

[r] as Limited Default in Eastern Massachusetts English

David Teeple
UC Santa Cruz
Oct. 6, 2005

Introduction. The phenomena of r-deletion and r-insertion which characterize Eastern Massachusetts English have been discussed at length in papers such as McCarthy (1991; 1993), Halle and Idsardi (1997), Orgun (2001), Uffmann (2003), and Bakovic (2000). The analyses of all but Uffmann and Bakovic lack explanatory depth in some sense, since in none of these works is intrusive r-insertion, particularly, attributed any natural phonological basis. For them, r-insertion is instead a *deus ex machina* which descends upon the grammar in the face of phonological principles.

Short of a conscious effort on the part of speakers, a phenomenon like r-insertion seems improbable, since markedness considerations would surely never select a segment such as [r] as default. However, I feel this view can be discarded. I argue that, despite its markedness as a segment generally, [r] is epenthesized as default in a circumscribed domain of application because of its particular phonologically relevant characteristics; that is, *faithfulness* is largely responsible for r-insertion. In this regard, I follow Bakovic (2000).

Bakovic provides the first convincing argument that r-insertion is rooted in faithfulness to the features of the preceding vowel. However, he follows previous analyses in attributing r-insertion to the unmotivated FINAL-C (McCarthy 1993), which requires all prosodic words to end in consonants. This is a highly dubious constraint from a cross-linguistic perspective as well as from a particularist one, and I will argue for its replacement. He also employs the constraint LIC[r], which is incapable of accounting for the facts of r-deletion.

Furthermore, it had been assumed by McCarthy, Halle & Idsardi, and Orgun that schwa epenthesis interacts opaquely with r-deletion. Since I argue here that schwa is not strictly epenthetic, but faithful to the features of [r], such claims of opacity are easily discarded. Orgun's Sympathy analysis meant to handle this opaque interaction is unnecessary, as is Halle and Idsardi's appeal to Kiparsky's (1973) Elsewhere Condition.

Having defended these views, I will incorporate them into an OT analysis employing predominantly faithfulness constraints.

I. R-deletion and r-insertion in Eastern Massachusetts English

As described by McCarthy (1991; 1993), certain dialects of English spoken in Eastern Massachusetts are characterized by widespread dropping of coda [r]s, as well as epenthesis or retention of [r]s in onset position. McCarthy calls these r-deletion, intrusion, and linking, respectively (examples from McCarthy 1993:1-2):

(1) r-Deletion

- a. He put the tune<r> down.
vs. He put the tuna down.
- b. The spa<r> seems to be broken.
vs. The spa seems to be broken.

(2) r-Intrusion

- a. He put the tuna [r] away.
- b. The spa [r] is broken.

(3) Linking [r]

- a. He put the tuner away.
- b. The spar is broken.

The deletion data seem natural enough from a phonological perspective, in that codas are generally dispreferred cross-linguistically, and the English [r] itself is a marked segment in any syllabic position. For this reason, my analysis will not dwell at much length on r-deletion, though I will of course have to account for it along with the insertion and linking data.

With respect to r-insertion, McCarthy (1993:2) notes that, as in British English dialects, “it is generally agreed that *r* is inserted to resolve hiatus, by separating two adjacent heterosyllabic vowels.” This much is to my mind uncontroversial, although Halle and Idsardi (1997) seem to disregard hiatus resolution as a possible motivating factor in formulating their r-insertion rule (see section II.B below).

II. Markedness approaches to r-insertion

What has been difficult to explain for all analysts of these phenomena is the selection of the particular hiatus resolving segment. Why, for instance, would a language select as default the highly marked English [r] over an unmarked segment like [t]? Is the phenomenon natural at all? My answer is of course that the phenomenon is natural, and that claims to the contrary have simply missed what is natural about it. These other analyses have typically taken a markedness approach to r-insertion, which I here review briefly.

II.A. McCarthy's OT Analysis

For McCarthy (1993), r-insertion is in no way phonologically natural. In cases of hiatus, the most common pattern is for a default phoneme to epenthesize; and yet, McCarthy writes, “the problem with this approach is that *r* is demonstrably not the

default consonant in English” (1993:189). Hence, he is forced to make the arbitrary stipulation that [r] be inserted in intervocalic positions, where other conditions on prosodic constituency do not prevent it. As Halle and Idsardi (1997:357) are quick to point out, this arbitrary stipulation amounts to “giving up on the enterprise” of OT.

McCarthy, having assumed that r-insertion is not default, concludes further that its purpose cannot be the resolution of hiatus, since r-insertion often does not occur following function words. Since this evidence suggests that r-insertion occurs only at prosodic word boundaries, he formulates the following constraint, requiring that all prosodic words end in consonants (p. 6):

- (4) FINAL-C
 $*V]_{PrWd}$

An immediately noticeable difficulty with this formulation is that it does not seem to have the weight of universal markedness behind it. If anything, it is more common cross-linguistically for prosodic words to end in vowels, just as it is for all syllables to end in vowels. Furthermore, the set of constraints McCarthy employs should not rule out sentence-final consonant epenthesis, since FINAL-C remains undominated by DEP-IO. Therefore, I will not employ FINAL-C as a constraint, as all other OT analyses of r-insertion have done. I will argue for a replacement: PrWd]ONS.

Further, McCarthy offers the constraint CODA-COND, as stated below:

- (5) CODA-COND
 $*VrX]_{\sigma}$

This requires deletion of all coda [r]s. I take issue with this constraint primarily in that it is overly environment-specific. I will instead employ markedness constraints of the form *Margin-r, etc., as well as the well-accepted *Coda (Prince & Smolensky 1993).

Not crucial to our discussion, but worth noting, is that FINAL-C and CODA-COND are sharply criticized by Halle & Idsardi (1997) for having to exist in both ‘crisp’ and ‘sloppy’ versions (Ito & Mester 1994). For instance, FINAL-C is only satisfied by an ambisyllabic [r] if an association line is traced down from the PrWd edge to the [r] (the ‘sloppy’ FINAL-C), while it is violated if the association line is traced from the [r] up (the ‘crisp’ version). Similarly, CODA-COND cannot be violated by an ambisyllabic [r] under McCarthy’s assumptions, despite the fact that it at least partly resides within a rime. I believe that current conceptions of ANCHORING constraints (McCarthy & Prince 1995) will allow us to ignore these complaints, though they were a thorn in McCarthy’s side at the time. It is now standardly assumed that there must be a vantage point of association.

McCarthy’s “arbitrary stipulation,” however, remains a real problem for his analysis.

H.B. Halle and Idsardi's Rule-based Analysis

Halle and Idsardi (1997) themselves have no qualms about positing an arbitrary stipulation requiring r-insertion, since they seem to view the grammar more or less as a language-specific collection of arbitrary stipulations. For them, the difficulty is to explain the order in which certain rules apply, or that some rules do not always apply.

Specifically, they note that a rule forcing [r] to delete must in some instances follow a rule of schwa-insertion: /fijr/ + /mi/ => fi.jər.mi => [fi.jə.mi]. Since at the surface level, r-deletion cannot be reconstructed, the rule ordering seems to be opaque.

Opaque rule interactions, they argue, cannot be translated into a satisfactory OT account, since OT (at least in certain incarnations) allows no intermediate stages of derivation. In OT, we should expect a form like [fij] to emerge in the case above:

(6) Halle & Idsardi (1997:340)

fear/_C	Coda-Cond	Final C	MaxIO(C)
a. [fijr]	*!		
b. [fij]	✓	✓	*
c. [fijər]	*!		
d. [fijə]	✓	*!	

The difficulty with this line of argumentation is that it is not firmly based in phonetic fact, nor is it even in keeping with the constraints in this very tableau.

The actual output of the constraint ranking above should be [fi.jɾ], where the [r] is syllabic; this candidate violates none of the constraints in (6) and is utterly faithful. Though it never occurs in an unstressed syllable (McCarthy 1991), syllabic [r] is predicted by the constraint ranking.

Since we need to rule out even syllabic [r] from the output, we have a sound reason to discard CODA-COND from the analysis.

More importantly, we can rule out the opaque interaction of schwa-insertion and r-deletion by appeal to faithfulness. That is, with respect to the features comprising /r/, the most faithful possible correspondent consistent with other constraints is [ə]. In other words, [ə] is an allophone of /r/ suited to word-final, pre-consonantal position. I will argue in depth for this allophonic relationship in IV.A. below; this relationship is deeply related to the featural faithfulness approach generally, and is present in Bakovic's (2000) analysis in a slightly different form than the one I will offer.


Once this allophonic relationship has been established, there will be no need to argue for opacity. Labelling a highly productive phonological phenomenon as 'opaque' strikes me as unacceptable, unless we are at the same time willing to return to the days of rule-ordering, to the great satisfaction of Halle & Idsardi.

II.C. Orgun's Analysis

Orgun (2001) appeals to notions of markedness and syllabic position in defending his reanalysis of the r-insertion puzzle. He assumes that, in addition to the set of negative universal markedness constraints *Margin-*n*, it would be useful to assume the positive set Nuc-*n*, which states that any segment *n* should serve as a nucleus.

Assuming both of these sets of constraints obtains the correct results for his analysis, but the ranking seems to be a sleight of hand. Nuc-*n* does the same work as *Margin-*n*, except that an ambisyllabic [ij] sequence will violate *Margin-[i, j] but not Nuc-*n*. Orgun's analysis relies on this incomplete overlap, and is therefore somewhat suspect:

(7) *r* emerges as the epenthetic consonant (Orgun 2001:8)

/dɹɔ + ɪŋ/ 'drawing'	FINAL-C	NUC-i,u	*CODA-r	*CODA-i,u	*r
a.  draw[r]ing			*		*
b. draw[j]ing		*!			
c. drawing	*!				

There is an additional problem here, present also in McCarthy's (1993) analysis: It is unclear that the epenthetic [r] is PrWd-final, and likewise that candidate (c) is in violation of FINAL-C. Under the assumption that we have one prosodic word, [dɹɔ], with another prosodic word node adjoined, such a constraint will capture the facts. However, I would prefer to assume that the prosodic structure over 'drawing' includes only one PrWd node, and therefore I cannot rely on FINAL-C.

Further, Orgun seems to have missed the featural naturalness of r-insertion. His account requires the phenomenon to rely solely on markedness – and a rather dubious ranking of markedness constraints, at that – while faithfulness is all but ignored.

Orgun further argues that Sympathy (McCarthy 1999) can solve the opacity issue connected with schwa-insertion and r-deletion. But, as I have already suggested, this analysis is unnecessary. Where schwa surfaces in these cases, it is merely the allophonic realization of [r].

III. Bakovic's faithfulness approach

With respect to the featural naturalness of r-insertion, only Bakovic's (2000) (and following him, Uffmann's (2003)) account is sound. Bakovic relies on previous claims made by Kahn (1976), Broadbent (1991), Ortmann (1999), and Gnanadesikan (1997), to the effect that r-insertion is glide formation. The account takes note of the featural similarity between inserted [r] and preceding vowels, attributing the phenomenon to featural faithfulness constraints.

Bakovic assumes that r-insertion is not really insertion, but association of one input segment to two output segments, a violation of INTEGRITY-IO (McCarthy & Prince 1999); this is a sensible position to take. He further assumes that r-deletion is a

type of coalescence, a claim which has no theoretical import - to my mind - which might distinguish it from simple deletion.

Following Gnanadesikan (1997:159-162), Bakovic argues that [r] is featurally tied to the back low vowels [ɑ,ə,ɔ] with respect to the feature [PHAR] (they are all [-ATR]), and separated principally by the [COR] feature. Hence, he adopts constraints requiring identical specifications for each relevant feature, IDENT-[PHAR] and IDENT-[COR], ranking the former higher than the latter. To achieve the desired result that [r] inserts to break up hiatus, he ranks FINAL-C above IDENT-[COR]:

(8) $\{\{LIC[r] \gg FINAL-C\}, MAX, DEP\} \gg IDENT[COR]$

Input: <i>Homer</i> /ə ₁ ɪ ₂ / left	LIC[r]	FINAL-C	MAX	DEP	ID[COR]
a. <i>Homer</i> /ə ₁ ɪ ₂ / left	*!				
b. <i>Homer</i> /ə ₁ ɪ ₂ / left		*			*
c. <i>Homer</i> /ə ₁ ø/ left		*	*!		
d. <i>Homer</i> /ə ₁ ɪ ₂ ə/ left		*		*!	

A possible problem for his account is that the use of LIC[r] will predict incorrect deletions. We should expect, based upon Bakovic's ranking, that a word like 'girl' /grl/ should surface as *[gəl] or *[g(r.r)], since LIC[r] requires [r] to be in an onset position. Yet, according to McCarthy (1991), what we actually find in this dialect is that syllabic [r] can occur when stressed: [gr̩l]. This form, like any other form with a non-onset [r], violates LIC[r]. We seem to have no choice but to reformulate the constraint to account for [r]'s need to be in a strong syllable, either as the nucleus or as the onset, but not as a coda.

Another problem – common to any faithfulness approach to the phenomenon – is that a glide is always faithful to the preceding vowel, and never to the following one. No constraints known to me can handle this fact satisfactorily, though it is seemingly almost universal. My intuition is that this fact is a consequence of the need to maintain sonority curves: an onset should be maximally distinct from the following rime, and a rime should be maximally homogeneous. Hence, [r], like the other glides, is an optimal choice for epenthesis into ambisyllabic positions.

Finally, Bakovic's account also inherits the problems associated with FINAL-C, already mentioned.

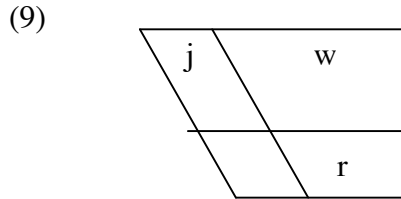
IV. Grounding for the faithfulness approach

The essence of a faithfulness analysis of r-insertion is that the segment optimally suited to epenthesize and fortify a syllabic boundary is one which is also as faithful as possible to the input.

Here I provide some evidence that [r] can be faithful to the features of a certain set of vowels, namely, those which trigger r-insertion.

IV.A. The features associated with [r]

Crucial to a natural explanation of the insertion of [r] will be the determination of its phonologically relevant features. Following Kahn (1976) and Bakovic (2000), I assume that r-insertion is glide formation, and so it is natural for us to determine which vowels select which glides:



- [j]: follows [i] or [e]
- [w]: follows [u] or [o]
- [r]: follows [ɑ], [ɔ], or [ə]

This apportioning of the vowel space is based on the fact that vowels which trigger r-insertion never trigger j-insertion or w-insertion. Each glide has its own domain, although the domains exempt all lax front and lax high vowels, which never occur word-finally in EME.

Bakovic's IDENT-[phar] will capture the class of r-insertion vowels, since they are the only lax vowels that can occur word-finally. The [dorsal] features, which would at first seem better candidates to divide the vowel space in the given way, cannot provide for the fact that mid vowels split along [ATR] lines; that is, [o] and [e] pattern with the high glides, but [ɔ] and [ɛ] pattern with [r]. Hence, we seem to need to make reference to [ATR].

We could only accept an account based solely on the dorsal features if we reformulated the height dimension to exclude the mid range; in such a system, all vowels would be either [+high] or [-high], and it would need to be independently argued that mid vowels have no status as a natural class in English phonology – not necessarily implausible, but difficult to argue, especially since it leaves us no way to distinguish [o] from [u] or [i] from [e]. However, since we already have a feature capable of making the [o]/[ɔ] split adequately – [ATR] – parsimony suggests we abandon the purely dorsal approach.

But can we really argue that [r] is itself [-ATR]? According to Gnanadesikan (1997:159-162), we can, as Delattre & Freeman (1968) have shown that [r] involves a pharyngeal constriction.

Further, can we be certain that schwa shares this [-ATR] feature? Gick, et al (2000) provide some empirical observations of tongue root retraction; and Gick (2003) follows this up with more rigorous analysis of a pilot X-ray film, concluding that the pharynx is “significantly more constricted during schwa than during speech rest position...” (Gick, et al 2002:4).

Gick, et al. (2002), provide fairly sound evidence that the articulation of [r] differs significantly from that of schwa only with respect to the coronal ‘C-gesture’ present in

the [r]. All ‘V-gestures,’ that is dorsal articulations and pharyngeal retraction, are nearly identical. Hence, it would not be unreasonable to claim that [r] is identical to schwa with respect to all but one feature: [+/-coronal].

It has also been noted that [r] almost never follows tense vowels in any dialect (Gick, et al, 2002, Lehiste 1964), which is in keeping with the association of [-ATR] with this segment.

Combinatoric evidence is attested as well for a featural relationship along the backness dimension. We find that there is at least one environment in which [r] seems to be in complementary distribution with its fellow liquid, [l] - namely, within a rime preceding a coda nasal, the next least sonorous set of segments after liquids. In such an environment, [l] can only occur following a front vowel (and even then, not very frequently), while [r] cannot occur after a front vowel but often occurs after back vowels or as a nucleus:

(10)	film	*-[irm]
	kiln	*-[irn]
	helm	*-[erm]
	*-[olm]	form
	*-[oln]	horn
	*-[alm]	farm
	*-[aln]	barn
	*-[lm]	term
	*-[ln]	turn

This complementarity is not as evident when the nasals are replaced by obstruents, as in (11). However, we should still note that [r] does not occur after front vowels unless the following obstruent is a coronal and the [r] itself can be construed as the only actual coda segment, the coronal being an appendix (Borowsky 1986).

(11)	field	beard
	*-[i:lp]	*-[i:rp]
	*-[i:lk]	*-[i:rk]
	filled	*-[ird]
	milk	*-[irk]
	help	*-[erp]
	Alps	*-[ærp]
	golf	scarf
	gulp	burp

It would not be an entirely accurate generalization to say that [r] never follows a front vowel within a rime. The constraints on its occurrence are, however, fairly acute. In fact, ‘beard’ and ‘weird’ are perhaps the only monomorphemic words exhibiting a rime of this kind. Such data align with the fact that [r] shares the feature [+back], for which light [l], as a [-dorsal] segment, is undefined. (Why dark [l] can’t occur in the same environment as [r] is not clear – or even established as a fact.)

We will not necessarily need to make reference to the backness dimension in formulating our constraints, but it is important that we be able to characterize [r] as being featurally related to the vowels which trigger r-insertion. I think there is ample evidence for such a characterization.

IV.B. Ambisyllabicity of [r]

I will adopt the assumption first proposed by Kahn (1976) and defended by Gussenhoven (1986), among others, that word-final consonants are ambisyllabic preceding a word-initial vowel. This is thought to be evidenced by such pairs as ‘saw Ted’ and ‘sought Ed’, where flapping arises only in the ambisyllabic ‘sought Ed.’

According to McCarthy (1993:179), intrusive [r] is considerably more vocalic than an [r] in onset position only. In support of this claim, and in response to Halle and Idsardi (1997), McCarthy (1999) adduces spectrographic evidence of acoustic differences between the two [r]s. This seems to support the ambisyllabicity of intrusive [r].

For our purposes, ambisyllabicity will not be a crucial assumption, but it would be in line with claims about other word-final consonants. Since I argue below that intrusive [r] is not purely epenthetic but in fact faithful to the input stem, it must pattern as a fully specified stem correspondent would; that is, it must be ambisyllabic.

V. An OT Analysis without External Stipulations or Opacity

Since I am in agreement with Bakovic (2000) that we must make reference to featural faithfulness in order to explain the r-insertion and deletion phenomena in EME, I will take his analysis as a starting point, and provide necessary refinements.

V.A. Unlicensing LIC[r]

Let us take an example of a phenomenon which Bakovic’s account fails to capture: linking [r] with schwa insertion:

(12) ‘fear a’ (linking [r] with schwa insertion)

/fi _I ə/	LIC[r]	FIN-C	MAX	ID- [cor]	No Coda
a. fi.j(I.I)ə	✓				
b. fi.j.rə	✓				*!
c. fi.jə(I.I)ə	✓			*(!)	*(!)
d. fi(I.I)ə	✓		*!		*
e. fi.jə..Iə	✓	*!		*	

I here focus on the fact that Bakovic’s account would disallow schwa insertion where it is in fact reported (that is, something like (12c) should actually win, according to McCarthy

1991.) All of the above candidates satisfy Bakovic’s LIC[r], as well as McCarthy’s (1993) Coda-Cond, since in each case the [r] is linked to an onset position. Hence, the wrong output is predicted.

What is actually unacceptable about candidate (12a) is that EME prohibits syllabic [r] in unstressed syllables. It allows syllabic [r] in stressed syllables (McCarthy 1991). Hence, reduction of [r] to schwa is no different than reduction of [a] or [u] to schwa in unstressed syllables: place contrast is neutralized. For example, in the word ‘girl’ /grl/, whose only syllable must bear stress, we do not find reduction: [grl]. Thus, we could employ a constraint against non-default unstressed nuclei. In this case, I employ a version of de Lacy’s (2002) constraints against high-sonority nuclei in unstressed positions. The constraint $*\mu_w/r$ is universally ranked below constraints like $*\mu_w/a$ and $*\mu_w/o$, which ban more sonorous segments than [r] from weak nuclei. I assume that ambisyllabic segments do not contribute to syllable weight. Together with $*Coda-r$, this should derive the correct deletion output, as well as force the default schwa to appear, removing [r] from nucleus position:

(13) $*\mu_w/r$ (essentially from de Lacy 2002): [r] should not be a weak mora.

(14) ‘fear a’ (linking [r] with schwa insertion)

/fijr ə/	$*\mu_w/r$	FIN-C	ID-[cor]	No Coda
a. fij.rə				*
b. fi.jə(ɹ.ɹ)ə			*(!)	*(!)
c. fi.jə.ɹə		*!	*	
d. fi.j(ɹ.ɹ)ə	*!			

While this does rule out candidate (14d), we then incorrectly predict candidate (14a), since the prosodic word ends in a consonant. This again demonstrates the inadequacy of FINAL-C, already noted by Halle & Idsardi (1997).

V.B. Prosodic word status and FINAL-C

I have mentioned a few theoretical problems associated with FINAL-C – particularly the crisp/sloppy problem.

There is a more pressing problem, however. McCarthy (1993) formulates FINAL-C as a constraint on the final syllable of the prosodic word. However, it is not clear in what sense this will predict forms like [drɔ(r.r)ɪŋ] ‘drawing’, since the final syllable of the prosodic word is not where r-insertion occurs.

What I would prefer to argue is that r-insertion occurs when it can, in order to satisfy ONSET (Ito 1986; Prince & Smolensky 1993). One recourse is to a rather well-accepted set of constraints: ANCHORING (McCarthy & Prince 1995). With such constraints, balanced by ONSET, we can obtain ambisyllabicity, as well as some of the problematic r-insertion facts:

- (15) ANCHOR-Morpheme, R, σ , R:
The rightmost segment of each morpheme should correspond with the rightmost segment of some syllable.

This does remedy the problem in tableau (14), without any crisp/sloppy worries, since ANCHORING constraints are designed with a vantage point of association in mind. Furthermore, Halle & Idsardi's complaint that FINAL-C predicts /fijr/ \rightarrow [fij]/_C is no longer worrisome, since MAX is ranked above IDENT-[cor] (tableau (17)).

- (16) 'fear her' (linking [r] with schwa insertion)

/fijɹ/ + /ə/	ANCH-MorphSylR	MAX	INTEG
a. \Rightarrow fi.jə(ɹ.ɹ)ə			*
b. fi(ɹ.ɹ)ə		*!	
c. fij.rə	*!		

- (17) 'fear me' (r-deletion with schwa insertion)

/fijɹ/ + /mi/	* μ_w /r	MAX	*Coda/r	ID-[cor]	No Coda
a. \Rightarrow fi.jə.mi				*	
b. fijr.mi			*!		*!
c. fij.mi		*!			*
d. fi.jɹ.mi	*!				

- (18) 'drawing' (r-insertion)

/dɹɔ/ + /ɪŋ/	ONS	ANCH-MorphSylR	No Coda
a. \Rightarrow dɹɔ(ɹ.ɹ)ɪŋ			*
b. dɹɔ.ɪŋ		*!	
c. dɹɔ.ɪŋ	*!		

V.D. Obtaining faithfulness directionality

A fact ignored by Bakovic's (2000) account (as well as every markedness account, for obvious reasons) is that every instance of glide insertion involves faithfulness to the features of the preceding vowel, and never to the following one.

The intuition that should guide us in the formulation of a constraint attaining this end is that onset-nucleus transitions should be as perceptually salient as possible, while nucleus-onset or coda-onset transitions can be relatively weak. Languages seem to prefer, for instance, [uwi] over [iwu]; for instance, as Junko Ito points out to me, the latter is impossible in Japanese, whether by insertion or by faithfulness to an input glide. The onset-nucleus transition is not perceptually distinct enough.

According to Rosenthal (1994:33), a ban on homorganic glide-nucleus pairs is the norm cross-linguistically. He employs a constraint SYLL-SEG which is meant to rule out such syllables:

- (19) SYLL-SEG (Rosenthal 1994:30):
If rt_i is linked directly to σ , then $*\mu_i$.

That is to say, a single underlying segment cannot be both an onset and moraic. This constraint will not only rule out onset-nucleus pairs consisting of a homorganic glide and vowel, but will also rule out geminates - a desirable result for English, though it might incorrectly predict that languages with geminates must contain homorganic glide-vowel sequences.

Unfortunately, SYLL-SEG would also rule out homorganic nucleus-glide sequences where the glide is ambisyllabic (e.g., [u(w.w)i]), which is the exactly what we are trying to rule *in*.


Hence, I formulate a constraint that attempts to capture the facts based on features rather than prosodic structure alone, though my constraint has a decidedly less snappy name, and doesn't simultaneously account for the lack of gemination in English:

- (20) *Onset-Nucleus-Sharing: An onset should not share features with a following nucleus.

This constraint will have to be considered gradiently violable by feature value, since many cases of assimilation involve onset-nucleus sharing of a small number of feature values. An alternative might be to formulate a family of such constraints on a feature-specific basis, but for the time being this will not be necessary.

Of course, languages like Mandarin would have to rank *Ons-Nuc-Share below ONSET, allowing for redundant glide onsets (i.e., [wu] or [yi]). The idea behind the constraint is that, when possible, glide formation will be leftward-looking.

- (21) 'fear evil'

/fijr + ivəl/	* μ_w/r	ANCH- MorphSylR	*O-N- Sharing	ID- [cor]
a.  .fi.jə(ɪ.ɪ)i.vəl.				*
b. .fi.jə.ji.vəl.			*!	
c. .fi.jə(j.j)i.vəl.		*(!)	*(!)	
d. .fi.j(ɪ.ɪ)i.vəl.	*!			*

This seems to satisfactorily capture the facts.

V.D. Residual problem: lack of r-insertion after function words



Part of the problem that McCarthy (1993) had in formulating a constraint forcing r-insertion is that r-insertion does not always apply to break up hiatus where it is otherwise expected:

- (22) No r-insertion after function words (McCarthy 1991)
 - a. ‘Didj[ə] eat’
 - b. ‘I wann[ə] eat’
 - c. ‘He went t[ə] eat’
 - d. ‘th[ə] apples’

- (23) r-insertion after phrase-final function words
 - a. ‘Are ya gonna[r] or aren’t ya?’
 - b. ‘Didja[r] or didn’t ya?’

McCarthy formulates FINAL-C in order to force r-insertion prosodic word-finally. Under the assumption that ‘wanna eat’ is one prosodic word, no r-insertion is therefore required.

- (24) ‘gotta eat’ (no r-insertion)

/gət tu/ + /i:t/	ONS	ID -[cor]	No Coda
a.  r)ə.i:t		*	
b. r)ə(ɪ.ɪ)i:t		*(!)	*(!)
c.  r)ə.i:t	*!		


What constraint(s) can we posit which will force candidate (24b) to emerge as optimal, while forms like [dɪɔ(ɪ.ɪ)ɪŋ] ‘drawing’ (with a presumably prosodic word-internal intrusion) are allowed to emerge with r-insertion?

Perhaps we could appeal to the fact that the underlying word-final vowel is not a schwa in any of these function words – in fact it is almost predictably [+ATR] and [+high]. Unfortunately, these same function words exhibit r-insertion phrase-finally (see (23) above).

The *tentative* proposal I offer involves altering our conception of FINAL-C. McCarthy proposes that all prosodic words must end in consonants. However, inasmuch as glide insertion in satisfaction of FINAL-C *always* yields better satisfaction of ONSET, I propose a constraint requiring that an onset *follow* a prosodic word. Let us call it PrWd]ONS (cf. the definition of FINAL-C in (4)). In order to predict (24b) as the


optimal candidate, we need the following ranking: PrWd]ONS >> ANCHOR-Stem, L, PrWd, L >> ONSET. Given this ranking, (24b) will emerge as optimal, as in (24').

- (25) PrWd]ONS: A prosodic word should be followed by an onset.
- (26) ANCHOR-Stem, L, PrWd, L: The left edge of a stem should coincide with the left edge of a prosodic word.
- (24') 'gotta eat' (no r-insertion)

/gat tu/ + /i:t/	PrWd]ONS	ANCH-Stem PWdL	ONS
a.  r)ə.i:t			*
b. r)ə(ɪ.ɪ)i:t		*!	
c. r)ə.ɪi:t		*!	

The fact that satisfaction of PrWd]ONS generally produces an ambisyllabic glide is a product of that constraint's interaction with ANCH-Morph, R, Stem, R. The glide, recall, shares features with the segment to its left, and as such constitutes a part of the same morpheme.

- (27) 'didja[r] or didn't ya'

/dɪd ju/ + /ɔ:ɪ/	PrWd]ONS	ANCH-Stem PWdL	ANCH- MorphSylR
a.  ʒ)ə(ɪ]ɪ)ɔ		*	
b. ʒ)ə]ɪɔ		*	*!
c. ʒ)ə]ɔ	*!		

While this solution does achieve the desired results, the constraint PrWd]ONS is only mildly more plausible in terms of typological universals than is FINAL-C. FINAL-C demands a rime consonant in a particular environment; PrWd]ONS demands an onset in a particular environment. If anything, we should prefer the constraint that demands onsets; but it is nonetheless clear that the stated environment – “to the right of a prosodic word” – is rather awkwardly defined. As noted, this is only a tentative proposal.

VI. Conclusion

I have asserted that r-insertion in EME occurs primarily to avoid hiatus, much like any glide insertion cross-linguistically.

Further, following the work of Bakovic (2000), I have argued that an approach treating r-insertion as glide formation is the most satisfactory way to explain why it is [r],

and not some unmarked, epenthetic default segment, that is selected to satisfy ONSET. Namely, [r] shares features with the vowels that trigger r-insertion.

I have also offered a preliminary constraint meant to capture glide faithfulness directionality. This needs to be done somehow, although my constraint is more or less stipulative.

The primary weakness in the account I have offered is the use of PrWd]ONS in place of FINAL-C. I feel it is a marginally more satisfactory way to view the facts of EME r-insertion; but it must be possible for us to better define in theoretical terms the environments where r-insertion occurs.

VII. References

- Bakovic, E. (2000). "Deletion, insertion, and symmetrical identity." *Harvard Working Papers in Linguistics* 7.
- Borowsky, T. (1986). *Topics in the Lexical Phonology of English*. PhD dissertation, UM Amherst.
- Broadbent, J. (1991). "Linking and intrusive r in English." *UCL Working Papers in Linguistics* 3:281-302.
- de Lacy, Paul (2002). *The Formal Expression of Markedness*. PhD dissertation, UM Amherst. ROA 542-0902.
- Delattre, P.C., and D.C. Freeman (1968). "A dialect study of American r's by X-ray motion picture." *Linguistics* 44:22-68.
- Gick, B. (2003). "An X-Ray investigation of pharyngeal constriction in American English schwa." *Phonetica* 59(1):38-48.
- Gick, B., A.M. Kang, and D.H. Whalen (2000). "MRI and X-ray evidence for commonality in the dorsal articulations of English vowels and liquids." In *Proceedings of the 5th seminar on "speech production: models and data and the crest workshop on models of speech production: motor planning and articulatory modeling"*. Kloster Seeon, Bavaria, Germany. (unseen)
- Gick, B., A.M. Kang, and D.H. Whalen (2002). "MRI evidence for commonality in the post-oral articulations of English vowels and liquids." *Journal of Phonetics* 30:357-371.
- Gnanadesikan, A. (1997). *Phonology with Ternary Scales*. PhD dissertation, UM Amherst.
- Gussenhoven, C. (1986). "English plosive allophones and ambisyllabicity." *Gramma* 10:119-141.
- Halle, M., and W. Idsardi (1997). "r, hypercorrection, and the Elsewhere Condition." In *Derivations and Constraints in Phonology*, ed. Roca. Oxford: Clarendon Press.
- Ito, J. (1986). *Syllable Structure in Prosodic Phonology*. PhD dissertation, UM Amherst.
- Ito, J., and R.A. Mester (1994). - and R.A. Mester (1994). "Reflections on CodaCond and Alignment." Unpublished ms., UCSC. ROA?
- Kahn, A. (1976). *Syllable-Based Generalizations in English Phonology*. PhD dissertation, MIT.

- Kiparsky, P. (1973). "‘Elsewhere’ in phonology." In *A Festschrift for Morris Halle*, eds. Anderson and Kiparsky. New York: Holt, Rinehart and Winston, 93-106.
- Lehiste, I. (1964). *Acoustical Characteristics of Selected English Consonants*. Bloomington, Indiana: Indiana University.
- Lindau, M. (1985). "The story of /r/." In *Phonetic Linguistics: Essays in Honor of Peter Ladefoged*, ed. Fromkin, pp. 157-168. Orlando, FL: Academic Press, Inc.
- McCarthy, J. (1991). "Synchronic rule inversion." In *Proceedings of the Seventeenth Annual Meeting of the Berkeley Linguistics Society*, pp. 192-207. Berkeley Linguistics Society, UC Berkeley.
- McCarthy, J. (1993). "A case of surface constraint violation." *Canadian Journal of Linguistics* 38:127-153.
- McCarthy, J. (1999). "Sympathy and phonological opacity." *Phonology* 16:331-399.
- McCarthy, J., and A. Prince (1995). "Faithfulness and Reduplicative Identity." In *University of Massachusetts Occasional Papers 18: Papers in Optimality Theory*, 249-384. GLSA, UM Amherst.
- McCarthy, J., and A. Prince (1999). "Faithfulness and identity in prosodic morphology." In René Kager, Harry van der Hulst, and Wim Zonneveld, eds., *The Prosody-Morphology Interface*, p. 218-309. Cambridge: Cambridge University Press.
- Orgun, C.O. (2001). "English r-insertion in Optimality Theory." *NLLT* 19:737-749.
- Ortmann, A. (1999). "Consonant epenthesis: its distribution and phonological specification." In *Phonology and Morphology of the Germanic Languages*, eds. Kehrein and Wiese, pp. 51-76. Tübingen: Niemeyer.
- Prince, A., and P. Smolensky (1993). *Optimality Theory: Constraint Interaction in Generative Grammar*. Technical report, Center for Cognitive Science, Rutgers University, New Brunswick, NJ, and Computer Science Dept., University of Colorado, Boulder. ROA 537-0802.
- Rosenthal, S. (1994). *Vowel/Glide Alternation in a Theory of Constraint Interaction*. PhD dissertation, UM Amherst.
- Uffmann, C. (2003). "A new look at intrusive [r]." Handout for a seminar at the University of Essex. <http://www.staff.uni-marburg.de/~uffmann/ufo.htm#ank3>