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Infixal Nominal Reduplication in Maŋarayi

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In this paper, we analyze nominal reduplication in Maŋarayi, an Aboriginal language spoken in the Northwest Territory of Australia. Nominal reduplication in Maŋarayi does not conform to any purely prosodic template, suggesting either an analysis with no prosodic template (as in Merlan 1982) or one with a violable prosodic template (as in McCarthy and Prince 1993b and 1995b). We explore both analyses in the framework of Optimality Theory (OT; Prince and Smolensky 1993), concluding that both analyses adequately account for the data. However, we provide theoretical arguments against the templatic analysis, arguing that reduplication is best explained a-templatically.

1 The Maŋarayi Reduplicant

Maŋarayi exhibits productive reduplication in many word types for a variety of grammatical functions. In particular, nominal reduplication is used to denote plurality or the property of having (lots of) the reduplicated noun (Merlan 1982), sometimes accompanied by a suffix *-ji* or *-ɟi*.[1] This nominal reduplication, with a few exceptions, turns out to be very regular. The most crucial set of data is given in (1).[2]

(1)	*base form*	*gloss*	*redup. form*	*gloss*
	guɾjag	'lily'	guɾjuɾjagɟi	'having a lot of lilies'
	gaŋɟi	'MMBC, MMBSSC'	gaŋɟaŋɟiji	pl.
	gambuɻa	'MB, ZC'	gambambuɻaji	pl.

Merlan (1982:216) claims that the reduplicant is infixal CVC (e.g. *guɾ-juɾ-jagɟi*), where the first consonant of the reduplicant is a copy of the onset of the second syllable of the base (marked with a double underline in (2)), and the remainder of the reduplicant is a copy of the rime of the first syllable (single underline) (see also Davis 1988):

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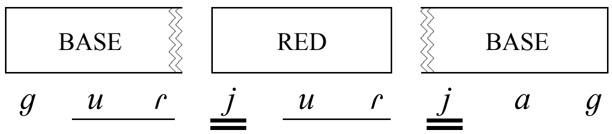
[1] The distribution of these suffixes is not important to the analysis, so they will be ignored in this paper.

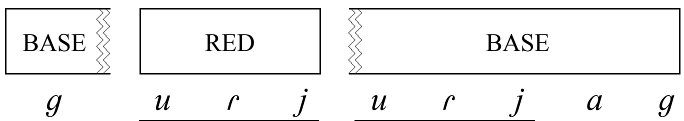
[2] In the gloss, M = mother, F = father, B = brother, Z = sister, C = child, and S = son, with combinations taken one by one as a string of possessives (e.g. MMBC = mother's mother's brother's child).

(2) RED=CVC



Another possible interpretation of the data is that the reduplicant is infixal VCC (cf. McCarthy and Prince 1986, 1993b, 1995b):

(3) RED=VCC



Comparing these two interpretations, it turns out that the CVC reduplicant is less harmonic than the VCC reduplicant. The CVC reduplicant does not preserve the linear order of the base segments it copies (a violation of McCarthy and Prince's (1995a) LINEARITY-BR), while VCC reduplication does. The CVC reduplicant creates an adjacency relationship not present in the base (violating CONTIGUITY-BR), while the VCC reduplicant does not. Additionally, the CVC reduplicant is misaligned worse with respect to the left edge of the prosodic word than the VCC reduplicant is (a violation of ALIGN-L (RED,PrWd), from Generalized Alignment (McCarthy and Prince 1993a)). These facts are summarized in the chart below:

(4)

RED shape	LINEARITY-BR	CONTIGUITY-BR	ALIGN-L (RED,PrWd)
CVC (juɾ)	j < uɾ	j⁀u	guɾ
VCC (uɾj)	✔	✔	g

The CVC reduplicant fares better than the VCC reduplicant with respect to only one possible constraint, RED=σ. But if this constraint exists and is high-ranking, we should see a more harmonic CVC reduplicant (such as **guɾ-guɾ-jag*, which preserves both linearity and contiguity). Thus, the CVC reduplicant cannot fare better than any other reduplicant with respect to any constraint hierarchy, so it could never be a correct output. So we can conclude that the reduplicant must have a VCC shape.

The data in (5) seem to show that the VCC reduplication approach is problematic, since the reduplicant (underlined and set off by hyphens) does not conform to the VCC pattern. The data in (5) require a VC shape. However, both VCC and VC can be unified if we assume that the reduplicant copies the *maximal* sequence of consonants available in the base after the copied vowel. In (1), two consonants follow the copied vowel, while only one consonant does in (5). Thus, the reduplicant is of the general shape VC_1, with VC and VCC as possible exponents.

(5)

base form	*gloss*	*redup. form*	*gloss*
waɭima	'young person'	w-aɭ-aɭima	pl.
gaɭugu	'poor thing'	g-aɭ-aɭugu	pl.
jiɾag	'father'	j-iɾ-iɾagɟi	'father(s) and child(ren)'
gabuɟi	'old person'	g-ab-abuɟi	pl.
guɾaɟɲinji	'dirty'	g-uɾ-uɾaɟɲinji	'very dirty'

This descriptive generalization is successfully extended to other sets of data. The examples in (6) are essentially the same as (1): the reduplicant is infixal VCC. Although these examples alone allow for the interpretation that the reduplicant is CCV due to the identical vowels in the first and second syllables of the base (e.g., *ɟa-lwa-lwaji* or *ɟalwa-lwa-ji*), this is implausible if we expect the reduplicant to appear in a coherent and uniform manner from word to word (as opposed to varying from word to word as in Merlan 1982).

(6)

base form	*gloss*	*redup. form*	*gloss*
ɟalwaji	'mud'	ɟ-alw-alwaji	'very muddy'
guɳgu	'MB'	g-uɳg-uɳguji	pl.
baɳgal	'egg'	b-aɳg-aɳgalji	'having a lot of eggs'
waɳgiɟ	'child'	w-aɳg-aɳgiɟ	pl.
ɟimgan	'knowledgeable person'	ɟ-img-imgan	pl.

The examples in (7) are additional cases where the shape of the reduplicant is ambiguous, because CV reduplication is an obvious possibility, again due to the identical first and second vowels (e.g., *ga-ma-magɟi* or *gama-ma-gɟi*). However, the VC$_1$ shape still holds for these data, so it can be naturally assumed that the first VC is the actual reduplicant in these examples:

(7)

base form	*gloss*	*redup. form*	*gloss*
gamag	'digging stick'	g-am-amagɟi	'having digging sticks'
ɖadal	'shell'	ɖ-ad-adalji	'having shells; turtles'
ɖuɖu	'wing'	ɖ-uɖ-uɖuji	'having wings'
malam	'man'	m-al-alamji	pl.
baɖa	'father'	b-aɖ-aɖaji	'father(s) and child(ren)'
baɾaŋali	'father-in-law'	b-aɾ-aɾaŋaliji	'in-laws'

Finally, the examples in (8) are analyzed in the same way, with a VCC reduplicant. These cases might also be analyzed as partial reduplication resulting from the combination of total reduplication plus the NoEcho or *Repeat effect in the sense of Spaelti (1997) and Yip (1998, to appear). However, as they are a direct consequence of VCC reduplication, there is no need to posit two separate analyses.

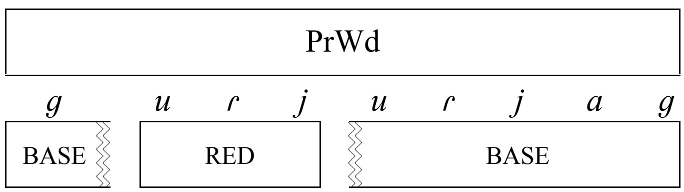
(8)	*base form*	*gloss*	*redup. form*	*gloss*
	bugbug	‘old person’	b-ugb-ugbug	pl.
	ɟabɟab	‘MF’	ɟ-abɟ-abɟab	pl.
	banban	‘woomera’	b-anb-anban	‘having woomera’

In summary, we conclude that VC_1 is the shape of the reduplicant operative in Maŋarayi. In the remainder of the paper, we present both an a-templatic and a prosodic templatic analysis of these data in the framework of OT, and compare the two analyses.[3]

2 A-Templatic Analysis: Emergence of the Unmarked

The diagram below shows how the reduplicant is positioned with respect to the base and the prosodic word for the reduplicated form *g-uɾj-uɾjag*:

(9)



There are two properties of the reduplicant that need to be explained: (i) the left edge of the reduplicant is misaligned from the left edge of the prosodic word by one segment, *g*; and (ii) the reduplicant maximally copies as many adjacent consonants from the base as possible, but only copies one vowel (i.e. the reduplicant adds only one syllable to the base). Each of these properties is explained in this section in the framework of OT.

2.1 Misalignment of the Reduplicant

The misalignment of the reduplicant violates the following constraint from Generalized Alignment (McCarthy and Prince 1993a) which requires that the reduplicant occur as far left in the prosodic word as possible:

(10) **ALRW ≡ ALIGN-Left (RED,PrWd)**
The left edge of any reduplicant must be aligned to the left edge of some prosodic word (gradiently violable).[4]

Violations of ALRW emerge through satisfaction of left-anchoring of the base (McCarthy and Prince 1995a):

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[3] Not all data from Merlan 1982 can be accounted for under this analysis. The form *mu-ɭi-ɭimuɭi* ‘FFs and SSs’ has a CV reduplicant and not a VC reduplicant (**m-uɭ-uɭimuɭi*) as expected. Additionally, some forms undergo total reduplication: *ŋuguŋuguji* ‘soaked; having water’, *mariɟmariɟ* ‘young girls’, and *ŋalaŋalaji* ‘mother(s) and child(ren)’. This type of reduplication for nouns seems less productive and unpredictable, so we do not analyze it in this paper.

[4] One might be inclined to treat the reduplicant as right-aligned, so that the correct analysis of *guɾjuɾjag* is with the second *uɾj* as the reduplicant: *guɾj-uɾj-ag*. However, there is no way to prevent the *a* from being reduplicated, so a right-alignment analysis would predict the incorrect **guɾja-ɾja-g* as the correct output. That the left-alignment analysis is preferable is supported by Nelson (1998), who argues for the elimination of right-anchoring (right-anchoring would be required to prevent the final *g* from reduplicating).

(11) **ANCHL-IO**
The left edges of the input and output must correspond.

The fact that left-anchoring of the base is more important than left-alignment of the reduplicant is captured in OT by the ranking ANCHL-IO >> ALRW. Given this constraint hierarchy, the leftmost segment of the input must be the leftmost position in the output, preventing the reduplicant from being prefixed. However, the position of the infixation is not free. Under the pressure of the low-ranked alignment constraint, the reduplicant is mandated to be infixed immediately after the initial consonant of the base.

(12)

		/guɾjag, RED/	ANCHL-IO	ALRW
✔	a.	g-urj-uɾjag		g
	b.	guɾ-guɾjag	*!	

The reduplicant does not copy leftmost material from the base. This is required by the anchoring constraint ANCHL-BR:

(13) **ANCHL-BR**
The left edges of the base and reduplicant must correspond.

Since the optimal candidate necessarily violates this constraint, the ranking of ANCHL-BR below ALRW is motivated. This ranking prevents the reduplicant from being left-anchored with respect to base material. As demonstrated below, in order to satisfy the anchoring constraint, either of the two high ranked constraints must be violated:

(14)

		/guɾjag, RED/	ANCHL-IO	ALRW	ANCHL-BR
✔	a.	g-uɾj-uɾjag		g	*
	b.	gu-gu-ɾjag		gu!	
	c.	guɾ-guɾ-jag		guɾ!	
	d.	guɾ-guɾjag	*!		

Because the reduplicant is infixed, the adjacency relationships in the input are not sustained in the base output, violating the correspondence constraint CONTIG-IO:

(15) **CONTIG(UITY)-IO**
If α and β are in the input, and α' and β' are their respective output correspondents, then α and β are adjacent iff α' and β' are adjacent.

Candidates which satisfy CONTIG-IO are those in which the reduplicant is prefixed or suffixed. We already demonstrated above that prefixal reduplication is ruled out by ANCHL-IO. When the reduplicant is suffixed, as in **guɾjag-ag* or **guɾjag-jag*, however, ALRW is violated more than the desired output form violates it. This observation motivates ranking ALRW over CONTIG-IO.:

(16)

	/guɾjag, RED/	ALRW	CONTIG-IO
✔	a. g-u̲ɾ̲j̲-uɾjag	g	g⁀u
	b. guɾjag-a̲g̲	guɾjag!	
	c. guɾjag-j̲a̲g̲	guɾjag!	

Summarizing the analysis so far, ALRW >> CONTIG-IO requires the reduplicant to be at the left edge of a prosodic word (i.e., as a prefix). But ANCHL-IO ranked above ALRW demands the reduplicant not to be prefixal. The optimization of these three constraints results in infixal reduplication where the reduplicant is only one segment away from the left edge of the prosodic word.

2.2 Size of the Reduplicant

The size of reduplicants cross-linguistically can often be characterized as the emergence of an unmarked prosodic structure (McCarthy and Prince 1994). This effect can be achieved by a prosodic alignment constraint like ALLσLEFT (Mester and Padgett 1994, Spaelti 1997) dominating the correspondence constraint MAX-BR (McCarthy and Prince 1995a), which maximizes segmental copying from base to reduplicant:

(17) **ALLσLEFT ≡ ALIGN-Left (σ,PrWd)**
The left edge of any syllable must be aligned to the left edge of some prosodic word (gradiently violable).

MAX-BR
Every segment in the base must have a correspondent in the reduplicant.

Since the alignment constraint is satisfied only by a monosyllabic word (and vacuously by null strings), it conflicts with MAX-BR whenever the entire reduplicated word contains more than one syllable. Crucially, however, non-reduplicated words can be more than monosyllabic, as seen from the data above. This indicates that the correspondence constraint MAX-IO (18) must dominate ALLσLEFT, which in turn outranks MAX-BR, yielding the emergence of the unmarked schema in (19).

(18) **MAX-IO**
Every segment in the input must have a correspondent in the output.

(19) *Emergence of the Unmarked (EoU)*: MAX-IO >> ALLσLEFT >> MAX-BR

This EoU ranking yields a reduplicant that copies as much base material as possible without being larger than a syllable, as exemplified in the following tableau:

(20)

	/guɾjag, RED/	MAX-IO	ALLσLEFT	MAX-BR
✔	a. g-uɾj-uɾjag		*/**	g/ag
	b. g-uɾ-uɾjag		*/**	g/jag!
	c. g-uɾjag-uɾjag		*/**/***!	g
	d. g-uɾj-uɾj	ag!	*	g

Candidate (20b) loses because it fails to copy as much base material into the reduplicant as candidate (20a). On the other hand, candidate (20c) copies too much, resulting in an increase in the syllable count. Candidate (20d) satisfies the lower-ranked constraints by deleting input segments, violating high-ranked MAX-IO. Candidates such as **g-g-urjag*, which do not increase the syllable count will be ruled out by undominated constraints on syllable well-formedness which are not relevant to this paper.

2.3 Summary

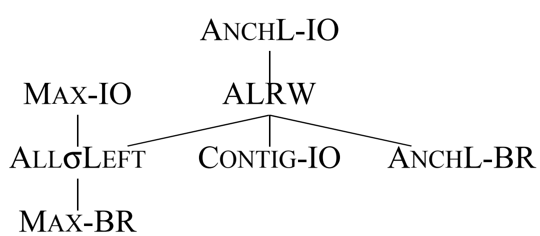
The two major properties of nominal reduplication have been discussed independently in the preceding subsections, establishing two separate constraint rankings. Considering examples from (5), these constraint rankings need to be brought together. That is, ALRW must be ranked crucially over ALLσLEFT, in order to prevent minimal reduplication of only the word-initial consonant, as in the incorrect **wa-w-ɭima*:

(21)

	/waɭima, RED/	ALRW	ALLσLEFT	ANCHL-BR
✔	a. w-aɭ-aɭima	w	*/**/***	*
	b. wa-w-ɭima	wa!	*/**	

To sum up, the overall constraint ranking is provided below:

(22) Constraint Ranking in Maŋarayi



3 Templatic Analysis

The EoU analysis of nominal reduplication in Maŋarayi given in the previous section is not the only possible analysis. Templatic analyses, both segmental and prosodic, can also account for the same data. While a segmental template such as RED=VC_1 works, we do not discuss it in this paper given ample cross-linguistic arguments developed in the literature since the advent of prosodic morphology (McCarthy and Prince 1986, *et seq.*).

Thus, we are left with only prosodic templates to consider. In this section, we argue that a prosodic templatic analysis suffers from conceptual problems not shared by the a-templatic EoU analysis.

The templatic analysis given in McCarthy and Prince 1993b (henceforth M&P) is essentially identical to our EoU analysis, replacing ALLσLEFT with M&P's templatic constraint RED=σ:[5]

(23) **RED=σ**
A reduplicant must be monosyllabic.

The tableaux and arguments concerning misalignment of the reduplicant developed in §2.1 remain unchanged, since they do not make reference to ALLσLEFT. The resulting constraint ranking is given below:

(24) ANCHL-IO >> ALRW >> CONTIG-IO, ANCHL-BR

The templatic constraint RED=σ must be ranked lower than ALRW (which is itself ranked lower than ANCHL-IO). This ranking prevents a candidate from satisfying the syllabic template with an improperly positioned reduplicant:

(25)

/guɾjag, RED/	ANCHL-IO	ALRW	RED=σ
✔ a. g-uɾj-uɾjag		g	*
b. guɾ-guɾ-jag		guɾ!	
c. guɾ-guɾ-jag	*!		

This is not sufficient to account for the data. In the EoU analysis, there is a principled reason why the reduplicant has the size it does: it maximally copies segments without increasing the prosodic size of the entire form. The templatic analysis must achieve the same results. Consider the following tableau:

(26)

/guɾjag, RED/	MAX-IO	RED=σ	MAX-BR
✔ a. g-uɾj-uɾjag		*x*	g/ag
b. g-uɾjag-uɾjag		*y*!	
c. g-uɾj-uɾj	ag!	*x*	g

The reduplicants in candidates (26a) and (26c) are the same; they incur the same violations of RED=σ, marked as *x* in the tableau. Since (26c) satisfies MAX-BR better than (26a) does but violates MAX-IO, MAX-IO must outrank MAX-BR. Candidate (26b) has a different reduplicant and satisfies both MAX-IO and MAX-BR. Thus, its violations of RED=σ (marked as *y*) must be worse than those for (26a), and RED=σ must outrank

[5] M&P's ROOT-ALIGN and LEFTMOSTNESS function like ANCHL-IO and ALRW, respectively, so we use our version of their constraints. In addition, their analysis lacks certain constraints such as CONTIG-IO and MAX-BR, but these can be added without affecting their original analysis.

MAX-BR. Thus, $x < y$. Since the reduplicants in (26a) and (26c) are not syllables, the violations incurred cannot be non-zero. Crucially, RED=σ must be gradiently violable. Otherwise, there is no way to distinguish between the reduplicants in (26a) and (26b), predicting incorrectly that (26b) would be the correct output (no matter how RED=σ is ranked).

The following tableau yields another restriction on counting violations of the templatic constraint:

(27)

	/guɾjag, RED/	MAX-IO	RED=σ	MAX-BR
✔	a. g-urj-uɾjag		*x*	g/ag
	b. g-uɾ-uɾjag		*z*	g/jag

Since RED=σ outranks MAX-BR, candidate (27b) cannot violate RED=σ less than (27a) does, so $x \leq z$. Similarly, the following tableau for *w-aɭ-aɭima* adds a further restriction on the possible violations of RED=σ:

(28)

	/waɭima, RED/	MAX-IO	RED=σ	MAX-BR
✔	a. w-aɭ-aɭima		*z*	w/ima
	b. w-aɭim-aɭima		*v*!	w/a

The reduplicant for candidate (28a) is the same as for (27b), a VC sequence straddling a syllable boundary. Thus, its violations should be the same, *z*. The reduplicant for (28b) is similar, but not identical, to that for (26b). It receives *v* violations, with $z < v$.

These violations seem inconsistent. A reduplicant which neither contains nor is contained by a syllable (-*uɾ.j*- and -*a.ɭ*-) is more harmonic with respect to RED=σ than one which contains a syllable plus extra material (*-*uɾ.ja.g*- and *-*a.ɭi.m*-). That means that if the template is to be violated, it is better to be smaller than the template than larger. Yet from (27), we conclude that a larger reduplicant (-*uɾ.j*-) is actually the same or better than a smaller one (*-*u.ɾ*-). This inconsistency is troubling, since it is unclear how to compute violations for a templatic constraint. Hence, we conclude that a templatic analysis is not satisfactory.

4 Conclusion

In this paper, we have shown that nominal reduplication in Maŋarayi can be analyzed in terms of emergence of the unmarked, without reduplicative templates. Although templatic analyses such as M&P's can be constructed which account for the same data, such analyses are theoretically problematic. Under the a-templatic analysis we adopt, these problems do not arise. In addition to previous arguments against templatic approaches to reduplication (such as Prince 1996, Spaelti 1997, and McCarthy and Prince 1999), this study offers a new argument against templates from a theoretical perspective.

References

Davis, Stuart. 1988. "On the Nature of Internal Reduplication." In Michael Hammond and Michael Noonan, eds. *Theoretical Morphology: Approaches in Modern Linguistics*. Academic Press, Inc. 305–323.
McCarthy, John, and Alan Prince. 1986. "Prosodic Morphology." Ms., University of Massachusetts, Amherst, and Brandeis University.
McCarthy, John, and Alan Prince. 1993a. "Generalized Alignment." In Geert Booij and Jaap van Marle, eds. *Yearbook of Morphology*. Dordrecht: Kluwer. 79–153.
McCarthy, John, and Alan Prince. 1993b. "Prosodic Morphology I: Constraint Interaction and Satisfaction." Ms., University of Massachusetts, Amherst, and Rutgers University.
McCarthy, John, and Alan Prince. 1994. "Emergence of the Unmarked: Optimality in Prosodic Morphology." *Proceedings of the North Eastern Linguistics Society 24*. 333–379.
McCarthy, John, and Alan Prince. 1995a. "Faithfulness and Reduplicative Identity." *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*. 249–384.
McCarthy, John, and Alan Prince. 1995b. "Prosodic Morphology, " In John Goldsmith, ed. *The Handbook of Phonological Theory*. Blackwell Publishers. 318–366.
McCarthy, John, and Alan Prince. 1999. "Faithfulness and Identity in Prosodic Morphology." In Rene Kager, Harry van der Hulst, and Wim Zonneveld, eds. *The Prosody-Morphology Interface*. Cambridge University Press. 218–309.
Merlan, Francesca. 1982. *Mangarayi*. Lingua Descriptive Studies, vol. 4.
Mester, Armin, and Jaye Padgett. 1994. "Direct Syllabification in Generalized Alignment." *Phonology at Santa Cruz* 3. 79–85.
Nelson, Nicole. 1998. "Right Anchor, Aweigh." Ms., Rutgers University.
Prince, Alan. 1996. "Aspects of Mapping under OT." Talk given at University of California, Santa Cruz. 11 October.
Prince, Alan, and Paul Smolensky. 1993. "Optimality Theory: Constraint Interaction in Generative Grammar." Ms., Rutgers University, New Brunswick, and University of Colorado, Boulder.
Spaelti, Philip. 1997. *Dimensions of Variation in Multi-Pattern Reduplication*. Doctoral dissertation, University of California, Santa Cruz.
Yip, Moira. 1998. "Identity Avoidance in Phonology and Morphology." In Steven Lapointe, Diane Brentari, and Patrick Farrell, eds. *Morphology and its Relation to Phonology and Syntax*. Stanford, California: CSLI Publications. 216–246.
Yip, Moira. To appear. "Repetition and its Avoidance: The Case of Javanese." *Arizona Phonology Conference 4: Features in Optimality Theory*. University of Arizona Coyote Papers.