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REVIEWS

Andrea Calabrese, *Markedness and economy in a derivational model of phonology* (Studies in Generative Grammar **80**). Berlin: Mouton de Gruyter, 2005. Pp. viii + 532.

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Researchers across various disciplines from propositional logic to theoretical linguistics agree that rules and constraints are always logically inter-translatable, with Mohanan (2000: 145ff.) being the most recent to emphasize the relevance of this insight for phonological theory:

(1) p → q   is equivalent to   ¬(p & ¬q)
     [+nasal] → [+voice]   *[+nasal, −voice]

Unfortunately, most linguists take this equivalence to mean that one should adopt a model which is either rules-only or constraints-only, for the sake of theoretical sanitation. Thus, proponents of Optimality Theory (OT) employ only constraints, while proponents of classical generative phonology (see, for example, Kenstowicz & Kisseberth 1979) employ only rules.

 At last, someone recognizes that intertranslatability does not mean that a given phonological model must choose between rules and constraints and should have only one or the other. As Andrea Calabrese argues in this book, logical equivalence does not imply equivalent explanatory adequacy for a given phonological phenomenon (34).

 According to Calabrese, an ideal phonological theory should contain BOTH constraints and rules (119), each serving a different function:

(2) (a) Constraints are instructions to avoid a given configuration.
     (b) Rules are instructions to create a given configuration.

Employing both rules and constraints allows for a principled separation between what is a 'conspiracy', e.g. the ban on three consecutive consonants (*CCC) (Kisseberth 1970), and what is not, e.g. the ban on open syllables ending with [a] (*a]$_{\text{Syll}}$) (McCarthy 2000).

 Calabrese proposes that only conspiracies should be handled with constraints, and illustrates at length with a discussion of vowel hiatus. Constraints are characterized by the fact that they have multiple repairs across languages. Thus, in the survey conducted by Casali (1998), vowel

hiatus is sometimes repaired by deleting the first vowel, sometimes by delet-ing the second vowel, sometimes by deleting the least sonorous vowel, sometimes by glide insertion, and sometimes by vowel coalescence. Rules, on the other hand, characterize processes that never have multiple repairs across languages. For example, *o*-raising before word-final voiced obstruents in Polish is better represented by the rule in (3a) than by the constraint in (3b).

(3) (a) [+back, +round] → [+high]/_ [−sonorant, +voice] #
     (b) *[+back, +round, −high] [−sonorant, +voice] #

The constraint in (3b) is not a good model of Polish *o*-raising because it would lead one to expect that a possible repair strategy lies in changing any of the features of [back], [round] or [high] in order to satisfy the constraint. However, Polish *o*-raising involves the instruction to CREATE the vowel [u], not merely to get rid of the offending combination in (3b). Rules are often the best model for phonological processes like Polish *o*-raising, which are idiosyncratic, language-particular effects of rule-telescoping. Bach & Harms's (1972) 'crazy rules' represent cases that are not conspiracies, but processes that learners, lacking historical knowledge, can only suppose are due to idiosyncratic, conventionalized instructions.

On the other hand, in Italian dialects, the effect of metaphony on mid [−A(dvanced)T(ongue)R(oot)] vowels is very well handled by the inviolable constraint in (4), first proposed in Calabrese's 1988 dissertation.

(4)   *[+high, −ATR]

Since in Italian, metaphony involves the transfer of the feature [+high] to a stressed vowel when the target is [−ATR], it will by nature contravene (4). As Calabrese (1998) shows, various Italian dialects resolve the of-fending configuration created by metaphony in different ways. Foggiano deletes [−ATR], resulting in 'hypermetaphony', where a mid lax vowel alternates with a high tense vowel. Arpino enacts 'breaking'; that is, it creates a diphthong whose first half is [+high] and whose second half is [−ATR], thus separating the offending combination under separate timing slots. (In the book under review, Calabrese accounts for 'breaking' or diphthongization via fission: when a co-occurrence constraint against [*+aF, +bG] is resolved by insertion of the value [−bG], the result is a feature bundle containing both [+bG, −bG], which is most economically repaired by separating the features into their own bundle.) A nice theme throughout Calabrese's book is the idea that dialect variation results from different choices of repair strategy for the same constraint.

There are many potential advantages of adopting the model proposed here instead of OT. Formulating the ban on open syllables ending with [a], which is not invoked in any conspiracy, in terms of constraints does not

represent any insightful advancement over a rule. It is better to make predictions about what kinds of processes will lead to various repairs and what kind of processes will not, rather than predicting that any or every phonological process represents a conspiracy.

Calabrese's constraints are resolved by a ranking of certain dedicated repairs, all of which are phonological operations, that is, deletion or insertion operations. Calabrese's particular formulation of how repairs work avoids the need to postulate dozens of highly specific IDENT constraints, which are otiose in his model. Finally, employing rules allows stating a general process (e.g. assimilation) as factored into a single rule with varying conditions. A constraint formalism does not really accomplish this.

Calabrese develops a very sensible theory of markedness. In order to express coda *s*-palatalization in Brazilian Portuguese, OT would need to posit a constraint like *s]$_{Syll}$. In Calabrese's model, this allophony is not derived by constraints but expressed as part of a 'conventionalized instruction' to insert the feature [−anterior] into coda stridents, which has the advantage of not having to corrupt the theory of markedness. Here, Calabrese builds on his previous work on 'grounded' constraints, which predates Archangeli & Pulleyblank's (1994) important book. Importantly, Calabrese's constraints are always inviolable in a given language. Thus, *CCC is inviolable in Yawelmani, *[+high, −ATR] is inviolable in Italian, and so forth.

In his model of constraint-checking and repair, Calabrese invokes serial computation. The crucial difference between his constraints and OT is thus that the constraints can be checked and repaired in a serial derivation, which means that Calabrese can handle opacity without any new innovations, in classical ordering fashion. Constraint-checking may be ordered with respect to rules (183).

Calabrese's book is to be commended for its explicitness about representational assumptions. Since Calabrese is not constrained by using OT-style tableaux, his diagrams and derivations include much fuller representational detail (e.g. explicit featural representations, and full skeletal and prosodic structure).

In what follows, I would like to present an analysis of glide fortition in various languages that demonstrates how the insightful analysis of 'Palatalization and affrication' (chapter 4) can be extended to new processes with positive results. Note that not everything I say below would be explicitly adopted or necessarily endorsed by Calabrese (my analysis combines featural proposals and analyses in Halle 2005, Calabrese's book, and Chitoran & Nevins 2006), but the point here is to illustrate the architecture that is proposed in the book under review.

Let us begin by taking a closer look at phonological processes that change the Designated Articulator (DA) or primary place of articulation of a consonant and how they are modeled in Calabrese's book. Consider the

well-known process of velar softening, whereby /ki/→[si] or [tʃi] (e.g. English *electric*, *electricity* and Italian [amiko] 'friend', [amitʃi] 'friends'). Calabrese proposes an implicational relationship between tongue body and tongue blade features, whereby the raising of the tongue body to produce a constriction requires an automatic raising of the posterior part of the tongue blade, following articulatory research in Perkell (1980).

(5)   tongue body [+high, −back] ↔ tongue blade [–anterior, +distributed]

As a consequence of (5), the future representation of the front high vowel /i/ contains [−anterior, +distributed], on the assumption that vowels may have two designated articulators. Velar softening results from the assimilation rule in (6), which spreads the tongue blade node and its dependents:

(6)   Spread [tongue blade: −anterior, +distributed] leftward to a velar stop

The result of (6) for a [DA: dorsal] stop such as /k/ leads to the feature set in (7). (Note that '&' is a typographical convenience used here to separate place & manner/voice features.)

(7)   [DA: tongue body] [tongue blade: −anterior, +distributed] & [−voice, −continuant]

However, (7) violates a crucial feature co-occurrence filter (cf. (8)) that Calabrese assumes is inviolable in all languages that lack laminal palato-alveolar stops. As shown by Lahiri & Blumstein (1984), such segments are extremely rare, possibly because the length of a laminal constriction makes it difficult to execute the abrupt release characteristic of a stop (Catford 1977: 152).

(8)   *[+distributed, −continuant]

The filter in (8) is presumably what underlies the cross-linguistic markedness of palatal stops. It represents a true constraint, i.e. one which has many cross-linguistic repairs. If it were to be expressed solely in terms of rules, we would fail to capture the conspiratorial generalization that fricativization and affrication in various languages are repairs to (8).

    In English, the filter in (8) is repaired by deleting [−anterior] and [−continuant]. (7) thus becomes (9).

(9)   [DA: tongue body] [tongue blade: +anterior, +distributed] & [−voice, +**continuant**]

    Note that the repairs to (8) depend on the value of [voice]. A voiceless segment is repaired by the deletion of the features [−continuant] and [−anterior], yielding /s/, whereas a voiced segment will be repaired by the deletion of [−anterior] at the left margin and [−continuant] at the right margin, resulting in /dʒ/. In Italian, on the other hand, the repair of voiceless as well as voiced segments will result in an affricate. As Catford's (1977)

observation is relevant only to the release portion of a stop, Calabrese (343) proposes that [+continuant] may be inserted at the right margin of the feature set in (7). Fission (described above for diphthongization) subsequently yields [tʃ].

The feature set in (9) involves activation of two designated articulators, viz. both tongue body and tongue blade. Following secondary-articulator promotion and primary-articulator demotion (cf. Romanian $k^w \rightarrow p$), (9) becomes (10).

(10)   **[DA: tongue blade**: +anterior, +distributed] & [−voice, +continuant]

The features in (10) correspond to [s]. The derivation of English velar softening thus proceeds via two very well-motivated steps: (i) the correlation statement between tongue body and tongue blade features in (5); and (ii) the constraint in (8), which is repaired by deleting the offending features and reconfiguring the Designated Articulator.

In considering what drives the operation of secondary-articulator promotion, it is useful to assume the cross-classification of vowels, glides, and consonants in (11), where [consonantal] is a major class feature, and [vocalic] specifies degree of constriction.

(11)   *Cross-classification of vowels, glides and consonants*

Vowels	Glides	Consonants	
—	—	+	[consonantal]
+	—	—	[vocalic]

This classification enables a representational encoding of Maddieson & Emmorey's (1985) finding that vowels and glides differ in their degree of constriction.

It is further necessary to assume a co-occurrence filter that bans a consonant with two designated articulators (cf. (12)). As argued by Halle (2005: 37), '[i]n most languages, consonants may not have more than one designated articulator'.

(12)   *[+consonantal, 2 DA]

Calabrese proposes that markedness is a 'usage cost'; this suggests that (12) is not active in all languages, but that in those languages in which it is active, complex segments such as labiovelar [gb] are inviolably disallowed (see Sagey 1986). Importantly, (12) has no effect on glides, which are [−consonantal] and which host two designated articulators: /j/ has both [DA: dorsal & DA: coronal], whereas /w/ has both [DA: dorsal & DA: labial].

The reason for formulating (12) as a constraint is once again the fact that it has a wide variety of different repairs. In the step from (9) to (10), the violation of (12) is repaired by deleting one of the DAs. Deletion of the dorsal DA results in a coronal fricative.

One of the predictions that (12) makes is that, if glides have two designated articulators – DA: tongue body AND either DA: tongue blade (in the case of /j/) or DA: lips (in the case of /w/) – then only one of these DAs will be able to remain when a glide becomes [+consonantal]. Empirical support for this prediction is Kaisse's (1992) important study of the behavior of glides under fortition. She observes that in Bergüner Romantsch, the glide /j/ alternates with [k]. The derivation is shown in (13).

(13)   Underlying representation:
       [DA: dorsal, +high, −back] [DA: coronal, −anterior, +distributed] & [–consonantal, −vocalic]
       Spreading/change to:
       [DA: dorsal] [DA: coronal] & [+**consonantal**, −vocalic]
       Checking of inviolable (12): violated
       Repair to (12): delete [DA: coronal], resulting in [DA: dorsal] & [+consonantal, −vocalic], mapped to [k]

By contrast, Harris & Kaisse (1999: 146) note the fortition of /j/ to [ʒ] in Argentinian Spanish, also modeled here as the result of a change to [+consonantal] and subsequent repair to the co-occurrence filter in (12) via promotion of coronal as the DA.

(14)   Underlying representation:
       [DA: dorsal, +high, −back] [DA: coronal, –anterior, +distributed] & [–consonantal, −vocalic]
       Syllable-initial change to [+consonantal]:
       [DA: dorsal] [DA: coronal] & [+**consonantal**, −vocalic]
       Checking of inviolable (12): violated
       Repair to (12): Delete [DA: dorsal], resulting in
       [DA: coronal, −anterior, +distributed] & [+consonantal, −vocalic], mapped to [ʒ]

Thus, (12) receives support as a constraint from the fact that it enjoys different repairs in different languages.

Finally, to return to the effect that spreading the features of the high front vowel /i/ has on stops (discussed above for velar palatalization), the resolution of (12) as shown in (10) may be contrasted with what happens in the Brazilian language Maimandé. The prediction of (12) is that when a stop is both [DA: dorsal] & [DA: coronal] as the result of spreading, languages may choose to repair the constraint violation differently. As discussed in Halle (2005), in Maimandé, the underlying sequence /it/ is mapped to [ik].

(15)   Rightward spreading of [DA: dorsal, +high, −back] (cf. (5)) to /t/:
       [DA: coronal] [DA: dorsal, +high, −back] & [–voice, −continuant]
       Constraint checking of (12): violated
       Repair: delete [DA: coronal], mapped to /k/

Thus, the wide range of different behaviors in English velar palatalization, Romantsch glide fortition, and Maimandé dorsalization all result from the operation of (12) (often in concert with (8)). This is the kind of mileage we should expect out of a constraint.

In conclusion, Calabrese's book represents an important move towards a realistic model of markedness within a theory that is constrained in its predictions and explicit in its representational proposals. Calabrese's model, where the grammar contains both rules and constraints, may not be everybody's idea of an Occamian theory, but something like it has got to be the right theory.

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