

# Derivations and Constraints in Phonology



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# *r*, Hypercorrection, and the Elsewhere Condition

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## 1. INTRODUCTION

Our purpose in this article is to contribute to the current debate regarding the differing theoretical assumptions between Optimality Theory (OT) and the more traditional theory of derivations employing ordered rules. Such a discussion of fundamental issues is greatly facilitated if there is a body of data at hand that satisfies two desiderata: (1) the data are of a degree of complexity that makes it necessary to invoke more than just the most elementary resources of the competing theories, and (2) the phenomena are well-enough understood so that obviously inadequate solutions can be rejected without extensive investigation of the most basic facts. One body of data that satisfies these desiderata is the well-known shibboleth of the Eastern Massachusetts *r*. We are fortunate, moreover, in that these data have been reviewed in two recent papers by John McCarthy (1991; 1993), a native speaker of the dialect, who happens also to be one of the leading phonologists of our generation. In addition, much of the same data have been discussed in chapter V of Harris (1994), where parallel developments in other dialects of modern English are also considered.

## 2. THE DISTRIBUTION OF *r* IN EASTERN MASSACHUSETTS ENGLISH

It is well known that speakers of the Eastern Massachusetts dialect 'drop their *rs*'. This aspect of New England speech has been taken note of even by popular culture, as evidenced by the T-shirts sported by tourists proclaiming 'I pahked my cah in Hahvahd Yahd'. In addition to dropping *rs*, speakers of the dialect also insert *rs* after non-high vowels. As a result, words that in many other English dialects are phonetically distinct, such as *spa* and *spar* or *tuna* and *tuner*, are pronounced alike in (almost) all contexts in the Eastern Massachusetts dialect. This is illustrated by the examples in (1).

- (1) a. the spa[r] is broken      the spar is broken  
       b. the spa seems broken    the spaʔ seems broken  
       c. algebra[r] is difficult   Homer is difficult  
       d. algebr[ə] bores me      Hom[ə] bores me  
       e. the study of algebr[ə]   the study of Hom[ə]

As McCarthy explains in detail, the general loss of surface contrast does not also result in a loss of contrast in underlying representations. For example, such nearly identical stems as *Volta* and *alter* must have distinct underlying representations, because the stems behave differently under level I affixation: for instance in the forms in (2):

- (2) Volt[ej]ic      alt[ər]ation  
       algebr[ej]ic   Hom[ər]ic

By admitting that these stems contrast in their underlying representation, we also admit that the phonology of the Eastern Massachusetts dialect includes machinery for both the insertion of *r* in some contexts (e.g. (1c)) and the deletion of *r* in other contexts (e.g. (1d)).

The level I affixation facts just reviewed are not the only evidence supporting the above conclusions. McCarthy (1991) reviews a number of additional facts, some of considerable complexity, all of which lead to the same conclusion: the dialect must distinguish in underlying representations syllables that end with a non-high vowel from syllables that end in non-high vowel + *r*, and as a consequence the dialect must include machinery for *r*-insertion as well as *r*-deletion. However *r*-insertion does not take place either before level I suffixes, as illustrated in (2), or in morpheme-internal position, as illustrated in (3).

- (3) Aida \*A[r]ida    Thais \*Tha[r]is

An important topic discussed in detail in McCarthy (1991), but not in McCarthy (1993), is the treatment of stem-final liquids. Liquid-final stems that have a nucleus ending in a [+high] glide [j,w] are subject to schwa epenthesis when the stem is word-final or is followed by a level II suffix. This is illustrated with *l*-final stems in (4a). As shown in (4b), no epenthesis takes place stem-medially or before a level I suffix.<sup>1</sup>

- (4) a. feel      [fijəl]  
       feeling    [fijəlɪŋ]  
       file        [fajəl]  
       foal        [fowəl]  
       fail        [fejəl]

<sup>1</sup> The majority of the examples in (4) and below appear in McCarthy (1991); in a few cases we have supplemented these with examples obtained from native speakers of the dialect among our acquaintances. We follow McCarthy's transcriptions of the long/tense vowels as involving an off-glide. This is crucial for the OT account because of the work done by the Final-C constraint, but this choice is not important to the rule-based account.

|           |          |
|-----------|----------|
| b. Healey | [hijlij] |
| Gaelic    | [gejlɪk] |
| polar     | [powlə]  |

It is to be noted that schwa epenthesis before *l* takes place even when the following morpheme begins with a vowel. Thus, the stem *feel* is disyllabic not only before pause, but also in *feel ill* and *feel sick*, and in *feeling*.<sup>2</sup> The liquid *r* exhibits exactly the same behavior as *l*. The behavior is, however, masked by the fact that *r* is deleted in syllable coda, i.e. before pause or consonant.

|             |            |
|-------------|------------|
| (5) a. fear | [fijə]     |
| fearing     | [fijərɪŋ]  |
| fearless    | [fijəlɪs]  |
| fear Ann    | [fijər æn] |
| fear Dan    | [fijə dæn] |
| b. see Ann  | [sij æn]   |
| see Dan     | [sij dæn]  |
| c. Byron    | [bajrən]   |
| viral       | [vajrəl]   |

As shown in (5a), like before *l*, schwa is epenthesized before stem-final *r* at the end of the word, before consonant and before level II suffixes. The examples in (5b) show that schwa is not inserted stem-medially or before level I suffixes. It is important to note that schwa epenthesis takes place in *r*-final stems, regardless of whether or not the *r* is deleted.<sup>3</sup> Although underlying stem-final *rs* trigger schwa epenthesis regardless of whether or not they are subject to deletion, inserted *rs* do not trigger schwa epenthesis. There is therefore no schwa epenthesis in the examples in (1) or in those in (6).

|                 |
|-----------------|
| (6) draw[r]-ing |
| draw[r] Ann     |
| rumba[r]-ing    |
| rumba[r] acts   |

The reason for this is that, as observed by McCarthy, *r* is inserted after [−high] nuclei. Since schwa epenthesis occurs after [+high] nuclei, it is to

<sup>2</sup> According to McCarthy (1991: 198) the bisyllabic pronunciation of *feeling* is found only in 'more monitored speech'. We have chosen to focus on this speech style because our informal observations suggest that it is the normal pronunciation with many speakers. Moreover from an expository point of view it is somewhat simpler than McCarthy's more casual style.

<sup>3</sup> A comparison of *desire* [dəzajə]—*desirous* [dəzajrəs] with *idea* [ajdijə]—*ideal* [ajdijəl] shows that we must distinguish *r*-final stems from schwa-final stems. For if *r*-final stems (such as *desire*) were represented as ending in a schwa we should have no account for the appearance of *r* before level I suffixes. Moreover, we should also lack an account for the facts of McCarthy's more casual speech, and we would have to limit schwa epenthesis to *l*. This argument is independent of the argument offered with respect to the data in (2) above.

be expected that there would be no schwa insertion before inserted *r*.<sup>4</sup> Finally, McCarthy draws attention to the fact that the underlying *r* in syllable onset is phonetically distinct from *r* elsewhere:

Preliminary phonetic investigation shows that the principal difference between, say, 'saw*r* eels' [sɔr ijlz] and 'saw reels' [sɔ rijlz] is that the *r* in 'saw*r* eels' is considerably more vocalic, with more energy at all frequencies (1993: 179)<sup>5</sup>

This difference between *r*s parallels the more familiar allophonic variation exhibited by *l*, the other liquid of English.<sup>6</sup> McCarthy assumes that this phonetic difference is reflected formally by the distinction between an *r* that is assigned to the syllable onset exclusively and an *r* that is ambisyllabic.<sup>7</sup> The main facts about the Eastern Massachusetts dialect that have been noted in the discussion to this point are summarized in (7).

- (7) i. Although phonetically indistinguishable, the stem final rhymes of such words as *algebra* and *Homer* must be distinguished in their underlying representations. The difference in the rhymes is required to account for the different behavior of the stem under suffixation
- ii. Stems that in their underlying representation end with a diphthongal nucleus in a [+high] segment followed by a liquid, epenthesize schwa before the liquid if the liquid is rhyme-final or followed by a level II suffix
- iii. Stems that in their underlying representation end with a [−high] vowel, insert *r* in the syllable coda when followed by a vowel
- iv. Coda *r* is deleted.
- v. The liquids [r,l] in syllable onset differ phonetically from liquids in syllable coda

### 3 OPTIMALITY ACCOUNTS

#### 3.1 *Traditional Optimality Theory*

As noted, McCarthy's 1993 paper considers only *r*-insertion and *r*-deletion and does not offer an OT account of schwa epenthesis. His analysis of these data is

<sup>4</sup> It is, however, not the case that *r* is inserted after [−high] nuclei everywhere (cf. e.g. (3); see also n. 13 below)

<sup>5</sup> Some spectrographic data on the contrast are given in Olive *et al.* 1993

<sup>6</sup> The Eastern Massachusetts dialect shares this distinction with the RP dialect. Thus, Jones (1950: 90–1) states that in RP [t]wo chief varieties are distinguished, a fairly 'clear' *l* with resonance approximating to *i*, and a 'dark' *l* with resonance approximating to *u*. The fairly clear *l*'s are used when a vowel or *j* follows. Definitely dark varieties of *l* are used finally and before consonants. The difference between the two *l*'s in feature terms is evidently that of [±back], and a rule to this effect will have to be included in the phonology of these dialects since the contrasts are peculiar to these dialects of English; in fact, many languages have a neutral *l* that is neither 'light' nor 'dark'.

<sup>7</sup> In the rule-based alternative presented in Section 24 below, we treat McCarthy's ambisyllabic *r*s as coda *r*s.

based on the two constraints in (8), which we reproduce from McCarthy (1993):

- (8) a. The constraint CODA-COND . . . prohibits [r] in post-nuclear position of a syllable, or, equivalently, requires that [r] be in the onset. CODA-COND is responsible for the loss of etymologic /r/ preconsonantly and utterance-finally. (McCarthy 1993: 172)
- b. FINAL-C governs the shape of the final syllable in a prosodic (i.e. phonological) word . . . a Prosodic Word (PrWd) cannot end in a (short) vowel though it can end in a consonant or glide (McCarthy 1993: 176)

The effect of these constraints is illustrated in the tableau in (9), which summarizes the information in McCarthy's 1993 tableaux (17) and (18). In (9), syllable boundaries are represented by dots; 'R' indicates that the *r* is inserted, rather than underlying, and the sequences 'r r' and 'R R' in (9iv) are used to represent ambisyllabic *r*.

(9)

|       | Candidates                                 | Coda-Cond | Final-C |
|-------|--|-----------|---------|
| ☞ i.  | Wan da. left.<br>Ho.me. left.              | ✓         | *       |
| ii.   | Wan daR. left<br>Ho.mer. left              | *!        | ✓       |
| iii   | Wan da. a.r.rived<br>Ho.me. a.r.rived.     | ✓         | *!      |
| ☞ iv. | Wan daR. Ra.r.rived<br>Ho.mer. ra.r.rived. | ✓         | ✓       |

McCarthy's remarks about these candidates are quoted in (10).<sup>8</sup>

- (10) The candidates [in (9i)] obey the dominant constraint CODA-COND, whereas the candidates [in (9ii)] violate it. Thus [the candidates in (9i)] are selected as the actual output forms; the fact that they violate the lower-ranked constraint FINAL-C is irrelevant according to the principles of OT. The candidates [in (9iii) and (9iv)] all obey the dominant constraint CODA-COND. This tie is resolved in the usual way, by passing the candidates on to the rest of the constraint hierarchy, in this case FINAL-C . . . [which] then rejects [(9iii)] (McCarthy 1993: 186)

McCarthy observes that in order for the examples (9iv) to obey the CODA-COND it is necessary to assume the *r* is ambisyllabic. McCarthy also notes some possible consequences for this view; we reproduce these comments in (11).

<sup>8</sup> McCarthy (1993: 189) states that Fill-V and Parse-V are ranked above Final-C, but ranked on a par with respect to Coda-Cond

- (11) There are at least two principled ways to incorporate this refinement into the enforcement of CODA-COND. First, if enforcement is subject to the Linking Convention . . . any *r* which is linked to both coda and onset position is immune to this constraint. Second, if CODA-COND is reformulated as a positive condition licensing *r* only in onsets . . . the fact that ambisyllabic *r* is also in a coda will not affect it. Either of these alternatives is fully satisfactory on all counts. (McCarthy 1993: 180)

Likewise, Final-C is satisfied with an ambisyllabic *r*; it does not require that the last consonant be wholly within the PrWd. McCarthy and Prince (1993*b*) compare Final-C, which is satisfied by 'sloppy' alignment, with the constraint Align-Left [i.e. Align(Stem, L, PrWd, L)], which requires 'crisp' alignment at the beginning of stems in English. McCarthy and Prince (1993*b*) point out that Align-Left must dominate Final-C so as to ensure crisp alignment and thus prevent ambisyllabic *r* from appearing in strings such as *Wanda retrieved*, for if the *r* in this string were ambisyllabic it would satisfy Final-C. Their argument is quoted in (12).

- (12) a Some care is required to complete the argument at the level of formal detail. One approach runs as follows. For purposes of Align-Left we need a string that 'is a' PrWd, whose first element is also the first element of the Stem. But in (103*b*) [see (12*b*), which illustrates the rejected candidate form of *saw Ted*; McCarthy and Prince assume that flapped *t* occurs when *t* is ambisyllabic] the string *Ted* fails to stand in the 'is a' relationship to the node PrWd, in the sense that if all the (graph-theoretic) edges emerging from its terminals are traced upward, they do not converge on the one PrWd node. Therefore there is no string that 'is a' PrWd in this upward sense (although tracing downward from PrWd would yield the string *Ted* as its contents), and the constraint cannot be met. The sketch of formal Alignment at the end of section 2 is based on the superannuated notion that linguistic structure correspond to acyclic graphs—trees in particular; given dual motherhood of nodes, we must sharpen our sense of 'is a' (McCarthy and Prince 1993*b*: 147–8)

b PrWd PrWd  
 / | \ / | \  
 s ə t ə d

Reduced to its essentials, the idea here is that constraints such as Align or Coda Cond or Final-C are specified with a vantage point. When the vantage point is that of the segment, Align constraints must be understood 'crisply'. When the vantage point is that of a higher prosodic category, Align constraints can be understood as 'sloppy'. We can restate the constraints CODA-COND and FINAL-C as in (13) so as to make it clearer that the constraints will be satisfied here by ambisyllabic elements.<sup>9</sup>

<sup>9</sup> The upward/downward idea of McCarthy and Prince (1993*b*) shows that McCarthy's speculation regarding the Linking Condition of Hayes (1986), quoted above, was not correct. The Coda condition could be formulated in a sloppy manner (which would disallow even geminate *r*; compare the restriction in Hebrew against gutturals either as geminates or wholly within Codas—McCarthy, 1994) and Final-C could be formulated in a crisp manner.

- (13) a CODA-COND: No *r* should be wholly within a syllable Coda.  
 b FINAL-C: Every word must end with (part of) a consonant.

The introduction of a vantage point obviously increases the number of constraints, since many Align constraints can now come in both 'crisp' and 'sloppy' varieties. And because the set of all constraints is taken to be part of Universal Grammar, each available constraint must be present in every grammar, though the constraint may be ranked very low. Thus, for instance, in addition to the sloppy constraint Final-C, there must also be a crisp constraint which we will call Final-C!. We will examine the effects of this crisp version below. At the time of the composition of McCarthy (1993), all insertion and deletion of elements in OT accounts was handled indirectly, by violations of the Fill and Parse constraints respectively. In the case of insertion an abstract place holder (graphically represented by an unfilled square) was inserted into strings in the Gen set, and if a candidate containing such a place holder was selected as optimal by the constraint hierarchy the place holder was ultimately filled by the default phoneme, i.e., by the least marked vowel if the place holder occupied the position of a syllable head, and by the least marked consonant elsewhere. In view of this, epenthesis must invariably insert a default phoneme. As McCarthy notes, (14), this poses a serious problem for his account of *r*-insertion.

- (14) The problem with this approach is that *r* is demonstrably not the default consonant in English. This means that the output form 'Wandar arrived' must differ segmentally (melodically) rather than just prosodically, from the corresponding input form /Wanda arrived/. Thus, this form goes beyond the standard Optimality-Theoretic view of the candidate set as consisting of all possible melody-conserving prosodic rearrangements of the input. Melody is not conserved in 'Wandar arrived', so it is necessary first of all to broaden the candidate set to include this form. (McCarthy 1993: 189)

To broaden the candidate set, McCarthy proposes to have recourse to a special rule of *r*-insertion, (15)

- (15) By a 'rule' here I mean a *phonologically arbitrary stipulation* — one that is outside the system of Optimality [emphasis added]. This rule is interpreted as defining a candidate set {Wanda, Wandar}, and this candidate set is submitted to the constraint hierarchy. That is, this rule enlarges the candidate set to include non-melody-conserving candidates like 'Wandar arrived' (and \*'Wandar left'), which are then evaluated by the constraints in the familiar way. (McCarthy 1993: 190)

This move, however, is unsatisfactory both on conceptual and on empirical grounds. Conceptually, reliance on an arbitrary stipulation that is outside the system of Optimality is equivalent to giving up on the enterprise. Data that cannot be dealt with by OT without recourse to rules are fatal counterexamples



to the OT research programme (see however, Blevins, Chapter 7 above [Editor])<sup>10</sup>

From an empirical point of view the proposed extension encounters a number of serious problems overlooked by McCarthy. For instance, McCarthy's general *r*-insertion rule ( $\emptyset \rightarrow r$ ) will extend the Gen sets not only for inputs such as *Wanda* but also for the other cases illustrated in (16) (LaCharité and Paradis 1993: 139 also note these problems with McCarthy's rule of *r*-insertion).

- (16) /wanda/ → {wanda, wandar} 'Wanda'  
 /sij/ → {sij, sijr} 'see'  
 /sijr/ → {sijr, sijrr} 'sear'

Of course, McCarthy could write a more specific rule of *r*-insertion (such as (29) below) that would be restricted to applying only after [–high] vowels. But the use of standard generative rules is sufficient to solve the problem, without OT constraints, candidates, and evaluation.

Consider, in particular, the candidates for the word *seeing* in (17). The brackets mark PrWd constituents. Following Selkirk (1995) the level I/II distinction is encoded here by either attaching the affix within the lowest PrWd (level I) or Chomsky-adjointing it to the PrWd, creating recursive PrWd structure. Recall that the discussion above showed that it is necessary to recognize both crisp and sloppy versions of some constraints. In view of this, we can no longer rule out such dual versions of other similar constraints. In particular, since, as we have seen above, Final-C is a sloppy constraint, the constraint set must also include its crisp analogue Final-C!, which we have ranked here as low as possible. Notice, however, that this constraint hierarchy selects the incorrect candidate from the set (17).

(17)

| /si: + rŋ/  | Coda-Cond | Final-C | Onset | NoComplexCoda | Final-C! |
|-------------|-----------|---------|-------|---------------|----------|
| ☞ [[sij]rŋ] | ✓         | ✓       | ✓     | ✓             | ✓        |
| [[sij.]rŋ]  | ✓         | ✓       | ✓     | ✓             | *!       |
| [[sijr]rŋ]  | ✓         | ✓       | ✓     | *!            | *        |
| [[sij]rŋ]   | ✓         | ✓       | *!    | ✓             | ✓        |
| [[sijr.]rŋ] | *!        | ✓       | *     | *             | ✓        |

<sup>10</sup> In an earlier part of the paper McCarthy specifically rejects an analysis of this kind, i.e. one in which phonemes are inserted only to be deleted by a later rule (overriding constraint). As an alternative to his ambisyllabification analysis, McCarthy considers an analysis in which 'all vowel-final words will receive intrusive *r* at Word level, but intrusive *r* will be deleted phrasally when it cannot be resyllabified as an onset' (1993: 181). He rejects this analysis out of hand: 'This analysis

We must therefore conclude that the account in McCarthy (1993) failed to provide a satisfactory analysis of the data in terms of the then current version of OT.

### 3.2 A Correspondence Theory approach

The problems just noted—(1) the need for a rule to extend the Gen set, instead of relying on the insertion of the unmarked phoneme, and (2) the incorrect choice of [sij rɪŋ] as the surface manifestation of *seeing*—can be dealt with rather differently in McCarthy and Prince's 1995 Correspondence Theory (COT). COT drops the inert prosodic position analysis of epenthesis in Prince and Smolensky (1993), and simply allows Input and Output to diverge. A relation between elements of I(nput) and O(utput), is established and the relative deviation of this relation from the conceptual ideal of identity is measured by I/O constraints, such as MaxIO. The guiding idea behind Correspondence Theory is that the phenomenon of reduplication provides the model for all of phonology, with the correspondence between Base and Reduplicant serving as the model for the I/O relation. The question that must be asked at this point is how this new approach will ensure that *r* appears in the output instead of some other 'default consonant', say *t*. One obvious answer is to admit 'positional defaults'. This answer was in effect already available in Prince and Smolensky (1993), because that theory distinguished Fill violations in the syllable peak from those in syllable margins. Since phonological theory distinguishes Onsets from Codas, nothing prevents us from saying that *r* is the default consonant in Codas, and that *t* is the default Onset. What is interesting about the cases under discussion is that the inserted *r* is ambisyllabic, and thus counts as both Onset and Coda. The constraint rankings in (18) will select the correct candidate from the set in (16)

- (18) Coda-Cond >> MaxIO(C). Align-Left >> Final-C >> Dep(C) >> \*Coda/t  
>> \*Coda/r. \*Ons/r

MaxIO in (18) is the COT analogue of Parse (in its role as maintainer of underlying segments, not in its role as enforcer of the Strict Layer Hypothesis of Selkirk, 1995). Dep is the COT counterpart of Fill. The constraints \*Coda/t and \*Coda/r in (18) belong to a family of constraints, modelled on Prince and Smolensky (1993) syllable structure constraints (see, however, Clements, Chapter 9 above [Editor]). Their role here is to give a ranking of undesirable segments in Codas. Since MaxIO(C) outranks this entire family, the family's effect is limited to inserted elements. Moreover, since Final-C outranks Dep(C), we will

may be a descriptive success, but it is an explanatory failure. The derivations are dubious because many *r*'s are inserted at Word level only to be deleted phrasally in what Pullum 1976 calls the "Duke of York gambit" (p. 182). The rejected analysis, however, is in all relevant respects indistinguishable from McCarthy's account. Specifically, McCarthy's proposed 'phonological rule' inserts *r*'s that are then excluded from the output by the OT constraints that apply subsequently. For some additional discussion see below.

be effectively limited to inserting ambisyllabic consonants. According to Prince and Smolensky 1993 the Onset hierarchy is universal and has the form in (19)

(19) \*Ons/a >> >> \*Ons/y >> >> \*Ons/r >> >> \*Ons/t

The ranking in (19) accords with the idea that *t* is the least objectionable epenthetic onset. But then, in order to ensure that it is *r* that is inserted in the cases under discussion, we must make certain of two things. First, we must make sure that *r* is the least objectionable coda; i.e. \*Coda/*r* must be dominated by all other \*Coda/*X* constraints. Second, \*Coda/*t* must dominate \*Ons/*r* so that it is better to have an Onset containing (part of) *r* than a Coda containing (part of) *t*. Moreover, in order for these constraints to do their work properly, they must be interpreted as 'sloppy'. That is, the \*Coda/*X* constraints do not care if the segment in question is also linked to an Onset position, i.e. they do not care if the consonant is ambisyllabic. By contrast, Coda-Cond does care about sloppiness. In fact, Coda-Cond is just the strict version of \*Coda/*r*. However, it is suspicious to require the two such closely related constraints in (20).

(20) Coda-Cond: No *r* wholly within a Coda  
\*Coda/*r*: No (part of) *r* within a Coda

And it is even more suspicious that the two almost identical constraints must be ranked so far apart, as in (18).<sup>11</sup> An additional problem is posed by the facts of schwa epenthesis before coda liquids, which interact crucially with *r*-deletion. These facts, which were covered in McCarthy (1991) but omitted in McCarthy's (1993) OT analysis, are extremely important in evaluating the adequacy of the OT analysis. In rule-based terminology these two processes apply in counterbleeding order, with schwa epenthesis preceding *r*-deletion. It is clear that the constraints implementing schwa epenthesis must be ranked fairly high, because the output violates Final-C, whereas simple failure to maintain *r* in the output would not, as shown in (21).

(21)

| <i>fear</i> / _ C | Coda-Cond | Final C | MaxIO(C) |
|-------------------|-----------|---------|----------|
| a [fjɹ]           | *!        | ✓       | ✓        |
| b [fj]            | ✓         | ✓       | *        |
| c [fjəɹ]          | *!        | ✓       | ✓        |
| d [fjə]           | ✓         | *!      | *        |

<sup>11</sup> This is especially troubling in connection with theories of constraint learning such as Tesar and Smolensky (1993) because every positive example for moving Coda-Cond up in the rankings will also be motivation to move \*Coda/*r* up in the ranking. Because of this learning problem, we predict this ranking of constraints to be unstable; thus any consonant other than *r* would be a better choice as the default Coda.

Both (21b) \*[fij] and (21d) [fijə] violate MaxIO, because both fail to preserve *r* in the output. Moreover, [fijə] (21d) is worse than \*[fij] (21b) in two additional ways. First, in epenthesis schwa, [fijə] (21d) also violates Dep(V), which states that every vowel in the output should have an input correspondent (similar to the role formerly played by Fill). Second, [fijə] violates Final-C, which \*[fij] (21b) does not by virtue of its final [j].

We begin the discussion of these problems by examining schwa epenthesis before *l*, for there is no *l*-deletion (in this dialect) to complicate matters there. The constraint in (22) will do the appropriate work with *l*.

(22) \*j{rl} Do not end a syllable with j + liquid.

Now we must rank MaxIO(C) above Dep(V), so that adding vowels is better than eliminating consonants. Consider the candidates for *feel* in (23).

(23)

| <i>feel</i> | *j{rl} | Coda-Cond | Final-C | MaxIO(C) | Dep(V) |
|-------------|--------|-----------|---------|----------|--------|
| a. [fijl]   | *!     | ✓         | ✓       | ✓        | ✓      |
| b. [fij]    | ✓      | ✓         | ✓       | *!       | ✓      |
| c. [fijəl]  | ✓      | ✓         | ✓       | ✓        | *      |
| d. [fijlə]  | ✓      | ✓         | *!      | ✓        | *      |

The constraint ranking in (23) does the correct work: (23c) [fijəl] is chosen over (23d) [fijlə] by virtue of Final-C, which requires that words end with consonants. This ranking, however, will not do the correct work with *r* as shown in (24).

(24)

| <i>fear</i> | *j{rl} | Coda-Cond | Final-C | MaxIO(C) | Dep(V) |
|-------------|--------|-----------|---------|----------|--------|
| a. [fijr]   | *!     | *         | ✓       | ✓        | ✓      |
| b. [fij]    | ✓      | ✓         | ✓       | *        | ✓      |
| c. [fijər]  | ✓      | *!        | ✓       | ✓        | *      |
| d. [fijə]   | ✓      | ✓         | *!      | *        | *      |
| e. [fijrə]  | ✓      | ✓         | *!      | *        | *      |

Here the ranked constraints choose [fij] (24b) as the best candidate. It is obvious that a more specific constraint must be at work, which identifies the sequence /j + liquid/ in the input and forces epenthesis directly. But even if we can rule out [fij] (24b) by forcing epenthesis, we must get the epenthetic vowel in the right place. For [fijəl] in (23c) we could appeal to Final-C or to

Align(Stem, R, PrWd, R) to force epenthesis inside the stem (and thus violate Stem Contiguity). But with (24d) [fijə] there is no surface *r* to appeal to, so Final C, Align-Right, and Contiguity are all useless in this regard. In fact, Stem Contiguity would pick [fijrə] (24e) as the best candidate, for it maintains Stem Contiguity while preserving all the underlying elements of the stem, thereby satisfying MaxIO. Since we see no principled way to solve this problem, let us just formulate a brute-force I/O constraint, as in (25)

(25) /j{r}l/ ⇒ [jə] For input /j + liquid/, have at least [jə] in the output

Constraint (25) yields the correct results in this case, as shown in (26).

(26)

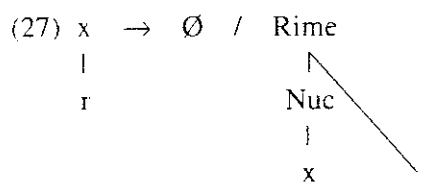
| <i>fear</i> | /j{r}l/ ⇒ [jə] | Coda-Cond |
|-------------|----------------|-----------|
| a [fijr]    | *!             | *         |
| b. [fij]    | *!             | ✓         |
| c. [fijər]  | ✓              | *!        |
| d [fijə]    | ✓              | ✓         |
| e [fijrə]   | *!             | ✓         |

However, constraint (25) as formulated has too much power, for it will also force epenthesis where it is not needed. Where *l* or *r* can be ambisyllabic (or wholly in the following onset), as in *velum* and *Byron*, the constraint incorrectly selects [vijələm] and [bajərən], rather than the correct schwaless forms [vijləm] and [bajrən]. But it seems that whatever constraint one proposes to prevent the insertion of schwa in such cases—for example a constraint mandating [r,l] in the Onset of the syllable following coda [j,w]—the constraint must be ranked above (25) and will therefore choose \*[fij rə] (26e) as the winning candidate for *fear*. In sum, our attempts to formulate an OT account of the facts of the Eastern New England *r* and related matters have not produced encouraging results. While these failures do not exclude the possibility that an adequate OT solution may yet be discovered, the burden of proof is clearly on proponents of OT. We turn now to an alternative account based on rules and principles

#### 4. AN ACCOUNT BASED ON RULES AND PRINCIPLES

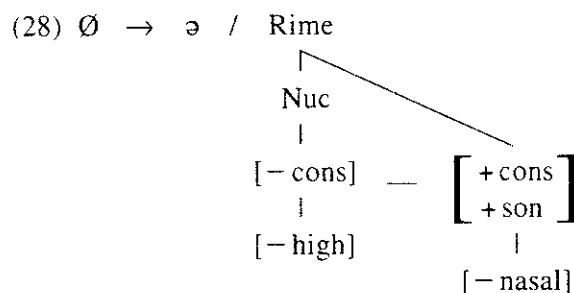
##### 4.1 *r*-deletion.

It will be recalled that *r*-deletion occurs before consonants and at the end of clauses, i.e. in syllable coda. This is expressed more formally in rule (27).



#### 4.2 Schwa epenthesis

As illustrated in (4) and (5) above in the dialect under discussion here, McCarthy's 'monitored speech', schwa is epenthésized before a rhyme-final liquid when preceded by a diphthong ending in a [+high] vowel or glide. Rule (28) provides a formal account of this.



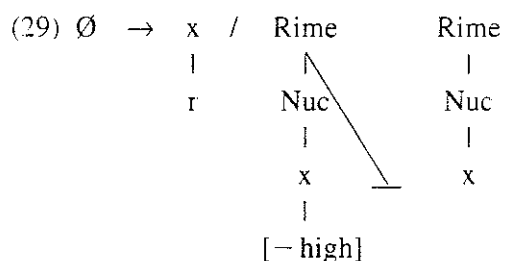
It was noted above that schwa is inserted also word-internally before level II suffixes beginning with a vowel. If we assume that (28) is a level II (noncyclic) rule and that it is ordered before any rules of resyllabification, rule (28) will insert schwas correctly.<sup>12</sup>

#### 4.3 r-insertion

We quoted McCarthy's observation (1993: 178) that the 'intrusive' *r* in 'Wanda[r] arrived' and the 'linking' *r* in 'Homer arrived' are phonetically identical but that they differ from the onset *r* in 'Wanda returned'. If we assume that there is no resyllabification across word boundaries, this difference in quality of the *r* is then totally context-determined: one kind of *r* appears in coda, another *r* appears in onset. Whatever the phonetic difference—and its nature remains to be elucidated by phonetic research—there is one *r* in the onset and another in the coda. Since the inserted 'intrusive' *r* is phonetically identical with the 'linking' *r* in the coda of *Homer* we formulate

<sup>12</sup> McCarthy (1991: 198) cites forms such as *goal of* and *feel it* and the participles *feeling* and *fearing* as having no inserted schwa in his more casual speech. In order to account for these forms it would be necessary to assume that resyllabification is ordered before schwa insertion. (29). McCarthy gives no information about the pronunciation of phrases like *feel ill* and *feel sick* in his dialect. If there is insertion only in *feel sick*, but not in 'feel ill' nothing further needs to be added. If—as in the speech of several of our informal consultants—there is insertion in both phrases, it will be necessary to posit that a clitic (such as *of* or *it*) is incorporated into the word on its left.

the rule of *r*-insertion (29) so that it inserts *r* into syllable coda. However, unlike schwa epenthesis, *r*-insertion requires the presence of a following vowel, which may be in the same word (*draw[r]ing*) or may be in the next word (*Wanda[r] arrived*). The *r*-insertion rule must therefore also be part of the phrase-level rule block, i.e. Level III. Moreover, as noted by McCarthy, 'intrusive *r* is found only at the end of lexical words. The lexical word with intrusive *r* may itself be contained inside a larger word by virtue of a Level II suffix (*drawing, withdrawal*) but the consistent generalization is that intrusive *r* is limited to lexical-word final position' (1993: 176). This morphological restriction can be captured instead by restricting the operation of (29) to derived environments, and by restricting (29) to Level II and subsequent (noncyclic) levels of the phonology (See Kiparsky, 1993 for the separation of the derived environment condition from the lexical/cyclic conditions)



We recall that the context in which *r*-deletion (27) occurs is the syllable coda. *r*-insertion also occurs in syllable coda, but only if additional conditions are satisfied. An immediate consequence of this fact is that if *r*-deletion is ordered after *r*-insertion, all effects of *r*-insertion will be eliminated in the output. This, therefore, is not a viable ordering of the rules. Unfortunately, the reverse order—i.e. *r*-deletion preceding *r*-insertion—results in derivations where the effects of *r*-deletion are repaired by *r*-insertion. This type of rule interaction has been termed by Pullum 'the Duke of York gambit' and objections to it have been raised on the grounds that the gambit subverts the essential difference between rules, which reflect idiosyncratic facts of a language, and repairs, which are consequences of general structural principles obeyed by the language.

There is, however, yet a third solution. Rules precisely of this kind were studied by Kiparsky (1973) in a paper that is in our opinion among the most important contributions to phonology. Kiparsky proposed that, when rules of the kind just described arise in a language, they are subject to a special convention on their application. The special importance of Kiparsky's proposals derives from the fact that his conventions on rule application must—obviously—not be part of the phonology of any language, but are part of UG, part of the principles that determine what may or may not arise in a particular language. Specifically, Kiparsky's principle tells us that if, by some quirk of circumstance, a language develops two rules that are formally similar in precisely the same way as *r*-insertion and *r*-deletion, then *r*-insertion must

be ordered before *r*-deletion and, moreover, that the two rules are disjunctively ordered so that strings of the form of the output of the *r*-insertion rule may not be subject to *r*-deletion. We have reproduced Kiparsky's formulation in (30).

(30) Two adjacent rules of the form

A → B / P \_\_\_ Q

C → D / R \_\_\_ S

are disjunctively ordered if and only if:

(a) the set of strings that fits PAQ is a subset of the set of strings that fit RCS;

(b) the structural changes of the two rules are either identical or incompatible.

Kiparsky explains that 'incompatible' changes have opposite effects, such as, assigning the feature [+F] and [-F], or, as in the case under discussion here, inserting a segment and deleting it. When rules satisfying these conditions are found in a language, they are ordered so that the more complex one—(29) in our case—precedes the less complex one—here (27). The rules, moreover, must apply disjunctively, i.e. both rules may never apply to the same string. This has usually been interpreted to mean that if a string is subject to rule (29) it is not also subject to rule (27). In the examples *draw[r]ing* and *Wanda[r] arrived* this gives the correct result: since the *rs* here are inserted by rule (29), they are not subject to deletion by rule (27). It has been pointed out to us by Francois Dell (p.c.) that prior application of (29) is not a necessary condition for blocking the application of (27). For instance, *r*-insertion does not apply to the examples in (31), yet they are not subject to *r*-deletion.

- (31) a. Lear is  
 b. the rear is  
 c. fire away [fajərəwej]  
 d. layering empowering  
 e. fear Ann [fijər æn]

To account for these examples we need to generalize the condition on disjunctivity as given in (30).<sup>13</sup> Any two rules meeting the Elsewhere Condition prerequisites are subject to the following constraint: the less complex rule may not apply to a string that has the form of the output of the more

<sup>13</sup> McCarthy devotes considerable attention to *r*-insertion after function words (prepositions, pronominal clitics, auxiliary verbs). He shows that *r*-insertion does not occur if the function word is part of the same constituent as the following word; e.g. no insertion occurs in *I'm gonna eat* or in *Didja eat*. By contrast, when the function word is not part of the same constituent as the next word, *r*-insertion occurs; e.g. *I said I was gonna[r] and I did* or *we oughta[r] if we re asked* (McCarthy 1993: 176). This difference is explained if we assume that in *I'm gonna eat* and *Didja eat* the cliticized function word is morphologically (and phonologically) part of the following word. The space separating the words in the conventional orthography is thus misleading. Since *r*-insertion (31) takes place after [-high] vowels only if they come at the end of a constituent that is a lexical category or phrase, cliticization of the function word to the following word prevents *r*-insertion. In cases such as *We oughta[r] if we re asked* the function word cannot cliticize across the clause boundary, and consequently cliticizes to the preceding word. Then, because the function word is at the end of a constituent, *r*-insertion (31) will apply.



complex rule. That is, the less complex rule is blocked if the current representation is compatible with the structural change of the more complex rule. Since application of the more complex rule will obviously generate such strings, the proposed generalization subsumes under it all previously noted cases.

One might ask at this point why there are dialects with rules with 'incompatible' structural changes of the kind illustrated above, i.e. dialects where one rule inserts an element into the string which then is deleted by another rule. These are typical instances where the undesirable 'Duke of York gambit' might arise, were it not for the fact that such rules are subject to the Elsewhere Condition. We believe that some light on the reason for the existence of such pairs of rules is shed by the phenomenon of hypercorrection.

Hypercorrection typically arises when a phonetic contrast is lost by a group of speakers who are in contact with speakers in whose speech the contrast is maintained. Once the speakers of the innovative dialect become aware of the fact that they are pronouncing certain words differently from many of the individuals with whom they are in contact, it is not uncommon for the former to take corrective steps to eliminate the differentiating trait. The corrective rule, however, often fails to restore the status quo ante and produces instead hypercorrection.

It is well known that the deletion of coda *r* is relatively widespread among English dialects and historically prior to *r*-insertion. These facts fit well with the suggestion that *r*-insertion is a corrective rule of the type sketched above. Speakers notice that coda *rs* are missing in their utterances and attempt to correct this by *r*-insertion in some intervocalic contexts. Once the *r*-insertion rule is added, however, the Elsewhere Condition orders it with respect to *r*-deletion, whose domain of application is somewhat more limited in dialects with *r*-insertion than it is in dialects without this rule (For a discussion of such dialects, see Sledd 1966; Harris 1994: ch. V). This naturally leads to another question: why is the rule of *r*-insertion as complicated as it is? That is, why isn't the rule formulated to simply insert *r* everywhere? The answer is again found in the operation of the Elsewhere Condition. If the rule of *r*-insertion is more general than the rule of *r*-deletion, then by the Elsewhere Condition that general *r*-insertion rule must follow the *r*-deletion rule, and be disjunctive with it. Because *r*-deletion deletes all coda *rs* the hypothetical general *r*-insertion rule would then be blocked from creating any coda *rs*. Thus, the Elsewhere Condition has an intimate relation with hypercorrection by rule addition: the added rule must be more specific than the original rule.

A reviewer has also asked whether the reinterpretation of the Elsewhere Condition does not amount to a trans-derivational constraint. The reinterpretation of the Elsewhere Condition is not a trans-derivational constraint because no access to previous or subsequent representations in the derivation (or in other derivations) is necessary. Rather, the application of a rule to the current representation is blocked in one particular circumstance—if the form is com-

patible with the structural description or change of a more specific rule. Thus, what is required is a limited access to the formal encodings of other rules, not to other representations or derivations. Of course, what this suggests is that phonological rules are organized in the grammar partially by their formal properties. In other words, the Elsewhere Condition is really a universal principle of phonological grammar organization. A system of phonological rules is not mentally encoded simply as a blind list; rather, rules with similar function and properly nested environments are bound together in the grammar. Thus, the reinterpreted Elsewhere Condition provides intrinsic ordering and structure to phonological rules and derivations.

In sum, the three ordered rules (28), (29), and (27), supplemented by the revised version of Kiparsky's Elsewhere principle, not only capture the facts of the Eastern Massachusetts dialect but also allow us also to gain some insight into the evolution of these dialectal phenomena, as well as into the reasons for the rather special interaction among the three rules. By contrast, as discussed in section 2, an OT account of these data encounters a number of non-trivial difficulties, and it remains to be shown that it is possible to construct an OT account for these data that not only grinds out the facts but also explains the reason for their existence.<sup>14</sup>

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<sup>14</sup> For some recent discussion of explanatory adequacy in phonology, see Halle (1996)

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