Historical change and dialectal variations of English *r*[*]

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In this paper, I argue that historical change of *r* is due to the overall process in which *r* undergoes weakening. I propose that this weakening process results in demotion of faithfulness constraints relevant to *r* realization. It is shown that such analysis of *r* can explain why *r*-insertion always and necessarily follows *r*-deletion, and how such incompatible kind of rules can coexist in a dialect. In addition, it is shown that the rule-based approach to these phenomena is not very successful. **(Seoul National University)**

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1. Introduction

In some dialects of English, *r* is not pronounced before a consonant or a pause; however, it is pronounced before a vowel. In the latter case, the *r* is called **linking *r***. The relevant examples are illustrated below (*r* indicates *r*-deletion and **r** represents a linking *r*):

(1) Father's at home, but mother isn't.
I remember, I remembe**r** the house where I was bo**r**n.
Sta**r**light, sta**r** bright, very fi**r**st star I've seen tonight.
The wa**r**, the long war is ove**r**.
(Grandgent 1920: 41)

Interestingly, *r* is inserted before a vowel, even though there is no *r* in

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the spelling, as in (2). This *r* is referred to as **intrusive *r***. Intrusive *r* takes place typically after *a*, *ɔ*, and *ə*.[1] (In the following examples, ɾ indicates an intrusive *r*.)

(2) sodaɾ and salt
the Shahɾ of Persia
rawɾ oysters
Linden sawɾ another sight
(Grandgent 1920: 42)

Deletion and insertion of *r* pose three major problems. One is the apparent arbitrariness of *r*-intrusion, that is, why only *r*s, not others, are inserted after *a*, *ɔ*, and *ə*. The other is the opacity problem resulting from the interaction of schwa insertion and *r*-deletion. If schwa insertion takes place between high glides and coda *r*s, and the subsequent *r*-deletion rule eliminates coda *r*s, the application of these two rules to, say, *fear* /fijr/ will produce [fijə]. In this form, the schwa insertion rule becomes opaque since there remains no surface environment for this rule. Such opacity problems have been considered to be problematic in the standard OT because its output- orientedness. Hwangbo (1998, to appear) proposes possible solutions to the above two problems.

The final problem is why *r*-intrusion follows *r*-deletion historically and how these two seemingly incompatible rules can coexist in a dialect. McCarthy (1991) argues that the introduction of *r*-intrusion rule is so natural that it seems to have happened independently in Britain and New England. He claims that the apparent addition of *r*-insertion rule (∅→r) is in fact a natural consequence of historical rule generalization in which deletion rule (r→∅) become a synchronic inversion rule (r~∅).

Closely related to the historical change are dialectal variations of *r* distribution. Harris (1994: 232-237) illustrates four systems: System A that is a rhotic type (Canada, Ireland, Scotland, most of the United States, and part of the Caribbean); System B that is a non-rhotic type with only linking *r*s (Southern England), System C that is a non-rhotic

[1] As indicated in Hwangbo (1998: 294), intrusive *r* may also occur after *æ* and *ɛ*, but only marginally, as in *baaing* [bæɪŋ] (Donegan 1993: 118-9) and *yeah it is* [jɛɪɪɪz] (Broadbent 1991: 295, Wells 1982: 226).

type with both linking and intrusive *r*s (non-rhotic England, some parts of the eastern and southern United States, the southern hemisphere), and System D that has *r* only in foot-initial onsets (the Upper South of the United States). These systems are summarized below:

(3)

	System A	System B	System C	System D
foot-initial	red	red	red	red
morpheme-internal	very	very	very	very
coda	poor man	poor man	poor man	poor man
linking	bearing	bearing	bearing	bearing
intrusive	saw it	saw it	sawr it	saw it

The aim of this paper is to account for this historical fact and dialectal variations in the framework of the Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1995; henceforth OT). It will be shown that the historical change and dialectal variations can be explained by constraint reranking, more specifically by demoting the relevant faithfulness constraints.

The remaining part of this paper is organized as follows. In section 2, an OT approach to *r*-deletion and *r*-intrusion is briefly introduced. In section 3, the historical and dialectal facts are analyzed in the proposed OT framework. In section 4, Halle and Idsardi's rule-based approach is reviewed in detail. Section 5 concludes the paper.

2. An OT approach to System C

In this section, I introduce an OT analysis of *r*, as proposed in Hwangbo (1998, to appear). Generally, in *r*-less dialects, *r* has been said to be deleted in coda position. However, *r*-loss can be treated as vocalization of *r* or weakening of the consonantal strength of *r* (Lutz 1994). This position (i.e., *r*-loss as vocalization) is also supported by Kenyon and Knott (1953: xix), Sledd (1966), Donegan (1993: 116-119), Olive et al. (1993: 367), McMahon (1994: 80), McMahon et al. (1994: 303-4) and Blevins (1997: 232), among others. Most interesting among

these is a proposal introduced by McMahon et al. (the proposal is not their own but a reviewer's). The proposal, which is based on Delattre and Freeman (1968), can be summarized as follows. As shown in Delattre and Freeman, *r* has two constrictions in vocal tract: one at palate and the other at pharynx. Furthermore, the pharyngeal constriction of *r* is rather similar to that of *ə*. Thus, if palatal gesture was reduced in magnitude, the remaining pharyngeal gesture would be regarded as a schwa. From this perspective, the *ə* of *fear* [fijə] can be thought to be derived directly from *r*.[2] Hwangbo (to appear) adopts and develops the vocalization approach since it provides a unified way of accounting for both *r*-vocalization and *r*-intrusion.

Hwangbo (1998) shows that *r*-intrusion is phonetically motivated and thus a natural phenomenon. He shows that *r*, especially postvocalic *r*, can be treated as a glide in *r*-less dialects, and thus *r*-intrusion can be treated as a kind of glide insertion, following Walmsley (1977) and Broadbent (1991). Mainly based on Harshman et al.'s (1977) findings, Hwangbo classifies vowels into three types: palatal (i.e., *i*, *ɪ*, *e*), velar (i.e., *u*, *ʊ* and *o*) and pharyngeal vowels (i.e., *ə*, *ɛ*, *æ*, *ɑ*, and *ɔ*).[3] According to the factor analysis by Harshman et al., the vowels classified here as pharyngeal have negative values in Factor 2; palatal

[2]As McMahon (1994: 81) indicates, one apparent difficulty for the above account is that it fails to explain why a low vowel plus *r* is realized as *ɑː* or *ɔː*, instead of *ɑə* or *ɔə*, in some dialects. We can deal with this problem as follows. Low vowels *ɑː* and *ɔː* have a great pharyngeal constriction. Schwa has a pharyngeal constriction, too (McMahon et al. 1994: 303; cf. McMahon 1997: 80). Thus, *ɑː*, *ɔː* and *ə* are similar to *r* in pharyngeal constriction, except that *ə* is weak in acoustic cue. Consequently, it seems plausible to suppose that the weaker segment is absorbed or merged into the stronger segment (cf. 'Production Hypothesis' of Jun 1995). In the case of a high vowel plus a schwa, there is no similarity in pharyngeal constriction; that is, they are acoustically/perceptually distinct, and thus a schwa can retain its identity. See McMahon (1994: 81) for an articulatory explanation of this problem.

[3]In this connection, there are two things to be clarified. First, schwa was not included in Harshman et al.'s research. However, it would be plausible to classify schwa as pharyngeal since schwa is said to have a pharyngeal constriction similar to that of *r* (McMahon et al. 1994: 303). Second, vowels may be classified differently. For example, Wood (1975, 1979) classifies vowels into four categories based on the degree of vocal tract constriction: palatals ([i-ɛ]-like vowels), velars ([u-ʊ]-like vowels), upper pharyngeals ([o-ɔ]-like vowels), and low pharyngeals ([ɑ-a-æ]-like vowels).

vowels positive values in Factor 1; and velar vowels negative values in Factor 1 (Harshman et al. 1977: 702; Hwangbo 1998: 303-2). Given the well-known fact that postvocalic *r*s have a pharyngeal constriction (Delattre and Freeman 1968; Lindau 1985), it would be plausible to suppose that they are pharyngeal or pharyngealized glides (Gnanadesikan 1997: 161-2; Blevins 1997: 231).[4] Based on these assumptions, Hwangbo (1998) argues that when glides must be inserted to resolve hiatus, palatal vowels attract a palatal glide (*see* ~ *it*); velar vowels a velar glide (*do* ~ *it*); and pharyngeal vowels a pharyngeal glide (*saw* ~ *it*).[5] In addition, he shows that the chosen glides have the shortest distance from the attractor vowels in the vowel space. He concludes that glide insertion in English can be considered to be governed by the economy principle, that is, the minimization of the effort.

To incorporate the above observations, Hwangbo (to appear) assumes the constriction-based model of feature organization, where features such as *palatal*, *velar*, and *pharyngeal* are defined in terms of constriction location instead of articulator involvement (Clements and Hume 1995). This model provides us a way of unifying the description of consonants and vowels. Crucially, this approach enables us to group *a* ɔ, ə, and *r* as a natural class by the feature *pharyngeal*.

Before considering relevant OT constraints, we need some comments on the representation of linking and intrusive *r*s. McCarthy (1993: 178-9) argues that linking and intrusive *r*s are of the same quality and distinct from true word-initial *r*s. For example, the *r* in *saw*ːr *eels* [sɔːr ijlz] is considerably more vocalic than the *r* in *saw reels* [sɔ rijlz]. Accordingly, McCarthy claims that this phonetic distinction should be reflected in the representations. McCarthy claims that more vocalic *r*s (i.e., linking and intrusive *r*s) are ambisyllabic. I call this position the Ambisyllabic-*r* Hypothesis for convenience.

The main constraints and their ranking used in this paper are as

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[4] Here, 'pharyngeal glide' means that it has a prominent constriction in pharynx, without ruling out the possibility that the glide has a little bit of constriction in palate.

[5] Some can raise a question of why only *r* is inserted after pharyngeal vowels, since there are other pharyngeal consonants such as *ħ* and *ʕ*. This is because *ħ* and *ʕ* are not phonemes (or allophones) of English and are excluded by the undominated constraints **ħ* and **ʕ*.

follows:

(4) a. MSD: Minimal Sonority Distance Condition (Steriade 1982: 94-5).

b. *Cod/r: No *r* should be wholly within a syllable coda (Halle and Idsardi 1997: 337; McCarthy 1993).[6]

c. Max: Every input segment has a correspondent in the output.

d. Dep: Every output segment has a correspondent in the input.

e. Ident(F): Correspondent segments have identical values for the feature F (McCarthy and Prince 1995).

f. Ons: Every syllable has an onset.

g. Final-C: Every word must end with (part of) a consonant (Halle and Idsardi 1997: 337; McCarthy 1993).

h. *PL/loc: Every occurrence of place feature is penalized. This constraint ranges over *PL/pal, *PL/vel, and *PL/phar, etc.

(PL=place, loc=constriction location, pal=palatal, vel=velar, phar= pharyngeal)

(5) MSD *Cod/r ≫ Max, Dep(C^{Lr}), Ident(voc), Ident(phar) ≫ Ons ≫ Dep(G) ≫ Final-C ≫ Dep(V) ≫ Ident(pal) ≫ *PL/loc[7]
(C^{Lr}=True consonant, G=Glide)

Here we need some comments on the above constraints. First of all, MSD (Minimal Sonority Distance Condition) is a general constraint that controls the sonority difference between tautosyllabic segments, based on sonority hierarchy (cf. McCarthy 1991). Sonority hierarchy proposed by Steriade (1982: 94-5) is as follows: *a* = 10; *e*, *o* = 9; *i*, *u* = 8; *r* = 7; *l* = 6;

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[6]Here *Cod/r is defined in a crisp manner and Final-C in a non-crisp manner, following Halle and Idsardi (cf. Itô and Mester 1994). Ons must be interpreted in a non-crisp manner. See H&I for the criticism of such use of constraints.

[7]In this paper, following Itô & Mester (1994: 39), the ranking Ons≫ CrispEdge(PrWd)≫Final-C is assumed for English ambisyllabicity. This ranking forces a word-final or inserted consonant to be ambisyllabic but prohibits a word-initial consonant (including *r*) from being ambisyllabic. The ranking Ons≫ Dep(G) wrongly predicts glide insertion word-initially, as in *is* [ɪz] →[jɪz]. However, this result is restricted only to the phrase-initial position. This problem will therefore be solved by the constraint CrispEdge(phrase), which must be ranked above Ons.

m, *n* = 5; *s* = 4; *v*, *z*, *ð* = 3; *f*, *θ* = 2; *b*, *d*, *g* = 1; *p*, *t*, *k* = .5. This paper is concerned with the sonority distance between high vowels and glides on the one hand, and *r* and *l* on the other: it is assumed to be greater than 2.[8] It seems reasonable to suppose that the sonority of *j* and *w* is less than *i* and *u* since *j* and *w* are more consonant-like than *i* and *u* respectively (cf. Kirchner 1998: 189, 197). Then, the sequences *j*/*w*+*r* and *j*/*w*+*l* are not allowed in the same rhyme because the sonority distance between glide *j* and *w* (<8) on the one hand, and *r* (=7) and *l* (=6) on the other hand, are too short; that is, their distance is less than 2.

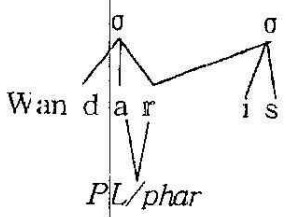
The next constraint we will consider is Ident(F). Ident(voc) and Ident(phar) are ranked relatively high. Thus, *r* must preserve its vocalicity and pharyngeal constriction, even where it cannot preserve its whole identity. Ident(pal) is assumed to be ranked below Dep(V). In this connection, it is interesting to note Boersma's (1998: 180-4) argument that it is more important to realize rarer place features than to realize commoner place features. In English, as in almost all other languages, palatal constrictions (mainly by coronal gestures) are commoner than velar and pharyngeal constrictions. This means that the palatal place feature will first be lost if *r* is placed in the position (e.g., coda position) where its double (palatal and pharyngeal) place features cannot be fully realized. This fact is reflected here as constraint ranking Ident(phar)≫Ident(pal). For more detailed discussion of this issue, see Hwangbo (to appear).

Next, consider Dep family. Dep is usually divided into Dep(C) and Dep(V). It is very important to note here, however, that Dep(C) can be further divided into Dep(C^{tr}) and Dep(G). This distinction will play a crucial role in explaining glide insertion including intrusive *r*s and historical facts of *r*, which will be addressed in the next section. The next constraints to be considered are Ons and Final-C. They are the very constraints to force something to be inserted between vowels and force it to be ambisyllabic. Finally, *PL/loc penalizes every occurrence of place features (constriction location features). Given the fact that every place feature is penalized, spreading existing features, as in (6), is

[8]The application domain of MSD may vary depending on where high glides belong within a syllable. If a glide belongs to a nucleus, MSD must apply between a nucleus and a coda. If a glide belongs to a coda, MSD must apply within a coda.

preferred to inserting new features.

(6)



The members of *PL/loc are assumed to be unranked to one another. It follows then that they just serve as constraints that demand the minimal use of articulators, i.e., the least effort, even though they are defined in terms of the constriction location. In the following tableaux, the space between segments indicates a syllable boundary, and the sequences such as *rr* or *rr* represent an ambisyllabic segment. For simplicity, only the violation marks for vowels and glides are presented in *PL/loc columns. In other words, PL should be regarded as V-PL (Vowel Place). Some irrelevant constraints may be omitted in the following tableaux.

Consider now how intrusive *r*s occur:

(7)

Wanda is	Dep(C^{tr})	Ons	Dep(G)	Final-C	*PL/ pal	*PL/ vel	*PL/ phar
a. Wandat tis	*!				*		**
b. Wanda is		*!		*	*		**
c. Wandaj jis			*		**!		**
d. Wandaw wis			*		*	*!	**
☞ e. Wandar ris			*		*		**

Candidate (a) violates Dep(C^{tr}) because a true consonant *t* is inserted. Candidate (b) violates Ons and Final-C. The remaining candidates tie on Dep(G). All candidates have two pharyngeal vowels and one palatal vowel, and are penalized as such by the constraints *PL/loc. Candidates (c) and (d) have an extra place feature, *PL/pal* and *PL/vel* respectively, since

they have epenthetic glides. Candidate (e) does not use any additional place feature because it spreads feature *PL/phar* of the preceding vowel to the epenthetic glide, as in (6).[9] As a result, candidate (e) is the optimal form. Note that the optimal form (e) is the one that uses the fewest constriction location features among candidates (c) - (e). Alternatively, it resolves hiatus using the least effort.

In (8), we consider how linking *r*s are accounted for in OT:

(8)

Homər is	*Cod/r	Max	Dep(C^{tr})	Ons	Dep(G)	Final-C
a. Homət tis		*!	*			
b. Homə is		*!		*		*
c. Homəi is		*!			*	
d. Homəw wis		*!			*	
☞ e. Homər ris						

Here, it is important to note that ambisyllabic consonants do not violate *Cod/r because they are not wholly within a syllable coda (see (4b)). Candidate (b) deletes *r*, violating Max. Candidates (a), (c), and (d) delete *r* and insert other segments instead, violating Max and Dep. The ambisyllabic *r* in candidate (e) does not incur any violation and makes the candidate optimal.

Now, look at tableau (9) to see how *r*-vocalization takes place:

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[9] A reviewer indicates the possibility that in (7c) the intrusive *j* shares palatality with the following *i*, causing (7c) to tie with (7e). More generally, this question is about the directionality of spreading. A solution may be to draw on the fact that nuclei are more closely related to codas than to onsets, as reflected in the traditional notion of rhyme. Thus, it is possible to argue that spreading within the same constituent (here, rhyme) is preferable to spreading across constituents. This restriction could be implemented into the OT constraints, even though it will not be pursued in this paper.

(9)

fijr$_i$	MSD	*Cod/r	Max	Ident(voc), Ident(phar)	Final-C	Dep(V)	Ident (pal)
a. fijr$_i$	*!	*					
b. fijər$_i$		*!				*	
c. fij			*!				
d. fijr$_i$ə					*	*!	
☞ e. fijə$_i$					*		*

Candidate (a) violates MSD. Candidate (b) violates *Cod/r. Candidate (c) just deletes the final *r* to satisfy MSD, violating Max. Candidate (d) escapes MSD violation by adding a schwa at the end, violating Final-C and Dep(V). Candidate (e) vocalizes *r* into a schwa. Nevertheless, it does not violate Ident(voc) and Ident(phar) since both *ə* and *r* are vocalic and have a pharyngeal constriction. It violates Final-C, but does not violate Dep(V). Therefore, candidate (e) is the optimal form. Remember that *fear* [fijə] has been considered opaque with respect to the schwa insertion rule. Assuming that the relevant process is not schwa insertion but *r*-vocalization, [fijə] is now a transparent surface form.

It has been shown in this section that *r*-intrusion is a very natural process and that there arises no opacity problem in treating schwa insertion and *r*-loss. It has also been argued that OT provides an adequate way of accounting for *r*-phenomena in English (more specifically, System C).

3. Historical change and dialectal variations

Blevins (1997: 233) presents two reasons that make a synchronic explanation of intrusive *r* quite difficult. One is that *r*-intrusion does not seem to be phonetically motivated. I have already shown in section 2 that *r*-intrusion is phonetically motivated. The other is why *r*-intrusion comes into existence and always follows *r*-loss historically. To quote McCarthy (1991), "Why is this such a natural change that it seems to have happened independently in Britain and New England?" McCarthy

maintains that the addition of *r*-epenthesis rule (∅→*r*) to *r*-deletion rule (*r*→∅) produces more general rule (*r*~∅) which he calls synchronic inversion rule. He suggests that this is why the historical change is natural, implying that 'more general' is 'more natural.' In this section, I will provide an OT explanation to this historical fact. I will argue that historical development of *r*-less dialects is accounted for as minimal reranking of constraints which is triggered by *r*-weakening. In this connection, it will be useful to review Lutz's (1994) study of consonantal weakening.

According to Lutz, historical loss of *r* is done through the gradual weakening of consonantal strength of *r*. The strength of a given consonant is a function of its inherent strength and positional strength. For example, *l*, *r*, and *h* are inherently weak consonants. It is well known that coda position is relatively weaker than onset position. Consequently, *r* in coda position is weaker in consonantality than that in onset position. Throughout the history of English, some inherently weak consonants have undergone weakening process, starting with those in syllable coda (i.e., in weak position) and then those in onset (i.e., in strong position). Weakening of *r* is one instance of the overall historical weakening process (cf. Gimson 1989: 210). I will argue that weakening of *r* can be captured by gradual constraint reranking.

Some vestiges of historical change of *r* are found in present English dialects. The four *r* systems that we have already seen are the examples. They are reproduced below for convenience:

(10)

	System A	System B	System C	System D
foot-initial	red	red	red	red
morpheme-internal	very	very	very	very
coda	poor man	poor man	poor man	poor man
linking	bearing	bearing	bearing	bearing
intrusive	saw it	saw it	sawr it	saw it

First, consider rhotic dialects. For simplicity, I will not use all the constraints introduced in the previous section. The following constraints

and their ranking will be sufficient for our purposes. *Ons/r is a constraint that bans onset *r*s.

(11) **Rhotic dialects (System A)**

a. Max≫*Cod/r, *Ons/r

b. ..., Dep(r)≫Ons≫Dep(j), Dep(w)
=Dep(C^{tr}) = Dep(G)

c. Ident(phar)≫*PL/loc≫Ons

In these dialects, neither coda *r*s nor onset *r*s are deleted (vocalized) because Max dominates *Cod/r and *Ons/r. Intrusive *r*s do not occur because Dep(r), a member of Dep(C^{tr}), dominates Ons. It is important to note that in these dialects intrusive *j*s and *w*s can freely occur (e.g., *tiree[j]ana*, *two[w]of*; Harris 1994: 104), because Dep(j) and Dep(w) are dominated by Ons. In short, *r*s in these dialects are not glides and thus behave differently from *j*s and *w*s. In such dialects, *PL/loc must dominate Ons since otherwise *j*s or *w*s would be wrongly inserted, even after *a*, *ɔ*, and *ə*, to satisfy Ons (**saw[j]it*, **saw[w]it*).

Consider now the weakening process of *r*. Weakening of *r* means that realization of underlying *r* becomes less faithful. Thus weakening of *r* is reflected in the grammar as the demotion of faithfulness constraints relevant to *r*. The weakening (or vocalization) of *r* takes place in syllable coda easier than elsewhere because coda position is a relatively weak position. At a point in the course of weakening, coda *r* becomes unperceivable by people; that is, coda *r* is regarded as lost. From a ranking perspective, this means that faithfulness constraints relevant to coda *r* are demoted. Specifically, Max (or at least Max(r)) is demoted below *Cod/r, as in (12a):

(12) **Non-rhotic dialects without intrusive *r*s (System B)**

a. *Cod/r≫**Max**≫*Ons/r

b. ..., Dep(r)≫Ons≫Dep(j), Dep(w)
=Dep(C^{tr}) = Dep(G)

c. Ident(phar)≫*PL/loc≫Ons

In these dialects, coda *r*s are deleted since *Cod/r dominates Max (12a). In such dialects, intrusive *r*s cannot take place since Dep(r) which is

still a member of Dep(C^{tr}) dominates Ons (12b).

As weakening process goes on, even *r*s in strong position (i.e., onset position) become weak, and eventually to the degree in which *r*s are regarded as glides. This means that *r*s behave in the same manner as *j*s and *w*s. For this, faithfulness constraints for *r* must be ranked in the same position as those for *j* and *w*. Thus, Dep(r) demotes below Ons to join Dep(j) and Dep(w), as in (13b).

(13) **Non-rhotic dialects with intrusive *r*s (System C)**

a. *Cod/r≫Max≫*Ons/r

b. Dep(C^{tr})≫Ons≫**Dep(r), Dep(j), Dep(w)**
= Dep(G)

c. Ident(phar)≫Ons, *PL/loc

In these dialects, intrusive *r*s—as well as intrusive *j*s and *w*s—occur between appropriate vowels since Ons is more important than Dep(r) which is now a member of Dep(G). Here, it is not necessary that *PL/loc dominates Ons. It suffices that *PL/loc is dominated by Ident(phar). Note that the constraint ranking in (13) is the very ranking that we used in (5).

If *r*-weakening process goes on further, almost all onset *r*s are not be perceived (System D).[10] In such dialects, Max is demoted below *Ons/r that bans every *r* (including ambisyllabic *r*) from occurring in onset

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[10]System D might not be the next step to System C. This is because weakening process would go on as follows: complete weakening of coda *r*s (System B), slight weakening of onset *r*s (System C), complete weakening of ambisyllabic *r*s, and complete weakening of (non-phrase-initial) onset *r*s (System D). Consequently, complete weakening of ambisyllabic *r*s is the next step of System C, which I call C′. The change from System C to System C′ could be done by demoting Max below *Cod/r(sloppy) that bans any (part of) *r* in coda position:

System C: *Cod/r(crisp) ≫ **Max** ≫ *Cod/r(sloppy), *Ons/r
System C′: *Cod/r(crisp), *Cod/r(sloppy) ≫ **Max** ≫ *Ons/r

System C′ has neither linking *r*s nor intrusive *r*s, while it retains all onset *r*s. System C′ is not an attested dialect. In this connection, however, it is very interesting to note that the suppression of intrusive *r*s is often accompanied by the regular suppression of linking *r*s as well, though this suppression is said to be 'conscious' (Gutch 1992: 565).

position (14a). However, foot-initial onset *r*s die hard because they are in doubly strengthened position: onset is strong position and foot-initial position is stronger one. Thus, *Ons/r has to be dominated by some positional faithfulness constraint such as Max(foot-initial) that demands underlying foot-initial segments have output correspondents (14b).

(14) **Non-rhotic dialects only with foot-initial onset *r*s (System D)**
a. *Cod/r, *Ons/r ≫ **Max**
b. Max(foot-initial)≫ *Ons/r

In these dialects, *r* cannot appear in all coda positions and most onset positions since Max is dominated by *Cod/r and *Ons/r. Only foot-initial *r*s survive since Max(foot-initial) dominates *Ons/r.

Incidently, it is intriguing to observe that the distribution of *r* in System D is nearly the same as that of *h* in most dialects of English. It is also interesting to note that *h* also has undergone weakening process throughout the English history (cf. Lutz 1994: 175-176).

The above account shows why *r*-loss is always and necessarily followed by *r*-intrusion. It is because *r*-loss and *r*-intrusion are gradual manifestation of one and the same process, namely, weakening of *r*. As mentioned earlier, weakening of *r* is sensitive to the position where it occurs. First, if *r*s begin to get weak, *r*s in coda position are more weakened, demoting Max below *Cod/r (*r*-deletion). This is because coda position is relatively weak position. Next, if weakening process goes on further, onset *r*s begin to be weakened and become as weak as glides *j* and *w*. As a result, faithfulness constraint Dep(r) demotes below Ons to join Dep(j) and Dep(w), causing *r*-intrusion (see (13) above). Consequently, *r*-intrusion follows *r*-deletion.

Theoretically, as a reviewer points out, Max and Dep are independent constraints, and thus there is no reason that demotion of one a priori precedes that of the other. Consequently, we can tentatively suppose that, as *r* gets weaker, Dep(r) demotes first below Ons and join Dep(j) and Dep(w). Then *r* behaves like *j* and *w* with respect to Ons; that is, *r*, *j* and *w* behaves as a natural group (glides). If so, it is plausible to suppose that onset *r* has become as weak as onset *j* and onset *w*. Then, at this point of *r* weakening, *r* in coda (i.e., in weak position)

must have been much weaker than onset *r*. Being weaker than a glide means being fully vocalized (i.e., deleted). This implies that Max has already been demoted below *Cod/r. This result is contradictory to the tentative assumption that the demotion of Dep(r) precedes the demotion of Max. Therefore, it is not the case that the demotion of Dep(r) precedes the demotion of Max. The reverse is true.

Another consequence of the weakening theory is that it explains why *r*-deletion and *r*-intrusion coexist. Again, this is because *r*-deletion and *r*-intrusion are both the result of the demotion of faithfulness constraints Max and Dep(r). Once weakening of *r* is at work, then the demotion of Max and Dep(r) is inevitable, as shown above. Thus, it is very natural that *r*-deletion and *r*-intrusion coexist. It is predicted from this that System B with only *r*-deletion is not stable. This prediction is supported by the following observations. First, Harris (1994: 232, 293 n. 5) indicates that standard Southern British system is a dialect with only linking *r*s. However, he adds that it is a prescriptive one, recommended by the classic pronunciation guides. Most, if not all, native speakers of this dialect actually use intrusive *r*s. Second, Broadbent (1991: 282) points out that "RP speakers variably suppress intrusive *r* and this suppression has often been interpreted in the literature as the *phonological* absence of intrusive *r*." She argues that this suppression is socially motivated and therefore RP in isolation is a poor data base. She claims that "West Yorkshire speech, ..., shows no suppression of so-called intrusive *r*." She concludes that there is no distinction between RP and West Yorkshire speech, if we abstract away from such 'sociolinguistic' suppression. The above observations show that System B is not stable. Thus it is predicted that System B changes into System C before long.

Furthermore, the historical weakening account by Lutz seems to be in support of the Ambisyllabic-*r* Hypothesis. Remember that linking or intrusive *r*s are more vocalic (or weaker) than the underlying onset *r*s. To use Lutz's terms, onset *r*s are quite strong since they are in strong position while coda *r*s are too weak to be perceived because they are in weak position. Intrusive or linking *r*s are in between, because they are ambisyllabic, in other words, they are shared by weak coda position and strong onset position. In this hypothesis, three-way distinction of *r* is

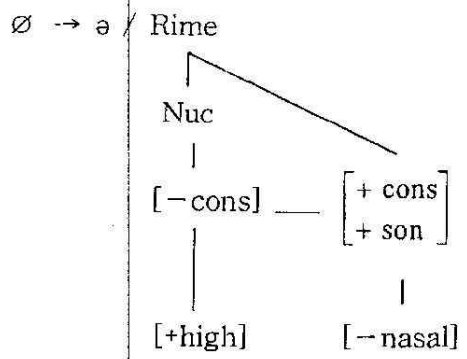
possible: coda *r*s are extremely weak; ambisyllabic *r*s are less weak; onset *r*s are least weak.

To sum up, it has been shown in this section that historical and dialectal facts are explained by the constraint reranking. In the next section, it will be shown that a rule-based theory is not very successful.

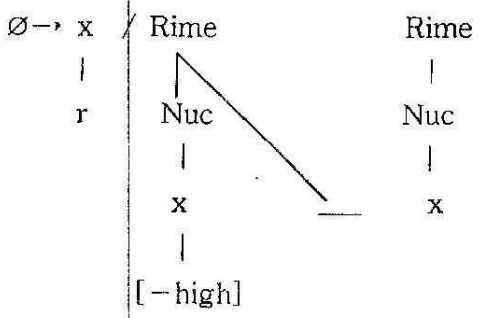
4. A rule-based approach

Halle and Idsardi (1997; henceforth H&I) provide a rule-based explanation of *r*-insertion and *r*-deletion. They assume that intrusive and linking *r*s are exclusively in coda position, and that resyllabification across a word boundary is not permitted (p. 343). I term this position the Coda-*r* Hypothesis. Their rules are reproduced below:

(15) **Schwa Insertion**[11]

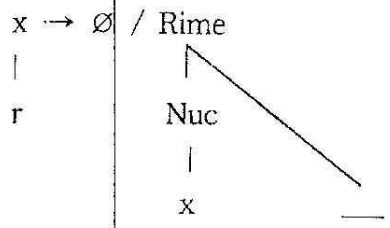


(16) ***r*-insertion**



[11]A line would have to be added in the nucleus to be matched to H&I's original text which states that schwa is inserted between diphthongs ending in high glides, and *r* and *l*. With only one line in the nucleus, *fill*, for example, would be subject to this rule, resulting in *[fiəl]. If a dialect permits this pronunciation, the extra line would not be necessary.

(17) ***r*-deletion**



Consider now how these rules interact. First, schwa insertion must be ordered before *r*-deletion. Consider then *r*-insertion and *r*-deletion that show a very interesting interaction. Let us follow H&I's explanation:

> [a]n immediate consequence of this fact [that both *r*-deletion and *r*-insertion occur in the syllable coda] is that if *r*-deletion is ordered after *r*-insertion, all effects of *r*-insertion will be eliminated in the output [as in (18)]. 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 [as in (19)]. This type of rule interaction has been termed by Pullum 'the Duke of York gambit' and objections to it have been raised on the ground 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 (p. 344).

(18) UR	Wanda is	Homer is	Homer saw	fijr	fijr ɪŋ
ə-insertion	---	---	---	fijər	fijər ɪŋ
r-insertion	Wandar is	---	---	---	---
r-deletion	Wanda is	Home is	Home saw	fijə	fijə ɪŋ
SR	*Wanda is	*Home is	Home saw	fijə	*fijə ɪŋ

(19) UR	Wanda is	Homer is	Homer saw	fijr	fijr ɪŋ
ə-insertion	---	---	---	fijər	fijər ɪŋ
r-deletion	---	Home is	Home saw	fijə	fijə ɪŋ
r-insertion	Wandar is	Homer is	---	---	fijər ɪŋ
SR	Wandar is	Homer is	Home saw	fijə	fijər ɪŋ

In order to remedy the problems mentioned in the above quotation, H&I propose a third solution, which crucially relies on the Elsewhere Condition (EC):

(20) **Elsewhere Condition** (Kiparsky 1973: 94)
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 fit PAQ is a subset of strings that fit RCS, and
(b) the structural changes of the two rules are either identical or incompatible.

Here, too, let us continue to follow H&I's account of the application of the EC:

> [w]hen rules satisfying these conditions are found in a language, they are ordered so that the more complex one—[(16) *r*-insertion rule] in our case—precedes the less complex one—here [(17) *r*-deletion rule]. 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 [(16)] it is not also subject to rule [(17)]. In the examples *draw[r]ing* and *Wanda[r] arrived* this gives the correct result: since the *r*s here are inserted by rule [(16)], they are not subject to deletion by rule [(17)] (p. 345).

H&I admit that this solution is problematic with linking *r*s. Consider *Homer is*, for example. The *r*-insertion rule (16) does not apply to this example, not even vacuously. Thus, by definition, the *r*-deletion rule (17) will have to apply to it, producing an incorrect form **Hom[ə] is*. In order to remedy this deficiency, H&I generalize the condition on disjunctivity given in (20) as follows: "[a]ny 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 complex rule. That is, the less complex rule is blocked if the current representation is compatible with the structural change of the more complex" (p. 345). With this revision, H&I obtain the following derivations. (BLOCKED indicates that the relevant rule is blocked by the EC.)

(21)	UR	Wanda is	Homer is	Homer saw	fijr	fijr ɪŋ
	ə-insertion	---	---	---	fijər	fijər ɪŋ
	r-insertion	Wandar is	---	---	---	---
	r-deletion	*BLOCKED*	*BLOCKED*	Home saw	fijə	*BLOCKED*
	SR	Wandar is	Homer is	Home saw	fijə	fijər ɪŋ

As shown above, the application of the EC is blocked in *Wandar is* where *r*-insertion has applied, as well as in *Homer is* and *fijər ɪŋ* where *r*-insertion has not applied.

H&I notes that the above account does not show why there are dialects with rules with incompatible structural changes of the kind illustrated above, and why the deletion of coda *r* is relatively widespread among English dialects and historically prior to *r*-insertion. They explain this fact by assuming that the *r*-insertion rule is a hypercorrective rule. Speakers notice that coda *r*s are missing in their utterances and attempt to correct this by *r*-insertion in some intervocalic contexts. Once the *r*-insertion is added, the Elsewhere Condition orders it with respect to *r*-deletion. Furthermore, the EC requires that the added rule must be more specific than the original rule. If the added rule of *r*-insertion is more general than the rule of *r*-deletion, then by the EC that general *r*-insertion rule must follow the *r*-deletion rule, be disjunctive with it, and thus will not take any effect.

However, the above explanation which has recourse to hypercorrection does not show that *r*-insertion is a natural next step to *r*-deletion. This is because hypercorrection by definition presupposes a mistake. It seems strange to suppose that a mistake (leading to hypercorrection) always and necessarily accompanies the *r*-deletion rule.

Next, H&I's rule-based approach cannot account for the dialects or the stage of historical change in which only linking *r*s, not intrusive *r*s, are permitted (System B). With only *r*-deletion rule (17), we obtain the following derivation:

(22)	UR	Wanda is	Homer is	Homer saw	fijr	fijr ɪŋ
	ə-insertion	---	---	---	fijər	fijər ɪŋ
	r-deletion	---	Home is	Home saw	fijə	fijə ɪŋ
	SR	Wanda is	*Home is	Home saw	fijə	*fijə ɪŋ

Since H&I assume the Coda-*r* Hypothesis, resyllabification is not permitted. Consequently, every coda *r* is deleted. Thus the above derivation produces a system similar to System D, instead of System B. H&I's rule analysis might be right if System B was not a natural or stable dialect as mentioned before. In that case, however, we should assume that for System C the *r*-deletion rule and *r*-insertion rule come into existence at the same time. This assumption contradicts the well-known fact that *r*-insertion follows *r*-deletion historically, and as a result contradicts the Hypercorrection Hypothesis itself. It also poses the question of why two contradictory rules come into existence at the same time.

Finally, H&I's analysis has a fatal flaw in the application of the EC. In brief, *r*-insertion rule (16) and *r*-deletion rule (17) are **not** subject to the EC because they do not meet the prerequisite (20a). For a comparison with a typical application of the EC, consider the following Finnish rules and examples taken from Kiparsky (1973: 95-96):

(23) a. k → C_i / ____ # C_i
b. k → Ø / ____ #

(24)	a. menek # kotiin	→	menek kotiin	'go home'
	b. menek # pois	→	menep pois	'go away'
	c. menek # alas	→	mene alas	'go down'

The strings (24a, b) meeting the SD of rule (23a) is a subset of the strings (24a, b, c) meeting the SD of rule (23b). Since these two rules meet the first prerequisite of the EC, (23a) is a special rule. Then, it is obvious that the strings (24a, b) which are subject to the special rule (23a) are also subject to the general rule (23b). Given this fact, we are forced to determine which rule we should apply first to the (24a, b). Only in cases like this does the EC work, making the special rule take precedence over the general rule. Consequently, rule (23a) first applies to (24a, b), though vacuously to (24a). In this case, the general rule (23b) cannot apply to the results of the special rule (23a), even if its SD is met by them, as in (24a). Consider now (24c). Since it matches only the SD of (23b), not that of (23a), we are not forced to decide which rule to apply first. It is necessary and sufficient for us to apply rule (23b) to it. This means that the string *menek#alas* has nothing to

do with the EC.

Now let us return to the *r*-related rules (16) and (17). If they are to be subject to the EC, the input (or the set of strings meeting SD) of rule (16) must be a subset of the input (or the set of strings meeting SD) of rule (17). Unfortunately this is not true. That is, the input —*drawing, Wanda is*, etc.— of rule (16) never forms a subset of the input —*Homer saw, spar is*, etc.— of rule (17), and vice versa. As seen above, if a subset relationship holds between the inputs of two rules, any string subject to a special rule will necessarily also be subject to the general rule (cf. Kiparsky 1973: 103). However, *drawing* which is subject to the *r*-insertion rule is not subject to the *r*-deletion rule. On the other hand, *Homer saw* which is subject to the *r*-deletion rule is not subject to the *r*-insertion rule. Since these examples satisfy only one of the SDs of two rules, we are not forced to decide which rule to apply first, and this is clear evidence for showing that they have no bearing on the EC.

Consequently, the derivations in (20), where the EC plays a crucial role, are not available. Without the EC, the ordering in (18) results in wrong surface forms. The alternative ordering in (19) will not be very successful, either, because this rule ordering incurs the Duke of York gambit. However, Idsardi (p.c.) points out that SCs may also be compared with SDs in their Revised EC. If so, the Revised EC would have to be written as follows:

(25) **Revised Elsewhere Condition**

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 fit PAQ or PBQ is a subset of strings that fit RCS, and

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

In that case, the less complex rule is blocked if the current representation is compatible with the structural change of the more complex.

It seems that this revision allows our two rules to be controlled by the EC since the set of strings —*Wandar is, Homer is,* etc.— meeting the SC of *r*-insertion rule is a subset of the strings —*Wandar is, Homer is, spar,* etc.— meeting the SD of the *r*-deletion rule.

However, it is very important to note here that there are highly unusual features in this revision.[12] First, generality has traditionally been defined on the application domains of rules. If the domain of one rule is a proper subset of the domain of the other, then the first rule is a priori a special case of the second. It is obvious that the domain of a rule is determined by its SD. However, a comparison between the **output** (here the set of strings that fit PBQ) of one rule and the **input** (here the set of strings that fit RCS) of the other, and the concomitant subset relationship, dose not guarantee that involved two rules have special-general relationship with respect to the domain. For example, even though the output of *r*-insertion rule (16) is more special than the input of *r*-deletion rule (17), we cannot know which rule's domain is more special ($V]_{\sigma}[_{\sigma}V$ vs. $Vr]_{\sigma}$).

Second, the definition in (25) appears to deviate from the original motive of the EC. If a pair of rules are within the purview of the EC, then the general rule of the pair always bleeds the special one. For concreteness, consider the rules in (23). The general rule (23b) bleeds the special rule (23a). Crucially, this is why the EC should be introduced into the grammar: "for were it not for such a principle, the more specific rule of the pair would never get a chance to apply and so would not appear in the grammar" (Sommerstein 1977: 186). Put alternatively, the EC is needed to ensure that the specific rule (e.g., rule (23a)) has a chance to apply. Keeping this in mind, consider the rules under discussion: the *r*-insertion rule (16) and the *r*-deletion rule (17). The *r*-deletion rule (the 'less complex' rule, to use H&I's terms) does not bleed the *r*-insertion rule (the 'more complex' rule, to use H&I's terms). On the contrary, the former feeds the latter, as seen in (19). All this shows that the rules under consideration are not the type that needs the EC in the traditional sense.

Third, the imposition of disjunction via the EC has always been illustrated with the application of rules, not with current representations.

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[12] See also Prince (1997) for the criticism of the EC in general.

In other words, with the traditional EC, it has been sufficient for us just to know whether the special rule has been applied or not. With the Revised EC, however, we are obliged to compare the current representation with the structural change of a special rule (i.e., a previous rule), even when we know that the special rule has not applied. It follows then that the introduction of SC (here PBQ) in the definition of EC seems to make things complex, even though 'the Revised EC does not amount to a trans-derivational constraint,' as H&I (p. 346) maintains.

Finally, the Revised EC lacks independent motivation. Idsardi and Purnell (1997) present some Duke of York derivations that can be blocked by the EC. However, there is no case among them that needs the Revised EC.

The above observations show that the Revised EC has several unusual features. It is important to note here that all these peculiarities are brought about because of *r*-insertion and *r*-deletion. If there are other ways to address these phenomena, the revision of the EC would be hard to be justified.

It has been shown in this section that H&I's proposal armed with the Revised EC, the Coda-*r* Hypothesis, and the Hypercorrection Hypothesis cannot account for dialects with only linking *r*s (i.e., with only *r*-deletion rule). If there cannot be dialects with only *r*-deletion rule, how can hypercorrective *r*-insertion rule be added to non-existent dialects? Furthermore, it has also been shown that the Revised EC has too many peculiarities.

5. Conclusion

It has been shown that the rule-based approach proposed by H&I cannot account for the historical change and dialectal variations. By contrast, it has been shown that the proposed OT approach can explain the historical and dialectal facts by the minimal reranking mechanism. More specifically, the historical or dialectal facts are accounted for by the demotion of faithfulness constraints that reflects the weakening of *r*.

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