

The Irrelevancy of the Relevancy Condition: Evidence for the Feature Specification Constraint*

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Jensen [7] (henceforth J) has proposed a constraint on phonological theory that is designed to limit the possible class of segments that may serve as intervening material in phonological rules. Odden [17] presents evidence that this proposed constraint is empirically false as well as theoretically flawed, to which Jensen and Stong-Jensen [8] (henceforth JSJ) have responded. This response takes two forms: (i) JSJ bring into question the empirical details of certain of my counterexamples to the Relevancy Condition (RC); (ii) they also modify both the general theory of phonology to exclude certain potential counterexamples from the domain of explanation by RC, and they modify RC as well, so that its role becomes that of a device limited to assigning degrees of markedness to rules violating RC rather than an absolute constraint on rules.

It is the purpose of the present paper to examine JSJ's analysis of vowel harmony in Khalkha Mongolian and Eastern Cheremiss. It will be argued that the empirically correct account of either language entails a violation of RC, which strengthens the original argument that RC stands refuted. I then examine the various theoretical modifications offered by JSJ, arguing that the original hypothesis is so greatly weakened as a result of these modifications as to be uninteresting. I shall then discuss additional counterexamples to RC, showing that contrary to the claim advanced by JSJ, rules which violate RC are not highly marked. Throughout this paper, I shall argue that the strongest constraint on intervening material in phonological rules that is empirically supported is Howard's Crossover Constraint (COC). Additionally, however, I argue for a weaker version of that constraint, a version which was originally suggested by Howard. As a direct consequence

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I. I. KHALKHA MONGOLIAN

Khalkha Mongolian exhibits a front/back Vowel Harmony system whereby words generally contain only back vowels or only front vowels. Vowel Harmony enters into morphophonemic alternations, since suffixes containing vowels generally have front vowels after front vowels and back vowels after back vowels. The vowel *i* does not undergo any alternations, and Vowel Harmony propagates across the vowel *i*. When the stem contains no vowel other than *i*, a suffix will invariably contain a front vowel. Under these conditions, *a* alternates with *e* and *u* alternates with *ü*. The following alternations illustrate the operation of Vowel Harmony.

- (1) čam-a:s 'you' (ablative)
 ger-e:s 'house' (abl.)
 arxin-a:s 'drinking' (abl.)
 delxi:g-e:s 'world' (abl.)
 bičix-e:s 'writing' (abl.)

The following rule of Vowel Harmony is proposed in [17].

$$(2) \begin{bmatrix} +\text{syl} \\ +\text{back} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{back} \\ -\text{low} \end{bmatrix} / \begin{bmatrix} +\text{syl} \\ -\text{back} \end{bmatrix} (C_0 \begin{bmatrix} +\text{syl} \\ +\text{hi} \\ -\text{rd} \end{bmatrix})_0 C_0 \text{---}$$

Under this analysis, the suffixes which undergo Vowel Harmony are represented with underlying back vowels, viz. $-u:/i$ 'causative', $-a:/\text{instrumental}$.¹ Two arguments were advanced to show that the alternating suffixes have underlying back vowels: (1) that this assumption allows a more natural and simple formulation of Vowel Harmony; and (2) that nonalternating suffixes contain front vowels, not back vowels. Since only the feature $+\text{syl}$ is common to determinants and focus, RC incorrectly predicts that no vowel may intervene between determinant and focus, whereas in fact the vowel *i* must be allowed to intervene.

JSJ propose a reanalysis of Khalkha Vowel Harmony which does not violate RC. They assume that alternating suffixes in fact contain underlying front vowels rather than back vowels and that the following rule replaces (2).

of the preceding discussion, I propose a well-formedness condition which disallows overspecification of features in phonological rules.

1. VOWEL HARMONY IN MONGOLIAN AND CHEREMISS

J proposes RC, which states:

Only IRRELEVANT segments may intervene between focus and determinant in phonological rules. The class of segments defined by the features common to the input and determinant of the rule is the class of segments RELEVANT to that rule, provided at least one of the common features is a major class feature. If there is no common major class feature, then all segments are relevant. [7:680]

This constraint is intended to characterize phonological rules which apply at a distance more narrowly than they are by Howard's COC. The latter constraint states:

No segment may be matched with an element other than determinant or focus of a rule if that segment meets the internal requirements¹ of the focus of that rule. [6:95]

I have discussed five rules in [17] that violate RC in allowing relevant material to intervene between determinant and focus. The rules discussed there include Vowel Harmony in Khalkha Mongolian, Rounding Harmony in Eastern Cheremiss, *s*-palatalization in Karok, Midvowel Raising in Menomini, and *x*-labialization in Karok. JSJ acknowledge that two of these rules *s*-palatalization in Karok and Menomini Midvowel Raising, constitute true counterexamples to RC. On the basis of these counterexamples, RC is therefore refuted as an absolute universal constraint on phonological rules. JSJ attempt to blunt the force of this conclusion by proposing alternative analyses of Vowel Harmony in Khalkha Mongolian and Rounding Harmony in Eastern Cheremiss that conform to RC.² I shall argue here that both of the proposed reanalyses are empirically incorrect.

¹ Although Howard does not explicitly define the term "internal requirement," it is employed in reference to any segment satisfying the set of feature specifications which appear on the left-hand side of the arrow. Thus, if a rule applies to a word-final vowel, then all vowels satisfy the internal requirements of the rule, although only those in word-final position may actually serve as focus in this rule.

² I discussed a rule of *x*-labialization in Karok, which is ignored by JSJ. Since they offer no reanalysis of that rule, *x*-labialization must also be considered to be a counterexample to RC.

exists nonalternating back vowel suffixes fails, and with it an argument for their reanalysis.

In addition to the phonological evidence that *man* and *tan* are independent words, there are two morphosyntactic arguments confirming this conclusion. The first argument is simply that these words are actually freely occurring lexical items, *man* being the first-person-plural pronoun stem and *tan* being the second-person-plural pronoun stem, as in *ta* 'you (pl. nomin.)', *tan-i-g* 'you (pl. acc.)', *man-i-g* 'us (pl. acc.)'.⁴ The second argument that *man* and *tan* are not suffixes is the fact that even when used to mark possession, these pronouns appear at the end of the clause containing them, and will be separated from the word which they modify by all postpositions, viz. *ger dotor man* 'in our house'. These facts show that it is incorrect to view *man* and *tan* as suffixes. They are not exceptions to any version of Vowel Harmony, and cannot be adduced to counter my original analysis.

JSJ cite the nonapplication of Vowel Harmony to the emphatic particle *da*: in the form *xetsii-da*:⁵ 'difficult indeed' as an additional exception to my Vowel Harmony rule (2). However, this particle exhibits a variable behavior with regards to Rounding Harmony and Fronting Harmony which cannot be accounted for under the analysis of JSJ but which is explained under the analysis in [17]. This particle may appear as *da*:; regardless of the vowel preceding, i.e. *tom da*: 'large indeed', *irex da*: 'he will come indeed', or it may also undergo Vowel Harmony or Rounding Harmony, viz. *tomdo*:, *irexde*:. Assuming that Vowel Harmony changes back vowels to front vowels, these facts are explainable by optionally weakening the boundary which stands before the particle *da*: to a morpheme boundary, across which Vowel Harmony and Rounding Harmony may apply. Under JSJ's front vowel hypothesis, these data are simply inexplicable. Far from constituting evidence against the analysis of [17], the behavior of the particle *da*: strongly supports that analysis. We must thus conclude that both of the morphemes which JSJ adduce to be nonalternating back vowel suffixes are not suffixes at all.⁶

Were there no additional evidence available, we would therefore

⁴ In the nominative case, the stem *man-* is replaced by the alternative stem *bid*.

⁵ Poppe [25], from which this form derives, writes this as two words without morpheme boundaries, viz. *xetsii da*:. This is not a trivial observation, considering the previously mentioned problem of treating particles as suffixes.

⁶ JSJ might counter that the nonalternating negative suffix *-gii* must also be treated as a separate word. This treatment is impossible, however, since that suffix may be followed by the perfective verbal suffix *-san* as shown in *yava:gan-san* 'was going, yava:gii-sen 'wasn't going'.

$$(3) \left[\begin{array}{c} +\text{syl} \\ +\text{rd} \\ \{-\text{hi}\} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ \{+\text{low}\} \end{array} \right] / \left[\begin{array}{c} +\text{syl} \\ +\text{back} \\ \{+\text{rd}\} \\ \{-\text{hi}\} \end{array} \right] \text{X} \text{---}$$

JSJ claim that this formulation of Vowel Harmony predicts that only the vowel *i* as well as consonants can intervene between determinant and focus, and thus they conclude that Khalkha Vowel Harmony does not violate RC. They advance one argument in favor of their reanalysis of the Vowel Harmony rule and give another arguing that alternating suffixes should be viewed as containing underlying front vowels. As JSJ note, my claim that alternating suffixes contain underlying back vowels depends partially on the lack of any nonalternating back vowel suffixes. I have argued that the nonalternating suffix *-gii* 'negative' need not be treated as an exception to Vowel Harmony, since the Vowel Harmony rule proposed in [17] only applies to back vowels, whereas this suffix contains an underlying front vowel. Under the reanalysis offered by JSJ there is no explanation for the behavior of this suffix. Instead, a rule-exception feature must be introduced into this suffix. Since this fact should argue against JSJ's analysis, to overcome this argument they attempt to show that my analysis also requires a rule-exception feature for at least two back vowel suffixes.

JSJ claim that the possessive morphemes *man* 'our' and *tan* 'your (pl.)' must be treated as exceptions to Vowel Harmony under my analysis, since they do not alternate with **men* or **ten*, cf. *german* 'our house', *ger tan* 'your (pl.) house'. If their claim were true, these facts would provide a refutation of the aforementioned argument for the back vowel analysis, namely, that apparent exceptionality of suffixes cuts one way. However, additional evidence shows that *man* and *tan* are not exceptions to Vowel Harmony at all but are in fact words, and consequently not subject to Vowel Harmony.⁷ In addition to front/back Vowel Harmony, the independent Rounding Harmony rule also does not apply to the words *man* and *tan*; thus, *dotor man* 'inside us', *dotor tan* 'inside you (pl.)', not **dotor mon*, **dotor ton*. If the grammar treats *man* and *tan* as independent words, then the fact that neither front/back Vowel Harmony nor Rounding Harmony apply in this context will be provided with the single unified explanation that neither rule applies across a word boundary. Thus, JSJ's argument that there

⁷ Although Poppe [25] writes the noun and the pronoun as a single word, in the current orthography they are written separately, viz. *ger man*. Poppe (personal communication) believes that *man* and *tan* should be treated as words rather than suffixes.

choose the back vowel analysis over the front vowel analysis, since the latter analysis not only entails exceptionality which is not necessary in the former analysis, but it also fails to account for the behavior of the particle *da*: JSJ attempt to adduce further evidence in favor of the front vowel analysis. Since they take alternating vowels to be underlying front vowels which become backed after back vowels, front vowels in general, and the vowel *i* in particular should not condition any front/back vocalic alternations. JSJ argue that if one allows the vowel *i* to condition application of Vowel Harmony as is the case in my analysis, certain undesirable consequences result.

The vowel *a*: in the stem *yila*: 'gnat' does not undergo Vowel Harmony to become **e*: although it is preceded by a front vowel. JSJ argue that in order to prevent application of Vowel Harmony within the stem under my back vowel analysis, Vowel Harmony must contain 'a + boundary before C₀ _____' [8:134]. They also conclude that it is necessary to posit separate phonological rules as well as morpheme structure rules or constraints in that analysis, whereas such a morpheme structure constraint is not required under their front vowel analysis.

If this argument is applied in a principled way, then either their reanalysis will also require a morpheme structure constraint, or else there reanalysis does not observe the restrictions on morpheme internal vowel sequences. The argument which they advance is not unique: it is merely an illustration that the relationship between morpheme structure constraints and phonological rules is problematic and unresolved.

JSJ claim that it is possible to capture the constraint on the co-occurrence of vowels that front vowels other than *i* do not appear after back vowels within a stem by the Vowel Harmony rule. JSJ claim '(24) [= my (3), above], which applies both within and cross boundaries, effects a simplification of the morpheme structure component since no morpheme structure condition is needed to account for vowel harmony within roots' [8:135]. How precisely this simplification results is not made clear. If JSJ's intention corresponds to this statement, we must conclude that the noninitial vowels in all morphemes containing more than one vowel derive from underlying front vowels, since they assume that Vowel Harmony applies within roots. Thus phonetic *axa* 'elder brother' derives from underlying *axe* by application of Vowel Harmony (3). The reanalysis advanced by JSJ therefore entails a grammar where back vowels are restricted to morpheme initial syllables and all noninitial vowels are front vowels. This constraint is insufficient, since in an example such as *yila*: the final stem

vowel cannot be determined by application of Vowel Harmony, as it theoretically could in the form *axa*. This stem must therefore contain an underlying noninitial back vowel. The relevant generalization for JSJ's grammar is therefore that back vowels appear within a morpheme only in the initial syllable, or in a noninitial syllable only when no vowel other than *i* precedes within that morpheme. This reanalysis must be rejected on numerous grounds; it requires nonalternating vowels to be represented in lexical representations in a form other than their phonetic form, where there is no justification for this assumption; it requires a constraint on the occurrence of back vowels which is not otherwise needed in the grammar and is not supported by any phonetic facts. This constraint must in fact be represented by a morpheme structure constraint, so the analysis of JSJ cannot even simplify the morpheme structure component.

It could perhaps be argued that the details of the grammar required under JSJ's analysis as represented here are not the details desired by JSJ. This may be true, since JSJ are entirely silent on the details of how their reanalysis is actually able to eliminate a morpheme structure condition. If the above analysis of lexical representations were rejected, another analysis must be proposed. If we reject the initial assumption that all vowels in morpheme noninitial position are represented lexically as front vowels, we will allow back and front vowels to appear in noninitial position. If front vowels appear only after front vowels and back vowels only after back vowels, and JSJ still intend to state the regularities of morpheme internal vowel sequences without employing a morpheme structure condition, then the grammar required by JSJ's analysis simply does not recognize as systematic the fact the co-occurrence of vowels is restricted. As such, their analysis fails to be observationally adequate. On the other hand, if they state no underlying correlation between the frontness of initial and noninitial vowels, then JSJ will be required to arbitrarily derive some instances of the vowel *a* from *e* and other instances from the vowel *a*. Either analysis is unacceptable, and we must therefore conclude that JSJ's attempt to treat the constraints on morpheme internal vowels as a direct result of application of their rule of Vowel Harmony has failed. Consequently, the argument advanced in favor of JSJ's version of Vowel Harmony that the front-vowel analysis simplifies the morpheme structure component falls apart. Regardless of the analysis of Vowel Harmony selected, a morpheme structure constraint restricting morpheme internal sequences of vowels is necessary.

JSJ assert that the analysis of [17] requires a morpheme boundary to account for the fact that morpheme internal *a*: in *yila*: 'gnat' does

assuming that the variable X is not to be counted, JSJ's feature saving count is simply inaccurate: their rule employs 9 features and my rule employs 10, a "savings" of a single feature. Furthermore (4) can be reformulated to eliminate the rightmost expression of C_0 and therefore eliminating a feature, by enclosing the vowel i in subscripted parentheses:

$$(6) [+syll] \rightarrow \left[\begin{array}{c} -\text{back} \\ -\text{lo} \end{array} \right] / \left[\begin{array}{c} +\text{syll} \\ -\text{back} \end{array} \right] (C_0 (\left[\begin{array}{c} +\text{syll} \\ +\text{hi} \\ -\text{rd} \end{array} \right])_0)_b \text{---}$$

This reformulation of (4) employs 9 features, exactly as many as JSJ's analysis. Furthermore, their grammar requires that the suffix *-güi* 'negative' be marked as a focal exception⁸ to their Vowel Harmony rule. Thus, even employing JSJ's own feature counting criteria, their analysis must be rejected.

Analyses selected solely on the basis of feature counting have been viewed in the literature with increasing suspicion. Arguments against feature counting as the sole base for selecting among competing analyses have been given in Phelps [22, 23], McCawley [15], and Jensen [7]. This suspicion is particularly warranted when one analysis can be supported over another analysis on the basis of feature counting alone at the expense of other evaluation criteria such as rule naturalness and generality. On grounds of rule naturalness, JSJ's analysis is inferior to the back vowel analysis. Their rule applies to the unnatural class of segments $e, ü$, but not i , whereas my analysis refers to the natural class of back vowels. In addition, JSJ's analysis requires the use of both braces and angled brackets: these abbreviatory devices have been justly viewed with suspicion (McCawley [16]) as an indication of a missing generalization.

JSJ's rule fails for independent reasons, namely, that their rule schema (3) expands incorrectly. To demonstrate this point, it is necessary to consider in detail the precise subrules abbreviated by (3); it is also necessary to consider two different sets of subrules as resulting from (3), depending on the order of expansion of braces and angled brackets.⁹

⁸ A segment marked as a focal exception may not serve as the focus in a phonological rule, although it may serve as the conditioning environment. A segment marked as a contextual exception may not serve as conditioning environment, although it may serve as focus in that rule.

⁹ SPE does not state whether angled brackets are to be expanded before braces or vice versa.

not become *e:. Contrary to JSJ's claim, this conclusion is not necessary; the neutralization constraint proposed by Kiparsky [10] guarantees that Vowel Harmony does not apply within roots. In fact, the conclusion that Vowel Harmony does not apply within roots is necessary under any analysis on independent grounds, in order to account for mixed vowel roots such as *Dashdende* 'Dashdende', *lager* 'camp', *german* 'German.' Even if Kiparsky's constraint is rejected in favor of a direct restriction of Vowel Harmony such that it only applies to suffixal vowels, nonapplication of Vowel Harmony within a root such as *yila*: or *Dashdende* is necessary under any analysis of Vowel Harmony.

I have discussed the two arguments which JSJ advanced in support of their version of Vowel Harmony. I have shown that the correct analysis of *man*, *tau*, and *da*: gives no support to their version of Vowel Harmony, whereas the treatment of the particle *da*: strongly argues against their analysis. The claim that their analysis eliminates a morpheme structure condition has been shown to be false. The final argument advanced by JSJ in favor of their reformulation of Vowel Harmony is that it is "simpler" than the version proposed in [17], since their version of Vowel Harmony purportedly saves two features over my analysis. It is not obvious that this reasoning is valid, nor that it is factually accurate. JSJ include a morpheme boundary in calculating the value of my Vowel Harmony: as I have pointed out, this boundary is not required. I reproduce below both versions of Vowel Harmony for ease of comparison.⁷

$$(4) [+syll] \rightarrow \left[\begin{array}{c} -\text{back} \\ -\text{low} \end{array} \right] / \left[\begin{array}{c} +\text{syll} \\ -\text{back} \end{array} \right] (C_0 (\left[\begin{array}{c} +\text{syll} \\ +\text{hi} \\ -\text{rd} \end{array} \right])_0)_b C_0 \text{---}$$

$$(5) \left[\begin{array}{c} +\text{syll} \\ +\text{rd} \\ \{ \langle -\text{hi} \rangle \} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ \langle -\text{lo} \rangle \end{array} \right] / \left[\begin{array}{c} +\text{syll} \\ +\text{back} \\ \{ +\text{rd} \} \\ \langle -\text{hi} \rangle \end{array} \right] X \text{---}$$

JSJ do not state explicitly what theory of feature counting they appeal to in order to determine the number of features "saved" in their analysis. Assuming that they are operating within the theory of evaluation articulated in Chomsky and Halle [2], an ambiguity arises in evaluating (5), namely that SPE is not explicit about variables. Even

⁷ I have eliminated the feature *+back* from my original formulation of Vowel Harmony; as JSJ point out, this simplification is possible.

- (15) $\left[\begin{array}{c} +\text{syl} \\ +\text{rd} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ -\text{lo} \end{array} \right]$
 (16) $\left[\begin{array}{c} +\text{syl} \\ +\text{hi} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ -\text{lo} \end{array} \right]$

Subrule (13) incorrectly applies to \ddot{u} to yield \ddot{o} rather than u . Subrule (15) can never apply, since subrule (13) will have previously and incorrectly changed any \ddot{u} in the proper environment to \ddot{o} . Subrule (16), like subrule (10), incorrectly changes i to \ddot{r} . Consequently, JSJ's rule of Vowel Harmony cannot be made to work under any expansion of angled brackets and braces.

It must be concluded that JSJ's reanalysis of Khalkha Mongolian Vowel Harmony fails to hold up under close scrutiny, while the analysis proposed in [17] does. Since my analysis must be formulated to violate RC, we must therefore conclude that Khalkha Mongolian Vowel Harmony does indeed refute RC.

1.2. EASTERN CHEREMISS

I turn now to an investigation of the Vowel Harmony rule of Eastern Chermess. In that language, suffixes containing the underlying vowel e appear with o and \ddot{o} following the vowels u , o or \ddot{u} , \ddot{o} , respectively. The vowel schwa as well as consonants may intervene between the determinant and focus. The following examples illustrate application of this rule to the third-person suffix $-e$.

- (17) $\text{ba}\ddot{s}\text{alal}\ddot{t}\text{e}$ 'be smeared'
 $\text{optal}'\text{e}$ 'pour'
 $\text{mu}\ddot{s}\text{ko}$ 'wash'
 $\text{p}\ddot{o}\text{rt}\ddot{o}$ 'turn'
 $\text{todal}'\text{o}$ 'break'

The rule proposed in [17] to account for these alternations is reproduced below.

- (18) $\left[\begin{array}{c} +\text{syl} \\ -\text{high} \\ -\text{back} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{round} \\ \text{aback} \end{array} \right] / \left[\begin{array}{c} +\text{syl} \\ +\text{round} \\ \text{aback} \end{array} \right]$
 $(C_0 \left[\begin{array}{c} +\text{back} \\ +\text{syl} \\ -\text{low} \\ -\text{round} \end{array} \right])_0 C_0$

Let us first assume that braces are expanded before angled brackets. Rule (4) expands into the following subrules (ignoring the expansion of the determinant):

- (7) $\left[\begin{array}{c} +\text{syl} \\ +\text{rd} \end{array} \right] \rightarrow [+back]$
 (8) $\left[\begin{array}{c} +\text{syl} \\ (-\text{hi}) \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ (+\text{lo}) \end{array} \right]$

Expansion of the angled brackets contained in (8) yields the following disjunctively applied rules.

- (9) $\left[\begin{array}{c} +\text{syl} \\ -\text{hi} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ +\text{lo} \end{array} \right]$
 (10) $\left[\begin{array}{c} +\text{syl} \\ +\text{hi} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ -\text{lo} \end{array} \right]$

Note, however, that subrule (10) changes all high vowels to back vowels; in particular, (10) will incorrectly apply to i in the suffix $-lig$ of *bayalig* 'wealth,' yielding incorrect **bayalig*. JSJ's rule will incorrectly change i to \ddot{r} if braces are expanded before angled brackets. Therefore, in order to salvage their analysis, JSJ must assume a different order of expansion between angled brackets and braces.

Let us now assume that angled brackets are expanded before braces. Rule (3) expands to the following rule schemata.

- (11) $\left[\begin{array}{c} +\text{syl} \\ \{ +\text{rd} \\ -\text{hi} \} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ +\text{lo} \end{array} \right]$
 (12) $\left[\begin{array}{c} +\text{syl} \\ \{ +\text{rd} \\ +\text{hi} \} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ -\text{lo} \end{array} \right]$

Expansion of braces then yields the following subrules, (13) and (14) deriving from (11), and (15) and (16) deriving from (12).

- (13) $\left[\begin{array}{c} +\text{syl} \\ +\text{rd} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ +\text{lo} \end{array} \right]$
 (14) $\left[\begin{array}{c} +\text{syl} \\ -\text{hi} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{back} \\ +\text{lo} \end{array} \right]$

Since the determinant and focus have in common only the feature *+syl*, RC incorrectly predicts that no vowels may intervene between the determinant and focus. Since the occurrence of schwa in this rule violates RC, JSJ proceed to reanalyze the vowel harmony system of this language in such a way that no schwa ever intervenes between determinant and focus. In order to accomplish this, they argue that all schwas which appear between determinant and focus at the phonetic level are derived in one of two ways: either they are inserted after application of Vowel Harmony by certain morphological rules, or else they derive from the vowel *e*, which undergoes harmony and is subsequently reduced to schwa. I will ignore the first approach as being irrelevant to the discussion at hand: all of the examples to be discussed here involve instances of schwa outside of the realm of morphological schwa insertion.¹⁰

JSJ argue along the following lines: under the version of Vowel Harmony which they propose, that rule does not propogate across a vowel, but rather applies iteratively to convert the string of vowels *o . . . e . . . e* to *o . . . o . . . o*, whereupon the midvowels *e*, *o*, *o* are reduced to *ɔ*. Reduction changes the medial vowel *o* to schwa, yielding the phonetic string *o . . . ɔ . . . o*.

JSJ offer the following forms in support of the midvowel reduction rule which reduces *e*, *o*, and *o* to *ɔ* when these vowels stand before an affix.

- (19) kobašte 'fur'
 kobašta-že 'it's fur'
 surtaško 'to the house'
 surtaška-žo 'to his house'
 körgö 'inside'
 körga-štö 'in the inside'

JSJ suggest the following Midvowel Reduction rule

$$(20) \begin{bmatrix} +syl \\ -hi \\ -lo \end{bmatrix} \rightarrow \begin{bmatrix} +back \\ -rd \end{bmatrix} / \text{---} +$$

¹⁰ I originally stated that schwa cannot be treated as epenthetic and that there are no schwa - 0 alternations except those resulting from general vowel deletion rules. JSJ correctly observe that there are a few schwa - 0 alternations conditioned by morphological and lexical factors. They also observe that vowel deletion is not a single general process, but represents three distinct and limited processes. This does not however affect my original argument.

Vowel Harmony is then revised as follows.

$$(21) \begin{bmatrix} +syl \\ -hi \\ -back \end{bmatrix} \rightarrow \begin{bmatrix} +rd \\ -back \end{bmatrix} / \begin{bmatrix} +syl \\ +rd \\ -back \end{bmatrix} X \text{---}$$

By ordering Vowel Harmony prior to Midvowel Reduction, the surface form *körgaštö* is derived in the following manner.

- (22) körgö-šte Vowel Harmony
 körgö-štö Midvowel Reduction
 körga-štö

Were this analysis correct, it would indeed show that there is an account of Eastern Cheremiss Vowel Harmony which does not violate RC. However, I will argue here that JSJ's analysis is incorrect; I will at the same time show that the analysis which I originally proposed requires a refinement. Additional data show the need for a constraint on the Vowel Harmony rule of this language which very clearly argues for an analysis where Vowel Harmony propogates across schwa. The crucial observation which refutes JSJ's reanalysis of Vowel Harmony is the fact that the process does not apply in as general a context as implied by either (18) or (21). In fact, that rule only applies to a word final vowel, so that the vowel *e* in nonfinal position never harmonizes with a preceding *o* or *ö* (Sebeok and Ingemann [31]).

- (23) sögem 'I stand'
 söget 'you (sing.) stand'
 sögena 'we stand'
 sögeda 'you (pl.) stand'
 toleş 'he comes'
 sögenam 'I have stood'
 sögen 'he stood'

Furthermore, nonfinal *e* does not harmonize with *o* or *ö* separated by a phonetic schwa from the determinant vowel.

- (24) söganem 'I want to stand'
 söganet 'you want to stand'

Both the analysis of JSJ and my original analysis would incorrectly predict forms such as **sogom*, **soganom*. However, the analysis of

[17] can readily be modified to express the generalization that only word final vowels may serve as the input to Vowel Harmony, as follows.

$$(25) \begin{bmatrix} +\text{syl} \\ -\text{hi} \\ -\text{back} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{rd} \\ \alpha\text{back} \end{bmatrix} / \begin{bmatrix} +\text{syl} \\ +\text{rd} \\ \alpha\text{back} \end{bmatrix} (C_0 \begin{bmatrix} +\text{syl} \\ +\text{back} \\ -\text{low} \\ -\text{rd} \end{bmatrix})_0 C_0 \text{---} \#$$

The fact that only word final vowels participate in Vowel Harmony alternations also shows that Midvowel Reduction, however it is formulated, must precede Vowel Harmony so that the presence of underlying *e* in the nonfinal syllable of *surt-e-še-že* does not block application of (25) in the derivation of *surt-š-k-ž-o* 'to his house.' Ordering Midvowel Reduction before Vowel Harmony guarantees that final *e* becomes *o* in that form, where the medial vowels undergo reduction to schwa, but blocks application of Vowel Harmony to the final vowel of *tolneže* 'he wants to come,' where the medial vowel fails to reduce and thus blocks application of Vowel Harmony to the final vowel.

Although the original analysis of [17] can be corrected to incorporate the crucial restriction that Vowel Harmony applies only to word final vowels, JSJ's reanalysis of Vowel Harmony cannot be modified along these lines, since that analysis depends crucially on multiple application of Vowel Harmony to nonfinal vowels, which later are claimed to undergo reduction to schwa. Consequently, the attempt to exclude schwa from the Eastern Cheremiss Vowel Harmony rule fails, and again, RC stands refuted.

JSJ might conceivably wish to salvage their analysis by positing a disharmony rule changing *o* to *ō* back to *e* when these vowels stand in nonfinal position, along the following lines.

$$(26) \begin{bmatrix} +\text{syl} \\ -\text{hi} \\ -\text{lo} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{rd} \\ -\text{back} \end{bmatrix} / VC_0 \text{---} [+ \text{seg}]$$

Under this modification, Vowel Harmony (21) is applicable to the underlying form *šogem*; that rule will apply and yield *šogom*. The above Disharmony rule would subsequently apply, and will yield the correct phonetic form *šogem*. The use of a Disharmony rule would then be one conceivable, albeit unattractive way of salvaging JSJ's

analysis of Vowel Harmony. This is accomplished only by adding an otherwise unnecessary Disharmony rule which must be stated with considerable complexity, since there are numerous forms to which Disharmony would not apply, i.e. *latkok* 'twelve,' *binobat* 'guilty,' *bikok* 'straight,' *krešoni* 'Christian,' *otbor* 'yard,' or *orolem* 'to guard.' Even granting for the sake of argument that the Disharmony rule can indeed be stated in some manner, it does not suffice to patch up JSJ's analysis of Vowel Harmony, since it falsely predicts that word final *e* might undergo Vowel Harmony conditioned by preceding *o* or *ō*, where the nonfinal midvowel would subsequently undergo Disharmony to become *e*, yielding the phonetic vowel sequence *o...e...o#*. In fact, Vowel Harmony must be blocked under these circumstances, c.f. *soganeže* 'he wants to stand,' *tolneže* 'he wants to come.' The revised version of JSJ's analysis which employs a Disharmony rule incorrectly generates **soganežo*, **tolnežo*. On the other hand, the Vowel Harmony rule proposed in [17] and constrained in (25) will not apply to any vowel in either form. It will not apply to the medial vowel *e* since that vowel does not stand before # as is required by (25), nor will it apply to the final vowel *e*, since *e* precedes that vowel, not a round vowel (the determinant) or schwa (the intervening material). It must be concluded that JSJ's analysis of Vowel Harmony cannot be suitably revised at any cost.

I have reviewed in detail the two attempts made by JSJ to reanalyze rules which I adduced as counterexamples to RC, and have shown that these reanalyses cannot be maintained. It must therefore be concluded that the entire set of counterexamples in Section 3 of [17] is vindicated.

2. REVISIONS OF RC

In an attempt to blunt the number of possible counterexamples to RC, JSJ offer a number of revisions either of the theory of phonology or of RC in particular. The original RC was a very strong hypothesis as it was stated in J: it claimed to predict all the intervening material, and only that, in any phonological rule. However, in the face of the relevant evidence, JSJ have been forced to considerably weaken the strength of the original hypothesis. It is in fact now rendered so weak that it makes no empirical claims whatsoever. I shall discuss certain of the modifications offered by JSJ in the following section.

2.1. DETERMINANT AND RC

JSJ observe that for a rule such as the Main Stress Rule of English, it may be difficult to separate the determinant from the intervening material in the statement of the environment. They suggest that determinant and intervening material are not appropriate terms for such a rule. They then proceed to redefine determinant as follows (according to JSJ, this proposal is due to Ringen [30]).

(27) In a rule of the form

$$A \rightarrow \begin{bmatrix} B \\ \alpha F \end{bmatrix} / YCX \text{---} Z \\ \text{or} \quad / Y \text{---} XCZ$$

C is a *determinant* if and only if it contains αF or $-\alpha F$ for some phonological feature F.

According to the revised definition, the term "determinant" is meaningful only for rules of phonological feature assimilation or dissimilation. Since RC is stated in terms of the relationship between the features of the determinant and focus, the definition in (27) effectively serves to limit the class of cases where RC makes predictions. Specifically, RC can now make no predictions about what constitutes possible intervening material in rules which do not assimilate or dissimilate phonological features. Needless to say, this provides JSJ with considerable flexibility in dealing with potential counterexamples; depending on whether or not it is advantageous to exclude a certain rule from the domain of explanation of RC, the precise formulation of the rule may be modified so that it satisfies condition (27) or else does not, thus achieving the desired result.

It is not clear that the above characterization of determinant, suggested by Ringen [30] and JSJ, is appropriate. Since "determinant" is useful primarily in discussing constraints on intervening material in phonological rules, and it is precisely these constraints which are under discussion, there is no clear, independent evaluation whether the above characterization of determinant encompasses all cases of what would intuitively be viewed as determinant in a given phonological rule. In particular, their definition of determinant entails that no determinant is encountered to the Finnish *e*-raising rule, which raises word final *e* of *vetä*- 'water' to *i* in nominative singular *vetä* (Kiparsky [10]). Careful consideration of this rule reveals that no feature assimilation or dissimilation takes place.

$$(28) \begin{bmatrix} +\text{syl} \\ -\text{low} \\ -\text{back} \end{bmatrix} \rightarrow [+hi] / \text{---}\#$$

According to condition (27), this rule has no determinant, despite the well-justified intuition that the word boundary is the determinant. It may prove difficult to argue for or against the proposed definition of determinant, since that construct has significance only in discussion of constraints on material intervening between determinant and focus. An alternative is to take condition (27) as a condition that restricts the scope of RC. In either case, RC is weakened, and therefore rendered less interesting.

2.2. GRAMMATICAL CONDITIONING AND RC

In their discussion of the definition of determinant, JSJ note "that the term 'phonological' in this definition must be taken literally, specifically excluding rules with grammatical conditioning from the domain of the Relevancy Condition" [8:126]. It is not apparent whether this statement is to be taken at its literal value, namely that RC also does not hold for rules which require any nonphonological conditioning, or whether JSJ have in mind a less general restriction. If it is their intention to exclude all rules with nonphonological conditioning from the realm of RC, then RC is weakened considerably. Such a revision is rather serious, since some element of grammatical conditioning, including use of morpheme boundaries, is not uncommon in otherwise highly general phonological rules. Even worse, this revision prevents JSJ from explaining the class of intervening segments in the Latin Liquid Dissimilation rule by exploiting the predictions of RC. This rule was originally discussed in J as a rule where the class of intervening material can be predicted by RC. According to the account given in J and JSJ, *l* in the suffix *-a:lis* becomes *r* after *l*, where only liquids are excluded from intervening between determinant and focus. This rule accounts for the alternations in forms such as *nava:lis* 'naval', *milita:ris* 'military'. JSJ propose the following rule.

$$(29) \begin{bmatrix} -\text{syl} \\ +\text{cons} \\ +\text{son} \\ -\text{nas} \end{bmatrix} \rightarrow [-\text{lat}] / \begin{bmatrix} -\text{syl} \\ +\text{cons} \\ +\text{son} \\ -\text{nas} \\ +\text{lat} \end{bmatrix} X \text{---}$$

This rule must be grammatically conditioned, since no other suffix containing *l* alternates.

- (30) text-ilis 'woven'
 flex-ilis 'flexile'
 alt-ilis 'fattened'
 ama-bilis 'loveable'
 lauda-bilis 'laudable'
 inexplica-bilis 'inexplicable'

Given this added restriction on RC, the intervening material cannot be predicted in this rule. The exclusion of RC from the domain of rules with nonphonological conditioning not only weakens the predictive power of RC, it also eliminates rules such as the Latin Liquid Dissimilation rule as an example of the predictive power of RC.

2.3. A CLASS OF COUNTEREXAMPLES

A considerable selection of my original critique was devoted to demonstrating counterexamples to show that RC is not sufficiently strong to properly constrain the class of intervening segments in all rules. Such a rule is Rounding Harmony in Khalkha Mongolian, where the vowels *e* and *a* become *ö* and *o*, respectively, when preceded by *ö* or *o*. The vowel *i* may intervene between the determinant and focus. The following data illustrate the application of Rounding Harmony to the ablative affix -*u:s*.

- (31) dorj-o:s 'Dorj'
 öglö:n-ös 'morning'
 morin-o:s 'horse'
 ölmī:g-ö:s 'instep'

The following rule was proposed in [17]:

$$(32) \begin{bmatrix} +\text{syl} \\ -\text{hi} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{rd} \\ -\text{lo} \end{bmatrix} / \begin{bmatrix} +\text{syl} \\ -\text{hi} \\ +\text{rd} \end{bmatrix} (\text{C}_0 \begin{bmatrix} +\text{syl} \\ +\text{hi} \\ -\text{rd} \end{bmatrix})_0 \text{C}_0 \text{---}$$

I pointed out that RC incorrectly predicts that both the vowels *i* and *u* are irrelevant, whereas Rounding Harmony does not propagate across *u*, cf. *ort:tax* 'make introduce', and thus the vowel *u* is not irrelevant.

In response to this entire class of counterexamples, JSJ state: "The Relevancy Condition was devised as a constraint on intervening material in phonological rules. It does not state that rules may not be further restricted than the condition predicts" [8:130]. I cited statements given in J which lead to the conclusion that in fact RC was intended to predict intervening material fully. Certainly one is free to revise RC to allow for additional restrictions on intervening material which cannot be predicted by RC. However, if this approach is to be taken, RC is again weakened considerably because it only sets an upper limit on what material may be allowed to intervene, and does not set a lower limit on what material must be allowed to intervene.

Furthermore, although JSJ do not discuss any mechanisms which allow additional restrictions to be imposed on variables, the resulting proliferation of negative and non-Boolean conditions of the form 'X ≠ ... [-high] ...' considerably increases the generative power of the theory. Unless such conditions can be shown to be independently necessary in as wide a variety of cases as will be required for formulation of rules in accordance with RC, the added power required by RC is an argument against that theory.

In this vein, JSJ claim that RC does in fact make an important prediction regarding the application of Rounding Harmony in Mongolian. They claim that: "The interesting prediction made by the Relevancy Condition in Rounding Harmony is that *i* will not block the rule, whereas *e* and *a*, relevant segments, will block the rule. This would not be expected a priori. . . . In a theory without the Relevancy Condition, the fact that *e* and *a*, but not *i*, block the rule is accidental" [8:138]. JSJ have in fact misrepresented the facts in these statements. The vowels *e* and *a* do not ever block application of Rounding Harmony, rather, they undergo that rule. Nor is this so-called blocking "accidental"; Howard's Crossover Constraint automatically constrains the rule so that *a* and *e* cannot be intervening material. Again, RC does not make any prediction which is not already made by the Crossover Constraint.

2.4. RELEVANCY AND MARKEDNESS

JSJ conclude that two of my original counterexamples to RC, Karok s-palatalization and Menomini Midvowel Raising are true counterexamples (as is the undiscussed Karok x-labialization rule). Since RC as stated by J and as revised by JSJ stands refuted, they come to the conclusion that RC is to be reinterpreted as a convention assigning

numerical markedness to rules. They state: "Up to this point, we have been implicitly regarding the Relevancy Condition as an absolute condition on rules. Another interpretation is to regard it as a measure of the markedness of a rule. To the extent that rules conform to this condition, they are unmarked. Such rules are expected to occur in languages" (8:152).

JSJ then propose to construct a "scale of deviation" which assigns degrees of markedness to rules, ranging from 0 assigned to rules conforming to RC, up to 4 assigned to rules having more than one intervening syllable containing relevant segments. Accordingly, the Menomini Midvowel Raising rule is assigned the highest markedness value 4, since more than one relevant syllable may intervene.

At this point, it is abundantly clear that RC does not serve to constrain the action of any phonological rule: as JSJ observe, "marked" rules do exist in languages. It is not clear whether any testable claim can be made by RC once it is redefined as a markedness assigning device, or whether JSJ's reduction of RC to a markedness device merely serves as a theoretical prophylactic immunizing their claim against refutation. Since there is no independent method of determining the degree of markedness of a rule, there is no way of empirically verifying whether any given rule violating RC is marked, and thus JSJ's claim that RC assigns degrees of markedness is unrefutable.

In general, any relativistic or typological claim that a phenomenon is rare or marked is extremely difficult to evaluate. Whereas absolute constraints may be refuted by a single well-chosen counterexample, relativistic constraints cannot be tested as easily. The general view is that a marked situation should be historically unstable and crosslinguistically uncommon. If it turned out that violations of RC were in fact rare or historically unstable, then JSJ's proposal to reinterpret RC as a markedness constraint might be appropriate. Therefore, the claim that violations of RC are marked may be evaluated by investigating whether such violations are rare or unstable. In the remainder of this section, I will bring to light additional counterexamples to RC not discussed in my original critique, in order to show that violation of RC does not entail any particular markedness.

I have argued above that the Khalkha Mongolian Vowel Harmony rule violates RC, since the relevant segment *i* intervenes between determinant and focus. Were Khalkha unique in having such a rule, it might be argued that markedness theory as elaborated by JSJ makes this prediction. However, the same rule is encountered in Classical Mongolian (Poppe [28], Grøbech and Krueger [4]). In Classical Mon-

golian, *a* and *u* appear in suffixes that follow back vowels and *e* and *ü* appear in suffixes that follow front vowels, where the vowel *i* may intervene. The vowel *i* does not alternate, and if the stem contains no vowel other than *i*, the suffix invariably contains a front vowel. Thus, Classical Mongolian Vowel Harmony is identical in essentials to the Khalkha Vowel Harmony rule.

(33) aqa-dur	'elder brother'	(dative)
qadam-dur	'father in law'	(dat.)
dalai-dur	'sea'	(dat.)
morin-dur	'horse'	(dat.)
eme-dür	'woman'	(dat.)
tölöb-tür	'pattern'	(dat.)
biçig-tür	'letter'	(dat.)
aqa-luḡa	'elder brother'	(comitative)
noqai-luḡa	'dog'	(comit.)
ulus-luḡa	'people'	(comit.)
keüken-lüḡe	'child'	(comit.)
biçig-lüḡe	'letter'	(comit.)
aqa-yi	'elder brother'	(accusative)
eme-yi	'woman'	(acc.)
ulus-i	'people'	(acc.)

A strong argument can be made that back vowels underly the alternating suffixes even in Classical Mongolian. The stems *min-* 'I' and *çin-* 'you' are contextual exceptions to Vowel Harmony. When the alternating genitive suffix *-ai-ü* (cf. *sün-ü* 'milk (gen.)', *morin-u* 'horse (gen.)') is added to these stems, the back vowel *u* appears in *minu* 'my', *çinu* 'your.' Under the assumption that Vowel Harmony changes back vowels to front vowels, the appearance of back vowels in the genitive suffix of these forms is accounted for by treating these stems as contextual exceptions to Vowel Harmony.

If highly marked rules are in some sense unusual, one would expect such rules to be unstable and consequently subject to historical change, leading to grammatical restructuring whereby the marked rule does not violate RC. In fact, Classical Mongolian Vowel Harmony, which embodies a violation of RC, has remained virtually unchanged in the historical development of the modern languages over the past half millennium. The vowel *i* functions in a similar manner as a neutral vowel in Khalkha, Buriat (Poppe [27]), and Kalmyk (Todaeva [32]). The stability of the vowel harmony system of Mongolian is particularly remarkable in light of the widesweeping phonological changes in the

vowel system which characterizes the development of Modern Mongolian from Ancient Mongolian (Poppe [26, 29]). If a highly marked rule ought to be subject to historical change, the historical development of Mongolian fails to confirm JSJ's claim that rules violating RC are highly marked.

The Vowel Harmony rules of Classical Mongolian and Khalkha are not isolated rules. The Vowel Harmony rule of Votic (Ariste [1]) is similar in its formulation to Vowel Harmony in Mongolian. In that language, one encounters the front and back phonetic vowel pairs *ä/ä*, *ö/o*, *ü/u*, *e/ä*, *i/ä*. Stems generally contain only front or only back vowels, with the exception that the vowel *i* freely cooccurs with both front and back vowels. Suffixal vowels generally assimilate to the backness of the preceding syllable. The suffixes *tä* ~ *ta* (partitive), *le*: ~ *læ*: (allative) and *üd* ~ *üd* (nominalization) alternate accordingly, as shown in (34).

(34) apəə-ta	'silver'	(partitive)
sut-ta	'wolf'	(partit.)
pä:-tä	'head'	(partit.)
ület-tä	'thieves'	(partit.)
ma:-tæ:	'land'	(allative)
naizə-ta:	'woman'	(all.)
tö:-le:	'work'	(all.)
üvü:-le:	'good'	(all.)
takə-üz	'flatness'	
pe:n-üz	'smallness'	
terve-üz	'health'	

Vowel Harmony propagates across the vowel *i*, as shown below.

(35) rikka-pi:-ta	'richer (pl.)'	(partitive)
opəzi:-ta	'horses'	(partit.)
lintui-ta	'birds'	(partit.)
vasaroi-ta	'hammer'	(partit.)
tüttäritä	'daughters'	(partit.)
vävüi-tä	'son in laws'	(partit.)

When the stem contains no vowel other than *i*, a suffix will appear with a front vowel.

(36) i:r-tä	'mouse'	(partitive)
pilli:-tä	'flute'	(partit.)
vi:mis-sä	'last'	(partit.)
irt-tä	'log'	(partit.)
sinis-sä	'blue'	(partit.)
si:n-tä	'mushroom'	(partit.)

The precise formulation of Vowel Harmony depends on the nature of the underlying suffixal vowels. It can readily be shown that the alternating suffixes must be treated as having underlying back vowels rather than front vowels. The ethnonymic suffix *läin* ~ *läin* is optionally exempted from undergoing Vowel Harmony when attached to a front vowel stem, and may thus appear with either a back vowel or a front vowel after a front vowel stem, but may only appear with a back vowel after a back vowel stem.

(37) viro	'Estonian'
viro-läin	'Estonian person'
vad'd'a	'stake'
vad'd'a-läin	'Vote'
so:m:a:	'Finnish'
so:m:a-läin	'Finn'
venäi	'Russian'
venä-läin	'Russian person'
venä-läin	'Russian person'

If we assume that alternating suffixes contain underlying back vowels and formulate Vowel Harmony as a vowel fronting rule, the appearance of a back vowel in a suffix which is preceded by a front vowel may be accounted for by optionally exempting this suffix from undergoing Vowel Harmony. If the converse assumption is made, namely, that front vowels underly the alternating suffixes and that Vowel Harmony changes front vowels to back vowels, it will be impossible to generate the form *venä-läin*.

A second argument can be made that the vowels of alternating suffixes are underlying back vowels. When a case suffix follows the front vowel *e* of the pronoun *kase* 'this,' a back vowel will appear within the case suffix, as illustrated in (38).

(38) kase	nominative
kase-za	inessive
kaze-ssa	elative
kaze-ta:	allative
kaze-fta	adessive
kaze-fta	ablative

Under the hypothesis that alternating vowels are back vowels in underlying representation, the appearance of back vowels after a front vowel in (38) is explained by marking the final vowel of the stem as a contextual exception to Vowel Harmony.

I have thus shown that the Votic Vowel Harmony rule acts on underlying back vowels to derive front vowels; furthermore, this rule propagates across the vowel *i*. The following rule is therefore proposed for Votic Vowel Harmony.

$$(39) \quad [+syl] \rightarrow [-back] / \left[\begin{array}{c} +syl \\ -back \end{array} \right] (C_0 \left[\begin{array}{c} +syl \\ -rd \\ -back \end{array} \right])_0 C_0 \text{---}$$

It should now be noticed that this rule, which violates RC, is virtually identical to the Vowel Harmony rules encountered in Khalkha and Classical Mongolian. It must therefore be concluded that this rule is not an odd rule which may simply be ignored by claiming that it is a highly marked rule. Rather, this rule must be accounted for in any theory which attempts to capture crosslinguistic generalizations.

Further evidence is available to reinforce the claim made here that rules with wide crosslinguistic attestation may uniformly violate RC. A palatalization rule which propogates across consonants similar to the Karok *s*-palatalization rule is encountered in numerous languages. For example, in Chimalpa Zoque (Knudson [11]), the dental consonants *s* and *c* are palatalized to *š* and *č* when they stand before the vowel *i*, or are separated from it by only a consonant.

(40) mec-a ² a	'two'
meč-hi ²	'the two of them'
tič-pa	'it is drying'
tič-i	'dry'
maktas-a	'four'
maktas-hi ²	'the four of them'
ʔi is-pa	'he sees it'
ʔiš-nitum	'to see as one'

The following palatalization rule is proposed to account for these alternations.

$$(41) \quad \left[\begin{array}{c} +cor \\ +stri \end{array} \right] \rightarrow [-ant] / \text{---} (C)_i$$

Similar to the Karok *s*-palatalization rule, this rule also violates RC, since the determinant and focus have no features in common, and therefore no segments should be allowed to intervene.

According to Davis [3], the Luiseño retroflex sibilant *s* becomes *š* when preceded by a front vowel, where a consonant may intervene between determinant and focus. Thus, we consider the consonantal alternations of the interrogative affix *-ša*.

(42) wunal-šu	'that?'
ʔo:nu-š	'that?'
ʔivi-s	'this?'
pilek-su	'very?'

Davis proposes the following rule.

$$(43) \quad s \rightarrow š / \left[\begin{array}{c} V \\ -back \end{array} \right] (C) \text{---}$$

Again, similar to rules in Karok and Zoque, this rule violates RC, since no features are common to determinant focus, RC incorrectly predicts that no segments may intervene between determinant and focus.

Lyman and Lyman state that in Choapun Zapotec, "the alveopalatal spirants are retroflexed except when occurring before *i*" [14:139], illustrated below.

(44) žitu	[žitʉ]	'cut'
šija ²	[šidza ²]	'Zapotec'
že	[že]	'big'
rešeda ²	[rešeda ²]	'I like'
či	[tši]	'ten'
čuni ²	[tšuni ²]	'spider'
bešte	[bešte]	'dust'

They continue: "Alveopalatal spirants remain unretroflexed before the

vowel *i*, even when another consonant intervenes between the spirant and the vowel" [14:139].

- (45) škina? [ški?ina?] 'my nose'
 žbia? [žbja?] 'my finger'

Deretroflexion in Zapotec is expressed by the following rule, which again violates RC.

- (46) $\left[\begin{array}{c} +\text{cor} \\ +\text{sib} \\ -\text{ant} \end{array} \right] \rightarrow [+ \text{distrib}] / \text{---} (\text{C})\text{i}$

We therefore see that there is a crosslinguistically well-supported rule palatalizing or deretroflexing sibilants in the neighborhood of a front vowel, and that this rule may propagate across a consonant. It is therefore either false to claim that marked rules are rare, or else rules violating RC are in fact not marked.

In Votic (Ariste [1]), the consonant *l* has two allophones, a plain *l* which is basic, and a velarized *l* which appears before back vowels. Alternation of *l* and *l̥* is illustrated below.

- (47) vad'd'a-hain 'Vote'
 venā-hain 'Russian'
 venā-lāin 'Russian'
 üvā-le: 'good (allative)
 tō:-le: 'work' (alla.)
 naizə-tə: 'woman' (alla.)
 səsari:-tə: 'sisters' (alla.)

This rule also propagates across a consonant.

- (48) ma:-hta 'ground' (abl.)
 vāi-hta 'oil' (abl.)
 tu:-hta 'bone' (abl.)
 səsari:-hta 'sisters' (abl.)
 mi-ltä 'I' (abl.)
 pä:-ltä 'head' (abl.)
 tō:-ltä 'work' (abl.)

The following rule will account for the alternation *l* ~ *l̥*.

- (49) $[+\text{lat}] \rightarrow [+ \text{back}] / \text{---} (\text{C}) \left[\begin{array}{c} +\text{syl} \\ +\text{back} \end{array} \right]$

Since no major class features are shared by the determinant and focus, no segment will be allowed to intervene according to RC. The appearance of an optional consonant in (49) thus violates RC.

Lastra shows that in Cochabamba Quechua, "i and u are lowered to *e* and *o* before *q*, *nq*, and *rq*" [13:19-20]. The following alternations illustrate application of this rule.

- (50) wasipi 'at home'
 wasipe-qa 'at home' (topic)
 ninku 'they say'
 ninko-qa 'they say' (topic)
 ni-n 'he says'
 ne-nqa 'he will say'
 ne-rqa 'he said'
 hamu-n 'he comes'
 hamo-nqa 'he will come'
 hamo-rqa 'he came'
 l'ank'a-n 'he works'
 l'ank'a-nqa 'he will work'
 l'ank'a-rqa 'he worked'
 parlaku-sqa 'that we are talking'
 mik'u-riy 'please eat!'

Although neither *n* nor *r* condition the lowering of *i* and *u* independently, these and only these consonants may intervene between the focal vowel and the determinant *q*. Even assuming that assimilation of *n* to *q* precedes application of Vowel Lowering and that Vowel Lowering is therefore conditioned directly by a uvular *n* in *hamo-nqa*, Vowel Lowering must still propagate across *r*, since that consonant is a dental spirant and does not assimilate to the following consonant.

- (51) $[+\text{syl}] \rightarrow [-\text{hi}] / \text{---} \left(\left[\begin{array}{c} +\text{son} \\ +\text{cor} \end{array} \right] \left[\begin{array}{c} +\text{cons} \\ +\text{back} \\ -\text{hi} \end{array} \right] \right)$

Although RC incorrectly predicts that nothing may intervene between determinant and focus, the consonants *n* and *r* must be allowed to intervene.

In Classical Mongolian, velar consonants are lowered to uvular

consonants when they stand before or after a back vowel (Poppe [28], Grønbech and Krueger [4]).

(52)	qara-qan	'little black'
	ula-ya-qan	'little red'
	noyi-qan	'little prince'
	keü-ken	'little child'
	ine-ken	'little this'
	ala-yda	'to be killed'
	yabu-yda	'to be gone to'
	tayilu-yda	'to be explained'
	üje-gde	'to be seen'
	jiru-γ	'picture' (jiru- 'to draw')
	ide-g	'bribe' (ide- 'to eat')

When a velar stands before a consonant or in final position and is preceded by the vowel *i*, the velar assimilates to the vowel preceding that *i*.

(53)	biçi-g	'letter' (biçi- 'to write')
	büji-g	'dance' (büji- 'to dance')
	jori-γ	'intention' (jori- 'to intend')
	qori-γ	'forbiddance' (qori- 'to forbid')
	bari-yda	'to be seized'
	biçi-gde	'to be written'
	čečeg-lig	'flower garden' (čečeg 'flower')
	jimis-lig	'orchard' (jimis 'fruit')
	temür-lig	'metal' (temür 'iron')
	miqa-liry	'corpulence' (miqa 'flesh')
	baya-liry	'riches' (bayan 'rich')

Velar Lowering must be formulated so that it propagates across a syllable containing the vowel *i* in order to account for these data.

$$(54) \left[\begin{array}{c} +\text{cons} \\ +\text{back} \end{array} \right] \rightarrow [-\text{hi}] \% \left[\begin{array}{c} +\text{syl} \\ +\text{back} \end{array} \right] (C_0 \left[\begin{array}{c} +\text{syl} \\ +\text{hi} \\ -\text{rd} \end{array} \right]) \text{---}$$

Since the determinant and focus have no major class features in common, RC predicts incorrectly that nothing will intervene between determinant and focus.

The short vowel *ä* in Tigre generally appears phonetically as a low

front vowel. However, it has a low back allophone transcribed here as *a*, having the quality of *a* in English *father*, when followed by either a pharyngeal or glottalized consonant (Odden [19], Palmer [20]).

(55)	ʔäb	'father'
	mäbrähät	'lamp'
	wälät	'girl'
	zäriʔ	'seed'
	säffʔ	'winnow'
	sinät	'backpack'
	ramač	'embers' ¹¹
	faraʕ	'clan'

This rule propagates over any string of consonants and vowels, so that *ä* will be changed to *a* as long as there is a glottalized or pharyngeal consonant somewhere following that vowel, regardless of the intervening vowels or consonants.

(56)	tadiʕ	'sternum'
	käti:b	'writing'
	nädi:ʔ	'sending'
	fati:h	'opening'
	zabi:t	'hitting'
	wadi:k	'falling down'
	sandu:k'a:	'her box'
	ʔabli:k'a:	'horse's necklace'
	barne:t'a:	'hat'
	maše:k'na:y	'miser'

In order to express both the restricted occurrence of the back vowel *a*, its complementary distribution with respect to *ä* and the alternation *a* → *ä* in the nominalizations of (56), the following rule is proposed.

$$(57) \left[\begin{array}{c} +\text{syl} \\ -\text{long} \end{array} \right] \rightarrow [+ \text{back}] / \text{---} [+ \text{segment}]_0 \left[\begin{array}{c} +\text{cons} \\ +\text{low} \\ +\text{glottal} \end{array} \right]$$

Since the determinant and focus have no major class features in common, according to RC, no segment should be allowed to intervene.

¹¹ The vowel *ä* also becomes *a* when followed in the next syllable by *a*, or *a* derived from *ä*, by an independently motivated rule. Thus, *ramač* derives from *rämäč* by application of this vowel harmony rule.

stated in two forms, a weaker hypothesis and a stronger hypothesis. The weaker hypothesis states:

No segment may be matched with an element in a rule other than the focus or determinant if that segment can also undergo that rule [6:94].

The stronger hypothesis states:

No segment may be matched with an element other than determinant or focus of a rule if that segment meets the internal requirements of the focus of that rule [6:95].

We observe that the Ayutla Mixteco Low Tone Raising rule (60) violates the stronger form of the Crossover Constraint, since a segment which meets the internal requirements of the focus, namely a L tone, appears as optional material. On the other hand, this rule does not violate the weaker form of the Crossover Constraint, since the intervening material will be unable to undergo Low Tone Raising on independent grounds, namely that only word initial L tones can serve as focus. We must therefore conclude that the weaker version of the Crossover Constraint is the version which is supported.

3. THE EVIDENCE FOR RC

I have discussed a significant number of rules which violate RC, many of which are essentially the same rule occurring in a variety of different languages. It must therefore be asked, on the basis of the new data discussed here as well as the original counterexamples advanced in [17] and defended in the first section of the present paper, whether RC can even be viewed as a tendency that languages will observe more often than not. It would be correct to claim that the statistical majority of phonological rules act on adjacent segments, and that rules applying to nonadjacent segments are generally less common.¹¹ Any impression that violation of RC is uncommon should therefore be attributed to the uncommon status of phonological rules applying to nonadjacent segments.

¹¹ The most common phonological rules which apply to nonadjacent segments appear to be those applying to vowels separated from their determinant by any sequence of consonants. Thus, a typical Vowel Harmony rule might state

$$V \rightarrow [\alpha F] / \begin{matrix} V \\ [\alpha F] \end{matrix} C_0$$

I will not attempt to propose any explanation for this fact here.

The fact that the Tigre \bar{a} -backing rule propagates across any number of syllables constitutes another violation of RC.

Pankratz and Pike [24] discuss numerous tonological sandhi rules of Ayutla Mixteco which apply to the initial tones of a word under the influence of a preceding word. Word final phonemic glottal stops which are present in isolation are deleted in medial position, but have an influence on the application of the tone rules. One of the rules described by Pankratz and Pike changes an initial L tone (here marked as V) which stands before a L tone into a Mid tone (unmarked), when the preceding word both ends in a glottal stop and has a final H tone (here marked as \bar{V}).

(58)	kùmi?	'four'
	dikà	'brushes'
	kùmi dikà	'four brushes'
	k ^w áçp?	'small' (pl.)
	tùmì	'feathers'
	k ^w áçí tumì	'the feathers are small'
	lúlú	'small' (sing.)
	lúlú tùmì	'the feather is small'

Initial L tone is also changed to Mid tone when a word final L tone separates the left-hand H tone from the focus.

(59)	çilólà?	'her knife'
	vìšj?	'cold'
	çilólà vîšj?	'her cold knife'
	k ^w ñ?	'green'
	tìnàà?	'tomato'
	k ^w ñ tìnàà?	'the tomato is green'

The following rule is proposed to account for these alternations.

$$(60) \text{ [Low]} \rightarrow \text{[Mid]} / \text{[High]} \text{ ([Low]) } ?\# \text{ — [Low]}$$

We observe that the occurrence of an optional Low tone in the formulation of this rule violates RC, since the determinant and focus have no features in common.¹² This rule also appears to violate the Crossover Constraint proposed by Howard [6]. Howard's constraint is

¹² Even assuming within an autosegmental approach to these rules that the "major class feature" of tonality is shared, L tone and H tone share no other features.

Since I have argued that violations of RC are quite common, it should be asked what evidence exists in support of RC, in order to ascertain that we have not lost any important generalizations in rejecting RC. J discusses four rules that are intended to support RC. It is argued there that these rules can be provided with a straightforward characterization of their intervening material only by invoking RC. If a number of rules were to be discovered where the intervening material can only be expressed in a simple fashion by interpreting a variable according to RC, then one might retain some element of that theory and articulate it as a new theory of variables predicting these facts, which does not simultaneously make false predictions in other areas. However, the four rules which J cites as evidence for RC do not in fact provide convincing evidence for that constraint.

I shall briefly review the original evidence adduced by J in support of RC. In each of these cases, J's proposed analyses are either open to serious empirical question, make exactly the same prediction as that embodied in the Crossover Constraint, or require significant overspecification of the rule in question in order to force it to comply with RC.

The first rule which J cites in support of RC is the Latin Liquid Dissimilation rule. As I have discussed above, this rule changes *l* in the suffix *-atis* to *r* when preceded by *l*. The rule propagates across any string of consonants and vowels, but is blocked by the consonant *r*. J attempts to characterize the restriction on intervening material by invoking RC. He proposes two forms of that rule, one employing the feature *syllabic* and another employing the feature *vocalic*. As pointed out in [17], the rule formulated with the feature *syllabic* requires the inclusion of a significant number of unnecessary features in order to satisfy the predictions of RC. J proposes the following rules.

$$(61) \begin{bmatrix} +\text{cons} \\ +\text{voc} \end{bmatrix} \rightarrow [-\text{lat}] / \begin{bmatrix} +\text{cons} \\ +\text{voc} \\ +\text{lat} \end{bmatrix} \quad \text{X} \text{ ---}$$

$$(62) \begin{bmatrix} -\text{syl} \\ +\text{cons} \\ -\text{obs} \\ -\text{nas} \end{bmatrix} \rightarrow [-\text{lat}] / \begin{bmatrix} -\text{syl} \\ +\text{cons} \\ -\text{obs} \\ -\text{nas} \\ +\text{lat} \end{bmatrix} \quad \text{X} \text{ ---}$$

Since the features [+cons, +voc] are common to determinant and

focus in (61) only *-cons* or *-voc* segments, i.e., vowels and nonliquids, may intervene between determinant and focus, according to RC. Similarly, since the features [-syl, +cons, -obs, -nas] are common to determinant and focus in (62), any segment will be allowed to intervene except one which has this feature specification. In either case, many otherwise unnecessary features must be included in J's characterization of determinant and focus, since if these features were omitted, RC would make incorrect predictions. The features *+cons*, *+voc* in (61) and *-syl*, *+cons*, *-obs*, *-nas* in (62) are included only to satisfy the requirement imposed by RC. Without independent justification for including unnecessary features in the determinant and focus, Latin Liquid Dissimilation does not serve as evidence supporting RC. A significantly simpler formulation of this rule results by stating the restrictions on Latin Liquid Dissimilation in the specification of the intervening material itself. The following rules, employing the features *vocalic* and *syllabic*, respectively, are noticeably simpler in formulation than either (61) or (62)

$$(63) [+lat] \rightarrow [-lat] / [+lat] \left\{ \begin{array}{l} +\text{cons} \\ -\text{voc} \end{array} \right\}_0 \text{ ---}$$

$$(64) [+lat] \rightarrow [-lat] / [+lat] \left\{ \begin{array}{l} -\text{son} \\ -\text{cons} \\ +\text{nas} \end{array} \right\}_0 \text{ ---}$$

RC therefore draws no support from Latin Liquid Dissimilation.

The second rule that J adduces in favor of RC is the Sanskrit *n*-retroflexion rule, whereby the consonant *n* is changed to *ṅ* when preceded by *ṣ*, *r*, or *ṛ*. This rule propagates across any number of segments, but is blocked by dental, retroflex and palatal consonants. The genitive plural suffix *-na:m* alternates with *-ṅa:m* under these conditions, viz., *de.va:-na:m* 'god (gen. pl.)', *priya:-na:m* 'lovely (gen. pl.)', *kri.da:-na:m* 'game (gen. pl.)'. As pointed out in [17] and [18], the formulation of *n*-retroflexion proposed by J is incorrect, since it does not prevent that rule from propagating across a palatal obstruent, viz. *kr̥ṣa:-na:m* 'weak (gen. pl.)'. The formulation offered by J incorrectly allows *n*-retroflexion to propagate across palatals. JSJ revise their account of *n*-retroflexion and employ the feature *grave* in place of the feature *coronal*, resulting in the following rule for *n*-retroflexion [8:129].

$$(63) \begin{bmatrix} +\text{cons} \\ -\text{syl} \\ +\text{nas} \\ -\text{grave} \\ -\text{hi} \end{bmatrix} \rightarrow [-\text{ant}] / \begin{bmatrix} +\text{cons} \\ -\text{grave} \\ -\text{nas} \\ +\text{ant} \\ -\text{lat} \end{bmatrix} \left\{ \begin{array}{l} -\text{cons} \\ +\text{grave} \end{array} \right\}_0 \text{ --- } [-\text{obst}]$$

The determinant and focus have in common the features [+cons, -grave], and RC therefore predicts that any grave or nonconsonantal segment may serve as intervening material. However, in modifying the form of this rule in order to bring the class of intervening material predicted by RC in line with the facts, JSJ have incorrectly characterized the class of conditioning segments. The matrix they propose for the determinant characterizes the segments *ṣ*, *ṛ*, *r*, and the palatal continuant *ç*, whereas the segment *ç* does not condition application of that rule, as shown by *krçā:nā:m* 'weak (gen. pl)'. It is necessary to further modify (63) to correctly restrict the class of conditioning segments to *ṣ*, *ṛ*, and *r*. However, if the feature *-hi* is included in the specification of the determinant, determinant and focus will have *-hi* in common, and RC would incorrectly predict that any *+hi* segment may intervene. Since the relevant palatal obstruents are *+hi*, such a reformulation of *n*-retroflexion will incorrectly allow palatals to serve as intervening material. Various manipulations of the features *hi* and *grave*, inter alia, do not resolve the problem of characterizing *n*-retroflexion in conformity with RC.

The only formulation of that rule which correctly restricts the intervening material, determinant, and focus is (64), which employs both the feature *grave* and the feature *coronal* in a manner that brings *n*-retroflexion in conformity with RC.

$$(64) \begin{bmatrix} +\text{cons} \\ -\text{syl} \\ +\text{nas} \\ -\text{grave} \\ -\text{hi} \end{bmatrix} \rightarrow [-\text{ant}] / \begin{bmatrix} +\text{cons} \\ -\text{grave} \\ -\text{ant} \\ -\text{nas} \\ +\text{ant} \\ -\text{lat} \\ +\text{cor} \end{bmatrix} \text{ X --- } [-\text{obst}]$$

This rule restricts the class of determining segments correctly, and is also able to correctly restrict the class of intervening segments. However, this rule employs an unconscionable amount of overspecification not otherwise needed. The account of Sanskrit *n*-retroflexion proposed in [18] is significantly simpler.

$$(65) \begin{bmatrix} +\text{nas} \\ +\text{cor} \end{bmatrix} \rightarrow [-\text{ant}] / \begin{bmatrix} +\text{cont} \\ +\text{cor} \\ -\text{ant} \end{bmatrix} \quad ([+grave] ([-cons])_0 \text{ --- } [+son])$$

The version of Sanskrit *n*-retroflexion proposed by JSJ and revised here requires specification of 14 features, whereas the version argued for in [18] requires 9 features. Employing JSJ's own criterion of feature counting, their version of Sanskrit *n*-retroflexion is clearly inferior to the present version. RC can draw no support from the formulation of Sanskrit *n*-retroflexion.

The third argument which J sets forth in support of RC is that RC correctly predicts that the vowels *i* and *e* are allowed to intervene between determinant and focus in Finnish Vowel Harmony. In that language, vowels in affixes generally alternate according to the nature of the preceding vowel, with front vowels appearing after front vowels and back vowels appearing after back vowels. Accordingly, *a* alternates with *ä*, *o* with *ö*, and *u* with *ü*. The vowels *i* and *e* do not alternate, and Vowel Harmony propagates across these vowels. J proposes the following rule for Finnish Vowel Harmony.

$$(66) \begin{bmatrix} +\text{syl} \\ +\text{low} \\ +\text{rd} \end{bmatrix} \rightarrow [-\text{aback}] / \begin{bmatrix} +\text{syl} \\ \text{aback} \\ \{ +\text{low} \\ +\text{rd} \} \end{bmatrix} (C_0 \text{ --- })_0 C_0 \text{ ---}$$

RC predicts on the basis of this formulation of Vowel Harmony that the class of intervening material includes consonants and the vowels *i* and *e*, since determinant and focus have in common the features [+syl, {lo, +rd}].

If J's account of Finnish Vowel Harmony were correct, then it would be an instance where RC correctly predicts the class of intervening material. It would not constitute particularly striking evidence for RC, since the feature specification of the class of intervening material is not complex. However, there is reason to doubt the correctness of J's analysis. Although J does not provide a complete analysis of Finnish Vowel Harmony, we may infer from J's rule that suffixes are assumed to contain the underlying front vowels *ä*, *ö*, and *ü*. The analysis proposed by Kiparsky [9] assumes that alternating suffixes contain underlying back vowels which become front vowels by the following rule (adapted from [9]).

$$(67) \quad V \rightarrow [-\text{back}] / \left[\begin{array}{c} V \\ [-\text{back}] \end{array} \right] (C_0 \left(\left[\begin{array}{c} V \\ [-\text{rd}] \\ [-\text{lo}] \end{array} \right] \right))_0 \text{---}$$

If the back vowel analysis were supported over the front vowel analysis, then Finnish Vowel Harmony would not only provide no support for RC, it would constitute a counterexample to that constraint, since only the feature *syllabic* is common to determinant and focus in that version of Vowel Harmony.

The first argument against the front vowel analysis is the fact that it applies to a highly unnatural class of segments (*ä, ö, å* to the exclusion of *i* and *e*), whereas the back vowel analysis applies to all back vowels. This unnatural class is expressible only by employing braces. A second argument against the front vowel analysis is the fact that under that analysis, a separate vowel harmony rule is required, applying to affixes which are preceded by stems containing only the vowels *i* and *e*, since according to [9], front vowels appear in suffixes when preceded by no vowel other than *i* or *e*, as shown by *perkelet-ä*. The appearance of front vowels after *i* or *e* is automatically guaranteed in the back vowel analysis, since (67) is conditioned by any front vowel, including *i* and *e*. Finally, the front vowel analysis which J proposes cannot explain the way in which Vowel Harmony interacts historically with the change of long *aa* to *oa* in certain dialects. According to [9], the long vowels *aa* and *ää* developed into the diphthongs *oa* and *ää* in these dialects. Affixes which historically alternated between *aa* and *ää* currently alternate between *oa* and *öö* in this dialect. Kiparsky explains these facts by assuming that the historical change of *aa* to *oa* has also changed the underlying back vowel affixes. If affixes are assumed to contain underlying front vowels rather than back vowels, it would be impossible to explain the supposed change of underlying *ää* to *öö* in a form such as *jätti-öö* 'leave'.

Whether or not the front vowel analysis proposed by Kiparsky is correct and thus constitutes an additional counterexample to RC, it is incumbent on J to provide a more detailed discussion of the data adduced by Kiparsky in support of the back vowel analysis, if that analysis is to be rejected. Without such discussion, Finnish Vowel Harmony certainly provides no support for RC.

The last rule adduced by J in support of RC is Navaho Strident Assimilation. According to J, strident obstruents within a word agree in the feature *anterior*. Thus, *c, dz, c', s*, or *z* cannot cooccur with *c', dz', s',* or *z'*. The following rule is proposed to account for assimilation of stridents.

$$(68) \quad \left[\begin{array}{c} +\text{obst} \\ +\text{stri} \\ +\text{cor} \end{array} \right] \rightarrow [\alpha\text{ant}] / \text{---} X \left[\begin{array}{c} +\text{obst} \\ +\text{stri} \\ +\text{cor} \\ \alpha\text{ant} \end{array} \right]$$

RC predicts that no segments which are [+obst, +stri, +cor] may intervene between determinant and focus. However, as I have pointed out in [17], this is not a striking result, nor does RC allow a simpler expression of Navaho Strident Assimilation. Without RC, this rule may be formulated as follows.

$$(69) \quad [+stri] \rightarrow [\alpha\text{ant}] / \text{---} [+\text{seg}]_0 \left[\begin{array}{c} +\text{stri} \\ \alpha\text{ant} \end{array} \right]$$

This version of Navaho Strident Assimilation is simpler than that required by RC. In addition, the Crossover Constraint automatically predicts that no strident may serve as intervening material, since it will also serve as focus in this rule. Navaho Strident Assimilation therefore does not lend any support to RC.

I have shown that the four rules J adduced in support of RC do not provide convincing support for that hypothesis. In each instance, J attempts to argue that specification of intervening environment required without RC is complex, but that RC allows these environments to be predicted automatically. For example, the formulation of Latin Liquid Dissimilation which directly states the restrictions on the class of intervening material requires the inclusion of the expression {-son, -cons, +nas}₀. Such expressions involving braces are generally viewed with suspicion, since they are not commonly required in phonological rules. If RC could be employed to automatically eliminate all such expressions from the characterization of intervening material whenever they appear, then that constraint might be supported. In actual fact, in the one case where a disjunction of features is encountered in the statement of intervening material, RC cannot predict these features unless they are factored out of the intervening material and imposed on the determinant and focus.

Although I have argued at length that there is no evidence in support of RC and that there is a significant amount of evidence against that theory, the question of what generalizations can be made about possible intervening material in phonological rules remains open to investigation. The strongest constraint which has not been empirically refuted is the Crossover Condition (as observed above, the weaker version of the Crossover Condition is supported). It is conceivable,

however, that a stronger constraint can be argued for, although I do not have any proposals about such a constraint. The predictions of any such proposal can be automatically tested against the data discussed here and in [17] for empirical validity. These data have been brought forth only because RC predicts that such situations will not occur; however, it is only because RC is originally stated as a precise scientific hypothesis that it is even possible to bring that constraint under discussion.

4. A CONSTRAINT ON OVERSPECIFICATION

I have argued in detail against the empirical validity of RC, as originally offered by J and as revised by JSJ. Although the conclusions drawn above are somewhat negative, the discussion clears the way toward securing an important positive conclusion for phonological theory. I shall discuss in this last section a constraint on the form of phonological rules which results from the refutation of RC.

As I have argued here and in [17], it is generally necessary to include features in the determinant and focus of phonological rules which are necessary only to satisfy the requirement of RC. Without including unnecessary features in the determinant and focus of rules, a much wider range of rules would stand as counterexamples to RC. Without including unnecessary features in the determinant and focus of the Latin Liquid Dissimilation rule, for example, that rule would stand as a counterexample to the very constraint it is intended to give support to. Additional examples of rules that can be brought into conformity with RC only by inclusion of extra features are discussed in [17]. As I have previously argued, J's use of overspecification of rule features greatly reduces the strength of RC. In an attempt to defend RC in light of this evidence, JSJ assert that such overspecification is indeed necessary and is not specious. They have failed to observe, however, the existence of a contradiction between the use of overspecification in rule formulation and their reinterpretation of RC as a device assigning markedness values. Specifically, if a rule is overspecified in order to make it conform to RC, then the relatively less marked and hence simpler value of the rule resulting from conformity with RC is lost by virtue of including additional symbols in the formulation of that rule. As a concrete example, consider Grassmann's Law (Phelps [21]).¹⁴

¹⁴ Phelps includes the feature *+asp* in the specification of focus. However, this feature is not crucial in the formulation of Grassmann's Law and I have eliminated it here.

$$(70) \quad [\text{voice}] \rightarrow [-\text{asp}] / \text{---} [+\text{seg}] \left[\begin{array}{l} +\text{asp} \\ +\text{ROOT} \\ \alpha\text{voice} \end{array} \right]$$

Since no major class features are common to the determinant and focus, this formulation of Grassmann's Law violates RC and is thus assigned the deviation value 3. Since this rule employs 6 symbols, it will be given the value 1/9.

The rule can, however, be forced to conform with RC by including redundant features in the determinant and focus, as J unsuccessfully proposes. The following rule conforms to RC by including the correct set of added features.

$$(71) \quad \left[\begin{array}{l} -\text{syl} \\ +\text{cons} \\ +\text{obs} \\ -\text{cont} \\ \alpha\text{voice} \end{array} \right] \rightarrow [-\text{asp}] / \text{---} X \left[\begin{array}{l} -\text{syl} \\ +\text{cons} \\ +\text{obs} \\ +\text{asp} \\ -\text{cont} \\ +\text{ROOT} \\ \alpha\text{voice} \end{array} \right]$$

This rule conforms to RC, and thus is not assigned any degree of deviation. However, it also requires eight extra features in its formulation, with the result that this rule is assigned the value 1/13. Thus, a putative savings accomplished by formulating this rule in accordance with RC is more than negated by the "cost" of the added features which are necessary to achieve conformance with RC.

JSJ also attempt to argue that only by using rule overspecification in individual rules can certain sets of rules be collapsed into a single schema. They argue for the existence of two nasal assimilation rules in Yoruba, whereby underlying *n* becomes *m* before a labial consonant and *ɲ* before a velar. JSJ claim that the most general set of rules for this assimilation is the following.

$$(72) \quad \left[\begin{array}{l} +\text{cons} \\ +\text{nas} \end{array} \right] \rightarrow \left[\begin{array}{l} +\text{ant} \\ -\text{cor} \end{array} \right] / \text{---} \left[\begin{array}{l} +\text{ant} \\ -\text{cor} \end{array} \right]$$

$$(73) \quad \left[\begin{array}{l} +\text{cons} \\ +\text{nas} \end{array} \right] \rightarrow \left[\begin{array}{l} +\text{back} \\ +\text{hi} \\ -\text{cor} \end{array} \right] / \text{---} \left[\begin{array}{l} +\text{back} \\ -\text{syl} \end{array} \right]$$

The argument is that these rules cannot be collapsed, whereas by

adding redundant features to both rules, (74) and (75) can be collapsed as (76).

$$(74) \quad \begin{bmatrix} +\text{cons} \\ +\text{nas} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{ant} \\ -\text{cor} \\ -\text{back} \\ -\text{hi} \end{bmatrix} / \text{---} \begin{bmatrix} +\text{ant} \\ -\text{cor} \\ -\text{back} \\ -\text{hi} \\ -\text{syl} \end{bmatrix}$$

$$(75) \quad \begin{bmatrix} +\text{cons} \\ +\text{nas} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{ant} \\ -\text{cor} \\ +\text{back} \\ +\text{hi} \end{bmatrix} / \text{---} \begin{bmatrix} -\text{ant} \\ -\text{cor} \\ +\text{back} \\ +\text{hi} \\ -\text{syl} \end{bmatrix}$$

$$(76) \quad \begin{bmatrix} +\text{cons} \\ +\text{nas} \end{bmatrix} \rightarrow \begin{bmatrix} -\alpha\text{ant} \\ -\text{cor} \\ \alpha\text{back} \\ \alpha\text{hi} \end{bmatrix} / \text{---} \begin{bmatrix} -\alpha\text{ant} \\ -\text{cor} \\ \alpha\text{hi} \\ \alpha\text{back} \\ -\text{syl} \end{bmatrix}$$

It is questionable whether such assimilatory rules in fact represent the collapsing of individual assimilation rules, as argued by McCawley [16] *inter alia*, and thus it is not clear whether the example adduced by JSJ as independent need for overspecification is appropriate. More importantly, JSJ fail to observe a significant point about feature matrices within the theory of SPE, namely, that prior to application of the abbreviatory conventions, all feature matrices contain full specifications of all phonetic features. Thus, Chomsky and Halle [2:336] offer a feature representation of the rule $i \rightarrow y / \text{---} \{p, r, y, a\}$, where each segment in the determinant is specified for all phonetic features, including redundant ones. They then outline certain procedures for eliminating all unnecessary features subsequent to the application of the collapsing transformations. While it is literally true that JSJ's rules (74) and (75) are overspecified, the resulting rule schema (76) is not overspecified. Chomsky and Halle observe with respect to the relationship between collapsing conventions and the evaluation metric:

... we define certain "notational transformations" that permit rules to be collapsed when they are similar in certain ways and appropriately ordered; we then assign to the system of rules, as its value, the number of features that appear when *all notational transformations have applied*. (emphasis added, [2:392]).

Furthermore, JSJ miss an extremely important hypothesis made by

Chomsky and Halle regarding the use of abbreviatory devices: If rules are similar in the requisite formal ways and stand in a specific ordering relationship, then the rules are obligatorily collapsed as a single schema. Chomsky and Halle observe:

The question of when a sequence of rules is to be abbreviated by the parenthesis convention is not a matter of choice but rather one of fact. That is, the conventions regarding parentheses is just one part of an evaluation procedure to be applied to grammars. This procedure is perfectly general (language-independent) and performs the function of determining which of the grammars consistent with the data is to be selected as the grammar of the language for which the data provides a sample. [3:30]

In contrast, neither the use of rule overspecification in the final version of a rule, the inclusion of a variable, nor conformity to RC is obligatory.

I would therefore like to suggest that Chomsky and Halle's goal of eliminating unnecessary features from rules be made an absolute and universal constraint on well-formedness. Accordingly, I propose the Feature Specification Constraint.

(77) No matrix may contain a feature αF unless elimination of αF yields a rule either applying to a distinct set of strings or produces a distinct structural change in the language having that rule.

By the provisions of this constraint, no rule may refer to the vowels i and e in a language having the vowels i, e, a, o, u with the matrix $[+\text{syl}, -\text{back}, -\text{rd}]$, since the specification $-\text{rd}$ is not crucial in characterizing i and e in this language to the exclusion of all other segments. Furthermore, this condition prohibits the inclusion of vacuous features in a structural change, so that a change of u to o in this same language may contain the structural change " $\rightarrow [-\text{hi}]$," but may not contain the structural change " $\rightarrow [+round, -\text{hi}]$," since the feature $+\text{rd}$ does not yield a distinct output. On the other hand, in a language having the vowels i, a, u , the vowel i may be uniquely identified either by the matrix $[+\text{syl}, +\text{hi}, -\text{rd}]$ or $[+\text{syl}, +\text{hi}, -\text{back}]$. The Feature Specification Constraint does not address itself to selecting between these matrices, since both are well formed. Other criteria, such as naturalness, generalness, or simplicity must be invoked to make this selection.

This constraint thus strictly limits the number of formal descriptions

available for a phenomenon. Without the Feature Specification Constraint, there will be a wide variety of formal descriptions available for Latin Liquid Dissimilation. I pointed out a sampling of the distinct formulations of that rule possible without constraints an overspecification in [17]. The following formulations of Latin Liquid Dissimilation produce the same outputs and apply to the same class of segments, differing only in the features employed to characterize the determinant and focus.

$$(78) \quad [+lat] \rightarrow [-lat] / [+lat] \left\{ \begin{array}{l} +syl \\ -son \\ +nas \end{array} \right\}_0 \text{ ---}$$

$$(79) \quad \left[\begin{array}{l} +son \\ +lat \end{array} \right] \rightarrow [-lat] / [+lat] \left\{ \begin{array}{l} +syl \\ -son \\ +nas \end{array} \right\}_0 \text{ ---}$$

$$(80) \quad [+lat] \rightarrow [-lat] / \left[\begin{array}{l} +son \\ +lat \end{array} \right] \left\{ \begin{array}{l} +syl \\ -son \\ +nas \end{array} \right\}_0 \text{ ---}$$

However, with the Feature Specification Constraint, only (78) is well formed. Rules (79) and (80) are impossible, according to that condition.

In addition to sharply limiting the number of formal descriptions available for any phenomenon, the Feature Specification Constraint makes certain general linguistic hypotheses that have previously been advanced more easily testable. A number of phonological constraints have been proposed in the literature which make their claims based on the specifications of features in rules, one of which is RC. A general criticism that can be leveled against all such hypotheses is that to the extent that the precise feature specification of a rule is not tightly constrained, such hypotheses are unrefutable. Armed with the Feature Specification Constraint, a great deal of the circularity is removed from these theories: they are more easily testable, and thus more interesting hypotheses. Specific hypotheses dependent on feature specification include the Proper Inclusion Precedence Principle (Koutsoudas, Sanders, and Noll [12]), Constraint on Assimilation Rules (Guerssel [5]), and Ringen's characterization of determinant [29].

I have argued above that JSJ have failed to provide alternative formulations of any of my original rules shown to be counterexamples to RC. The various weakenings of phonological theory offered by JSJ

have been examined and rejected. JSJ state that other cases which do not conform to RC as originally stated must be brought forth in order to further refine the weakest version of RC that they propose. Additional cases have been brought forth here and have been shown to indicate that violation of RC is a concomitant feature of a wide range of phonological rules which apply between nonadjacent segments. Based on the nature of my original counterexamples and those adduced in the present work, I am persuaded that no refinement of RC is possible.

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Expressing Cross-Categorical Selectional Correspondences: An Alternative to the X Syntax Approach

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0. INTRODUCTION

The system of phrase structure known as X' Syntax,* developed in Jackendoff [15, 18], receives its impetus from the Lexicalist Hypothesis, which calls for a lexical account of cross-categorical parallelisms. Since the Lexicalist Hypothesis was first articulated (by Chomsky [7]) with respect to the relation between sentences and derived nominals, X' Syntax takes the expression of subcategorical parallelisms in Ss and NPs to be one of its major areas of concern. In particular, there are in related Ss and NPs regular correspondences in the syntactic positions on which an identical set of selectional restrictions must be imposed. X' Syntax attempts to account for such correspondences by generalizing the grammatical relations of the S to the NP, with a view to generalizing the projection rules which enforce selectional restrictions on corresponding positions in the S and the NP. Since grammatical relations are defined (as in the standard theory) by phrase structure configurations, subcategorical parallelism is ultimately sought to be expressed in terms of structural parallelism.

In this paper I present evidence that the subcategorical correspondence in Ss and NPs cannot be adequately expressed in terms of generalized grammatical relations, or even as a mapping between (two sets of) grammatical relations. I argue for an alternative theory of subcategorical correspondences, based on (a refined notion of) thematic functions and general principles assigning thematic functions to syntactic positions. In section 1, I consider one of the two major cases of parallelism that the generalization of grammatical relations purports to account for (namely, the case of Ss with adjectival predi-

* The material presented here is taken from my doctoral dissertation (in progress). I wish to thank Joel Hust, Alfredo Hurtado, Richard DeArmond, and Karattuparambil Jayaseelan for useful discussions of the ideas in this paper; the usual disclaimers apply. For the purposes of this article (following the practice of Jackendoff in [18]), bars will be represented as primes, e.g. $X' = X'$.