THE CONSPIRACY OF COMPLETENESS

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1 Introduction

In this paper, I would like to step back and examine an issue which eventually bears on all work in Optimality Theory (OT),[1] but as far as I am aware, has only been vaguely addressed in the literature. Exactly how does Universal Grammar delimit the set of possible constraints, and how does this affect the makeup of particular grammars? The outcome, I hope, will be to show that, given certain assumptions, the theory of possible constraints can be made maximally general without necessarily predicting an explosion of bizarre unattested language types. This result relies crucially on a particular proposal concerning the correct way to represent notions of structural and inherent segmental prominence. The two conclusions are not independent, and the utility of the demonstrated conspiracy effect may be taken as indirect support for the representational assumptions it requires.

(1) **Premise:** UG defines the set of possible constraints.

The key premise is that UG *does* define the set of possible constraints—that is, constraints cannot be formulated "from scratch" by a learner. Cross-linguistic variation is intended to follow only from the many possible language-particular rankings of these same constraints. Although this conviction is not always strictly adhered to (cf. Prince and Smolensky's (1993; 101) FREE-V constraint for example), it is clear that it is of central significance in the theory. Without this claim of universality, the issue of violability would become less crucial, and an important distinction between OT and Declarative Phonology (Scobbie 1991, 1992, 1993 and Bird *et al.* 1993)[2] would be lost. M&P (1993b; 6) refer to the set of possible constraints as **Con**.

In the first part of this paper I attempt to provide substance to the theory of **Con**, and examine its relation with the constraint inventories of particular grammars. Specifically, I address the question whether a given language must incorporate all possible constraints in its hierarchy. In developing a highly general theory of **Con**, my principle goal is to show that such generalization does not necessarily lead to wild overgeneration of empirically implausible grammars or loss of predictive power in the theory as a whole. To this end I demonstrate a new Optimality effect which crucially relies on violability of constraints but not on strict domination. I show that if the representation is set up in

[1] For extensive introduction and discussion of the principles of Optimality Theory, see Prince and Smolensky (1993) (henceforth P&S 1993) and McCarthy and Prince (1993ab) (henceforth M&P 1993ab) and references cited there.

[2] See the comparative discussion in LaCharité and Paradis (1993).

a particular way, it is possible for large families of related constraints to "conspire" to produce a unified effect.

2 Completeness

The fact that UG sets the bounds of **Con** does not necessarily mean that each language must make use of the *entire* set of possible constraints. In this paper I adopt the strongest position on this issue, which I call the **Completeness Hypothesis**:

(2) **The Completeness Hypothesis:**
Every grammar explicitly includes all members of **Con**.

While this idea is certainly not new, I have yet to see it asserted explicitly in its strongest form. For instance, M&P (1993b; 6) state that "individual grammars are constructed by imposing a ranking on the entire universal constraint set Con, *possibly with some setting of parameters and fixing of arguments within the constraints*, such as the various arguments of Align" (emphasis added). From this portrayal of the relation of **Con** to the hierarchies of individual grammars, it is not clear whether the "setting of parameters" and "fixing of arguments" is meant to imply literally that only *some* possible instantiations of schemata like Align are to be included in the grammars of particular languages.

In any case, having asserted the Completeness Hypothesis, we must briefly address the concern that this standpoint might somehow entail (i) the impossibility of some grammars by forcing them to reckon with the existence of too many constraints, and (ii) the existence of too many possible grammars. The first concern may be dismissed in all cases except one.[3] The mere existence of a constraint in the hierarchy of a language does not necessarily mean its effects are empirically visible, and therefore the Completeness Hypothesis poses no immediate problem for Optimality Theory. Any constraint can be arbitrarily violated in an optimal candidate as long as higher-ranked constraints rule out all other candidates. Thus, constraints which do not appear to be active in a given language are merely positioned at the bottom of its hierarchy. (see also the discussion of "parameterization via ranking" in P&S 1993; sec. 8.2)

In answer to the second concern, that Completeness forces us to admit more possible grammars than we would otherwise have to contend with, I submit that this concern is unfounded when the Completeness Hypothesis is compared with its weaker alternative, what we might refer to as the "à *la carte*" hypothesis:

(3) **À la carte hypothesis**: the constraints of a particular grammar must be a *subset* of **Con**.

[3] Completeness would be a problem for any attempt to handle optionality from within the hierarchy of a single grammar by proposing that competing "optional" forms result from an absolute tie at the top of the harmonic ordering—**Eval** cannot determine a single optimal candidate, so either one is a possible output. If all constraints are present, then two variant forms would have to agree on all possible constraints rather than only on those present in the particular grammar. The sheer numbers might become prohibitive in this case, and would certainly make the linguist's task of accounting for optionality impractical.

While Completeness may appear to be the most radical position to take it is actually more conservative than the *à la carte* alternative, more conservative at least in terms of the number of grammars that it predicts. This is because the *à la carte* theory includes all grammars predicted by Completeness as special subcase, since a particular grammar may always choose to incorporate all of **Con** (a subset of itself) in an *à la carte* fashion.

Not only does Completeness entail *fewer* possible grammars than *à la carte* theory, it also narrows task of the learner, who does not have to explicitly choose the relevant constraints for his or her language, but must only put the existing constraints in (partial) order. Note that the hypothesis of Completeness would only be possible in a theory in which constraints are violable in the first place. A theory in which constraints cannot be violated must either (i) assume an *à la carte* theory of the relationship between **Con** and the constraint set of an individual grammar (this might be implemented in terms of parameter setting in the traditional sense), or (ii) deny the central premise (1) that the set of possible constraints is provided by UG in the first place. Otherwise there would be no way for two languages to differ.

3 The theory of Con

In addition to the Completeness issue itself, I also consider the related question of the actual contents of **Con**. The purpose of this section is to provide substance to the theory of **Con**, basically to formalize the obvious fact that *constraints come in families*. That is, **Con** has structure—it is not a random list of constraints.[4] My specific proposal is that the individual constraints in **Con** follow from a small set of parameterized schemata, or **metaconstraints**. I refer to the set of such metaconstraints as *meta*-**Con**. This requirement holds of *all* constraints, as formalized in (4).

(4) If C is a constraint in **Con**, then C follows as an instantiation of a metaconstraint *meta-C* in *meta*-**Con**.

Under this conception, M&P's generalized ALIGN schema would be a member of *meta*-**Con**, while individual instantiations such as ALIGN(PrWd,L,Ft,L) are true constraints, and belong in **Con**. *meta*-**Con** may be thought of as the "theory" of **Con**. Each metaconstraint is a principle in this theory, defining the space of possible structural relations that can be constrained by grammar.[5]

The statement in (4) is completely without force if it is not supplemented with the conditions in (5)–(6).

(5) **Metaconstraint Nonspecificity:**
A metaconstraint cannot make reference to a specific phonological category in its formulation.

[4]If **Con** is finite (see note 5 below), then it is not absolutely necessary for it to be structured in this way; it could be enumerated in UG by brute force.

[5]If *meta*-**Con** is finite (I assume it to be quite small, in fact), then **Con** itself will be finite just in case the set of phonological categories that can be supplied as metaconstraint arguments is also finite.

(6) **Metaconstraint Generality:**
Every possible instantiation of a given metaconstraint in *meta*-**Con** is present in **Con**.

Without both the requirements of Metaconstraint Nonspecificity and Generality, the relation between *meta*-**Con** and **Con** could still be realized as a 1:1 mapping—each metaconstraint could be "hard-wired" to yield only a single constraint, rendering the "family" analogy vacuous. Nonspecificity and Generality simply enforce the intuitive reaction that, when presented with a constraint nicely formulated in terms of a parameterized schema, we expect all of the other logically possible parameterizations of the same schema to be available as well. Under the proposal here, then, if there is a constraint such as ALIGN(PrWd,L,Ft,L), mentioned above, then there must also exist, for example, some possibly disturbing ones such as ALIGN(μ,R,Stem,L), as well as every other constraint that can identified by some parameterization of ALIGN. By Completeness (2), these constraints are all present in the constraint hierarchy of any language.

The proposal outlined so far is summarized informally in (7):

(7) **The proposal:**

- Constraints must come in families. Any given constraint in **Con** is a specific case of a more general metaconstraint in *meta*-**Con**.
- A metaconstraint cannot be "hardwired" to deal with only a any specific phonological category. [METACONSTRAINT NONSPECIFICITY]
- The family of a metaconstraint is fully general. There are no paradigmatic gaps in **Con** that could be filled by a particular parameterization of a metaconstraint in *meta*-**Con**. [METACONSTRAINT GENERALITY]
- All constraints in **Con** are incorporated directly in every particular grammar. [COMPLETENESS]

Again, the general ideas presented here appear to be circulating in vague form in much of the OT literature. In the first part of this paper I have merely attempted to pin them down and present them in a coherent formulation. In the remaining sections I examine one apparent consequence of this general theory of **Con**, which has to do with the proliferation of constraints that it entails.

4 An example: sonority and prominence in the syllable

Maintaining the conditions of Metaconstraint Nonspecificity and Generality appears to make the number expected grammars grow very large very quickly. In this section I attempt to show that this explosion will not necessarily be easily detectible, and the typological range of grammars it predicts may in fact be very narrow. I take a simple example concerning the "alignment" of segmental sonority and structural prominence within the syllable.

(8) **Prominence Alignment**:
"...a general operation ... in which scales of prominence along two phonological dimensions are harmonically aligned." (P&S 1993; 129)

P&S (1993) invoke the operation of **prominence alignment** (8) to account for the overwhelmingly true generalization that more sonorous segments correspond to more prominent positions in syllable structure. This important subcase (often called the Sonority Sequencing Generalization) is referred to by P&S as the **Universal Syllable Position/Segmental Sonority Prominence Alignment**:

(9) **Universal Syllable Position/Segmental Sonority Prominence Alignment**: "The syllable position [Peak > Margin] and segmental sonority [$a > i > \cdots > d > t$] scales are universally aligned." (P&S 1993; 137)

The slightly misleading term "operation" in this case refers merely to fixing of the relative rankings of the families of "anti-association" (*MARGIN and *PEAK)[6] constraints, which govern the placement of segments within the syllable. For instance, in a language in which the segments are arranged by sonority in the order $a > i > \cdots > d > t$, the universal prominence alignment operation entails that the *MARGIN constraints be ranked as $\text{*M}/a \gg \text{*M}/i \gg \cdots \gg \text{*M}/d \gg \text{*M}/t$, while the *PEAK constraints are inversely ranked, $\text{*P}/t \gg \text{*P}/d \gg \cdots \gg \text{*P}/i \gg \text{*P}/a$. The constraints cannot be freely ordered, or wildly different types of prominence alignment would be possible (including the extreme case in which syllable peaks must correspond to sonority *troughs*).[7] Crucially, P&S do not assume any direct representation of the notion of prominence at all—the scales are apparently defined independently as strict orderings on sets of elements. No single *M or *P constraint makes direct reference to this ordering; each one refers only to a particular pairing of a sonority value with a structural position. The hierarchical domination relations among the constraints themselves (e.g. the fact that $\text{*M}/a \gg \text{*M}/t$ and *never* vice-versa) are the sole means of capturing prominence alignment.

4.1 Representing prominence

In this section, I approach the problem of prominence alignment from a different angle. I claim that it is only the particular formulation of the *M and *P families that leads to the necessity of explicitly ordering them. If the association relations are constrained differently, then no universal ranking restrictions are necessary. To outline this point I make use of some alternative representational assumptions, which provide an important key to understanding the prominence alignment effect. In section 4.3 I return to discuss how whether it might be possible to minimally modify P&S's proposal to yield a similar result.

I assume that the effects of the "prominence" of a segment (its sonority) are an epiphenomenon of its degree of specification in the representation. Consider the simple phoneme sequence /pin/. The segmental prominence (sonority) of each phoneme can be captured in a grid-like form as in (10). For simplicity, we assume that segments

[6]These are discussed in detail in P&S (1993; chap. 8)

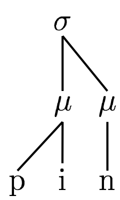
[7]However, since the segmental sonority scales can vary slightly from language to language, the rankings of the *MARGIN and *PEAK series cannot quite be universally fixed either. It seems then that P&S would have to assume the notion of prominence alignment plays some sort of active role in constraining language-particular domination hierarchies.

are identified representationally by having marks along grid lines corresponding to the hypothetical phonological categories V, R and O. The column heights are faithful to the sonority contour of the sequence—it is crucial that more sonorous segments have more marks.

(10)
```
    x     V ("vowel")
    x  x  R ("resonant")
 x  x  x  O ("obstruent")
 p  i  n
```

In order to be able to relate the scale of segmental prominence with that of structural position, I translate the latter scale into a grid-like format as well. For instance, if we start from a base structure as shown in (11), then any segment that is the "head" of a μ (in the sense of Zec 1988) receives a mark on the μ line, and furthermore, the syllable peak itself recieves an additional mark on the line labelled 'σ'.[8]

(11)



(12)
```
    x     σ
    x  x  μ
 p  i  n
```

Now the full structure, shown in (13), obeys the prominence alignment generalization because the most prominent syllable position (the segment having both a μ and a σ mark) lines up with the segment with the most marks on the V, R and O lines.

(13)
```
    x     σ
    x  x  μ
    x     V
    x  x  R
 x  x  x  O
 p  i  n
```

We must admit certain specific constraints dealing with particular aspects of this type of alignment as well. Some common cases are shown informally in (14):

[8]The particular representation in (11) follows the proposal of Hyman (1985) and Zec (1988) in that the onset consonant is associated with the first mora, rather than directly to the syllable node. The matter is irrelevant here, since the pure grid representation in (12) does not encode constituency. What is crucial is only that the syllable peak represents a higher column of marks than the margins (and, likewise, by virtue of its association with a mora, the coda consonant corresponds to a higher column than the onset).

(14) a. A vowel must be a syllable head.

b. A syllable head must be a vowel.

c. A syllable head must be at least a resonant.

d. A mora must be a vowel.

e. A mora must be at least a resonant.

These 'licensing' constraints can be captured as instances of a single very general metaconstraint, which we may refer to as '$a \rightarrow b$':

(15) $\boxed{a \rightarrow b}$ (metaconstraint)
a mark on level a must correspond to (vertically align with) a mark on level b.

Now the statements in (14) can be stated formally as specific parameterizations of the $a \rightarrow b$ metaconstraint:

(16) a. $\text{V} \rightarrow \sigma$

b. $\sigma \rightarrow \text{V}$

c. $\sigma \rightarrow \text{R}$

d. $\mu \rightarrow \text{V}$

e. $\mu \rightarrow \text{R}$

We must keep in mind that, by Metaconstraint Generality and the Completeness Hypothesis, all possible parameterizations of $a \rightarrow b$ must be available and indeed present in all grammars. For instance, every grammar must incorporate the constraint $\text{O} \rightarrow \sigma$, requiring even the least sonorous of segments to be syllable peaks. Even if UG contained only the five different phonological levels (O, R, V, μ, σ) mentioned in this section, we would predict $5 \times 5 = 25$ individual $a \rightarrow b$ constraints, for a total of 25! (25 factorial) distinct rank-orderings inside this family alone. While this number may be alarming in itself, it need not be as long as the set of possible grammars it entails still excludes the types of languages we want to be impossible. In particular, we want it to be impossible for a language to exhibit a generalization other than that expressed by the prominence alignment operation—we want to express the fact (stipulated by P&S) that prominence alignment is universal.[9]

[9] This does not mean that there will not be exceptions. Prominence alignment does not hold universally, precisely because it is encoded in terms of violable OT constraints—see for example P&S's (1993; 17) example of the syllabification of /ul/ as [wĺ] rather than [úl] in Berber (where the notation [x́] means that the segment [x] is analyzed as a syllable peak). What is important is that there cannot be a language that as a general rule prefers /l/ to /u/ as a syllable peak. For P&S (1993) precisely such a language could be described simply by ranking $*\text{P}/u \gg *\text{P}/l$. Prominence alignment explicitly stipulates that this ranking is not permitted (assuming the grammar is not free to consider /l/ more sonorous than /u/). See the discussion at the end of section 4.2 for a restatement of this point.

Stated another way, although in the literal sense this astronomical number of possible languages is inescapable under the current proposal, the important question is whether we would be able to tell the difference between all these grammars. In the next section I suggest that, for some kinds of constraints at least, there is an important way in which the answer is *no*.

4.2 The Conspiracy Effect

For the $a{\rightarrow}b$ metaconstraint, the crisis posed by Generality and Completeness is resolved due to a "conspiracy" effect. Given our representational assumptions, the family-internal rankings of the constraints yielded by $a{\rightarrow}b$ are irrelevant in one crucial sense: under any ordering, the $a{\rightarrow}b$ family as a whole *always reinforces prominence alignment*.

(17) $a{\rightarrow}b$ always reinforces **prominence alignment**.

To demonstrate this conspiracy, I consider the artificially restricted case in which other constraints independently determine that the sequence /pin/ is to have one and only one syllable peak, but its exact location (on one of the three segments) is undetermined. Omitting the added complication of locating the mora heads, we concentrate on just the constraints referring to the four categories σ, V, R and O (narrowing the number of relevant $a{\rightarrow}b$ constraints down to $4 \times 4 = 16$). The three possible candidates for locating the syllable peak are shown in the tableau in (18).

(18) Optimal location of syllable peak

/pin/		$\sigma{\rightarrow}O$	$\sigma{\rightarrow}R$	$\sigma{\rightarrow}V$	$\sigma{\rightarrow}\sigma$	$V{\rightarrow}O$	$V{\rightarrow}R$	$V{\rightarrow}V$	$V{\rightarrow}\sigma$	$R{\rightarrow}O$	$R{\rightarrow}R$	$R{\rightarrow}V$	$R{\rightarrow}\sigma$	$O{\rightarrow}O$	$O{\rightarrow}R$	$O{\rightarrow}V$	$O{\rightarrow}\sigma$
a. ♡	[x] (over i) σ x V x x R x x x O p i n	-	-	-	-	-	-	-	-	-	-	*	*	-	*	**	**
b.	[x] (over n) σ x V x x R x x x O p i n	-	-	*	-	-	-	-	*	-	-	*	*	-	*	**	**
c.	[x] (over p) σ x V x x R x x x O p i n	-	*	*	-	-	-	-	*	-	-	*	**	-	*	**	**

What should be noted from the tableau is that the violation marks for candidate (a) constitute a *subset* of the marks for candidates (b-c). By the **Cancellation Lemma** (P&S 1993; ch. 8), then, this tableau shows that under *any internal ranking*, the family of constraints combines to prefer the candidate (a), the form which follows the prominence alignment generalization. Although there are 16 constraints in the tableau (several of which are violated in the optimal candidate), the constraints as a group will do the same work under any ranking. This is a desirable result, because both candidates (b) and (c) violate the prominence alignment generalization—the prominent structural position (syllable peak) is not aligned with the most prominent segment (the vowel). Although the constraints in the tableau could be ordered to produce 16! distinct grammars, *none* of these grammars would prefer candidate (b) or (c).

Before we go on to examine the foundations of the conspiracy result, let us briefly summarize and clarify the reasoning in section 4 so far. First I translated the notions of sonority and structural prominence into a grid notation where column height is proportional to degree of prominence. Then I noted a few reasonable-looking constraints (14) on the correspondence between the two prominence scales. These could be given a simple formulation in terms of the single metaconstraint, $a \rightarrow b$, as in (16). But the principle of Metaconstraint Generality (6) forces us to contend with all possible parameterizations of this metaconstraint, not just the particular individual constraints that we find useful. The resulting proliferation of constraints (all of which must be present in any grammar, by Completeness) yields a large number of possible grammars. However, tableau (18) demonstrates that there is a way in which the ordering of the constraints does not matter. The entire $a \rightarrow b$ family combines to do the work of the prominence alignment operation *under any ordering*. Therefore, although Generality and Completeness would appear to raise problems for any restrictive theory of universal grammar (too many possible grammars, no predictive power), the crisis is resolved in the case of the $a \rightarrow b$ metaconstraint, since all rankings produce the same type of effect.

It is important to stress that the ranking of the constraints is not in fact totally irrelevant. Given that the constraints are free to interact with all other constraints in **Con**, we can see, for example, that if the O$\rightarrow \sigma$ constraint were absolutely undominated in a language, that language would require the base input form /pin/ (shown in (10)) to correspond to an output form [.ṕ.í.ń.] in which *each segment* is a syllable peak:

(19)
```
x  x  x  σ
   x     V
   x  x  R
x  x  x  O
p  i  n
```

Crucially, this language still satisfies prominence alignment, and I believe it would be an extremely tricky matter in OT to rule out such a language on principled grounds (the form would violate many other structural constraints, but these violations are irrelevant if O$\rightarrow \sigma$ is truly undominated). The $a \rightarrow b$ family produces this type of grammar, but as mentioned in note 9 it does not, for instance, yield a grammar which would prefer the following output form, in which both consonants are parsed as syllable nuclei while the vowel is not.

(20)
```
x     x  σ
   x     V
   x  x  R
x  x  x  O
p  i  n
```

This type of language could be represented by P&S if the ranking $^*\mathrm{P}/i \gg \{^*\mathrm{P}/n, {}^*\mathrm{P}/p\}$ were permitted; therefore, by the prominence alignment operation it is not.

The point about the conspiracy effect is not that $a \rightarrow b$ entails strict prominence alignment in all surface forms of all languages (it would do so only if there were no other metaconstraints in *meta*-**Con**), but rather that the coexistence of all the $a \rightarrow b$ constraints (forced by Completeness) will never *in itself* motivate a failure of prominence alignment.

4.3 What is behind the conspiracy?

The $a \rightarrow b$ family performs roughly the same function as the family of anti-association constraints (*MARGIN and *PEAK) in P&S (1993). The difference, noted in the previous section, is that $a \rightarrow b$ implements the prominence alignment operation under any ranking, whereas P&S must stipulate prominence alignment as a separate effect, captured in terms of universal ranking restrictions on the *MARGIN and *PEAK constraints. In this section I discuss briefly what is required in order for the conspiracy effect to hold.

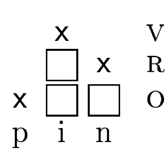
The ability to depend on such a conspiracy effect carries what may turn out to be too high a price. It relies crucially on the "continuous column" (Hayes 1991; 27) nature of the representation of inherent segmental prominence—a mark on a line n must be supported by a mark directly below on line $n-1$. This is because it is necessary that any form which violates, say, $\sigma \rightarrow$R (the syllable [.k.] for example), will also violate $\sigma \rightarrow$V. To see this, consider for each of the segments in /pin/, the effects of parsing this segment as a syllable peak. For P&S, analyzing a segment of sonority value $|\alpha|$ as the syllable nucleus always results in a single violation of the corresponding anti-association constraint, $*P/\alpha$. Under the scheme I am proposing, on the other hand, placing a σ mark on a given segment may lead to violations of several $a \rightarrow b$ constraints, or to none at all:

(21) violating $*P/p$ $\rightsquigarrow$ violating $\sigma \rightarrow$V, $\sigma \rightarrow$R
violating $*P/n$ $\rightsquigarrow$ violating $\sigma \rightarrow$V
violating $*P/i$ $\rightsquigarrow$ no relevant violations

For P&S, the logically possible ranking $*P/n \gg *P/p$ would lead to a (presumably) impossible grammar; therefore this ranking must be prohibited. But notice that translating the *P constraint into $a \rightarrow b$ terms, it is impossible for a language to prefer P/p over P/n. Violating both $\sigma \rightarrow$V and $\sigma \rightarrow$R is always less harmonic than violating $\sigma \rightarrow$V alone, no matter how the two constraints are ranked.

We see now how the integrity of the conspiracy account rests (rather precariously) on the particular conception of how the phonological representation must encode structural and segmental prominence. The story would *not* work if the representation of /pin/ were as in (22), with only the top-most grid mark present in each column, because the implication relations in (21) would be lost:

(22)



If this structure were correct, then we would have to resort to universal domination restrictions in order to capture the prominence alignment effect, exactly as P&S do. This is because under such a representation, the ranking $\sigma \rightarrow$O $\gg$ $\sigma \rightarrow$V would force the syllable peak to be an obstruent, yielding *[ṕin]. In order to rule out such a language, this ranking would have to be universally prohibited.

Having reached an understanding of the conditions necessary for the conspiracy effect to hold, it is now possible to force the same result simply by proposing a slight modification of P&S's anti-association constraint schemata. If *P and *M are redefined as in (23), the prominence alignment effect follows under any ordering.

(23) a. $\boxed{\text{*P}/\alpha}$
A segment of sonority less than or equal to $|\alpha|$ must not be analyzed as a syllable peak.

b. $\boxed{\text{*M}/\alpha}$
A segment of sonority greater than or equal to $|\alpha|$ must not be analyzed as a syllable margin.

Now, a form containing P/*p* not only violates *P/*p* but *P/*n* and *P/*i* as well—the necessary result. Note the underlined portions of the definitions, however. We are forced to formulate *P and *M as two distinct metaconstraints, nearly identical, but nevertheless *formally unrelated*. I assume that the parameters of a metaconstraint cannot range over values like those underlined in the definitions in (23).[10] This assumption turns out not be crucial here, however. If a metaconstraint could be parameterized between the relations *greater than* and *less than* then we could unify *P and *M under a single metaconstraint *ASSOC({M/P}, α, *rel*), where *rel* ranges over the set {*greater than*, *less than*}. However, in this case we would expect two further constraint families to emerge (one with parameters (P,α,*greater than*) and one with (M,α,*less than*)). This would negate the whole conspiracy effect.[11] The contrast between the underlined expressions in the two metaconstraint definitions is in fact the incarnation of the prominence alignment "operation". Rather than universally stipulating the hierarchical ordering of the constraint families, the operation stipulates that the metaconstraint dealing with the lower value on the structural prominence scale (Margin) incorporates the *greater than* relation, whereas the metaconstraint dealing with the higher value (Peak) employs *less than* in its definition.

4.4 In search of the theory of segment structure

I do not claim that (10) is the correct representation for the segments in /pin/;[12] my intent here has been to identify the utility within OT of representing prominence explicitly in grid-like terms. Explorations of the relation between degree of featural specification and sonority can be found in Lekach (1979), Steriade (1982), Levin (1985), Clements

[10] An additional principle discussed in Green (in prep.) has this effect, limiting metaconstraint parameters to range only over the set of legal phonological category labels (which we may think of here as including the names of all features and prosodic units). The parameters are not allowed to range over such notions as "greater than/less than", "sonority value" or even "left/right" edge specification.

[11] The conspiracy effect outlined in this paper relies crucially on the positive "convergent" character of the $a \rightarrow b$ metaconstraint itself, and moreover would be effectively nullified if there were a complementary '$a \rightarrow \neg b$' metaconstraint. I do not claim that every metaconstraint in *meta*-**Con** will or should turn out to display this conspiracy effect. In some cases, such as directional edge-orientation, no such conspiracy exists, since the possibilities of rightward and leftward bias are in direct opposition.

[12] The representation used here is in fact a somewhat watered-down version of that pursued in Green (in prep.).

(1988), Zec (1988), Rice and Avery (1991), Rice (1992) and Carnie (1993). None of these proposals lends itself perfectly to derive the conspiracy result described here. However, if the sonority hierarchy can be captured directly in terms of segmental complexity by simply comparing the height of columns of privative features (as in (24)), then the sonority sequencing generalization stipulated by P&S in (9) will follow directly from the featural structure of segments represented in a way such as (24) (where *a*–*f* are the names of the entire set of privative features used to define segments), without separate statement in the grammar (compare with the different approach in Larson 1992). What is crucial is that the entire feature set of a less sonorous segment be subsumed in that of a more sonorous segment, and that no two segments have disjoint feature sets.[13]

(24)

	x			*a*
	x	x		*b*
	x	x		*c*
	x	x	x	*d*
x	x	x	x	*e*
x	x	x	x	*f*
p	a	y	n	

5 Summary

This paper has attempted two things: first, to provide a general and substantive theory of the set of universal constraints (**Con** and *meta*-**Con**), and second, to explore in some detail an example in which the fully generalized contents of **Con** nevertheless combine to yield a specific and useful linguistic generalization. The operation of **prominence alignment** can be achieved as a conspiracy effect which follows from the assumption of Completeness coupled with a maximally general theory of *meta*-**Con** (Metaconstraint Nonspecificity) and its relation to **Con** (Metaconstraint Generality). Rather than leading to sheer chaos, the large constraint family that arises from a single metaconstraint may demonstrate a kind of "mob psyche", conspiring to enforce the same general alignment pattern regardless of the family-internal rankings of the individual constraints. This result is encouraging, since it shows that full constraint generality (the kind that is only made possible by the OT claim of constraint violability) does not necessarily reduce the explanatory power of the theory as a whole; in fact it has the potential to yield focused and useful results.

[13] Zec (1988; chap. 3) identifies exactly this crucial requirement (adopting the unification-based term "extension"), although within her rule-based framework (using a morification algorithm) she must merely stipulate the role of the extension requirement in producing the prominence alignment effect. Furthermore, she limits the class of relevant features to a small handfull that are directly marked on the root node of a segment. In the theory of **Con** that I have outlined, it would not be permissible simply to limit the range of parameterization of a metaconstraint to a select subset of possible features.

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