

Definition of the Base

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1. Introduction

McCarthy and Prince define the base for morphological affixation in a two part definition, given in (1). I refer to this as the “single-side definition of the base.”

(1) McCarthy and Prince 1993a:106

(a) The base of a suffixed morpheme is the phonological string preceding the exponent of that morpheme, up to the nearest initial edge [of a PrWd.

(b) The base of prefixed morpheme is the phonological string following the exponent of that morpheme, up to the nearest final edge] of a PrWd.

This definition was meant to apply both to cases of fixed morphological affixation and to cases of reduplicative affixation. However, Generalized Alignment (McCarthy and Prince 1993b) made it unnecessary to refer to a base for fixed morphological affixation (non-reduplicative affixation). For example, in McCarthy and Prince 1993a, the placement of the Ulwa possessive affix (examples are given in (2)) was accounted for in part through the notion that the base of the possessive is a foot.

(2) Ulwa Possessive Forms (Hale and Lacayo Blanco 1989)

siwanak	‘root’	siwa-ka-nak	‘his/her root’
kululuk	‘woodpecker’	kulu-ka-nak	‘his/her woodpecker’
bas	‘hair’	bas-ka	‘his/her hair’

In McCarthy and Prince 1993b this same data is accounted for through an alignment constraint ALIGN (*ka*, L; Ft, R), which serves to align the left edge of

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the affix to the right edge of a foot. The base no longer needs to be referred to in order to account for fixed segment affixation.

The definition of base in (1) is still employed, however, to account for the placement of reduplicative morphemes (e.g Kager 1999). In this paper, I discuss some of the difficulties with this definition. I propose an alternative definition of the base and show that it does not run into the same difficulties as the single-side definition. I argue for a definition of the base such as that in (3).

(3) Base (proposed definition): The base of a reduplicative morpheme consists of all of the segments in the output with the exception of the reduplicant.

2. Argument for a uniform base

I will argue that the proposed definition of the base (as given in (3)) is preferable to the more commonly assumed, single-side definition (as given in (1)), based on three main arguments.

First, the proposed definition does not handle prefixes differently from suffixes. In the most straightforward cases, like the examples in (4), the definition in (3) and that in (1) pick out the same base. Therefore the more general one should be preferred.

- | | | | | | | |
|-----|---------|-------|-----------|-------------------|----------------|---------------|
| (4) | Agta: | tak | 'leg' | <u>tak</u> -takki | 'legs' | (Healey 1960) |
| | Dakota: | haska | 'be tall' | haska- <u>ska</u> | 'be tall, pl.' | (Shaw 1976) |

Second, it is not clear that the single-side definition can pick out the correct base in all cases. For example, Nahuatl (Sullivan 1988, Chisholm 2001) has a pattern of reduplication (5).

(5) Nahuatl Diminutive (Plural)

- | | | | |
|-----|------|--------------|---------------------|
| (a) | (i) | siwa-pil | 'dear little woman' |
| | | woman-DIM | |
| | (ii) | siwa-pi-pil | 'dear little women' |
| | | woman-PL-DIM | |
| (b) | (i) | tutu-pil | 'little bird' |
| | | bird-DIM | |
| | (ii) | tutu-pi-pil | 'little birds' |
| | | bird-PL-DIM | |

In the plural forms, the root is followed by the reduplicant, which is followed by the diminutive suffix. Since the reduplicant is a suffix (it follows the root) the single-side definition picks out the string of segments preceding the reduplicant as the base. If it is stipulated that the reduplicants in (5) are prefixes, rather than suffixes, then the correct base under the single-side definition will be chosen. But

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then there is a larger problem: there is no way to tell, *a priori*, what the base is. There are cases where the reduplicant is positioned as it is in (5) but copies from the preceding segments.² This occurs in Dakota, as shown in (6).

(6) Dakota Negation (Shaw 1976)³

- (a) (i) haske-šni 'not long'
long-NEG
(ii) haska-ska-šni 'not long (pl)'
long-PL-NEG
- (b) (i) ap^he-šni 'didn't strike'
strike-NEG
(ii) ap^ha-p^ha-šni 'didn't strike repeatedly'
strike-REPEATEDLY-NEG

This would mean that looking at the same morpheme order, ROOT-RED-SUFFIX, the definition in (1) would need to consider the reduplicant in Nahuatl to be a prefix because it copies from the following string of segments but would need to consider the reduplicant in Dakota to be a suffix because it copies from the previous string of segments. Thus, following the single-side definition, the reduplicant in these cases could not be considered to be a prefix or a suffix until it is seen from which side it copies. However, the single-side definition is meant to pick out the base with regard to the prefixal/suffixal status of the reduplicant. If the base cannot be picked out until what the reduplicant copies has been identified, the definition is circular. Under the proposed definition of the base this problem does not arise because the base is not identified by the prefixal or suffixal status of the reduplicant. Rather, the base is always defined as the entire output with the exception of the reduplicant; that is, all the material which is not part of the reduplicant morpheme (the realization of RED). So the base-reduplicant relation in the proposed view is the reduplicant-nonreduplicant relation. Adopting the proposed definition solves the puzzle presented by the Nahuatl and Dakota data, as it defines the base in the same way for both, in fact, all, languages.

Third, it is not clear how the single-side definition would be implemented in optimality theory (OT) (Prince and Smolensky 1993). In the single-side definition you need to know the prefixal/suffixal status of a reduplicant in order to know what the base is. A base-reduplicant (BR) constraint then, needs to have access to the information of whether the reduplicant in an output candidate is a prefix or a suffix in order to know what segments the reduplicant is to be judged with respect to. OT assumes that the prefixal/suffixal status of an affix follows from the ranking of alignment constraints relativized to the morpheme (i.e. ALIGN

² I use the term "copy" descriptively.

³ There is a difference in the last vowel of the root in the unreduplicated and reduplicated forms due to an ablaut rule that underapplies in reduplicated forms (Shaw 1976).

(AFFIX₁, PRWD)-LEFT⁴ and ALIGN (AFFIX₁, PRWD)-RIGHT) rather than from information in the input. So a morpheme has no prefixal or suffixal status in the input but is placed in the output by the ranking of relativized alignment constraints. Since whether a reduplicative morpheme is a prefix or a suffix depends on a constraint ranking, it is not clear how a BR constraint would have access to this information. It seems that a BR constraint would have to know the relative ranking of the alignment constraint(s) relativized to the reduplicant in order to know what to evaluate as the base. There is no mechanism in OT that can do this, and building one in would defeat the OT tenet that constraints are evaluated independently of each other. Under the proposed definition of the base any BR constraint will always evaluate the reduplicant with respect to everything else in the output, and so it does not need to ‘know’ anything.

I suggest that stipulation of a particular base is unnecessary as well as problematic. By adopting the proposed definition, that the base is always everything in the output with the exception of the reduplicant, the identification of the base is both simplified and incurs none of the problems encountered by the single-side definition.

2.1. A word about anchoring constraints

Given my hypothesis that the base is everything in the output with the exception of the reduplicant, a few more words need to be said about the anchoring of the reduplicant. Taking the base to be everything other than the reduplicant means that, for example, the infixred reduplicant in Samoan [a-lo-loʔfa] (‘love’) (Marsack 1962) does not satisfy ANCHORBR-LEFT as the left edge of the base is [a...]. However, under the single-side definition of the base, [loʔfa] would be taken to be the base and the reduplicant would satisfy ANCHORBR-LEFT. So under the proposed definition, only the left and right edges of the output (excepting the reduplicant) can be referred to by the constraints ANCHORBR-LEFT and ANCHORBR-RIGHT.

In addition to being anchored to the base, I assume that the reduplicant may also be anchored to constituents within the base. There are languages in which the reduplicant is anchored to the root, and languages in which the reduplicant is anchored to the stressed syllable. Broselow and McCarthy 1983:53 note that “reduplicative morphemes may be prefixed not only to morphological but to phonological constituent”, i.e. the syllable bearing the main stress. Thus, in addition to constraints which anchor the reduplicant to the prosodic word, I assume ANCHOR (RED, STRESSED SYLL) and ANCHOR (RED, ROOT). The Samoan example above is a case where we would assume that ANCHOR (RED, STRESSED SYLL) is highly ranked. Such anchoring constraints also make it possible to correctly limit what is copied by the reduplicant since the proposed

⁴ I assume the standard definitions of all constraints referred to. See, for example, McCarthy and Prince 1999.

definition defines the entire output, excepting the reduplicant but including all other affixes, as the base.

3. Theoretical consequences

Adopting the proposed definition of the base leads us to expect a pattern of reduplication which is not predicted under the single-side definition. It is predicted that the reduplicant may stand in correspondence with both preceding and following segments, as both are part of the base. The single-side definition of the base predicts this not to be possible because the base is limited to either the segments preceding or the segments following the reduplicant. I am aware of several cases where copying from both sides potentially occurs, and these are discussed in section 3.1. A second consequence of adopting the proposed definition of the base is that any BR constraint will always be evaluated with respect to the entire output, excepting the reduplicant. I look at a case where the single-side definition of the base makes a different prediction in section 3.2.

3.1. Copying from both sides

There are several languages that have been analyzed as cases where the reduplicant copies both from the preceding and from the following segments. This would not be possible under the single-side definition of the base, but is expected under the proposed definition. One such case is “out-of-control” reduplication in the Salish language Spokane.

(7) Spokane out-of-control reduplication (Bates and Carlson 1998)

- (a) č'ehək'^w ‘uncovered’ č'eh-hek'^w-k'^w ‘it suddenly became uncovered’
(b) p'araq' ‘turned back’ p'r-raq'-q' ‘it got turned back by accident’
(c) šilič ‘turn’ šl-lič-č ‘it got turned by accident’

A process of unstressed vowel deletion in the base accounts for the vowels missing from the bases in the examples in (7) (Bates and Carlson 1998). Under this analysis, the reduplicant is infixes, and copies its initial material from the preceding segment and its final material from the following segment. The single-side definition of the base is not compatible with this analysis, but the proposed definition is.

The reduplication patterns of Hausa and Mangarayi have also been analyzed as cases of copying from both sides. The data are given in (8) and (9) where the (i) forms show the reduplicant as copying from both sides and the (ii) forms label the reduplicant as copying only the from the following segments.

(8) Hausa (Leben 1977:425, Newman 1972:318) (nominal roots are given in parentheses following Davis 1988:317)

- (a) baaki (bak) 'mouth' baak(+RED)+unaa 'mouths'
 (i) baak-unk-unaa
 (ii) baa-kun-kunaa
- (b) tuduu (tud) 'high ground' tud(+RED)+unaa 'high ground'
 (i) tud-und-unaa
 (ii) tu-dun-dunaa

Hausa is analyzed by Davis, among others, as a case of copying from both sides (i.e. as being the (i) forms) because that would place the reduplicant at a morpheme boundary, as the segments to the reduplicant's left make up the root, and the segments to its right are a plural suffix. Davis further notes that if the reduplicant in Hausa were as is represented in the (i) forms, it would have all the characteristics of an interfix, defined by Dressler 1985 as a semantically empty morpheme placed between a stem and a suffix. The reduplicative morpheme in (8) does not add any meaning to a word, as the unreduplicated form, for example, [baakunaa] for (8a), has the same meaning. Therefore this form of the reduplicant in Hausa can be considered an interfix if it is analyzed as copying from both sides. If the reduplicant is analyzed as in the (ii) forms instead, it does not fall at the morpheme boundary, and instead it is strangely infixated to the left of the final segment of the root. Hausa, then, seems to be a case where the reduplicant is best analyzed as copying from both sides, showing us that both sides should be considered to be the base.

Reduplication in Mangarayi is also often analyzed as a case of copying from both sides (Merlan 1982, Davis 1988, Jones 1997).

(9) Mangarayi (Merlan 1982:216)

- (a) jimgan 'knowledgeable person'
 (i) jim-gim-gan 'knowledgeable people'
 (ii) j-img-imgan
- (b) jalwayi 'muddy'
 (i) jal-wal-wayi 'very muddy'
 (ii) j-alw-alwayi

The analysis involving copying from both sides can be seen to have the virtue of obeying ALIGN (MORPH, SYLLABLE), which demands that the edge of every morpheme fall at a syllable boundary. The forms in (i) do this whereas the forms in (ii) do not. How an OT analysis can capture the difference between the two reduplicant options is shown in (10).

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(10) Mangarayi

/RED+jimgan/	ALIGN (MORPH, SYLLABLE)	LINEARITYBR
a. <i>jim-gim-gan</i>		*
b. <i>jimg</i> -imgan	*!*	

Candidate (b) incurs two violations of ALIGN (MORPH, SYLLABLE) because both the left edge and right edge of the reduplicant are one segment off from a syllable boundary. Candidate (a) wins in this tableau because it satisfies ALIGN (MORPH, SYLLABLE), at the cost of violating LINEARITYBR. So although candidate (b) will win under the opposite ranking and there is no way to know for sure which option Mangarayi takes, it can be seen that it is possible to motivate and analyze a reduplicant which copies from both sides of its base. The single-side definition of the base does not predict the (i) forms in (9) to be possible. It is hard to see how the ranking in (10) could be ruled out. Therefore the single-side definition of the base faces the challenge of making sure a ranking never surfaces which would favor a reduplicant that copies from both sides.

3.2. MAXBR as base-minimizer

The second consequence of adopting the proposed definition of the base is that BR constraints will always evaluate the reduplicant with to respect everything else in the output. Reduplication in Nakanai has previously been analyzed in OT assuming the single-side definition of the base (Spaelti 1997) and I will show here how it works under the proposed definition of the base. Examples of reduplication in Nakanai are given in (12). (Unreduplicated meanings not available.)

(12) Nakanai reduplication (selected forms) (Johnston 1980)

- | | | | |
|-----|------------|---------------------------|----------------|
| (a) | vigilemuli | vigile- <u>mul</u> i-múli | 'story' |
| (b) | karusu | ka- <u>rusu</u> -rúsu | 'ribs/battens' |
| (c) | lua | i- <u>la</u> -lúa | 'two by two' |
| (d) | pita | <u>pa</u> -pita | 'muddy' |

The stress is penultimate in Nakanai and so it can be deduced that the reduplicant is anchored to the left of the stressed syllable (ANCHOR (RED, STRESSYLL)-LEFT is highly ranked). Spaelti insightfully unites these forms and others into one pattern of reduplication, noting that if the first vowel of what he takes to be the base (the segments following the reduplicant) is less sonorous than the second, that vowel is skipped and the next vowel is copied into the reduplicant instead. When the two vowels are equal in sonority, both are copied, as in the first two examples in (12). It is clear from the last two examples above that the reduplicant is the copy to the left and so we can deduce that the reduplicant in the first two forms is infixd rather than suffixed.

Spaelti, assuming the single-side definition of the base, takes the base to be only the segments that follow the reduplicant. He argues that the reason a reduplicant is infixed is to make the base smaller, and thus to better satisfy MAXBR. His tableau for the example in (12a) is reproduced in (13).⁵

(13) Spaelti 1997:162

/RED+vigilemuli/	ALL-FT-RT	MAXBR	ALIGN (RED, PRWD)-LT
a. \mathcal{E} vi(gile)(muli)(múli)	**/*		vigile
b. (vigi)(lemu)le(múli)	**/*	li	vigi
c. vi(gile)(gile)(múli)	**/*	muli!	vi
d. (vigi)vi(gile)(múli)	**/*	lemuli	

Spaelti is able to rule out candidate (c) in (13) because he has defined the base of reduplication to be the segments following the reduplicant, under the single-side definition of the base. Therefore the base is flexible, depending on the position of the reduplicant: candidate (c) incurs four violations of MAXBR whereas candidate (a) incurs none, even though both copy the same number of segments. But it is unclear why the constraint MAXBR is only sensitive to some of the segments in the output. In some way the segments following the reduplicant must be labeled as the base. Where and how did this labeling happen? The base as defined in the single-side definition is not labeled in the input, as the placement of the reduplicant as a prefix or a suffix is derived from the evaluation. If the base is labeled in the output, there must have been an independent operation that applied the single-side definition to each of the output candidates and thus marked some string of segments in each as the base. However, no operation has been claimed to act on the output candidates in OT except Evaluation. Therefore, the labeling of the base must come from the constraints themselves.⁶ But then the problem this causes, as discussed in section 2, is again an issue: MaxBR in the above tableau must be able to see that ALIGN (RED, PRWD)-LEFT is higher ranked than ALIGN (RED, PRWD)-RIGHT (not shown in (13) but assumed to be lower-ranked). Knowledge of the ranking of other constraints is not a property OT constraints have. Therefore, the single-side definition of the base runs afoul of the limits of the OT framework. In the proposed definition, no stipulation of a particular base is needed, and there is nothing to implement in OT because base-reduplicant

⁵ To help the winner stand out, I don't shade any cells of the winning candidate in my tableaux.

⁶ There is another possibility, and that is that base is randomly specified in the output candidates. This alternative is examined by Haugen, Hicks Kennard and Kennedy 2002, and is argued against because it generates many more output candidates and does not add any simplification or elegance to the theory of reduplication.

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correspondence constraints evaluate the reduplicant with respect to everything else in the output. The base is defined on the output to be the material that is not the reduplicant. Therefore, how BR constraints are evaluated does not change from one candidate to the next, as it does with MAXBR in (13). This seems a very desirable result of adopting the proposed definition.

Given the definition of the base I am proposing, all the candidates in (13) perform equally on MAXBR as all copy four out of ten segments of the base, thus each incurring six violations of MAXBR. And, given the rankings in (13), candidate (c) will incorrectly win if MAXBR is evaluated according to the proposed definition because it better satisfies the alignment constraint, as shown in (14).

(14) Spaelti's tableau with MAXBR evaluated under proposed definition of the base

	/RED+vigilemuli/	ALL-FT-RT	MAXBR	ALIGN (RED, PRWD)-LT
a.	vi(gile)(<u>muli</u>)(múli)	**/*	vigile	vig!ile
b.	(vigi)(<u>lemu</u>)le(múli)	***/*	vigili	vigi
c.	☞ WRONG! vi(gile)(gile)(múli)	**/*	vimuli	vi
d.	(vigi)vi(gile)(múli)	***/*	lemuli	

It is ANCHOR (RED, STRESSED SYLL)-LEFT which will make the choice of (a) over (c), as the left edge of the reduplicant in (c) is anchored four segments away from the left edge of the stressed syllable, as shown in (15). Thus, by appealing to anchoring constraints, we can rule out candidate (b) without appealing to a flexible base.

(15) ANCHOR (RED, STRESSED SYLL)-LEFT rules out (b),(c) and (d) in (14)

	/RED+vigilemuli/	ANCHOR (RED, STRESS SYLL)-LEFT	ALIGN (RED, PRWD)-LEFT
a.	☞ vi(gile)(<u>muli</u>)(múli)		vigile
b.	(vigi)(<u>lemu</u>)le(múli)	l!e	vigi
c.	vi(<u>gile</u>)(gile)(múli)	g!ile	vi
d.	(vigi)vi(gile)(múli)	v!igile	

4. Conclusion

I have proposed that the base in reduplication is the entire output, excepting the reduplicant, contra the standardly assumed single-side definition. I have shown that the assumption that the base is everything except the reduplicant has multiple desirable consequences. It is simpler than the single-side definition, in which the base changes depending on what kind of affix the reduplicant is. It is not subject to the same limitations and problems that the single-side definition has. Finally, it makes an arguably correct prediction that the reduplicant may copy material from both the segments preceding it and those following it, something that is not predicted to occur under a definition where the base is taken to be one side or the other of the reduplicant. As MAXBR can no longer be used as a base-minimizer under the proposed definition of the base, I have offered another analysis for one case where this was employed in the literature. Defining the base as the entire output excepting the reduplicant has allowed me to account for the data examined without any stipulation of a particular base, and with a unified definition of the base which requires no special implementation in OT.

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