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# Discontiguity in Umpila and Mangarrayi\*

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## 1. Introduction

Contiguity is the relationship of adjacency between elements of a string. It has been observed in various ways (e.g. Marantz 1982, McCarthy & Prince 1986) that in reduplicative copying, contiguity is typically a strong requirement. Observation of contiguity results in reduplications with the pattern of (1a), for example. (1a) observes contiguity, because the reduplicant copy YZ can be matched with an uninterrupted substring of the Base. Less typically, reduplication disrupts contiguity. For example, (1b) disrupts contiguity, because the string XZ of the reduplicant is not mirrored as an uninterrupted substring of the Base.

- (1) a. XYZ-YZ observes contiguity  
b. XYZ-XZ disrupts contiguity

Contiguity was thus thought for a time to be at least a kind of violable requirement on the output of prosodic morphology. Interestingly, recent research (McCarthy & Prince 1993, Spencer 1993, Kenstowicz 1994, Lamontagne 1996) makes contiguity now look plausibly like a more general requirement of phonology-morphology, in that it can compel effects on the input-output mapping, for example. The present paper is a contribution to this recent line of research, discussing evidence from two endangered Australian languages, Umpila and Mangarrayi. Umpila, a Middle Paman language of Cape York, displays a verbal reduplicative pattern involving extreme violations of contiguity in the reduplicant as compared with the Base. Mangarrayi, a non-Pama-Nyungan language of the Northern Territory, has a nominal reduplicative pattern that I

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argue shows the force of contiguity as a transderivational requirement. Umpila and Mangarrayi thus add weight to the argument that contiguity is a general requirement of phonology-morphology.

The paper is structured as follows. The next section gives some relevant theoretical background on Optimality Theory, Correspondence Theory, and recent proposals about contiguity. This is followed in Section 3 by a discussion of contiguity and discontinuity in Umpila reduplication. The purpose of this discussion is to raise data on an extreme case of contiguity violation under pressure from markedness constraints, as an interesting study of contiguity effects in reduplication and how these can be modelled in OT. The next section, Section 4, moves on to the case of a Mangarrayi reduplicative pattern that I argue constitutes evidence for the instantiation of contiguity as a constraint on the Output-Output relation. An instantiation of contiguity on the Output-Output relation is a welcome result in Correspondence Theory, but so far as I am aware, no cases of it have previously been reported. The discussion of Mangarrayi also raises the possibility that contiguity may be evaluated with respect to the prosodic domain vs. juncture distinction, not only for syllables, but also perhaps for subsyllabic constituents. The paper ends with a brief conclusion.

## 2. Theoretical background

This section presents relevant theoretical background, and subdivides into two sections. The first section covers rudiments of Optimality Theory and Correspondence Theory, both of which are employed in this paper. The second section discusses contiguity, especially recent proposals for it in the literature.

### 2.1. Optimality Theory and Correspondence Theory

The discussion of the present paper is cast within the framework of Optimality Theory (OT) together with Correspondence Theory. OT (Prince & Smolensky 1993) holds that the grammar consists of a set of violable universal constraints ranked on a language-particular basis. The input is subjected to GEN, a component of the grammar which creates a set of candidate outputs. These outputs are run through the total constraint hierarchy of the language. The candidate which violates the least highly-ranked constraint the least amount is selected as the optimal candidate, and surfaces as the actual output.

Correspondence Theory (McCarthy & Prince 1995) is a model for faithfulness comparison. Faithfulness being the degree to which one thing resembles another, Correspondence Theory introduces the concept of correspondence for comparing the right things with each other. Segments (and possibly features) stand in correspondence with each other if the strings they belong to are related in a broad morphological sense. So for example in the schematic example in (2) below, the output segment *X* is said to stand in correspondence with its input counterpart *X*, and vice versa. And the same goes for the other segments in the string. (The subscripting is intended to notate this correspondence.)

(2) Correspondents in a string

Input:	$X_1$	$Y_2$	$Z_3$
Output:	$X_1$	$Y_2$	$Z_3$

With correspondence, it becomes easier to be clear about what violates faithfulness and in what way. If a segment exists in one string, but has no counterpart in a corresponding string, then segmental faithfulness is violated either along the input-output 'direction' (in segmental deletion) or along the output-input 'direction' (in segmental epenthesis). Corresponding segments that differ by a feature value or feature

presence violate featural faithfulness. Another way to violate faithfulness is to manipulate segment order: if segment order differs between corresponding segments, this involves Contiguity and/or Linearity violations.

Work in Correspondence Theory has proposed that faithfulness is regulated over strings that are broadly morphologically related. The strings may be, for example, of the same word (input, output versions (IO)), or a Base-Reduplicant pair (BR), or a pair of derivationally related words (output-output (OO)). (On the last see Benua 1995, 1997.) All these relations -- IO, BR and OO -- will figure in the discussions in later sections of this paper.

## 2.2. Contiguity

We turn now to contiguity. In the introduction I noted that recent research suggests that contiguity may be a "general requirement of phonology-morphology". What does this really mean? Here is one answer, the one I will adopt in this paper.

Suppose that a general requirement of phonology-morphology has to be one whose effects we can observe over different morphological mappings, and perhaps also at different size-units in the phonology. If contiguity is a general requirement of phonology-morphology, then we expect to see effects of contiguity over different mappings and perhaps also at different size-units in the phonology. In OT with Correspondence Theory, this expectation translates into the hypothesis that contiguity is a violable constraint that is instantiated for various relations (e.g. Input-Output (IO), Base-Reduplicant (BR), Output-Output (OO)), and possibly also evaluated with respect to prosodic domains (e.g. syllable, foot) (Lamontagne 1996, following a general line of Selkirk 1980). We now review two recent advances in the research on contiguity as a general constraint of the grammar. The ideas behind both of these advances will receive some confirmation from my discussion of Umpila and Mangarrayi.

One advance of recent research in OT has been the realization that contiguity holds not only of the Base-Reduplicant relation, but also of the Input-Output relation (McCarthy & Prince 1993, Spencer 1993, Kenstowicz 1994, Lamontagne 1996). The existence of IO Contiguity is possible to deduce since there are various phonological and morphological processes that have the potential to disrupt contiguity on the input-output mapping, and which can therefore be blocked or constrained in their application if the contiguity constraint outranks the need for the phonological/morphological process. Such phonological/morphological processes include string-internal segmental epenthesis, segmental deletion, and infixation of a segmentally-specified morpheme, as illustrated in (3a-c) respectively.

- |     |    |            |                |     |           |
|-----|----|------------|----------------|-----|-----------|
| (3) | a. | epenthesis | /XY/           | --> | [XZY]     |
|     | b. | deletion   | /XYZ/          | --> | [XZ]      |
|     | c. | infixation | /XYZ/, /AB/--> |     | [XY-AB-Z] |

A concrete example of how a process affecting the input-output mapping can be constrained by Contiguity comes from Chukchee (Spencer 1993, Kenstowicz 1994). In Chukchee, medial triconsonantal clusters are not allowed. When a string of three consonants arises through morpheme concatenation, a schwa is epenthesized to break up the cluster. Where the schwa goes (between the first two consonants or the last two consonants) depends on where the morpheme boundaries are. The generalization is that the schwa goes between morphemes, not into the middle of a morpheme. See (4) for representative examples. (Epenthesized schwa is underlined.)

- |     |               |                     |                       |
|-----|---------------|---------------------|-----------------------|
| (4) | /miml-qaca-n/ | miml <u>ə</u> qacan | 'place near water'    |
|     | /wejem-lq-n/  | wejem <u>ə</u> lqən | 'teeming with rivers' |

Epenthesis to the edges of morphemes satisfies IO Contiguity for each morpheme in a way that epenthesis into the middle of a morpheme wouldn't. Chukchee is thus an example of the effect of Contiguity on the IO relation.

Another recent advance in understanding contiguity comes in the work of Lamontagne 1996, who tests, with some success, the idea that contiguity is evaluated with respect to prosodic domains. Syllables appear to be domains to which contiguity evaluation is sensitive. In particular, Lamontagne argues that there may be independent assessment of contiguity violations within syllables as opposed to contiguity violations across syllables. In other words there are two separate kinds of contiguity constraints, one which evaluates contiguity within a domain, and one which evaluates contiguity across identical domains. Contiguity within a domain is evaluated by constraints called D(omain)-CONTIG(uity). Contiguity across identical domains is evaluated by constraints called J(uncture)-CONTIG(uity). Here is an example of the kind of work this proposal can do.

In Diola Fogny, an underlying two-consonant cluster simplifies by deleting the first consonant. But in Wiyot, by contrast, the second consonant deletes. (In Wiyot, the clusters must also be illicit clusters.) For Lamontagne 1996, this difference between Diola Fogny and Wiyot can be explained as one ranking difference. In Diola Fogny, D-CONTIG dominates J-CONTIG, where the domain is the syllable. So preserving contiguity within the syllable is more important than preserving contiguity between syllables. In Wiyot, the reverse ranking obtains: J-CONTIG dominates D-CONTIG, where the domain is syllable. So preserving contiguity between syllables is more important than preserving contiguity within syllables. Tableaux in demonstration of this are reproduced in (5) below (from Lamontagne 1996:18-19).

(5) Contiguity governing cluster reduction

**Diola Fogny** VC<sub>1</sub>C<sub>2</sub>V --> V.C<sub>2</sub>V  
 e.g. /let-ku-jaw/ --> lekujaw 'they won't go'

D-Contig >> J-Contig [Domain = Syllable]

/let-ku-jaw/	D-Contig	J-Contig
le.tu.jaw	*!	
le.ku.jaw		*

**Wiyot** VC<sub>1</sub>C<sub>2</sub>V --> V.C<sub>1</sub>V  
 e.g. /kit-hus-/ --> kitus- 'finish fishing'

J-Contig >> D-Contig [Domain = Syllable]

/kit-hus-/	J-Contig	D-Contig
ki.hus	*!	
ki.tus		*

The interesting conclusion from cases like the epenthesis contrast between Diola Fogny and Wiyot is that prosodic domain vs. prosodic juncture is a relevant factor in assessing violation of contiguity. This point will emerge again below in the discussion of Mangarrayi.

To recap on the discussion of contiguity in this section: we have seen two things. The first is that recent research suggests that contiguity is a general requirement of phonology-morphology in the sense of being an OT constraint hypothesized to have instantiations over various relations (IO, BR, OO). The second thing that we have seen

is the line of investigation of Lamontagne 1996, that contiguity is evaluated with respect to the prosodic domain vs. juncture distinction. The discussion of Umpila and Mangarrayi in the next sections will bear on both these points.

### 3. Base-Reduplicant Contiguity: Umpila

Umpila is a language of northern Cape York, Australia, that has reduplication on the verb to indicate 'progressive' aspect. There are five major patterns of this progressive reduplication, along with other minor patterns that apply to one or two verbs at most. (For full details, see Harris & O'Grady 1976, the original source on the Umpila progressive.)

From the point of view of contiguity, there are three patterns of interest, all of which have a suffixed, syllable reduplicant. One pattern involves major contiguity violations. I'll refer to this pattern as "the Skipping Reduplication". See (6) for examples. Reduplicants are underlined.

#### (6) The Skipping Reduplication

Stem	Reduplicated stem	Gloss (non-progressive meaning)
puuya	puuya-l- <u>pa</u>	'blow (with mouth)'
pujka	pujka-l- <u>pa</u>	'fall; set (of heavenly body)'
ʔuki	ʔuku-l- <u>ʔi</u> <sup>1</sup>	'track up'
ʔaʔi	ʔaʔa-l- <u>ʔi</u>	'hit, kill'

Interestingly, the Skipping Reduplication pattern is actually relatively productive. The Skipping Reduplication is characteristic of the so-called L-conjugation (this being a set of verbs with shared tense-aspect morphology, also the largest conjugation, and more transitive than intransitive in semantics). The Skipping Reduplication applies to about 80% of the members of the L-conjugation for which there is data. The -l- in the forms in (6) is the L-conjugation marker, though it also appears on verbs of other conjugations that take this reduplication pattern.

There are phonological generalizations about what is 'skipped' in the Skipping Reduplication. (These generalizations have been noted in both the original study of Harris & O'Grady 1976 as well as the analysis by Levin 1983.) The segments that are 'skipped', i.e. not copied, but passed over, are consonants. Furthermore, the non-copied consonants are always either dorsals, glottals, liquids or glides. In terms of Umpila underlying segments and the required shape of the reduplicant, this means that /k, ŋ, ʔ, w, y, r, l, ʔ / are the consonants that cannot be copied into the reduplicant onset.

The Skipping Reduplication contrasts minimally with two other reduplication patterns for the Umpila progressive. These patterns are illustrated in (7) below. The pattern of (7a) disallows 'skipping' (unlike the Skipping Reduplication), but also disallows copying any of the dorsals, glottals, liquids or glides (like the Skipping Reduplication). I'll call this "the Non-Skipping Reduplication". The other pattern, that

<sup>1</sup>The vowel behavior of this form, as of the one for 'hit, kill' below it, is due to left-to-right vowel assimilations which are completely general in the Umpila 'progressive' reduplications: schematically, /a i/ → [a a + i], /a u/ → [a a + u], /u i/ → [u u + i]. Interesting as these are, this paper isn't the place to analyze them. So my discussion of Umpila reduplication proceeds as if the assimilations weren't there.

of (7b), also disallows 'skipping', but allows any consonants to be copied into the onset of the reduplicant. I'll call this "the Any Consonant Reduplication" (bearing in mind that, like the Non-Skipping Reduplication, it also can't 'skip' segments in copying).

(7) a. The Non-Skipping Reduplication

Stem	Reduplicated stem	Gloss (non-progressive meaning)
ɲuʊŋka	ɲuʊŋka-l-a	'smell (tr)'
ʔiimʔa-ji	tiimʔa-a-ji <sup>2</sup>	'squeeze, rub, massage'
pirka-pa	pirka-a-pa	'miss (something aimed at)'

b. The Any Consonant Reduplication

Stem	Reduplicated stem	Gloss (non-progressive meaning)
ʔiʔintaka	ʔiʔintaka-ka	'hiccup'
wuʊŋka	wuʊŋku-ka	'stay'
(ŋaaji)	(ŋaaji)	'(in camp)'
wali	wala-li	'twist (tr)'

We have so far covered the basic generalizations about the three patterns of reduplication which involve a suffixed syllable reduplicant: the Skipping Reduplication (6), the Non-Skipping Reduplication (7a), and the Any Consonant Reduplication (7b). With this in place, let's move on to some analysis. The argument will be that having Contiguity as an OT constraint with an instantiation for the Base-Reduplicant relation allows us to analyze in a satisfying way the difference between forms that take the Skipping Reduplication versus forms that take the Non-Skipping or the Any Consonant reduplication patterns.

In the Skipping Reduplication, contiguity is obviously violated: the reduplicant cannot be matched with a substring of the Base. This means in OT terms that the constraint CONTIG<sub>BR</sub> is violated. See (8) for a statement of this constraint.

- (8)  
CONTIG<sub>BR</sub> The Reduplicant string corresponds to a contiguous substring of the Base.

So in the Skipping Reduplication, Contig<sub>BR</sub> is violated, but under pressure from what constraint/s? What I propose is that Contig<sub>BR</sub> is violated by markedness constraints on what segments can serve as syllable onsets. While in the Base, and in non-reduplicated words, dorsals, glottals, liquids and glides are freely found as syllable onsets, in the Reduplicant they are banned. In OT terms, this state of affairs can be captured as instance of "the emergence of the unmarked" (McCarthy & Prince 1994): Base faithfulness (to the input) dominates relevant markedness constraints, which in turn dominate Reduplicant faithfulness (to the Base). Schematically, Base-Faith >> Markedness >> Reduplicant-Faith. For the Umpila Skipping Reduplication, a constraint subhierarchy that produces the emergent unmarkedness effect is the one in (9).

<sup>2</sup>The laminal/apical discrepancy between the initial consonants of the stem and the reduplicated stem is reproduced from Harris & O'Grady 1976 who don't comment on it.

## (9) Skipping Reduplication: Emergent unmarkedness subhierarchy

Contig<sub>IB</sub> >> \*Dors/Ons, \*Glot/Ons, \*M/r, l, ʎ, y, w >> Contig<sub>BR</sub>

The markedness constraints in (9) are an effort to decompose the restrictions on Reduplicant content into restrictions that have some general cross-linguistic validity.<sup>3</sup> The constraint \*Glot/Ons, 'no glottal onsets', is to encode the idea that glottals, as relatively 'weak' consonants are less good onsets. The constraint \*M/r, l, ʎ, y, w is an adaptation into Umpila segments of a subpart of the Margin Hierarchy of Prince & Smolensky 1993. The constraint penalizes a form where glides and liquids are in the syllable margin (i.e. onset or coda). In the Margin Hierarchy of Prince & Smolensky 1993, the constraint on liquids and glides is lower ranked than that on vowels, but higher ranked than that on obstruents. This fixed hierarchy can interact with faithfulness constraints placed along it. In the Umpila case, for example, Contig<sub>BR</sub> is ranked below the margin constraint on glides and liquids, but above the margin constraint on obstruents (since the latter are OK in the reduplicant, unless they're glottal or dorsal, of course). The constraint \*Dors/Ons, 'no dorsal onsets', represents the left-over restriction on the reduplicant once glottals and glides are covered. This constraint is somewhat mysterious, at least to me; it doesn't seem possible to derive its effect from currently considered rankings of general place markedness, for instance. I speculate that \*Dors/Ons is like \*Glot/Ons, relating to the 'weakness' of dorsals – their relatively greater susceptibility to lenition, for instance. But I leave this problem open.

The emergent unmarkedness effect on the reduplicant that (9) produces is demonstrated in (10) below with various Skipping Reduplication forms. (10a) involves a 'skipped' dorsal. (10b) involves a 'skipped' glide. (10c) involves a 'skipped' glottal.

## (10) Emergent unmarkedness effects of (9): Skipping Reduplication

## a. "skipped" dorsal

\*Dors/Ons >> CONTIG<sub>BR</sub>

/puŋka, RED/ 'fall; set (of heavenly body)'	*Dors/Ons	CONTIG <sub>BR</sub>
puŋka-l-ka	*!	
<sup>BR</sup> puŋka-l-pa		*

## b. "skipped" glide

\*M/r, l, ʎ, y, w >> CONTIG<sub>BR</sub>

/puuya, RED/ 'blow (with mouth)'	*M/r, l, ʎ, y, w	CONTIG <sub>BR</sub>
puuya-l-ya	*!	
<sup>BR</sup> puuya-l-pa		*

<sup>3</sup>It is entirely possible that what forces Contiguity violation in Umpila is not onset markedness, but rather Alignment (or Anchoring) needs. But doing an Alignment analysis presupposes that we can safely dismiss markedness as a factor here and regard the identity of the set of skipped segments as a fluke. I choose not to do this, following the line of past analyses (Harris & O'Grady 1976, Levin 1983) and the suggestive involvement of glottals, glides and liquids.

c. "skipped" glottal<sup>4</sup>\*Glot/Ons >> CONTIG<sub>BR</sub>

/t̥aʔi, RED/ 'hit, kill'	*Glot/Ons	CONTIG <sub>BR</sub>
t̥aʔi-l-ʔi	*!	
☞ t̥aʔi-l-ʔi		*

The tableaux in (10a-c), then, exemplify the emergent unmarkedness effects which violate Base-Reduplicant Contiguity in the Skipping Reduplication. The other two similar reduplication patterns -- the Non-Skipping Reduplication and the Any Consonant Reduplication -- both differ from the Skipping Reduplication in the enforcement of Base-Reduplicant Contiguity. This provides us with a clear case of a ranking permutation of CONTIG<sub>BR</sub> within the grammar of Umpila (i.e. a case of cogrammars. Cf. Inkelas, Orgun & Zoll 1994, Itō & Mester 1995). In both the Non-Skipping Reduplication and the Any Consonant Reduplication, CONTIG<sub>BR</sub> is undominated. The difference between the Non-Skipping and the Any Consonant is in the enforcement of the markedness constraints we saw implicated in the Skipping Reduplication (\*Dors/Ons, \*Glot/Ons, and \*M/r, l, ʔ, y, w). In the Any Consonant Reduplication, it seems that the markedness constraints are rendered inactive by the dominating requirement that the reduplicant be left-aligned with the edge of a syllable. Base-Reduplicant Contiguity is not violated. In ranking terms, then, the Any Consonant Reduplication results from the ranking in (11).

## (11) Any Consonant Reduplication

Align-L(RED, σ), >> \*Dors/Ons, \*Glot/Ons, \*M/r, l, ʔ, y, w  
CONTIG<sub>BR</sub>

//i/intaka, RED/ 'hiccup'	Align-L(RED, σ)	CONTIG <sub>BR</sub>	*Dors/Ons	*Glot/Ons	*M/r, l, ʔ, y, w
ʔiʔintaka-a	*!				
ʔiʔintaka-ʔa		*!			
☞ ʔiʔintaka-ka			*		

The Non-Skipping Reduplication, on the other hand, displays the effect of active markedness constraints in a reduplication pattern that allows the reduplicant to be less than a syllable (i.e. prosodically misaligned). Again, Base-Reduplicant Contiguity is not violated. This translates as the ranking in (12).

<sup>4</sup>Note that the optimal candidate given just this subranking is not the actual output. The actual output, t̥aʔi-l-ʔi, undergoes a vowel assimilation I am not analyzing in this paper. (See footnote 1 for further comment.)

## (12) Non-Skipping Reduplication

\*Dors/Ons, \*Glot/Ons, \*M/r, l, ɭ, y, w, >> Align-L(RED, σ)  
 CONTIG<sub>BR</sub>

/ɲuŋka, RED/ 'smell (tr)'	*Dors/Ons	*Glot/Ons	*M/r, l, ɭ, y, w	CONTIG <sub>BR</sub>	Align-L(RED, σ)
ɲuŋka-l-ka	*!				
ɲuŋka-l-na				*!	
ɲɤ ɲuŋka-l-a					

We have seen then, that having Contiguity as an OT constraint on the Base-Reduplicant relation allows us to describe the interestingly circumscribed range of contiguity effects in Umpila reduplication. Subrankings of CONTIG<sub>BR</sub> with markedness constraints capture quite neatly the small typology of contiguity effects of Umpila reduplication: the Skipping Reduplication, where CONTIG<sub>BR</sub> is violated in an emergent unmarkedness effect, and the Non-Skipping and Any Consonant reduplications, where CONTIG<sub>BR</sub> is undominated and markedness effects either appear (Non-Skipping) or don't (Any Consonant). I conclude that these Umpila facts provide strong and moreover interesting evidence for the instantiation of Contiguity on the Base-Reduplicant relation.

This ends the discussion of Umpila. We move on to look at evidence from Mangarrayi reduplication that Contiguity is a general constraint in that it has an instantiation for the Output-Output relation.

## 4. Output-Output Contiguity: Mangarrayi

Mangarrayi is a non-Pama-Nyungan language spoken at Jilkmirngan Community, south-east of Katherine, Northern Territory, Australia. In the generative literature Mangarrayi has received attention for one of its nominal reduplicative patterns, exemplified in (13) below. (It is worth noting that several languages of the surrounding area share this pattern, to varying degrees of productivity. These languages include, for example, Alawa, Jingulu, Wambaya, and the Ngumbin languages Mudburra, Gurindji, Ngarinyman and Bilinarra.)

## (13) Mangarrayi (Data from Merlan 1982:216)

Non-reduplicated word		Reduplicated form of the word	
waɭjima	'young person'	waɭaɭjima	'young people'
gaɭugu	'poor thing'	gaɭaɭugu	'poor things'
gabuji	'old person'	gababuji	'old people'
jimgan	'knowledgeable person'	jimgimgan	'knowledgeable people'
wanɣɣij	'child'	wanɣanɣij	'children'
jalwayi	'mud'	jalwalwayi	'very muddy'

The reduplication pattern in (13) makes a word one syllable longer. But where is the reduplicant? Any answer is analysis-dependent. Various stands have been taken in the literature. Merlan 1982 and Davis 1988 say that the reduplicant is the second syllable of the reduplicated form, as in *jim-gim-gan*, for instance. McCarthy & Prince

1986, 1993 take the reduplicant to be a string infixed after the first consonant, thus *j-im-imgan*. For our purposes, the simplest option is to adopt the view of Merlan 1982 and Davis 1988, that the reduplicant is the second syllable of the reduplicated form. (Another possible option would be that the reduplicant is actually the first syllable of the reduplicated form, but as this would introduce additional complications faithfulness-wise I won't pursue it here. But it's possible.) Under the assumption, then, that the reduplicant is the second syllable, we get the morphological parses in (14) for the forms in (13) above.

(14) Morphological parses

wa- <u>la</u> -lɪma	'young people'
ga- <u>la</u> -lugu	'poor things'
ga- <u>ba</u> -buji	'old people'
ɟim- <u>ɟim</u> -gan	'knowledgeable people'
wan- <u>gan</u> -gij	'children'
jal- <u>wal</u> -wayi	'very muddy'

We can see from the forms in (14) that there is a descriptive pattern to the reduplicant: the reduplicant is filled with a copy of the onset of the following syllable and a copy of the nucleus-coda of the first syllable. An obvious question is: why? The answer that I will propose here implicates contiguity as the reason.

Recall the proposal of Lamontagne 1996, that contiguity may be evaluated with respect to the prosodic juncture versus domain distinction. Looking at segment contiguity in the Mangarrayi reduplication at the level of syllables, a generalization emerges. This reduplication pattern preserves segment contiguity between syllables, at the expense of segment contiguity within syllables, for the comparison of the reduplicated with the non-reduplicated form of the word. That is, for the Output-Output relation, syllable juncture contiguity is respected, but syllable domain contiguity is violated. J-CONTIG- $\sigma_{OO}$  dominates D-CONTIG- $\sigma_{OO}$ . See (15) for constraint statements and (16a,b) for ranking demonstration. (Note that the tableaux only consider forms with the reduplicant placement we are assuming, i.e. infixed after the first syllable. This placement could plausibly be analyzed using a MAX- $\sigma_{1OO}$  constraint (deriving in spirit from the work of Beckman 1997), to the effect 'keep the segments of the first syllable in the first syllable in all output forms of the word'. This constraint would dominate left-alignment of the reduplicant with the prosodic word.)

(15)

D-CONTIG- $\sigma_{OO}$

Each pair of segments adjacent within a syllable in one output word has a corresponding pair of segments adjacent within a syllable in a morphologically-related word.

J-CONTIG- $\sigma_{OO}$

Each pair of segments spanning a syllable boundary in one output word has a corresponding pair of segments spanning a syllable boundary in a morphologically-related word.

(16) Mangarrayi pattern: J-CONTIG- $\sigma_{00}$  >> D-CONTIG- $\sigma_{00}$ 

## a. Form involving CV syllables

ga.bu.ji, RED 'old people'	J-CONTIG- $\sigma_{00}$	D-CONTIG- $\sigma_{00}$
ga-bu.-bu.ji	*!	
ga-ba.-bu.ji		*

In (16a), the optimal candidate violates D-CONTIG- $\sigma_{00}$  with the syllable *ba* that doesn't occur in the non-reduplicated form *gabuji*. But the optimal candidate has at syllable junctures only syllable juncture contiguity relations found in the non-reduplicated form: *ab* and *uj*. Note that under this infixation, it's only possible to achieve observance of J-CONTIG- $\sigma_{00}$  by violating D-CONTIG- $\sigma_{00}$ . The failed candidate *gabubuji* respects low-ranking domain contiguity at the expense of high-ranking juncture contiguity, and so loses out.

## b. Form involving CVC syllables

jim.gan, RED 'knowledgeable people'	J-CONTIG- $\sigma_{00}$	D-CONTIG- $\sigma_{00}$
jim.-jim.-gan	*!	
jim.-gim.-gan		*

In (16b) we find the same violation pattern for a form that involves CVC syllables. Again, the optimal candidate violates contiguity within the syllable with the string *gi*, but maintains contiguity between syllables with *m.g*. The failed candidate *jim-jim-gan* takes the opposite approach, and misses satisfying high-ranking syllable juncture contiguity by satisfying low-ranking syllable domain contiguity: *ji* is a substring within a syllable in the non-reduplicated form, but *m.j* is not a substring across a syllable in the non-reduplicated form.

The argument, then, is that Contiguity on the Output-Output relation is what drives this pattern of Mangarrayi reduplication. In the Mangarrayi pattern, the demand for syllable juncture contiguity outweighs the conflicting demand for syllable domain contiguity. The strings compared for contiguity are an output-output pair, the reduplicated and non-reduplicated forms of a word. What we are seeing, then, is a syllable-level evaluation of Contiguity as an OT constraint on the Output-Output relation. This seems a more satisfying explanation for the segmental content of the reduplicant in this pattern than previous proposals that rely on odd mapping procedures (Davis 1988) or unmotivated-looking infixation after the initial consonant (McCarthy & Prince 1993).

The account sketched so far, though, actually does not go quite far enough. A challenge facing the account is this: what guarantees that the output for a form with CVC syllables keeps the rhyme of the first syllable together in the reduplicant? Concretely, why is the output form *jim-gim-gan*, not *jim-gam-gan*? Why *wan-gan-gij*, not *wan-gin-gij*?<sup>5</sup> Both members in these two candidate pairs fare equally well

<sup>5</sup>Thanks to Laura Benua for pointing this out to me.

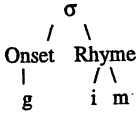
current constraint ranking; both members satisfy J-CONTIG- $\sigma_{OO}$ , and violate D-CONTIG- $\sigma_{OO}$  just once. See (17).

(17)

jim.gan, RED 'knowledgeable people'	J-CONTIG- $\sigma_{OO}$	D-CONTIG- $\sigma_{OO}$
<u>jim.-gam.-gan</u>		*(am)
i.o. --> jim.-gim.-gan		*(gi)

A solution to this problem might be the following. We'll hold onto the contiguity ranking of J-CONTIG- $\sigma_{OO}$  >> D-CONTIG- $\sigma_{OO}$  that has got us most of the facts. Then we need a supplement to cover the choice between e.g. *jim-gim-gan* and *jim-gam-gan*. A possible supplement would be to extend Contiguity to cover subsyllabic evaluation.<sup>6</sup> One way to implement Contiguity subsyllabically would be to evaluate segment contiguity between Onset and Rhyme (Juncture Contiguity between subsyllabic constituents), and assess this independently from segment contiguity within the Rhyme (Domain Contiguity within subsyllabic constituents). Assuming the structure of (18) for word-internal CVC syllables in Mangarrayi, and the constraints in (19), we can get the analysis to work out in favor of the actually-occurring output, as the tableau in (20) demonstrates.

(18) Assumption about word-internal CVC syllable structure (relevant details only)



(19) Subsyllabic Contiguity constraints

#### D-CONTIG-SUBSYLL $_{OO}$

Each pair of segments adjacent within a subsyllabic constituent (Onset or Rhyme) in one output word has a corresponding pair of segments adjacent within a subsyllabic constituent in a morphologically-related word.

#### J-CONTIG-SUBSYLL $_{OO}$

Each pair of segments that are adjacent across subsyllabic constituents of the same syllable in one output word has a corresponding pair of segments that are adjacent across subsyllabic constituents of the same syllable in a morphologically-related word.

<sup>6</sup>An alternative approach (suggested to me by John McCarthy) would be to use Anchoring constraints with B-R copying to ensure whole constituent copying. That approach is more restrictive; it is simply unable to enforce non-constituent copying.

## (20) Subsyllabic contiguity evaluation

jim.gan, RED 'knowledgeable people'	D-CONTIG-SUBSYLL <sub>OO</sub>	J-CONTIG-SUBSYLL <sub>OO</sub>
jim.-gam.-gan	*!	
* jim.-gim.-gan		*

In (20), the optimal candidate violates only J-CONTIG-SUBSYLL<sub>OO</sub>, by having the Onset-to-Rhyme sequence *gi*, which is not present in the non-reduplicated form of the word.<sup>7</sup> Its *im* sequence in the reduplicant of course satisfies D-CONTIG-SUBSYLL<sub>OO</sub>. The failed candidate *jim.-gam.-gan* has the Rhyme-internal sequence *am*, which violates high-ranking D-CONTIG-SUBSYLL<sub>OO</sub>. It is then irrelevant that *jim.-gam.-gan* satisfies low-ranking J-CONTIG-SUBSYLL<sub>OO</sub> (with the Onset-to-Rhyme sequence *ga*). I conclude that a subsyllabic extension of Contiguity evaluation may be all that is needed to complete our account of this Mangarrayi reduplicative pattern in terms of Output-Output Contiguity.

## 5. Conclusion

This paper has argued in support of the position that Contiguity is a general requirement of the phonology-morphology, in the sense of being an OT constraint with instantiations on various relations currently considered in Correspondence Theory. The evidence in favor of the generality of Contiguity has come from reduplicative patterns of two Australian languages, Umpila and Mangarrayi. I argued that Umpila provides strong and moreover interesting evidence in favor of Contiguity being a violable constraint on the Base-Reduplicant relation. Mangarrayi was argued to provide evidence that Contiguity is also a violable constraint of the Output-Output relation. Furthermore, the Mangarrayi facts argue in favor of the position of Lamontagne 1996, that Contiguity may be evaluated with respect to the prosodic juncture vs. domain distinction, at least at the level of the syllable. A final proposal of this paper was to extend Contiguity to be evaluated at the subsyllabic level. I conclude that the evidence discussed in this paper points to Contiguity being a violable constraint, instantiated on at least the Base-Reduplicant and Output-Output relations, and evaluated with respect to the prosodic juncture vs. domain distinction at both the syllabic and subsyllabic levels.

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<sup>7</sup>It's worth noting that a possible drawback of extending Contiguity to subsyllabic constituents is that we are then assessing Juncture Contiguity violations between different kinds of constituents (Onset-to-Rhyme, rather than syllable-to-syllable, or foot-to-foot). This runs counter to the ideas in Lamontagne 1996. If one thought that Onset and Rhyme weren't inherently different things, though, this presumably mightn't be a problem.

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