide further evidence for the proposed asymmetry in the grammar.

The result is then that in the default case, unstressed right edge copying implies left edge copying. Otherwise, right edge copying must be due to stress.[13]

This formulation has advantages over the previous situation: in contrast with a system in which the symmetric constraints are freely rankable, there is no danger of predicting the unattested ranking with an unstressed right edge syllable being expressly targeted for copying in the default pattern. Furthermore, there is no need to posit a fixed ranking in order to derive the preference for left over right edge copying.

A serious problem remains however. In the edge-anchoring system in which the constraint is sensitive to degrees of violation, the unfounded prediction is still made that that the right edge is actually preferred over a non-edge with respect to copying of unstressed material. In addition, the prediction that the right edge can still be targeted *upon compelled violation* of left anchoring (regardless of stress) still remains. These residual RIGHT-ANCHOR effects arise because R-ANCHOR is still a part of the EDGE-ANCHOR constraint; partial satisfaction by right edge copying receives one fewer violation than copying no edges, which opens the door to possible optimality.

Thus, the constraint is revised to neutralize the distinction between internal and right edge material:

(44) *Categorical, morpheme-based version*

> EDGE-ANCHOR$_{BR}$: Each segment at an edge of the base corresponds to the segment standing at the same edge in the reduplicant. *One violation is given if the reduplicant fails to anchor to both edges.*

[13] It is entirely possible that some constraint other than stress could cause the right edge to be copied. One possible example would be in a language where final unstressed vowels are long (Zhang 2001, Barnes 2001). Potentially such a language could target final long vowels, which would be prominent by virtue of their length, not their position. It is also conceivable that tone distinctions could determine the locus of anchoring via prominence of a final H tone; however, I have not yet encountered such a case. See Chapter 1 for some speculation of what types of elements seem to be subject to right edge reference and which are not.

This system then makes a three-way distinction in terms of preferred targets for copying:

(45) both edges > left edge > {right edge, non-edge}

Both edges are copied when possible; left edge copying is preferred over both right edge copying and copying of a non-edge. E-ANCHOR assigns one violation whether one or both edges go unanchored.

(46) Non-edge and right edge copying equally marked

edge copied:	L-ANCHOR	E-ANCHOR
a. both edges	✓	✓
b. left edge only	✓	*
c. right edge only	*	*
d. neither edge	*	*

This leads to the new result that if violation of L-ANCHOR (and thus E-ANCHOR) is compelled, then some other constraint altogether must decide between right edge and internal copying.

3.7 Other edge-relativized constraints in the literature

At least two examples of constraints that target both edges can be found in the literature. Bickmore (1999:128) proposes the following constraint, which aligns an edge of an output High Tone Span (HTS) with an edge of the stem:

(47) ALIGN (H,E,S,E): Align an edge E of an output HTS with the edge E of the stem.

The constraint however does not target both edges simultaneously; it is satisfied when a HTS is aligned to either edge of the stem. Thus, the example candidates below both

```
                                                          H
                                                          |
satisfy the constraint in (47) for input /to-timok-er-a/, tòt̂imókérá 'we rest':
```

```
(48)   a. to-(timok-er-a)Stem                       b. to-(timok-er-a) Stem
                 \  |  /                                      \ /
                    H                                          H
```

Any candidate that contains a HTS within the stem in which neither edge of that stem aligns with a stem edge will violate the constraint.

Another constraint that appeals to edges is proposed by Gordon (2002:498). His constraint, which aligns secondary stress, targets both edges of the output simultaneously (paraphrased):

(49) COINCIDE EDGE (PrWd, σ̀): The edges of a Prosodic Word must coincide with the edges of secondary stress syllables.

In order to be perfectly satisfied, candidates must have secondary stressed syllables standing at both edges of the prosodic word. Violation marks are assigned for each edge to which no secondary stress syllable is aligned.

3.8 Residual issues

To a certain extent, the foot-relativized EDGE-ANCHOR constraint writes the requirement that the reduplicant be a foot into the constraint itself. This is a liability of the proposal, since reduplicant size restrictions are typically taken to emerge by the Emergence of the Unmarked (McCarthy & Prince 1994, 1995), in order to avoid the typological possibility of back-copying a size restriction. However, the requirement is not as strong as the templatic constraint "RED=σσ", as if contraction is compelled, as seen for Semai and Ulu Muar Malay, then the constraint can still be perfectly satisfied, as long as the edges of the main stressed foot in the base are copied.

Given the claim that anchoring targets privileged positions, then "head foot edges" would be a novel category. With the minor exception of "inherent reduplication" examples though, all other reduplicated words exist along with a non-reduplicated, prosodified word. The head foot edges may represent the essential structure of the head foot, in a way that is admittedly not yet completely understood.

A final issue to consider is: what repercussions does EDGE-ANCHOR have for our understanding of locality? Strictly speaking, if locality requires that a segment that is copied over must itself be copied, then structures such as *kʔ-[kɯːʔ], dan-[dayáŋ]*, must violate this. However, there is also a sense in which they could not be more local; there is no other position in which locality, in the sense above, would be better-satisfied.

3.9 Conclusion

In conclusion, I offer a summary of the cases and effects observed in this chapter.

(50) Cases and effects

Case	*Effect*	*Ranking*
Semai, Ulu Muar Malay	Base-contraction in reduplicant	EDGE-ANCHOR >> BR-CONTIGUITY
Dutch	Base-contraction in truncated form	EDGE-ANCHOR >> BT-CONTIGUITY
Yidiɲ	Edges of main stressed foot correspond to edges of RED	BR-CONTIGUITY, EDGE-ANCHOR >> NO CODA
Tagalog	Edges of main stressed foot only copied if correspond to stem edges	LEFT-ANCHOR, EDGE-ANCHOR >> NO CODA
Makassarese	Epenthesis RED-finally only if stem is C-final	EDGE-ANCHOR-IO, EDGE-ANCHOR-BR >> FINAL C
Yoruba, Kinande	Reduplication only if base = foot; otherwise, periphrasis	EDGE-ANCHOR, MORPH-REAL >> *PERIPHRASIS

Given the implication of the copying of the right edge of the base always occurring when it was also the right edge of the main stressed foot, I have claimed that the two proposed EDGE-ANCHOR constraints are a part of an inclusion hierarchy, beginning with LEFT-ANCHOR:

(51) EDGE-ANCHOR inclusion hierarchy

LEFT-ANCHOR
{ LEFT-ANCHOR, EDGE-ANCHOR$_{\text{Head-foot}}$}
{ LEFT-ANCHOR, EDGE-ANCHOR$_{\text{Head-foot}}$, EDGE-ANCHOR$_{\text{Base}}$}

In this chapter, we saw illustrations of the various predictions made by these constraints. The proposed system captures numerous right edge effects that were previously treated with specifically right edge correspondence constraints. I argued here that, consistent with the Positional Anchoring approach, the right edge cannot, and need not, be singled out by faithfulness constraints. EDGE-ANCHOR constraints, which are evaluated categorically, account for the implication that the right edge of a main stressed foot may only be targeted in case the left edge of the foot is targeted along with it.

CHAPTER 4

DERIVATION OF RIGHT EDGE EFFECTS

4.1 Introduction

The central prediction of the proposed theory is that there is no morphological reduplication that explicitly targets the right edge of the base. However, cases that appear to exhibit right edge reduplication exist. In order for the theory to be preserved, these cases must convincingly submit to an alternative account. In the previous chapter, we saw evidence that constraints can target both edges of the main stressed foot of the base for copying. In this chapter, I examine two sets of apparent counter-examples to the claim of inherent asymmetry. The first set is parasitic on right edge stress. In other words, main stress in these examples falls at the right edge of the base, and the stressed rhyme, syllable, or foot is the target of a Positional Anchoring constraint. Thus, right edge correspondence between base and reduplicant is coincidental.

I note several cases of stressed syllable targeting in both reduplication and truncation. The examples are given in order of increasing complexity of the role played by targeting of the stressed syllable, culminating with a detailed analysis of reduplication in Lakhota.

In the second class of exceptions, we will see that the prosodic morphology imposes a prosodic template, which forces augmentation by means of copying. When this copying occurs at the right edge, the result can be mistaken for a reduplicative morpheme (Ussishkin 2000). However, these are not cases of morphological reduplication at all, and thus do not involve base-reduplicant anchoring. Rather, they exhibit left anchoring of the root in the output. The cases examined include Yoruba and two Mayan languages (Tzotzil and Tzeltal).

4.2 Stress

If reduplicative anchoring is indeed a type of Positional Faithfulness, then we would expect other prominent positions besides the left edge to serve as targets for reduplication. Phonetic prominence grants stressed syllables a perceptual advantage in the processing system, as compared to unstressed syllables (Beckman 1998). Of particular interest to the issue of right edge copying are cases where main stress is on the right edge, and reduplication targets this material when seeking to anchor the RED morpheme.

Perhaps the most straightforward type of ‘exception’ to the ban on explicit right edge copying is the class of cases where what must necessarily be the target under this analysis is the main stressed foot (or a sub-component therein). Stress is known to independently be a target for anchoring in both reduplication and truncation, as the following examples show. Reduplicative patterns in Samoan and Chamorro as well as truncation in English target the stressed syllable even when it is word-internal, thus at neither edge.

In Samoan, the main stressed foot is a trochee at the right edge. The reduplicant is a CV syllable, copying the stressed syllable of the prosodic base.

(1) Samoan plural reduplication (McCarthy & Prince 1993:108)

táa	<u>ta</u>-táa	‘strike’
nófo	<u>no</u>-nófo	‘sit’
alófa	a-<u>lo</u>-lófa	‘love’
ʔalága	ʔa-<u>la</u>-lága	‘shout’
fanáu	fa-<u>na</u>-náu	‘be born, give birth’

(2) Chamorro continuative reduplication (Topping 1973:259, McCarthy & Prince 1996:44)[1]

sága	<u>sá</u>-saga	‘stay’
hugándo	hu-<u>gá</u>-gando	‘play’
táitai	<u>tá</u>-taitai	‘read’
éggaʔ	<u>é</u>-ʔeggaʔ[2]	‘watch’

Similarly, in English hypocoristic formation, the main-stressed syllable of a base name can serve as the target for copying, regardless of where it stands within the word.

(3) English hypocoristics (Weeda 1992)

Ríchard	Rich
Eugéne	Gene
Alexándra	Sandra, Sandy
Patrícia	Tricia
Rebécca	Becca, Becky
Elízabeth	Liz, Lizzie
Virgínia	Ginny

The argument then is that in cases where stress is at the *right* edge, the analysis is not ambiguous between targeting the right edge or the stressed constituent. Rather, it must necessarily target the stressed syllable. The following are some examples.

[1] Unfortunately, Topping gives no examples of this kind of reduplication with lexical stress.
[2] The first glottal stop is excrescent, appearing regularly to prevent VV hiatus.

In the case of Manam and Siriono, stress is on the penultimate mora. In both cases, reduplication targets the final foot of the base.

(4) Plural reduplication in Manam (Lichtenbirk 1983, McCarthy & Prince 1996, 1995)[3],[4]

salága	sa-<u>laga</u>-lága	‘long’
moíta	mo-<u>ita</u>-íta	‘knife’
ʔarái	ʔa-<u>rai</u>-rái	‘ginger sp’.
láʔo	<u>laʔo</u>-láʔo	‘go’
malabóŋ	mala-<u>bom</u>-bóŋ	‘flying fox’

(5) Repetitive reduplication in Siriono (Moravcsik 1978, McCarthy & Prince 1996)

ñimbucháo	ñimbuchao-<u>chao</u>	‘separate (intr.) = come apart’
achisía	achisia-<u>sia</u>	‘I cut’
embúi	embui-<u>mbui</u>	‘divide’
esiquío	esiquio-<u>quio</u>	‘smash’

Unfortunately, I am not certain regarding the stress of the reduplicated form in the Siriono data. However, it is clear that stress, rather than right edge correspondence, is what drives these patterns.

In the following section, I argue that the principal source of prominence in a stressed constituent is the rhyme. Nancowry reduplication reveals the need to single out the rhyme in a Positional Anchoring constraint.

[3] McCarthy & Prince (1996:31fn.) note that there are no examples given of reduplication with a base of the form CVN.CV, e.g. *lúnta*. Thus, we do not know whether it would reduplicate as *luntá-nta, lun-lúnta, lunta-lúnta*, or whether, alternatively, reduplication is avoided and the plural is expressed periphrastically.
[4] McCarthy & Prince analyze this pattern as suffixing, however assuming that the reduplicant is the unstressed string, the analysis leads to an infixed reduplicant.

4.2.1 Evidence for main stressed rhyme as target: Nancowry

At least two arguments can be made in favor of a rhyme-based positional anchoring constraint generally. First, it is well established that in quantity-sensitive stress systems, stress assignment is uniquely sensitive to the quality of the rhyme. It is standard to disregard the onsets of stressed syllables for stress-assessing purposes (Hayes 1995). Second, in some theories of prosody, only the rhyme (and not the syllable) is projected (Halle & Vergnaud 1987). Given this kind of theory, it follows that as far as prominence is concerned, the rhyme is the crucial domain.[5]

Assuming that only the rhyme of the stressed syllable is prominent, then the onset of the stressed syllable is not a 'privileged position' in Beckman's terms. This contrasts with the case of onsets as a class. Onsets generally are of course prominent; however, the onset of the stressed syllable cannot be singled out. We would thus not expect only the onset of a stressed syllable to be included under the scope of a Positional Faithfulness constraint.

The constraint proposed here is meant to reflect these claims about the prominence of the stressed rhyme:

(6) MAX-Ŕ (Base, Reduplicant): Each segment in the main stressed rhyme of the base must have a correspondent in the reduplicant.[6]

---

[5] In addition, it is worth noting that the onset of a stressed syllable is rarely, if ever, singled out as a position in which contrast is preserved. (Beckman (1998) cites Copala Trique as a possible example.) This general lack of contrast preservation suggests that that IDENT is similarly restricted to the stressed rhyme, as opposed to crucially encompassing the entire syllable.

[6] When it appears that the entire stressed syllable is copied, then we see the combined effect of stressed rhyme copying plus satisfaction of ONSET by faithful copying of the corresponding onset.

Nancowry (Radhakrishnan 1981, Steriade 1988, Alderete et al. 1999) provides evidence for this formulation of the constraint. I will show that the contents of the reduplicant depend crucially on the material in the main stressed rhyme. This will be the key to explaining why the reduplicant copies a right edge and not a left edge, e.g. *ʔit-sut* ‘to kick with the foot’.

4.2.1.1 Stress and the monosyllabic size restriction

Stress is final in roots (Radhakrishnan 1981:15). This is important, given the striking observation that reduplication is limited to roots that are monosyllabic.[7] By appealing to MAX-Ŕ, we can begin to understand the restriction.

The comparison is the following:

(7) a. Monosyllabic roots:	ʔVC_n-CV́C_n	(e.g. *ʔit-sút*)
b. Disyllabic roots:	*ʔVC_n-σCV́C_n	(e.g. **ʔin-siʔún*)

The form in (7a) successfully undergoes reduplication. In (7b), reduplication is not permitted.

The important observation is that like all other cases of stressed rhyme copying, this process is strictly local. Thus I claim that when the stressed rhyme is copied, the affected rhymes must be adjacent, with no other rhymes intervening. This is illustrated below:

---

[7] Examples of disyllabic roots that do not reduplicate include: *siʔún* ‘to bow’, *kawuí* ‘to be foolish’, and *taráp* ‘to trap’ (a borrowing from English).

(8)

a. R ⟷ R

ʔ i t - s u t

b. R R R

*ʔ i n - s i ʔ u n

In a purely segmental account using right anchoring, there is no such way to characterize the locality, and thus the restriction:

(9) Right anchoring is non-local in both cases

a. ʔ i t - s u t

b. *ʔ i n - s i ʔ u n

This contrasts of course with instances of final C copying in total reduplication. The difference is whether all material that is copied over is itself copied. Thus, total reduplication of *sut*, forming hypothetical *sut-sut*, can descriptively be seen as local:

(10) If the *t* copies over *u,s* it must copy *u,s*: s u t – s u t ✓Local

ʔ i t – s u t *Local

Rhyme adjacency, where corresponding rhymes are adjacent at the level of the rhyme, clearly provides a reason to exclude reduplication of the type in (9b).

4.2.1.2 TETU

The reduplicant is severely reduced with respect to markedness when compared to the corresponding base in the ways outlined in (11). Alderete et al. clearly show the aspects of unfaithful copying to result from the Emergence of the Unmarked (TETU, McCarthy & Prince, 1994). Subject to TETU are the reduplicant's onset, vowel, and final consonant, with the following restrictions:

(11) Elements of TETU:

a. onset = ʔ
b. final consonant = stop (but not *ʔ*; palatals become plain coronals)
c. vowel = {i,u}
d. agreement in place of $VC)_\sigma$

Roots of the shape *CVh* are excluded from the discussion.[8] They are unpredictable, and do not invite a contrast between the two theories considered. Examples using stop-final roots are given in (12a-b). If the final stop is a coronal (or reduplicates as one, as is the case with palatal *ɲ*), then the reduplicant is *ʔiC*, with the vowel agreeing in place with the copied coda. With a non-coronal final stop, the reduplicant is *ʔuC*.

(12) Root-final stops

a. final stop = [+coronal] (t, ɟɲ); RED = *ʔiC*

sut	ʔit-sut	'to rub/ to kick with the foot'
kiɟɲ	ʔin-kiɟɲ	'to monkey/to show the teeth like a monkey'

b. final stop = [-coronal] (k,ʔ,m); RED = *ʔuC*

ɲiák	ʔuk-ɲiák	'binding/to bind'
yaʔ[9]	ʔu-yaʔ	'to leave something/to lay an egg'
rom	ʔum-rom	'flesh of fruit/to eat pandarus fruit'

Continuants are banned from the reduplicant's coda, which is why the root-final consonant is vocalized in the examples in (13).

---

[8] Examples of some such reduplicated roots are: *ʔu-həh* 'to mourn using only words when crying'; *ʔu-koh* 'to murder'; *ʔi-cih* 'to stitch, embroider'; *ʔi-yoh* 'to pierce, stitch'.
[9] *ʔ* patterns with dorsal codas, in that the RED vowel is consistently *u*. However, unlike other dorsals, *ʔ* is disallowed by an emergent coda condition against *ʔ* and continuants in reduplicants.

(13) Root-final continuants (except *h*)

a. final continuant = [+coronal] (s,y); RED = *ʔi*

tus	ʔi-tus	'to fall off/to pluck out'
ruáy	ʔi-ruáy	'moving back and forth/to beckon'

b. final continuant = [-coronal] (ɬ,w); RED = *ʔu*

tow	ʔu-tow	'heart/to brood'
túaɬ	ʔu-túaɬ	'round/a knot'

Clearly, although the reduplicant does not correspond perfectly to the related base, we do not see complete emergence of the unmarked either. Alderete et al. show that the markedness constraints push in the direction of a reduplicant of the shape *ʔi*; a constraint requiring faithfulness to a portion of the base works against this neutralization, preserving as much of the base's qualities as the ranking allows. The reduplicant corresponds to the base in some way, with the rightmost elements of each morpheme in correspondence in these forms.

4.2.1.3 Background: Alderete et al.

In this section I begin by briefly reiterating the assumptions made by Alderete et al. that are adopted in this analysis. They argue that the reduplicant-initial consonant as well as the nucleus are default segments arising by TETU; the glottal stop satisfies ONSET with minimal violation of segmental markedness constraints. The hierarchy that they assume is the following:

(14) Place Markedness hierarchy

*PL/LABIAL,*PL/DORSAL »*PL/CORONAL »*PL/PHARYNGEAL

Pharyngeal, at the bottom of the hierarchy, includes the laryngeal *ʔ*. AGREE(Place) requires the reduplicant's V and coda C to agree in place. The reduplicant's vowel is either *i* or *u*. In the language generally, *a* is also possible in an unstressed syllable; however, REDUCE requires that vowels in an unstressed syllable must be short. Also, an emergent coda condition bans continuants and glottal stops from the coda position.

I accept all of the above from their analysis. The crucial difference is their claim that an undominated constraint requiring right anchoring of the final root consonant ensures copying of the coda C. The ranking they argue for is the following:

(15) R-ANCHOR » Place Markedness » MAX_{BR}

This is not possible in the proposed theory. Moreover, such an analysis requires that R-ANCHOR dominate L-ANCHOR, as the latter must be ranked below Place Markedness in order to allow for neutralization of the onset in the reduplicant. This ranking is problematic, since it makes the prediction that an unstressed right edge can be explicitly targeted for copying.

However, a reduplicant-specific faithfulness constraint forcing faithful copying of the rightmost segment of the root must dominate Place Markedness. This constraint cannot be E-ANCHOR, since onsets are neutralized, ultimately ruling out forms like *ɲum-ɲím*. Rather, I propose that Nancowry shows stressed rhyme copying.

4.2.1.4 Reduplication as stressed rhyme copying

Characterizing the reduplicant with MAX-Ŕ, and exploiting the generalization that stress is always final in the root, is preferable on several grounds. This analysis makes it possible to describe the restriction of the process to monosyllabic roots in terms of rhyme adjacency, which is not possible under the alternative approach. Also, the analysis is consistent with the proposed anchoring system, which is more restrictive than the symmetric L/R-ANCHOR theory. In addition, as we will see, only with the proposed MAX-Ŕ account can we explain the behavior of reduplication with *V*- and *h*- final roots with diphthongs.

The stressed rhyme MAX constraint defined in (6) applies here; the constraint is repeated below.

(16) MAX-Ŕ (Base, Reduplicant): Each segment in the main stressed rhyme of the base must have a correspondent in the reduplicant.

Each segment in the rhyme of the stressed syllable of the base is required to have a correspondent in the reduplicant. The descriptive generalization that characterizes the data is the following: the reduplicant copies the segment corresponding to the weak mora in the stressed rhyme of the base. In a case where there is no weak mora, as in a root of the shape *CV*, then we find neutralization to *ʔi*.

In the examples given thus far, the place of the rightmost segment of the root is maintained. However, additional data from reduplication with diphthongs in (17) show that in fact the situation is even more complex.

Either member of a diphthong can be stressed. (Unstressed vowels reduce to schwa).

(17) Reduplication with diphthongs

V₁ is stressed		*V₂ is stressed*		*both unrounded*	
ʔi-kúəh	‘to shave’	ʔu-suáh	‘to singe’	ʔi-fɯ̃́ə	‘to blow a whistle’
ʔi-rúəh	‘to pulverize’	ʔu-fuáh	‘to open’	ʔi-líəh	‘to get ready’

With these examples of *V*- and *h*- final forms with diphthongs, it is clear that the reduplicant’s vowel reflects the rounding of the *unstressed* vowel of the base’s diphthong, regardless of the proximity of this vowel to the right edge. This is a new discovery, and behavior that cannot be explained by R-ANCHOR. The data in (12) and (13) as well as the diphthong data in (17) are united here under the claim that the reduplicant shows stressed rhyme copying.

4.2.1.5 HEAD MATCH$_{BR}$

What remains to be explained, assuming the claim that MAX-Ŕ characterizes the reduplicant is correct, is why it is the place of the *coda* that is copied, and not that of the vowel. I argue that this is because a constraint requires that if two moras stand in a correspondence relation and the first mora is stressed, then the second mora must also be stressed (Pater 1995, Alderete 1996, McCarthy 1999):

(18) HEAD MATCH$_{BR}$: If μ_1 is stressed and $\mu_1 Y \mu_2$, then μ_2 must also be stressed.

When the stressed rhyme of the base is copied by a monosyllabic reduplicant, the reduplicant will be adjacent to this syllable.[10] The obvious threat posed by faithful copying of the head mora's stress is the resulting adjacency of the stressed syllables. Stress clash is not permitted in Nancowry. However, stressed rhyme copying should potentially lead to stress clash cross-linguistically, in cases where HEAD MATCH$_{BR}$ » *CLASH. Possible examples of this sort of stress clash creation can be found in West Tarangan: *daɔ́n-<u>ɔ́n</u>*, from *daɔ́n*, '3p. shoot' (Nivens 1992), and in monosyllabic reduplicated stems in Djinang (Waters 1980). However, if the constraint against stress clash is ranked high, then the only way to satisfy HEAD MATCH$_{BR}$ is to avoid copying the stressed mora. Thus, the reduplicant's vowel is unstressed, and violation of HEAD MATCH$_{BR}$ is avoided by the correspondence of the reduplicant's vowel to an unstressed element of the base. This is what happens in Nancowry. It is important to note that the proposal is *not* that a non-prominent position is targeted. Rather, the interaction of constraints determines that the weak element is this strong position in the optimal element to copy.

As mentioned above, the vowel of the reduplicant is limited to *i* and *u*. In the case of coda consonants then, the reduplicant prefers to reflect the place specification of the unstressed segment, as opposed to copying the stressed segment without copying its stress. In (19), I entertain only candidates that satisfy the emergent phonotactic constraint

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[10] In truncation, nothing compels violation of this constraint. So when MAX-Ŕ is satisfied, HEAD MATCH$_{BASE\text{-}TRUNCATUM}$ is as well: *Virgínia* → *Gínny* (English); *Alexandrá* → *Sandrá* (French), etc. If a correspondent of the stressed vowel of the base is present, then it is stressed in the truncated form. If it is not, then nothing penalizes stressing a vowel corresponding to a vowel that does not receive stress in the base form.

on the reduplicant, requiring that the V and coda C agree in place, thus ruling out *$ʔim_3$-$ɲím_3$.

(19) Motivation for HEAD MATCH$_{BR}$

/RED,ɲim/	HEAD MATCH	MAX-ŕ	*PL/LAB, *PL/DOR	*PL/COR	*PL/PHA
a.☞$ʔum_3$-$ɲím_3$		i	u,m,m	i,ɲ	ʔ
b. ʔi-$ɲí_2$m		im!	m	i,i,ɲ	ʔ
c. $ʔi_2$-$ɲí_2$m	*!	m	m	i,i,ɲ	ʔ

In candidates (b) and (c), AGREE(Place) is vacuously satisfied, since no coda appears in the reduplicant. Candidate (b) is maximally unmarked with respect to the Place Markedness hierarchy, but its failure to contain material from the stressed rhyme of the base proves fatal. While the stressed vowel is copied in (c), the stress is not. This violation of HEAD MATCH$_{BR}$ is fatal. In the winner (a), violation of HEAD MATCH$_{BR}$ is avoided by copying of the segment corresponding to the weak mora of the base's rhyme. This solution achieves maximal possible satisfaction of MAX-Ŕ. The candidate $ʔu_3$-$ɲím_3$ is ruled out by IDENT(vocalic), which requires that corresponding segments agree with respect to this feature. IDENT(vocalic) can be violated, as we see in *ʔi-tus*; however, nothing compels the violation here, as copying of stops is unmarked. Finally, the failure of the candidate *$ɲum_3$-$ɲím_3$ shows that the onset of the stressed syllable does not fall under the domain of MAX-Ŕ.

4.2.1.6 The revealing behavior of diphthongs

The MAX-Ŕ analysis differs from Alderete et al.'s in the predictions that it makes with respect to *V*-final and *h*-final roots. For these, they predict that the unmarked *i* will surface. With MAX-Ŕ as the relevant anchoring constraint however, the vowels are predicted to be in correspondence in both cases. The special case of CV roots is addressed below.

The unstressed vowel of the root is clearly in correspondence with the reduplicant vowel for *V*- and *h*-final roots, where the root vowel is a diphthong, as is predicted by MAX-Ŕ working in tandem with HEAD MATCH$_{BR}$. Correspondence between the vowels is determined by satisfaction of IDENT(round); *i* or *u* will occur in the reduplicant's vowel depending on the roundness value of the vowel corresponding to the non-head mora of the root diphthong.

(20) HEAD MATCH$_{BR}$ determines winner

/RED, suáh/	IDENT$_{BR}$(round)	HEAD MATCH$_{BR}$	MAX-ŕ
a. ☞ʔu$_2$-su$_2$áh			a
b. ʔi$_3$-suá$_3$h		*!	u
c. ʔi$_2$-su$_2$áh	*!		a

Under this analysis, we are able to unify the copying of the coda in the stressed rhyme and the copying of the unstressed vowel of a diphthong in *V*- and *h*-final forms. In both cases, a constraint against the stressed mora corresponding to an unstressed mora in the reduplicant will cause copying of the segment linked to the unstressed mora of the base rhyme. The ranking has the effect of targeting the weak part of a prominent position, but this is the result of the combined effect of the independently motivated constraints. In similar forms with a single vowel, almost all reduplicate with *ʔi* (Alderete et al. suggest that the exceptions are actually *w*-final). Under the analysis here, if we assume that HEAD MATCH$_{BR}$ » MAX-Ŕ, then the *i* vowel is explained under this account as well: the default vowel is epenthesized when correspondence to the base vowel is prohibited.

4.2.1.7 The weak mora

For completeness, I will illustrate how targeting the weak mora in the rhyme is effective in all the types of cases discussed above. My assumptions are the following: the rhyme branches into a strong and a weak mora, it is this level of *daughter of the rhyme* that is relevant to the analysis, and I assume *h* does not satisfy Weight by Position (Hayes 1995); *h* attaches directly to the syllable.

Thus, when the coda C (except *h*) is linked to the weak mora as in the examples below (and in diagram 22a), the weak mora is copied, not the weak vowel:

(21) Weak mora linked to coda C

a. ruáy	ʔi-ruáy	(*ʔu-ruáy)
b. ɲiák	ʔuk-ɲiák	(*ʔit-ɲiák)
c. túəɬ	ʔu-túəɬ	(*ʔi-túəɬ)

When the base coda C is *h*, the weak mora is a member of the diphthong; the weak V is then copied (22b):

(22) a. non-*h* coda   b. *h* coda

The only consonant that is non-moraic is *h*. In all other cases where a coda appears, the place of the coda is copied by the reduplicant's coda C if the coda is a stop, and by its V otherwise.

4.2.1.8 Crucial rankings summarized

The following crucial rankings are required for Nancowry:

(23) a. AGREE(Place) » MAX-Ŕ: The phonotactic constraint that emerges in reduplication causes the reduplicant V and coda C to agree in place, with the result that only one segment of the stressed syllable rhyme will have a correspondent.

b. {HEAD MATCH$_{BR}$, MAX-Ŕ}» Place Markedness: Faithful copying of the unstressed mora of the stressed rhyme of the base occurs. However, the onset emerges as the unmarked *ʔ*, as it is subjected to the Place Markedness hierarchy.

c. HEAD MATCH$_{BR}$ » MAX-Ŕ: When the root contains a single V, the reduplicant vowel will emerge consistently as the unmarked *i*, rather than corresponding to the head mora of the base.

This goes to prove that the apparent right anchoring effects of Nancowry are parasitic on the main stressed rhyme. In the next section, independent evidence from French hypocoristics offers further support for this definition of MAX-Ŕ.

4.2.2 Additional evidence in favor of main stressed rhyme as target: French hypocoristics

Truncation in French hypocoristics also shows that the onset must be excluded from the domain of stress-sensitive faithfulness.

In the default case, when the base name is C-initial, the optimal hypocoristic is left-anchored and has no coda:

(24) Left-anchored hypocoristics

Base=base name	*Truncatum=hypocoristic*	
a. dɔminik	dɔmi	'Dominique'
b. dɔrɔte	dɔro	'Dorothé'
c. karolin	karo	'Caroline'

The failure of these forms to include a final coda, at the expense of copying more material from the base (and thus incurring additional violation of MAX(Base, Truncatum)), shows that NO CODA » MAX_{BT}. In addition, since the final syllable is stressed, we know that LEFT ANCHOR » MAX-Ŕ.

(25) *dɔminik → dɔmi, *dɔmin*

[dɔminík]	LEFT ANCHOR	MAX-Ŕ	NO CODA
a. ☞dɔmi		ik	
b. dɔmin		ik	*!
c. minik	*!		*

However, stressed material is targeted for copying when left anchoring cannot be satisfied, namely when the base name does not have an onset.

(26) Hypocoristics for V-initial base names

a. elizabɛt	zabɛt	‘Elizabeth’
b. ɛrnɛstin	nɛstin	‘Ernestine’
c. alɛksɑ̃dra	sɑ̃dra[11]	‘Alexandra’

Thus, we see that hypocoristics must have onsets: ONSET » LEFT ANCHOR. Also, if the stressed syllable rhyme contains a C, the hypocoristic is C-final; thus, MAX-Ŕ» NO CODA. Given that MAX-Ŕ » NO CODA, if MAX-Ŕ were sensitive to onsets (MAX-σ́), then in a left anchored form, the onset of the stressed syllable would wrongly be copied. In other words, in (25), we would expect **dɔmin* to be optimal, since this candidate copies at least the onset of the stressed syllable. However, the stressed syllable onset-copying candidate is ruled out. Similarly in English, a name such as *Clèopátra* cannot map onto **Cleop*, even though this form copies the onset of the stressed syllable.[12] This is further evidence that MAX-Ŕ is the correct positional faithfulness constraint of rhyme as target.

4.2.3 Conclusion

Using the constraint MAX-Ŕ as opposed to R-ANCHOR to account for Nancowry reduplication, we see that the copied material necessarily comes from the stressed rhyme of the base. HEAD MATCH surfaces in this conflict situation: the reduplicant is required to copy material from the stressed rhyme, but the stressed vowel cannot be copied without

[11] It seems that not all native speakers share the intuition that this is a valid nickname for the relevant form (Viviane Déprez, p.c.)

[12] Although FAITH STRUCTURE ROLE (McCarthy & Prince 1995) would also work for these cases, this constraint is violable (cf. *trab-trabaho* in Ilokano, for example). The prediction under the approach given here is that copying of the stressed syllable onset, by virtue of its being a member of the stressed syllable, is never permitted.

its stress. Instead, the reduplicant's vowel avoids correspondence with the stressed vowel of the base. The analysis accounts for the behavior of diphthongs in *V*- and *h*-final forms and allows explanation of the restriction to monosyllabic roots, thus broadening the coverage of the data with respect to previous analyses. The MAX-Ŕ account also allows the more restrictive, R-ANCHOR-less system of anchoring to persevere. Further evidence from French hypocoristics illustrates what seems to be a correct prediction of the theory: the onset of the stressed syllable of the base must necessarily be left out of the domain of the positional faithfulness constraint relating to stress.

Nancowry reduplication is an example of the parasitic nature of right edge copying. In this case, the apparent activity of RIGHT-ANCHOR is crucially reduced to a dependence on the stressed rhyme, following from the activity of MAX-Ŕ and HEAD MATCH$_{BR}$.

4.2.4 Right edge stress in hypocoristics: Catalan

We also see stress-related apparent right edge targeting in truncation. In Catalan (Cabré and Kenstowicz 1996), the base name is shortened to a form that is at least two moras long, and never longer than two syllables. In all cases that follow this pattern,[13],[14] it is unstressed, left edge material that is deleted in the hypocoristic:

[13] There is a separate pattern of hypocoristic formation in Catalan, by which the left edge of the base is anchored (e.g. *Montserrat* → *Montse*). A similar duality of left edge preserving and stressed syllable retaining patterns is available in English, leading to variation in nicknames such as *Patrícia* → *Patty, Tricia*.

[14] The claim that stress is the driving factor would predict that in lexically marked forms, the main stressed foot would constitute the hypocoristic. Although the right-anchored candidate hypocoristic for a base name with antepenultimate stress is out (*Penèlope* → **Lope*), the foot-preserving candidate is out as well: **Nelo* (Cabré & Kenstowicz 1996:697). Apparently, such base names have no acceptable hypocoristic form. It is not immediately clear how lexical stress alone could derail hypocoristic formation.

(27) Catalan Hypocoristics

Ambrós	Brós
Joaquím	Quím
Montserrát	Serrát, Rát
Francísco	Císco
Teodóra	Dóra

Although it is descriptively accurate in this case to say that the right edge is targeted, a RIGHT-ANCHOR account of these data would clearly be missing the role that stress plays in this process.[15]

4.3 Lakhota: stressed syllable reduplication

Lakhota reduplication (Shaw 1980, Marantz 1982, Shaw 1985, Sietsema 1988, Patterson 1990) offers a challenging case of apparent suffixing/right-anchoring. I show that this pattern of reduplication must be analyzed as stressed syllable copying.[16] Thus, much as in the examples discussed above, the analysis hinges on an active MAX-σ́ constraint, which leads to the targeting of the stressed segments of the base for copying.[17]

(28) MAX-σ́: The segments in the stressed syllable of the base have a correspondent in the reduplicant.

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[15] Cabré and Kenstowicz duly note the crucial role of stress in their analysis.
[16] This intuition that the stressed syllable is the target was shared by Williamson (1992:xxiii), "The accented syllable is generally repeated".
[17] Earlier, it was argued that the stress-related BR constraint excluded the onset, MAX-Ŕ. The use here of MAX-σ́ is for simplicity; it represents the combined effect of MAX-Ŕ, ONSET, and DEP-IO.

This leads to the result that the reduplicant is always unstressed, a generalization that holds in all forms, although the expectation for the reduplicant to fall on a consistent edge relative to the base does not.

As presented in Chapter 1, the proposed theory of reduplication posits an inherent difference between fixed segment affixes and reduplicative affixes. Whereas fixed segment affixes are subject to alignment constraints for placement (cf. EDGEMOST McCarthy & Prince 1993:10), reduplicative affixes surface in order to satisfy a base-reduplicant positional faithfulness constraint. These constraints target privileged positions, such as the left edge, or stressed syllable. Locality considerations will force the reduplicant to be adjacent to the targeted material, however no constraint explicitly positions the reduplicant within the word. This leaves open the possibility that, under certain rankings, the reduplicant could occur to the left or right of the adjacent base, with this position determined by independently motivated constraints on the output. In Lakhota, we see an illustration of this prediction, yielding examples like the following:

(29) Inconsistent placement relative to base (epenthetic final vowels capitalized):

a. RED to left of base:	ksa-ksápA	'to be wise'
	xlo-xlókA	'to have holes'
b. RED to right of base:	čoká-ka	'empty'
	hã́ska-ska[18]	'be tall'

Although it may seem odd to find a system in which the position of the reduplicant will appear to the left or right of a given base depending on the structure of the output, this behavior is derived from familiar notions. Reduplicant placement is dependent on:

[18] The copying of a superficially unstressed syllable in examples such as this one will be explained in section 4.2.2.

copying of the stressed syllable, normal application of stress on the output of reduplication, and correspondence of stressed syllables from one representation to another.

Reduplication can mark plurality of an inanimate subject, iterative or repetitive action, distributive action or state, or intensification.[19] Ambiguity of meaning may result in some cases, but the process of reduplication is the same. C-final stems must epenthesize a V, and are then uniformly disyllabic on the surface in the language generally; V-final stems are either mono- or disyllabic (Shaw 1980:117). In this pattern, stems that have one V underlyingly always stress the second occurrence of the sequence that is copied in reduplication; underlyingly bi-vocalic stems always stress the first occurrence.

(30) Lakhota

a. *one V underlyingly, V#*

/ksa/	ksá	<u>ksa</u>-ksá	'to cut'
/ži/	ží	<u>ži</u>- ží	'yellow'

b. *one V underlyingly, C#*

/sap/	sápA	<u>sap</u>-sáp-A	'to be black'
/yũk/	yṹkA	<u>yũk</u>- yṹk-A	'be in reclining position'
/ksap/	ksápA	<u>ksa</u>-ksápA	'to be wise'
/xlok/	xlókA	<u>xlo</u>-xlókA	'to have holes'

[19] Iterated numbers have previously been assumed to fall into this class. However, under the current analysis, they must be taken to be a separate class. They are isolated, in that they are exceptional in at least a couple of ways: they are a source of several lexically stressed roots (*yámni* 'three'; *záptã* 'five'), and they often exceed the canonical maximum root size (*šakówĩ* 'seven'; *šaglógã* 'eight' (White Hat 1999:30)). For lack of a better way to address isolated examples like *napčĩ́wãg-wãk-a* (**napčĩ́-čĩ-wãk-a*) 'by nines', I suggest that they are historically compounds, and that the rightmost member is targeted for reduplication: /napčĩ́+wag, RED/, where the compound is right-headed, → *napčĩ́wãg-wãk-a*.

c. *two V's underlyingly, V#*

/čoka/	čoká	čoká-ka	'empty'
/ia/	iá	iá-a	'speak'
/ũspe/	ũspé	ũspé-spe	'to learn'
/škokpa/	škokpá	škokpá-kpa	'hollowed out'

The driving force of reduplication is stressed syllable copying. This is an unproblematic claim for V-final monosyllabic bases (30a) and forms in which epenthesis occurs word-finally due to an underlying final C (30b). The last two forms are the ones that most clearly support such an analysis: /xlok/ → *xlo-xlókA, *x-lok-lókA, *xlokÁ-kA.*

Stress in Lakhota is peninitial, although several processes make this generalization opaque. For example, C-final roots receive an epenthetic final V, which is not stressed. Such words then exhibit initial stress on the surface: */puz/→ púzA* 'be dry'.

Lexically stressed forms have a striking quality, in that they reduplicate as if they received default stress (31). That is, although they exhibit lexical stress on the surface, their lexical marking is effectively ignored for the process of reduplication. I show this type of opacity to be severely restricted, in that it must lead to a regularization of some kind. By disregarding lexical stress, the grammar regularly obeys the stressed syllable copying constraint, as it would apply to forms that do not have lexical stress, for example: /hã́ska, RED/ → {hãšká-ska} hã́ska-ska. We will return to this idea in §4.3.2.

(31) *two V's underlyingly, V#, lexically stressed*

/hã́ska/	hã́ska	hã́ska-ska	'be tall'
/yámni/	yámni	yámni-mni	'three'

The standard analysis takes this reduplication pattern to be uniform suffixing of the RED morpheme. In a theory in which the analyst is compelled to label the reduplicant as *prefix* or *suffix* it is clear that this choice is forced as the lesser of two evils. By opting for a suffixing analysis, one avoids having to claim for example that *čoká* in *čoká-ka* is a prefix, while merely *ka* is what is left of the root. The challenge for such a theory is however that so many forms appear to be prefixing, such as <u>*sap*</u>*-sápA,* <u>*xlo*</u>*-xlókA*. In fact I show (section 4.3.5) that the latter example can never successfully succumb to a suffixing account. I show first that the pattern must involve rather reduplication of the stressed syllable, and then illustrate why it cannot be due to suffixing of a RED morpheme. Isolated problematic examples exist, and these will be addressed in the course of the discussion.

Before turning to the details of the analysis, I will mention a slightly different pattern in verb reduplication that indicates active (vs. stative), which involves shifting of the stress "to the first syllable" (Shaw 1980:51): *yús-yuza* 'to take hold of' (vs. *pus-púza* 'be dry') . However, no forms are given where the root in the base has two vowels underlyingly. Thus there are no forms to give evidence of the stressed syllable analysis presented here which, barring opacity, predicts: <u>*čók*</u>*-čoka* in the active. Shaw's analysis predicts that stress will shift away from an otherwise stressed syllable to an unstressed syllable in this case, e.g. *[čoká]* $\rightarrow$ *čóka-ka*. This data is thus an important point of comparison. I am still in search of the data needed to shed light on this issue.

4.3.1 Stressed syllable copying: MAX-σ́

The core constraint that is operative in the analysis is MAX-σ́, which requires that the stressed syllable be targeted for copying:

(32) MAX-σ́: The segments in the stressed syllable of the base have a correspondent in the reduplicant.

An important aspect of the proposed system is that there is no alignment of a RED morpheme, rather only targeting of the prominent (stressed) syllable for the purposes of anchoring (see Chapter 1).

Stress in Lakhota is peninitial. A cover constraint abbreviating the relevant prosody 'PENINITIAL' is sufficient for present purposes. The tableau below also shows evidence of an output-output constraint requiring the prosodic head of the un-reduplicated output form (in brackets) and the reduplicated form to be in correspondence, 'HEAD MATCH'.

(33) a. PENINITIAL: Stress is peninitial.
b. HEAD-MATCH-OO: If μ_1 is stressed in output string S_1 and $\mu_1 \Re \mu_2$, then μ_2 in output string S_2 must also be stressed.

The HEAD-MATCH constraint plays a crucial role, as it rules out an otherwise threatening competitor, as we see comparing the winner to candidate (b) in the tableau below.

(34)

/čoka, RED/ [čoká]	HEAD-MATCH$_{OO}$	MAX-σ́	PENINITIAL	L-ANCHOR
a. ☞ čoká-<u>ka</u>				*
b. <u>čok</u>-čóka	*!			
c. <u>čok</u>-čoká		*!	*	

The winner (a) shows that the stressed syllable is reduplicated, and stress is peninitial in the output (compare (c) on both counts). Also, the original stressed syllable of the unreduplicated word is preserved with its stress (b). Left anchoring to the base is necessarily foregone, given these over-riding concerns.

One might argue that the so-called 'inherent reduplication' forms, verbs that imply repetition of action, offer counter-evidence to the claim that OO-HEAD MATCH is active here, as these words are "generally used in their reduplicated form" (Riggs 1973:69). Examples are: *yuhuhuza* 'to shake'; *panini* 'to jog'; *kapsĩsĩta* 'to whip'. Without the unreduplicated *yuhúza*, e.g., we would expect both MAX-σ́ and L-ANCHOR to be satisfied: *yu-yúhuza*. It must be the case that although the unreduplicated form is not well attested, it is still the otherwise possible output of the underlying form for these words, and thus eligible for reference by output-output constraints. I do not know what to make of the non-canonicality of the underlying forms for *yuhuhuza* (presumably /yuhuz/) and *kapsĩsĩta* (/kapsĩt/).

4.3.2 Opacity of lexically stressed forms

As we have just seen, stress is assigned to reduplicated forms peninitially, while the surface stressed syllable is in correspondence with the stressed syllable in the non-reduplicated form. Opacity is involved in the case of lexically marked forms, (of which there are just a few (Chambers 1974:4, Shaw 1980:150)). I propose that when these words reduplicate, the syllable that is copied is the one that would have received stress in the unaffixed form by the *default* rules, i.e. as if stress were assigned without heeding lexical markings. In this section, evidence is presented that speakers can have access to default forms, even when these forms do not surface. I present a preliminary version of a system that could achieve this result. The potential of the idea is that this type of behavior, apparent exploitation of a non-surface default form, occurs elsewhere.

(35) Exploitation of “default” forms

- Derived French *h-aspiré* words (certain suffixes only) (§4.3.3.1)
- Chamorro shifting of stress to the penultimate syllable in lexically stressed words that are then suffixed
- Ọwọn-Afa reduplication (Ola 1995), in which allomorphy disappears in reduplication. Reduplication occurs only with the base formed from the input void of lexical marking. (§4.3.3.2)
- “Infixing” reduplication to a main stressed foot (Broselow & McCarthy (1983)). These known cases occur in languages which the canonical stem is a single foot.

We see the general relevance of a default form, in reduplication examples and non-reduplicative examples as well. Before proceeding with the analysis of Lakhota, I will present briefly two of these cases in which lexical faithfulness suppression can also be seen to apply.

4.3.3 Increased canonicality of derived forms

4.3.3.1 Default in French h-aspiré

Kiparsky (1973) observed that derived *h-aspiré* forms exhibit increased canonicality, as compared to non-derived forms.

(36) *h-aspiré*

a. *le Hitler*	*le héros*	(*l'Hitler, *l'héros)
b. *l'Hitlérien*	*l'héroïne*	(*le Hitlérien, *la héroïne)

V-initial nouns are usually preceded by the article *l'*, which forms the onset of the initial syllable, e.g. *l'heure* [lœr], 'the time/hour'. Nouns that contain *h-aspiré* however are preceded by the full article *le* or *la* in spite of the ONSET violation that doing so will cause.

Descriptively, lexical faithfulness is being suppressed in a derived form (36b).[20] This allows the markedness forces that normally enforce canonicality to show through. In the following tableau, the lexical faithfulness constraint, which here requires faithfulness to the lexical marking that leads to exceptional left-alignment of the *h-aspiré* word with the left edge of a syllable, is shaded. This is to facilitate considering the same competition

[20] Tranel (1996) captures this with variable ranking between ONSET and an alignment constraint requiring left alignment of the morphological word and a syllable. For *h-aspiré* words, the marked ranking ALIGN-LEFT >> ONSET leads to prohibition of resyllabification, even in the face of an onsetless syllable. The opposite ranking, ONSET >> ALIGN-LEFT, is assumed to hold in the default, non-*h-aspiré* cases. The analysis proposed here is very similar, differing only in the assumption that faithfulness rather than markedness (alignment) constraints are responsible for the exceptional forms.

in the absence of lexical faithfulness. Clearly, suppression of the lexical faithfulness constraint leads to a different optimum, one that better satisfies ONSET (b).

(37) Suppression of FAITH-LEX

/lœ, l+Hitler *h-aspiré*/	FAITH-LEX	ONSET
a. ☞lœ Hitler		*
b. {☞l'Hitler}$_{\text{Default}}$	*!	

The tentative proposal is that the default form is retained by the grammar. In the case of subsequent optimization that makes reference to the results of an earlier calculation, appeal to the earlier 'default' winner can be made. This is shown below, where rather than output-output faithfulness comparing the candidates to the earlier optimum, it compares them to the earlier *default* optimum, contained in the input here in curly brackets.

(38)

/lœ, l+Hitler *h-aspiré*, +ien/ {l'Hitler}$_{\text{Default}}$	FAITH-OO$_{\text{DEFAULT}}$	FAITH-LEX	ONSET
a. lœ Hitlerien	*!		*
b. ☞l'Hitlerien		*	

Once FAITH-LEX is subverted in a grammar (for example, if the ranking in (37) were reversed: ONSET >> FAITH-LEX), then there is no possibility to introduce exceptionality: the output form and default form will be identical: *l'Hitler*.

4.3.3.2 Default in Ọwọn-Afa reduplication

In Ọwọn-Afa distributive reduplication (Ola 1995), expressing ‘every X’, the reduplicant surfaces as a VCV- prefix; the final vowel of the reduplicant assimilates to the initial vowel of the base.

(39) V-initial nouns

oʃù	oʃo-oʃu	*month*	
ɔrũɣɔ́	ɔrɔ-ɔrũɣɔ́	*morning*	
ɛrɛtɛ̃	ɛrɛ-ɛrɛtɛ̃	*afternoon*	

(40) C-initial nouns

bàtà, ɪbàtà	ɪbɪ-ɪbàtà	*shoe*	(cf. **bata-bata*)
kòkó, ɪkòkó	ɪkɪ-ɪkòkó	*cocoa*	
kpákó, ɪkpáko	ɪkpɪ-ɪkpákó	*wood*	

C-initial nouns are in variation with forms in which [ɪ] is epenthesized initially. I will take this to indicate that a lexical faithfulness constraint applies to C-initial nouns, and that these nouns bear some optional lexical feature ‘α’. Thus, DEP-V_α (or L-ANCHOR-IO_α) is active, and ranked above the markedness constraint that would otherwise force epenthesis in C-initial nouns:

(41) FAITH-LEX » $*\#C_{NOUN}$

In reduplication however, being lexically faithful to the extent that the markedness constraint $*\#C_{NOUN}$ is violated is not an option.

(42) FAITH-OO$_{\text{DEFAULT}}$ » FAITH-LEX » *#C$_{\text{NOUN}}$

Although *#$_{NOUN}$[C is dominated in this case, it is assumed to be crucial in the analysis, given that it emerges in reduplication, and that it is surface-true in the related language of Yoruba. FAITH-LEX here is an anchor constraint that applies only to nouns that bear lexical marking indicating membership to this class of exceptional cases (here, 'α').

(43) FAITH-LEX » *#$_{\text{NOUN}}$[C

/bàtà$_{\alpha}$/	FAITH-LEX	*#$_{\text{NOUN}}$[C	MAX-IO	DEP-IO
a.☞bàtà		*		
b. àtà	*!		*	
c. {☞ɪbàtà} $_{\text{Default}}$	*!			*

This ranking is based on a 'worst case scenario' for deriving the reduplicated form ɪbɪ-ɪbàtà; in reality, variation is found in these forms (Ola 1995), which would require variable ranking between FAITH-LEX and *#$_{\text{NOUN}}$[C.

Here again, lexical faithfulness is suppressed upon derivation.

(44) Default visible in reduplication

/b̀atà$_{\alpha}$/ {ɪbàtà}$_{\text{Default}}$	FAITH-OO$_{\text{DEFAULT}}$	FAITH-LEX	*#$_{\text{NOUN}}$[C
a.☞ ɪbɪ-ɪbàtà		*	
b. bàtà-bàtà	*!		*

Unlike the un-reduplicated forms, there is no variation in reduplication of C-initial nouns.

4.3.3.3 Default in Lakhota reduplication

I argue that stressed-syllable copying is the objective in Lakhota reduplication. This generalization is obscured by lexically stressed forms, which copy the syllable that would be stressed if lexical faithfulness were ignored; that is, reduplication occurs as if stress had been assigned according to the default pattern.

Descriptively, reduplication in lexically stressed forms behave as outlined in (45).

(45) Lexically-stressed words

hã́ska	*lexically-stressed underlying form*
hãská	*the "default" stress-assigned candidate*
hãská-ska	*stressed-syllable targeting reduplication performed on the "default" form*
hã́ska-ska	*stress realized on the lexically marked vowel*

Here, FAITH-LEX is HEAD-MATCH-IO.

(46)

/hã́ska/	FAITH-LEX	PENINITIAL
a. ☞hã́ska		*
b. {☞hãská} $_{\text{Default}}$	*	

Candidate (a) is the winner, but (b) has the status of ‘default’. The default is never realized, and yet it serves as the base for reduplicative copying.

In Lakhota reduplication, we see that there is an additional layer of complexity. The ‘default’ form does not surface in reduplication. Rather, the optimal candidate reduplicates *as if* it were stressed like the default form. This intermediate candidate (b) serves as a ‘flower candidate’ of Sympathy Theory.

(47)

/hã́ska, RED/ [hã́ska] { hãská }$_{Default}$	⊛MAX-SEG	FAITH-LEX	PENINITIAL	MAX-σ́	FAITH-OO$_{DEFAULT}$ ⊛
a. ☞hã́ska-ska			*	*	*
b. ⊛hãská-ska		*!			
c. hãs-hã́ska	*!**				*

The final ranking for Lakhota then can be summarized as in (48)

(48) Final ranking: FAITH-LEX MAX-SEG⊛

FAITH-OO$_{DEFAULT}$ ⊛ HD MATCH-OO MAX-σ́ PENINITIAL

L-ANCHOR

4.3.3.4 Problems with unrestrained Sympathy Theory

An account using Sympathy Theory (McCarthy 1999) that was not limited to suppression of lexical faithfulness (and which did not include this innovation) would be problematic on two levels. First, the Selector constraint would be an anti-faithfulness constraint, and not one that would be easy to motivate independently. It would need to require the candidates to actively be unfaithful to lexical stress: ¬HEAD-MATCH$_{IO}$⊛.

(49) Opaque faithfulness to output form that exhibits default stress

/hã́ska, RED/ [hã́ska]	⊛MAX-SEG	HEAD-MATCH$_{OO}$	MAX-σ́	PENINITIAL	¬HEAD-MATCH$_{IO}$⊛
a. ☞ hã́ska-ska			*	*	*
b. hãs-hã́ska	s!ka				*
c. ⊛ hãská-ska		*!			

Sympathy would not constrain the predictions in the same way.[21] In the envisioned account, only "default" candidates could influence the selection of the winner. However, Sympathy could allow for any constraint, for instance ALIGN-R (σ́, PrWd), to be the Selector. In a language that never stressed the final syllable on the surface, this could lead to unstressed right edge reduplication, precisely what is argued here not to be possible.

In the majority of Lakhota forms, the generalization regarding copying of the stressed syllable holds true on the surface. The argument here is that, indeed, it holds true of all forms at some level. But in lexically stressed words, restoration of lexical stress masks this uniformity.

The final class of cases to be examined involves tri-consonantal clusters, which are simplified in all cases, including reduplication.

4.3.4 Tri-consonantal clusters

Tri-consonantal clusters are ruled out generally in Lakhota. No mono-morphemic forms contain a CCC sequence. When compound formation would create such a sequence, the final C of the first member is then deleted:

(50) Compound formation (Shaw 1980)

/phet + šniž/ → [phešnižA] 'coals, embers'
fire to fade

/šũk + blok/ → [šũblokA] 'stallion'
horse male

---

[21] I am not claiming that the approach proposed here can account for all of the cases that led to the development of Sympathy Theory; this requires further investigation.

This is evidence of a constraint against tri-consonantal clusters, *CCC, dominating MAX. Positional Faithfulness to initial onsets of morphemes leads to the selection of the final C for deletion in these cases.

Words that are simplified due to tri-consonantal clusters that arise in reduplication behave as expected under this analysis. In addition, these cases exhibit emergent LEFT-ANCHOR. When satisfaction of MAX-σ́ is not at risk, LEFT-ANCHOR (see Chapter 2) is free to exert its effects. LEFT-ANCHOR is evaluated with respect to the base, which in this case is the entire stem; there is no reason to assume that the base contracts to satisfy *CC, as is evident from forms like *ksa-ksá*, (**k-sa-sa*). In Chapter 2 we saw various examples where markedness concerns could cause minimal shrinkage of the base. However, the constraint MAX ROOT-BASE (MAX Rt-B) prefers that the base contain at least the root. (The left edge of base is indicated by a left bracket):

(51) MAX ROOT-BASE: Each segment in the root must have a correspondent in the base.

(52)

/ksa, RED/ [ksá]	LEFT-ANCHOR	MAX ROOT-BASE	*CC
a. ☞ <u>ksa</u>-$_{B}$(ksá			**
b. $_{B}$(k-<u>sa</u>-sá	*!		*
c. k-<u>sa</u>- $_{B}$(sá		*! (k)	*

With *CC subordinated, both LEFT-ANCHOR and the base-maximizing constraint MAX Rt-B are necessarily satisfied for all inputs that have one vowel. We also see activity of a constraint against three consecutive consonants, *CCC. This constraint will be discussed further in the following section.

(53) *CCC: A sequence of three consonants is forbidden.

(54) Emergent LEFT-ANCHOR

/ksap, RED/ [ksápA]	*CCC	ANCHOR-σ́	PENINIT	LEFT-ANCHOR	MAX RT-B	*CC
a. ☞<u>ksa</u>- $_B$(ksáp-A						**
b. k-<u>sap</u>- $_B$(sáp-A					*!	*
c. $_B$(k-<u>sap</u>-sáp-A				*!		*
d. $_B$(ksápA-<u>pA</u>		*!	*	*		*
e. ✖<u>ksap</u>- $_B$(ksáp-A	*!					**

A markedness constraint against CC clusters could potentially prefer candidate (b) or (c), in which the base would be minimized (b) or left anchoring would be forsaken (c), in order to reduce the number of *CC violations in the reduplicant. As shown above however, with *ksa-ksá, *k-sa-sá*, *CC violations are freely tolerated in reduplication (as they are elsewhere). Candidate (e) is harmonically bounded according to the constraints shown, however if maximal base-reduplicant parsing were valued over satisfaction of *CCC (MAX-BR » *CCC), then this candidate would be optimal.

4.3.5 Alternative analysis

Using the most charitable means of converting the standard suffixing analysis of Lakhota reduplication into Optimality Theory, I show that suffixing of a RED morpheme is not a possible explanation for the system. The standard analysis of Lakhota reduplication claims that the pattern is suffixing, "…copies the entire final syllable" (Shaw 1980:332); "…simply and straight-forwardly copies the last maximal syllable as a suffix" (Patterson 1990:95). However, a study of the data, in particular roots beginning with a *CC* cluster, shows that this cannot be analyzed as suffixation of RED plus right anchoring. Note that in a suffixing analysis, sometimes the suffixed RED is stressed, sometimes it is not (*pus-<u>púz</u>A* vs. *čoká-<u>ka</u>*). Considering that stress is not appealed to in the suffixing analysis, I have not marked it in the examples below.

In order to maintain a suffixing analysis of reduplication, both Shaw and Patterson assume a rule of consonant deletion after suffixation of the entire final syllable of the stem, as in the following (affix is in italics):

(55) C-deletion in CCC clusters:

C → ∅/ __CC

UR	/ksap/
Reduplication	ksap + *ksap*
C-deletion	ksa *ksap*
Stem formation	ksa-*<u>ksap</u>*-A

The C-deletion rule has independent support from the formation of compounds, repeated from (50) above :

(56) Compound formation

/phet + šniž/ → [phešnižA] 'coals, embers'
fire to fade

/šũk + blok/ → [šũblokA] 'stallion'
horse male

The markedness constraint that is at work is clearly one and the same, essentially '*CCC', analogous to the rule Shaw suggests (55). However, there is no indication that the means by which the markedness constraint is satisfied need be the same. That is, in the compound cases, it seems that a constraint requiring root-initial faithfulness would dictate that the final C of the first root will be the one to delete. The rule-based analysis in fact seems to profit unduly from the fact that Lakhota has no roots that end in CC#. If there were such roots, then the proposed rules would lead to the following mapping: hypothetical $pan_3t_4 \rightarrow pat_4\text{-}pan_3t_4\text{-}A$. This prediction represents, to the best of my knowledge, and to the detriment of such an analysis, an unattested general solution to simplifying CCC clusters.

In the reduplication cases, it is far from obvious that the markedness constraint is negotiated in the same way as with compounds. Note that already in disyllabic stems, it is the second syllable that copies, not the first, e.g. *čoka-ka*. Thus, any constraint requiring left edge BR-faithfulness (here, LEFT-ANCHOR), must be dominated by constraints deriving the monosyllabic size of the reduplicant, as well as the constraints that determine the target. If we assume for the sake of argument that the constraint is RIGHT-ANCHOR, then we get the following ranking: {RIGHTMOST, RIGHT-ANCHOR, 'RED=σ'}>> L-ANCHOR.

(57) Constraints

a. LEFT-ANCHOR: The left edge of the reduplicant corresponds to the left edge of the base.

b. RIGHT-ANCHOR: The right edge of the reduplicant corresponds to the right edge of the base.

c. ‘RED=σ’: This is a stand-in constraint, representing the ranking that must be in place for a syllable-sized reduplicant to emerge.[22]

d. RIGHTMOST (RED, Stem): The morpheme RED is rightmost; is a suffix. (McCarthy & Prince 1993a:10).[23]

[22] If we use ALL-σ-LEFT (Ito and Mester 1997), then the ranking is: MAX-IO » ALL-σ-LEFT » MAX-BR.

[23] In Chapter 1, it was argued that constraints like RIGHTMOST cannot be used to apply to reduplicative morphemes. In the analysis constructed here as an equivalent of the earlier suffixing claims of Shaw and

(58) LEFT-ANCHOR is subordinated

/čoka RED/	RIGHTMOST	R-ANCHOR	'RED=σ'	L-ANCHOR
a. ☞ čoka-<u>ka</u>				*
b. čok-<u>čok</u>-a	*!			
c. čoka-<u>čo</u>		*!		
d. čoka-<u>čoka</u>			*!	
e. ×čo-<u>ka</u>-ka	*!*			

Candidate (c) shows that R-ANCHOR must dominate L-ANCHOR. Thus, when '*CCC' comes into play, L-ANCHOR will be irrelevant, as R-ANCHOR would necessarily dominate it, and nothing would compel violation of L-ANCHOR to make the grammar seek further for an anchoring constraint to satisfy.

An analysis of suffixing reduplication then under the standard assumptions of OT would involve suffixation of a RED morpheme, as well as right-to-left mapping from the RED morpheme to the base, in observation of RIGHT-ANCHOR. Also necessary is an undominated constraint that requires that the reduplicant contain only root material, RED ≤ ROOT:

(59) RED ≤ ROOT: The Reduplicant contains only the root. (McCarthy & Prince 1993a:76)

(60) RED ≤ ROOT » {RIGHTMOST, RIGHT-ANCHOR}

/sap, RED/	RED ≤ ROOT	RIGHTMOST	R-ANCHOR
a. ☞sap-<u>sap</u>-A		*	
b. ×sa-<u>sa</u>-p-A		**!	
c. sapA-<u>pA</u>	*!		

Patterson, RIGHTMOST can be replaced by LOCALITY and IO-CONTIGUITY (the constraint against intrusion), which would have the same effect.

However, this analysis runs into a problem with CCVC forms, such as *ksa-ksapa*. A ranking paradox results:

(61) L-ANCHOR » R-ANCHOR (paradox)

/ksap, RED/	*CCC	RED ≤ ROOT	RIGHT MOST	R-ANCHOR	L-ANCHOR
a.☞desired winner ksa-<u>ksa.p</u>-A			*	*!	
b.❽wrong winner ksap.-<u>sa.p</u>-A			*		*
c. <u>ksa</u>-ksap-A			**!***	*	
d. ksa-<u>ksa</u>-pA			**!		
e. ksapA-<u>pA</u>		*!			
f. ksap-<u>ksap</u>A	*!		*		

Although it would be reasonable to think in this case that NO CODA was forcing the infixation (NO CODA >> RIGHTMOST), this ranking would lead to the wrong winner for /sap, RED/ → **sa-<u>sa</u>-pA*, rather than *sap-sapA*. The problem is, whether we assume that the stem-final *p* is structurally part of the base (c,d) or part of the reduplicant (a), the lack of a correspondent for this edgemost segment in the other leads to a fatal violation for the actual winning candidate. Given the ranking thus far, we would expect candidate (b), which is as well aligned as possible and perfectly right-anchored, to emerge as optimal. However, this result is incorrect; the actual attested form is (a).

We have seen that a stressed syllable reduplication analysis accounts more or less straightforwardly for this complicated system, in which the appearance of the reduplicant can vary from right to left, depending on the other constraints involved. A special innovation was required to derive the generalization regarding targeting the stressed syllable in words with lexical stress. However, the claim that the default form has a status in the grammar, even when it does not surface, is one that is apparently widely exploited and is worth studying further. The standard suffixing analysis however results in a ranking paradox, which fails to generate the attested system.

4.3.6 Conclusion

The proposed solution accounting for lexically stressed words in Lakhota reduplication, although perhaps not the last word on the matter, suggests an approach that both allows us to preserve the underlying intuition that reduplication copies the stressed syllable, and that relates the reference to a default form to a situation that occurs generally in optimizations in which canonicality is transparently increased upon derivation.

4.4 Non-reduplicative copying as a right edge effect

Some examples of right edge copying that have been argued to involve a suffixed RED morpheme in the past are argued here not to involve a reduplicative morpheme at all. Rather, in these cases, augmentation to a prosodic target results in augmentative copying.

4.4.1 Recent literature

In this section, I review the discussion in the recent literature regarding phonological copying, and argue that a sub-class of cases that appear to be right edge morphological reduplication are really just cases of expansion to fill a template, by means of copying output segments. Augmentative copying is shown to simply be an alternative to insertion when expansion to fill a prosodic template is required. I focus on cases from

Mayan languages (Tzotzil and Tzeltal), and also from Yoruba. (See also Beckman 1995, Alderete et al 1999 for the use of spreading as the optimal repair for reasons of markedness).

4.4.1.1 All reduplication is morphological

Gafos (1998a) predicts the restrictive typology of consonant harmony systems (Gafos 1998b) by constraining the operation of consonantal spreading so that consonants must spread though an intervening vowel. He finds that only consonantal features that do not significantly alter the acoustic quality of vowels are the ones that are found to spread. He further argues however that all apparent cases of long distance consonantal spreading, as in the following example from Temiar: */a + kɔɔw/ → kakɔɔw*, are necessarily *reduplicative* in nature, that is, due to an underlying RED morpheme. This is a problematic assumption on several grounds. First, it loses the parallel nature of augmentation by copying, versus augmentation by epenthesis. I will briefly illustrate these two types of augmentation.

Non-reduplicative copying is one way to augment /CV/ so that it becomes bi-moraic.

(62) Yoruba copying of CV stem to satisfy [μμ] requirement for adjectives (Awoyale 2000:296)[24]

/dò/	dòdò	'of being deeply red'
/jɔ/	jɔjɔ	'very, very much'
/gan/	gangan	'in particular'
/ko/	koko	'of being extremely hard'
/pà/	pàpà	'of running hurriedly along'
/rà/	ràrà	'of hovering above'

The above examples would all violate IO-INTEGRITY, the constraint against multiple correspondence. In the epenthesis examples below, it is alternatively DEP that is sacrificed in order to achieve the minimal bimoraic template in Axininca Campa.

(63) Axininca Campa minimal word epenthesis to [μμ]

/p/	pAA	'feed'
/na/	naTA	'carry'
/t^ho/	t^hoTA	'kiss, suck'

In addition, Gafos's proposal that all reduplication is morphological leads to a problematic situation when copying occurs to satisfy an output template. It must be the case in the example constructed below that the number of RED morphemes is a direct consequence of the output size: (This hypothetical example is a slight variation on the attested case of Cupeño (Crowhurst 1994)).[25]

(64) Forms containing between zero and two REDs in Cupeño′:

čál$[\text{al}]_{\text{RED}}[\text{al}]_{\text{RED}}$
páčik$[\text{ik}]_{\text{RED}}$
pínəʔwəx *no RED morpheme*

[24] Awoyale claims that these stems are ideophones. Akinlabi (p.c.) however disagrees, and suggests that they are simply adjectives.
[25] As it is, Cupeño is a mixed system that copies vowels, but epenthesizes consonants when needed to satisfy the disyllabic post-tonic template (Crowhurst 1994).

Such a case would be necessarily morphological in Gafos's system. However, genuine examples like this one, in which the number of reduplicants depends on the output prosodic shape are unknown in the literature.[26] And finally, this analysis does not capture the generalization about the locus of copying. In Gafos's theory, cases such as Yoruba, as well as Temiar, are all due to a RED morpheme. Thus, there is nothing to be said about a prediction of side preference.

Gafos does not in fact confront the possibility that copying is neither due to a RED morpheme nor to multiple association lines, but rather to multiple correspondences in the output. As a result his approach, in which MAX-BR is responsible for reduplication, says, "reduplicate unless you can't"; segmental markedness rules out reduplication in the cases where it is not needed. However, a better theory of copying, given that copying in the cases that he discusses seems to be compelled by the global markedness needs of the output form, would say, "do not reduplicate unless you must". This stance has been advanced by authors since though, as in the approach explored by Smith (1998).

4.4.1.2 'Split-output' copying

Smith (1998) argues that "split-output" copying is possible in Correspondence Theory, a kind of copying that is distinct from reduplication. In this case, one input correspondent can have more than one output correspondent. However, there is no reduplicative morpheme, and thus no BR-correspondence between the two output segments. In the case that she examines (the language game *May-ka*, based on the

[26] Cases of full satisfaction varying with non-satisfaction are well-attested, however. See Chapter 3.

Chinese Fanqie spelling system), highly-ranked CONTIGUITY forces doubling. Smith claims that LEFT-ANCHOR and RIGHT-ANCHOR are undominated in the hierarchy, and these compel the faithfulness violations. It looks like May-ka thus exhibits a type of edge anchoring of the base.

(65) a. OUTPUT-CONTIGUITY: The portion of S_2 standing in correspondence form a contiguous string. ("No Intrusion"). (McCarthy & Prince 1995)

b. INTEGRITY: No element of S_1 has multiple correspondents in S_2. ("No Breaking"). (McCarthy & Prince 1995)

Thus, */xwey+ayk/ → xway-kwey, *xay-kwey*.

(66)

/xwey+ayk/	OUTPUT-CONTIGUITY	INTEGRITY
a. ☞ xway-kwey		w
b. xay-kwey	*xw	

The winning candidate violates the constraint against doubling output segments, INTEGRITY, but the latter candidate fares worse on O-CONTIGUITY.

4.4.1.3 Markedness-driven copying

In gerundive "reduplication" in Yoruba (Akinlabi 1985, Ola 1995, Alderete et al. 1999, Kawu 2000 and others), the prefix *í-* is added, and the adjacent consonant copies to provide an onset for this syllable:

(67) Gerundive formation: C_1í+C_1V_1

jó	jíjó	‘dance’
kú	kíkú	‘die’
mɔ̀	mímɔ̀	‘know’
là	lílà	‘split’

Kawu (2000) argues that this is not a case of morphological reduplication, but rather an example of phonological copying in which the consonant is copied simply to provide an onset. He further notes that there is an independent markedness constraint in the language against onsetless high-toned vowels in particular. Thus in this case, *H&ONSET compels the violation of INTEGRITY. Kawu also goes on to highlight the parallel nature of epenthesis and copying. What determines the choice between the two is simply the relative ranking of INTEGRITY and DEP, the constraint against epenthesis.[27]

4.4.1.4 Augmentation

Arguing against the existence of consonantal roots in Modern Hebrew, Ussishkin (2000) promotes a “prosodic template” analysis of the forms imposed on the binyanim. Using output-output correspondence, he claims that the binyanim are formed relative to the basic *paʕal* binyan. The *paʕal* then is the only form to be influenced by IO-Faithfulness. Emergent prosodic restrictions witnessed in other binyanim are said to follow from the TETU ranking, which affects derived words only:

[27] It is doubtful that the situation is quite this simple. McCarthy (1997) notes that spreading of a consonant across a vowel is thought by some to be something that does not occur in any language. The Yoruba case above is a counter-example. However, it does seem likely that spreading is more constrained than epenthesis, in a way not captured by the mere relative ranking of these two constraints.

(68) Derived word TETU

FAITH-IO » PHONO-CONSTRAINT » FAITH-OO

A crucial component of the analysis is the separation of minimality vs. maximality constraints. Although I will not be implementing Ussishkin's articulated system of a branching requirement enforcing minimality, and prosodic alignment yielding maximality, I will briefly sketch the approach here.

(69) Minimality and maximality

a. σ-ALIGN: "Every syllable must be aligned to the edge of some prosodic word containing it". (Maximality: limit $[\sigma\sigma]_{PrWd}$)

b. PROSODIC WORD BRANCH: "A prosodic word must branch at the level of the prosodic word or foot". (Minimality: bans $*[\sigma]_{PrWd}$)

Faithfulness constraints negotiate the effects of these constraints in the following way:

(70) Fixed prosody in Modern Hebrew (Ussishkin 2000:144)

ranking	result
FAITH AFFIX » σ-ALIGN	*only morphologically complex words can be larger than [σσ].*
σ-ALIGN » FAITH-IO	*paʕal forms are never larger than [σσ].*
FAITH-IO » PRWDBRANCH	*paʕal forms may be smaller than [σσ].*
PRWDBRANCH » FAITH-OO	*derived forms must be [σσ] or smaller.*

Thus, both minimality and maximality act on the OO-derived forms, which leads to fixed prosody for this class of words.

Ussishkin also claims that there is a right edge bias in prosodic template satisfaction, which is consistent with asymmetric, left edge relativized STRONG ANCHOR:

(71) STRONG LEFT-ANCHOR: if *x* is at the left edge of the input, and *x* and *y* stand in correspondence, then *y* is at the left edge of the output.

This constraint penalizes e.g. /$k_1$atab/ → *k_1*a*k_1*atab* e.g., but not k_1*atabab*. Thus, it is an example of a right edge effect following from a left edge requirement. There is some question though as to whether this asymmetry is authentic (cf. Javanese *babot, *batot*, (Mester 1986), epenthesis in Mohawk: */k+ek+s/* → *í:keks* (McCarthy & Prince 1996), and also Shona (Myers 1987)). If the asymmetry can be upheld, then we would expect that, all other things being equal, copying in longer forms would always default to the right edge, as CONTIGUITY would force this, for example in hypothetical *badupikik, *badupipik*. STRONG RIGHT ANCHOR could challenge this result, leading to a preference for internal copying when OO-CONTIGUITY is ranked below the anchoring constraints. Regardless, it is still clear that since these cases do not involve a morphological RED morpheme, the fact that segments at the right edge of the word are copied does not present a problem for the asymmetric BR-Anchoring theory, as no BR-Anchoring is in fact occurring.

An important question is however: could STRONG LEFT ANCHOR force reduplicative suffixing? Ussishkin's constraint must be modified slightly, in order to preserve the asymmetric results achieved thus far. Note that STRONG LEFT ANCHOR could actually work *against* left edge reduplication, as a left anchored form would violate it: b_1*a*-b_1*adupi*. Thus, the constraint should be changed to require the segment at the edge of the input to stand in correspondence with the leftmost segment in the *corresponding morpheme* in the base.

(72) STRONG LEFT-ANCHOR (revised): if x is at the left edge of morpheme α in the input, and x and y stand in correspondence, then y is at the left edge of the corresponding morpheme α in the output.

(73) a. /{katab}$_\alpha$/ → {**k**akatab}$_\alpha$ (*STRONG LEFT-ANCHOR)
b. /{katab}$_\alpha$, RED$_\beta$/ → ka$_\beta$-{katab}$_\alpha$ (✓STRONG LEFT-ANCHOR)

What is crucial to rule out is the possibility that a left-anchored reduplicative morpheme could violate STRONG LEFT-ANCHOR. If it could, then this constraint could actually compel right edge reduplication (regardless of the relative prominence of the last syllable of the base), which is argued not to be possible. With this assumed structure of morpheme correspondence, however, reduplicative copying will not violate STRONG ANCHOR, and thus STRONG-LEFT ANCHOR will not compel right edge reduplication. This assumption then will preserve the results in the cases where there is a sole morpheme in the output, and it will eliminate the possibility that a left-anchored segment in the reduplicant would cause a violation of this constraint.

4.5 Right edge effects in IO-anchoring

The essential argument for a left/right asymmetry in reduplication is that the desire to access the root has a reflex in the grammar by which prefixing is ultimately preferred, because this does not impede root access, while introducing the additional morpheme as early as possible. Hawkins and Cutler (1988) argue that in the case of fixed segment affixes, *suffixing* is preferred, sometimes even when this conflicts with otherwise obeyed morphological head order, using the same essential motivation: early access of the root.

Given the over-arching theme of 'root first' in these two realms, we would expect that IO-anchoring would also exhibit an edge asymmetry, with a left edge bias. Thus, rather than arbitrary anchoring to one edge or the other, we would expect to find cases of apparent right edge root anchoring only when IO-LEFT ANCHOR is not possible, due to a highly ranked constraint. Examples exhibiting IO-LEFT-ANCHOR violations due to compelled epenthesis are given below. Such cases must be addressed, to determine whether they would support the existence of a RIGHT-ANCHOR constraint. The result is that all cases are consistent with an asymmetric system, in which violation of LEFT-ANCHOR is compelled by a yet higher-ranked constraint. The examples mainly fall into two classes, as noted by Broselow (1982): violation compelled by syllable structure markedness, or by prosodic requirements.

4.5.1 Spanish initial epenthesis

Spanish (Harris 1987): initial epenthesis in #sC clusters. Initial *s*, as in many languages (Attic Greek, among others) is extra-syllabic. The result in Spanish is that a syllable is created by epenthesizing *e* to support the *s*. Examples follow:

(74)	Esclerosis	cf.	arteriosclerosis	*sEclerosis
	Esperma		zoospermo	*sEperma
	Esfera		hemisferio	*sEfera
	Eslavo		Yugoslavo	*sElavo

There are two issues here. The first is simply to recognize that this is of course not right anchoring, but rather epenthesis to resolve markedness at the left edge of the word. However, we must explain why epenthesis is initial, when **seperma* for example with epenthesis after the initial consonant would serve the same purpose.

(75) a. M-CONTIGUITY: Contiguity is respected within morphemes. (Landman 1999, Kisseberth 1970)

b. *#sC: Word-initial consonant clusters that begin with *s* are marked.

(76) {M-CONTIGUITY, *#sC} » LEFT-ANCHOR

/sclerosis/	M-CONTIGUITY	*#sC	LEFT-ANCHOR
a. ☞Esclerosis			*
b. sclerosis		*!	
c. sEclerosis	*!		

The answer appears to be that CONTIGUITY in this case dominates IO-LEFT ANCHOR. Supporting evidence for this answer comes from the behavior of final epenthesis:

(77) Final epenthesis (Harris 1987:108)

adelantE	(*adelanEt)	cf.	adelanto
padrE	(*padEr)		padrino

In order to save an otherwise unsyllabifiable root-final segment, an *e* is epenthesized. Notably however, it appears morpheme-finally, thus not violating the CONTIGUITY of the root.

The relevance of MORPHEME CONTIGUITY, which forces epenthesis to be at morpheme edges, can be seen when comparisons are made to “plural epenthesis”. Monomorphemic *embalse/*embales*, but the plural form of *azul* is *azules*, not **azulse*. Thus, when MORPHEME CONTIGUITY does not apply, the effect of FINAL-C (McCarthy & Prince 1994) can be seen.

(78) M-CONTIGUITY » NO CODA (word-internal)

/embals/	MORPHEME CONTIGUITY	FINAL-C	NO CODA
a. ☞ em.bal.sE		**	**
b. em.ba.lEs	*!	*	**

(79) M-CONTIGUITY inactive; epenthesis is word-internal

/azul + s/	MORPHEME CONTIGUITY	FINAL-C	NO CODA
a. azulsE		*!	*
b. ☞ azulEs			*

It is clear that LEFT-ANCHOR is not undermined by a putative RIGHT-ANCHOR constraint here. Rather, L-ANCHOR is dominated by independently motivated markedness and faithfulness constraints: *#sC, M-CONTIGUITY » L-ANCHOR.

4.5.2 Augmentation via epenthesis

Augmentation can either take the form of epenthesis of unmarked material, or else copying of (usually adjacent) segments, shown in the previous section to depend on the relative ranking of DEP and INTEGRITY. In terms of the apparent right anchoring that is the focus of the discussion, Tzotzil (Mayan) is a language that I claim exemplifies augmentation to satisfy an emergent morphological template. The closely related language Tzeltal is an example where affixation imposes a template on the output.

In (80) below, we see that a full range of cases, combining the two types of templates and the different means of satisfying them in the case of augmentation.

(80) Typology of augmentation to satisfy a template

	insert	copy	mixed
[σσ]	Iraqi Arabic Axininca Campa Lardil Mohawk	Tzotzil	Cupeño (…σ́[σσ]) (copy V, epenthesize C) Ethio-Semitic[28] (copy C, epenthesize V))
CVCVC+affix	Miwok[29]	Tzeltal	Yokuts[30]

Returning to the examples involving augmentation, there are several cases where epenthesis is used to augment a sub-minimal base.

(81) Epenthesis

a. Mohawk (verbs must contain two syllables)

/k+ek+s/	íːkeks	'I eat'

b. Iraqi Arabic (minimal word = μμ)[31]

*drus	ʔídrus	'study!'

c. Axininca Campa (minimal word = μμ)

/p/	pAA
/na/	naTA
/t^ho/	t^hoTA

d. Lardil (minimal word = μμ)

Underlying	Uninflected	Accusative	
/maan/	maan	maanin	'spear gen.'
/parŋa/	parŋa	parŋan	'stone'
/wik/	wikA	wikin	'shade'
/wun/	wunTA	wunin	'rain'

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28 See Rose (to appear).

29 Ulwa *-ka-* infixation is a related example, exhibiting suffixing to the initial iamb in the base. The difference is that extra material is not deleted in Ulwa: *bas → (bas)ka; karasmak → (karas)-ka-mak.*

30 See Arcangeli (1983).

31 Epenthesis is optional (ʔidrúus ~ drúus 'lessons'), except in the case where a monosyllabic word is sub-minimal, in which case it is obligatory. This example is notable also for the fact that it violates both weak and STRONG-LEFT-ANCHOR and HEAD-DEP, leaving one to wonder why epenthesis is not final: **drúsi*. See below for speculation.

In the first two examples, epenthesis occurs at the left edge, which is not expected under this analysis. Looking more closely at these cases however, it appears that the additional material is in fact not epenthetic, but rather prefixal. The prefix disappears when the verb is already at least minimal size. Evidence to this effect is offered below.

Mohawk initially appears to be an example of metrically conditioned epenthesis where the epenthetic vowel is initial. Verbs in Mohawk must be disyllabic; an *i* is inserted when needed to achieve disyllabicity.

(82) Initial *i* in Mohawk (Piggott 1995:294, Michelson 1988)

a. k-yʌ-s	íkyʌs	'I put it'
b. k-tat-s	íktats	'I offer it'
c. k-ek-s	íːkeks	'I eat'
d. s-riht	íseriht	'cook!'
e. t-n-her-ʔ	ítenehreʔ	'you and I want'

However, further investigation of this vowel reveals that its behavior is quite different from the other two epenthetic vowels in the language, *e* (inserted for phonotactic reasons) and *a* (the "joiner" inserted between certain morphemes). These two vowels are often overlooked for stress assignment, whereas the *i* is invariably stressed. Thus, it appears that *i* is rather a verbal prefix; it surfaces only when the output would otherwise fail on prosodic minimality. The ranking that would yield this result is one where left-alignment of the root usually dominates realization of the *i* prefix; the highly-ranked disyllabicity requirement on verbs can then compel the *i* to surface just in case it will provide the crucial second syllable: FOOT BINARITY(σ)$_{Verb}$ » ALIGN L(root, stem) » REALIZE MORPHEME (*i*), ALIGN L(*i*, stem).[32]

The case of Iraqi Arabic is a bit more complicated. Epenthesis happens in the case of mono-moraic verb stems (the final C is extra-metrical): *drus* → *ʔídrus* 'write'. Additionally, epenthesis may occur optionally when a stem has an initial CC cluster (presumably, it may not occur otherwise, but this is not made explicit): *ʔidrúus* ~ *drúus* 'lessons'. It is not possible to argue that CONTIGUITY drives the initial epenthesis, because final CC clusters are broken up medially: C**V**C, *CC**V**. I must suggest that the prefixes occur by analogy to similar verbal prefixes in a closely related language. However, this clearly requires further research.

4.5.3 Appalachian English a-*prefixation*

One additional case of disappearing prefixes is worth mentioning: participial *a*-prefixation in Appalachian English (Wolfram & Christian 1976). This case is different from the two mentioned above however; instead of a highly ranked markedness constraint compelling the realization of the prefix, in this case, the prefix disappears when its realization would violate specific markedness constraints.

This prefix is observed in participial forms of verbs with initial stress:

[32] Thanks to John Alderete for discussion of these data.

(83) *a*- prefixation[33]

a-wálking e.g. *Jenny went a-walk-/wander-/hunting in the woods*
a-wándering
a-húnting
a-tálking

There is no prefix when the participial verb begins with a relatively unstressed syllable, **a-discóverin', *a-retírin'*, e.g. **He was a-discoverin' a bear in the woods*. There is also no prefix when the verb begins with a vowel, **a-eatin', *a-askin',* e.g. **He was a-eatin' the food.* I take this to indicate that the Morpheme Realization constraint for the verbal participial prefix is relatively low ranked, below both *LAPSE ("do not have two adjacent unstressed syllables" (Selkirk 1984)) and ONSET.

Wolfram and Christian point out that this prefix appears only in the participial form, as the following gerund forms are ungrammatical.

(84) No *a*- prefixation in gerunds

*He watched their a-shootin'
*A-sailin' is fun.

A-prefixation is also ruled out when the *–ing* form functions adjectivally.

(85) No *a*- prefixation in adjectives

*The movie was a-shocking.
*Those a-screamin' children didn't bother me.

[33] According to Wolfram and Christian (1976:70), most sources consider *a*-prefixing to be historically derived from prepositions, especially *on*, e.g. *he was on hunting*.

Thus, only the verbal forms allow the prefix. This supports the relativization of a realize morpheme constraint to only the verbal prefix ranked high enough to surface in forms where its presence would do no harm, and disappear otherwise.

In the case of fixed segment affixation accompanied by an imposed template, we do see an example of augmentation by means of epenthesis in Southern Sierra Miwok.

4.5.4 Epenthesis to fulfill a template: Southern Sierra Miwok

Southern Sierra Miwok (Sloan 1991) offers an interesting example of epenthesis to fulfill a template. A variety of templates can be imposed by a suffix. That is, in isolation, the stem need not conform to a particular size; the same is true with certain concatenating morphemes that do not impose a templatic requirement on the stem. However, with suffixes that subcategorize for a certain templatic size, a monomorphemic stem conforms to the requisite *CVCVC*, *CVCV*, *CVCCV* or '*CVCVX'* shape.

The C-final CVCVC is typically filled by epenthesis of {Y,[34] ʔ} when the stem is too small and/or not C-final.[35] The underlying segmentism of the root is evident in forms that have 'concatenating' suffixes, i.e. suffixes that do not impose a template on the stem to which they affix.

(86) CVCVC-imposing suffixes

a. -kuH-

alteration	*UR*	*affixed form*	
∅→V	/wyks/	wykUs-kuH	'to go/someone evidently went'
∅→V, ∅→C	/loːt/	lotUʔ-kuH	'to catch, to grasp, to grab/capture'

[34] /Y/ varies between {y~u~o} (where *y* is the central high vowel), depending on the preceding vowel.
[35] In some cases of both native Miwok and Spanish loan words, deletion to fit the template is necessary, e.g. *saruːca-* 'crosscut saw' → *sarus-nY-* 'to saw' (cf. Spanish *serrucho*)

b. -peH-

C: → C	/liw:a/	liwaʔ-peH	‘to talk, tell something/speechmaker’
CV → VC	/hal+ki/	halik-peH	‘to hunt/hunter’

These examples show several different means of accommodating the template. The first is epenthesis of a consonant and/or vowel, even within the stem, (at the cost of CONTIGUITY). The length of an underlying segment can be neutralized for the sake of template satisfaction. Also, there are cases with CVC roots where the root is reanalyzed in the event of suffixation, to incorporate the suffix. The combination of the two then functions as a root for the sake of the template. This is seen in the last example in (86b), where metathesis occurs (violating LINEARITY). Additional segments, when needed, are epenthesized rather than copied.

4.6 Examples of copying to fulfill a template

In the following examples, I propose that a template is imposed on the output form, which leads to copying to fulfill the template. In each case, independent evidence suggests that the copying witnessed is augmentative rather than reduplicative, which supports the striking result that these apparent counter-examples to the asymmetric theory of reduplication advanced here instead offer further evidence in favor of Positional Anchoring.

4.6.1 Yoruba

In Yoruba, there is a class of ideophones that appears to exhibit right edge reduplication.

(87) Yoruba ideophones; ‘partial reduplication’ (emphasis, increased intensity) (Akinlabi 1985, Awoyale 1974, 1989, 2000)[36]

rogodo	rogodo-do		‘of being very round and small’
lɔ̀kɔ̀tì	lɔ̀kɔ̀tì-tì		‘of being very sticky’
gbàgìdì	gbàgìdì-dì		‘of being very bulky’
gɛ̀gɛ̀rɛ̀	gɛ̀gɛ̀rɛ̀-gɛ̀	(~gɛ̀gɛ̀rɛ̀-rɛ̀)	‘of being very stout and bulky’
pepere	pepere-pe	(~pepere-re)	‘of being very cute and robust’

Ideophones are roughly characterized as providing “vivid vocal images or representation of visual, auditory, and other sensory or mental images” (Awoyale 1974 and references therein).

Awoyale (1974) provides examples from English that he calls “suspected ideophones”. The comparison to English is used in part to highlight the difference between ideophones and onomatopoeias.

(88) Possible English ideophones (Awoyale 1974:137)

wishy-washy	tick-tock	fuzzy-wuzzy
hurly-burly	higgledy-piggledy	hanky-panky
roly-poly	criss-cross	flip-flop
tip-toe	zig-zag	riff-raff

McCarthy & Prince (1996) note that these words (‘echo words’ in their terms) observe severe prosodic restrictions. Each member is no longer than one foot, and also necessarily has initial stress, leading to the ungrammaticality of examples like hypothetical **banána-*

[36] There is also a productive process of total reduplication with ideophones, “distributive reduplication”, (e.g. *kɛ́rɛ́/kɛ́rɛ́-kɛ́rɛ́* “of moving quickly/of moving several times quickly”; *gbàgìdì/gbàgìdì-gbàgìdì* “of being big/of several things being big”, etc.).

cabána.[37] They note that an echo word must be a compound of exactly two metrical feet, i.e. two minimal words.[38]

I propose that Yoruba ideophones undergo augmentation by means of augmentative copying at the right edge. The target size is four syllables (i.e. two disyllabic feet). Ola (1995) notes several cases of a four-syllable upper limit on prosodic size in Yoruba (among them, root size, clefted nouns, number of prefixes, and hypocoristics). Citing earlier work by Bagemihl, she proposes a "maximum prosodic word" that is binary at the level of the foot and the prosodic word.

In preparation for the comparison of these English examples with the quadrisyllabic forms in Yoruba, I would like to highlight the similarity that these forms have to a compound structure. Anywhere from zero to both members of the form can be an attested word in English: *fuzzy, burly, flip, flop*. However, even in the case of two independent words coming together, there is no obvious compositional meaning. The words are prosodically similar to compounds, with a main stress for each member of the "ideophone". Semantically however, they are less transparent, in most cases being composed of what must be considered two cranberry morphs.

Prosodically, these ideophones are highly restricted, with a template of two disyllabic feet, as mentioned above. They also must exhibit uniform tone height.[39] In this way, they are similar to Yoruba hypocoristics, which also have a restriction on the tonal

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[37] Alan Prince (p.c.) however provides isolated exceptions to the generalization above: *banána-ráma* and *Durán-Durán*.

[38] They make a similar observation for Pig Latin, which they claim is a case of reduplication ("with extensive prespecification"). Pig Latin involves word reduplication, resulting in two phonological words, with the second one being minimal, (a monosyllabic foot), e.g. *onology-phay*.

[39] In fact, the tones are generally associated with prescribed meanings: low tones suggest heaviness, large size, coarseness of sound; mid tones average or medium proportion and high tones indicate high pitch in sound, smallness, light weight, or fast speed (Awoyale 1974:286).

contour: it must be HHML (Ola 1995). A further restriction appears to be that three identical syllables in a row are prohibited (Awoyale 2000:297).[40]

4.6.1.1 Four syllable template

The first task at hand is to derive the four syllable template. Ola (1995:219) achieves this by first of all positing the constraint for hypocoristics : Hypocoristic template = PrWd-Bin Ft^{max}, which results in a bipodal template. Rather than stipulate this, a better approach is to have the size emerge by Ussishkin's "Derived word TETU", discussed in §4.2.1.3 above. The constraints that emerge to impose a four-syllable size are given below:

(89) a. FOOT-ALIGN: Every foot must be aligned to the edge of some prosodic word containing it. (Maximality: limit $[(\ldots)_{Ft}(\ldots)_{Ft}]_{PrWd}$) (Ito, Kitagawa & Mester 1996)

b. PROSODIC WORD BRANCH: A prosodic word must branch at the level of the prosodic word. (Minimality: bans $*[(\ldots)_{Ft}]_{PrWd}$) (Ito & Mester 1992)[41]

c. FOOT BRANCH: A foot must branch. (Minimality: bans $*(\sigma)$)

Both minimality and maximality act on the OO-derived forms, which leads to fixed prosody for this class of words.

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[40] The exception that he cites is the case of tonally polarized triplication, (e.g. *kúú-kùù-kúú*, 'of several short pieces'), which is a different process than the one with which we are concerned.

[41] This constraint is a revision of the original constraint proposed by Ito & Mester, which was satisfied by branching at either the prosodic word or foot level. Perhaps a better alternative would be to appeal to NONFINALITY, with the requirement that the head foot be footwise non-final (Ito, Kitagawa & Mester 1996, McCarthy 1997).

(90) Derived template:

```
 PrWd
 /  \
Ft   Ft
/\   /\
σσ   σσ
```

The ranking then that imposes a four-syllable template on this class of ideophones is the following:

(91) FAITH-IO >> FOOT-ALIGN, PRWD BRANCH, FOOT BRANCH >> FAITH-OO_{IDEO}

4.6.1.2 /CV/ Ideophones

All four-syllable forms that originate from an underlying /CV/ ideophonic stem would be of the shape $C_1V_1C_1V_1rV_1$-C_1V_1 (C≠*r*), or else $C_1V_1C_1V_1rV_1$-rV_1.[42] I make two assumptions in my analysis. The first is that the underlying form for these examples is /CV/. The other however is that these four-syllable forms are derived from ideophones that have already been derived from this underlying form, to trisyllabic size: *CVCVrV*. This step obviously deserves attention, but I take it for granted in this discussion.

The forms in (91) are at least partly in free variation, according to Awoyale (1989:26); both can have a 'metaphorical' sense. Only the second variants can express a literal sense. In my analysis, I will offer an account of the free variation.

[42] The second-syllable onset can apparently be optionally deleted (Akin Akinlabi, p.c.).

(92) Four-σ ideophones: copied syllable appears at the right edge; it appears that copying may be non-local [43]

pepere	pepere-pe	~	pepere-re	'of being very cute and robust'
gɛ̀gɛ̀rɛ̀	gɛ̀gɛ̀rɛ̀-gɛ̀	~	gɛ̀gɛ̀rɛ̀-rɛ̀	'of being very stout and bulky'
gbàgbàrà	gbàgbàrà-gbà	~	gbàgbàrà-rà	'of being heavy and strong'
gogoro	gogoro-go	~	gogoro-go	'loftiness'

The necessary constraints are given below.

(93) a. *3σ: Bans three identical adjacent syllables bearing the same tone.[44]

b. LOCALITY: The copied portion of the base and the corresponding reduplicant must be adjacent.[45]

c. INTEGRITY: No element of S_1 has multiple correspondents in S_2. (McCarthy & Prince 1995)

The data in fact support a further distinction in INTEGRITY constraints: in particular, we need a constraint is sensitive to *r* only (INTEG(r)). As we see in the tableau below, violation of INTEG(r) is more highly ranked than the other more general version of INTEGRITY.[46] The ranking illustrated in the tableau in (90)

[43] There is one exception, gégéré-gé/*gégéré-ré. This is the only example of the form #$C_1V_2C_1V_2$ … so the unavailability of * rV́rV́ might indicate emergent markedness of rV́, suggesting that additional forms from underlying /CV/ would also be limited.

[44] As with *2σ mentioned below, I assume that this constraint is related to the OCP. Another way to express this restriction is through local self-conjunction (Smolensky 1995) of the constraint against adjacent identical syllables, *2σ. Mandarin exhibits a similar ban on three consecutive identical syllables (Feng 2002).

[45] See Chapter 1, §1.2 for references and formalization.

[46] This predicts that in any three syllable ideophone ending in *rV*, the possibility exists to copy the second CV, as in hypothetical *bogoro-go*. I have no data to confirm this prediction. In addition, there is apparently the possibility to copy over *l* in a non-local fashion as well, e.g. *bèbèlè-lè* ~ *bèbèlè-bè*. Apparently, *-lV* indicates the diminutive (Awoyale 2000:304). Thus, it must be that INTEG(l) is also separately ranked, higher than the general constraint.

(94) DEP >> INTEG

[bàbàrà] [+ideophone]	*3σ	INTEG (r)	LOCALITY	INTEG
a. ☞(bàbà)(ràbà)			**	**
b. (bàbà)(ràrà)		*!		**
c. (bàbà)(bàrà)	*!			**

Free variation between bàbàrà-bà and bàbàrà-rà occurs assuming the ranking between INTEG(r) and LOCALITY is crucially unranked (see Anttila & Cho 1998 for discussion of free variation through crucially unranked constraints).

4.6.1.3 /CVCV/ Ideophones

With disyllabic bases, it appears that the ideophone will double. Given the ban of three like syllables, this is the best possible solution, as triplication of the final syllable (e.g. **hábábábá*) is independently ruled out.

(95) σσ bases that double to fill four-syllable template

hábá-hábá	'of humans: wobbling, clumsy movement'
gáɗí-gáɗí	'of a network: completely filled up'
fata-fata	'of talking fast at a high pitch'
gule-gule	'of responding hurriedly'
bi̋ri̋-bi̋ri̋	'of a sizeable object rotating swiftly'

The additional constraint needed to account for these forms appear below:

(96) DEP: No insertion. (McCarthy & Prince 1995)

(97)

[gádí] [+ideophone]	*3σ	DEP	LOCALITY	INTEGRITY
a. ☞ gádígádí				****
b. gádídírí		*!		***
c. ✖ gádídígá			*!***	****
d. gádídídí	*!			****

The candidate *gágádídí* in fact ties with the winner on all of the above constraints. However, this type of augmentative copying is unknown to me and may be unattested. I suggest that in this case it is ruled out by a low-ranked *2σ constraint against 'echo' in adjacent syllables.[47] The *r* in candidate (b) is epenthesized, thus violating DEP. Candidate (c) is harmonically bounded, as its violations of LOCALITY are in addition to all of the violations that it shares with candidate (a).

4.6.1.4 /CVCVCV/ Ideophones

Underlyingly /CVCVCV/ ideophones augment simply by copying the final syllable. This is predicted by the constraint ranking as it has developed thus far.

(98) Final syllable copying only: /CVCVCV/ ideophones

rogodo	rogodo-do	'of being very round and small'
lɔ̀kɔ̀tì	lɔ̀kɔ̀tì-tì	'of being very sticky'
gbàgìdì	gbàgìdì-dì	'of being very bulky'
lɔ́kɔ́sán	lɔ́kɔ́sán-sán	'of being very slim and agile'
sánpɔ́nná	sánpɔ́nná-ná	'of being very blunt or plain'

[47] Such a constraint ("*REPEAT" in Yip 1995 e.g.) has been argued by Yip to be related to the OCP.

(99) copying of final syllable

[bàkàtà] [+ideophone]	DEP	STRONG LEFT ANCHOR	INTEG	LOCAL
a. ☞(bàkà)(tàtà)			**	
b. ✗(bàbà)(kàtà)		*!	**	
c. ✗ (bàkà)(tàkà)			**	*!*
d. (bàkà)(tàrà)	*!			

In this example, we see that the STRONG LEFT-ANCHOR constraint is once again needed to explain why augmentative copying occurs at the right edge of the word (b). We also see an argument that DEP is ranked above INTEGRITY, as only one form of augmentation need occur, and copying is the unique attested solution (d). Also, we see that the non-local copying candidate is harmonically bounded. Non-local copying could be forced in order to satisfy *3σ in the CV examples. Here, there is no threat to the OCP, so non-local copying is uniformly banned.

4.6.1.5 Comparison with a morphological reduplication analysis

A morphological reduplication account would be hard-pressed to explain why non-identity of ideophone-internal vowels would have such a direct effect on the edge from which a segment may be copied. The divide falls plainly between ideophones that originate from underlying /CV/ on the one hand, and the trisyllabic ideophones (with probable further internal structure) on the other. For the /CV/ examples, copying of either that CV or the *rV* augment is possible. However, the longer ideophones allow augmentation to copy the adjacent CV sequence only. Under an augmentation analysis, the divergent structures of these ideophones dictates the options in terms of phonological copying. If a RED morpheme were responsible for the copying however, then there is no way to explain why anchoring is strict in the one case and can vary in the other. It is also worth noting that there is no productive suffixing in Yoruba (Awoyale 1974:151). Thus, under a right-aligned RED, right-anchoring account, this would be the lone suffixing morpheme. Under the proposed analysis however, augmentation by phonological copying is unsurprising, given the independently imposed prosodic template.

A final class of apparent, systematic exceptions is given below. These are potentially damaging to the proposal at hand, as they are *five* syllables long. If the template is two disyllabic feet, it is not immediately clear how to justify their excessive length, as these words already meet the required size. These would turn the tables in favor of an analysis with suffixed RED.

4.6.1.6 /CVCVCVCV/ Ideophones

If the template is four-syllables, it is not immediately clear how to justify the excessive length in these forms, as they already meet the required size.

(100) five-syllable forms[48]

hàràgbàdù-dù	*hàràgbàdù-hà	'very stout and bulky'
porogodo-do	*porogodo-po	'being completely used up'

Predictably, it is not possible to copy from the "wrong-side" in these cases; there is no *rV* augment to inhibit copying of adjacent material. How is it though that the five-syllable forms are allowed? These exceptional forms all have one thing in common, in fact:

[48] Additional forms which behave the same way but for which I lack glosses are: *bàràkàtà-ta* and *fárágádá-dá*.

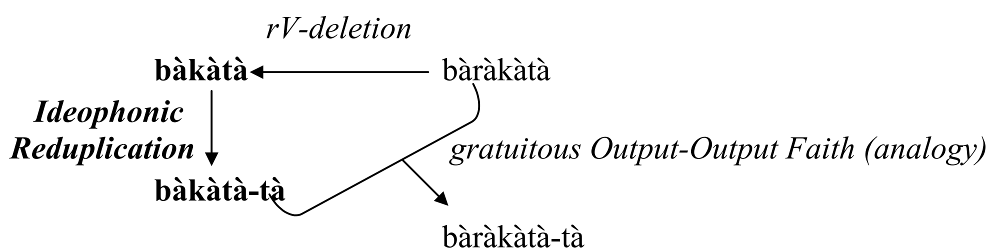
second syllables that begin with *r*. It turns out that for each of these forms, there is a corresponding form of four syllables, minus the *–rV-* syllable (Akin Akinlabi, p.c.):

(101) corresponding four-syllable forms

hàgbàdù-dù
pogodo-do

Necessary for the ‘exceptional’ forms in (99) then is a system of analogy. This is not an easy task, and one that certainly goes beyond the scope of the investigation at hand. However this system were to work, it would have to allow the *rV* syllable to get re-inserted to the ideophone formed in accordance with the standard four-syllable template. Below, I offer a sketch of how analogy might be structured. The examples in (100) arise when gratuitous OO-FAITH is observed between the four-syllable original ideophone and the augmented ideophone derived from a base that has undergone *rV*-deletion.

(102) Analogy in case of five-syllable ideophones



Finally, I offer some additional evidence of a four-syllable template.

4.6.1.7 Further evidence of four-syllable template

Additional examples showing evidence of four-syllable template for intensifying ideophones are given below.

(103) Diminutive suffix –lV (/-nV) fulfills template requirement[49]

jáńjá[50]	jáńjá-lá	'small shapeless piece/ very small shapeless piece'
tóńtó	tóńtó-ló	'small roundish piece/ very small roundish piece'
béńbé	béńbé-lé	'small handy object/ very small handy object'
tínńtín	tínńtín-ní	'tiny particle/ very tiny (almost invisible) particle'

These forms need undergo no further derivation to form the intensifying ideophone; with the presence of the diminutive suffix *–lV*, they already satisfy the four-syllable requirement.

Finally, I will note that the proposed type of augmentation, primarily through copying, receives support from the independently motivated C- and V-copying found in the language, illustrated below.

4.6.1.8 C-copying: gerundive formation

In gerundive "reduplication" in Yoruba, the prefix *í-* is added, and the adjacent consonant copies to provide an onset for this syllable (Akinlabi 1985, Ola 1995, Alderete et al. 1999, Kawu 2000 and others):

[49] [l] and [n] are in complementary distribution in Yoruba; [n] occurs only after nasal vowels.
[50] The *n* here is syllabic.

(104) Gerundive formation: C_1í+C_1V_1

jó	jíjó	'dance'
kú	kíkú	'die'
mɔ̀	mímɔ̀	'know'
là	lílà	'split'

Kawu argues that this is not a case of morphological reduplication, but rather an example of copying in which the C is copied simply to provide an onset. An independent markedness constraint against onsetless high-toned Vs, *H&ONSET, compels the violation of INTEGRITY.

(105) a. INTEGRITY: No element of the input has multiple correspondents in the output. (McCarthy & Prince 1995).

b. *H&ONSET: An onsetless syllable may not contain a H tone.

Kawu also highlights the parallel nature of epenthesis and copying. What determines the choice between the two is simply the relative ranking of INTEGRITY and DEP, the constraint against epenthesis.[51]

4.6.1.9 V-copying: simplifying Cr clusters in loan words (Akinlabi 1993)

Loanwords with C clusters are re-syllabified, following permissible structures in Yoruba.

[51] It is doubtful that the situation is quite this simple. McCarthy (1997) notes that spreading of a consonant across a vowel is thought by some to be something that does not occur in any language. The Yoruba case above is a counter-example. However, it does seem likely that spreading is more constrained than epenthesis, in a way not captured by the mere relative ranking of these two constraints.

(106) *i* or *u* may be inserted to break up such onset clusters

síléèt̀ì	'slate'
sítóòfù	'stove'

(107) Inserted V may be *u* in two cases:

a. *u* inserted if the initial C is labial /b,f,m/.

b. *u* inserted as a final V because of the tendency for front/back vowels to exclude each other in the last two syllables of polysyllabic nouns ('Back Harmony').

The following cases illustrate when neither *i* nor *u* surface as the created nucleus.

(108) Insertion with Cr clusters

k**e**reyɔ́ɔ̀nù	'crayon'	/e/
t**ɛ**rɛlîinì	'trellis'	/ɛ/
sák**á**ráméńtì	'sacrament'	/a/
t**ɔ́**rɔ́fi	'trophy'	/ɔ/
p**ò**ròpɛ́là/p**ù**ròpɛ́là	'propeller'	/o/

There is a clear distinction between Cr clusters and other clusters entering the language: only Cr clusters are "split up" by these five Vs.

(109) Effects of Cr clusters in loan words

- The V used for onset cluster simplification is identical with the following V; these cases require a rule of vocalic spreading (i.e. copying).[52]
- Even though all sonorants (and coronals) can occupy C_2 position in these CC clusters, only /r/ is transparent to spread.

[52] Other cases of regressive vocalic spreading exist in the language (Akinlabi 1993:156); this is not particular to the loan word phonology. Examples are: *owó-adé* → *owáadé* 'Ade's money'; *owó ɛmu* → *owɛ́ɛmu* 'wine money'. Postlexically, *r* blocks regressive spreading like every other C in the language.

This case is relevant for the discussion of ideophones as it again shows the potential for the grammar to exploit copying to satisfy a highly-ranked markedness constraint against consonant clusters. What is also interesting about the loan word data is that they exhibit copying over *r*, as we saw was possible for consonants and vowels alike in the underlyingly CV forms. Proclivity of *r* to be copied over is not captured by the account proposed above, in which rather it was claimed that *r* would not itself copy locally due to a constraint against multiple correspondence that applied to *r* alone.

4.6.1.10 Conclusion

In spite of the superficial resemblance that these intensive ideophone examples bear to morphological reduplication, we have seen that Yoruba ideophone formation necessarily involves augmentation to a bipodal template rather than suffixation of a RED morpheme and subsequent right-anchoring. Only with an augmentation analysis can we explain why the resulting form is consistently four syllables long. It also offers a unified analysis of the intensification of both two syllable and three syllable ideophones; a suffixed RED would make the wrong prediction (hábáhábá vs. *hábá-bá). It is also only this account that accurately predicts when insertion of a CV syllable that copies material non-locally is possible.

4.6.2 Tzotzil

Another example of apparent right edge reduplication that, upon closer inspection, seems to involve rather right edge augmentation is the case of 'affect' verbs in Tzotzil (Ringe 1981). Affect verbs are a special class of aspect verbs that take only neutral aspect and exhibit the prefix *x-*. These are formed from CVC roots, the basic root form in Tzotzil (Sarles 1966:32)), copying the final *-VC* to yield $C_1VC_2VC_2$. I propose that rather than reduplication, as Ringe claims, this is a case of augmentation to disyllabic size by copying. Roots of the form CV, CVVC, or CVCV do occur; many of the CVCV roots are direct loans from Spanish. Any longer forms are either derived from CVC forms, Spanish loans, or perhaps in the case of a few, due to either a derivation which is no longer functional in the language, or else due to dialect mixture and influence from nearby Tzeltal speakers (Sarles 1966:32). However, there is no evidence that longer forms undergo copying. Ringe notes one (onomatopoetic) exception: *korok* → *korokok* 'cluck'. Short of this however, what we do not see are examples such as *rason* 'sense, wisdom' → **rasonon* 'suddenly realizing'. Only a templatic analysis could capture this restriction.

(110) Tzotzil affect verbs

a. bek'	bek'ek'	'brush into a pile, sweep up/ being wafted'
b. sak	sakak	'white/ moving palely and rapidly; in darkness'
c. kal	kalal	'brimming suddenly with tears'
d. kev	kevev	'running with twisted mouth (drunk)'
e. kot	kotot	'feeling cramp or stomachache'
f. kech	kechech	'flooding'
g. kuj	kujuj	'ducking down'

In a symmetric system, this pattern could potentially be analyzed as right-anchored, with a suffixed reduplicant. The unavailability of such an account is an advantage here, as it leads unambiguously to a templatic analysis. A templatic analysis is shown to be superior, in that it can easily explain why the size of the roots targeted by this constraint is restricted to CVC; the CVCVC output then fulfils the target template. Morphological reduplication involving the introduction of a RED morpheme and BR anchoring, would entail no such restriction.

Affect verbs have an emergent prosodic template requirement that they be disyllabic. The problem in enforcing this restriction is that not all of the forms in (110) have a bare output form. However, I must tentatively claim that this non-existent output is one that is available for output-output correspondence. If the output-output constraint is ranked above INTEGRITY, which we know to be independently ranked above FOOT BINARITY, then augmentative copying is the optimal way for affect verbs to fulfill their prosodic template: INTEGRITY-IO >> FOOT BIN >> INTEGRITY-OO.

(111) a. INTEGRITY: No element of S_1 has multiple correspondent in S_2. (McCarthy & Prince 1995)

b. FOOT BINARITY: Feet are binary at the level of the syllable. (McCarthy & Prince (1993a,b)

(112) INTEGRITY-IO » FOOT BIN

/sak/	INTEGRITY-IO	FOOT BIN
a. ☞ sak		*
b. $sa_1k_2a_1k_2$	*!	

When there is no *[+affect]* specification for the input, then we see that faithfulness prohibits compliance with foot binarity.

The affect is however formed in relation to an output (or at least possible output, as must be claimed here). This opens the door to satisfaction of FOOT BIN, if we employ Ussishkin's "Derived word TETU".

(113) Derived word TETU
FAITH-IO » PHONO-CONSTRAINT » FAITH-OO

(114) FOOT BIN >> INTEGRITY-OO

[sak] $_{[+affect]}$	INTEGRITY-IO	FOOT BIN	INTEGRITY-OO
a. sak		*!	
b. ☞ $sa_1k_2a_1k_2$			**

In order to rule out the candidate s_1as_1ak, we need to invoke STRONG LEFT-ANCHOR, which will decide in favor of $sa_1k_2a_1k_2$.

Copying of the final *-VC₂* of the root is not the only means by which affect verbs can be formed. There are several fixed-segment suffixes that can lead to an affect verb: *-et, -laj, -luj/-lij*, and *-C_1on,* which copies the first C of the root. In all of these cases, the affix attaches to a root of the shape CVC. This is consistent with the analysis; if a fixed-segment affix is supplied, then nothing more than concatenation must be done in order for the affect verb to satisfy FOOT BIN. For example, *[kop], et$_{[+affect]}$* → *[kopet]* 'pouring rain'.

(115) Foot binarity is satisfied by affixation

kop, et$_{[+affect]}$	INTEGRITY-IO	FOOT BIN	INTEGRITY-OO
a. kop		*!	
b. ☞ kopet			
c. kopopet			*!*

The winner (b) in fact satisfies all of the constraints under discussion.

I will now turn to the closely-related case of Tzeltal, where the base of affixation is what must satisfy FOOT BIN.

4.6.3 Tzeltal

Tzeltal **(**Slocum 1948, Berlin 1963) exhibits a similar pattern in certain verb or attributive stems. The differences are that the affix is consistently an overt, fixed-segment one, and that it is the base, as opposed to the resulting form, that satisfies FOOT BIN. The result is an output that is trisyllabic.

The affect verbs/attributive words formed by suffixation of *-et* are always preceded by the prefix *š*-, which indicates the incompletive aspect. This affix has been omitted from the examples below, for the sake of focusing on only the relevant details:

(116) Tzeltal affect verbs/attributive

-níhihet	'(walking about), head downwards, in a crouched position'
-péčečet	'sailing high in the air'
-máčačet	'(walking about) grasping about in the dark, or eyes closed'
-ʔúmumet	'(walking about) face in a fixed smile'
-túčučet	'(walking about) tallest person in crowd'

These examples suggest that, in addition to FOOT BIN, NONFINALITY is emerging in the derived form. The version of NONFINALITY employed here requires the head foot to be syllable-wise non-final in the prosodic word.

(117) FAITH-IO >> FOOT BIN, NONFINALITY >> FAITH-OO

(118)

/nih, et/	INTEGRITY-IO	FOOT BIN	NONFINALITY	INTEGRITY-OO
a. ☞ [-níhi]het				**
b. [-níhet]			*!	

To put this pattern in the context of the language, I will mention that Tzeltal has two patterns of morphological reduplication: total reduplication, and left-anchored partial reduplication. These are types predicted by the proposed theory.

4.7 Conclusion

In spite of the appearance of right edge copying in the various examples above, this chapter shows that in none of these cases is it necessary to appeal explicitly to a constraint that targets the right edge for morphological copying. Some examples were shown to reduce to targeting of stressed material, in which stress coincidentally appeared rightmost in the base. In Lakhota, this was complicated by the fact that lexically stressed forms behaved as if they received default stress. I suggested that this regularization, although at the cost of opacity, leads to uniformity of the overall paradigm. IO-anchoring was shown to behave consistently with the theme of asymmetric left edge faithfulness; it seems that unless a language is compelled violate left anchoring of the root to the output, left anchoring will always occur. Also, cases of augmentative copying were explored. In Yoruba, it was argued that an augmentation analysis for intensifying ideophones has several advantages over the alternative reduplication analysis. Two Mayan languages were argued to exhibit slightly different templates in the formation of affect verbs, with the effect in each being that augmentation to satisfy emergent phonological requirement imposed a resulting "prosodic template”, leading to augmentative copying at the right edge. Crucially, no RED morpheme was present in any of the above cases, and no reference to the right edge for purposes of BR-anchoring was required. These examples all offer further support for the proposed theory of asymmetric anchoring.

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