

Consonant epenthesis and hypercorrection

Bert Vaux, Harvard University

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Abstract

Optimality Theory explicitly requires that the choice of epenthetic consonant in a given language be “natural”, i.e. predictable from the interaction of inventory constraints and well-formedness constraints; this consonant is typically claimed to be [ʔ] or [t]. Rule-based theories on the other hand allow rules to insert synchronically arbitrary segments. This paper provides cross-linguistic empirical evidence demonstrating that the rule-based prediction is correct, providing further support for the assertion of Anderson 1981 that phonology is not “natural”. I argue that recent OT accounts of consonant epenthesis are fundamentally incapable of capturing the insertion facts, and lose essential insights of rule-based phonology into the relationship between historical change and language acquisition, and between automatic and morphologically-conditioned phonology.

"Epenthesis of r is always historically secondary to deletion of r, from which it derives by reanalysis." (McCarthy 1993:190)

“Any theory must allow latitude for incursions of the idiosyncratic into grammar” (Prince and Smolensky 1993:101)

Consonant epenthesis has received a great deal of attention in the recent phonological literature because of the significantly different ways in which it is treated by constraint-based and rule-based theories. Optimality Theory requires that the choice of productive epenthetic consonant in a given language be predictable from the interaction of independently-motivated inventory and well-formedness constraints; this consonant is typically claimed to be [ʔ] (Lombardi 1997, Alderete et al. 1999, McCarthy 1999) or [t] (McCarthy and Prince 1993, Anttila 1994). Rule-based formalisms on the other hand allow rules of the type “ $\emptyset \rightarrow [g] / V_V$ ” (i.e. “insert [g] between vowels”), wherein the choice of epenthetic segment is synchronically arbitrary (though a formal cost is associated with each feature included in the rule, predicting that rules inserting fewer features will be more common than rules inserting large bundles of features). The greater restrictiveness of the OT prediction is often touted as an advantage of OT over DP.

In this paper, however, I demonstrate that the prediction of rule-based phonology is correct: a language can choose any consonant for insertion by regular rule. This is a problem for the OT accounts of consonant epenthesis developed by Lombardi, McCarthy, and Steriade, which are specifically designed to exclude insertion of synchronically-arbitrary segments. The primary problem for all of the OT accounts is that language arises from the confrontation of the human language acquisition device with the arbitrary linguistic data to which it is exposed; since these data encode layers of historical change, the resulting phonological grammar will be “unnatural” in the words of Anderson 1981 and Hyman 2000 (cf. also Bach and Harms 1972, Hellberg 1978, Chomsky 2000). I will argue that unnatural systems of this type are accounted for most efficiently and insightfully in a

rule-driven framework; existing OT implementations can be jury-rigged to account for the relevant phenomena, but only at the cost of abandoning the central theoretical tenets that have been claimed to give OT the advantage over derivational theories. The OT perspective moreover loses essential insights of rule-based phonology into the relationship between historical change and language acquisition, and between automatic and morphologically-conditioned phonology.

1. Introduction

In order to approach the larger issues just discussed I begin with the following question: What consonants are chosen for insertion, and why? Two answers to this question have been proposed in the recent literature:

(1)

- i. The default epenthetic consonant is a coronal, preferably [t] (Broselow 1984, McCarthy and Prince 1993, Anttila 1994, McCarthy 1999 (in part), Kager 1999:125).
- ii. The consonant chosen for regular insertion is [ʔ], [h], or a homorganic glide. Other consonants are only allowed to be inserted by the activity of morphologically-conditioned constraints. (Lombardi 1997, McCarthy 1997, 1999 (in part), Steriade 2000, Bakovic 2000)

2. Lombardi 1997

Lombardi 1997 observes that theory (1i) conflicts with the fact (according to her) that glottal stop is the most common epenthetic consonant, and that a coronal is "never the general, purely syllabification-driven epenthetic consonant of a language" (1997:1). She notes that this is a problem, because if we have a universal ranking of markedness for place of articulation of the sort in (2) then we should expect some sort of coronal, rather than a glottal stop, to be chosen for default insertion.

(2) *Dorsal, *Labial >> *Coronal

Lombardi proposes to resolve this problem by assuming that all pharyngeals and laryngeals have a Pharyngeal Place specification, and *Pharyngeal universally ranks below *Coronal, as in (3).

(3) *Dorsal, *Labial >> *Coronal >> *Pharyngeal

In this hierarchy [ʔ] is the least-marked consonant, and therefore should be selected as the epenthetic consonant unless other factors intervene; a sample derivation is outlined in (4).

(4) Consonant epenthesis in a hypothetical language (based on Lombardi 1997:2)

/GAO/	ONSET	MAX	*LAB	*COR	*PHAR
ga.ʔo					*
ga.to				*!	
ga.bo			*!		
ga		*!			
ga.o	*!				

Lombardi identifies the three potential interfering factors in (5). The well-known insertion of [t] in Axininca Campa for example she attributes to (5a-b), inventory and sonority constraints respectively, as outlined in (6): *Cor is outranked by the inventory constraint *ʔ, ensuring that a coronal rather than a glottal stop is inserted; *Cor is also outranked by the sonority constraint *FricV, which bans fricatives before vowels, thereby ensuring that the stop [t] is chosen over the fricatives [h] and [s].

(5) factors that can interact with Place markedness

- a. inventory constraints (Axininca inserts [t] because it has no /ʔ/)
- b. sonority constraints (to get Axininca [t] rather than [h] or [s])
- c. faithfulness constraints relativized to particular morphological domains
(e.g. Gokana inserts *r/n* between long vowels in the 2pl subject and the logophoric)

(6) Axininca [t]-insertion with suffixes (1997:11)

/inkoma-i/	/inkoma-i/	Onset	*ʔ	*FricV	*Cor	*Phar
ιNκοματι	iŋkomati	*			*	
ιNκομαʔι	iŋkomaʔi	*	*!			*
ιNκομαι	iŋkomai	**!				
ιNκομαηι	iŋkomahi	*		*!		*
ιNκομασι	iŋkomasi	*		*!	*	

Lombardi's analysis encounters a number of problems. First of all, she states that Pharyngeal is the least-marked Place, which goes against conventional wisdom. Steriade 2000 notes that the presence of [ʔ] in an inventory is not implied by the presence of other consonants, and its unmarkedness is only inferred from insertion facts. In several languages with epenthetic [ʔ], such as German, it is actually more marked than their other consonants. The same is true in Axininca, where according to Lombardi [t] is inserted because *[ʔ] is undominated. Steriade concludes that "there is either no constant context-free, all-purpose preference for glottal as against other stops, or, if there is a preference, it is the opposite from the one needed to predict the proper choice of epenthetic consonants" (2000:43). Lombardi responds that "some other feature or feature cooccurrence, rather than Place markedness, must account for the markedness of the...true Pharyngeals" (1997:3), but it is not clear what this would be.

The second problem with Lombardi's analysis is that it is not at all clear that glottal stop is the most common epenthetic consonant; homorganic glides are a plausible

competitor. (Homorganic glides are presumably selected for epenthesis because they do not require insertion of any features not present in the input; the adjacent vowel simply spreads its features to the inserted Onset node.) Regardless of which is more common, glottal stop or homorganic glide, given the free rankability of constraints in OT this competition is not relevant to our theory of phonology unless one proposes a fixed universal constraint ranking or can demonstrate that the cross-linguistic distribution of epenthetic [ʔ] vs. other segments corresponds to the percentage of ranking permutations that yield this output.

The third problem is that in Lombardi's analysis it is merely an accident that *l*-insertion and *r*-insertion happen in English dialects that have *l*-deletion and *r*-deletion respectively; it is also an accident that Korean has both *n*-insertion and *n*-deletion before high front vocoids, and so on.

Finally, Bakovic (p.c.) notes a propos of Axininca [t] that "if glottal stop crucially violates context-free markedness constraints other than the lowest-ranked member of the place markedness hierarchy, as [Lombardi's] account entails, there is no longer any reason to expect that the attested cases of coronal onset epenthesis will be morphologically (or otherwise) restricted." He points out moreover regarding claim (5c) that faithfulness cannot be relevant to morphologically-conditioned coronal epenthesis, because we are dealing with epenthetic segments not present in underlying forms.

In other words, Lombardi's model actually allows the insertion of *any* consonant, with or without morphological restrictions, makes no predictions about the default choice

of epenthetic segment, and provides no explanation for the close relationship between insertion and deletion in languages like English and Korean.

3. McCarthy 1997, 1999

McCarthy actually goes out of his way to make explicit the lack of correlation between insertion and deletion in his own treatment of the facts of *r*-insertion and deletion in Boston English, which are summarized in (7).

(7) Boston *r*-insertion and *r*-deletion

a. underlying /r/ deletes in syllable coda

b. [r] is inserted after low vowels before a vowel under certain conditions

c.	spa	‘place to buy lottery tickets’	the spa closed	the spa[r] is closed
	spar	‘beam’	the spar is closed	the spar is missing

McCarthy asserts that "hypercorrection is a source of *sporadic* change in individual lexical items. In no case known to me has a regular phonological process arisen through hypercorrection...I think the last word on the historical origin of *r* intrusion remains to be written, but I think it's clear that hypercorrection will play no role in accounting for it."

He suggests instead (1997:4; cf. Daly and Martin 1972, Gnanadesikan 1997, Gick 1999, Bakovic 2000) that [r]-insertion is actually a form of homorganic glide insertion, parallel to the insertion of [j] after tense front vowels and [w] after round vowels. In this analysis Boston [r] is a pharyngeal glide and the low vowels [a]/[ɔ]/[ə] are also pharyngeal;

[r] is therefore the logical glide to pick when resolving hiatus via homorganic glide insertion.

Halle and Idsardi 1997 observe a number of problems in this analysis. First of all, if the schwa in [fajə] is a vocalization of the underlying *r*, then we predict that *spar* should surface as *[spɔɹə], with vocalization of the *r* followed by gliding spawned from the *a* (1997b:3). Second, in order to avoid opacity problems McCarthy is forced to attribute the *r*-deletion in *spar* and *fire* to two different causes: a MAXIO violation in *spar* and an IDENT(*r*→Ø) violation in *fire*. In DP on the other hand it is easy to account for both deletions in a unified way; both simply result from a rule deleting *r* in syllable coda (Halle and Idsardi 1997b:3).

McCarthy's theory furthermore does not account for epenthetic segments that cannot be plausibly derived from the features of a neighboring vowel or from default feature insertion. Mongolian for example productively inserts /g/ between long vowels (8-9), and /g/ of course is hardly a likely candidate for default segmentism.

(8) Mongolian

- i. If the base ends in a long V or diphthong, /g/ is inserted before a suffix beginning with a long vowel (Beffa and Hamayon 1975:43)
- ii. This rule is general; no exceptions.
- iii. The same is found in Buryat (Sanʒeev et al. 1962:55).

(9) -g- ([g] in [+atr] contexts, [ɣ] in [-atr] words; data from Rialland and Djamouri 1984)

a. ablative /-AAs/	dalai ‘sea’	→	dalai[g]aas
	odoo ‘now’	→	odoo[g]oos ‘starting now’
	dülii ‘deaf’	→	dülii[g]ees
b. genitive /-IIn/	xii ‘air’	→	xii[g]ii
	da ‘chief’	→	da[g]iin
	debee ‘swampland’	→	debee[g]iin
c. instr. /-AAr/	guu ‘clasp’	→	guu[g]aar

The Mongolian case in fact poses a severe problem for *all* OT-based accounts of consonant epenthesis: no non-arbitrary constraint ranking can produce insertion of /g/ rather than a more logical consonant. One might object that a rule-based account of the same facts would be equally stipulative, but this is not entirely true. Derivational Phonology is specifically designed to encode declarative processes such as this: the language learner observes that /g/ is inserted under certain conditions and formulates a simple insertion rule that produces the desired outputs. OT on the other hand is forced to postulate a Byzantine ranking that does not interact with the rest of the phonological system and is not independently motivated or verifiable; this runs counter to the fundamental spirit of OT.

Finally, McCarthy’s attempt to explain the insertion of *l* and *r* in terms of phonetics misses the generalization that these unexpected epenthetic segments cooccur with synchronic rules deleting the same segment, be it *r* in Boston English and Uyghur, *l* in Bristol, or *n* in Korean. They also fail to account for the fact that *r*-insertion developed in England shortly after *r*-deletion did; according to McCarthy’s theory it is equally plausible

for *r*-insertion to develop *before* *r*-deletion, a highly unlikely scenario. (Note that the OT formalism does not actually exclude this, nor does the DP formalism; McCarthy 1997's explicit segregation of deletion and insertion therefore finds no motivation in his theory.)

Another instructive insertion/deletion pair occurs in Uyghur. As in Turkish the consonant normally selected for epenthesis is [y], regardless of the quality of neighboring vowels, as shown in (10).

(10) Uyghur (Hahn 1991:25)

a. *y* inserted between two vowels at morpheme boundary

oqu+Al- → [oquyal-] 'to be able to read'

išlä+Al- → [išläyäl-] 'to be able to work'

b. *y* inserted between CV root and C suffix

yu:-b → yuyup 'wash and...'

su:-m → süyüm 'my liquid'

Uyghur also optionally deletes *r* and *y* in syllable codas:

(11) optional *r*- and *y*-deletion in syllable coda (Hahn 1992:77, 79)

- | | | |
|----|----------------|-------------|
| a. | kördüm ~ ködüm | ‘I saw’ |
| | bazar ~ baza | ‘bazaar’ |
| b. | päyzi ~ päzi | ‘gorgeous’ |
| | hoyla ~ hola | ‘courtyard’ |
| | eytiñ ~ etiñ | ‘tell!’ |

These two processes produce interesting patterns of insertion of the same consonants, as revealed in the possessive paradigms in (12).

(12) Uyghur possessive marking (Hahn 1992:90)

a. stem	b. 1.SG /-m/	c. 2.SG /-ŋ/	d. 3.SG /-(s)i/	
q1z-lar	qizlirim	qizliriN	qizliri	
ʔana	ʔanam	ʔanaŋ	ʔanisi	‘mother’
baha:r	baharim	bahariŋ	bahari	‘spring’
koʃa	koʃam	koʃaŋ	koʃisi	‘street’
sija:	sijajim/sijarim	sijajiŋ/sijariŋ	sijasi	‘ink’
toxu:	toxujum	toxujun/toxuruŋ	toxusi	‘chicken’

We can see in columns b and c that the 1st person suffix /-m/ and the 2nd singular suffix /-N/ attach directly to stems ending in short vowels, but give rise to a [+high] epenthetic vowel when following consonant-final stems. The 3rd singular suffix in column c is also underlyingly consonant-initial, but in post-consonantal position this /s/ deletes rather than triggering epenthesis, as with [qizliri] rather than *[qizlirisi].

The interesting property of Uyghur for our purposes is that it avoids superheavy syllables. Adding monoconsonantal suffixes such as -m and -N to stems ending in long vowels such as *toxu*: ‘chicken’ should produce forms containing superheavy syllables such as **toxu:m*, but outputs of this type are ungrammatical. Uyghur chooses instead to epenthesize twice, yielding forms such as *toxuyum* and *toxurum*; according to Hahn [y] and [r] are in free variation in these situations.

Why are [y] and [r] chosen for insertion here rather than say glottal stop or a homorganic glide? The variation between [y] and [r], which are precisely the segments that delete in the complementary environment in Uyghur, clearly demonstrates that these two segments are chosen for insertion because they are also targets of deletion. No manipulation of the feature specifications of *y* and *r* in tandem with homorganic glide insertion can save the day here.

One might try instead to say that all long-vowel roots have been historically reanalysed as ending in *y* or *r*, and it is this *y* or *r* that surfaces in columns b and c. This analysis runs into several problems. First, it requires postulating *y*- and *r*-final allomorphs for every single long-vowel stem, which relegates to the domain of arbitrary lexical content something that otherwise receives a simple phonological explanation. Second, as Hahn observes, "If an inserted *y* or *r* had become an underlying segment in a given root, then such a root would be expected to take on the allomorph *-i*" in the 3rd person, which it does not, as shown by minimal pairs like *bahari* vs. *siyasi*. Finally, notice that forms with underlying /r/ such as *bahar* do *not* show the *y* ~ *r* alternation, but instead surface with an

[r] in all situations where it is not placed in a syllable coda during the course of the derivation.

It is therefore clear that Uyghur employs both *r* and *y* insertion, and that the choice of these particular segments results not from homorganic glide insertion but from hypercorrection. The theories of Lombardi and McCarthy, which do not allow for synchronic relationships of this sort, are emphatically unable to account for the Uyghur facts and similar cases that we find in Korean and several other languages.

4. Steriade 2000

The only phonologist I am aware of who has attempted to correlate insertion and deletion within OT is Steriade, who in her 2000 P-map paper states that "epenthetic segments are, frequently, those whose insertion generates the least deviation from an auditory representation of the input." Applying this theory to *r*-insertion she states that "not surprisingly, postvocalic [r] in most varieties of American English is an approximant hardly distinguishable from the end of a preceding low back vowel: it may thus be the closest thing to Ø in that context." (2000:45) In other words, for Steriade *r* is simultaneously a likely segment to delete, because of its imperceptibility, and a likely segment to be inserted.

Steriade then goes on to say that her theory of perceptibility predicts the most common insertion options to be [ʔ], [h], and homorganic glides. The primary reason for this is that "[ʔ] has, with [h], a uniquely favorable property for an epenthetic consonant: it does not possess an oral constriction and thus it will fail to induce coarticulatory changes on neighboring vowels" (2000:42).

Steriade's model has an advantage over Lombardi's and McCarthy's in providing an explicit explanation for the connection between insertion and deletion, but still falls short. For example, Steriade's model does not account for epenthetic consonants that are not likely to be the most confusable with zero, such as Axininca [t], Mongolian [g], and Korean [n]. I have provided a representative sampling of cases of this type in (14).

(14) epenthetic segments not easily analysable in terms of confusability with Ø (N.B. none of the following segments are synchronically homorganic with neighboring segments)

- t Axininca, Korean (Kim-Renaud 1975), French¹, Maru (Burling 1966, Blust 1994), Finnish (Anttila 1994)
- d a French aphasic (Kilani-Schoch 1983)
- n Korean (Kim-Renaud 1975, Hong 1997), Greek (Smythe 1920:§134), Sanskrit (de Chene 1983), Dutch (Booij 1995:171), German dialects (Ortmann 1998)
- ŋ Buginese (Trigo-Ferre 1988, Lombardi 1997:14)
- N Inuktitut and East Greenlandic (Mennecier 1995, 1998; Massenet 1986:29, 37)
- r English, German, Uyghur, Zazai Basque (Hualde and Gaminde 1998:42), Japanese (disputed) (de Chene 1985), Seville Spanish (Martin-Gonzalez, p.c.)
- l Bristol English (Wells 1981), Midlands American English (Gick 1999), Motu (Crowley 1992:45), Polish (Nowak, p.c.)

¹ It is commonly agreed that [t] is inserted in certain environments in French, but Dell (p.c.) suggests that it is actually the default epenthetic consonant in French.

- y Turkish (Underhill 1976:29), Uyghur, Greenlandic (Rischel 1974), Pishaca (Grierson 1906:120), various Indic languages (Masica 1991:190), Arabic (Heath 1987:48), Slavic (Carlton 1991:106)
- w Abajero Guajiro, Greenlandic (Rischel 1974), Arabic (Heath 1987:48)
- v Marathi (Bloch 1919:71, Masica 1991:190)
- b Basque (Markina, Urdiain, Etxarri, and Lizarraga dialects; Hualde and Gaminde 1998:42)
- ʃ Basque (Lekeito/Deba and Zumaia dialects; Hualde and Gaminde 1998:42)
- ʒ Cretan and Mani Greek (Newton 1972:56), Basque dialects (Hualde and Gaminde 1998:42)
- g Mongolian, Buryat
- s/z French, Land Dayak (Blust 1994), Dominican Spanish (Morgan 1998)
- x Land Dayak (Blust 1994)
- k Maru (Burling 1966, Blust 1994), (Danish?)

Steriade's model also does not deal well with languages that insert different segments in different situations. Sardinian for example inserts after a final consonant a copy of the last vowel, except in monosyllabic words where the inserted vowel is invariably *-e* (Harris and Vincent 327). The Guajiro case in (15) poses similar problems. The Abajero dialect of Guajiro, an Arawakan language of Colombia and Venezuela, chooses two distinct segments in situations where prosody requires insertion of a consonant: [h] is

inserted after final stressed short vowels (15a), but [w] is chosen for insertion between long vowels (15b). Both of these processes are entirely productive.

(15) Guajiro, Abajero dialect (Jose Alvarez, *Linguist List*; Mansen and Mansen 1984)

a. long vowel sequences productively trigger [w]-insertion

atpanaa+ee+chi → atpanaa[w]eechi ‘it will be rabbit’

ke+kii+ee+shi → kekii[w]eeshi ‘he wants to have a (good) head’

b. [h] inserted after final stressed short vowels (Mansen and Mansen 1984:15)

kashi → [kaʃh] ‘moon’

nūsha → [nyʃh] ‘his blood’

maa [ma:] ‘with you’ vs. ma [mah] ‘earth, world’

Multifaceted behavior of this sort can be attributed to the activity of higher-ranked markedness or faithfulness constraints, but if higher-ranked constraints can override P-map effects--which Steriade herself allows--then we cannot say that the P-map explains all epenthetic choices, as Steriade claims.

5. Conclusions

We have seen that each of the constraint-based theories considered here fails to account for the basic facts of consonant insertion that have been adduced in the literature. I have also shown that the actual facts of consonant insertion cross-linguistically are much more diverse than has been previously recognized, and do not conform to the tidy empirical space defined by laryngeals and homorganic glides in the OT literature. It is true that many of the unexpected segments in (14), such as the Basque [b], result historically from

homorganic glides, but such historical considerations cannot be adduced as arguments in a synchronic grammar. Moreover, other segments such as Korean *n* and Uyghur *y* and *r* are insightfully explained *only* as the results of hypercorrection processes. In sum, the phenomenon of consonant insertion poses severe problems for constraint-based theories when one leaves the friendly confines of the larynx.

The facts of consonant epenthesis support a rule-based approach to phonology over one based on constraints alone. Rule-based phonology correctly predicts that a wide variety of unexpected consonants should be selected for regular insertion, whereas OT theorists explicitly rule out this possibility. Rule-based phonology moreover provides a single formalism that encompasses both automatic and lexical phonology, whereas OT creates an unbridgeable divide between hypercorrection and morphophonology on one hand and regular phonology on the other. Given that rule-based phonology provides a unified and empirically-accurate account for an important range of facts that OT treats disparately and inaccurately, we must ask whether it is better to return to a derivational conception of phonology.

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Department of Linguistics

Harvard University

313 Boylston Hall

Cambridge, MA 02138

vaux@fas.harvard.edu