Reduplicant placement, anchoring and locality*

S.L. Anya Lunden

Univeristy of California, Santa Cruz

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Abstract

This paper investigates Marantz' Generalization in the context of Optimality Theory (OT). The locality generalization implicit in Marantz' Generalization, that reduplicants tend to be adjacent to their corresponding base segments, is drawn out and focused on. A family of ADJACENCYBR constraints are proposed to motivate this tendency. These constraints relate a reduplicant's placement to its anchoring, motivated by the idea that each segment in the reduplicant wants to be as close as possible to its correspondent in the base. It is shown how these constraints motivate less than full reduplication, exemplified by Dobel, Agta and Yidin^y, as they are at odds with MAXBR, which requires full reduplication. They are also shown to predict discontiguous reduplicants (a rare pattern, found in Marshallese and Mandarin) which are otherwise mysterious. Claims that the locality generalization is an absolute rather than a tendency are examined, and reduplication patterns from Chukchee, Indonesian, Madurese and others are analyzed. It is shown that a full typology of reduplication must be made available by the grammar, including 'opposite edge' reduplication, where the reduplicant is anchored to one edge but aligned to the opposite edge as patterns of this sort cannot be otherwise explained.

1 Introduction

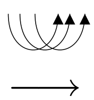
Marantz (1982) noted several tendencies of reduplication. His generalization regarding the dependency of reduplicant content on its placement has since become known as 'Marantz' Generalization' and is given in (1).

(1) Marantz' Generalization (Marantz 1982: 447)

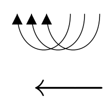
In the unmarked case, reduplicating prefixes associate with the melodies [(segments)–AL] from left to right, reduplicating suffixes from right to left

Agta and Dakota are classic examples of the two clauses of Marantz' Generalization. Agta follows the predicted pattern for prefixes and Dakota follows the predicted pattern for suffixes.

(2) Agta plural (Healey (1960))
tak-takki 'legs'



(3) Dakota plural (Shaw (1976))
haska-ska 'be tall, pl.'



Marantz' Generalization is a statement of explicit directionality and of implicit locality. How both of these components can be captured in Optimality Theory (OT) (Prince and Smolensky (1993)) is discussed §2. Because directionality does not exist in OT, the focus of this paper is on the locality generalization implicit in Marantz' Generalization. The locality generalization is that reduplicants are usually adjacent to the segments of the base with which they stand in correspondence. I will refer to such segments as the 'correspondent base' for ease of reference.

(4) Correspondent base: The segments in the base which stand in corre-

spondence to segments in the reduplicant (a subset of the base).

A proposal of how the locality generalization can be captured in OT is given and examined in §3. Marantz' Generalization is traditionally taken to be a tendency rather than an absolute and it is shown in §3.1 how the proposed implementation predicts this tendency cross-lingusitically for the locality generalization. In §3.2, further motivation for the proposed family of constraints is given by showing that they can account for reduplicant size and motivate discontiguous reduplicants. A comparison of this proposal with other work which is interested in locality in reduplication is given in §4. In §5 the constraint inventory for anchoring and placing reduplicants is examined, in light of claims that anchoring to the right edge is impossible and that alignment constraints do not refer to reduplicants (e.g. Nelson (2003)). A variety of reduplication patterns are drawn on to show that we cannot dispense with alignment constraints which refer to reduplicants or the need of reduplicants to anchor to the right. The conclusion is given in §6.

2 Anchoring, Alignment and Marantz' Generalization

Marantz' Generalization has two components. The first is a generalization about the direction in which the reduplicant copies base segments. The second is an implicit generalization about the placement of the reduplicant relative to the correspondent base. Both are examined in light of the theoretical mechanisms of OT.

As OT is non derivational, reduplicants are no longer thought to copy segments of the base in sequence. Rather than treating reduplicants as the result of right-to-left or left-to-right copying, OT assumes a reduplicant's segments stand in correspondence with segments in the base. The direction of copying (henceforth used in a descriptive sense) is captured in OT through anchoring constraints, as defined in (5).

(5) ANCHORBR-LEFT/RIGHT: The element at the designated periphery of the reduplicant has a correspondent at the designated periphery of the base (adapted from McCarthy and Prince (1999))

However, anchoring is not a perfect match to the pre-OT mechanism of copying direction because there may be a lower-ranked constraint which forces non consecutive copying. For example, if the constraint requiring consecutive correspondence of the reduplicant to the base, CONTIGUITYBR, is violated, then anchoring can be satisfied without a right-to-left or left-to-right direction of copying being following. Contiguity with respect to the base-reduplicant relation is defined in (6) and an example of its potential interaction with an anchoring constraint is given in (7).

(6) CONTIGUITYBR: "No skipping, no intrusion" The portion of the reduplicant which stands in correspondence to the base forms a contiguous string, and vice versa (adapted from McCarthy and Prince (1999))

(7)

/RED+takki/	ANCHORBR-LEFT	CONTIGUITYBR
☞ a. tak-takki		
b. tka-takki		*

While both candidates in (7) satisfy the anchoring constraint, only candidate (a) follows a left-to-right (or any consistent) direction of copying. Candidate (b) is properly anchored, but its direction of copying (descriptively speaking) switches back and forth. (Candidate (b) also violates LINEARITYBR which forbids metathesis. While candidate (b) above is not a likely candidate for metathesis, there are languages where contiguity and linearity are violated.) So while being anchored to the left will usually mean that a reduplicant's segments are copied from left-to-right (and being anchored to the right will mean they are copied from right-to-left), it is not an absolute.

If we put aside the qualification just mentioned, can anchoring constraints encode the direction component of Marantz' Generalization? The answer is yes, but only in the sense of a meta-generalization. Marantz' Generalization states that if the reduplicant is a prefix, then it will copy from left-to-right, and if it is a suffix, then it will copy from right-to-left. In OT, whether a reduplicant is a prefix or suffix depends on the relative ranking of the alignment constraints relativized to the reduplicant.

(8) ALIGN (RED, PRWD)-LEFT/RIGHT: The specified edge of the reduplicant coincides with the specified edge of the prosodic word (from the general alignment template proposed by McCarthy and Prince (1993))

So if ALIGN (RED, PRWD)-LEFT is ranked above ALIGN (RED, PRWD)-RIGHT, then the reduplicant is a prefix. If the ranking is reversed, the reduplicant is a suffix. A rephrasing of Marantz' Generalization to reflect this is stated in (9).

(9) A restatement of Marantz' Generalization in OT terms: In unmarked cases, if a language has the ranking ANCHORBR-LEFT ≫ ANCHORBR-RIGHT, then the language will have the ranking ALIGN (RED, PRWD)-LEFT ≫ ALIGN (RED, PRWD)-RIGHT. If ANCHORBR-RIGHT ≫ ANCHORBR-LEFT, then ALIGN (RED, PRWD)-RIGHT ≫ ALIGN (RED, PRWD)-LEFT.

The statement in (9) can be simplified to the meta-generalization in (10).

(10) In unmarked cases, the highest-ranked reduplicant anchoring constraint refers to the same edge as the highest-ranked reduplicant alignment constraint.

This is a meta-constraint because it refers to the relative rankings of different constraints and therefore is not encodable in any one constraint, so like Marantz' original statement, (10) describes what the more commonly found patterns of reduplication have in common.

The second component of Marantz' Generalization is an implicit statement of locality. Stating that a prefixal reduplicant associates left-to-right and a suffixal reduplicant associate right-to-left is equivalent to stating that the reduplicant will start copying with whatever segment of the base it is closest to. This not only holds in languages like Agta and Dakota (mentioned in §1) where the reduplicant is a prefix or suffix, but also in languages like Somoan, where the reduplicant is an infix, e.g. *a-lo-lófa* ('love') Marsack (1962).[1] In

[1] I refer to both reduplicants which are sometimes considered prefixed to the main stress and those that are 'true infixes' as infixes for descriptive transparency. This has no theoretical consequence as affixal terms are purely descriptive in OT, as the placement of the reduplicant is determined by the ranking of relativized alignment constraints.

all of the reduplicant patterns exemplified in (11), the reduplicant is next to its correspondent base.

(11)

prefixed	infixed	suffixed
tak-takki	a-lo-lófa	haska-ska

We can therefore extend the locality implicit in Marantz' Generalization beyond prefixes and suffixes, to reduplicants generally. The statement in (12) is proposed to capture and expand the locality generalization that is implicit in Marantz' Generalization.

(12) Locality Generalization:

Reduplicants tend to be adjacent to their correspondent base

The locality generalization as stated in (12) is the focus of this paper. A proposal for capturing this generalization directly in OT is first given and discussed. Then the question of whether the locality generalization is a tendency or an absolute is examined. It is argued that it is only a tendency and that claims that it's an absolute cannot be maintained in face of the evidence.

3 Locality

As we saw in the last section, implicit in Marantz' Generalization is that the reduplicant is adjacent to its correspondent base. This was stated as a locality generalization. Unlike the direction component of Marantz' Generalization, the locality generalization can be directly encoded into the grammar. Anchoring constraints have been assumed to capture this locality in OT (e.g. Spaelti (1997) and Yip (1999)) because, for example, the reduplicant in the Agta example given in the introduction obeys ANCHORBR-LEFT (because the left edge of the reduplicant stands in correspondence with the left edge of the base) and the reduplicant is also placed at the left. However, the placement of the reduplicant is completely distinct from its anchoring. The same reduplicant could appear as a suffix and its left edge would still stand in correspondence with the left edge of the base. This is illustrated in (13).

(13) prefix, obeys AnchorBR-Lt — suffix, obeys AnchorBR-Lt
a. tak-takki — b. *takki-tak

Whether a reduplicant is a prefix or a suffix in OT is determined by the ranking of the alignment constraints relativized to the reduplicant. Therefore, the ranking Align (Red, PrWd)- Left ≫ Align (Red, PrWd)- Right must hold in Agta, since the reduplicant is aligned to the left of the prosodic word. If the opposite ranking held, the form in (13-b) would be the correct form in the language. So we see that anchor constraints alone do not capture the locality aspect of Marantz' Generalization.

Looking at the cases where the reduplicant is anchored and aligned to the prosodic word, there are four logical combinations.[2] These are given in (14).

(14) With hypothetical base *gabadu* (not a tableau)

	AnchorBR-Lt	AnchorBR-Rt
Align (Red, PrWd)-Lt	a. ga-gabadu	b. du-gabadu
Align (Red, PrWd)-Rt	c. gabadu-ga	d. gabadu-du

Given the four possible anchoring-alignment combinations, only half of them result in forms which follow the locality generalization. These are (a) and (d), which are shaded. If only these four constraints determined the content and the placement of reduplicants, the locality generalization would be mysterious. What is needed, then, is a way to tie anchoring and alignment

[2]Here I put aside claims that some of these constraints don't exist (Nelson (1998, 2002a, 2002b, 2003), Bye & de Lacy (2000)). I address this claim in §5.

together. It is when the reduplicant is anchored and aligned to the same edge that the resulting form follows the locality generalization. I propose a family of constraints in the following section that motivate the locality generalization and predict that it will be more often followed than not.

3.1 ADJACENCYBR constraints

As we saw in the last section, what is needed is a constraint that will favor the cases in which the reduplicant is anchored and aligned to the same edge in order to motivate the locality generalization. I propose a constraint family in (15).

(15) ADJACENCYBR constraint family[3]

a. ADJACENCYBR-BY-SEG: Every segment in the reduplicant is next to its correspondent base

b. ADJACENCYBR-BY-σ: Every syllable in the reduplicant is next to its correspondent base.

c. ADJACENCYBR-BY-FOOT: Every foot in the reduplicant is next to its correspondent base.

These constraints are categorically violable. By assuming a family of constraints gradient violations are avoided (as argued for by McCarthy (2002)). Additionally, the constraints motivate less than full reduplication and patterns of discontiguous reduplication. These latter two aspects are discussed in the

[3]Kitto & de Lacy (1999) propose the constraint BE-ADJACENCY (where E stands for an epenthetic segment) to account for the tendency of copied epenthetic segments to be near the segment from which they have copied their features. ADJACENCYBR requires the same of reduplicant segments. Thus, there potentially is a family (beyond the family of quantized ADJACENCYBR constraints) of ADJACENCY constraints. They are restricted to output relations only, as any ADJACENCY requirements in the input-output (IO) domain would be non sensical.

following section.

Hypothetical examples of satisfaction and violation of the ADJACENCYBR constraints are given in the tableau below.

(16) Hypothetical outputs evaluated by the ADJACENCYBR family of constraints

	AD-BY-SEG	AD-BY-σ	AD-BY-FOOT
a. ga-b-badu			
b. ga-gabadu	*		
c. gaba-gabadu	*	*	
d. gabadu-ga	*	*	*

As can be seen, the ADJACENCYBR constraints are in a stringency relation: violation of ADJACENCYBR-BY-FOOT, for example, entails violation of ADJACENCYBR-BY-SEGMENT and ADJACENCYBR-BY-σ. Any reduplicant which non-vacuously satisfies any ADJACENCYBR constraint can be said to follow the locality generalization as stated in (12).[4]

The ADJACENCYBR constraints motivate and predict the locality generalization. We saw in (14) that given the four constraints which potentially anchor and align the reduplicant, we would expect the locality generalization to be followed in only half of all cases. The typology which includes the ADJACENCYBR constraints is given below. It shows that a skewing is predicted towards following the locality generalization. The typology is shown for hypothetical candidates that all have a syllable-sized reduplicant. This means that ADJACENCYBR-BY-SEGMENT will be violated and ADJACENCYBR-BY-FOOT will be vacuously satisfied by all the candidates, so only ADJACENCYBR-BY-σ is shown in the tableaux. Therefore, if a candidate fol-

[4] Vacuous satisfaction of ADJACENCYBR-BY-σ and ADJACENCYBR-BY-FOOT occurs when the reduplicant is smaller than a syllable or foot, respectively. For example, *gaba-ga* vacuously satisfies ADJACENCYBR-BY-FOOT.

lows the locality generalization, ADJACENCYBR-BY-σ will be satisfied and if it doesn't follow the locality generalization, ADJACENCYBR-BY-σ will be violated.

There are four possible combinations of anchoring and alignment (see (14) in §3) and if an ADJACENCYBR constraint is included in each of these four combinations there are six possible rankings in each of the four cases, for a total of 24 possible rankings. Although there are five constraints under discussion, the lower ranked anchoring and alignment constraint will never play a role. The possible combinations are shown below.

(17)

	constraint groups			possible rankings
a.	ANCHORBR-LT	ALIGN (RED, PRWD)-LT	ADJACENCYBR	6
b.	ANCHORBR-RT	ALIGN (RED, PRWD)-RT	ADJACENCYBR	6
c.	ANCHORBR-LT	ALIGN (RED, PRWD)-RT	ADJACENCYBR	6
d.	ANCHORBR-RT	ALIGN (RED, PRWD)-LT	ADJACENCYBR	6
			Total rankings:	24

If the reduplicant is subject to anchoring and alignment constraints which refer to the same edge, then the locality generalization will be followed no matter where ADJACENCYBR-BY-σ is ranked. This is the case for the constraint groups in (a) and (b) in (17). Thus, the locality generalization is satisfied in the 12 cases in which the anchoring and alignment constraints refer to the same edge (that is, in half the cases, parallel to what was seen in (14)). In the two groups in which the anchoring and the alignment constraints refer to opposite edges, ADJACENCYBR-BY-σ makes a new prediction; namely that the locality generalization is still more often followed than not. In four of the six possible rankings in both cases, the locality generalization will be followed, and only two rankings will result in an output which does not follow the locality generalization. This is shown for one pair of opposite-edge constraints in (18), and the results are the same, with regard to the locality generalization, for the other pair. Candidates (a) and (b) in each tableau follow the locality generalization, whereas candidate (c) does not. (The other candidate which does not follow the locality generalization, *du-gabadu*, has been left out of the following tableaux because it is harmonically bounded. If the six possible rankings of AnchorBR-Right and Align (Red, PrWd)-Left were shown as well, this candidate would be the winner in two rankings, and candidate (c) would be harmonically bounded.) In order help the winner stand out, none of the cells of the optimal form are shaded.

(18)

a. (locality generalization followed)

/Red+gabadu/	AnchorBR Lt	AdjacencyBR by-σ	Align (Red, PrWd)-Rt
☞ a. ga-gabadu			∗
b. gabadu-du	∗!		
c. gabadu-ga		∗!	

b. (locality generalization followed)

/Red+gabadu/	Align (Red, PrWd)-Rt	AdjacencyBR by-σ	AnchorBR Lt
a. ga-gabadu	∗!		
☞ b. gabadu-du			∗
c. gabadu-ga		∗!	

c. (locality generalization followed)

/RED+gabadu/	ADJACENCYBR BY-σ	ANCHORBR LT	ALIGN (RED, PRWD)-RT
☞ a. ga-gabadu			∗
b. gabadu-du		∗!	
c. gabadu-ga	∗!		

d. (locality generalization followed)

/RED+gabadu/	ADJACENCYBR BY-σ	ALIGN (RED, PRWD)-RT	ANCHORBR LT
a. ga-gabadu		∗!	
☞ b. gabadu-du			∗
c. gabadu-ga	∗!		

e. (locality generalization not followed)

/RED+gabadu/	ANCHORBR LT	ALIGN (RED, PRWD)-RT	ADJACENCYBR BY-σ
a. ga-gabadu		∗!	
b. gabadu-du	∗!		
☞ c. gabadu-ga			∗

f. (locality generalization not followed)

/RED+gabadu/	ALIGN (RED, PRWD)-RT	ANCHORBR LT	ADJACENCYBR BY-σ
a. ga-gabadu	∗!		
b. gabadu-du		∗!	
☞ c. gabadu-ga			∗

Tableaux (18a–d) output a winner which follows the locality generalization. In the final two tableaux, (e) and (f), both the anchoring and the alignment constraint are ranked above ADJACENCYBR-BY-σ, thus outputting a winner which satisfies the opposite-edge anchoring and alignment constraints at the cost of violating ADJACENCYBR-BY-σ. If we add up the rankings which output a winner that follows the locality generalization we get 20 such rankings (the 12 rankings in which the anchor and alignment constraints refer to the same edge, and the eight rankings in which they refer to opposite edges) out of a total of 24 possible rankings. This means that if we include the relevant ADJACENCYBR constraint, we predict that the locality generalization will be followed in five out of six cases. This is obviously substantially nearer the truth than the one out of two that was predicted before the ADJACENCYBR constraints were introduced.

We can now explain the locality generalization satisfactorily. It is not necessarily that reduplicants tend to be subject to anchor and alignment constraints which refer to the same edge, which would be a coincidence, but rather that there is a family of constraints that tie the anchoring requirement to the placement of the reduplicant. While it is unlikely that a grammar would persist in ranking an ‘opposite edge’ constraint above one which followed the meta-generalization in (10) (as is the case in hypothetical languages shown in (18a-d)), the ADJACENCYBR constraints motivate a language to follow (the OT version of) Marantz’ Generalization. This motivation is mysterious if only anchoring and alignment constraints determine the placement of a reduplicant.

The ADJACENCYBR constraints, as formulated, have effects on reduplicant output other than placement. These are examined in the following section.

3.2 Further motivating the ADJACENCYBR constraints

The ADJACENCYBR constriants are motivated by the idea that each segment of the reduplicant wants to be as close as possible to its correspondent segment in the base. A single segment reduplicant (or a reduplicant with discontiguous single segments) does this perfectly. However, such reduplicants will often run afoul of highly ranked syllable well-formedness contraints, and heavily violate MAXBR. Therefore, the ADJACENCYBR constraints offer compromises, based on the idea that a reduplicant of any relevant prosodic category (segment, syllable, foot) (Selkirk (1980)) will want to be adjacent to its correspondent base. A smaller reduplicant has the advantage of satisfying more ADJACENCYBR constraints which means that each segment will be as close as possible to its correspondent in the base. Motivating a smaller reduplicant puts the ADJACENCYBR constraints at odds with MAXBR, which requires every segment in the base to have a correspondent in the reduplicant. The role of the ADJACENCYBR constraints as reduplicant size restrictors is discussed in §3.2.1. There are a few cases in the literature of discontiguous reduplicants. Such reduplicants are a predicted consequence of the tension between the ADJACENCYBR constraints and MAXBR since by being discontiguous a reduplicant is better able to satisfy both constraints. Such cases are shown in §3.2.2.

3.2.1 ADJACENCYBR constraints as reduplicant size restrictors

There is tension between the ADJACENCYBR constraints and the constraint MAXBR. Considering only these four constraints (the three ADJACENCYBR constraints and MAXBR), the table in (20) shows which rankings force which size reduplicant.

(19) MAXBR: "No Deletion" Every element in base has a correspondent in the reduplicant (adapted from McCarthy and Prince (1999))

(20) Reduplicant sizes[5]

constraint ranking	reduplicant size
MAXBR≫ AD-BY-SEG, AD-BY-σ, AD-BY-FOOT	full reduplication
AD-BY-SEG ≫ MAXBR	segment reduplicant
AD-BY-σ ≫ MAXBR ≫ AD-BY-SEG	syllable reduplicant
AD-BY-FOOT ≫ MAXBR ≫ AD-BY-SEG, AD-BY-σ	foot reduplicant

Considering only these four constraints, the above rankings show how different size reduplicants are motivated. The unshown constraints in the rankings can be ranked anywhere with the same effect. For example, if a language has the ranking in the third line above, ADJACENCYBR-BY-σ ≫ MAXBR ≫ ADJACENCYBR-BY-SEGMENT, then the reduplicant will be a syllable in size no matter where ADJACENCYBR-BY-FOOT is ranked. This is shown in (21).

(21)

		/RED+gabadu/	AD BY-FOOT	AD BY-σ	MAXBR	AD BY-SEG
	a.	ga-b-badu			g,a,a,d,u!	
☞	b.	ga-gabadu			b,a,d,u	*
	c.	gaba-gabadu		*!	d,u	*
	d.	gabadu-gabadu	*!	*		*

[5]The ADJACENCYBR constraints only predict the locality generalization with respect to reduplicants up to two syllables in size. A bigger reduplicant, which will usually be an instance of full reduplication, will violate all the ADJACENCYBR constraints. For example, *gabadu-gabadu* violates ADJACENCYBR-BY-FOOT, even though it follows the locality generalization. However, it is not clear that the locality generalization should have anything to say about cases of full reduplication. It remains an empirical question whether a further ADJACENCYBR constraint is motivated. I am not aware of any cases of reduplication where the reduplicant is three syllables or more but less than a full reduplicant (taking into consideration that a reduplicant usually will only copy the root portion of the base, for independent reasons).

The ADJACENCYBR constraints motivate a smaller size reduplicant because the segments of a smaller reduplicant will be closer to their correspondents in the base than those of a larger reduplicant will. This is a clearer motivation for smaller reduplicants than is offered by the two size restrictor contraints in the current theory, ALL-σ-LEFT and ALL-FEET-LEFT, which require all syllables or feet, respectively, to occur at the left edge of the output (but are gradiently violable).

Dobel, a language spoken on the Aru islands of Indonesia, employs a single segment reduplicant. A reduplicant in Dobel copies the onset of the stressed syllable to nominalize verbs and for a variety of syntactic functions (Hughes (2000)). I assume a constraint ANCHOR (RED, $\acute{\sigma}$)-LEFT to capture this specific anchoring. Stress may occur on any of the last three syllables of the root, and in the majority of words it falls on the penultimate syllable.

(22) Dobel (Hughes (2000): 168, ff.)

buˈtemuy	‘slow, late’	*buˈ<u>t</u>temuy*	‘slowly’
k^{w}uˈbo	‘forest’	*k^{w}uˈ<u>b</u>bo*	‘of the forest’
sin	‘loud’	*ˈ<u>s</u>sin*	‘loudly’

A single-segment reduplicant is motivated by ADJACENCYBR-BY-SEGMENT, as shown for an example in Dobel in (23). A reduplicant which is a single segment is able to be adjacent to its correspondent base and not run afoul of any of the ADJACENCYBR constriants (satisfying ADJACENCYBR-BY-σ and ADJACENCYBR-BY-FOOT vacuously).

(23) Dobel *buˈttemuy* (‘slowly’)

/butemuy/	ANCHOR (RED, $\acute{\sigma}$)-LT	AD BY-SEG	ALIGN (R, PRWD)-LT	MAX BR
☞ a. buˈttemuy			∗∗	b,u,e,m,u,y
b. buˈtemmuy	∗!		∗∗∗∗	b,u,t,e,u,y
c. buteˈtemuy		∗!	∗∗	b,u,m,u,y
d. te-buˈtemmuy		∗!		b,u,e,u,y

A syllable reduplicant better satisfies MAXBR at the cost of not satisfying ADJACENCYBR-BY-SEGMENT. The reduplicant in Agta, a language of the Philippines, is a prefixal copy of the the first maximal syllable.

(24) Agta (Healey (1960))

takki	‘leg’	tak-takki	‘legs’
uffu	‘thigh’	uf-uffu	‘thigh’
ulu	‘head’	ul-ulu	‘heads’

(25) Agta *taktakki* (‘legs’)

/RED+takki /	AD BY-σ	ANCHOR R,PRWD)-LT	ALIGN (R,PRWD)-LT	MAX BR	AD BY-SEG
☞ a. tak-takki				k,i	∗
b. tak-tak-ki			∗!∗∗	k,i	∗
c. t-takki				a,k,k!,i	
d. takki-takki	∗!				∗

It can be seen that while the anchoring and alignment constraints are not at odds with each other, we still see an ADJACENCYBR constraint playing a role in determining reduplicant size.[6] By satisfying ADJACENCYBR-BY-σ, Agta ensures that the segments in the reduplicant are very near their correspondents

[6]Whether or not a language takes a maximal syllable (CVC) or not depends on the ranking of NOCODA (which requires that syllable not have a coda) with respect to MAXBR. As McCarthy & Prince (1994) show, languages that otherwise allow codas can disallow them in reduplicants by ranking NOCODA above MAXBR (but below MAXIO, which requires that the output not delete any input segments).

in the base.

Even if the language yields to MaxBR to the extent that AdjacencyBR-by-σ and AdjacencyBR-by-Foot are violated, a language can still satisfy AdjacencyBR-by-Foot. Yidin[y], a (no longer natively spoken) aboriginal language of Australia, takes this tact. (Anchoring and alignment of the reduplicant to the left is assumed in the tableau in (27).)

(26) Yidin[y] (McCarthy & Prince (1986), from Dixon (1977))

mulari	'initiated man'	mula-mulari	'initiated men'
gindalba	'lizards'	gindal-gindalba	'lizards'
kalamparra	'March fly'	kala-kalamparra	'March flies'

(27) Yidin[y] *mulamulari* ('initiated men')

/Red+mulari/	Ad by-Foot	Max BR	Ad by-σ	Ad by-Seg
☞ a. mula-mulari		r,i	∗	∗
b. mulari-mulari	∗!		∗	∗
c. mu-mulari		l,a,r!,i		∗

Thus it can be seen that the AdjacencyBR family of constraints not only serve to tie a reduplicant's placement to its anchoring, but also motivate a smaller size reduplicant, in opposition to MaxBR which motivates a larger reduplicant.

The rankings in (20) and in the tableaux for the various languages examined above assume that ContiguityBR is highly ranked, forcing the reduplicant and the correspondent base to both be contiguous. However, if ContiguityBR is low-ranking, the conflict between the AdjacencyBR constraints and MaxBR is mitigated. Two examples of this are discussed in the following section.

3.2.2 ADJACENCYBR and discontiguous reduplicants

A reduplicant is able to satisfy an ADJACENCYBR constraint and better satisfy MAXBR if it is discontiguous. Indeed, it is hard to imagine any motivation for a discontiguous reduplicant other than to allow each piece of the reduplicant to be next to its correspondent base. (This motivation is also noted by Urbanczyk (2000).) This effect will be shown for discontiguous reduplicant segments in Marshallese and for discontiguous reduplicant syllables in Mandarin.

Marshallese, spoken on the Marshall islands, has forms with discontiguous reduplicants, as in *ka-rriwwew* (‘distribute by twos’) (Bender (1971), cited by Moravcsik (1978)).[7] The core of the analysis of such a form is given in (28). ANCHOR (RED, ROOT)-LEFT must be is highly ranked, as the left edge of the reduplicant stands in correspondence with the left edge of the root. (*ka* is a prefix. The root in (28) is *riwew* (‘two’).) ADJACENCYBR-BY-SEGMENT must also be highly ranked, as it is fully satisfied at the cost of lower-ranked CONTIGUITYBR.

(28) Marshallese *ka-rriwwew* (‘distribute by twos’)

		/RED+ka+riwew/	ANCHOR (RED, ROOT)-LT	AD BY-SEG	MAX BR	CONT BR
a.	☞	ka-rriwwew			iew	∗
b.		ka-ririwew		∗!	wew	
c.		ka-rriwew			iwew!	

Because ADJACENCYBR-BY-SEGMENT is higher ranked than CONTIGUITYBR, the reduplicant is forced to be discontiguous, as can be seen by

[7] Unfortunately, there are only a few examples of this type of reduplication in Marshallese in the literature. The other cited examples are similar semantically and have the same number of syllables, e.g. *ka-jjilliw* (‘distribute by threes’), etc. and so it is hard to know how far the pattern extends.

comparing candidate (a), which has a discontiguous reduplicant, with candidate (b), which has a contiguous reduplicant. Comparing candidate (a) with candidate (c), we can see that a discontiguous, two segment reduplicant is preferred over a (contiguous) single segment reduplicant because MAXBR is higher ranked than CONTIGUITYBR, forcing the reduplicant to be as large as possible (assuming syllable well-formedness constraints prevent the coda from reduplicating).

In the Marshallese data we see a case where ADJACENCYBR-BY-SEGMENT is satisfied by a reduplicant which is bigger than a segment, at the cost of violating CONTIGUITYBR. Adjectival reduplication in Mandarin, a productive process, is a case where ADJACENCYBR-BY-σ is satisfied by a reduplicant which is bigger than a syllable.

(29) Mandarin (Zhang (1987))

a.	ganjing	‘clean’	ganganjingjing	‘quite clean’
b.	gaoxing	‘happy’	gaogaoxingxing	‘quite happy’
c.	qingchu	‘clear’	qingqingchuchu	‘quite clear’
d.	luosuo	‘long-winded’	luoluosuosuo	‘quite long-winded’

The reduplicant is not marked in the above data because there are several alternatives. All the possibilities have in common that each syllable of the reduplicant is adjacent to their individual correpondent bases. These alternatives tie for the winning candidate (since it isn’t possible to distinguish them) in the tableau in (31).

(30) *COMPLEX: Syllable margins may not be complex.

(31) Mandarin *ganganjingjing* (ng=ŋ) (‘quite clean’)

		/RED+ganjing/	MAX BR	*COMPLEX	AD BY-σ	CONT BR
a.	?☞	ganganjingjing				*
	?☞	ganganjingjing				*
	?☞	ganganjingjing				*
	?☞	ganganjingjing				*
b.		ganjingganjing			*!	
c.		ganganjing	j!iŋ			
d.		ggaangngjjiingng		*!**		*

By splitting up or infixing the reduplicant (as all the candidates in (a) do) both ADJACENCYBR-BY-σ and MAXBR are satisfied. Candidate (b) also satisfies MAXBR, but it violates the high-ranking ADJACENCYBR constraint. Candidate (d) satisfies not only ADJACENCYBR-BY-σ, but also ADJACENCYBR-BY-SEGMENT. However, we must assume that a syllable well-formedness constraint such as *COMPLEX rules out such a candidate. Which of the forms of candidate (a) will actually win depend on several unknowns. While all four forms violate CONTIGUITYBR, the first two forms are worse, since both the reduplicant and base are discontiguous. The first, second, and fourth forms also violate CONTIGUITYIO, since the segments in the output corresponding to the input have intervening reduplicant material. This suggests that the third form, *ganganjingjing*, is most harmonic. However, alignment and/or input-ouput anchoring constraints could also play a role in deciding between the forms.

The discontiguous reduplicants in Marshallese and Mandarin are evidence that some languages try to satisfy both a particular ADJACENCYBR constraint and MAXBR, at the cost of violating CONTIGUITYBR. Such reduplicants could only be motivated by this tension between the ADJACENCYBR constraints and MAXBR. Neither traditional reduplicant size restrictor, ALL-σ-

LEFT or ALL-FEET-LEFT, could account for the pattern of Mandarin adjectival reduplication.

3.3 Summary

The proposed family of ADJACENCYBR constraints predicts that a reduplicant will usually be next to its correspondent base and their inclusion in the grammar explains the cross-linguisitic tendency described by the locality generalization. These constraints provide a counter force to MAXBR, motivating reduplicants that are less than full copies of their bases, something that otherwise does not have a clear cause. The ADJACENCYBR constraints also motivate discontiguous reduplicants, a rare but attested pattern. Because the winning candidates in the Marshallese and Mandarin examples in §3.2.2 violate CONTIGUITYBR they would be harmonically bounded if there was not a higher-ranked constraint which favored these candidates. The family of ADJACENCYBR constraints explains what a candidate with a discontiguous reduplicant has in its favor: smaller pieces of the reduplicant mean each segment can be closer to its correspondent in the base.

4 Other proposals

There have been several other recent proposals for encoding the adjacency of the reduplicant to its correspondent base. In this section I discuss them and how they differ from the current proposal.

Nelson (2002) assumes a generic LOCALITY constraint, as given in (32).

(32) LOCALITY: The copied portion of the base and the correspond-

ing reduplicant must be adjacent (cf. Marantz 1982, McCarthy and Prince 1993a, 1995, Urbanczyk 1996, 2000)

Nelson says that this constraint is 'a place-holder for the constraint or group of constraints that require base-reduplicant adjacency' (2002a: 323). What I have proposed here can be seen to serve the purpose of filling in the specifics of the locality constraint family.

Spaelti (1997) proposes a revision to the formulation of ANCHORBR as given in (33).

(33) Spaelti (1997): 222:
'Anchoring'
Anchor (Base, Redform)[8] [where Redform is the reduplicant and the base together–AL]

Under Spaelti's definition, forms which obey the locality generalization will satisfy the constraint in (33). For example, Agta *tak-takki* satisfies this constraint because the left and right edges of the base, *takki*, correspond to the left and right edges, respectively, of the redform, *taktakki*. A form which does not follow the locality generalization will not satisfy the constraint in (33). For example, the base of Madurese (Stevens (1994)) *trɛ-ɛstrɛ* ('wives') is *ɛstrɛ* and its left edge does not stand in correspondence with the left edge of the redform (*trɛɛstrɛ*).

Following Lunden (2004), I assume the base for reduplication is all of the segments in the output, excepting the reduplicant (cf. McCarthy & Prince's 'single-side base' (1993a): 106). Under this revised definition of the base the

[8]Spaelti formulates this as 'Align (Base, Redform)', but since it represents a correspondence relation rather than an instance of coinciding placement, it seems it is an anchoring relation.

constraint in (33) will not be violated even by forms that do not follow the locality generalization. Cases of internal reduplication will always follow the anchoring constraint in (33) whether the reduplicant follows the locality generalization or not. For example, under this formulation, the base of Somoan *a-lo-lofa* is *alofa*, and the left and right edges stand in correspondence with the left and right edges of a non-optimal candidate such as **a-fa-lofa*.

Urbanczyk (2001) proposes the adjacent string hypothesis, which is given in (34).

(34) Adjacent String Hypothesis (Urbanczyk (2001): 174)
[The] B[ase] is the string adjacent to [the] R[eduplicant] such that it begins at the tropic edge.

(35) Tropic Edge (Urbanczyk (2001): 174)
The tropic edge immediately follows [the] R[eduplicant] if R=prefix, or immediately precedes R if R=suffix.

The adjacent string hypothesis only states that the reduplicant is next to its base (the base being defined as either the preceding, or as the following string). It makes no reference to a correspondent base, and the adjacency of the reduplicant to that correspondent base. For example, the form **ki-takki* follows the adjacent string hypothesis because the base of the prefixal reduplicant is the following string of segments. However, the reduplicant is not adjacent to its correspondent base, which is what the proposed ADJACENCYBR constraints require. So the adjacent string hypothesis is an identification of the base, under the single-side base assumption, rather than a statement of reduplicant locality.

Yip (1999) proposes that the phenomenon of reduplication is due to constraints which favor alliteration and rhyme. This is a nice argument for 'odd' cases of reduplication like (36). (This and the data in (37) is cited in Yip (1999).)

(36) Tzeltal

nit nit-it-an 'push'

It can be assumed that the syllabification yields *ni.ti.tan*, a word which now exhibits both rhyme (the first and second syllables) and alliteration (the second and third syllables). However it does not seem that more usual cases of reduplication exhibit alliteration and rhyme, for example (37).

(37) Tagalog

lakad (pag)-la-lakad 'walking'

The Oxford English Dictionary defines a rhyme as occurring when '... the last stressed vowel and any sounds following it are the same, while the sounds preceding are different' (Simpson (1989)). Given this definition, the onsets of the two rhyming syllables must be different, meaning the reduplicated word in (37) does not exhibit rhyming. The same can be argued for alliteration: that the two syllables/feet/etc. must have different rimes. Rhyming and alliteration, therefore, are questionable motivating factors for the general tendency for adjacency of the reduplicant and the correspondent base. Clearly, however, there is benefit in repeated sounds being adjacent.

The proposed family of ADJACENCYBR constraints has the advantage of not only capturing the cross-linguistic tendency for a reduplicant to be next to its correspondent base, but also motivates reduplicants that are less than full copies of the base and accounts for the fact that reduplicants may be discontiguous in order to better to satisfy an ADJACENCYBR constraint.

Having shown for the need for the ADJACENCYBR constraints to account for the locality generalization, I now turn to the question of whether the locality generalization is a tendency or an absolute.

5 Another look at the right edge

There have been several proposals to do away with reference to the right edge. In the realm of reduplication, this predicts that reduplicants cannot copy from the right edge of the root or base. Bye & de Lacy (2000) claim that no constraint, reduplication-related or otherwise, can make reference to the right edge. Nelson (1998, 2002a, 2002b, 2003) proposes that the locality condition in Marantz' generalization (what this paper puts forth as the locality generalization) is in fact universal, claiming that languages which seem to violate the locality generalization are in fact doing something different than reduplication.[9] Nelson proposes that anchoring constraints can only refer to privileged positions in the sense of Beckman (1999), meaning that while the constraints ANCHORBR-LEFT and ANCHORBR-$\acute{\sigma}$ exist, there is no constraint ANCHORBR-RIGHT, as the right edge is not a privileged position. Given that the ADJACENCYBR constraints (LOCALITY for Nelson (2002a, 2003)) are active in the grammar we then expect reduplicants to be prefixal, rather than suffixal, since they may copy from the left edge but may not copy from the right edge. (Note that a reduplicant may be infixal or suffixal if it targets

[9] For some languages, Nelson proposes that the reduplicant in fact copies from both the left and right edge. I look at only languages which she claims do not to truly undergo reduplication. See Kawahara (2003) for an analysis of right-edge reduplication in Yoruba which argues that it is a case of real reduplication.

the stressed syllable, as it will then be placed adjacent to the stressed syllable.) Since alignment constraints which refer to reduplicants could force a prefix which copies from the left to be placed at the right edge, or could even force copying from the right, as illustrated in (38), Nelson (2002a, 2003) argues that alignment constraints may not refer to reduplicants. (I use and refer to ADJACENCYBR in lieu of any specific ADJACENCYBR constraint when reduplicant size is not central to the point at hand, as is the case (38).)

(38)

		/RED+gabadu/	ALIGN (RED, PRWD)-RT	ADJACENCY BR	ANCHORBR LEFT
☞	a.	gabadu-<u>du</u>			∗∗∗∗
	b.	gabadu-<u>ga</u>		∗!	
	c.	<u>ga</u>-gabadu	∗!		

Nelson's claims are summarized in (39).

(39) Asymmetric anchoring hypothesis (AAH) (Nelson 1998, 2002a, 2002b, 2003): Reduplicants are:

a. suffixes only if the stress is final (prefixal hypothesis)

b. always adjacent to the correspondent base (locality hypothesis)

What this means for the constraint inventory is shown in (40) and (41).

(40) Relevant constraints assumed in this paper:

ANCHORBR-LEFT	ALIGN (RED, PRWD)-LEFT	(family of) ADJACENCYBR
ANCHORBR-RIGHT	ALIGN (RED, PRWD)-RIGHT	

(41) Subset of these allowed by AAH:

ANCHORBR-LEFT, (family of) ADJACENCYBR

Under normal circumstances, the set of constraints in (41) would yield only outputs consistent with the AAH, such as hypothetical *ga-gabadu* (where the reduplicant consists of one or more segments anchored at the left edge) and variations of this in cases where the reduplicant is anchored to the stressed syllable, as in hypothetical *ga-ba-bádu*.

However, even with the absence of anchoring to the right edge and RED-alignment constraints, the system of constraints still predicts copying from the right edge, as illustrated in §5.1. It is shown that the system predicts the same patterns with and without alignment constraints which refer to reduplicants and therefore I argue for the inclusion of RED-alignment constraints in the system, showing that this makes additional positive predictions. In §5.2 the status of ANCHORBR-RIGHT in the grammar is considered. Exceptions to the tendency for reduplicants to copy from the left edge are examined. Allowing ANCHORBR-RIGHT to be a constraint in the grammar would account for these languages straightforwardly, but would leave the general preference for copying from the left edge unaccounted for. I discuss this choice in §5.2.1, arguing that ANCHORBR-RIGHT is sufficiently motivated.

5.1 Another look at alignment

Chukchee is a language which seems not to follow the locality generalization, as the reduplicant is a suffixed copy of the initial syllable. Such reduplication forms the absolutive singular.

(42) Chukchee (Krause (1980): 152, Muravyova (1998): 523)

a. jilʔe-jil 'gopher'

b. tumgə-tum[10] 'friend'

c. qulgə-qul 'fish-scale'

d. ele-el 'summer'

Assuming the AAH, there can be no alignment constraint placing the reduplicant at the right edge. Therefore another explanation for the pattern must be found. Nelson (2002a, 2002b, 2003) rejects Chukchee as a real pattern of reduplication because reduplication only occurs with a limited number of root shapes. She cites Krause (1980) in saying that reduplication occurs only with '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' (1980: 157). It is thereby implies that the reduplication is phonologically protective in nature and that what appears to be a morphological reduplicant is only present in order to prevent phonological mutations. There are two possible interpretations of this argument.

The first possibility is that since the reduplicant serves to protect root material, it should not be considered real reduplication. This argument is not convincing, as the reduplicant does serve the purpose of forming the absolutive singular, and the fact that not all such forms involve reduplication is not surprising since absolutive singular formation is lexically governed (Andrew Spencer, p.c.). Both vowel-final roots and consonant-final roots undergo reduplication, showing that reduplication isn't especially limited. Further, other

[10]The schwa in this example and in the following example is epenthetic.

languages in the same family show the same kind of reduplication. Zhukova (1980: 41) says that this type of reduplication is quite pervasive in Chachuwen Koryak and Palan Koryak as well as in Chukchee and that words with this type of reduplication are part of the core vocabulary.[11] This shows that the non local reduplication in these languages is not a peripheral phenomenon.

The second possibility is that the claim made about Chukchee is that while there is a process of reduplication, there is no constraint which aligns the reduplicant to the right. Since it is anchored to the left edge, we would expect it to appear at the left edge in order to satisfy ADJACENCYBR-BY-σ. However, highly ranked constraints that penalize the phonological mutations Krause cites could force the reduplicant to occur at the right edge. This would be in line with Krause's claim that the reduplicant, while morphological, is at the right edge to serve a phonological purpose. Such an analysis would preserve the AAH claim that reduplicants aren't subject to alignment constraints. However, reduplication cannot be forced to occur in order to prevent phonological change at the right edge because there are many roots which then would be expected to take the reduplicative marker but do not. One common absolutive singular marking is null and Muravyova (1998) states that 'nominal stems taking the zero ending undergo various phonological changes' (1998: 523). A phonologically protective account of Chukchee reduplication is suspect because it cannot distinguish which roots should undergo reduplication and which should not. For example, Muravyova states that one phonological change a root with null absolutive singular marker might undergo is epenthetic schwa insertion to break up disallowed consonant clusters. The absolutive singular form *qepəl* ('ball') with null affix, from root *qepl*, exemplifies this

[11] Thanks to Jaye Padgett and Andrew Spencer for providing translations of this source.

process (datum from Muravyova (1998)). A root which is similar in shape but which takes the reduplicative absolutive singular is *qulg* ('fish-scale'), *qulgə-qul* in the absolutive singular. (Note that an epenthetic schwa is inserted even cases where there is a reduplicant.) These roots have the same shape and indeed, the one which does not take the reduplicative absolutive singular is subject to 'phonological mutation' in the form of internal schwa epenthesis. The argument that reduplication occurs with exactly this subset of roots because they are the roots that would otherwise undergo phonological changes seems to predict that all such roots should undergo reduplication. Yet the existence of forms such as *qepəl* indicate that this isn't the case.[12]

If the grammar did allow alignment constraints to refer to reduplicants, then the Chukchee pattern could be captured straightforwardly: roots which are lexcially specified to take the reduplicative marking would have reduplicants which copy from the left edge (due to ANCHORBR-LEFT) but are placed at the right edge (due to ALIGN (RED, PRWD)-RIGHT).

In fact, the grammar can still produce 'opposite edge' reduplicants even without RED-alignment constraints or the kind of analysis that was suggested for Chukchee. If ANCHORIO-LEFT,[13] CONTIGUITYIO and the relevant ADJACENCYBR constraint were ranked above ANCHORBR-LEFT this would yield hypothetical *gabadu-du*, as shown in (44).

[12] Jaye Padgett suggested that perhaps *qepl* does not take a reduplicative absolutive sigular marking because its coda consonants rise in sonority, meaning that a reduplicated form **qep.lə.qep* would have a less sonorant segment in the coda of the first syllable than in the onset of the second. As languages prefer to have codas that are more sonorant than the following onset, this could explain why *qepl* does not reduplicate. I have been unable to find enough data to support or refute this idea. I have found the possible counter-example *ətləq* ('tundra') (Krause (1980)). However, here the (second) schwa breaks up a sequence of three consonants, so it may be needed even if the root were to undergo reduplication.

[13] Assuming no input-reduplicant (IR) correspondence. ALIGN (ROOT, PRWD)-LEFT would work with or without IR.

(43) ANCHORIO-LEFT: The left edge of the output must have a correspondent at the left edge of the input.

(44)

	/RED+gabadu/	ANCHOR IO-LEFT	CONTIG IO	ADJACENCY BR	ANCHOR BR-LEFT
	a. ga-gabadu	∗!			
	b. ga-ga-badu		∗!		
	c. gabudu-ga			∗!	
☞	d. gabadu-du				∗

If the ranking of ADJACENCYBR and ANCHORBR-LEFT were reversed then the optimal output would not follow the locality generalization.

(45)

	/RED+gabadu/	ANCHOR IO-LEFT	CONTIG IO	ANCHOR BR-LEFT	ADJACENCY BR
	a. ga-gabadu	∗!			
	b. ga-ga-badu		∗!		
☞	c. gabudu-ga				∗
	d. gabadu-du			∗!	

The constraints allowed by the AAH exclude ANCHORBR-RIGHT and RED-alignment constraints in order to force reduplicants to follow the pattern in (46-a) (ignoring anchoring to the stressed syllable).

(46) a. ga-gabadu

b. gabadu-ga

c. gabadu-du

d. du-gabadu

We see from the hypothetical case in (44) that reduplicated forms of the type in (46-c) are also predicted by a system with no ANCHORBR-RIGHT or

RED-alignment constraints. High-ranking alignment constraints which align all morphemes except the reduplicant to the left edge would also force such an output. Such a system also predicts one of the two kinds of opposite edge reduplication, as shown in (45). Thus, a system that follows the constraint allowances of the AAH still predicts three out of the four logical patterns of reduplication (considering only left and right edge copying and reduplicant placement). If RED-alignment constraints were part of the grammar, but we maintained that anchoring could not target the right edge, these same three patterns would be predicted to occur. (There is no way for an output of the pattern *du-gabudu* in (46-d) to surface, because right edge association cannot be forced in the absense of ANCHORBR-RIGHT.)

The AAH assumes that such patterns only occur when they are motivated by other factors, such as the idea of the phonologically protective role of the reduplicant in Chukchee. High-ranking CONTIGUITYIO-LEFT might count as such a factor. However, the analyses in (44–45) are indistinguishable from a transparent analyses in which the reduplicant is placed due to an alignment constraint. There is no way to know whether a language places a left-anchored reduplicant at the right edge because of another constraint such as CONTIGUITYIO-LEFT or because the reduplicant is subject to an alignment constraint which places it there: since the two systems make the same typological predictions it is not possible to differentiate between them. While it might be possible in the case of Chukchee to argue that the reduplicant occurs at the right edge for phonological reasons, it is not clear that the AAH truly restricts right edge and non local copying to such cases. Since anchoring and alignment constraints which refer morphemes other than the reduplicant can force everything else in output to be as close to the left edge as possible, we still expect to find reduplicants at the right edge for reasons that are not clearly motivated by factors such as increased phonological harmony. Alignment constraints which refer to reduplicants are further considered in the follow section.

5.1.1 The nature of alignment constraints

It is odd to postulate that alignment constraints cannot refer to reduplicants. Affixes are generally assumed to be placed through the relativized alignment constraints of McCarthy & Prince (1993), who generalize alignment constraints to the form in (47).

(47) Generalized alignment (McCarthy & Prince (1993))

Align (Cat_1, $Edge_1$, Cat_2, $Edge_2$) $=_{def}$

$\forall$ Cat_1 $\exists$ Cat_2 such that $Edge_1$ of Cat_1 and $Edge_2$ of Cat_2 coincide

Where Cat_1, $Cat_2 \in$ PCat $\cup$ GCat

$Edge_1$, $Edge_2 \in$ { Right, Left }

McCarthy & Prince say ‘PCat and GCat consist, respectively, of the sets of prosodic and grammatical (morphological or syntactic) categories provided by linguistic theory’ (1993: 2). Therefore every morpheme, being of a grammatical cateogy, is potentially subject to an alignment constraint. It is hard to see why reduplicative morphemes would be singularly exempt. If we allow RED-alignment constraints in the grammar then we don’t have contradiction, as reduplicants would then be like all other morphemes in this respect.

Two forms of reduplication in Indonesian provide strong evidence that alignment constraints must place reduplicants just like they do other morphemes. An account employing RED-alignment constraints is proposed and compared to an account without such constraints, as given in Nelson (2003).

The prefix *məN-* attaches to transitive verbs in Indonesian to denote the active voice. Examples are given in (48).

(48) (Sneddon (1996): 68)

a. məmbuka 'open'

b. mənulis 'write'

c. məmukul 'hit'

d. mənolong 'help'

There are two different orderings of the prefix *məN-*, the root and the (full) reduplicant. In one case (the meaning of which varies), the prefix *məN-* occurs on the first copy. In the reciprocal formation, it appears on the second copy.

(49) (Sneddon (1996):14, 20, 104)

a. məmbuka-buka 'leaf through (a book)'

b. mənulis-nulis (meaning not given)

c. pukul-məmukul 'hit each other'

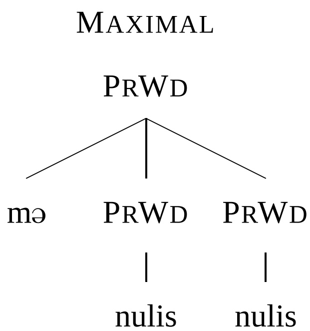
d. tolong-mənolong 'help each other'

Because the prefix *məN-* has the same meaning in both kinds of reduplication, the only difference is in the placement of the reduplicant, assuming that *məN-* is prefixed to the root in both kinds of reduplication. If the reduplicant were, for example, the second copy in both forms, it would mean that the alignment of *məN-* differed, depending on the reduplicant. This seems less likely since it is the meaning of the reduplicant, not the meaning of *məN-*, which is different. (Sneddon (1996) says of the type (49a,b) that the second copy is treated as the reduplicant (1996: 15) but describes the forms in (c) and (d) as "base-RED-base" (1996: 104), suggesting that there is reason not to treat the second copy as the reduplicant in this case.) Neither ADJACENCYBR nor anchoring constraints can distinguish the two cases of reduplication. ADJACENCYBR will predict that the reduplicant be in the same place (adjacent to the root) in both cases and cannot account for the non locality in the reciprocal formation. Since the reduplicant in both cases is a full copy of the root, something other than anchoring must distinguish them. In a system in which reduplicants are subject to alignment constraints, this difference is easily accounted for: the reduplicants are different morphemes and are therefore subject to different alignment constraints. Reciprocal reduplicants are aligned to the left, whereas other kinds of reduplicants, which I will refer to as 'Case 1' reduplicants, are aligned to the right. This is shown in (51) and (52) below.[14]

Cohn & McCarthy (1994) show that the reduplicant is a separate prosodic word in Indonesian. This means aligning a morpheme to the left edge of a prosodic word (PRWD) does not force that morpheme to the left edge of the output because the alignment constraint will also be satisfied if the morpheme is at the left edge of the rightmost PRWD. Therefore alignment to the maximal PRWD (MAXPRWD) is needed. The structure of *mənulis-nulis* is given in (50) for illustration.

[14]The fact that base-reduplicant identity holds in Case 1 reduplicants but not in reciprocal reduplicants is abstracted away from. We will need the ranking IDENTIR$_{Recip}$ $\gg$ IDENTBR $\gg$ IDENTIR$_{Case1}$, or, alternatively, $\exists$-IDENT constraints in the sense of Struijke (2000) relativized to the reduplicant. This difference could be made to fall out in an account which forced a correspondent of the left edge of the root that placed at the left edge of the output to surface faithfully.

(50)



(51)

		/RED$_{Case1}$+mən +tulis/	ALIGN (RED$_{Recip}$, MAXPRWD)-LT	ALIGN (*məN-*, MAXPRWD)-LT	ALIGN (RED$_{Case1}$, MAXPRWD)-RT
☞	a.	mənulis-<u>nulis</u>$_{Case1}$			
	b.	mə<u>nulis</u>$_{Case1}$-nulis			$\sigma!\sigma$
	c.	<u>tulis</u>$_{Case1}$-mənulis		$\sigma!\sigma$	$\sigma\sigma\sigma$

(52)

		/RED$_{Recip}$+mən+pukul/	ALIGN (RED$_{Recip}$, MAXPRWD)-LT	ALIGN (*məN,* MAXPRWD)-LT	ALIGN (RED$_{Case1}$, MAXPRWD)-RT
☞	a.	<u>pukul</u>$_{Recip}$-məmukul		$\sigma\sigma$	
	b.	mə<u>mukul</u>$_{Recip}$-mukul	$\sigma!$		
	c.	məmukul-<u>mukul</u>$_{Recip}$	$\sigma!\sigma\sigma$		

By allowing the reduplicant to be subject to alignment constraints the theory is able to account for the fact that reduplicants with different meanings appear in different positions, in the same way it would account for difference in placement of non reduplicative morphemes.

Nelson (2003) proposes that the pattern of reciprocal reduplication (as in (49c,d)) is formed through first performing full reduplication and then adding *məN-* to the result, making the formation of the reciprocal serial in nature. Although the result of the first step is not a surface form in the language, the analysis assumes that it can be referred to through output-output (OO) correspondence. This is shown in (54).

(53) Constraints: ((27) in (Nelson 2003: 18))

a. *NC̥: A voiceless consonant must not follow a nasal (Pater (1995))

b. IDENTOO: Corresponding segments in the output base and the affixed form must agree in nasality (cf. Benua (1997)).

c. ALIGN (*meN*-, R; ROOT, L): *meN*- must prefix to the root.

(54) Formation of *pukul-məmukul* ((28) in (Nelson 2003: 18))

		[pukul-pukul], məN	*NC̥	ALIGN (*məN*-, R; ROOT, L)	IDENTOO
☞	a.	pukul-məmukul			*
	b.	pukul-mənpukul	*!		
	c.	məmukul-mukul		*!	**
	d.	mukul-məmukul			**!
	e.	pukul-pukul-mən		*!	

An unconsidered candidate in the above tableau is *məmukul-pukul*. It ties with the winning candidate on the constraints shown, and in fact reflects the morpheme order of Case 1 reduplicants, like (49a,b). Since the AAH does not allow an appeal to alignment constraints relativized to the reduplicant, no constraint is able to pull the reduplicant to the left, as in the actual output, rather than to the right, as in the proposed candidate. In fact, we would expect the proposed candidate to win, as it satisfies ADJACENCYBR-BY-FOOT, whereas the winning candidate does not. (The analysis in Nelson (2003) assumes that no locality constraint applies in (54) since adjacency was satisfied at the time of reduplication. However, this doesn't seem clear, since the ADJACENCYBR constraints must still be in the constraint hierarchy.) The correct winner can be selected if we assume that there is a constraint which aligns *məN*- and/or the root to the right edge of the prosodic word. While this works for reciprocal reduplication, it will output the wrong winner in Case 1 reduplication. Therefore, it seems that an account in which alignment constraints are relativized to the reduplicant is superior. Since an analysis of Indonesian which employs RED-alignment constriants is able to capture the two patterns of reduplication straight-forwardly it is a strong argument for assuming that the grammar has alignment constraints that refer to reduplicants.

As discussed at the end of the previous section, the same patterns of reduplication are predicted both in a grammar without RED-alignment and in a grammar with RED-alignment. Therefore we must look to other factors to determine if RED-alignment constraints are motivated. Allowing alignment constraints to refer to reduplicants avoids any stipulation regarding the definition of alignment constraints. Further, if alignment constraints can refer to reduplicants, then alignment constraints can be relativized to different reduplicants within the same language. This allows a straight-forward account of languages like Indonesian which have more than one pattern of reduplication. I therefore argue that it is not motivated to restrict alignment constraints from referring to reduplicants.

It has been shown that the AAH doesn't make accurate predictions with respect to the possible patterns of reduplication, with or without alignment constraints that refer to reduplicants. The thus-modified AAH therefore is a statement of asymmetric anchoring only. The prediction in (55) revises the predictions in (39).

(55) asymmetric anchoring hypothesis REVISED: Reduplicants are:

a. Always adjacent to their correspondent base if prefixal.

This revised AAH is examined in light of reduplication in Madurese and Sawai in the following section.

5.2 Another look at ANCHORBR-RIGHT

The revised AAH assumes that anchoring is assymetric, specifically that the reduplicant cannot target the right edge for copying. The predicts that a reduplicant can never copy from the right edge but be placed at the left edge. Madurese, however, has a robust process of reduplication of this pattern. Nelson (2002a, 2002b, 2003) claims that Madurese is not a counter-example to the locality generalization because although the surface forms appear to consist of a copy of the final syllable prefixed to the root (e.g. *trɛ-ɛstrɛ* ('wives')) the forms are 'consistent with an independently attested compounding phenomenon seen with non-reduplicated compounds, e.g. /*tuchuq-əmpul*/ → chuq-əmpɔl 'pinky finger' (Stevens (1968), McCarthy & Prince (1996), Weeda (1987))' (2002a: 325). The claim is that final syllable reduplicants are not a copy of the final syllable, but rather is full reduplication which has been truncated. As an instance of full reduplication, the reduplicant would be neither counter to the locality generalization (at some level in the derivation) nor would it have to copy from the right edge.

Seeing syllable-final reduplication and compound truncation as involving the same process in Madurese is tempting because both give special status to the final syllable of the root. Further, a prefixed reduplicant which is a copy of the final syllable is very unusual, but full reduplication and truncation are independently usual cross-linguistically, and both are part of Madurese morphology. If we are able to explain this unusual pattern of reduplication through a combination of usual processes, then the oddity of syllable final reduplication in Madurese is explained. The forms in (56) and (57) give examples of the two processes under discussion.

(56) Final syllable reduplication (Stevens (1994))

a. wɤ-kʰuwɤ 'caves'

b. ỹãt-nẽỹãt 'intentions'

(57) Truncation of first member in compounds (Stevens (1968))

a.	cʰuʔ-ənpul[15]	'pinky finger'	from tucʰuʔ ('finger') ənpul ('pinky')
b.	sar-suri	'afternoon market'	from pasar ('market') suri ('afternoon')

Weeda (1987) argues that '. . . equating [final syllable reduplicants] with compounding should be viewed with suspicion' (1987: 409). He bases this on the fact that while a final syllable reduplicant may occur before a prosodically unincorporated prefix to the root, full (root) reduplication may not. While (58-a-i) and (58-a-ii) occur in free variation, in the examples with the unincorporated prefix *ma-*, only the single syllable reduplicant may occur (cf. (58-b-i) and (58-b-ii)).

(58) Weeda (1987):408, phonetic symbols following Stevens (1994)

a. (i) bu-lɤbuwɤn[16] 'to pretend to fall'

(ii) lɤbu-lɤbuwɤn 'to pretend to fall'

b. (i) bu+ma-lɤbu 'to pretend to fall'

(ii) *lɤbu+ma-lɤbu

[16]From the underlying form /RED+*labo-an*/. Madurese has a process of glide insertion between two vowels (Stevens (1994)). The language has four underlying vowels which each have a lax/lower and a tense/higher pronunciation. The tense/higher pronunciation occurs after voiced or aspirated obstruents and the lax/lower elsewhere. (Vowel harmony occurs through liquids and glides and through *s* if it is at a morpheme boundary (Stevens (1994)).) The example in (58-b-i) is from the underlying form /RED+*N-pa-labo*/. Madurese has a rule of nasal substitution in which a nasal followed by a stem-inital unaspirated stop will be replaced by a nasal with the same place of articulation as the stop (Stevens (1994)).

If (58-a-i) were (58-a-ii) with the additional operation of truncation applied, then we expect that anywhere the single syllable reduplicant may occur, the full reduplicant may as well as both are possible surface forms here. But it is quite general that while final syllable reduplicants may occur before an unincorporated prefix, full reduplicants may not (Weeda (1987), Stevens (1994)). Further, full reduplication only occurs in a limited number of fixed forms, whereas final syllable reduplication occurs much more generally. For every full reduplicant there is an alternative single syllable reduplicant, but this is not true in the reverse (Stevens (1994)). Stevens (1994) gives another reason why the processes of final syllable reduplication and truncation in compounding cannot be equated. While final syllable reduplicants behave as a separate phonological word, the truncated elements in compounds do not. This means that phonological rules do not operate across the reduplicant-base boundary, but they do operate across the boundary in compounds (for examples see Stevens (1994): 371), strongly suggesting that they are not the result of the same process (i.e. truncation). There is an abundance of evidence, then, that final syllable reduplication is not full reduplication that has been subject to truncation.

If stress were final in Madurese, we could assume that the crucial BR anchoring constraint was ANCHORBR-$\acute{\sigma}$ and not ANCHORBR-RIGHT. McCarthy & Prince (1996) in fact claim that stress in Madurese is final (1996: 49). However, Weeda (1987): 409 refutes this, citing Kiliaan (1911) as showing that stress is idiosyncratic and concluding that we are therefore not able to account for the singling out of the final root syllable by appealing to the position of stress. Cohn (2003) states, based on her field work, that stress is largely penultimate. (Cohn also argues that anchoring to the right is needed, both for Madurese, and for truncation in Indonesian terms of address and personal names which preserve the final CVC syllable.)

Therefore, it seems that we are not able to attribute copying of the final syllable (or preservation of the final syllable in compound truncation) to ANCHORBR-σ́. In order to account for the Madurese pattern, not only alignment constraints relativized to the reduplicant are needed (in order to capture that the reduplicant is not adjacent to its correspondent base) but also anchoring of the reduplicant to the right edge. How an such an analysis works is shown below.

The reduplicant in Madurese does copy from the right, but as can be seen from a form like *kɔl-pɔkɔl-an* ('hit one another') (datum here and in (60) from Davis (1999): 12), it actually copies from the right edge of the root, not from the right edge of the base as a whole.

(59)

/RED+pɔkɔl+an/	ALIGN (RED, PRWD)-LT	ANCHOR (ROOT, RED)-RT	AD BY-σ
☞ a. kɔl-pɔkɔl-an			*
b. lan-pɔkɔl-an		a!,n	*
c. pɔ-kɔl-kɔl-an	σ!		

If the suffix is a consonantal, however, it will be copied by the reduplicant. This means that MAXBR is ranked above ANCHOR (RED, ROOT)-RIGHT (assuming some higher ranked constraint which will limit the reduplicant to a syllable in size, such as ALL-σ-LEFT). This is illustrated with *lɔʔ-təllɔ-ʔ* ('in threes').

(60)

/RED+təllɔ-ʔ/	ALIGN (RED, PRWD)-LT	MAXBR	ANCHOR (ROOT, RED)-RT
☞ a. lɔʔ-təllɔʔ		t,ə,l	ʔ
b. lɔ-təllɔʔ		t,ə,l,ʔ!	

Madurese thus offers empirical evidence showing that anchoring to the right edge is needed. The eastern Indonesian language Sawai (also called Weda) also appears to require reference to the right edge.

The reciprocal form of a verb in Sawai is formed by prefixing *fa-* and reduplicating the second consonant of the root. Examples are given in (61).

(61) Reciprocal verbs in Sawai (Whisler and Whisler (1995): 664)

a.	ɛŋɔtɔ	'to see'	fatɛŋɔtɔ	'see one another'
b.	gali	'to help'	falgali	'help one another'
c.	pitno	'to tie'	fatɛpitno	'tie two things together'

Assuming that *pitno* is syllabified *pit.no*, this is a very odd pattern because the copied consonant is not reliably from the same syllable (in (a) and (b) above the consonant is copied from the final syllable, but in (c) it copied from the penultimate syllable). If this is the case, an analysis remains elusive, but it should be noted as a pattern in which the reduplicated consonant is neither local nor due to an anchoring constraint assumed by the AAH. Note that this pattern cannot be seen as copying the leftmost consonant that wouldn't result in gemination (geminates are reduced in this language) because copying the first consonant of the base in (a) would not result in gemination.

However, there is some reason to think that *pitno* might be syllabified *pi.tno* as Whisler and Whisler (1995) give the example word *kmɔn* ('axe'). This recommends the data to a reasonable analysis. In this case, the reduplicant would be anchored to the rightmost syllable, copying just the (first segment of the) onset. As stress is penultimate in this language (Whisler and Whisler (1995): 660), this could not be due to anchoring to the stressed syllable, and must instead be due to anchoring to the rightmost syllable. In order to further support such an account an inventory of possible onset clusters is needed (for example, *tp* must not be possible since there seems to be an epenthetic vowel breaking up this cluster in (c)). Whisler and Whisler note that while most words are disyllabic, shorter and longer words also exist, and so the choice of reduplicant consonant in these cases would also decide for or against this analysis. Under this analysis, anchoring to the right edge would identify the syllable that the reduplicant copies from, but would predict the wrong consonant in the case of (c) in (61) (assuming we are forced to copy a consonant, as copying a vowel would incur further violations of ALL-σ-LEFT) since the consonant nearest the right edge is *n*, not *t*. Further, if there were a word-final coda we would still expect that the first onset consonant would be copied but anchoring to the right would result in a copy of the coda instead. A way to reference the leftmost segment of the final syllable is needed.

Reference to privileged positions inside privileged positions occurs in other instances, as illustrated by the Dobel data given in (22) in §3.2. The reduplicant in Dobel copies the leftmost segment of the stressed syllable. This is an example of a reduplicant copying a privileged position (the onset, or left-edge) from within another privileged position (the stressed syllable).

There is some evidence that the final syllable is a privileged position. Beckman (1999) lists prominent positions as including ‘possibly final syllables’ (1999: 1) and gives the example that unstressed, non final vowels in English are limited to schwa. Therefore, we could postulate that the left edge of final syllables constitute a privileged position within a privileged position. This would allow us to account for the reduplication pattern in Sawai but would violate the AAH since it requires reference to an unstressed final syllable.

If we take the problems for the revised AAH raised by Madurese and Sawai seriously, then we are forced away from the revised AAH to a less restrictive theory, one which allows anchoring to the right. The consequences of this move are discussed in the following section.

5.2.1 Discussion

If we assume the grammar includes not only RED-alignment constraints but also anchoring to the right, we could then account for all four basic patterns of reduplication. Because of the presence of the ADJACENCYBR constraints in the grammar, we would correctly predict that the locality generalization would be much more often followed than not, but allow and in fact, predict, that it will not be followed by all languages. However, we would be unable to predict that the most common pattern for reduplicative words to show *ga-gabadu*, in which the reduplicant is anchored and aligned to the left.

Nelson (2003) explains the cross-linguistic tendency of reduplicants to be prefixal, but fixed-segment affixes to be suffixal, by postulating that while fixed-segment affixes impede early access to the root, left edge reduplicants which satisfy the locality generalization do not, since they are a copy of left edge of the root. While this explains why it isn't bad for reduplicants to be of the form *ga-gabadu*, it doesn't explain why reduplicants of the form *gabadu-du* should be disfavored.

If we allow anchoring to both the left and right edges then we are left with the unpredicted fact that ANCHORBR-LEFT outranks ANCHORBR-RIGHT in the majority of languages. Taking the position that anchoring to the right is motivated, I must assume that ANCHORBR-LEFT $\gg$ ANCHORBR-RIGHT is a cross-linguistically preferred ranking for extra-grammatical reasons. Note that other constraints seem to share this property. For example, CONTIGUITY constraints are highly ranked cross-linguistically, but this is not predicted by the constraint typology. We know that CONTIGUITY constraints can be violated. For example, CONTIGUITYBR is violated in Sanskrit.

(62) CONTIGUITYBR The portion of the base standing in correspondence forms a contiguous string, as does the correspondent portion of the reduplicant

(63) Sanskrit (Whitney (1889), as cited in Steriade (1988): 120)

pa-prat^h-a	'spread'
ma-mna:-u	'note'
sa-swar	'sound'
da-d^{h}wans-a	'scatter'

Reduplicants overwhelmingly do not skip over segments, meaning that CONTIGUITYBR is usually an undominated constraint. However, it must be lower-ranked in Sanskrit. This skewing is not captured in any way by the grammar. A constraint typology, however, would predict that we should see languages like Sanskrit much more often than we do. I suggest that anchoring to the right is in a similar position: given a typology we would expect to find much more copying from the right than we do, however, it must be accorded the status of a constraint in the grammar because there are languages in which in it is highly ranked. By rejecting the AAH we are able to account for reduplicative patterns of languages that would otherwise be left unexplained.

6 Conclusion

Marantz' generalization has been examined in light of Optimality Theory. A family of ADJACENCYBR constraints which motivate the cross-linguistic tendency for a reduplicant to be next to its correspondent base have been proposed. The ADJACENCYBR constraints account for reduplicant size (as they are at odds with MAXBR) and motivate cases of discontiguous reduplicants (as they are at odds with CONTIGUITYBR) as they encode the intuition that it is good for each segment of the reduplicant to be as close as possible to its correspondent in the base. The typology without ADJACENCYBR does not predict the locality generalization. With ADJACENCYBR, however, the correct skewing is found: it is predicted that the locality generalization will be followed much more often than not. It has been shown that reduplicants do not always follow the locality generalization and so it is a correct prediction that the locality generalization is not universal.

It has been argued that alignment constraints can refer to reduplicants. In languages like Indonesian, which have different reduplicative morphemes that are placed differently, RED-alignment constraints have been argued to be essential. And, in fact, the same members of the basic typology of reduplication patterns are predicted with and without such constraints, but employing them would allow more transparent analyses of languages such as Chukchee. It was therefore concluded that they are a part of the grammar. The Madurese and Sawai patterns are instances of the one pattern predicted never to occur in a system with no anchoring to the right. In order to account for such patterns, it is argued that reduplicants must be able to target the right edge. By granting ANCHORBR-RIGHT the status of a constraint in the grammar, the cross-linguistic preference for copying from the left is given the status of an extra-grammatical fact. I have argued that the asymmetric anchoring hypothesis needs to be abandoned in the face of empirical evidence. The evidence shows that reduplicants may anchor either to the left or to the right and can be placed through alignment constraints. In conjunction with the ADJACENCYBR constraints, this group of constraints accounts for the placement and anchoring of reduplicants found empirically.

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