Locality in Echo Epenthesis: Comparison with Reduplication*

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1. Introduction

In echo epenthesis the quality of epenthetic vowels is determined by a neighboring vowel. This is illustrated by the examples from Kolami given in (1):

(1) Kolami echo epenthesis (Zou 1991: 463)

/ayk+t/	→	[ayakt]	'swept away'	cf.	/ayk/	→	[ayk]
/erk+t/	→	[erekt]	'lit (fire)'	cf.	/erk/	→	[erk]

In the data above, one underlying vowel is realized twice in the output, and one of the realizations serves as an epenthetic vowel to break up triconsonantal clusters.

Echo epenthesis involves repetition of one underlying segment and in this sense superficially resembles reduplication, exemplified below in (2) by the Agta plural. Again, a single underlying string of segments surfaces twice.

(2) Agta reduplication (Marantz 1982: 447)

/takki/	→	[tak-takki]	'leg(s)'
/uffu/	→	[uf-uffu]	'thigh(s)'

This similarity might lead one to think that that echo epenthesis and reduplication are fundamentally the same phenomenon; in fact, Kitto and de Lacy (1999) propose to treat them both under the general rubric of copying by way of correspondence (McCarthy and Prince 1995).

This paper, however, points out one major difference between echo epenthesis and reduplication. In terms of locality, echo epenthesis is subject to a stricter restriction than is reduplication: reduplication can copy a distant segment to satisfy a higher ranked

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constraint, but echo epenthesis never copies a distant vowel. To capture this difference, I propose that echo epenthesis and reduplication involve different mechanisms: echo epenthesis, which is inherently phonological, is always achieved by spreading of a V-place node, while reduplication is achieved by correspondence-based copying. To derive this asymmetry, I propose a restriction that copying is available only for morphological operations like reduplication, but not for phonological operations like echo epenthesis, which is driven by phonotactics. This position is, within the current framework of Optimality Theory (Prince and Smolensky 1993), a defense of Prince's (1987) claim that "copying […] is fundamentally obliged to morphology" (507).

The rest of this paper is organized as follows. In §2, I illustrate the difference in locality between echo epenthesis and reduplication, and propose a way to account for the difference. §3 further discusses locality in echo epenthesis in more detail and also considers predictions of the proposed theory. In §4, I present several cases of nonlocal reduplication which contrast with known cases of echo epenthesis. §5 discusses theoretical implications for current phonological theory, mainly focusing on the role of copying and spreading in phonology.

2. The difference and proposal illustrated

Consider the hypothetical pattern in (3). With the standard sonority scale (low vowels are the most sonorous; high vowels are the least; and mid vowels are inbetween), the hypothetical examples in (3) illustrate a pattern in which echo epenthesis targets the most sonorous vowel in the underlying form, skipping the closer vowel that could be potentially repeated ([e] in (a) and [i] in (b)). The main finding of this paper is that such sonority-based echo epenthesis is not attested. This is based on my survey of 55 cases of echo epenthesis.[1] The absence of such cases indicates that echo epenthesis is subject to a strict locality requirement.

(3) Sonority-based echo epenthesis (unattested)

a.	/tametk/	→	[tametak]
b.	/temitk/	→	[temitek]

The absence of such a pattern is all the more striking given that a parallel pattern is possible in reduplication. For example, in Nakanai, the most sonorous vowel in the base is copied as a reduplicative vowel (Johnston 1980; Spaelti 1997 among others) regardless of the distance between the corresponding segments. Some data are given in (4). As shown in (4ab), reduplication targets V_1 when V_1 is more sonorous than or equally sonorous to V_2. However, when V_2 is more sonorous than V_1, as in (4c-e), then V_2 is copied. The data in (4a) and (4c) constitute a minimal pair in this regard.

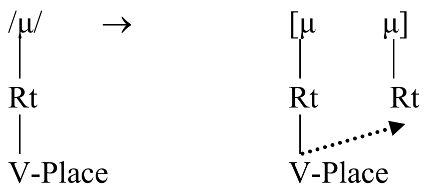
[1] The survey only includes echo epenthesis driven by phonotactic reasons such as cluster resolution or coda avoidance, excluding what has been treated as "morphemes with unspecified timing slots" (a.k.a. harmonizing affixes). It also excludes languages that have vowel harmony like Turkish. Due to space limitations, the entire list of these patterns and references are omitted from this version of the paper. See Kawahara (2004).

(4) Sonority-based reduplication

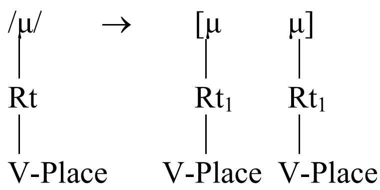
a.	/RED-taro/	→	[ta-taro]	'away'
b.	/RED-buli/	→	[bu-buli]	'roll'
c.	/RED-mota/	→	[ma-mota]	'vines'
d.	/RED-kusa/	→	[ka-kusa]	'wet'
e.	/RED-biso/	→	[bo-biso]	'two by two'

Therefore, it seems that echo epenthesis is subject to a more strict locality requirement. To account for this difference, I propose that echo epenthesis always involves spreading a V-place node (see Clements 1989 *et seq* for V-place in feature organization) as in (5) whereas reduplication is achieved by correspondence-based copying (McCarthy and Prince 1995; also Marantz 1982; Steriade 1988), as illustrated in (6) (the numerical subscripts represent a correspondence relationship).

(5) Echo epenthesis as spreading of a V-place

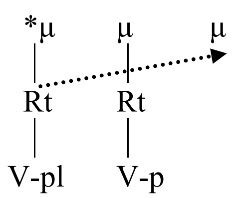


(6) Reduplication as copying by correspondence

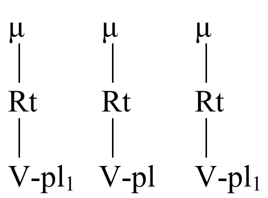


Given the uncontroversial assumption that spreading affects intervening segments while correspondence copying does not, the difference between echo epenthesis and reduplication follows naturally. Spreading can be viewed as the extension of articulatory gestures across a time domain to encompass more than one segment; therefore, spreading necessarily affects intervening segments. This is why spreading of a V-place node across another vowel, as depicted in (7), is impossible. (See below for some concrete proposals regarding the source of ungrammaticality of (7).) Correspondence, on the other hand, is nothing more than a relationship between two segments (McCarthy and Prince 1995), and it does not affect intervening segments at all. Therefore copying one vowel across a different vowel without affecting the latter is possible, as illustrated in (8).

(7) Skipping impossible for spreading



(8) Skipping possible for copying



To guarantee that echo epenthesis is always achieved by spreading rather than copying, we need to impose a restriction on assignment on correspondence. More concretely, because echo epenthesis should never be achieved by correspondence, we need to limit correspondence to morphological operations, despite some recent claims to the contrary. Two mechanisms have been proposed for non-reduplicative copying, which are both illustrated below in (9) ("S" stands for a segment; arrows represent correspondence relationships):

(9) Two ways to achieve copying outside of reduplication

(a) /…S…/ → [...S...S]$_{morph}$ *via surface-to-surface correspondence*

(b) /….S…/ → [S…S]$_{morph}$ *via multiple-IO mapping*

(9a) achieves copying by way of surface-to-surface correspondence just like reduplication, but without any reduplicative morpheme (see Kitto and de Lacy 1999; Rose and Walker 2001; Zuraw 2003 among others). (9b) involves (long distance) splitting, and achieves copying by having two output correspondents of one input segment (Ussishkin 2000; Nelson 2003 and others).

As I have argued above, allowing such mappings predicts an unattested echo epenthesis pattern that potentially skips an intervening vowel. Thus we need to rule these out. Meanwhile, copying should be possible for reduplication, i.e., where an independent morpheme, which is usually taken to be a phonologically empty morpheme RED, is involved. Therefore, the correspondence relation depicted in (10) should be possible:

(10) /…S…+ RED/ → […S…] […S…]

To differentiate (9a) and (9b) from (10), the crucial observation is that the difference lies in the fact that in (9a) and (9b), multiple correspondents of one underlying segment are in a single morpheme, while in (10) they are in different morphemes.

More formally, to rule out (9a) and (9b) while allowing (10), I propose to impose a restriction on correspondence, relying on the notion of *exponence* and *Morpheme Associate* in McCarthy and Prince (1995: 312):

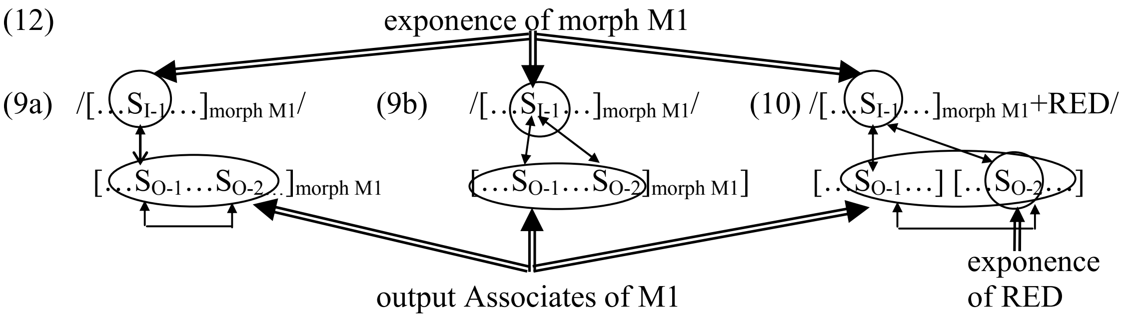
> A morpheme stands in a primitive relation of *exponence* with some structure of segments or autosegments. Typically, this is given by the lexical entry of the morpheme, but in the case of reduplicative morphemes, their only content is what's in the output, and this is then their exponence.

The exponents of underlying nonempty morphemes are their segments found in the input. However, the exponents of reduplicative morphemes, which by definition lack underlying content, are their output segments. McCarthy and Prince (1995:312) further define a more general notion of morphemic content, *Morpheme Associate*, which is preserved under correspondence:

(11) Morpheme Associate:
A segment (autosegment) x is an associate of morpheme M if x or some correspondent of x is an exponent of M.

Given this definition, in both (9a) and (9b) the multiple correspondents of S are output morpheme associates of S in the input. Now consider the diagram below which summarizes exponence and output morpheme associates in (9a), (9b) and (10) (Morpheme Associates in the input are ignored as they are irrelevant for the discussion):

(12)



One critical observation is that having multiple Associates in the output (S_{O-1} and S_{O-2}) of one underlying segment in morpheme M1 (=S_{I-1}) is allowed iff one of the Associates is also exponent of another morpheme. I thus propose the following restriction:

(13) Let S be elements in the Input and Output where
$S_I \in$ Input
$S_o \in$ Output
S_{O-1} and S_{O-2} cannot be output Associates of a morpheme M1 for S_{I-1} unless S_{O-2} is also an exponent of morpheme M2 (where M1 $\neq$ M2).

As a corollary of this proposal, multiple correspondents of one underlying segment, whether generated by (9a) or (9b), are not allowed within one morpheme.[2] It then follows that a phonological operation like echo epenthesis cannot be achieved by (9a) or (9b), as it would violate (13).

3. Locality in Echo Epenthesis

This section discusses how to rule out the unattested pattern in (3) under the current proposal. Given (13), copying is inherently limited to morphological operations. As a consequence, copying, which can potentially skip intervening segments (see §4), cannot be used for echo epenthesis. The only way to achieve echo epenthesis, therefore, is to resort to spreading. However, spreading cannot skip a potential target for the reason detailed below.

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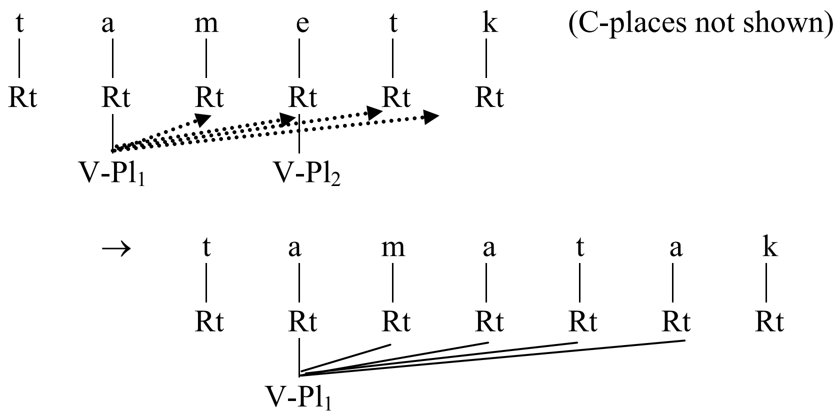
[2] This has consequences for a correspondence-based analysis of fission and other phenomena (such as an analysis of Semitic biconsonantal roots). See §5 for some discussion.

For the sake of illustration, I assume locality of spreading, which basically prohibits skipping in spreading.[3] It does not matter whether we use strict locality, which requires segment-level locality (Gafos 1996; Ní Chiosáin and Padgett 1997 and others) or tier-dependent locality which requires spreading of V-place to be local at the level of the V-place tier (Archangeli and Pulleyblank 1994 among others). I take the former view here for illustration, which follows from the conception of spreading as extending the temporal span of articulatory gestures to encompass more than one segmental root node. However, nothing hinges upon this choice.

Schematically, suppose that underlying /$C_1V_1C_2V_2C_3C_4$/ attempts to resolve the word-final consonantal cluster via spreading of V_1. In order for V_1 to be realized between C_3 and C_4, the V-Place of V_1 must also spread onto V_2 (recall that skipping is impossible). Total spreading of V_1 changes V_2 into V_1, since one vowel cannot simultaneously bear two V-Place specifications.[4] This is illustrated in the diagram (14), using /tametk/ as an example, which results in [tamatak], not [tametak]:

(14)


In short, the reason why echo epenthesis cannot map underlying /tametk/ onto [tametak] is that, given locality of spreading, it must instead result in [tamatak].[5]

To complete the discussion on locality of echo epenthesis, there is one more point to address. Although echo epenthesis is subject to a very strict locality restriction, there is one case where we find variation in terms of which segment is targeted for echo epenthesis.[6] The variation arises in case where a glide is closer to the target position than a vowel. In such a configuration, some languages chose the intervening glide as the echoed segment, but other languages allow such intervening glides to be transparent. For

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[3] In theories that do not assume such strict locality, a representation like (5) is ruled out by prohibition on line crossing (see Goldsmith 1976; Clements and Hume 1995).

[4] A V-place node may be imposed on consonants; this means that the vocalic gesture is coarticulated with the consonantal gestures. In some recent proposals, such structures are claimed to be marked and penalized by a various set of constraints. See e.g. Gafos and Lombardi (1999).

[5] The issue of vowel transparency in vowel harmony remains as a problem for a theory that assumes locality of spreading. The question - why spreading of the entire V-Place (in echo epenthesis) does not exhibit transparency - is an interesting question, but to solve this problem is beyond the scope of this paper. Bakovic (2000: 263-268) provides a nice overview of several approaches for relevant problems.

[6] This observation has already been made by Kitto and de Lacy (1999), though their analysis is based on morphemes with unspecified timing slots.

example, given an input like /twa/, two outputs are possible cross-linguistically: [tuwa] and [tawa]. This variation is illustrated by the following examples from Fula and Winnebago:

(15) Fula Borrowing from French (Paradis 1996: 516)

a. [CC(≠G)V]: echo a vowel			b. [CGV]: echo of a glide		
French	Fula		French	Fula	
[plas]	[palas]	'place'	[bwasõ]	[buwasɔŋ]	'drink'
[traktœr]	[taraktɔr]	'tractor'	[kwafe]	[kuwa:f-a:-dɛ]	'coif'

(16) Winnebago epenthesis (Miner 1992)

a. [CC(≠G)V]: echo a vowel			b. [CGV]: echo a vowel		
/ʃroʃ/	[ʃoroʃ]	'deep'	/kwe/	[kewe]	NO GLOSS
/xrutʃ/	[xurutʃ]	'inch long'	/ʃ+waʃi/	[ʃawaʃi]	'dance 2nd'

Glides in Winnebgao are transparent to echo epenthesis, while glides in Fula are opaque. This ambiguous behavior of glides is independently observed in the context of vowel harmony: some glides are transparent while other glides are opaque to vowel harmony, which is arguably another kind of operation which spreads vocalic features (Clements 1977 *et seq*). Following Herman (1994) and Hume (1995), this dual behavior of glides can be captured as resulting from the dual status of glides: some glides are consonantal, having C-place specifications, while other glides are vocalic and therefore have V-place specifications instead.[7]

Glides in Fula, therefore, have V-place values, and thus echo epenthesis cannot spread across these glides. This can either be achieved by a prohibition on line crossing (Goldsmith 1976; Clements and Hume 1995) or, if we assume strict locality, can be derived from the impossibility of two contradictory V-place specifications on a single segment. Either way, as a result, echo epenthesis must be initiated by the intervening glides because spreading across these vowels is impossible.[8] Glides in Winnebago, on the other hand, have only C-place specifications, and therefore it is possible for V-place to spread through them just like vowel harmony can rather freely permeate consonants.

In summary, I have pointed out two generalizations concerning the locality of echo epenthesis:

(17) (i) Echo epenthesis never targets a distant vowel.
(ii) Echo epenthesis can target a vowel when a closer glide is available.

[7] Another way to account for glides' variation between vocalic and consonantal is to assume that glides can either be true onsets or be incorporated in nucleus thereby functioning as nuclear onglides (see Smith (2002: 146-158) and references cited therein). I do not attempt to apply this line approach to the problem of variable transparency of glides here.

[8] In some languages, once spreading is blocked, a default vowel is epenthesized. See the Japanese foreign word epenthesis case discussed below.

I have argued that if echo epenthesis is always achieved by spreading, the first local property of echo epenthesis follows. The second property can be captured by assuming that the status of place specifications for glides is cross-linguistically variable.

Finally, to close this section, I discuss some more predictions of the proposal in (13) for echo epenthesis. Due to space limitations, I can only briefly discuss each of the predictions; see Kawahara (2004) for further discussion on these points. The predictions are:

(18) (i) There is no long-distance consonantal echo epenthesis across vowels.
(ii) Echo epenthesis can be blocked by intervening segments.
(iii) Length is never transferred.

First, it has been observed that major C-place does not spread across vowels (Clements and Hume 1995; Gafos 1996; Ní Chiosáin and Padgett 1997 *inter alia*); therefore the proposed theory, which prohibits non-reduplicative copying, predicts that there should be no language that has consonantal echo epenthesis across vowels. This prediction seems to be borne out, since, for example, no language is reported to supply a consonant to onsetless syllables by long-distance consonantal echo epenthesis; there are no cases like /ata/ → [tata], /aka/ → [kaka].[9]

Second, spreading is known to sometimes be blocked by a particular set of segments, so echo epenthesis should also sometimes be blocked when certain segments would intervene between the echoed vowels. Japanese loanword epenthesis provides an example: echo epenthesis takes place only across [h]. Echo epenthesis takes place across [h] as in [bahha] 'Bach' or [gohho] 'Gogh', but a default [ɯ] is inserted instead if an oral consonant intervenes, as in [sokkɯsɯ] 'socks'. This sort of laryngeal transparency is one well-known property of spreading (Steriade 1987).

Finally, since length not a property of segments, it cannot be transmitted when a segment spreads ("length harmony" is not attested; see Hyman and Udoh 2002 for recent discussion). This predicts that even when a long vowel initiates echo epenthesis, the result is always a short vowel because of the effect of *LONGVOWEL (no faithfulness constraint could require an echoed vowel to preserve the length of the trigger vowel). On the other hand, if echo epenthesis could be achieved by correspondence-based copying, IDENT-BR(μ) could produce long epenthetic echo vowels. Note that in reduplication, length of the base is sometimes transferred to the reduplicants. In Kihehe reduplication, for example, as seen in /mi-doodo+RED/ → [mi-doodo-doodo] 'fairly little', the long vowel reduplicates as long and the short vowel as short (Odden and Odden 1985). In my survey, the prediction in (18c) is also borne out, although there are admittedly not many cases where echo epenthesis is triggered by long vowels.

4. Locality in reduplication

In §3, I discussed the locality requirement on echo epenthesis. In this section, I

[9] Kawu (2000) argues that such a case exists in Yoruba, but the pattern he discusses is inherently morphological, which is likely to involve reduplication. See Marantz (1982) and Alderete et al. (1999) for an analysis of this case as reduplication.

show that even though reduplication too is subject to a locality requirement, the requirement here is less stringent. I first provide illustrative cases of nonlocal reduplication. Next, adopting the position that locality of corresponding segments is governed by violable constraints (Hogoboom 2003; Kitto and de Lacy 1999; Nelson 2003; Riggle this volume), I provide an analysis of these cases. This assumes that reduplication is achieved by a mechanism different from spreading; namely, by correspondence-based copying, a standard position in the generative literature (McCarthy and Prince 1995; Marantz 1982; Steriade 1988).[10]

4.1. Examples

The fact that the locality requirement in reduplication is violable is clearly illustrated by reduplication in Nakanai. The data are repeated below:

(19) Sonority based reduplication

a.	/RED-taro/	→	[t<u>a</u>-taro]	'away'
b.	/RED-buli/	→	[b<u>u</u>-buli]	'roll'
c.	/RED-mota/	→	[m<u>a</u>-mota]	'vines'
d.	/RED-kusa/	→	[k<u>a</u>-kusa]	'wet'
e.	/RED-biso/	→	[b<u>o</u>-biso]	'two by two'

As seen in (c-e), when V_2 is more sonorous than V_1, V_2 is reduplicated. Nakanai is not an isolated example; a similar example is found in Tawala, where a CV_1V_2 base reduplicates as CV_2-CV_1V_2, as in *ge-gae* 'go up' (Ezard 1997: 43) in which V_1 is never copied.[11] Efik (Cook 1987) provides yet another example where, if the base has [-ATR] vowel followed by [+ATR] vowel, the second vowel is copied; /RED+tika/ → [a-tika] 'kick'.[12]

Yoruba ideophone reduplication shows a parallel sonority-driven copying pattern, but for consonants (Nelson 2003: 174-185 and references cited therein).[13] Yoruba expands three-syllable ideophones to four syllables by copying one syllable to express emphasis or increased intensity. The distinct behavior of phonological two types of

[10] When reduplicative copying is impossible for independent reasons, other strategies can be used to assign exponence to reduplicants. In Igbo and Lushootseed, for example, epenthesis is used when copying is made impossible by higher ranked constraints (Alderete et al. 1999). Similarly, in FeʔFeʔ Bemileke, spreading is necessitated when copying is impossible, and further epenthesis is observed when spreading is blocked. See Kawahara (2004) for an analysis of FeʔFeʔ Bemileke.

[11] Given that V_2 is always less sonorous than V_1 and thus is shorter than V_1, it might be that reduplicative vowels are required to be as short as possible (see Kirchner 1996; Alderete et al. 1999).

[12] This reduplication fails to copy a consonant, but it is a general property of this language that prefixes begin with a vowel.

[13] Nelson (2003) in fact argues that (20) is not a case of morphological reduplication but rather of phonological augmentation to a four-syllable template, arguing that a morphological analysis cannot explain the difference between (a) and (b) in (20). However, a simple analysis is possible as discussed below. Moreover, since this process accompanies a change in meaning, it casts doubt on an analysis that augmentation is purely phonological. Also, as Nelson admits, there are some cases where the same process creates an output larger than four syllables; if this echo were the result of purely a phonological requirement to be four syllables, this pattern remains unexplained. Hence, I take the data in (20) as a genuine case of morphological reduplication.

ideophones is of some interest here: when the third syllable has an [r] onset, the target of reduplication is either the third or second syllable; otherwise, it is always the third syllable that is targeted. Some examples are provided in (20):

(20) Yoruba ideophone reduplication

a. CVCVrV → $CVC_iV_jrVC_iV_j$ or CVCVrVrV

pepere → pepere-pe	~ pepere-re	'of being very cute and robust'
gɛ̀gɛ̀rɛ̀ → gɛ̀gɛ̀rɛ̀-gɛ̀	~ gɛ̀gɛ̀rɛ̀-rɛ̀	'of being very stout and bulky'
gogoro → gogoro-go	~ gogoro-ro	'loftiness'

b. CVCVC(≠r)V → $CVCVC_iV_jC_iV_j$

rogodo → rogodo-do	'of being very round and small'
lɔ̀kɔ̀tì → lɔ̀kɔ̀tì-tì	'of being very sticky'
lɔ́kósán → lɔ́kósán-sán	'of being very slim and agile'

As seen in (20a), syllables with an onset [r] can be skipped in reduplicative copying. The variation in (20a) follows from avoiding [r] onsets in reduplicants; [r] is a sonorous segment and hence is avoided as an onset consonant. Such avoidance of onset [r] is in fact independently motivated in the phonology of Yoruba, which manifests itself through the optional deletion of intervocalic [r] (see Akinlabi 1993).

Finally, so-called opposite-edge reduplication constitutes another example of reduplication that skips potential local targets. Even though some recent proposals, notably Nelson (2003), argue that such cases are nonexistent, Creek provides one convincing case of opposite-edge reduplication (Riggle this volume):

(21) Creek reduplication

	Base	Reduplicated	
a.	polo:k-i:	polo:-<u>po</u>-k-i:	'round'
b.	holwak-i:	holwa:<u>ho</u>-k-i:	'ugly'

Descriptively speaking, the stem-initial CV is copied and infixed before the root-final consonant. Notice again that potentially closer targets are skipped for reduplicative copying: [l] in (21a), and [l] and [w] in (21b).

In summary, there is a set of cases where reduplication skips potential targets that are closer than segments which are actually copied. This contrasts with echo epenthesis, where such skipping is not allowed, as discussed in §3.

4.2. Analyses

This difference between echo epenthesis and reduplication can be derived from the difference in the mechanisms involved: as shown in §3, if echo epenthesis is always achieved via spreading, its strict locality condition follows on the assumption that spreading affects each intervening segment. On the other hand, if reduplication involves copying by way of correspondence, then the weaker locality condition on reduplication follows if such locality is governed by violable constraints. It then follows that skipping is possible in reduplication because correspondence-based copying does not affect intervening segments, unlike spreading.

Exactly how locality of correspondence should be formalized in terms of constraints is a topic for current research, but this issue is orthogonal to the concerns of this paper (see Hogoboom 2003; Kitto and de Lacy 1999; Nelson 2003; Riggle this volume for relevant discussion and different proposals). For current purposes, all that is required is that the adjacency requirement on corresponding segments be violable. To provide a concrete analysis, I adopt from Kitto and de Lacy (1999) the following constraint that requires that correspondents be as close as possible:

(22) ADJACENCY: Corresponding segments must be adjacent. Assign one violation mark for each segment that stands between corresponding segments.

The violation of this constraint is calculated gradiently to capture the fact that in reduplication total adjacency is rarely achieved, yet copying usually results in such a way that adjacency is maximally respected (though cf. McCarthy 2004).

In Nakanai, the markedness requirement that vocalic nuclei be as sonorous as possible overrides the locality requirement in reduplication. Following Prince and Smolensky (1993) and other subsequent work, I adopt the family of *X/NUC constraints with the fixed ranking given in (23). Assuming that a nuclear low vowel is entirely not marked, I leave out the constraint *LOWVOWEL/NUC (see Gouskova 2003).

(23) *X/NUC: X cannot be in the nucleus of the syllable
*HIGHVOWEL/NUC » *MIDVOWEL/NUC

In Nakanai, these constraints dominate ADJACENCY. The tableaux below illustrate the interaction of these constraints. For simplicity's sake, violation marks of ADJACENCY and *X/NUC are shown only when they are incurred by the reduplicative vowel:

(24)

/RED+buli/	*HIV/NUC	*MIDV/NUC	ADJACENCY
a. ☞ [b_1u_2-$b_1u_2l_3i_4$]	*		*
b. [b_1i_2-$b_1u_2l_3i_4$]	*		**!*

(25)

/RED+beta/	*HIV/NUC	*MIDV/NUC	ADJACENCY
a. [b_1e_2-$b_1e_2t_3a_4$]		*!	*
b. ☞ [b_1a_4-$b_1e_2t_3a_4$]			***

As seen in the first tableau, when the two vowels are equal in sonority, ADJACENCY exerts its effect, requiring the closer base vowel to be copied. On the other hand, when V_2

is more sonorous than V_1, reduplication targets the more sonorous vowel, disregarding the distance between the corresponding segments.

To express tendency to avoid an onset [r] in Yoruba, I employ the markedness constraint *r/ONSET. If this constraint is crucially unranked with respect to ADJACENCY (see e.g., Anttila and Cho 1998 for unranked constraints), a specific ranking between them is chosen at each evaluation time, as in (26) and (27) below. As a result, the variation arises:

(26)

/pepere+RED/	ADJACENCY	*r/ONSET
a. ☞ [$p_1e_2p_3e_4r_5e_6$-r_5e_6]	*/*	**
b. [$p_1e_2p_3e_4r_5e_6$-p_3e_4]	***!/***	*

(27)

/pepere+RED/	*r/ONSET	ADJACENCY
a. [$p_1e_2p_3e_4r_5e_6$-r_5e_6]	**!	*/*
b. ☞ [$p_1e_2p_3e_4r_5e_6$-p_3e_4]	*	***/***

Finally, for the case of Creek, the requirement to copy the initial segments of the base, which is either expressed as ANCHOR-L or MAX-$BR_{\sigma1}$, takes precedence over locality requirement on correspondence segments. See Riggle (this volume) for a more detailed analysis.

5. Discussion: Copying and Spreading

In the discussion above, I have argued that the difference in locality requirements between echo epenthesis and reduplication follows naturally if the former involves spreading and the latter involves copying. The independently motivated characteristics - spreading affects intervening segments while reduplication does not - derives the difference in their locality requirements. What is particularly important is that correspondence-based copying can never derive echo epenthesis. Otherwise, we would lose the explanation of why echo epenthesis cannot skip a potential target vowel, while reduplication can. Recall that in my analysis, echo epenthesis cannot skip an intervening target because skipping is inherently a property of correspondence, but correspondence does not trigger echo epenthesis.

My proposal limits multiple correspondents of one underlying segment where each of the surface correspondents is an exponent of a different morpheme. With this modification added to the original Correspondence Theory of McCarthy and Prince (1995), purely phonological copying is in principle ruled out.

There are two major theoretical consequences of the view advanced in this paper. First, it provides support for the thesis that copying and spreading are distinct mechanisms: some recent works have cast doubt on the existence of autosegmental spreading in Optimality Theory (Bakovic 2000; Krämer 1999; Kitto and de Lacy 1999). The analysis presented here suggests that autosegmental spreading still plays a vital role in phonological theory, contrary to such claims.

Second, the proposal in (13) runs counter to some recent proposals that utilize the mechanism of phonological copying (Krämer 1999; Kitto and de Lacy 1999; Nelson 2003; Rose and Walker 2001; Zuraw 2003 among others). To the extent that this paper's conclusion is on the right track, it suggests reexamination of any analysis that relies on non-reduplicative copying.

Here, I will provide a brief reanalysis of some of such representative cases that have been analyzed in terms of non-reduplicative copying. Due to space limitations, I can only provide an outline of possible line of reanalyses. See Kawahara (2004) for more discussion.

First, fission (a.k.a. breaking or diphthongization) has been analyzed as a process that involves one-to-many correspondence (Keer 1999); this is rendered impossible by (13). One possible reanalysis is to treat fission as an insertion of a new root node (in violation of DEP) with concomitant redistribution of underlying features.

Second, Rose and Walker (2001) analyze long-distance assimilation as the effect of word-internal correspondence (see Zuraw 2003 for a similar approach); however, such cases can instead be analyzed as the effect of AGREE (or other co-occurrence constraints) on a large domain (e.g., stem or root). However, we need to make sure that it is impossible to achieve the unattested pattern in (3) by AGREE; this is guaranteed if there are no AGREE(PLACE) constraints. In fact, the absence of such a constraint is supported by the fact that there is no long-distance place assimilation.

Finally, a famous mapping of underlyingly biconsonantal Semitic roots (/sm/ → [smm]) has been analyzed as non-reduplicative copying (Ussishkin 2000). This can be perhaps reanalyzed by either (i) regarding the mapping as inherently morphological and thus involving a RED morpheme or (ii) assuming that underlyingly biconsonantal roots undergo default consonant epenthesis rather than copying to satisfy templatic requirements (see Gafos 2003 for such a view).

6. Conclusion

In this paper, I have proposed a modification to Correspondence Theory so as to limit correspondence-based copying to morphological operations like reduplication. From this proposal, it follows that echo epenthesis is always achieved by spreading of V-place, and never by copying. This explains the strict locality requirement on echo epenthesis, where skipping a closer target is absolutely banned. Reduplication, on the other hand, in principle involves copying via correspondence, unless copying is blocked by higher-ranked constraints (see footnote 10). As the locality requirement on corresponding segments is inherently governed by violable constraints, reduplication exhibits a looser locality requirement.

To the extent that this analysis is on the right track, it shows that spreading and copying are distinct mechanisms, even though both of them result in repetition of underlying single segments. My proposal further suggests that correspondence cannot be established without limit; rather, copying is fundamentally limited to morphological operations.

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