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Moira Yip

University of California, Irvine and Brandeis University

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Reduplication with Fixed Melodic Material

Moira Yip

University of California, Irvine
Brandeis University

Reduplication is often accompanied by substitution of fixed melodic material for part of the copy. The fixed material may be complete segments, or fixed features. In the latter case, the surface form combines the fixed feature with the other underlying features, so that the relevant vowel, for example, is a high version of the base vowel in Akan. The phenomenon, which I will call melodic replacement, is found with and without reduplication. When there is no reduplication, we get such things as ablaut and mutation. I will largely limit this discussion to cases involving reduplication.

The central points I will argue for are these. (1) Two previous analyses, Steriade's insertion analysis and McCarthy and Prince's over-writing analysis, are equivalent in their claims that loss of base material is the result of phonotactic pressures; that is, the impossibility of syllabifying both base material and new material simultaneously. (2) This insight is correct, but there is a class of cases that poses a problem for it, in that base material deletes even when the syllable could hold both it and the new material. I will offer an account of these cases that allows us to maintain the role of phonotactics in conditioning deletion. (3) There are major asymmetries in the syllabic positions that are subject to melodic replacement. Most noticeably, coda replacement is rare unless accompanied by nucleus replacement. I will argue that the left-to-right association of McCarthy and Prince's melodic overwriting offers an explanation for these asymmetries which is not available in Steriade's insertion approach. As a consequence, we may be able to eliminate the operation of "Insert into.." from the grammar, just as infixation can now be viewed as affixation under extrametricality (McCarthy and Prince 1990).

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Some languages which show melodic replacement with reduplication are listed below.

(1)a. <u>Complete Segments</u>				
Onset	Vowel	Coda	Onset+Vowel	Vowel+Coda
English	Sanskrit	Kaingang	Kolami	Vietnamese
Kota	Chinese	Man T'a	Nicobarese	Tzeltal
Vietnamese	Javanese	BellaCoola	Marathi	Anxiang
Mandarin	Yoruba	Tzeltal	Kannada	
Kamrupi	Madurese	Turkish	Tamil	
Turkish	Gothic	Armenian		
Armenian	Greek			
Marathi	Vietnamese			
Kamrupi	Bella Coola			
Cantonese	Gta?			
	Kota			
	Igbo			
b. <u>Features</u>				
Kunshan	Akan	Vietnamese	Kota	?
Javanese	Javanese	Rongxian		
	Kaingang	Miju		
	Vietnamese			
	Terena			

Examples of each kind of case are given in (2). Data comes from the following sources. Kota: Emeneau 1969; Vietnamese: Nhan 1984, Emeneau 1951; Kunshan, Man T'a: Chao 1931, Yip 1982, Bao 1990; Akan: Schachter and Fromkin 1968; Anxiang Yip 1991; Kolami: Emeneau 1955; Marathi: McCarthy and Prince 1986; Kaingang: Wiesemann 1972; Kota: Emeneau 1969; Javanese: Dudas 1968; Turkish: Underhill 1976; Igbo: Sanskrit: Steriade 1988.

(2) <u>Segments:</u>			
<u>Onset: Kota:</u>	ve:k me:kin		'to make sport of someone'
<u>English:</u>	table-shmable		
<u>Vowel: Javanese:</u>	eliŋ > elaŋ-eliŋ		'remember'
<u>Vietnamese:</u>	nhop > nhop nhep		'chew noisily'
<u>Coda: Man T'a:</u>	tuŋ > tun t'uŋ		'East'
<u>Kaingang:</u>	tam > tyŋ tam		'cover'
<u>Onset + Vowel: Kolami:</u>	palkul > palkul gilkul		'teeth and the like'
<u>Marathi:</u>	kholi > kholi bili		'room'
<u>Vowel + Coda: Vietnamese:</u>	nho > nho nhat		'trivial'
<u>Anxiang:</u>	mian > mian miər		'face'

(3) <u>Features:</u>			
<u>Onset: Kunshan:</u>	k'c	k'o fiç	
	ts'a	tso za	
(Place is held constant; continuancy and voicing dissimilate.)			
<u>Vowel: Akan [+high]:</u>	se > sise		'say'
<u>Vietnamese [-back]:</u>	mum > mum mim		'smile'
<u>Coda: Vietnamese [+nasal]:</u>	phot > phon phot		'moves the spirit'
<u>Onset + Vowel: Kota [Labial]:</u>	jaç > jaç boç		'noise of sexual intercourse'
	tat > tat potn		'starting up suddenly from sleep'

1. Previous Approaches to the Phenomenon:

Marantz (1982) and Yip (1982) made use of pre-specification

on the reduplicative CV template to deal with these data. McCarthy and Prince (1986:86, 1990) argue convincingly that such an analysis is untenable, and I refer the reader to their work.

Steriade (1988) argues for an insertion analysis, and explicitly states that apparent substitution is the result of insertion resulting in a violation of the phonotactics of the language, triggering loss of one of the original segments. She suggests that the position of insertion can be stated with two parameters: first/last syllable (with the option of extrametricality), and onset/rhyme. Coda replacement can thus be stated as "Insert [+cons] into rhyme". As an example consider Kaingang. Kaingang has a pluralization process which inserts /ŋ/, into the coda of the penultimate syllable (data from Wiesemann 1972, Steriade 1988). The [ŋ] is found with and without reduplication. There is also a vowel raising process which sometimes co-occurs with this:

(4)	ne	neŋ-ne	'bury'
	tam	tyŋ-tam	'cover'
	kavi	kaŋvi	'stretch'
	jakajen	jakyŋjen	'turn, twist'
	kavej	kaviŋ-vej	'dirty'

Steriade's analysis proceeds like this:

(5)	Reduplicate:	/tav/
	Final syllable extrametrical	tav-tav
	Insert /ŋ/ into 'final' rhyme:	tav <tav>
	Delete unlicensed material	taŋv-<tav>
		taŋ-tav

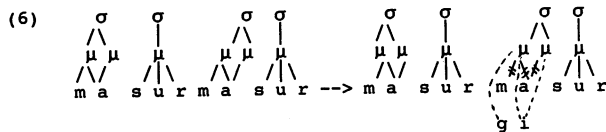
A central claim of her proposal is that base material is only deleted when the phonotactics of the language do not allow both inserted and base melodies to co-exist. In Kaingang syllables cannot end in two consonants, so in (5) insertion of /ŋ/ causes loss of /v/. As a further example, in Sanskrit the intensive is formed by insertion of /a/ into the rhyme. The original nuclear material, however, does not necessarily delete, but surfaces in coda position if possible: /su:d/ > sau-su:d, 'put in order'. This kind of morphology cannot create a new syllable, but must find room for the new material in the existing syllable, in contrast to concatenative morphology (see Steriade 1988: 78). In non-reduplicative environments, the difference can be exemplified by the concatenative morphology of the English -er suffix, presumably /r/, which can create a new syllable, as in fly [flay], flier [flayer], versus the non-concatenative Mandarin Er suffix, as in pai 'signboard' [pay] -> [par], where /r/ is inserted into the rhyme with concomitant loss of the base coda.

Bao (1990) takes Steriade's approach and puts it to work on Chinese fan-qie languages. He uses the term substitution, and his rules simultaneously insert new material and delete base material. There is no reliance on phonotactics, and as a result the rules frequently duplicate the effects of independently needed syllable-structure constraints. I shall not discuss Bao's proposal further.

McCarthy and Prince (1986, 1990) argue that new melodic material is introduced into the syllable by the standard process of association by which any melody associates to a template. In most cases this will be left-to-right, but right-to-left is also a possibility. Root nodes (segments) associate to prosodic nodes

(syllable, mora), while features associate to root nodes. Base material detaches only when the syllable cannot hold both overwritten and base material. Note that over-writing is clearly to prosodic positions, not root nodes, because null onsets (ie where there is no root node) may be filled by over-writing (for example in Kolami, where we find *i:r q:i:r* 'water'). The most precise statement of how over-writing works is given in McCarthy & Prince 1990 (p.245). It takes a melodic morpheme and "associates in the usual left-to-right fashion, delinking the base phonemes as it goes". The difference between this phenomenon and standard root-and-template morphology is that here the association operates in a feature-changing manner, rather than a feature-filling one.

This approach makes the general claim that the delinking of the base phonemes is a consequence of their slots in the syllable being taken up by the new melody. If the syllable is large enough to accommodate both new and old melody, no delinking should then take place, and we get something other than exact substitution. If the syllable cannot hold both, then delinking takes place. In Kaingang, after /ŋ/ associates to the coda any base coda will delink because the Kaingang syllable cannot end in two consonants. In Kolami, long vowels delink from both moras when /gi/ is associated because syllables with two different vowels are impossible in Kolami. So /maasur/ > maasur gi:sur, not maasur gi:sur. A sample derivation is given below:



The two proposals which hold the most promise of being right are those of Steriade and of McCarthy and Prince, and they agree on a number of points, laid out below:

(7) Similarities between Steriade and McCarthy and Prince:

- a. Delinking/deletion of base material is expected only when forced by the phonotactics.
- b. Syllable structure, including vowel length, is preserved in both theories.
- c. Replacement of empty onsets is expected in both theories

There are other areas in which they differ:

(8) Points of difference:

- a. The primitives of the theories differ
- b. Exactly where in the syllable does replacement melody surface?
- c. What sequences can be replaced at once (onset + vowel?, onset + coda?, etc)

The central claim about the role of phonotactics in causing delinking, (7a), is made by both Steriade and McCarthy and Prince, and in the next section of the paper I will focus on four problem cases in which delinking happens even when not forced by the phonotactics. I will then focus on some differences between Steriade's and McCarthy and Prince's approaches with respect to

what elements are subject to replacement.

2. Is Delinking always due to Phonotactic Pressure?

2.1 The Problem: Delinking in the absence of phonotactic pressure

In an interesting set of cases we find something unexpected under the theories just outlined. The general problem is this: material delinks from the base unnecessarily so to speak, when there is room for the two sets of material to co-exist. What one observes is something smaller replacing something larger. The first case I will discuss involves replacement of a complete rhyme by a single vowel, and the second and third cases involve replacement of two onset segments by a single new segment; the fourth case involves replacement of up to three [-cons] segments by one vowel. In each case I will attribute the unexpected loss of base material to some other property of the language.

2.1.1 First Problem: Vietnamese

Vietnamese has a rich array of reduplicative forms, some full and some involving replacement in one or other syllable. The replacement may be of the onset, here by /l/ lam tham 'whisper'; the nucleus, here by /e/ nuech nguac 'to be in disorder'; the nucleus-coda, here by /ang/, voi vang 'to hurry'; by [+nasal] on the coda ngoun nguot 'to almost stop'; or by [-back] on the nucleus: mum mim 'smile'. Data are from Emmeneau 1951 and Nhan 1984. Here and throughout I have omitted the tones, and I have otherwise used standard orthography, with comments where necessary. There is not always a clear semantics associated with a particular form of reduplication, so the choice seems to be lexically determined. Of interest here is a form of reduplication which substitutes a vowel for the complete rhyme of the syllable. This differs sharply from cases like Javanese, Kota and indeed other Vietnamese forms, in which nuclear vowels replace only nuclear vowels (eg Kota car cur-in, Javanese elan elin, Vietnamese quech quac). The new vowel varies among a,u,e,o, and although generally replaced in the second syllable, may be replaced in the first. (Examples with French glosses are from Cordier (1930) cited by Emmeneau.)

- | | | | |
|-----|------------|-----------------------|----------------------------------|
| (9) | gat | > gat gu | 'nod repeatedly' |
| | gap | > gap go | 'meet' |
| | xuc xac | > xuc xac xuc xe | 'call in a dice game' |
| | bong long | > bong long ba la | 'wander aimlessly' |
| | sung sinh | > sung sa sung sinh | 'porter des vêtements
amples' |
| | lung thung | > lung tha lung thung | 'extremely baggy' |

Any account in which delinking is caused by phonotactic pressures does not predict these forms, since the syllables which would result from delinking of the vowel only (such as gut, gop, xec, bang, lang, thang) are all acceptable in Vietnamese.²

There is a way to understand these facts without giving up the claim that delinking is the result of phonotactic pressure., and it rests on the observation made by both Steriade and McCarthy and Prince that languages have morphological truncation processes that delete segments. Marathi is one example (data from McCarthy and Prince 1986:85). We find forms like awti-bhawti 'around' and anne-sanne 'in front of', in which an onset has been truncated. (See also Bella Coola (Bagemihl 1991):ti-tixtala -> itixtala 'robin, DIM', and Tübatulabal (Crowhurst 1991), kuu-kuuŋu -> ?uu-

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kuuŋu 'she married') Given truncation as an operation of UG, let us reconsider the Vietnamese data. We may simply say that the forms in (9) are the result of the familiar replacement of a nucleus by a vowel, followed by truncation of the final consonant. The following derivation would be typical:

(10)		/gap/	'meet'
Reduplicate:		gap gap	
Insert/overwrite nucleus:		gap goap	
Delete unlicensed material:		gap gop	
Truncate coda:		gap go	

There is independent evidence for simple nucleus replacement, (11), and also some examples of simple truncation, (12):

(11)	nhop nguac	nhop nhop nguech nguac	'chew noisily' 'to be in disorder'
(12)	ray bay nhay rich dep	ray ra bay nha bay nhay chay ri rich dep de	'very cumbersome' 'very sleazy' 'murmurer' 'to be beautiful'

I conclude that the Vietnamese data do not require weakening of the claim that loss of base material is the result of phonotactic pressure.

2.1.2 Second Problem: Vietnamese again

Vietnamese offers a second problem for the delinking-due-to-phonotactic-pressure theories.³ The language has limited complex onsets, with the second consonant being the back rounded glide /w/ (orthographically u or o, but given here with w for clarity). There are forms of reduplication that overwrite the onset with a single consonant (here mostly /l/), so one can ask whether the glide is replaced or retained. What we find is great variability. Emeneau gives cases of both kinds, and Nhan implies that there is free variation:

(13)	a. <u>Glide not over-written (and shown in boldface)</u>		
	noi qwanh > noi lwanh noi qwanh		'talk around and about'
	mwot > lwot mwot		'to weep with big tears'
	chwat > lwat chwat		'to be dwarfish'
	hwang > twang hwang		'ruined'
	b. <u>Glide Over-written:</u>		
	khweo > leo khweo		'to be weak or feeble'
	hwang > bang hwang		'anxious'
	c. <u>Free Variation:</u>		
	qwan > lwan qwan		'hanging around'
	OR lan qwan		
	hwac > twac hwac		'to be wide opened'
	OR tac hwac		

The expected cases are those in (13a), since the new onset should be able to co-exist with the underlying glide, and thus there is no phonotactic pressure to cause its deletion. The problem is thus to explain the data in (13b-c). Notice that Vietnamese does not generally allow complex onsets. Suppose speakers tend to force these Cw words into the usual simplex onset canonical form, and

analyze apparent Cw clusters as single labialized segments, C^w. If this is right, the expectation is that the entire C^w segment will be replaced by a new onset, as in (13b). The variability in (13c) reflects speakers' uncertainty about the status of these Cw or C^w forms.

2.1.3 Third Problem: Kannada

Kannada is a Dravidian language, and has the familiar echo word forms with gi substituted for the first CV of the stem, and a meaning "...and the like". (Data comes from Sridhar 1990, Bright 1958) The particular interest of Kannada lies in the fact that the language has CC onsets from loan words, and we can examine whether g substitutes for the entire onset or a single consonant. It turns out that it replaces the whole onset, even if a well-formed cluster could be made from /g/ plus one of the onset consonants.

- | | | | |
|------|--------------|-------------------------|---------------|
| (14) | bhrame-gime | 'illusion and the like' | *bhrame-grime |
| | sku:lu-gi:lu | 'school and the like' | |
| | na:y-gi:y | 'dogs and the like' | *na:y-gni:y |

Kannada has complex onsets of any consonant followed by a sonorant (except /gl/): gra:ma 'village', gna:na 'knowledge'. Thus we might expect that in the first form in (14), /bhrame/, /g/ would force delinking of /bh/, but not /r/, and that the last form in (14), /na:y/, could have /g/ associated to the onset without any delinking being necessary.

The solution to understanding Kannada comes from the limitations on CC onsets in the language. The native language has no CC onsets, which are limited to loan words from Sanskrit, English, and other languages. Suppose, then, that when a word is subjected to the native morphological process of echo-word formation the copy must conform to the native syllable structure constraints, which disallow complex onsets. In that case when /g/ overwrites the onset, /bhr/ will all disassociate. Support for this idea comes from the fact that Sanskrit loans in general follow their own set of phonological rules (rather like Latinatinate words in English, or the Sanskrit vocabulary of another Dravidian language, Malayalam, as discussed in Mohanan (1986:80)), so it seems plausible that subjecting a Sanskrit word to the native echo-word morphology "nativizes" it, so to speak, so that the output must conform where possible to the native syllable canon, which allows only C onsets.⁵ This regularization of non-native forms when subjected to native morphology can also be seen in the Arabic broken plural, where non-canonical roots are shortened to canonical size (cf McCarthy and Prince 1990) and English, where Latinatinate roots subject to velar softening do not undergo the rule in non-Latinatinate morphology, eg magi[k]i, politi[k]ing). If this is correct, then Kannada turns out not to be relevant to the central issue here: can overwriting over-write something larger with something smaller? We need a language with true CC onsets and a single C over-writing melody to investigate this issue, and as yet no relevant data have come to my attention.⁵

2.1.4 Chaoyang Onomatopoeia

Chiang (1991) in a very interesting study of Chinese onomatopoeia gives data from a variety of languages (including Chaoyang, the dialect I will discuss here) in which the vowel /i/

is substituted for all [-cons] elements in the rhyme, but coda consonants are unchanged. Since /i/ may replace more than one segment, even when the two could co-occur in the Chaoyang syllable, these data constitute another problem for the view that deletion results only from phonotactic pressure. For example, /tsiau/ 'murmuring voice' becomes tsi tsiau kio, not tsiu tsiau even though tsiu would be an acceptable syllable.⁶ However, additional data from Zhang (1982), Zhu (1982) presents the phenomenon in a rather different light. I shall argue that there is no overwriting or substitution of any kind going on in these data, and that [i] is instead the realization of a placeless vowel.⁷ The data are given below, with tonal patterns to the right of each example; the onset replacement seen in the third syllable of each example will not be discussed here.⁸

(15)	a.	k ^h i k ^h a la kio	ML ML ML ML
	b.	tsi tsiau liau kio	H H H ML
		ĩ uãĩ nuãĩ kio	H H H ML
	c.	piŋ paŋ laŋ kio	L L L ML
	or	pi paŋ laŋ kio	
		k'iŋ k'om kio	L L ML
		hi hom lom kio	L L L ML
	d.	kik kiak liak kio	L L L ML
	or	ki? kiak liak kio	
		hi? hōp nōp kio	L L L ML

Underlyingly, Chaoyang allows rhymes of the form (G)V(C), where the final consonant may be a glide (u, i), a nasal, (m, ŋ) or an unreleased and probably glottalized stop (p, k, ?); the nuclear vowel may be plain or nasalized. In reduplication, the first syllable has a drastically reduced set of rhymes, consisting of i, iŋ, ik, or i?, with nasalized vowels possible in each case. Suppose that onomatopoeic reduplication is subject to a rhyme condition disallowing Place features in the rhyme (or possibly a rule of Place truncation removes Place features). This neutralizes all vowel qualities, and all vowels surface as the default vowel, here /i/.

The same rhyme condition also merges all final nasals into [ŋ] or even [Ø], and final stops into [k] or even [?]. Only Place is affected, with nasalization, glottalization, and tone being preserved. In other words, the sonority-based distinction between vowel-final, nasal-final and stop-final syllables is preserved, but all distinctions within each type are lost. There is apparently some freedom to lose final nasals altogether, and final stops may be velar or glottal. This analysis supports the view of Trigo 1988 on velars as the realization of placeless codas. Note also that the proposed rhyme condition is a natural extension of the coda conditions discussed in Steriade 1982, Itō 1986, 1989, and Yip 1991.

I have argued that each of the apparent counter-examples to attributing loss of base material to phonotactic pressure has another explanation that is well-motivated within the language in question, and that we can still maintain that loss of base material is otherwise the result of phonotactic pressure.

3. Insertion vs. Overwriting

The differences between Steriade's insertion and McCarthy

and Prince's overwriting were listed in (8) above, and repeated here for convenience.

(16) Points of difference:

- a. The primitives of the theories differ
- b. Exactly where in the syllable does replacement melody surface? Particularly, is the coda accessible?
- c. What sequences can be replaced at once (onset + vowel?, onset + coda?, etc)

Concerning the difference in primitives, (16a), Steriade's theory uses sub-syllabic constituents onset and rhyme, and an extra mechanism (insertion). McCarthy and Prince use only the mora at the sub-syllabic level, and an operation of association to a template motivated elsewhere. Ceteris paribus, McCarthy and Prince's approach is thus to be preferred. The other two differences are empirical, and I will take them in turn.

3.1 Is the Coda Accessible?

McCarthy and Prince take association to be left-to-right in the unmarked case, with (probably) right-to-left as a marked option. Most languages only permit one vowel per syllable, so vocalic melody can only surface in one position in either approach. On the other hand many languages allow multiple consonants in one syllable, either as complex onsets, or by admitting codas. McCarthy and Prince predict that the left-most onset position (if the new melody is a possible onset) should always be the first to be replaced,⁹ and that later syllabic positions (second C in an onset, or coda) should be accessible in limited circumstances only. I discuss below the conditions under which codas might be replaceable.

(17) Codas may be overwritten only if:

- a. Association is R>L, and coda is word-final; should be more likely in suffixation, otherwise should be highly marked.
- b. Consonant is not a possible onset - rare, since codas are usually a subset of onsets.
- c. A vc sequence is overwritten.

The clear overall prediction of McCarthy and Prince's approach is that coda overwriting should be very rare.

Contrast this with Steriade's prediction. Coda replacement is achieved by rules that "Insert c into rhyme", precisely comparable to onset replacement as "Insert c into onset". Coda replacement should therefore not be rare.

An informal survey suggests that coda replacement is indeed relatively rare, supporting McCarthy and Prince's claims. All the cases of which I am aware are listed in (1). The cases that do occur are of some interest. In the majority of cases they occur in languages with monosyllabic morphemes, and the codas are thus morpheme-final and/or word-final. This is to be expected for McCarthy and Prince, since right-to-left association can access final codas. On the other hand I detect no correlation with suffixation, contra the predictions of their approach. Another common property remains mysterious: all cases except Turkish and Armenian involve replacement by a nasal, or the feature

[+nasal].¹⁰ This suggests the possibility of an account along sonority lines, and some of the cases below if looked at in this light turn out not to be instances of coda-replacement at all.

The first case I will discuss is Kaingang, analyzed by Steriade as word reduplication, followed by coda replacement. In fact, Wiesemann (1972) shows that the process is basically root reduplication, and suffixal consonants are generally not reduplicated.¹¹ The few root codas that are reduplicated are never replaced by /ŋ/, and instead /ŋ/ appears only when the syllable would otherwise be open. The data in (18a) shows reduplication of a root coda, with no replacement by /ŋ/; (18b) shows that suffixal codas are not reduplicated; lastly, (18c) shows /ŋ/ appearing after a vowel-final root.

(18) a.	/rũm/ /gon/	rũm gon	rũmrũm gungon	'ruhren' 'schlucken'
b.	/ky-/ /pi-/	kym pir	kykym pipir	'schneiden' 'wenige'
c.	/ta-/ /tẽ-/ /kave-/ /po-/	tam tẽm kavej pov	tyŋtam tẽŋtẽm kaviŋkavej puŋpov	'cover' 'fliegen lassen' 'schmutzig' 'geteilt'

There is lexical variation in the form of the plural; for example, some roots undergo vowel raising as well, some roots add [ŋ], (18c), and others do not, (18b). For those that add [ŋ], I suggest that the velar nasal is the default realization of a heavy syllable; the language has no long vowels, and closed syllables count as two TBU's for intonation, whereas open syllables count as one. Trigo (1988) has argued that in coda position placeless nasals surface as velar nasals, and I suggest that a reasonable extension of this view might allow completely unspecified syllable-final positions (i.e. empty non-nuclear moras) to surface as velar nasals. Under this proposal, then the Kaingang roots in (18c) end in velar nasals because they require their reduplicative prefixes to end in a heavy syllable.¹²

A simpler process is seen in the Chinese dialect of Rongxian (Zhou 1987). In diminutives, verb reduplication, and familiar names, final stops become nasals. Apparently no nasal is added to vowel-final syllables. In addition, all final tones change to 35, high rising.

(19)				
Diminutives:	/muk/	muŋ		'wood'
	/ts'e/	ts'e		'vehicle'
Verb reduplication:	/tok/	tok toŋ		'do, make'
	/wat/	wat wan		'dig, excavate'
Terms of address:	/a yat/	a yan		
	/a luk/	a luŋ		
	/a sɛp/	a sɛm		

The change in (21) may be related to syllable structure. In Chinese dialects, stop final syllables are typically prosodically distinct in that they carry only a limited set of (usually) level tones. I will thus consider them mono-moraic, while sonorant-final syllables are bi-moraic (but see Duanmu 1990 for a dissenting

view). Now suppose Rongxian requires a sonorant-final syllable in all these cases, perhaps to provide a second mora to accommodate the new rising tone, and so the minimal change from [-son] stop to its [+son] nasal counter-part is made. Vowel-final syllables need no such change.¹³

Vietnamese is another case of apparent coda overwriting, also in a "mono-syllabic" language. We find forms in which the feature [+nasal] associates to the coda, giving a nasal copy of the root coda:¹⁴

(20)	nguot	nguo	nguot	'to almost stop'
	biek	bie[ŋ]	bie[k]	'to be blue or green'
	sich	si[ŋ]	si[c]	'noise of the movement of machines'
	cop	com	cop	'clump on ground in walking'

Nhan (1984) notes that this rather productive formation is always accompanied by tonal changes, and views it as an unstressed syllable weakening its rhyme from an obstruent to a sonorant coda (parallel to the explanation advanced above for Rongxian). In support of this analysis, I can find only two examples of nasal insertion on open syllables: /xa/ > xa xam 'be very far', /ra/ > ra-ram 'to grope', which is surprising if we are dealing with true over-writing here.

Of course, even if Vietnamese and Rongxian do turn out to have coda overwriting, this can be analyzed as right-to-left association of the new melody given the fact that the coda in question is always morpheme-final, and probably word-final if we think of these as compounds. Such an approach is at first glance untenable in a language with polysyllabic morphemes, and I know of two cases of coda-replacement in such languages, Turkish and Armenian, to which I now turn.

Turkish and Armenian have very similar adjectival intensives formed by reduplication of the initial CV of the root, followed by a new consonant.¹⁵ In Turkish (Underhill (1976:436-8)) the coda is replaced by /m, p, r, or s/:

(21)	temiz	tértemiz	'spotless'
	siyah	símsiyah	'jet black'
	yalnız	yápyalnız	'completely alone'
		yapáyalnız	
	boş	bomboş	'completely empty'
	belli	bésbelli	'obvious'
	mor	mósmor	'purple all over'
	uzun	úpuzun	'very long'

Underhill notes that, as one would expect of an echo-word phenomenon, identity is avoided. The inserted consonant may not be the same as C1 or C2 of the root, thus avoiding both full syllable reduplication, and identical clusters.

An important fact is that stress is on the last syllable of the reduplicative 'prefix'. Now the general rule for words with no lexical accent in Turkish is to accent the last syllable, so these forms are not behaving like simple words. Instead, they seem to pattern like compounds, for which the general rule is that the last syllable of the first half of the compound is stressed. For example, in compound verbs made of noun+etmek (auxiliary), stress

goes on the final syllable of the noun: /dikkat + ettin/ -> [dikkatettin] 'to pay attention' and in compound nouns the first half is again stressed /bu-güz/ [bugüz] 'today' and /kara-deniz/ [karádeniz] 'Black Sea'. The alternative to a compounding analysis would be a prefixation analysis, but Turkish has no prefixes, being consistently suffixing, which makes prefixing reduplication distinctly odd.¹⁶ Suppose then that we have word-compounding, with the first word specified as a bi-moraic syllable. Association of the new coda melody can now be right-to-left association at the word-level, where the coda is at the right edge and thus accessible.¹⁷

The other cases of coda replacement I have encountered cannot be analyzed in detail for lack of space. Strikingly, Man T'a (Yip 1982, Bao 1990), Tzeltal (Berlin 1963), Miju (Weidert 1987:477), are all languages in which each morpheme is monosyllabic. The coda position is thus morpheme (if not word) final, and accessible by right-to-left association under McCarthy and Prince's account.

In this section I have shown that apparent coda replacement in Kaingang, Vietnamese, and Rongxian has an entirely different analysis in terms of syllable structure. Turkish appears to be true coda-replacement, but since the coda is word-final it is accessible by a right-to-left over-writing analysis. The rarity of coda replacement is expected only in an over-writing approach, and can thus be taken as an argument for that approach.

3.2 What Combinations of Segments may be Replaced Together?

In an overwriting approach, it is possible to replace both onset and nucleus, by associating a cv melody or nucleus and coda, by associating a vc melody. These are equally simple, and should be found with roughly the same frequency. This seems to be right, although onset-nucleus cases are perhaps slightly more common, with nucleus-coda cases being more likely in "mono-syllabic" languages. Contrast this with an insertion approach, where nucleus-coda replacement is stated as "Insert vc into rhyme", and is very simple. Onset-nucleus replacement is more complex, requiring two operations: "Insert c into onset" and "Insert v into rhyme". One could imagine modifications such as "Insert cv into syllable (or demisyllable)" (see Clements 1990), but as it stands the insertion approach seems to lead us to expect that onset-nucleus replacement will be relatively costly and rare, and this does not seem to be true.

Now consider onset and coda replacement. In an overwriting approach, this results from association of a cc melody, provided cc is not a complex onset. It should thus be straightforward, but in fact it does not seem to exist. In English, for example, we get table-shmable, not ~~*table-shamle~~. Perhaps discontinuous association is avoided? In an insertion approach, onset-coda replacement requires two operations "Insert c into onset", "Insert c into rhyme"; in this respect it is thus equivalent to onset-nucleus replacement, even under a theory modified as suggested above. Again, then, we may need to assume that there is a constraint stating that "Insert" must be an operation on a continuous string.

To summarize, an overwriting approach correctly treats any

replacement of adjacent segments (nucleus plus either onset or coda) as simple, whereas an insertion approach considers only the rhyme-internal nucleus-coda sequence as a single process. Here the advantage lies with the overwriting approach. On the other hand, overwriting wrongly allows for a simple statement of the non-existent onset-coda replacement, so we must add some requirement for no skipping in overwriting to rule out this possibility. Since even the insertion account would need some comparable condition to distinguish between the common onset-nucleus pair and the non-existent onset-coda pair, I conclude that there is a slight advantage to the over-writing approach.

4. Summary

I have argued that the two main approaches to melodic replacement, McCarthy and Prince's over-writing and Steriade's insertion, are equivalent and correct in their claims that loss of base material is due to phonotactic pressures. Apparent counter-examples have been shown to have other explanations. I have argued that the main distinction between the two approaches lies in the predictions they make about the possibility of replacing the coda, with the observed rarity of coda replacement expected only under an over-writing approach; I have further argued that even these rare cases are often not over-writing at all, but changes in the nature of syllable structure, such as changing from an obstruent to a sonorant final mora. These facts point towards an over-writing analysis. If this is correct, the operation of insertion may be eliminated from the grammar, in the spirit of the analyses of infixation in McCarthy and Prince's work on prosodic circumscription.

Endnotes

Thanks to audiences at Harvard University, the University of Massachusetts, and NELS itself for comments on earlier versions of this paper. All errors and omissions are of course my own.

1. Emeneau (1955) reports that the lexicon includes forms like giasur, but the vowel sequences are hetero-syllabic, as in ali.ak 'male buffalo', and syllables like gia do not exist. Assuming that over-writing association is to syllabic positions, the vowel must indeed disassociate from second position within the syllable, and the new vowel then spreads to fill both moras of that syllable. Note that there are words like sa.atun 'I am going', ko.o '?I am bringing' with two identical vowels in adjacent syllables (Emeneau, p.12). The prediction is that these would surface as ko.o gi.o, in contrast to the treatment of tautosyllabic long vowels. Unfortunately, this is wrong. Emeneau gives koo.gii, and this is a mystery under the present analysis.

2.A similar pattern is found in Tzeltal (Berlin 1963): c'ih > c'ihc'u, pec > pecpu.

3. A third place of interest comes in the treatment of pre-nuclear glides by any kind of overwriting that overwrites the nucleus, either with or without the following coda. This glide may also disappear, as in the data in (a), or it may remain, as (b); obviously, an overwriting analysis cannot explain the (a) set of data:

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- (a) vuong vit 'to be caught on'
nguong nghiu 'to be embarrassed'
dam dui 'en cachette'
checch choac 'open wide'
- (b) ngueu nguau 'to make noises loudly and unceasingly'
nguech nguac 'to be in disorder'
quan quit 'to be attached to a person'

Both (a) and (b) sets include examples of replacement of the nucleus alone, and replacement of the nucleus-coda sequence.

4. Since the base is not simplified too, this nativization is apparently limited to derived environments.

5. An alternative would be to adopt an analysis like that Steriade proposes for Sanskrit intensives, in which the template has a parameter disallowing complex onsets. This would work for Kannada too, but would fail to relate the data to other properties of Kannada phonology.

6. I assume here that [tsii] and [tsi] are non-distinct in Chaoyang, similarly for [tsiu] and [tsiiu].

7. See McCarthy and Prince (1986) for a similar account of Akan "prespecification".

8. It is possible that [l] is the realization of a Placeless onset, but this analysis runs into problems because /l/ apparently surfaces even on onsetless syllables.

9. On the surface we will observe either replacement of the first C, or of the whole onset, depending on the phonotactics.

10. Note that in contrast onsets seem to be replaced by a rather wide range of segments, including b, k, q, s, m, l, r, and ʃm.

11. Some /n,r/ suffixes get reduplicated with the root, but then /ŋ/ is never inserted.

12. Exactly how to specify this fact in the template is beyond the scope of this paper; perhaps the template is an iambic foot.

13. This analysis assumes that the TBU is the mora, and that contour tones need two TBU's. This is clearly true in some African languages, but less obvious in most Chinese languages. See Duanmu 1990 for discussion, and Yip 1989 for a different view, not compatible with the analysis given here.

14. I have departed from Vietnamese orthography here to make the place of the final consonant clearer.

15. Thanks to Bert Vaux for drawing these to my attention.

16. A similar conclusion - that these forms are the result of componnding - has been reached by Dobrovolsky (1987), Itô and Hankamer (1989), and Barker (1989).

17. It would be appealing to consider the prefix to be the minimal word, but Itô and Hankamer (1989) argue that although the minimal word in Turkish is bi-moraic, word-final consonants are extra-prosodic. As a result a plain CVC syllable only counts as mono-moraic, and is sub-minimal in size.

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