

University of Massachusetts Occasional Papers in Linguistics

Volume 28 UMOP 26: *Papers in Optimality Theory II*

Article 7

2002

Morphological Contiguity

Meredith Landman

University of Massachusetts-Amherst

Follow this and additional works at: <https://scholarworks.umass.edu/umop>



Part of the [Linguistics Commons](#)

Recommended Citation

Landman, Meredith (2002) "Morphological Contiguity," *University of Massachusetts Occasional Papers in Linguistics*: Vol. 28 , Article 7.

Available at: <https://scholarworks.umass.edu/umop/vol28/iss1/7>

This Article is brought to you for free and open access by the Graduate Linguistics Students Association (GLSA) at ScholarWorks@UMass Amherst. It has been accepted for inclusion in University of Massachusetts Occasional Papers in Linguistics by an authorized editor of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Morphological Contiguity^{*,†}

Meredith Landman

University of Massachusetts-Amherst

This paper proposes a family of correspondence constraints that require input segments belonging to the same morphological constituent of a designated type to remain contiguous in the output (cf. Spencer 1993, Kenstowicz 1994b, McCarthy & Prince 1995, Lamontagne 1996), formalized here as MORPHOLOGICAL CONTIGUITY (M-CONTIG). The crucial effect of the M-CONTIG constraints is to prohibit insertion and deletion internal to a designated type of morphological constituent. For example, MORPH-I-CONTIG and MORPH-O-CONTIG prohibit deletion and insertion internal to the morpheme, a morphologically simple constituent, and STEM-I-CONTIG and STEM-O-CONTIG prohibit deletion and insertion internal to the stem, a potentially morphologically complex constituent. Evidence for this conception of contiguity comes from a number of languages that have been observed to display insertion and deletion processes restricted to the edges of morphological constituents: Chukchee, Axininca Campa, Diyari and Guhañ Ifugao. In addition, permutation of the M-CONTIG constraints among the relevant phonological constraints is shown to provide a general account of repairs that occur exclusively or preferably at morphological boundaries due to the emergence of the unmarked rankings (McCarthy & Prince 1994). The M-CONTIG constraints in this way account for some data previously handled by morpheme structure conditions and morphologically derived environment rules (Kiparsky 1973).

1. Introduction

Within the framework of Optimality Theory (OT) (Prince & Smolensky 1993), the extent to which an underlying representation (input) and surface representation (output) may differ is limited by a set of constraints demanding identity between input and output. These are the *faithfulness* (Prince & Smolensky 1993), or *correspondence* (McCarthy & Prince 1995), constraints. This paper

* I am especially grateful to John McCarthy for extensive and insightful comments on this material. I would also like to thank Roger Higgins, Lisa Selkirk, Paul de Lacy, Ania Lubowicz, Anne-Michelle Tessier, Jan Anderssen, and the editors of this UMOP volume for valuable suggestions and discussion. This work was supported by an NSF Graduate Research Fellowship.

† Since this paper was written in 1999, two additional works using contiguity have appeared: Alber and Plag (1999) and Alber (2001). Some of the theoretical points made in these papers are similar to my own, and I have added specific mention of these points in the text where relevant.

Meredith Landman

proposes a particular family of correspondence constraints which require input segments belonging to the same morphological constituent of a designated type to remain contiguous in the output (cf. Spencer 1993, Kenstowicz 1994b, McCarthy & Prince 1995, Baković 1995, Lamontagne 1996.), formalized generally here as MORPHOLOGICAL CONTIGUITY (M-CONTIG):

(1) MORPHOLOGICAL CONTIGUITY (M-CONTIG)

- a. M-I-CONTIG (“No M-internal deletion”)

The portions of the input standing in correspondence and belonging to the same M form contiguous strings.
- b. M-O-CONTIG (“No M-internal insertion”)

The portions of the output standing in correspondence and belonging to the same M form contiguous strings.

where $M \in \{\text{morpheme, stem}\}$.

The crucial effect of the M-CONTIG constraints is to prohibit insertion and deletion internal to a designated type of morphological constituent, determined by the value of *M*. For example, MORPH-I-CONTIG and MORPH-O-CONTIG prohibit deletion and insertion internal to the *morpheme*, and STEM-I-CONTIG and STEM-O-CONTIG prohibit deletion and insertion internal to the *stem*. The morpheme is taken here to be any morphologically simple constituent, so that, for example, roots and affixes are both morphemes. The stem, in contrast, is assumed to be a potentially morphologically complex constituent consisting of either a root or a root+affix complex; this is the minimum assumption needed to account for the data analyzed here. For concreteness, stems are assumed not to be recursive, but see discussion below.

Contiguity constraints are not new to the OT literature, and the proposal advanced here is an extension of two previous accounts: CONTIGUITY (Kenstowicz 1994b) and I/O-CONTIG (McCarthy & Prince 1995). This account differs from these previous accounts in that it claims that contiguity must be assessed independently and uniformly over either the morpheme or the stem. In contrast, CONTIGUITY appears to assess contiguity only over the morpheme, while the I/O-CONTIG constraints assess contiguity over the input, which may vary in its morphological constituency.¹

Evidence for this conception of contiguity comes from a number of languages that display insertion and deletion processes restricted to the edges of morphological constituents: Chukchee, Axininca Campa, Diyari – all three of which have previously been accounted for with contiguity constraints (see Section

¹ See also Lamontagne (1996), who proposes a family of contiguity constraints that assess contiguity over a designated type of *prosodic* constituent.

Morphological Contiguity

2) – and Guhag Ifugao.² In addition, I show that permutation of the M-CONTIG constraints among the relevant phonological constraints provides a general account of repairs that occur exclusively or preferably at morphological boundaries due to the *emergence of the unmarked* (McCarthy & Prince 1994) rankings. The M-CONTIG constraints in this way account for certain data previously handled by *morpheme structure conditions* – ‘descriptive generalizations over the lexical representations of the grammar’ (Kenstowicz 1994a) – and *morphologically derived environment rules* (Kiparsky 1973).

The remainder of this paper is organized as follows. Section 2 provides an overview of the two aforementioned previously proposed contiguity accounts, and the central data they were designed to account for. Section 3 sets forth the proposal: 3.1 presents the M-CONTIG constraints and illustrates the formalism; 3.2 presents evidence for stem and morpheme level contiguity; and 3.3 illustrates the factorial typology, showing that M-CONTIG provides a general account of repairs that occur exclusively or preferably at morphological boundaries. Section 4 explores several issues regarding the formal characterization of M-CONTIG. Section 5 compares the approach advanced here – a *context-sensitive faithfulness* approach – to an alternative that employs *context-sensitive markedness* constraint, e.g. NOFINALCODA. Section 6 concludes the paper.

2. Previous Accounts

This section reviews the mechanics and central data of two previous contiguity accounts upon which the proposal advanced here builds: CONTIGUITY (Kenstowicz 1994b) and I/O-CONTIG (McCarthy & Prince 1995). Special attention will be given to making explicit the main differences between these accounts and the one advanced here, viz., what they predict to be the morphological domain of contiguity.

2.1 CONTIGUITY (Kenstowicz 1994b): Schwa Epenthesis in Chukchee

Kenstowicz (1994b), building on Kenstowicz (1979ab) and Krause (1979), proposes a contiguity constraint to account for a restriction on schwa epenthesis in Chukchee, a Paleo-Siberian language spoken in Siberia (see also Spencer 1993). In Chukchee, schwa epenthesis splits up what would otherwise surface as a tautosyllabic cluster, for example, /miml+qaca+n/ ‘place near water’, surfaces as [mim.lə.qa.can], and not *[miml.qa.can]. Interestingly, epenthesis is restricted in that it systematically avoids a morpheme-internal position, for example, /miml+qaca+n/ surfaces as [mim.lə.qa.can], and not *[miməl.qa.can], although both outputs avoid potential tautosyllabic clusters through epenthesis. The data in (2) provide further illustration (data come from Krause (1980), whose data come from Skorik (1961).)

² German glottal stop insertion (Alber 2001) patterns with Guhag Ifugao in providing evidence for stem-level contiguity, see Section 3.3.1.

Meredith Landman

(2) CHUKCHEE (Krause 1980, from Skorik 1961)

/meni-y-tʔul/	me.ni.yet.ʔul	'material'
/wekw-tʔul/	wek.wet.ʔol	'stone'
/təm-k-tk-n/	təm.kət.kən	'hummock'
/yət-y-tay-n/	yət.yə.ta.yən	'lake'
/tum-y-ret/	tum.yə.ret	'comrade'

To account for this restriction on epenthesis, CONTIGUITY, is proposed:³

- (3) CONTIGUITY: If /...xy.../ are contiguous in lexical structure then avoid [...xay...] in prosodic structure, where [a] is either [] (epenthetic material) or <a> (underparsed material). [p. 8]

Tableaux (6) illustrates the role of CONTIGUITY in accounting for the Chukchee data.⁴ *COMPARG, (4), crucially dominates DEP, (5), so that epenthesis splits up potential tautosyllabic clusters. This rules out candidate (a), which fatally violates *COMPARG. Candidates (b) and (c), which both satisfy *COMPARG, crucially differ on violations of CONTIGUITY: candidate (b), the winning candidate, has the epenthetic vowel positioned at a morpheme juncture, while candidate (c) has the epenthetic vowel positioned inside a morpheme, and so fatally violates CONTIGUITY. Note that CONTIGUITY is not crucially ranked with respect to DEP, yet still rules out candidate (c).

- (4) *COMPARG No complex margins.
 (5) DEP Every segment of the output has a correspondent in the input.

³ There may be a minor problem with the definition in (4): If *a* were unparsed material in [...xay...], then *a* would need to be underlying, and so it seems that [...x<a>y...] could not derive from /...xy.../. This problem might be avoided with a reformulation like in (i):

- (i) Contiguity: if /...xy.../ are contiguous in lexical structure, then avoid [...xaz...] in prosodic structure, and if /...xy.../ are contiguous in lexical structure, then avoid [...x<a>y...] in prosodic structure.

⁴ The tableau is Kenstowicz's (9), except for two changes. First, I have substituted DEP where Kenstowicz uses FILL; the two constraints have same effect here. Second, in order to derive epenthesis, some constraint barring complex syllable margins must dominate DEP; I have added *COMPARG.

Morphological Contiguity

(6)

/miml+qaca+n/ 'place near water'	*COMP MARG	CONTIGUITY	DEP
a. miml.qa.can	*!		
b. mim.lə.qa.can			*
c. mi.məl.qa.can		*!	*

The use of CONTIGUITY in the analysis of Chukchee indicates that it enforces contiguity over the morpheme, but nothing larger (e.g., a stem). For example, if CONTIGUITY were to take as its domain the whole (morphologically-complex) input, e.g., /miml-qaca-n/, it would do no work in determining the distribution of the epenthetic schwa; candidates (b) and (c) would tie on CONTIGUITY violations, both incurring a single mark. Thus, the MORPH-CONTIG constraints proposed here have almost the same effect as CONTIGUITY, as both take the domain of contiguity to be the morpheme (unlike the STEM-CONTIG constraints). The two constraints differ only in that the MORPH-CONTIG constraints treat morpheme-internal deletion and morpheme-internal insertion as two distinct types of contiguity violations (following McCarthy & Prince 1995). The empirical predictions of – and evidence for (Alber and Plag 1999) – treating these two types of contiguity violations as distinct are discussed in Section 4.1 below.

2.2 I/O-CONTIG (McCarthy & Prince 1995): V-finalness in Diyari

McCarthy & Prince (1995) posit two contiguity constraints: I-CONTIG, which prohibits deletion internal to the input string, and O-CONTIG, which prohibits insertion internal to the input string:

(7) I/O-CONTIG

a. I-CONTIG (“No Skipping”)

The portion of the input standing in correspondence forms a contiguous string.

b. O-CONTIG (“No Intrusion”)

The portion of the output standing in correspondence forms a contiguous string.

Violations of these constraints are assessed as follows. I-CONTIG prohibits deletion internal to the input. For example, consider the correspondence relation in (8), in which the input correspondent *y* has no correspondent in the output, *xʔxʔ*, and *zʔzʔ*:

(8)

Input:	/ x	y	z /
Output:	[xʔ		zʔ]

Meredith Landman

This mapping violates I-CONTIG since the portion of the **input** standing in correspondence – the string made up of segments *x* and *z* – does not form a contiguous string in the input: *y* is intervening. O-CONTIG, in contrast, is *not* violated by the mapping, since the portion of the **output** standing in correspondence, namely, the string made up of segments *x'* and *z'* *does* form a contiguous string in the output (*x'* and *z'* are adjacent in the output).

O-CONTIG prohibits **insertion** internal to the input. For example, consider the correspondence relation in (9), in which *y* is inserted in the output:

(9)	Input:	/ x		z /
	Output:	[x'	y'	z']

(9) violates O-CONTIG, since the portion of the **output** standing in correspondence – the string made up of *x'* and *z'* – does not form a contiguous string in the output: *y* is intervening. In this case, I-CONTIG is not violated, since the portion of the **input** standing in correspondence, *xz*, forms a contiguous string. Crucially, edge deletion and insertion are not prohibited by I/O-CONTIG.

I/O-CONTIG bear a specific-general relation to the context free correspondence constraints, MAX and DEP,

- (10) MAX Every segment of the input has a correspondent in the output.

as a violation of I/O-CONTIG entails a violation of MAX or DEP. This scale of specificity sets up some interesting *emergence of the unmarked* ranking possibilities, as will be fleshed out in the discussion of the factorial typology in Section 3.5 below.

I-CONTIG plays an important role in McCarthy & Prince's suggested account of V-finalness in Diyari, a Pama-Nyungan language spoken in Australia (McCarthy & Prince 1994; fn. 15, 1995). In Diyari, a free-standing word must be V-final, i.e., codas are allowed only word-medially, as the data in (11) illustrate (taking both reduplicated and non-reduplicated forms to exemplify free-standing words):

- | | | |
|-----------|--|------------|
| (11) | Diyari (Austin 1981, Poser 1982, McCarthy & Prince 1986, 1991ab, 1994) | |
| wiɻa | wiɻa-wiɻa | 'woman' |
| kanku | kanku-kanku | 'boy' |
| kuɻkuɻa | kuɻku-kuɻkuɻa | 'to jump' |
| tʰilparku | tʰilpa-tʰilparku | 'bird sp.' |
| ŋankaŋti | ŋanka-ŋankaŋti | 'catfish' |

Morphological Contiguity

The pattern is construed as an instance of *the emergence of the unmarked*: Although codas – a marked structure – are tolerated in the language as a whole, they are not permitted at word edges. This can be straightforwardly derived with the use of contiguity constraints, by ranking NOCODA, (12), above MAX, (13), and I-CONTIG in turn above NOCODA, as in (14)

- (12) NOCODA Syllables may not have codas.
- (13) MAX Every segment of the input has a correspondent in the output.
- (14) I-CONTIG >> NOCODA >> MAX

According to (14), NOCODA crucially dominates MAX, forcing deletion of potential coda consonants; yet with I-CONTIG ranked above NOCODA, internal deletion is blocked. The result is that all outputs are V-final. The ranking analysis is illustrated in tableau (15) below. The input is a hypothetical C-final word, to illustrate that even C-final words will surface as V-final. Candidate (a), which deletes both potential coda consonants, does not violate NOCODA at all, yet fatally violates I-CONTIG because it deletes a consonant internal to the input. Candidate (b), which satisfies I-CONTIG, fatally violates NOCODA, since its final consonant could have been deleted with a less costly violation of MAX, as in candidate (c), the V-final winner.

(15)

/ CVCCVC/	I-CONTIG	NOCODA	MAX
a. CV.CV	*!		**
b. CVC.CVC		**!	*
c. CVC.CV		*	*

This use of contiguity constraints thus offers a straightforward account of processes that occur at (input) edges. Similar rankings will be important below with respect to M-CONTIG, to account for repairs that occur only at the edges of morphological constituents.

According to the formulation of I/O-CONTIG in (7), the morphological domain of these constraints appears to be whatever morphological constituency corresponds to the input. The reasoning here is as follows. I-CONTIG ranges over segments of the input, and O-CONTIG over segments of the output, thus, it is the structure of the *input* in the case of I-CONTIG that determines the domain over which contiguity is assessed, and the structure of the *output*, in the case of O-CONTIG. Assuming that morphological structure is available in the input, by Consistency of Exponence (McCarthy & Prince 1993ab), the morphological structure of the input and the output are the same, thus, for both I/O-CONTIG, the domain of contiguity is determined by the input. Because in OT inputs are assumed to be potentially morphologically-complex, I/O-CONTIG assess contiguity over whatever morphological structure an input has, e.g., morpheme,

Meredith Landman

stem, or stem+morpheme complex. I/O-CONTIG are thus not designed to single out a uniform, embedded morphological unit as the domain of contiguity, and, as a result, the Chukchee data, for which contiguity must be assessed over the morpheme, appear to be problematic for I/O-CONTIG.

3. The Proposal

This section sets forth the account. Section 3.1 illustrates the formalism of the constraints, Sections 3.2 and 3.3 present data in support of the constraints, and Section 3.4 illustrates the factorial typology.

3.1 MORPHOLOGICAL CONTIGUITY

The general schema for the M-CONTIG constraint family is repeated below:

(1) MORPHOLOGICAL CONTIGUITY (M-CONTIG)

a. M-I-CONTIG ("No M-internal deletion")

The portions of the input standing in correspondence and belonging to the same M form contiguous strings.

b. M-O-CONTIG ("No M-internal insertion")

The portions of the output standing in correspondence and belonging to the same M form contiguous strings.⁵

where $M \in \{\text{morpheme, stem}\}$.

As stated above, M-CONTIG is instantiated by four specific, independently rankable constraints: MORPH-I-CONTIG and MORPH-O-CONTIG, which enforce contiguity over the morpheme, and STEM-I-CONTIG and STEM-O-CONTIG which enforce contiguity over the stem. Again, the morpheme is assumed to be any morphologically simple constituent, while the stem, in contrast, is assumed to be a potentially morphologically complex constituent, either a root, or a root+affix. This conception of the stem will be motivated in the analysis of Guhaṅ Ifugao in Section 3.3.1 below.

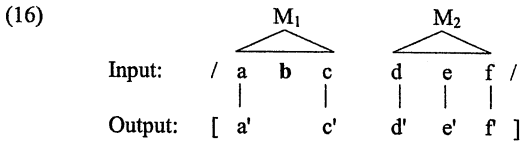
⁵ Note that given the formalization of MORPH-O-CONTIG, it is crucial that morphological structure be available in the output, a controversial assumption. However, the definition could be modified so that morphological information is only available from the input:

(i) M-O-CONTIG

The portions of the output standing in correspondence with correspondents belonging to the same M form contiguous strings.

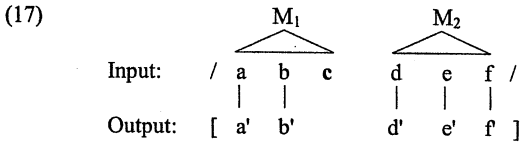
Morphological Contiguity

Violations of M-CONTIG are assessed as follows. M-I-CONTIG prohibits deletion internal to M. For example, consider the correspondence relation in (16), in which *abc* belong to M_1 , *def* belong to M_2 , the input segment *b* has no correspondent, and $a\mathfrak{R}a'$, $c\mathfrak{R}c'$, $d\mathfrak{R}d'$, $e\mathfrak{R}e'$, and $f\mathfrak{R}f'$.

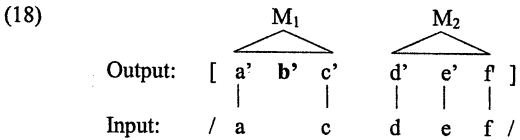


This mapping violates M-I-CONTIG since the portion of the input standing in correspondence and belonging to the same M, namely, *ac*, does not form a contiguous string in the input: *b* is intervening.

Compare (16) to the mapping in (17), in which it is *c* that has no correspondent in the output. (17) does not violate M-I-CONTIG, since the portions of the input standing in correspondence and belonging to the same M, namely, *ab* and *def*, do form contiguous strings.

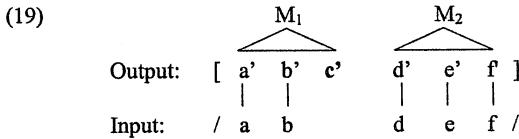


The mapping in (17) shows that deletion that is not internal to M does not incur violations of M-I-CONTIG. Conversely, M-O-CONTIG prohibits insertion internal to the input. For example, consider the correspondence relation in (18), in which the output segment *b* has no correspondent.



(18) violates M-O-CONTIG, since the portion of the output standing in correspondence and belonging to the same M, *a'bc'*, does not form a contiguous string in the output: *b* is intervening. Compare this mapping to the one in (19), in which insertion is not internal to M:

Meredith Landman



(19) does not violate M-O-CONTIG because the portions of the output in correspondence and belonging to the same M, namely, *a'b'* and *d'e'f'* form contiguous strings. M-O-CONTIG thus bans M-internal insertion only.

MORPH-I/O-CONTIG and STEM-I/O-CONTIG bear a specific-general relation to the context free correspondence constraints, MAX and DEP, as well as to each other. MORPH-CONTIG is most specific, as a violation of MORPH-CONTIG entails a violation of STEM-CONTIG and MAX or DEP. STEM-I/O-CONTIG is also in a specific-general relation to MAX and DEP, since a violation of STEM-I/O-CONTIG entails a violation of MAX or DEP. This scale of specificity sets up some interesting *emergence of the unmarked* ranking possibilities, as will be fleshed out in the discussion of the factorial typology in Section 3.5 below.

3.2 Evidence of morpheme-level contiguity

3.2.1 Schwa epenthesis in Chukchee

As illustrated in Section 2.1 above, one case of morpheme-level contiguity – observed by Kenstowicz (1979), Krause (1979), and Kenstowicz (1994b) – comes from schwa epenthesis in Chukchee. This section offers an analysis of this phenomenon using the M-CONTIG constraints, though the results are the same here as for Kenstowicz's CONTIGUITY, as both take the morpheme to be the domain of contiguity.

The general pattern is that stem-internal insertion may occur, though morpheme-internal insertion may not; some illustrative data are repeated below:

(20) CHUKCHEE

/meni-tʔul/	me.ni.yət.ʔul	‘material’
/tumy-ret/	tum.yə.ret	‘comrade’

As discussed above, the driving force behind this process is *COMPARG: schwa splits up what would otherwise surface as a tautosyllabic cluster. To resolve potential clusters through insertion, *COMPARG must dominate DEP(V), as in tableau (21).

Morphological Contiguity

(21)

/meniy-tʔul/ 'material'	*COMPARG	DEP(V)
a. me.niy.tʔul	*!	
b. ^ɛ me.ni.yet.ʔul		*

*COMPARG must also dominate STEM-O-CONTIG, since the optimal candidate displays stem-internal insertion:

(22)

/meniy-tʔul/ 'material'	*COMPARG	STEM-O-CONTIG	DEP
a. me.niy.tʔul	*!		
b. ^ɛ me.ni.yet.ʔul		*	*

That epenthesis targets morpheme boundaries is the effect of, as tableau (23) illustrates. Note that this tableau is not a ranking argument; it only demonstrates that MORPH-O-CONTIG is a tie-breaker, favoring candidates where epenthesis is not morpheme internal.

(23)

/miml-qaca-n/ 'place near water'	*COMPARG	MORPH-O-CONTIG	STEM-O-CONTIG	DEP
a. miml].qa.can	*!			
b. mi.məl].qa.can		*!	*	*
c. ^ɛ mim.l]ə.qa.can			*	*

The final ranking analysis is summarized as follows:

(24) *COMPARG, MORPH-O-CONTIG >> STEM-O-CONTIG >> DEP

3.2.2 C-insertion in Axininca Campa

A second example of morpheme-level contiguity comes from Axininca Campa, as suggested in McCarthy & Prince (1995). In Axininca Campa, an Arawakan language spoken in Peru (Payne 1980, McCarthy & Prince 1993), heteromorphemic vowel-vowel sequences, /...V-V.../, are never tautosyllabic (long vowels or diphthongs); an epenthetic coronal consonant (T) always epenthesizes between them as [V.TV]:

Meredith Landman

(25) AXININCA CAMPA (Payne 1980, McCarthy & Prince 1993)

/i-N-c ^h ik-i/	in.c ^h i.ki	'he will cut'
/i-N-c ^h ik-ako-i/	in.c ^h i.ka.ko.Ti	'he will cut for'
/i-N-c ^h ik-aa-i/	in.c ^h i.ka.Ti	'he will cut for again'
/i-N-koma-i/	ij.ko.ma.Ti	'he will paddle'
/i-N-koma-ako-i/	ij.ko.ma.Ta.ko.Ti	'he will paddle for'
/i-N-koma-aa-i/	ij.ko.ma.Taa.Ti	'he will paddle'

Two constraints force this process of insertion: *COMPNUC, which bans complex nuclei (long vowels or diphthongs), and ONSET, which requires syllables to have onsets:

- (26) *COMPNUC No complex nuclei.
- (27) ONSET No onsetless syllables.

Ranking *COMPNUC and ONSET above DEP derives the pattern of insertion:

(28)

/i-N-koma-i/	*COMPNUC	ONSET	STEM-O-CONTIG	DEP
a. ij.ko.mai	*!			
b. ij.ko.ma.i		*!		
c. ^{ep} ij.ko.ma.Ti			*	*

Epenthesis is blocked, however, when the underlying vowel-vowel sequence is tautomorphic /...VV.../. In this case, the vowels are always parsed as tautosyllabic:

(29) /i-N-c ^h ik-aa-i/	in.c ^h i.kaa.Ti	'he will cut again'
/i-N-koma-aa-i /	ij.ko.ma.Ta.Taa.Ti	'he will paddle again'
/no-N-c ^h ik-wai-i/	non.cik.wai.Ti	'I will continue to cut'

Thus, morpheme-external insertion is tolerated, while morpheme-internal insertion is not. This can be seen as the effect of MORPH-O-CONTIG.⁶ Ranking MORPH-O-CONTIG above *COMPNUC ensures that epenthesis is blocked morpheme internally:

⁶ McCarthy & Prince (1993) offer a different analysis of the Axininca Campa data. They derive the same pattern with Alignment constraints. However, their analysis relies on the existence of Align-R, which some researchers have recently argued to produce undesirable effects (Nelson 1999, Bye & de Lacy 1999).

Morphological Contiguity

(30)

/noN-c ^h ik-wai/	MORPH-O-CONTIG	*COMPNUC	ONSET	STEM-O-CONTIG	DEP
a. [☞] non.c ^h ik.wai		*			
b. non.c ^h ik.wa.Ti	*!			*	*

When a violation of MORPH-O-CONTIG is not at stake, the decision is passed to *COMPNUC, which prefers the candidate with epenthesis:

(31)

/i-N-koma-i/	MORPH-O-CONTIG	*COMPNUC	ONSET	STEM-O-CONTIG	DEP
a. iŋ.ko.mai		*!			
b. [☞] iŋ.ko.ma.Ti				*	*

A summary of the ranking hierarchy is provided in (32).

(32) MORPH-O-CONTIG >> *COMPNUC, ONSET >> STEM-O-CONTIG, DEP

3.3 Evidence of stem-level contiguity

3.3.1 Onset-initialness in Guhaŋ Ifugao

In Guhaŋ Ifugao, an Austronesian language spoken in the Philippines, onsets are required initially, as the (a) examples in (33) show, but not internally, as the (b) examples show (Newell 1956):⁷

(33) GUHAŊ IFUGAO (Newell 1956)

a. ?iŋŋi	'baby girl' (N.534)	keké	'laughter' (N.538)
?aggé	'not' (N.534)	hingiton	'look for' (N.538)
?umé	'go' (N.535)	madamut	'heavy' (N.524)
?ibba	'companion' (N.537)	bo?ón	'not' (N.529)
?ibughól	'open' (N.537)	litúŋon	'twist' (N.525)
?álgo	'sun, day' (N.537)	nakeké	'laughed' (N. 526)

⁷ There is some unclarity with this data which I have not been able to resolve. Sometimes two phonemically distinct words are glossed with the same meaning, for example, [?aggé] and [bo?ón] are both glossed as 'not', and sometimes morphologically similar words have nontransparent glosses, for example, [?aggé] is glossed as 'not', while the related [?ag.gé.a?] is glossed as 'I did not'. Further, comparing the similar [lalá?i] 'male' with [babái], it is surprising that the first has a glottal stop where there would otherwise be an onsetless syllable, while the second has no glottal stop, allowing for vowel hiatus.

Meredith Landman

ʔé	'go' (N.525)	lóʔtad	'wither' (N.524)
ʔúŋa	'child' (N.526)	laláʔi	'male' (N.529)
b. ʔag.gé.aʔ	'I did not' (N.538)	ma.gá.an	'remove' (N.535)
ʔi.ab.baʔ	'I will carry' (N.535)	bú.uj	'necklace' (N.535)
ba.bá.i	'female' (N.535)	ʔad.ʔu.áni	'today/now' (N.537)
ma.wi.it	'tomorrow' (N.538)	ʔi.ém	'you take' (N.538)
ʔi.á.lim	'bring' (N.538)	hé.ep	'sunflower' (N.538)
ha.f.tan	'whet stone' (N.538)	ʔa.a.lí.wan	'forget' (N.538)
ʔad.ʔu.á.ni	'today' (N.538)	ma.ni.go.áʔ	'I'm looking for' (N.538)
ʔa.nú.ud	'when' (N.538)	bu.ma.nú.at	'smolder' (N.538)

Like in Diyari, the pattern here is an instance of the emergence of the unmarked at edges: ONSET is satisfied only at edges (only initially). Interestingly, however, there is evidence that this pattern cannot be construed as the result of ranking MORPH-O-CONTIG above ONSET, and ONSET in turn above DEP. This is because onset-initialness is not a property of morphemes, but of a constituent larger than a morpheme (but potentially smaller than a free-standing word, see data below). To illustrate this point, consider the data in (34), in which onset-initialness cannot be a property of the morpheme, as the V-initial suffixes /-aʔ/ and /-on/ may surface as onsetless syllables:

(34)	/-aʔ/		'1 st person sing.'
	/manigo-aʔ/	ma.ni.go.áʔ (N.538)	'I'm looking for'
	/aggé-aʔ/	ʔag.gé.aʔ (N.538)	'I did not'
	/-on/		(unclear gloss)
	/lelé-on/	le.lé.on (N.524)	'make wider'

Identifying this morphologically complex constituent – along with simple roots, e.g., [ʔé] 'go' – as the stem, the generalization is that ONSET is obeyed exactly only at stem edges. This pattern thus provides evidence for STEM-O-CONTIG, and can be derived by ranking STEM-O-CONTIG above ONSET, and ONSET in turn above DEP:

(35) STEM-O-CONTIG >> ONSET >> DEP

In effect, all stems must be onset initial. The tableau in (36) below illustrates. The input is given as V-initial, to illustrate that even V-initial inputs will surface onset initial (though lexical optimization would yield a different input). The inserted consonant is represented here as a glottal stop – though there are no visible alternations to guarantee this, this consonant seems most likely to be the default epenthetic consonant, as (i) the glottal stop is relatively unmarked consonant and

Morphological Contiguity

(ii) in related languages, e.g., Tagalog, there are alternations indicating that the glottal stop is epenthetic. MORPH-O-CONTIG is left out of the hierarchy because with STEM-O-CONTIG undominated, its effects cannot be detected no matter where it is ranked in the hierarchy.

(36)

/aggé-a?/ 'I did not'	STEM-O-CONTIG	ONSET	DEP
a. ? _[stem ag.gé.ʔaʔ]	*!	***	**
b. [_{stem ag.gé.aʔ]}		**!	*
c. ^ɪ ? _[stem ag.gé.aʔ]		*	*

Candidate (a), which satisfies all potential ONSET violations, fatally violates STEM-O-CONTIG, while fully satisfying MORPH-O-CONTIG, because it inserts a consonant internal to the stem, but external to the morpheme. Candidates (b) and (c) both satisfy STEM-O-CONTIG, but (b) fatally violates ONSET, since a consonant could have been inserted initially with a less costly violation of DEP, as in (c), the C-initial winner.

Interestingly, there may also be evidence that C-initialness is not alternatively simply a property of the free-standing word, as some embedded constituents are also subject to the requirement. For example, the prefix *mun-* must attach to an onset-initial constituent:⁸

(37) /mun/

mun.ʔa.li	'call' (N.525)	mun.lá.ik	'squash'
mun.ʔo.lé	'do slowly' (N.525)	mun.na.nón	'remain'
mun.ʔi.kohl	'study' (N.530)	mun.bú.u	'wear necklace'
mun.ʔót.ʔot	'to eat raw' (N.525)	mun.hún.ni	'change direction'
mun.ʔi.náw	'to conceive' (N. 526)	mum.báŋ.ŋad	'return' (N.537)
mun.ʔa.gá.ʔe	'swim' (N.525)	mum.momá	'chewnut' (N.537)
mun.ʔiw.wan	'to pass' (N.524)	mum.bák.ka	'crawl' (N.537)

This can be accounted for if these embedded constituents are construed as stems, e.g., in the form [mun.ʔa.li] 'call', [ʔa.li] is a stem. Note that given my assumption that only root or root+affix structures are stems, the larger constituent within which the stems are embedded, e.g., [mun.ʔa.li], is not a stem. I made this assumption solely on the basis that root and root+affix structures are the only cases where it is clear what the morphological domain over which contiguity is

⁸ It is unclear from the data what the meaning of *mun* is.

Meredith Landman

assessed is, that is, these are the only morphological constituents within which Onset may be violated; I have no evidence *against* treating [mun.ʔa.li] as a recursive stem. Thus, it should be pointed out that the assumption is non-trivial: If stems were recursive, the ranking in (35) would produce the wrong results, incorrectly converging on candidate (a) as the winner, when candidate (b) should be the winner (indicated by the backwards arrow, ←):

(38)

/mun-ali/	STEM-O-CONTIG	ONSET	DEP
a. ! _{ESP} [stem mun.[stem ali]]		*	
b. ← [stem mun.ʔ[stem ali]]	*!		*

Given the V-initial input /mun-ali/, the correct output, candidate (b), would fatally violate STEM-O-CONTIG, due the insertion of the glottal stop within the larger stem. Although I avoid the derivation in (38) by assuming stems are not recursive, given that this assumption is not well-supported, I will note that even if stems were recursive, the right result could still in principle be derived. For example, ranking STEM-O-CONTIG below an OUTPUT-OUTPUT faithfulness constraint demanding faithfulness to the stem occurring as a free-standing word would yield candidate (b) as winner; this would of course predict that every stem could occur in isolation as a word, a prediction that would require more data than what is provided in Newell (1956) to confirm.

It is interesting that Alber (2001) reports a very similar pattern for glottal stop epenthesis in Standard German: V-initial roots and prefixes surface glottal stop-initial, e.g., *ʔor.gá.nisch* ‘organic’, *ʔán.-ʔor.gá.nisch* ‘inorganic’ while V-initial suffixes remain V-initial, e.g., *Dróh.-ung* [dro:ʊŋ] ‘threat’. Although Alber uses O-CONTIG to account for morphologically simple cases like *ʔor.gá.nisch*, she does not propose an account of the morphologically complex forms, that is, why glottal epenthesis occurs before prefixes and roots, but not suffixes. She does suggest some potential accounts, however, including the Output-Output account as sketched above, and the possibility that glottal stop insertion only occurs at the left edge of prosodic words, which, assuming prosodic words are recursive, would include the left edges of prefixes and roots, but not suffixes. (Whether the prosodic word account could be implemented using contiguity constraints would seem to be a question requiring further research.)

The pattern in Standard German differs from that in Guhaŋ Ifugao in that in Standard German, it is clear that both stems *and* prefix+stem complexes are subject to onset-initialness. The Guhaŋ Ifugao data provide no evidence as to whether the morphological constituent above the root+affix level, e.g., the whole constituent [mun.ʔa.li] ‘sew’, is also subject to onset-initialness. However, the

Morphological Contiguity

constraint ranking in (35) in fact predicts this result. For example, a hypothetical vowel-initial prefix would surface C-initial:⁹

(39)

/an-aggé-aʔ/ <i>hypothetical input</i>	STEM-O-CONTIG	ONSET	DEP
a. an.[ʔag.gé.aʔ]		*	**
b. ^{ESP} ʔan.[ʔag.gé.aʔ]		**!	

This prediction seems likely to be correct; that is, it is likely that V-initial prefixes would surface as in (39), like in German.

To close this section, it should be noted that the data analyzed in this section appears to be problematic both for CONTIGUITY, which predicts only morpheme-level contiguity, and thus, would predict here that suffixes should be onset initial, as well for I/O-CONTIG, which predict here the whole input to be the domain of contiguity, and thus, would predict that embedded stems need not be onset initial (unless some other high-ranking constraints came into play, e.g., OUTPUT-OUTPUT.)

3.4 V-finalness in Diyari

It is unclear from the Diyari data what morphological constituent V-finalness holds over, and so it will be analyzed here non-committally as due to M-I-CONTIG. Thus, the requirement that stems be V-final in Diyari is derived here by ranking M-I-CONTIG above NOCODA, and NOCODA above MAX:

(40)

/CVCCVC/	M-CONTIG	NOCODA	MAX
a. CVC.CVC		**!	
b. CV.CV	*!		**
c. ^{ESP} CVC.CV		*	*

Note that according to this analysis, V-finalness is not driven by a context-sensitive markedness constraint banning final codas (e.g., NOFINALCODA), but simply the context-free constraint, NOCODA, with I-CONTIG blocking internal insertion. Whether there is empirical data that might choose between a context-sensitive markedness account and the one advanced here, is discussed in Section 5 below.

⁹ This observation was inspired by the pattern of glottal stop epenthesis in German (Alber 2001).

Meredith Landman

3.4 The Factorial Typology: A general account of repairs active only at morphological boundaries

The ranking analyses arrived at in the previous section are specific instantiations of more general ranking schemas. These schemas are a subset of the factorial typology produced by permutation of the M-CONTIG constraints among the existing constraints in the hierarchy. This section systematically discusses these ranking permutations, establishing each as a general schema with distinct characteristics.

In the following discussion, PHONO-C represents some phonological constraint that potentially compels violations of MORPH-CONTIG, STEM-CONTIG, and MAX/DEP.

Consider first the ranking schema in (41), in which PHONO-C is dominated by all three faithfulness constraints. In this situation, nothing happens, as PHONO-C cannot compel any faithfulness violations.

(41) MORPH-CONTIG, STEM-CONTIG, MAX/DEP >> PHONO-C

Consider next the ranking in which the most specific constraint, MORPH-CONTIG, dominates Phono-C:

(42) MORPH-CONTIG >> PHONO-C >> STEM-CONTIG, MAX/DEP

This ranking characterizes a language in which PHONO-C is satisfied at morpheme edges, but potentially violated morpheme-internally. MORPH-CONTIG blocks morpheme-internal repairs so that PHONO-C can only force faithfulness violations of the low-ranking STEM-CONTIG and MAX/DEP(SEG). The result is an emergence of the unmarked (with respect to PHONO-C) at morpheme-edges. This happens in Axininca Campa for example, which has the ranking in (43):

(43) MORPH-O-CONTIG >> *COMPNUC >> STEM-O-CONTIG, DEP

Morpheme-internal deletions – the specific case – are ruled out because they are more costly than *COMPNUC violations, while all remaining deletions – the more general cases – are tolerated since they are less costly than *COMPNUC violations. In effect, unmarked syllable structure, i.e., simple nuclei, emerges at morpheme edges.

A similar effect results when the second most specific constraint, STEM-CONTIG, dominates PHONO-C, with PHONO-C in turn dominating DEP:

(44) STEM-CONTIG >> PHONO-C >> MAX/DEP

Morphological Contiguity

This ranking characterizes a language in which a constraint is enforced exactly at stem edges, though violations are tolerated stem-internally. PHONO-C compels faithfulness violations of the faithfulness constraint it dominates, MAX/DEP. Yet STEM-CONTIG, ranked above PHONO-C, blocks stem-internal repairs. The result is an emergence of the unmarked (with respect to PHONO-C) at *stem*-edges. Note that it makes no difference where MORPH-CONTIG is ranked here. Since STEM-CONTIG is undominated, and MORPH-CONTIG is in a specific-general relation with STEM-CONTIG, any ranking of MORPH-CONTIG in (44) will yield the same results. Both Guhañ Ifugao and Diyari provide examples of the schema in (44). Their respective ranking analyses are repeated below:

- (45) STEM-O-CONTIG >> ONSET >> DEP
 (46) STEM-I-CONTIG >> NOCODA >> MAX

In Guhañ Ifugao, ONSET is obeyed exactly stem-initially; all stems are onset-initial. In Diyari, NOCODA is obeyed exactly stem-finally; all stems are coda-less.

The ranking schemas in (42) and (44) are similar in that both yield an emergence of the unmarked at morphological edges: that is, both derive a specific repairs across morphological boundaries. These two ranking schemas thus offer an account of processes that are restricted to *morphologically derived environments* (Kiparsky 1973), i.e. processes that occur only across morphological boundaries. It should be noted, however, that the analysis only accounts for those processes involving segmental insertion or deletion, since these are the two types of repairs prohibited by the faithfulness constraints under consideration. Importantly, these faithfulness constraints do not prohibit any type of featural change in the input, and as a result, processes that are restricted to morphologically derived environments that involve featural changes are not accounted for. This raises the question whether contiguity should be extended so that it may take into account featural changes. I will postpone discussion of this issue to Section 5.3 below, where an analysis of this type is sketched.

The two ranking schemas, (42) and (44), may also derive certain so-called *morpheme structure conditions*, i.e., 'descriptive generalizations over the lexical representations of the grammar' (Kenstowicz 1994a). For instance, in Guhañ Ifugao, all stems must be onset-initial, and in Diyari, all stems must be vowel-final. The account here explains these two morpheme structure conditions as the product of the ranking schema in (44): they are both due to the interaction between prosodic constraints and STEM-CONTIG. Similarly, in Axininca Campa, all morphemes must bear simple vowels initially and finally, construed here as the effect of the schema in (42): the interaction between a prosodic constraint and MORPH-CONTIG.

In sum, the emergence of the unmarked rankings in (42) and (44) make possible a unified explanation of processes restricted to morphologically derived environments and morpheme structure constraints.

Meredith Landman

A fourth type of ranking schema is illustrated in (47), in which PHONO-C dominates all three faithfulness constraints:

(47) PHONO-C >> MORPH-CONTIG, STEMCONTIG, MAX/DEP

By this ranking, repairs that occur in order to satisfy PHONO-C will occur most preferably at morpheme boundaries and second-most-preferably at stem boundaries. This results again because of specific-general relations among the constraints. Violations of MORPH-CONTIG entail violations of STEM-CONTIG, and violations of STEM-CONTIG entail violations of MAX/DEP. In effect, deletion or insertion will always be favored at morpheme or stem edges.

The remaining rankings, illustrated in (48), are uninteresting; their effects coincide with one of rankings already discussed due to Anti-Paninian ranking effects. Such rankings result when two constraints in a specific-general relation are ranked so that the general constraint ranks above the specific constraint, thereby eclipsing the effects of the general constraint.

(48) STEM-CONTIG >> PHONO-C >> MORPH-CONTIG, DEP
 DEP >> PHONO-C >> MORPH-CONTIG, STEM-CONTIG
 DEP, MORPH-CONTIG >> PHONO-C >> STEM-CONTIG

The four types of ranking schemas are summarized as follows:

- (49) **PHONO-C is inactive:**
 MORPH-CONTIG, STEM-CONTIG, MAX/DEP >> PHONO-C
- (50) **Emergence of the Unmarked w.r.t PHONO-C at morpheme boundaries (i.e., repairs restricted to morpheme boundaries):**
 MORPH-CONTIG >> PHONO-C >> STEM-CONTIG, MAX/DEP
- (51) **Emergence of the Unmarked w.r.t. PHONO-C at stem boundaries (i.e., repairs restricted to stem boundaries):**
 STEM-CONTIG >> PHONO-C >> MAX/DEP
- (52) **Repairs preferably occur at morpheme (otherwise stem) boundaries:**
 PHONO-C >> MORPH-CONTIG, STEMCONTIG, MAX/DEP

3.5 Summary

This section has proposed a new approach to contiguity: M-CONTIG. The proposal was argued for on empirical grounds, as it was shown to account for data problematic previous proposals. The account also was shown to provide a general

Morphological Contiguity

account of processes that are active exclusively or preferably at morphological boundaries.

4. Issues in the characterization of M-CONTIG

Three issues regarding the formal characterization of contiguity constraints are discussed in this section: (i) whether or not to represent the two types of contiguity violations by a single constraint vs. two constraints, (ii) whether or not an anti-metathesis constraint should be treated as distinct from M-CONTIG, and (iii) whether or not any featural information should be included in the assessment of contiguity violations.

4.1 One constraint or two?

This section explores the consequences of treating the two types of contiguity (insertion and deletion) as one versus two constraints. A hypothetical language is discussed that would decide between the two approaches.¹⁰

In OT, two constraints can be shown to be distinct if, in the grammar of some language, they must be independently ranked. To simplify the discussion, I will use the MORPH-I/O-CONTIG constraints, though the same point could be made with the STEM-I/O-CONTIG constraints. What type of language in which MORPH-O-CONTIG and MORPH-I-CONTIG are crucially independently ranked characterize? One case would be a language in which a single phonological constraint is satisfied with one repair (e.g., deletion) internal to morphemes, and a different repair (e.g., insertion) at morpheme edges.¹¹ To illustrate, imagine a language in which potential CODACOND violations are avoided through deletion, that is, CODACOND and MAX(C) dominate DEP(V), as illustrated in (53).

(53)

/buk-ni/	CODACOND	MAX(C)	DEP(V)
a. buk.ni	*!		
b. bu.ni		*!	
c. bu.kA.ni			*

Suppose also that in this language, MORPH-O-CONTIG dominates MORPH-I-CONTIG as well as MAX(C), as in (54) below; given this ranking, deletion will be the favored repair morpheme-internally, since morpheme-internal insertion would result in a fatal violation of MORPH-O-CONTIG:

¹⁰ Alber and Plak (1999) present evidence that insertion and deletion contiguity violations must be assessed independently from Sranan, an English based Creole spoken in Surinam, in which morpheme internal CODACOND violations are satisfied through deletion, and not epenthesis, and thus O-CONTIG must dominate I-CONTIG.

¹¹ Thanks to John McCarthy for bringing this example to my attention.

Meredith Landman

(54)

/bukni/	CODACOND	MORPH-O-CONTIG	MORPH-I-CONTIG	* MAX(C)	DEP(V)
a. buk.ni	*!				
b. bu.ni			*	*	
c. bi.kA.ni		*!			*

Taking again the input in (55), /buk-ni/:

(55)

/buk-ni/	CODACOND	MORPH-O-CONTIG	MORPH-I-CONTIG	* MAX(C)	DEP(V)
a. buk.ni	*!				
b. bu.ni				*!	
c. bi.kA.ni					*

Thus the ranking in (55) derives a language in which CODACOND is satisfied by deletion morpheme-internally, and insertion at morpheme-edges. What is crucial here is that MAX (no deletion) and DEP (no insertion) are ranked oppositely from the more specific MORPH-I-CONTIG and MORPH-O-CONTIG (no internal insertion). Allowing for two separate contiguity constraints thus predicts the existence of a language in which a phonological constraint is satisfied through deletion internal to a morphological unit, and insertion with respect to its edges (or insertion internal, and deletion w.r.t. edges.) Note that a conflated contiguity constraint, like CONTIGUITY, which prohibits both morpheme internal deletion as well as morpheme internal insertion, would not derive this type of language. Whether or not such a language exists is a question left open for further investigation; no relevant case has been reported in the literature.

4.2 Metathesis

Within Correspondence Theory, metathesis does *not* incur violations I/O-CONTIG. To illustrate, the mapping $(xyz \rightarrow x'z'y')$, where z and y have metathesized, does not violate I-CONTIG, since x , y , and z stand in correspondence, and form a contiguous string in the input. Nor does it violate O-CONTIG, since x' , y' , and z' stand in correspondence, and form a contiguous string in the output. An independent constraint, LINEARITY, prohibits metathesis.

(56)

LINEARITY – “No Metathesis”.

The input is consistent with the precedence structure of the output, and vice versa.

Morphological Contiguity

The question arises whether to treat contiguity and metathesis constraints independently, or as a single constraint. In other words, can M-CONTIG and LINEARITY be shown to be separately ranked in the grammar of some language? Let us again consider what a language would have to look like for its grammar to have this property. Imagine a language in which *COMPARG is undominated. For example, consider tableau (57). Given the input /pso/, *COMPARG would rule out candidate (a). Candidates (b) and (c) both satisfy *COMPARG, but fare differently with respect to M-I-CONTIG and LINEARITY: candidate (b) satisfies *COMPARG through deletion, but violates M-I-CONTIG; candidate (c) satisfies *COMPARG through metathesis but violates LINEARITY. For a grammar to choose between these two candidates, M-I-CONTIG and LINEARITY would need to be crucially ranked.

(57)

/pso/		*COMPARG	M-I-CONTIG	LINEARITY
a.	ps _o	*!		
b.	sp _o		*	
c.	pos			*

The same holds for M-O-CONTIG and LINEARITY, as tableau (58) shows:

(58)

/pso/		*COMPARG	M-O-CONTIG	LINEARITY
a.	ps _o	*!		
b.	sp _o .so		*	
c.	pos			*

It does not seem unlikely that such a language would exist. However, here also I have found no such language reported in the literature, and so the issue left open here.

4.3 What are the objects of contiguous analysis?

Section 3.3 showed that emergence of the unmarked rankings – (59) and (60) – derive repairs that occur only at morphological boundaries. Processes restricted to morphological boundaries are familiar in the literature; these are the *derived environment rules* (Kiparsky 1973).¹² The question thus arises whether the above type of analysis can be used to derive all attested cases of derived environment rules. Recall that it is only processes that require insertion and deletion as repairs that are presently derived, since the faithfulness constraints under consideration

¹² Kiparsky (1973) discusses two types of derived environments: (i) strings spanning a morphological boundary, and (ii) tautomorphic strings to which some rule has applied (Kenstowicz 1994). I look only at the first type here.

Meredith Landman

MORPH-CONTIG, STEM-CONTIG, and DEP/MAX only prohibit insertion and deletion. Derived environment rules, however, are not restricted to insertion and deletion; in fact, attested cases most often involve featural changes. This section offers a brief sketch of what an extension of M-CONTIG might have to look like to account for such featural processes.

Kiparsky (1973) argues that in Finnish, there is a process by which an underlying /...ti.../ sequence surfaces as [...si...], but only in derived environments (data and generalizations from Kenstowicz & Kisseberth 1979.) For example, when the past tense suffix *-i* is preceded by a verb stem ending in *t*, e.g., *halut* 'want', the final *t* surfaces as *s*, e.g., *halus-i* 'wanted' (cf. *halut-a* 'want'). The process does not occur when an underlying ...ti... sequence is tautomorphemic, as evidenced by forms like *tila* 'room', and *äiti* 'mother'. This process can be derived in OT by ranking a constraint barring ...ti... sequences, *ti, above MAX([CONT]):

(59)

/halut-i/	'wanted'	*ti	MAX([cont])
 [-cont]			
a.	halut-i [-cont]	*!	
b.	halus-i [+cont]		*

That t-spirintization is blocked morpheme-internally can be derived by ranking a reformulated MORPH-CONTIG constraint – one which is sensitive to features – above *ti:

(60)

/äiti/	'mother'	MORPH-CONTIG(F)	*ti	MAX([cont])
 [-cont]				
a.	äiti [-cont]		*	
b.	äisi [+cont]	*!		*

The challenge for this type of account is in the formalization of MORPH-CONTIG(F). How exactly this might be done is left at this point as an open issue.

*Morphological Contiguity***4.4 Summary**

Three issues regarding the characterization of M-CONTIG have been raised in this section: (i) whether or not to represent the two types of contiguity violations by a single constraint or two, (ii) whether or not an anti-metathesis constraint should be treated as distinct from M-CONTIG, and (iii) how M-Contig might be implemented so that it would derive featural contiguity. The first two issues are to be resolved empirically, though at this point there is no known data to resolve them; the third issue requires further research.

5. Context-sensitive Faithfulness vs. Context-sensitive Markedness

The proposal advanced here treats repairs that only occur at morphological boundaries as the result of emergence of the unmarked rankings: M-CONTIG is ranked above some context-free PHONO-C, which is itself ranked above MAX or DEP. Thus, according to this analysis, what drives these repairs are *context-free* markedness constraints (e.g., NOCODA, ONSET). This section compares this approach to an alternative that treats edge repairs as driven by *context-sensitive* markedness constraints. For example, in Diyari, in which stems are necessarily V-final, an undominated context-sensitive markedness constraint banning prosodic word final codas, e.g. NOFINALCODA, would also derive V-final words.¹³ That these two accounts may produce the same results raises the question of whether they make the same predictions.

In fact, there does seem to be some evidence in favor of context-sensitive markedness constraints, which comes from the pattern of augmentation in the Pama-Nyungan languages. Hale (1973) finds that in some of the Pama-Nyungan languages of Australia, there has been a general shift from C-final verb stems toward “less marked” V-final stems – that is, a trend towards V-finaless – through an augmentation process that adds *-pa* to C-final stems, as the data in (61) illustrate.

(61)	<i>uninflected</i>	<i>ergative</i>	<i>dative</i>	[H., p. 450]
	ta-npa	ta-n-tu	ta-n-ku	‘outcrop’
	lu-npa	lu-n-tu	lu-n-ku	‘Kingfisher’
	punpunpa	punpun-tu	punpun-ku	‘fly’
	mapanpa	mapan-tu	mapan-ku	‘curing power’
	tjalinjpa	tjalinj-tu	tjalinj-ku	‘tongue’
	malanjpa	malanj-tu	malanj-ku	‘younger brother’
	(y)untalpa	(y)untal-tu	(y)untal-ku	‘daughter’
	tʷukurpa	tʷukur-tu	tʷukur-ku	‘dreamtime’
	mankurpa	mankur-tu	mankur-ku	‘three’
	tʷintirtʷintirpa	tʷintirtʷintir-tu	tʷintirtʷintir-ku	‘Willie-wag-tail’

¹³ Or, a constraint on *stem-final* codas could be posited, assuming that morphological information is available in the output.

Meredith Landman

At first glance, it looks like this V-finalness could be accounted for by ranking STEM-O-CONTIG above NOCODA, and NOCODA above DEP:

(62) STEM-O-CONTIG >> NOCODA >> DEP

However, this ranking produces incorrect results. The problem is that adding the syllable *pa* does *not* reduce the number of NOCODA violations in the word as a whole. For example, consider tableau (63), which takes as input /mankur/. The optimal candidate should be (a) (indicated by the backwards arrow, ←) in which *-pa* augments the stem. However, this candidate ties on NOCODA violations with the fully faithful candidate (b). Augmentation of *-pa* does nothing to reduce NOCODA violations, and so this candidate is ruled out. The constraint hierarchy incorrectly converges on candidate (c), in which *-a* augments the stem, as winner, since this candidate *does* incur less NOCODA violations than the faithful candidate, while satisfying high-ranking STEM-O-CONTIG (compare candidates (c) and (d)).

(63)

/mankur/	'three'	STEM-O-CONTIG	NOCODA	DEP
a.	← man.kur.PA		**!	**
b.	man.kur		**!	**
c.	! man.ku.rA		*	*
d.	ma.nA.kur.PA	*!		**

Thus, it does not seem to be NOCODA that is responsible for augmentation. Rather, there seems to be some force banning *final codas* in particular, e.g., NOFINALCODA in (64), as augmentation of *-pa* does succeed in avoiding a stem-final coda:

(64)

/mankurpa/	'three'	NOFINALCODA	RIGHT-ALIGN (STEM, PRWD)	DEP
a.	man.kur	*		**
b.	man.kur.PA			**
c.	man.ku.rA		*!	*

This throws into question the analysis proposed above for Diyari, in which the ban on final codas was construed as the effect of the context-free NOCODA. Since the two languages are related, one might want to analyze the V-final condition uniformly in both languages. In the grammar of Western Desert, the constraint clearly cannot be NOCODA, rather, it must be something like NOFINALCODA. This suggests that NOFINALCODA may also be responsible for V-final stems in Diyari.

Morphological Contiguity

5.1 Summary

Two approaches to repairs that are limited to morphological boundaries were compared in this section: M-CONTIG, which treats these processes as driven by context-free markedness constraints, and an alternative which sees these processes as due to context-sensitive markedness constraint. The case of V-final stems in the Pama-Nyungan languages was considered, and it was shown that at least in some of these languages, the M-CONTIG approach fails to account for the data. Though this is not necessarily an argument against this type of account for some processes limited to morphological boundaries, it does show that M-CONTIG cannot alone account for all processes limited to morphological edges. Further, that the analysis of *-pa* augmentation in languages closely related to Diyari cannot be handled with M-CONTIG may be taken as a weakness for the Diyari analysis posited above.

6. Conclusion

This paper offers an approach to contiguity by which contiguity is assessed over a uniform type of morphological constituent. The proposal is a departure from previous accounts in that it claims that contiguity must be independently assessed over two types of morphological units: the morpheme and the stem. The factorial typology provides an account of repairs that are active exclusively, or preferably, at morphological boundaries, and thus can account for data previously handled by derived environment rules or morpheme structure conditions.

Various issues remain open for future investigation. It remains to be resolved empirically whether or not to treat M-CONTIG as a single constraint barring both insertion and deletion, or as two constraints barring each, and whether or not to treat M-CONTIG and LINEARITY (anti-metathesis) as the same or separate constraints. Extending M-CONTIG so that it assesses featural contiguity also requires further exploration. Finally, since it was demonstrated that M-CONTIG cannot handle all data that context-sensitive markedness constraints can, it should be determined whether context-sensitive markedness can derive all M-CONTIG effects.

References

- Alber, Birgit. 2001. Regional variation at edges: glottal stop epenthesis and dissimilation in Standard and Southern varieties of German. To appear in the *Zeitschrift für Sprachwissenschaft*. ROA-
- Alber, Birgit & Ingo Plag. 2000. Epenthesis, deletion and the emergence of the optimal syllable in creole. The case of Sranan. To appear in *Lingua*.
- Alber, Birgit & Ingo Plag. 1999

Meredith Landman

- Austin, Peter. 1981. *A grammar of Diyari, South Australia*. Cambridge: Cambridge University Press.
- Baković, Eric. 1995. Strong Onsets and Spanish Fortition. In: MITWPL, Proceedings of SCIL 6. ROA-96.
- Benua, Laura. 1995. *Transderivational Identity: Phonological Relations Between Words*. Ph.D. dissertation, UMass-Amherst: GLSA.
- Bye, Patrik and Paul de Lacy. 1999. *Edge Asymmetries in Phonology: Eliminating Right Edge Reference*. Ms., Tromsø and University of Massachusetts, Amherst.
- Cole, Jennifer. 1990. Arguing for the phonological cycle: A critical review. In D. Meyer, S. Tomioka, and L. Zidani-Eroglu (eds.), *Proceedings of the Formal Linguistics Society of Midamerica* (pp. 51-67). Madison: Linguistics Student Organization, University of Wisconsin.
- Hale, Kenneth. 1973. Deep-surface canonical disparities in relation to analysis and change: an Australian example. In T. Sebeok (ed.), *Current Trends in Linguistics*, vol. 9: *Diachronic, Areal and Typological Linguistics*, pp. 401-458. The Hague: Mouton.
- Kenstowicz, Michael, and Charles Kisseberth. 1979. *Generative phonology: Description and theory*. New York: Academic Press.
- Kenstowicz, Michael. 1994a. *Phonology in Generative Grammar*. Cambridge, MA: Blackwell.
- Kenstowicz, Michael. 1994b. Syllabification in Chukchee: A constraints-based analysis. In A. Davison, N. Maier, G. Silva and W.S. Yan (eds.) *Proceedings of the Formal Linguistics Society of Mid-America 4*. Iowa City: Department of Linguistics, University of Iowa.
- Kiparsky, Paul. 1973. Abstractness, opacity, and global rules. In O. Fujimura, ed., *Three dimensions of linguistic theory*. Tokyo: Taikusha.
- Krause, Scott R. 1980. *Topics in Chukchee Phonology and Morphology*. PhD dissertation, University of Illinois at Urbana-Champaign. Ann Arbor, Michigan: University Microfilms International.
- McCarthy, John J. & Alan Prince. 1993a. *Prosodic Morphology I: constraint interaction and satisfaction*. Ms., UMass-Amherst, and Rutgers University, New Brunswick, N.J.
- McCarthy, John J. & Alan Prince. 1993b. Generalized Alignment. *Yearbook of Morphology 1993* pp. 79-154.
- McCarthy, John J. & Alan Prince. 1994. The Emergence of the Unmarked: Optimality in prosodic morphology. In *Proceedings of the North East Linguistic Society*, ed. by Mercè González, 333-79. Amherst: GLSA.
- McCarthy, John J. & Alan Prince. 1995. Faithfulness and reduplicative identity. In Jill Beckman, Laura Walsh Dickey & Suzanne Urbanczyk, eds., *UMOP 18*: 249-384. Amherst: GLSA.
- Nelson, Nicole. *Right Anchor, Aweigh!*. ROA-284.
- Newell, Leonard E. 1956. Phonology of the Guhang Ifugao dialect. *Philippine Journal of Science 85*: 523-539.
- Poser, William. 1989. The metrical foot in Diyari. *Phonology 6*: 117-148.

Morphological Contiguity

- Poser, William. 1982. Why cases of syllable reduplication are so hard to find. Ms., MIT, Cambridge, Massachusetts.
- Prince, Alan M. & Paul Smolensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. New Brunswick, NJ, Rutgers University.
- Selkirk, Elizabeth. 1986. On derived domains in sentence phonology. *Phonology Yearbook* 3: 371-405.
- Skorik, P. 1961. *Grammatika Chukotskogo jazyka*. M.
- Spencer, Andrew. 1993. The optimal way to syllabify Chukchee. Talk presented at Rutgers Optimality Workshop I, Rutgers University, New Brunswick, NJ.

Meredith Landman
Department of Linguistics
South College
University of Massachusetts
Amherst, MA 01003

landman@linguist.umass.edu