Is Grammar Dependence Real?

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March 2003

1. Introduction

It has long been observed that the phonology of a language is not completely uniform. In addition to well-studied free variation in pronunciation of certain words or word classes, phonological patterns can vary by register, morphological category (e.g., noun vs. verb), lexical stratum (native vs. foreign), morphological class (stem vs. affix, reduplicant vs. base), and so forth. We will refer to such variant patterns as subgrammatical phonological patterns. A complete phonological analysis of any language must address subgrammatical variation; indeed, characterizing the range of variation possible has been an explicit desideratum of certain phonological theories (e.g. Lexical Morphology and Phonology, which gave rise to the Stratum and Strong Domain Hypotheses of Mohanan 1986 and Kiparsky 1984).

In Optimality Theory (OT) there have been two major proposals to handle subgrammatical variation:

(a) the **indexed constraint** approach, in which the one overall constraint ranking for a language includes constraints like Faith-Root, Faith-Native, etc., which are specific to certain morphological classes or constructions. Proponents include McCarthy & Prince 1995, Pater 2000, Itô & Mester 1999, Alderete 2001a, Smith 1997, among others

(b) the **cophonology** approach, in which all constraints are fully general, but morphological constructions or lexical class are potentially associated with distinct rankings of those constraints. Proponents include Orgun 1996, Inkelas 1998, Anttila 2002, Inkelas & Zoll 2000, among others.

A number of arguments have been put forth in favor of the cophonology approach.[1] These arguments are amply articulated in the literature and we will not repeat them here. Our focus is instead on one argument, which we term the Grammar Dependence Argument, that has been put forth most prominently by Alderete(1999; 2001a) in favor of indexed constraints vs. cophonologies. Grammar Dependence is the strongest, perhaps the only, argument for the indexed constraint approach. We show that the Grammar Dependence Argument is empirically and theoretically flawed, thus removing this plank from the indexed constraint vs. cophonology debate.

2. Illustration of indexed constraints vs. cophonologies

The indexed constraint and cophonology approaches to subgrammatical diversity can be illustrated straightforwardly with respect to the well-known case of accent in Tokyo Japanese (of which an extensive overview is provided in Poser 1984). In this dialect the location of accent in nouns (1) is unpredictable, in contrast to adjectival and verbal (2) accent placement, which is systematic.

[1] On the link between cophonologies and variation see Anttila 2002; on 'inside-out' effects see Orgun 1996; on cyclic vs. noncyclic effects see Orgun 1996; Orgun 1997; on predicting the scope of morphologically conditioned phonological effects, see Inkelas 1998; on deriving Bracket Erasure effects using cophonologies, see Orgun 1996; Orgun & Inkelas 2002; on nonderived environment blocking see Inkelas 2000.

(1) Noun accent unpredictable (Smith 1997:7, taken from Haraguchi 1977)

ínoti	'life'
kokóro	'heart'
atamá	'head'

(2) Verb accent predictable (Smith 1997:8, taken from Poser 1984)

kák-u	'write'
nayám-u	'worry'
kumadór	'graduate'
kaké-ru	'hang'
todomé-ru	'stop'

Smith 1997 provides an indexed constraint analysis of these facts, utilizing a noun-specific accentual Faithfulness constraint to distinguish the behavior of nouns from that of other words:

(3) FAITHLOC$_{Noun}$(Accent): Output accent is faithful to its input location, *in nouns*

Noun-specific Faithfulness outranks the set of constraints that otherwise set default penultimate accent (FIXLOC(Accent)) in Tokyo Japanese, thereby preserving idiosyncratic underlying accent patterns on nouns:

(4) FAITHLOC$_{Noun}$(Accent) » FIXLOC(Accent) » FAITHLOC(Accent)

Because only the noun-specific accentual Faithfulness constraint – not the general accentual Faithfulness constraint for the language – is ranked above the constraints specifying default accentuation, underlying accent (if any) on other lexical categories is not respected.

A similar account is available using cophonologies, in which nouns and other parts of speech are subjected to different constraint rankings. In the noun cophonology, accentual Faithfulness is ranked high; in the non-noun cophonologies, accentual Faithfulness is ranked low, below the FIXLOC(Accent) constraints assigning accent to its default location.

(5)	Noun cophonology:	FAITHLOC (Accent) » FIXLOC(Accent)
	Verb/Adjective cophonology:	FIXLOC(Accent) » FAITHLOC (Accent)

On the cophonology account, no constraint is itself indexed for domain of application; rather, it is cophonologies themselves that are associated with different morphological constructions or lexical classes. Reranking of (general) constraints across different cophonologies is what provides for language-internal subgrammatical variation.

3. The Grammar Dependence Argument

Proponents of both indexed constraints and cophonologies agree that some substantial portion of the constraint hierarchy is invariant across all morphological or lexical contexts in each language. It is this portion that gives the language its characteristic properties.

Benua (1997), Alderete (2001a), and Itô & Mester (1999) have argued that the indexed constraint approach to subgrammatical variation is superior to the cophonology approach in its ability to make restrictive predictions about the amount of subgrammatical variation a language can allow. According to Benua (1997:6), comparing Transderivational Correspondence Theory (TCT), which is an indexed constraint theory, to 'cyclic theory', including cophonology theory,

> 'TCT is typologically more restrictive than cyclic theory. Because all words are evaluated against the same hierarchy of constraints, the parallel theory puts a limit on how deviant the deviant phonology of complex words can be.'

The full Grammar Dependence Argument, as characterized here, has three components:

- the empirical claim that each language is internally uniform as to the default structures emerging across different morphological contexts. Alderete, who terms this generalization Grammar Dependence, defines a grammar-dependent morphophonological process as one whose "output is constrained by the independently motivated grammatical principles in the language [as] a whole" (Alderete 1999:130). Grammar Dependence is thus the generalization that all morphophonological processes are grammar-dependent.
- the argument that allowing indexation only of Faithfulness, but not of Markedness, constraints derives the Grammar Dependence generalization (e.g. Benua 1997; Itô & Mester 1999; Alderete 2001a; Alderete 2001b) [2]
- the argument that indexed constraints are superior to cophonologies in their ability to implement what would be the comparable restriction on constraint reranking, and therefore to derive Grammar Dependence effects.

In this paper we show that all three components of the Grammar Dependence Argument are unsupported. The Grammar Dependence Argument is not a viable basis on which to compare competing approaches to morphological or lexical conditioning of phonology.

4. A taxonomy and typology of diversity

In any language there are certain phonological characteristics that all the morphological constructions, or lexical classes, of the language share. Working in cophonology theory, Anttila (1997, 2002) has characterized this constant aspect of a language's grammar as a fixed partial ordering of constraints, with which every cophonology in the language must be consistent. Let us term this fixed partial ordering the 'Master Ranking' of the language. Cophonologies may differ only in how they rank constraints whose ranking is underdetermined in the Master Ranking; the Master Ranking is what makes the language what it is.[3]

Clearly, there is an inverse relationship between the number of constraints in the Master Ranking and the amount of variation expected. Are there any a priori limits as to how much subgrammatical variation is possible, or on the degree to which two subgrammatical patterns in the same language may differ?

In pre-1993 Lexical Morphology and Phonology (e.g. Kiparsky 1984; Kiparsky 1985, Halle & Mohanan 1985; Mohanan 1986; Zec 1993), this issue was addressed with the Strong Domain and Stratum Domain Hypotheses, which constrained the degree to which strata could differ in their associated phonological rules. These proposals have not, however, survived the translation into

[2] The role of Alignment constraints in this argument is discussed in section 9.2.

[3] It is not trivial to translate the idea of the Master Ranking into the indexed constraint approach. A starting point might be to identify the Master Ranking with the set of constraints that are not indexed. However, this set is not clearly defined. Consider, by way of illustration, a language in which one morphological context (Context 1) requires the constraint ranking A » B » C while another context (Context 2) requires B » A » C. In cophonology theory the Master Ranking would be A,B » C. In indexed constraint theory, the set of nonindexed constraints depends entirely on whether A, B, or both are indexed, as well as on whether indexed constraints are indexed to only one context or to all contexts. Indexing only A, and only to Context 1, would yield this grammar: A1 » B » A » C. Indexing only B, and only to Context 2, would yield B2 » A » B » C. Clearly, the set of nonindexed constraints is different in the two cases (B » A » C vs. A » B » C). Taking into consideration still other possible methods of indexation (e. g. A *and* B to Context 1) makes the situation even more ambiguous. Indexed constraint theory thus does not make it easy to issue a clear single statement that is the equivalent of the Master Ranking. See Anttila (1997; 2002) for further discussion of related issues.

Optimality Theory, and were in any case flawed (see e.g. Inkelas 1998; Inkelas & Orgun 1998 for discussion.)

Within the indexed constraint approach, the question of whether – and how – to limit subgrammatical diversity has been answered with the Grammar Dependence Argument, often cited as the primary virtue of indexed constraints over cophonologies. As formulated (not under that name) by Benua 1997, Itô & Mester 1999 and Alderete 2001a,b, the Grammar Dependence Argument holds that there are a priori limits on subgrammatical diversity, that the limits have to do with the inability of Markedness constraints to be indexed (or reranked), and that indexed constraint approaches are superior to cophonologies in their ability to embody such limits.

We begin our exploration of the Grammar Dependence Argument in §5 with the proposed formal limit, a universal meta-constraint we term Faith-Based Variation, and the goals its proposers had in mind. In §6 we examine the purely technical argument that indexed constraint theory is better suited than cophonologies in its ability to embody Faith-Based Variation. We then explore, in §7, the issues of whether the proposed limit actually generates the Grammar Dependence generalization about language and whether, for that matter, the Grammar Dependence generalization is actually true. The findings are negative. In §8 we argue that these negative findings should be welcomed, because a priori limitations on subgrammatical diversity, like Faith-Based Variation, are antithetical to fundamental aspects of Optimality Theory.

5. Faith-Based Variation and Grammar Dependence

The Grammar Dependence Argument is based on an a priori restriction on subgrammatical variation to which we will assign the name 'Faith-Based Variation'. Largely developed within indexed constraint approaches, Faith-Based Variation is a universal meta-constraint permitting only Faithfulness constraints, not Markedness constraints, to be indexed to morphological or lexical contexts (Itô & Mester 1993, 1995, 1999; Fukazawa 1998; Alderete 1999:185, Kawahara 2001, among others).[4]

(6) Faith-Based Variation: only Faithfulness constraints can be morphologically or lexically indexed

The equivalent of Faith-Based Variation in cophonology theory would be the meta-constraint that all Markedness constraints must be ranked relative to one another in the Master Ranking in any given language. Cophonologies could thus vary only in the position of Faithfulness constraints in the hierarchy.

Faith-Based Variation is intended to capture Grammar Dependence, a principle to which Alderete (1999, 2001) devotes extensive discussion. Alderete 1999 defines a grammar-dependent morpho-phonological process as one whose 'output is constrained by the independently motivated grammatical principles in the language [as] a whole' (p. 130). In a discussion of dominant affixes, which delete contrastive accent from the base, Alderete (2001) writes that

> 'a dominant affix is always grammar dependent… What this means is that dominant affixes trigger a deletion, but it is the rest of the grammar which determines the structure resulting from this deletion.'

We take Alderete's claim to be that while morphological constructions, lexical classes, etc. may differ in the extent of their faithfulness to input, unmarkedess is parameterized in the same way throughout the language. Morphological or lexical contexts should therefore not differ in the relative markedness they assign to phonological structures.

(7) Goal of Faith-Based Variation: to eliminate markedness reversals in a language (=Grammar Dependence)

[4] On the status of indexed Alignment constraints, see section 9.2.

Faith-Based Variation is clearly intended to limit subgrammatical variation to a subset of the type of variation that is exhibited across different languages. While languages can differ in their markedness patterns, subgrammatical patterns – according to Faith-Based Variation – cannot.

To illustrate the type of subgrammatical variation expected under Faith-Based Variation, we present two cases of subgrammatical diversity that have been adduced in support of Faith-Based Variation. In each case, one based on inventories and one based on alternations, markedness appears to remain constant across the patterns in question, while faithfulness varies.

5.1 Markedness invariance across inventories within a language

Subgrammatical patterns in a language can differ in their structural inventories (segments, syllable types, etc.). In Optimality Theory, structural inventories are derived from the relative ranking of Faithfulness and Markedness constraints. Itô & Mester (1993, 1995, 1999) have argued that keeping Markedness fixed throughout a language, in accordance with Faith-Based Variation, derives an implicational subset relation among the inventories of the various subgrammatical patterns. The higher ranked Faithfulness is, the larger the inventory will be.

Certain subgrammatical inventory differences conform to this expectation. Consider, for example, Itô & Mester's analysis of a portion of the Japanese lexicon. Building on McCawley (1968), Itô & Mester motivate the existence of multiple lexical strata in the lexicon of Japanese, distinguished by alternations, phonotactics and morpheme combinatorics (see Rice 1997 for a critique of this view, and Itô et al. 2001 for a response). Itô & Mester propose that the Markedness constraints in (8) are active in Japanese:

(8) Markedness constraints active in Japanese

NOVOICEDGEM (NO-DD)	'no voiced obstruent geminates'
NOVOICELESSLAB (NO-P)	'no singleton *p*' (i.e. *p* must belong to a partial or total geminate)
NONAS_VOICELESS (NO-NT)	'post nasal obstruents must be voiced'

Lexical strata differ in how they conform to these constraints. Itô & Mester demonstrate an implicational relationship between the sets of constraints that the strata in (9) conform to: each stratum has a subset of the restrictions of the one graphically positioned above it in the table:

(9)

	NO-DD	NO-P	NO-NT
Yamato (Y)	√	√	√
Sino-Japanese (SJ)	√	√	*violated*
Assimilated Foreign (AF)	√	*violated*	*violated*
Unassimilated Foreign (UF)	*violated*	*violated*	*violated*

Itô & Mester neatly capture this implicational hierarchy by proposing a fixed ranking of Markedness constraints for the whole language:

(10) NO-DD » NO-P » NO-NT

The lexical strata in (9) differ, on this account, only in where stratum-specific Faithfulness constraints are ranked relative to the fixed markedness hierarchy in (10). Faithfulness ranks low for those strata that conform to the most constraints, and high for those strata that allow more marked structures.

(11) **FAITH$_{UF}$** » NO-DD » **FAITH$_{AF}$** » NO-P » **FAITH$_{SJ}$** » NO-NT » **FAITH$_{Y}$**

In summary, the four strata described in (9) exemplify the kind of subgrammatical diversity expected under Faith-Based Variation. Inventories in Japanese all contain the least-marked structures of Japanese, and differ only in where, with respect to the fixed markedness hierarchy of Japanese, they bar the door to more marked structures.

5.2 Markedness invariance in alternations

Grammar Dependence also embodies expectations regarding the kinds of alternations predicted to occur in a language. In particular, the unmarked structures that emerge as a result of neutralization should be the same across all constructions. Alderete's (1999; 2001a) analysis of Japanese accentual dominance illustrates this facet of Grammar Dependence. Poser (1984) provides a full account of the Japanese system; a synopsis of the part discussed by Alderete is as follows:

- Each minor phrase has exactly one accent
- Minor phrases consisting only of unaccented words are assigned default accent on the phrase-final mora (Poser 1984: 146)[5]
- Accent exists underlyingly on some morphemes (Poser 1984: 46 ff.)
- Certain affixes are dominant (in the sense of Kiparsky 1973), meaning that they delete accent from stems they combine with (Poser 1984: 49 ff.)

As shown in (12), the accented dominant suffix *-ppó* deletes accent from the stem it combines with.

(12) Dominant accented suffix (adjectivizer *–ppó*)
(Poser 1984:49, see also Alderete 2001:202)

/adá + ppó$_{Dom}$ + i/	ada-ppó-i	'coquettish'
/kaze + ppó$_{Dom}$ + i/	kaze-ppó-i	'sniffly'
/egára + ppó$_{Dom}$ + i/	egara-ppó-i	'acrid'

The dominant ethonym-forming suffix *-kko* is dominant without itself being accented. As illustrated below, *-kko* neutralizes accent in bases, producing accentless words that receive phrase-final accent when final in an otherwise unaccented phrase and otherwise remain unaccented.

(13) Dominant unaccented suffix (ethonymic *–kko*) (Poser 1984:72)

/kóobe + kko$_{Dom}$ /	koobe-kko	'indigène of Kobe'
/nyuuyóoku + kko$_{Dom}$/	nyuuyookukko	'indigène of New York'
/edo + kko$_{Dom}$ /	edo-kko	'indigène of Tokyo'

Accent deletion in the environment of a dominant affix is accomplished, for Alderete, by an indexed anti-Faithfulness constraint prohibiting the retention of stem accent:

(14) ¬OO$_{Dom}$-MAX-ACCENT:
'It is not the case that every accent in S1 has a correspondent in S2'

If final in an unaccented phrase, a word whose accent is removed in this manner is subject to phrase-final default accentuation in just the same way as an inherently unaccented word in the same context.

[5] Poser distinguishes accent – whose source is lexical – from H tone, assigned at the phrase level. The reason for this is that a phrase whose pitch peak corresponds to lexical accent has slightly higher F0 than a phrase whose pitch peak corresponds to phrase-final H tone. Poser conjectures that the difference could lie in the fact that lexical H tones are always followed in the phrase by L tone, whereas phrasally-assigned final H tones are not. See pp. 144-45.

Alderete points to this parallelism as an instance of Grammar Dependence. Regardless of the source of unaccentedness, according to Alderete (see especially Alderete 1999:161-62), Faith-Based Variation correctly predicts a single pattern of accentual unmarkedness to emerge across different constructions.[6]

6. Faith-Based Variation: indexation vs. reranking

For now, let us assume, with Alderete, that Grammar Dependence is a real effect, and, therefore, that generating it is a desirable property of any theory. It is then of interest to see whether indexed constraint theory and cophonology theory differ in their ability to incorporate Faith-Based Variation.

Alderete (2001:227) takes the strong position that cophonologies 'preclude a natural account' of Grammar Dependence effects. This of course does not mean that the stipulation of invariant Markedness ranking (i.e. Faith-Based Variation) is impossible in cophonology theory; as Benua (1997) and Itô & Mester (1999) have accurately observed, Faith-Based Variation can be implemented in cophonology theory as the statement that all Markedness constraints are fully ranked relative to one another in the Master Ranking. Proposals of exactly this kind in the literature include the proposed constraint on inter-level constraint reranking in Kiparsky (forthcoming) as well as an early cophonological implementation by Itô & Mester (1993) of the Japanese stratal effects, Itô & Mester's subsequent indexed constraint analysis of which was illustrated in §5.1.

Benua (1977) and Itô & Mester (1999) argue, however, that Faith-Based Variation, or for that matter any constraint on reranking, would be a pure stipulation in cophonology theory, whereas Faith-Based Variation is a principled, even natural, statement within indexed constraint theory. Pursuing a line of reasoning begun by Benua, Itô & Mester suggest the possibility of deriving Faith-Based Variation from the fact that Faithfulness constraints must identify the two strings that they relate, while Markedness constraints always apply to the same string, namely the output. Itô & Mester make the interesting proposal that Faith-Based Variation could therefore follow as a natural consequence of the way Faithfulness and Markedness constraints are stated within Optimality Theory.

This argument is not fully convincing, however, since Markedness constraints are clearly able to be indexed to phonologically defined contexts, e.g. unstressed syllables, initial vs. final position in the string, etc. We know of no principle that would allow a Markedness constraint to refer to final position within a string but prevent it from referring to the morphological or lexical category of that string, as Itô & Mester's argument would require. In fact, analyses involving positional markedness sometimes require the indexation of Markedness constraints to morphological contexts. Smith (1998) argues, for example, that the location of stress in Tuyuca depends on the indexation of Markedness constraints to the category "stem". As described by Barnes (1996), each prosodic word in Tuyuca has a single stress. Both stems and affixes can be either accented or unaccented. In words containing an accented stem and an accented suffix, stem accent prevails; in words containing no accented morphemes, stress falls by default on the stem. Smith analyzes the default preference for stem stress with a Markedness constraint that is indexed to stems (as opposed to affixes):

(15) STEMSTRESS 'Every stem has a stress'

Constraints of this type could be multiplied in analyses of languages in which prominence of any kind is attached to roots or stems; see e.g. Alderete & Bob 2002, Shaw forthcoming, and many others.[7]

We conclude that there is (as yet) no principled reason why Markedness constraints cannot be indexed, and therefore that Faith-Based Variation is as much a stipulation within indexed

[6]This claim faces a number of counterexamples, many discussed by Alderete (1999, chapter 5; 2001:245 ff.). Lack of space prevents us from discussing them here.

[7] In at least some of these cases, indexed Alignment constraints offer an alternative to indexed Markedness. See section 9.2 for discussion.

constraint theory as its equivalent would be in cophonology theory. The ability to incorporate Faith-Based Variation does not distinguish the two theories.

7. Markedness reversals exist, are consistent with Faith-Based Variation

Even if indexed constraint theory were better able than cophonology theory to incorporate Faith-Based Variation – which we have argued it is not – this ability would not confer an advantage on the theory. As we show in this and the next sections, the Grammar Dependence Argument is flawed both empirically and theoretically. We demonstrate (a) that markedness reversals exist, and (b) that, due to the power of Faithfulness constraint indexation, markedness reversals can be generated even when Markedness constraints are unindexed and invariantly ranked throughout a language. In short, Faith-Based Variation does not make significant predictions, nor are the predictions that it was originally thought to make correct. Faith-Based Variation is not an asset to the theory.

At a descriptive level it is clear that markedness reversals do exist. We discuss several reversals below. In each case it is possible to provide an analysis within the confines of Faith-Based Variation, thus simultaneously counter-exemplifying, on the theoretical side, the argument that Faith-Based Variation generates Grammar Dependence and, on the empirical side, the claim that Grammar Dependence is a property of language. The alternative analyses crucially rely on indexed Faithfulness and the notion of emergent unmarkedness, which we show is a fundamental property of Optimality Theory and a profuse source of markedness reversals.

7.1 Two examples

The principle of Faith-Based Variation is intended to prohibit reversals of markedness. However, markedness reversals are pervasive across the subgrammars of languages. We discuss one example from Japanese, then provide a general argument as to why markedness reversals are to be expected, and provide three further examples.

7.1.1 Overlapping inventories in Japanese

As mentioned in §5.1, the segmental inventories of four of the lexical strata of Japanese discussed by Itô & Mester (1993, 1995, 1999) conform to an implicational relationship in which all but the largest inventory is a proper subset of another. Itô & Mester (1993, 1995) also discuss a fifth lexical stratum whose inventory confounds this generalization. In particular, the Sino-Japanese stratum and the Mimetic stratum of Japanese differ in their inventories, with neither inventory being a subset of the other. Recall the markedness hierarchy from (10), repeated below:

(16) NO-DD » NO-P » NO-NT

While the Sino-Japanese stratum conforms to the implicational markedness generalizations implied by this hierarchy in prohibiting singleton labials but permitting NT sequences (e.g. *sampo* 'walk'), the Mimetic stratum exhibits a markedness reversal in prohibiting NT sequences but permitting labials (e.g. *pata-pata* 'palpitating', from Mester & Itô 1989:267). This is exactly the kind of markedness reversal that Faith-Based Variation should be ruling out.

Examples of this type are not rare. Ideophones in general yield abundant examples of inventory-based markedness reversals that could easily be analyzed by indexing or reranking only Faithfulness. For example, in Yir-Yoront (Cape York Peninsula, Australia) ideophones allow certain onsets not otherwise permitted in the language, yet ban certain codas which are otherwise possible (Alpher 1994:162); Childs (1994) discusses many similar cases in a number of African languages.

7.1.2 Different defaults in Fox

In Fox (Jones 1911, Dahlstrom 1997; Fukazawa et al. 1998; Itô et al. 2001; see also Burkhardt 2001), vowel hiatus is resolved via consonant epenthesis. As has also been described for Mohawk (Michelson 1989), Fula (Paradis & Prunet 1989), and some other languages discussed in Lombardi 2002, the identity of the epenthetic element varies across morphological contexts. In Fox, hiatus

between stem and affix is broken up by an epenthetic *t*, while hiatus between base and reduplicant (a), vowel hiatus is broken by an epenthetic *h* (b). A form with both kinds of epenthetic segment is shown in (c); data are taken from Dahlstrom 1997:219-221:

(17) a. Epenthetic *t* breaks vowel hiatus between prefix and stem:

ne-t-en-a:wa	'I say to him'	220
ke-t-en-a:wa	'you say to him'	220
ne-t-amw-a:wa	'I eat him'	220
ke-t-a:c̆imo	'you tell a story'	220
ne-t-ek̆a	'he says to me'	221

b. Epenthetic *h* breaks vowel hiatus in reduplication:

amwe-h-amwe:wa	'he eats him'	219
ayo-h-ayo:ya:ni	'I use it; conjunct'	219
iwa-h-iwa	'he says' 219	

c. ne-t-ek̆a-h-ik̆a 221

Still another epenthetic segment, *n*, is used in constructions involving a temporal particle.

A foundational assumption in Optimality Theory has been that the identity of epenthetic segments reflects unmarkedness in the grammar (see e.g. Smolensky 1993, and more recently de Lacy 2002).[8] By this reasoning, languages exhibit markedness reversals whenever they epenthesize different segments in different morphological or lexical contexts, holding phonological context constant. Insofar as Grammar Dependence is a claim about markedness effects and insofar as epenthesis reflects unmarkedness, the Fox data openly contradict Grammar Dependence. It is clearly not the case that all of the constructions in Fox are subject to the same default pattern.

7.2 Indexed Faithfulness as a source of Markedness Reversals

Fukazawa et al. (1998) offer an analysis of the Japanese facts in §7.1 which, if extrapolated to the other data we are discussing, removes the logical underpinnings of Faith-Based Variation and the Grammar Dependence Argument. Fukazawa et al. observe that indexing Faithfulness constraints to morphological or lexical contexts permits the markedness reversal between the Mimetic and Sino-Japanese vocabulary to be analyzed without reranking or indexing any Markedness constraints. We schematize their insight as follows: a Faithfulness constraint (or set of constraints), indexed to context X, counteracts the effect of the higher-ranked of two Markedness constraints (Markedness1 and Markedness2), such that the lower-ranked constraint emerges as a force for unmarkedness only in Context X.

(18) FaithX » Markedness1 » Markedness2

This ranking will generate a language which in most contexts enforces Markedness1 rather than Markedness 2, but in context X, enforces Markedness 2 rather than Markedness 1. This is a markedness reversal, pure and simple – but it is accomplished without any reranking or indexation of Markedness constraints at all.

The analysis of Fukazawa et al. is encapsulated in the example below, slightly modified from their examples on pp. 4, 9, 12, in which Markedness1 corresponds to *No-P and Markedness2 to *NT (see 16). The Faithfulness constraints IDENT(LABIAL) and IDENT(VOICE) are indexed to the Mimetic and Sino-Japanese strata. The partial ranking $\text{IDENT(LABIAL)}_{\text{Mimetic}}$ » NO-P » IDENT(LABIAL) permits labials in the Mimetic stratum but bans them elsewhere (i.e. in the Sino-Japanese stratum);

[8] According to de Lacy (2002:7), "consonant epenthesis is a 'pure' expression of markedness reduction".

the partial ranking IDENT(VOICE)$_{\text{Sino-Japanese}}$ » *NT » IDENT(VOICE) permits NT sequences in the Sino-Japanese stratum but bans them elsewhere, i.e. from the Sino-Japanese stratum:

(19) Analysis of Fukazawa et al. 1998 (slightly modified):

$$\text{IDENT(LABIAL)}_{\text{M}} \text{ » No-P » } \left\{ \begin{matrix} \text{IDENT(VOICE)}_{\text{M}} \\ \text{IDENT(LABIAL)}_{\text{SJ}} \end{matrix} \right\} \text{ » NO-NT » IDENT(VOICE)}_{\text{M}}$$

We may employ the same strategy to handle the markedness reversals evident in Fox epenthesis. Since Smolensky 1993 it has been assumed that segmental markedness is encoded through a ranking of feature-specific Markedness constraints. Thus a language epenthesizing /t/ would rank the Markedness constraint against /t/ lower than the Markedness constraints against all other segments or segment types. Capturing the Fox epenthesis facts using only Markedness constraints would require a reranking or indexation like the following, in which the subscripts Af, Rd, Tp represent the contexts "affixed stem", "reduplicated stem", and "temporal particle", respectively:

(20) Indexed markedness hierarchy for Fox:

$$\{*t_{Rd}, *t_{TP}, *h_{Af}, *h_{TP}, *n_{Af}, *n_{Rd}\} \text{ » } \{*n_{TP}, *t_{Af}, *h_{Rd}\}$$

Such an approach would, of course, be incompatible with the Faith-Based Variation theorem.

However, since Kiparsky 1994 it has also been known that markedness can be encoded through feature- or segment-specific Faithfulness constraints (see e.g. de Lacy 2002). Thus a language epenthesizing /t/ would rank the ban on inserting Coronal place lower than the ban on inserting any other place of articulation feature. Kiparsky's (1994) approach to markedness, which Kiparsky argues on other grounds to be superior to Smolensky's, would handle Fox consonant epenthesis by making individual Faithfulness constraints morphologically sensitive, but leaving Markedness constraints intact and unindexed:[9]

(21) Indexed Faithfulness hierarchy for Fox:

$$\left\{ \begin{matrix} \text{Dep-}t_{Rd} \\ \text{Dep-}t_{TP} \\ \text{Dep-}h_{Af} \\ \text{Dep-}h_{TP} \\ \text{Dep-}n_{Af} \\ \text{Dep-}n_{Rd} \end{matrix} \right\} \text{ » } \left\{ \begin{matrix} \text{Dep-}n_{TP} \\ \text{Dep-}t_{Af} \\ \text{Dep-}h_{Rd} \end{matrix} \right\} \text{ » } *n, *t, *h$$

Thus the markedness reversals in Fox epenthesis can be generated even when Markedness constraints are unindexed. The ability to index Faithfulness constraints means that Faith-Based Variation is having little or no effect on the descriptive power of the theory.

8. The Emergence of the Unmarked as a source of markedness reversals

The previous sections demonstrated that Faith-Based Variation does not derive the Grammar Dependence generalization, nor is the Grammar Dependence generalization empirically correct. This result is a welcome one, because, as we now show, Grammar Dependence is conceptually incompatible with two essential insights of Optimality Theory: the concept of the emergence of the

[9]De Lacy (2002) combines the approaches of Smolensky 1993 and Kiparsky 1994 in his theory of markedness. de Lacy could not, however, implement this particular faith-based analysis of Fox epenthesis, since the only Faithfulness constraint that he permits to be indexed to (marked) feature values is IDENT. The reason de Lacy does not index MAX or DEP to feature values is that he does not want to be able to derive marked inventories as a result of deletion or insertion (see e.g. §6.4.2, p. 164). However, such indexation appears necessary in Fox.

unmarked, and the fundamental assumption that markedness is relative. These fundamental aspects of Optimality Theory conspire to produce markedness reversals of all kinds.

Recall from the preceding section that a lower-ranked Markedness constraint can emerge if a higher-ranked one is neutralized by a competing Faithfulness constraint. When the Faithfulness constraint in question happens to be indexed to a specific morphological or lexical context, then the unmarkedness pattern dictated by the lower ranking Markedness constraint will emerge just in those contexts too.

Clearly, any result of this kind renders Grammar Dependence vacuous as a theoretical claim, and false as an empirical claim. A question for the Grammar Dependence Argument is: how common are effects like these? The answer is that because of the architecture of Optimality Theory they are pervasive. By definition, in any fixed ranking of Markedness constraints (as required e.g. by Faith-Based Variation), some Markedness constraints will be lower than others, with the potential to generate emergent unmarkedness patterns in certain contexts. The cases we looked at immediately above were simple illustrations; we now consider one last, somewhat more complex example of a robust TETU-driven markedness reversal.

8.1 Multiple default patterns in Turkish stress

As is well known, Turkish place names and certain other words, which we follow Inkelas et al. 1997 in calling "Sezer stems", are subject to a default stress pattern which differs from the default pattern assigned to non-Sezer words (Sezer 1981 and much subsequent literature; see Inkelas 1999 and Inkelas & Orgun 2002 for a review). Both stress patterns are defaults in that neither is imposed if stress is already present in the input. The patterns are distinct.

In Sezer stems, default stress falls on the antepenultimate syllable if it is heavy (H) and the penult is light (L); otherwise, default stress falls on the penultimate syllable:

(22)	a.	H́ L σ	Án.ka.ra
	b.	L Ĺ σ	A.dá.na
	c.	H H́ σ	Is.tán.bul
	d.	L H́ σ	E.dír.ne

In non-place-name words, by contrast, default stress is final, with no sensitivity to syllable weight.

(23)	a.	el.má	'apple'
	b.	elma-lár	'apple-plural
	c.	elma-lar-dán	'apple-plural-ablative'

Place names can be formed from ordinary, final-stressed words, and when this occurs, stress shifts to the Sezer pattern, e.g. *torba-lí* 'bag-with' → *Tórbalı; bebék* 'baby' → *Bébek*, etc.

It is essential to understand that both the Final and the Sezer stress patterns are imposed only on words containing only lexically unstressed morphemes: they are defaults. A word containing a lexically stressed morpheme will resist Final stress (e.g. *másа* 'table', *süt-lǘ-ce* 'milk-ASSOC-MIT'); such a word will, if used as a place name, also resist the Sezer stress pattern (e.g. *süt-lǘ-ce* 'milk-ASSOC-MIT' → *Sütlǘce*, not **Sǘtlüce*). By virtue of containing different default stress patterns in different morphological environments, the Turkish stress system contradicts the empirical generalization embodied in Grammar Dependence.

Inkelas (1999) presents a cophonology analysis of Sezer and non-Sezer stress in which Markedness constraints (specifically, NONFINALITY and WEIGHT-TO-STRESS (WSP)) are reranked relative to ALIGN-R(stress):

(24) Sezer cophonology: WSP, NONFINALITY >> ALIGN-R

	Ankara	WSP	NONFINALITY	ALIGN-R
☞ a.	án.ka.ra			**
b.	an.ká.ra	*!		*
c.	an.ka.rá	*!	*	

(25) Word cophonology: ALIGN-R » WSP, NONFINALITY

	torbalɯ	ALIGN-R	WSP	NONFINALITY
a.	tórbalɯ	*!*		
b.	tor.bá.lɯ	*!	*	
☞c.	tor.ba.lɯ́		*	*

Faith-Based Variation rules out this particular analysis of the stress-based markedness reversal in Turkish. However, Faith-Based Variation does not rule out all analyses of the reversal. It is trivial to modify the Turkish stress analysis as an emergent unmarkedness effect, compatible with Faith-Based Variation in the way outlined in the preceding section. Both Final *and* Sezer stress can be implemented as default patterns for every construction in the language, with final stress being less marked, i.e. the preferred default, in all morphological contexts. However, final stress is blocked in Sezer stems *by a high-ranking Faithfulness constraint specific to Sezer stems* (26a) which prohibits the assignment of stress to final syllables. As a result, the backup default pattern – namely, Sezer stress – is assigned instead.

(26) a. The Sezer-specific Faithfulness constraint: $\text{DEP}_{\text{final-}\sigma(\text{stress})_{\text{Sezer}}}$

b. The ranking for the language:

$\text{DEP}_{\text{final-}\sigma(\text{stress})_{\text{Sezer}}}$

|

MAX-stress

|

Align-R (Final stress pattern)

|

WSP, Nonfinality (Sezer stress pattern)

The ranking in (26b) embodies *two* default patterns; the lower ranked of the two emerges only when the higher ranked one is blocked by the even higher-ranked indexed Faithfulness constraint. On this view the co-existence of patterns like Final and Sezer stress is entirely expected: Sezer stress constitutes a classic case of "The Emergence of the Unmarked" (McCarthy & Prince 1994).

8.2 Summary: Grammar Dependence vs. Optimality Theory

The insight that markedness reversals can result from emergent unmarkedness renders the Grammar Dependence generalization empirically false and Faith-Based Variation vacuous at best; Alderete's claim (Alderete 1999: 8 ff., 130 ff., 142, 150 ff., 162, 185) that each language has a single default setting has no consequences as long as that single setting allows for different emergent defaults in different morphological contexts.

Because it is not possible, in Optimality Theory, to establish a single default for the whole language, this goal cannot be a desideratum of the theory. Abandoning Grammar Dependence is thus motivated not only to satisfy descriptive or explanatory adequacy: Grammar Dependence is conceptually inconsistent with Optimality Theory.

9. Faith-Based Variation falsified

As we have shown, the power of a grammar constrained by Faith-Based Variation does not differ greatly from the power of a grammar with no such a priori restriction. Because of the richness of the constraint set itself, Faith-Based Variation does not impose the intended Grammar Dependence restriction. Does Faith-Based Variation make *any* predictions?

The answer is a qualified yes; Faith-Based Variation does, under certain assumptions, restrict the power of the theory by making it impossible to describe markedness reversals in which Faithfulness reranking is not an option. The problem with this prediction is that such cases actually occur in language.

9.1 Case study: prosodic minimality

One type of case that Faith-Based Variation predicts to be impossible is a markedness reversal in which the relevant Markedness constraints interact with the very same Faithfulness constraint. Recall that the Fukazawa et. al. result discussed in §7.1.1 emerged from the fact that the Markedness constraints involved in the markedness reversal (NO-P, NO-NT) interacted with different Faithfulness constraints (IDENT-labial, IDENT-voice); it was for this reason that switching the relative ranking of the relevant Faithfulness constraints was equivalent to switching the relative ranking of the relevant Markedness constraints. But when a markedness reversal involves the same dimension of Faithfulness, reranking the relevant Faithfulness constraint can only neutralize a markedness contrast; it cannot effect a markedness reversal.

Minimality restrictions provide an illustration of this prediction. Consider a hypothetical language in which all roots must be mono-moraic. Such a language can be characterized by ranking the following constraints as shown in (27c):

(27) Relevant size constraints for language with monomoraic root template:
(after Prince & Smolensky 1993)

a. LEX=σ 'A root contains (minimally) a syllable'
b. LEX=PWD 'A root contains (minimally) a foot'

c. Ranking: LEX=σ »*STRUC (μ) » LEX=PWD, MAX

The ranking of LEX=σ over *STRUC(μ) imposes syllable-size minimality on roots; the ranking of *STRUC(μ) over Lex-PWd favors the smallest possible syllable, which is monomoraic. Since *STRUC(μ) also outranks MAX, the optimal root will consist of only a single monomoraic syllable, regardless of the size of the input, as shown by the following tableau:

(28)

	/pikola/	LEX=σ	*STRUC(μ)	LEX=PWD	MAX
a.	pikola		**!*		
b.	piko		**!		**
c.	pik		**!		***
☞ d.	pi		*	*	****
e.	p	*!		*	*****

In keeping with the Faith-Based Variation hypothesis, we expect that if such a language has subpatterns, they will be consistent with the re-ranking only of Faithfulness constraints, in this case MAX. The two relevant possibilities are illustrated in (29), and they are identical in their predictions. Ranking MAX above *STRUC(μ) derives a system in which roots can be of any size, since that ranking entails that all underlying material will be parsed:

(29) **MAX** » LEX=σ » *STRUC(μ) » LEX=PWD → roots will be one syllable or more
LEX=σ » **MAX** » *STRUC(μ) » LEX=PWD → roots will be one syllable or more[10]

Faith-Based Variation predicts that there can be no subgrammar of our hypothetical language that instantiates any other reranking of these constraints; one pattern that Faith-Based Variation thus rules out is the restriction of roots to exactly foot size. This pattern is describable with the constraints in (27), but would require reranking the Markedness constraints LEX=PWD (a Markedness constraint) and *STRUC(μ), contrary to what Faith-Based Variation would allow.

(30) Prohibited subgrammar of the hypothetical language in (27):

	/pikola/	LEX=σ	Lex=PWd	*STRUC(μ)	MAX
a.	pikola			***!	
☞ b.	piko			**	**
c.	pik			**	***!
d.	pi		*!	*	****
e.	p	*!	*		*****

This hypothetical case exemplifies the kind of system that Faith-Based Variation predicts not to exist. However, this prediction is one we do not want to make, as this hypothetical case is actually a real one in Japanese. As documented by Itô & Mester 1995, citing Hamano 1986 (see also Tateishi 1989), Sino-Japanese roots are mono-moraic, while mimetic roots are foot-sized. If, with Itô & Mester, we assume that the grammar is responsible for capturing generalizations of this sort, then Faith-Based Variation is overly restrictive.

9.2 Excursus on Alignment

One possibility for rescuing Faith-Based Variation in light of the above example would be to appeal to Alignment constraints to handle the minimality conditions in Japanese. Requiring mimetic roots to align with a well-formed foot would make them bimoraic; not requiring such alignment of other (e.g. Sino-Japanese) roots would, assuming the minimizing effects of *STRUC, render non-Mimetic roots monomoraic:

(31) Mimetic root = σσ

	/σσσ/	ALIGN L/R(mimetic, foot)	LEX=σ	*STRUC
a.	σσσ	*!		***
☞ b.	σσ			**
c.	σ	*!		*

(32) Sino-Japanese root = σ

	/σσσ/	ALIGN L/R(mimetic, foot)	LEX=σ	*STRUC
a.	σσσ			**!*
b.	σσ			**!
☞ c.	σ			*

[10] Alternatively: words can be any size up to a foot, depending on whether LEX=PWD is seen as a constraint on minimum size or ideal size. Note that introducing DEP into the constraint ranking would have no effect on the argument.

However convenient in the short term, this analysis bodes ill generally for Faith-Based Variation and the notion of Grammar Dependence. Either one stipulates that neither Markedness nor Alignment constraints can be indexed, in which case the predictions of the theory are too narrow, or one includes Alignment constraints in the set of potentially indexable constraints, in which case the predictions of Faith-Based Variation become even weaker. Insofar as many things that can be accomplished with Markedness constraints can also be accomplished with Alignment constraints, prohibiting the indexation of Markedness constraints while allowing indexation of Alignment constraints renders Faith-Based Variation vacuous.

In recognition of this fact, Alderete takes care to avoid using indexed Alignment constraints in his Faith-Based analyses of Japanese and Limburg Dutch accentuation. Alderete (2001:214) makes it very clear that his anti-Faithfulness analyses of Japanese and Limburg Dutch retain their Grammar-Dependent character *only* if the accentuation patterns are handled using Markedness constraints rather than indexed accentual Alignment constraints. But Alderete offers no principled reason for not indexing Alignment constraints and, indeed, a principled reason would be virtually impossible to find within contemporary versions of Optimality Theory, which routinely rely on indexed Alignment constraints for such very basic purposes as ordering affixes within words, distinguishing between infixes and affixes, and so on.

It seems clear that indexation must be an option both for Faithfulness and for Alignment constraints; including Alignment in what Faith-Based Variation allows means that theories which adhere to Faith-Based Variation have even more descriptive power than we have been according them in the discussion thus far.

9.3 Case study: Stress

Another type of markedness reversal which Faithfulness cannot resolve, and which Faith-Based Variation therefore predicts to be impossible, can be constructed in domains where Faithfulness constraints play little or no role and thus cannot be relied on to neutralize the higher-ranking of two Markedness constraints. This situation often arises in Optimality Theory analyses of stress assignment in which stress is assigned by grammar rather than being lexically present. The typology of stress assignment relies on Alignment constraints and Markedness constraints (e.g. Parse-σ, which requires the presence of stress feet; *STRUC, which bans stress feet; WSP, which requires heavy syllables to be stressed; FT-BIN, which requires stress feet to be binary; and CLASH, which prohibits adjacent stressed syllables). Here we focus on a typological parameter that is governed only by Markedness constraints.

According to Pater 2000, the usual situation in English, due to a general requirement of iterative quantity-sensitive footing, is for a (word-initial) pretonic heavy syllable to be stressed, even if a stress clash would result (33). Exceptionally, however, there are some words that resist stress when clash would result (34):

(33) Class S1 words: Pretonic heavy syllables get secondary stress (Pater: 244)

bàndána, Nàntúcket, pòntóon, càntéen, cèntúrion, càntánkerous, bàctéria, Òctóber, èxtrínsic, còghítion, prìvátion, vòcátion, cìtátion, èjéction
Hàlicàrnássus, pìthecànthrópus, àpothègmátic, ànimàdvérsion

(34) Class S2 words: Pretonic heavy syllables not stressed (Pater: 263)

advántage, combúst, congréssional, extínguish, obtáin

Pater (p. 265) demonstrates that the Class S1 pattern can be generated by ranking PARSE-σ above CLASH-HEAD, while for Class S2 words this ranking is reversed. Pater implements the reranking as indexation: CLASH-HEAD is split into two constraints, one indexed to S2. As shown in (35), by having the CLASH-HEAD-S2 constraint outrank PARSE-σ, clashing configurations are avoided.

(35) *CLASH-HEAD-S2 » PARSE-σ » *CLASH-HEAD

For words that do not belong to Class S2, the high-ranking CLASH-S2 constraint is irrelevant. PARSE-syllable therefore forces the footing of the pretonic heavy syllable, causing only a violation of the lower-ranked general CLASH constraint.

This case seemingly cannot be made consistent with Faith-Based Variation. Unlike some of the cases discussed in §7, it cannot be reanalyzed by indexing either Faithfulness or Alignment. The presence of stress in S1 is not attributable solely to Faithfulness to underlying pretonic stress; because S1 is the regular pattern, pretonic stress in S1 words can be assumed to be imposed by the grammar. Nor is the absence of pretonic stress in S2 words a matter of faithfulness to the *absence* of pretonic stress. S2 words do not generally resist stress assignment; if DEP-foot (or its equivalent) were even a component of the analysis at all, it would have to rank below PARSE-σ in both word classes. The only difference between S1 and S2 is whether or not the footing of heavy syllables can violate CLASH-HEAD.

Thus, by virtue of instantiating a markedness reversal in a system where Faithfulness plays no role, Pater's analysis of English shows (a) that Faith-Based Variation does make limited predictions, but (b) that those predictions are too strong.

The two case studies discussed in this section only confirm further that Faith-Based Variation is not doing what it has been claimed to do, and is thus not the kind of principle one should be citing in choosing one theory of language-internal variation over another.

10. Thought experiment

The alternative to indexed constraint theory is, of course, cophonology theory. We have noted the existence of numerous independent arguments for cophonologies in the literature. But there is a persistent criticism which has dogged cophonology theory since its inception, namely its apparent ability to describe wider ranges of diversity among cophonologies than have ever been attested in human language. As Benua (1997) writes, where 'serial theories' can be understood as theories using cophonologies:

> 'Serial theories… leave open the possibility that cycles or levels of derivation differ in any or all ways, and can produce wildly various surface patterns in different classes of words, including patterns that are unlikely to be attested in natural language.' (p. 6).

We have already established that indexed constraint theory, even when 'enhanced' with Faith-Based Variation, allows a large amount of subgrammatical diversity, including markedness reversals, as well. Here we make this point even clearer by showing that indexed constraint theory is capable of the same kinds of predictions regarding wild degrees of subgrammatical diversity which proponents of indexed constraints have criticized cophonology theory for making.

The hypothetical case we analyze is a language in which nominals exhibit Hausa-style lexical tone, in which any tone pattern is permitted lexically but in which there is a default tone pattern available to nouns lacking tone; and in which verbs exhibit French-style stress on the final syllable, and admit no tonal contrasts. Such wide differences between the phonology of words of different morphological class is to our knowledge unattested (presumably for the reason that no sound change of any known type could give rise to it), yet, fatally for the restrictive aspirations of Faith-Based Variation, the pattern is perfectly compatible with that principle.

Final stress in verbs is simple to require: Align-R(Verb, stress) imposes final stress on all verbs. Ranking this Alignment constraint above the markedness constraint (*Tone & *Stress) banning the co-occurrence of tone and stress in the same string means that nominals are the only

kind of word capable of bearing tone.[11] We can go farther and *require* (not just enable) tone to occur in nominals with the general constraint SPEC-tone, which requires tone on every syllable of every word. Ranked below *TONE & *STRESS, SPEC-tone is effectively limited to requiring tone in nominals.

(36) ALIGN-R(VERB, STRESS) » *TONE & *STRESS » SPEC-TONE

Ranking this portion of the hierarchy above DEP-tone and DEP-stress results in a situation in which tone is required on nouns and stress is required on verbs. This analysis is entirely compatible with Faith-Based Variation, in that the only indexed constraint in the entire analysis is ALIGN-R.

All that remains is, in accordance with Richness of the Base (Smolensky 1996), to erase any tones which happen to be underlying present on verbs, or any stress underlyingly present on nouns. This task is easily accomplished within the bounds of Faith-Based Variation. Assuming *TONE & *STRESS and ALIGN-R(Verb, Stress) to be inviolable in this hypothetical language, ranking SPEC-tone above MAX results in the deletion of tone from verbs, in which it would conflict with obligatory stress, and in the deletion of stress from nouns, in which it would conflict with obligatory tone:

(37) ALIGN-R(VERB, STRESS) » *TONE & *STRESS » SPEC-TONE » MAX-TONE, MAX-STRESS

Similar hypothetical examples can be constructed in the domain of reduplication. Assuming the 'Full Model' proposed by McCarthy & Prince (1995), FAITH_{BR} constraints enforce correspondence between reduplicant and base; both strings correspond directly with the input as well, via FAITH_{IR} and FAITH_{IO} correspondence constraints. In the Full Model it is easy to generate markedness reversals across reduplicant and base simply by positioning FaithIR and FAITH_{IO} differently within a fixed ranking of Markedness constraints, and ranking FAITH_{BR} low enough not to interfere. For example, vowel hiatus could be resolved via consonant epenthesis in the reduplicant (*VV » DEP-C_{IR}) and via vowel deletion in the base (*VV » MAX-V_{IO}), as follows:

(38) *VV » DEP-C_{IR}, MAX-V_{IO} » DEP-C_{IO}, MAX-V_{IR} » MAX_{BR}, DEP_{BR}

	red, /bi-at/	DEP-C_{IO}	MAX-V_{IR}	*VV	MAX-V_{IO}	DEP-C_{IR}	MAX_{BR}	DEP_{BR}
a.	biat-biat			*!*				
b.	bit-biat		*!	*			*	
c.	bit-biʔat	*!	*				**	
d.	bit-bit		*!		*			
e.	biat-bit			*!	*			*
f.	biat-biʔat	*!		*			*	
g.	biʔat-biat			*!		*		*
h.	biʔat-biʔat	*!				*		
☞ i.	biʔat-bit				*	*		**

Of course, since McCarthy & Prince 1995, alternatives to the Full Model have been proposed both within standard Base-Reduplicant Correspondence Theory (e.g. Struijke's Broad Faithfulness) and outside of it (e.g. Inkelas & Zoll's (2000) Morphological Doubling Theory); we cannot hope to cover the full debate here.

[11] *Tone & *Stress is a conjoined constraint; Alderete (1999, 2001) has used conjoined constraints to analyze some Japanese suffix-imposed tone patterns that appear to instantiate (less extreme) markedness reversals.

11. Conclusion

We have argued that the Grammar Dependence Argument is unsupported empirically, theoretically and conceptually:

- Indexed constraints and cophonologies are equally amenable to the Faith-Based Variation theorem, namely the stipulation that only the ranking of Faithfulness can vary within a grammar.
- Faith-Based Variation does not prevent the description of inventory-based or alternation-based markedness reversals, because the effect of indexing Markedness constraints can be emulated simply by indexing Faithfulness constraints instead.
- Faith-Based Variation has almost no predictive force, and the limited predictions it appears to make are incorrect.
- As a descriptive generalization, Grammar Dependence is not correct. Markedness reversals exist.
- Grammar Dependence as a concept is incompatible with emergent unmarkedness

One implication of these findings is that they put to rest the only existing argument – namely, Grammar Dependence – that has been offered favoring constraint indexation over cophonological reranking. A critical comparison between the two approaches must therefore be made on other grounds, including those cited in Orgun 1996; Inkelas 1998; Inkelas & Zoll 2000; Anttila 2002.

One reaction to the arguments we have made against Faith-Based Variation and Grammar Dependence, might be that even though Faith-Based Variation and Grammar Dependence themselves are not the answer, it is still worth looking for a synchronic principle that *will* correctly limit subgrammatical variation within a language to something less than the variation that is possible across languages. But even this might be wrong-headed.

First, we know that even language-internally there is more variation between, say, ideophones and non-ideophones than there is between, say, verbs and nouns. Any grammar that can describe the kinds of asymmetries holding between ideophones and non-ideophones in Yir-Yoront, clearly is capable of describing comparable, or even more extreme, asymmetries between categories like noun and adjective, or passive vs. active verb, etc. Thus any formal principle that tolerates the kind of language-internal variation that exists between ideophones and non-ideophones will overgenerate variation potential in other sectors of grammar. In this way, then, purely formal principles like Faith-Based Variation are doomed to miss a large part of the picture.

Looking at the problem in another way, it is standardly assumed that language splits evolve from dialectal splits and that dialect splits result from language-internal variation. Within the Optimality Theory framework, for example, Anttila 1997; Anttila & Cho 1998; Anttila 2002 explicitly relate subgrammatical variation to the kind of free variation giving rise to dialect splits. If one takes seriously the Optimality Theory view that languages differ only in their constraint ranking, then it has to be the case that dialects can differ in the ways languages can differ, and therefore that language-internal variation can encompass the same types of differences that characterize dialect splits. It therefore follows that there should not be any extrinsic, a priori limits on the dimensions along which two subgrammatical patterns can differ. The fact that the degree of difference between two languages is typically greater than the degree of difference found among patterns within a language is surely related to the fact that distantly related languages differ from one another more than closely related languages do. All of these scales of difference are phenomena for historical linguists, rather than Optimality Theory typologists, to explain.

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