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## Review of C. Paradis and J.-F. Prunet, eds. (1991) The Special Status of Coronals

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Coronal consonants are phonologically special.\* This collection of papers provides a comprehensive view of the special behaviour of coronals, relating their status to many important issues of current interest in phonology.

The introduction by Paradis & Prunet is a superb overview, a highlight of the book and an excellent resource. It not only outlines the ways in which coronals are special but also establishes connections with the theory of feature geometry, underspecification theory, the relationship of markedness to underspecification and the relationship between consonant and vowel representations. Seldom does an introduction to a volume of papers lay out its subject as clearly and comprehensively as Paradis & Prunet have done, making a genuine contribution to our understanding of the patterns of special behaviour displayed by coronals.

The collected papers focus tightly on the topic, with a helpful unanimity of basic assumptions complemented by a healthy independence in the details.<sup>1</sup> The stated goals of the book are to look at the special status of coronals from as wide an empirical base as possible, thus serving as a basic and thorough reference on coronal behaviour, and to back up the widespread but largely unproven idea that coronal is the 'unmarked' place of articulation. In many respects it succeeds in achieving this ambitious programme.

Evidence contributing to the claim that coronals are unmarked includes relatively high frequency in speech or in the lexicon, occasional appearance via epenthesis, freer distribution than non-coronals, susceptibility to place assimilation, and transparency to vowel–vowel assimilation. The consensus of the contributors to this volume is that coronal unmarkedness follows from underspecification of the feature [coronal] (Kiparsky 1985; Broselow 1985; Avery & Rice 1989; Paradis & Prunet 1989a, b). Because they are underspecified for place, coronals are less complex than other consonants (accounting for the frequency and epenthesis biases), potentially invisible to rules (hence the distributional bias and transparency), and potential targets of feature-filling place assimilation rules. Underspecification of [coronal] is assumed to hold at underlying representation and to continue until the [coronal] default rule fills it in at some later point in the derivation, ranging from very early (the cyclic lexical phonology in Fula: Paradis & Prunet 1989b) to very late (phonetic implementation in English: Avery & Rice 1989).<sup>2</sup>

Equally important as evidence for the unmarked nature of coronals is the fact that they are extremely common in phonemic inventories, where they occur with great richness of contrast. In the first paper of the volume, Keating describes the many possible contrasts of manner and place that coronals exhibit,

reflecting the many degrees of freedom of the tongue tip and blade articulatory system. This phonetic diversity of coronals is represented phonologically by setting up a variety of distinctive features that are dependent on the feature [coronal]. These dependent features include at least [anterior] and [distributed] for place (Sagey 1986; Steriade 1986) and possibly also [lateral] and [strident] for manner (respectively Levin 1988 and the paper by Shaw in this volume). A dependent feature like [distributed] can only be marked on a segment that is marked for its head, [coronal]. Though other articulators have dependent features, none has the variety attributed to [coronal], accounting for the frequently observed coronal bias in inventories and the greater cross-linguistic richness of coronal contrasts.

As explanations for different aspects of coronal unmarkedness, underspecification and dependent features are distinct or even mutually incompatible. By the logic of dependency, a segment that is specified for a dependent feature like [anterior] must also be specified for the corresponding head feature [coronal]. For example, even if the English plain alveolars *t*, *d*, *l*, *r* and *n* are underspecified for [coronal], the dentals *θ/ð* and palato-alveolars *tʃ/dʒ/ʃ/ʒ* must be fully specified to support the dependent features [distributed] and [anterior]. As a consequence, the dentals and palato-alveolars should not participate in the syndrome of properties attributed to [coronal] underspecification, and conversely, the plain alveolars should not function as a natural class with the other coronals until application of the [coronal] default rule.<sup>3</sup>

The real tension between underspecification of alveolars and full specification of other coronals becomes evident when we look more closely at English phonology. Several contributions in this volume note that coronals are by far the most common consonants in English, both in the dictionary and in corpora (cf. Wang & Crawford 1960; Denes 1963).<sup>4</sup> Davis argues that coronal consonants can cooccur where other homorganic consonants are prohibited because [coronal] is underspecified. Specifically, coronals escape a constraint prohibiting *sC<sub>1</sub>VC<sub>2</sub>* when *C<sub>1</sub>* and *C<sub>2</sub>* are homorganic, so *\*speb* is bad but *sted* is not. Yip likewise shows that coronals act as though they have no specified place feature with respect to a constraint prohibiting more than one place specification in consonant clusters, so *sk* or *ft* are permitted but *fk* is not. Because *f* is specified as [coronal] to support the dependent feature [–anterior], */fk* is ruled out as well. Stemberger & Stoel-Gammon present evidence that coronals are underspecified in on-line processing. (Béland & Favreau reach a similar conclusion based on evidence drawn from French aphasics.) Finally, Avery & Rice (1989) have proposed that the coronal nasal is a preferred target for postlexical place assimilation because it is underspecified for place: *i[ŋ] Kingston vs. from Kingston*.

Taken as a whole, this evidence suggests a role for [coronal] underspecification throughout the derivation in English, ranging from very early constraints on morpheme structure or Level I syllabification up through postlexical phonology and production. Not all of the evidence is unimpeachable – in particular, postlexical assimilation of *n* seems to be gestural hiding rather than true assimilation (Browman & Goldstein 1989: 214f; Padgett 1991) – but on the whole, the case seems convincing. It is therefore remarkable that there is also a considerable body of evidence that coronals, even plain alveolars like *t* or *n*, must actually be *specified* for [coronal] in English phonology:

– In American English, initial coronal + *yu* is prohibited (Borowsky 1986:

285f). This regularity encompasses marked and unmarked coronals: \**θyu*, \**tyu*.

- Syllable-initial clusters of coronal + *l* are prohibited, as both Yip and Mohanan (1991: 315) note. Both unmarked alveolars like *t* and marked dentals like *θ* are affected. (As usual in English, *s* is exceptional.)

- The diphthong *aw* can be followed only by coronals, marked or unmarked (*mouth(e)*, *mouse*, *lout*, *gouge*, *grouch*, *Bausch*).

- Under the influence of loanwords, the set of initial *sC* clusters is being extended to *fC* as well: *schmaltz*, *shpiel*, *schlock*, *shtick*. But this extension is incompatible with [coronal] underspecification as an explanation for the special status of *s*.

- The syllable appendix is restricted to coronals, both marked and unmarked (Fudge 1969; Halle & Vergnaud 1980; etc.): *rind*, *range*, \**r[aj]mp*, \**r[aj]nk*.

- Borowsky (1987) argues that vowel/zero alternations in the plural, genitive and preterite suffixes follow from the Obligatory Contour Principle (OCP), affecting consonants that agree in manner and place. This account relies on specification of [coronal] in both alveolars and palato-alveolars: *busses*, *fuses*, *churches*, *judges*.

- Borowsky (1986: 199f) argues that morpheme-internal superheavy syllables are permitted only when the coda shares place, including [coronal]: *chamber*, *danger*, *flounder*; *Hampton*, *plankton*, *antler*.

- Mohanan (1991: 315) cites the Level I phonological rules of *s*-voicing (*resume* vs. *refer*) and alveolar stop spirantisation (*divisive*) as referring to the class of coronals.

- Aronoff (1976: 98f) notes that the suffix *-tion* has allomorphs *-ion* and *-ition* when affixed to coronal-final verbs: *coerce*, *rebel*, *opine*, *abrade*, *revise*, *pervert*, *admonish*. Yip (1988: 88–89) attributes this to the OCP applying to coronal sequences and finds a similar effect involving the prefixes *ad-* and *ab-*.

The most striking observations are those like the first six, which treat plain coronals like *t* and marked ones like *f* or *θ* as a natural class. Unless [coronal] is fully specified, reference to such a class is impossible. (See Lamontagne 1992 for further discussion.)

This evidence, drawn from constraints on morpheme structure or Level I syllabification and rules of the lexical phonology, shows that [coronal] must be specified quite early in the derivation of English. But early [coronal] specification is obviously incompatible with the claim that underspecification of [coronal] persists into the postlexical phonology, and even at the early stages of the derivation, [coronal] underspecification could be problematic. It may be possible, by careful rule ordering, to ensure that the morpheme structure constraints discussed by Davis and Yip apply before the [coronal] default rule and that the other constraints listed above apply after the default rule, but such an ordering will sometimes be quite arbitrary.

One striking case is the difference between the restrictions on coda consonants following the diphthongs *aw* and *oy*. The *aw* prohibition would have to follow [coronal] fill-in since all coronals can occur in coda position. A similar restriction on *oy*, though, singles out only the alveolars as possible codas (*adroit*, *choice*, *coin*, \**coith*, \**coich*, \**coip*, \**coik*) and so it should be ordered before the [coronal] default rule. Yet except for how they divide up coronals, these rules are essentially the same, so the putative difference in ordering is mysterious.

Thus, though [coronal] underspecification explains much about English phonology, it also encounters significant difficulties. Clearly, future work on the topic must seek to reconcile these conflicting indications. There is a genuine need for studies that take a comprehensive look at the phonology of coronals within a single language and that contend with potential obstacles to [coronal] underspecification. In this volume, the only sustained attempt to deal with an apparent counterexample is Cho's analysis of Korean place assimilation. Place assimilation in Korean targets not just coronals but, under some conditions, labials and palatals too. Cho proposes that Korean organises place of articulation in *SPE* fashion with [ $\pm$ anterior,  $\pm$ coronal], so both [+coronal] (alveolars and palatals) and [+anterior] (alveolars and labials) can be underspecified.

Several contributions address the issue of the richness of coronal contrast within phonemic systems. Shaw's analysis of consonant harmony in the Athabaskan language Tahltan establishes some important results about the representation of intracoronals contrasts. Tahltan has five series of coronals, the *d* stop series and the *dl/l*, *d $\delta$ / $\delta$* , *dz/z* and *d $_3$ / $_3$*  affricate/fricative series. A harmony rule, to which *d* and *dl* are transparent, affects the *d $\delta$* , *dz* and *d $_3$*  series. Thus, sequences like *dz... (d)... z* or  *$\delta$ ... (l)... d $\delta$*  are possible, but not \**f... (dl)...  $\delta$* .

At least two features, [anterior] and [distributed], participate in this harmony process. By the basic assumption of feature geometry, a rule can assimilate two features only by spreading the node that dominates both of them, in this case [coronal]. But then the *d* and *dl* series must be underspecified for [coronal] to be transparent to the harmony rule. Underspecification of the *d* series is a straightforward matter, but underspecification of the *dl* series is incompatible with Levin's (1988) influential proposal that [lateral] is a [coronal]-dependent feature. By close examination of the phonological behaviour of phonetic velar laterals, Levin demonstrates that all laterals are underlyingly coronal. This follows from the logic of dependency if [lateral] is a [coronal] dependent. Shaw's analysis of Tahltan is the most compelling argument yet advanced against this claim.<sup>5</sup>

Rice & Avery, who also argue that [lateral] is not a [coronal] dependent, seek a different explanation for the limitation of [lateral] specification to coronals. They propose that the feature [lateral] is a dependent of a new class node, Spontaneous Voice (SV), which marks sonorant consonants. Their idea is that the coronality of laterals follows from a restriction on the combined complexity of the Place and SV nodes within a segment: if SV is specified (by [lateral]), then Place cannot be; if Place is specified (in non-coronals), then SV cannot be.

This proposal is coupled with several far-reaching revisions in the nature of phonological rules and of the feature hierarchy, most of which remain to be studied. The following questions for future research (the latter two mentioned by Rice & Avery) seem most pressing:

- Are global measures of the structural complexity of segments justified in general? For example, could we limit voicing to coronals?
- If [lateral] is a dependent of SV, and if SV marks sonorants, then how are lateral obstruents represented?
- How are retroflex or palato-alveolar laterals represented? Since consonants marked for [anterior] or [distributed] must also be specified for [coronal], it should not be possible for them to be lateral as well. This last question is directly connected with the theme of coronal underspecification.

There remains one final respect in which [coronal] might be special. Shaw's survey of consonant harmony rules (defined as long-distance consonant-consonant assimilation or dissimilation) reveals a bias in favour of rules involving coronals over other places of articulation.<sup>6</sup> This bias cannot be explained by underspecifying [coronal], since the harmony rule must affect features dependent on [coronal]. Instead, Shaw proposes an explanation based on a kind of transderivational blocking of labial or dorsal consonant harmony. If the features [labial] and [dorsal] are specified on a vowel intervening between two consonants, then they will block [labial] or [dorsal] harmony between those consonants. Transderivational blocking says that [labial] and [dorsal] consonant harmony are always avoided because they are sometimes blocked in this way. But since [coronal] is not involved in the representation of vowels, Shaw argues, there is no transderivational blocking of coronal consonant harmony. A similar explanation, attributed by Paradis & Prunet to Halle and Kenstowicz, has been proposed for the transparency of coronals to total vowel-vowel assimilation.

This proposal encounters two significant difficulties. The first problem, which Shaw also notes, is that the vowel features may not be disjoint from [coronal]. Much of the literature on palatalisation, beginning with Clements (1976) and continuing through Lahiri & Evers' contribution to this volume, relies on the assumption that [coronal] marks front vowels. In particular, Lahiri & Evers propose that front vowels are both [coronal] and [–anterior], with either feature able to spread to a nearby consonant. Spreading of [–anterior] palatalises a [coronal], while spreading of [coronal] palatalises a velar. (Lahiri & Evers analyse a third type of palatalisation, secondary palatalisation in  $p^v$ ,  $t^v$ ,  $k^v$ , as spreading of [+high] from vowel to consonant.)

The second problem is that there is much conceptual distance from the observation that, say, labial consonant harmony would be blocked by round vowels to the claim that labial harmony is transderivationally blocked even when non-round vowels intervene. Phonological rules normally apply in all conditions where they are not prohibited; transderivational blocking requires that a rule never apply because it is sometimes prohibited. Furthermore, as Shaw points out, [round] vowel harmony should also be avoided because of transderivational blocking by intervening labial consonants. Yet in several cases cited (Warlpiri, Igbo, Tulu), round vowel harmony does occur but is blocked precisely when it encounters a labial consonant.

The explanation for the frequency of coronal harmony seems to lie instead with the feature geometry of dependent features like [round], [distributed] and [anterior]. Because of familiar locality considerations, long-distance consonant-consonant assimilation must involve dependent features. But as we have noted, the feature [coronal] has more dependents than the other articulator features (at least in consonants). Moreover, the palato-alveolar segments, which are represented with [coronal] dependents, occur with great frequency in phonemic inventories. These observations combine to predict, on purely statistical grounds, that long-distance consonant-consonant assimilation will be overwhelmingly coronal.

All told, the contributions to this volume call on one or more of three separate explanations for different aspects of special coronal behaviour:

- Underspecification of [coronal], which accounts for some aspects of coronal unmarkedness: transparency to rules, susceptibility to assimilation, epenthesis, high frequency in the lexicon and corpora, and behaviour in on-line processing.

– Variety of features dependent on [coronal], which accounts for the typological diversity of coronals and their unmarked status in inventories, as well as their special affinity for palatalisation.

– Independence of [coronal] from vowel features, which accounts for the prevalence of coronal consonant harmony.

If the last explanation is incorrect and the prevalence of coronal harmony is actually a special case of coronal diversity, as argued above, then we are still left with two very different propositions. Sometimes coronal consonants are special by virtue of phonological inactivity or invisibility, and these cases form the core of evidence that [coronal] is underspecified. In another set of cases, the special behaviour of coronals requires actual specification of [coronal] to support dependent features and to engage in assimilation. These conflicting demands have not yet been successfully reconciled.

Clearly this review cannot represent the depth and breadth of empirical and theoretical coverage contained in this book. *The special status of coronals* exceeds its own goal of serving as a reference work on the phonology of coronals by opening up provocative and interesting new questions that will surely stimulate future research. Ultimately this should be its greatest value.

## NOTES

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[1] The contributors and their articles are: Patricia A. Keating, 'Coronal places of articulation'; Stuart Davis, 'Coronals and the phonotactics of nonadjacent consonants in English'; Moira Yip, 'Coronals, consonant clusters, and the coda condition'; Aditi Lahiri & Vincent Evers, 'Palatalization and coronality'; Keren Rice & Peter Avery, 'On the relationship between laterality and coronality'; Patricia A. Shaw, 'Consonant harmony systems: the special status of coronal harmony'; Young-mee Yu Cho, 'On the universality of the coronal articulator'; Joseph Paul Stemberger & Carol Stoel-Gammon, 'The underspecification of coronals: evidence from language acquisition and performance errors'; Renée Béland & Yves Favreau, 'On the special status of coronals in aphasia'.

[2] Underspecification of [coronal] is obviously an important source of evidence for underspecification theory more generally. Underspecification of only redundant feature values (Steriade 1987; Mester & Itô 1989) entails that [coronal] is underspecified only when it is truly predictable, as it is with the English liquids. Mester & Itô support this approach with an analysis of a Japanese palatalisation rule that applies to all of the coronals except (underspecified) *r*. In contrast, all of the contributors to this volume adopt a version of Radical Underspecification (see Archangeli 1988), where [coronal] is specified only when it is needed to support a dependent feature. (Avery & Rice 1989 propose a variation on this, accepted also by Béland & Favreau.)

But underspecification of [coronal] differs profoundly from underspecification of other features. Suppose, for instance, that [–back] is underspecified. Then a default rule [ ] → [–back] supplies this feature value to segments that are not already [+back]. In this rule schema, [ ] means [∅ back]. But the default rule [ ] → [coronal] must have an entirely different interpretation – it applies to segments that are [∅ Place] (not [∅ coronal]). This difference has important implications that have yet to be explored: [coronal] underspecification is impossible for multiply-articulated consonants like labialised coronals or coronal-dorsals (cf. Sagey 1986); and place functions like an *n*-ary distinctive feature whose default value is coronal (cf. McCarthy 1988).



- [3] Other questions are raised by the division of the coronal segments into underspecified and specified classes. In many languages, the number of coronals in the phoneme inventory is greater than the number of consonants at other places of articulation. Taking just the example of English, there are thirteen coronal consonants, five labial consonants and three velars (not including glides). However, when we divide coronals into specified and underspecified, there are seven underspecified coronals and six specified coronals. Either underspecification is not relevant to the greater inventory frequency of coronals, since both specified and underspecified varieties outnumber their counterparts at other places of articulation, or the 'markedness' seems less compelling, since seven unmarked consonants are not strikingly more than six marked ones.
- [4] Evidence of lexical or corpus frequency needs further study. It has not been established whether the prevalence of coronals in a corpus or the lexicon of English is a direct consequence of [coronal] underspecification or instead a side-effect of some other property: the frequency of coronals in English functional categories, the relatively free distribution of coronals, or the richness of the coronal phoneme system.
- [5] This account presupposes that the *dz* series, though alveolar, is specified for [coronal]. Shaw proposes that the *dz* series is marked by a [coronal]-dependent feature [+strident], which then requires specification of [coronal] itself. But under the assumptions of Radical Underspecification, which Shaw adopts, there is no reason to specify the fricatives *s* and *z* as [+strident].
- [6] The survey of consonant harmony has some gaps. It cites an Arabic restriction on the cooccurrence of labials but unaccountably disregards similar restrictions at all other places of articulation. The English prohibition on *sCVC<sub>1</sub>* sequences is described as [coronal] (dis)harmony when, as we have seen, Davis argues that coronals alone are immune. The survey also overlooks the labiovelar harmony rule of Mokilese (Mester 1986; McCarthy 1988) and the pharyngeal consonant harmony rule of Neo-Aramaic (Hoberman 1985).

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### 370 *Reviews*

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